



**PRIEST & ASSOCIATES
CONSULTING, LLC**

ENGINEERING EVALUATION

Jumpstart WRB's with Hunter and Atlas Polyiso
Foam Insulation in NFPA 285 Assemblies

Project No. 10431, Revision 4

Prepared for:

Jumpstart Consultants, Inc.
4649 Carolina Avenue, Bldg I
Richmond, VA 23222

January 28, 2020

Abstract

Atlas and Hunter have granted use of their EEVs (and related data) and/or DrJ Engineering NFPA 285 test approvals to determine Engineering Extensions of alternate WRB products manufactured by Jumpstart. These reports and/or approvals, along with cone calorimeter (ASTM E1354) data from Jumpstart were used to create a matrix of constructions using various combinations of Atlas/Jumpstart and Hunter/Jumpstart products which could meet NFPA 285 with specific limitations.

The conclusions reached by this evaluation are true and correct, within the bounds of sound engineering practice. All reasoning for our decisions is contained within this document.

Submitted by,



Javier Trevino
Associate Engineer
210-601-0655

January 28, 2020

Reviewed and Approved,



Deg Priest
President

January 28, 2020



INTRODUCTION

The purpose of this evaluation is to allow use of various Jumpstart WRB products with Atlas and Hunter insulations in existing NFPA 285 approval tables (Ref. 4, 5, 9 & 10) A test plan was written (Ref. 6) to compare the flammability of various Jumpstart WRB products to various Hunter and Atlas approved WRBs in the referenced approvals. Based on this test plan, cone calorimeter data (Ref. 3) was then submitted to evaluate substitutions of the approved WRB products with Jumpstart WRB products.

REFERENCED DOCUMENTS

- 1) *NFPA 285-12 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-loadbearing Wall Assemblies Containing Combustible Components*
- 2) *Babrauskas, V., Lucas, D., Eisenberg, D., Singla, V., Dedeo, M., & Blum, A. (2012). Flame retardants in building insulation: a case for re-evaluating building codes. Building Research & Information. doi:10.1080/09613218.2012.744533*
- 3) *Cone Calorimeter Data for Jumpstart – Data Confidential between Jumpstart and Priest & Associates.*
Intertek Reports:

| | |
|-------------------|-------------------|
| 102782149MID-001a | 102782149MID-001g |
| 102782149MID-001b | 102782149MID-001h |
| 102782149MID-001c | 102782149MID-001i |
| 102782149MID-001d | 102782149MID-001j |
| 102782149MID-001e | 102782149MID-001k |
| 102782149MID-001f | |
- 4) *Priest & Associates EEV 10126 – Atlas NFPA 285 Evaluation*
- 5) *DrJ Engineering TER 1306-03 Atlas Approved NFPA 285 Assemblies*
- 6) *Priest & Assoc. Test Plan 10385 – Cone Calorimeter Testing of Jumpstart WRB's compared to approved WRB's*
- 7) *Lindholm et al. Cone Calorimeter – a Tool for Measuring Heat Release*
http://www.ffrc.fi/FlameDays_2009/4B/LindholmPaper.pdf
- 8) *Babrauskas et al., 10 Years of Heat Release Research NIST Publication*
<http://fire.nist.gov/bfrlpubs/fire93/PDF/f93048.pdf>
- 9) *Priest & Associates EEV 10123 Rev 78 – Hunter NFPA 285 Evaluation*
- 10) *DrJ TER 1402-01 and 1402-02 Hunter Approved NFPA 285 Assemblies*

EVALUATION METHOD

NFPA 285 Criteria

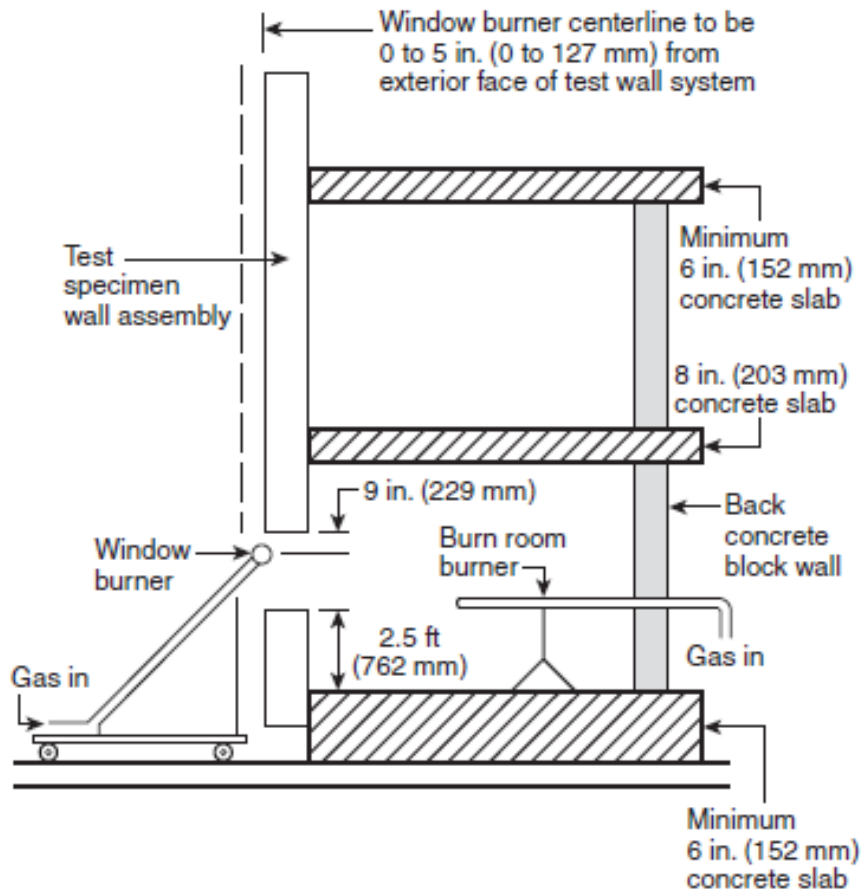
The NFPA 285 fire test (Ref. 1) is designed to test the flame spread properties of exterior walls containing combustible components. Two non-combustible rooms are stacked to simulate two stories of a multi-story building. The wall assembly is then attached to the exterior face of the rooms. A typical test wall measures 14 ft x 18 ft with a 30 in. x 78 in. window opening placed on the bottom floor.

During a test, a calibrated fire starts in the bottom room. After 5 minutes, the exterior burner is ignited to produce a specific heat flux/temperature pattern on the exterior of the wall. Both burners remain ignited during the 30 minute test. Personnel monitor flame spread visually during the course of the test. A computer data acquisition system monitors and records the thermocouples temperatures. The criteria for passing (Ref. 1) are as follows (reworded in simple terms for this analysis):

- 1) Flames shall not spread vertically 10 ft above the window opening as determined visually or by thermocouples located at the 10 ft level. Failure occurs when thermocouples 11 or 14 - 17 exceed 1000 °F.
- 2) Flames shall not spread (visually) horizontally 5 ft on either side of the centerline of the window opening.



- 3) Flames shall not spread inside the wall cavity as determined by thermocouples placed within the wall cavity insulation and air-gaps if present. Failure occurs when thermocouples 28 or 31 - 40 or 55 - 65 and 68 - 79 exceed 750 °F above ambient.
- 4) Flames shall not spread horizontally within the wall cavity past the interior room dimension as determined by wall cavity thermocouples. Failure occurs when thermocouples 18 - 19, or 66 - 67, or 79 - 80 exceed 750 °F above ambient.
- 5) Flames shall not spread to the second story room as determined by interior wall surface thermocouples. Failure occurs when thermocouples 49 - 54 exceed 500 °F above ambient.
- 6) Flames shall not occur in the second story (visually).
- 7) Flames shall not escape (visually) from the interior to the exterior at the wall/wall intersection of the bottom story room.

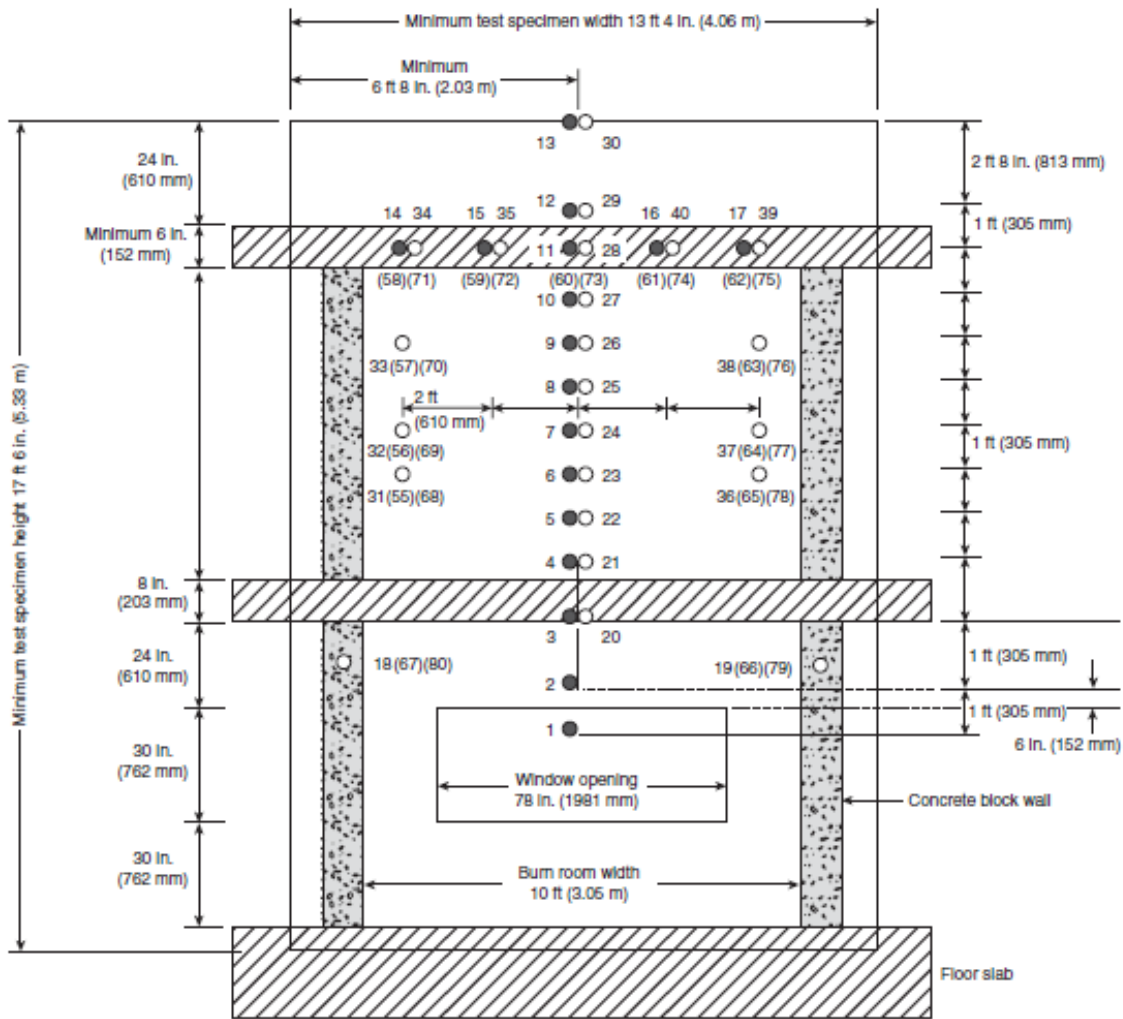


Two burners are ignited to produce a specific time-temperature profile in the room and on the exterior face of the wall.

Thermocouples are placed at strategic locations to monitor temperature as an indicator of flame spread.

In the depictions below, thermocouples 1 - 10, and 20 - 27 are not used for compliance purposes. The remainders are used to monitor flame spread.



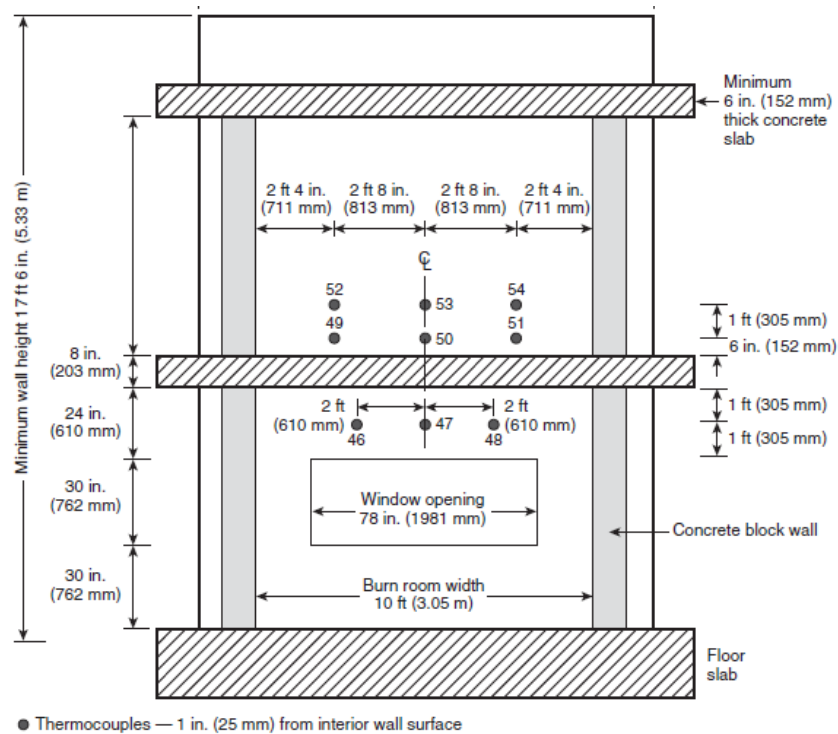


- Thermocouples — 1 in. (25 mm) from exterior wall surface
- Thermocouples — In the wall cavity air space or the insulation, or both, as shown in Figure 6.1(b) Details A through I.
- () Thermocouples — Additional thermocouples in the insulation or the stud cavity, or both, where required for the test specimen construction being tested, as shown in Figure 6.1(b) Details C through I.

Constructions Tested

This evaluation is based on the EEVs and/or DrJ TER reports submitted as the basis document (Refs. 4, 5, 9 & 10). The NFPA 285 section of this TER was based on several NFPA 285 tests deemed as worst case assemblies and an Engineering Evaluation (Refs. 4 & 9) allowing various component options based on the testing. Each report describes a specific construction tested per NFPA 285. The specific constructions are confidential, but included various combinations of wall components. These include cavity insulation, exterior sheathing, water resistive barrier (WRB), exterior insulation, exterior WRB, air gap, claddings, and window details.





WRB Flammability Analysis

From these worst case tested assemblies, the long list of approved WRB’s was based on cone calorimeter flammability analysis. If a potential WRB is less flammable than the NFPA 285 tested WRB, it is allowed as an alternate component. A test plan was written (Ref. 6) to compare the flammability of various Jumpstart WRB products to various Hunter and Atlas approved WRB’s in the referenced EEVs and DrJ Engineering TER reports (Ref. 4, 5, 9 & 10). Based on this test plan, cone calorimeter data (Ref. 3) was then submitted to evaluate substitutions of the approved WRB products with Jumpstart WRB products.

When analyzing cone calorimeter data, two sets of numbers are typically used. These are: the time to ignition (T_{ign}) at a given heat flux; and, the peak heat release rate (Pk. HRR). Clearly, smaller Peak Heat Release Rate (Pk. HRR) values and longer time to ignition (T_{ign}) values are considered to be improvements (i.e., less flammable) when comparing materials using the Cone Calorimeter. However, some data for a given comparison are conflicting. To resolve these types of discrepancies, researchers (Ref. 8) have used a ranking system to organize cone calorimeter data for flammability comparison.

The expression $Rank = \frac{Pk.HRR}{T_{ign}}$ resolves inconsistencies in relative flammability data when using the Cone Calorimeter. Lower HRR and longer T_{ign} make the rank smaller. So, smaller rank materials are considered less flammable than higher rank materials.

With that understood, it should be noted that the accepted relative error [of the HRR] in cone calorimeters is “approximately 20 – 30 % for 1 kW fires, 10 % for 3 kW fires and less than 10 % for 5 kW fires” (Ref. 7).

All seven of the Jumpstart WRB products listed below are less flammable (peak HRR or improved Rank) than at least one of the WRB’s in the TER report for WRB’s used under the exterior insulation (over the base wall surface). This data (Ref. 3) is confidential but may be requested by staff of DRJ Engineering for review.

- | | |
|-----------------------|---|
| 1) Jumpstart HWW-65A | 5) Jumpstart HWD2-72A |
| 2) Jumpstart HWW-65B | 6) Jumpstart HWHPT-92A |
| 3) Jumpstart HWHP-80A | 7) Jumpstart HWHP90A – see note 1 (Now called HWMPC-105A – Rev. 3 of this EEV – see note 2) |
| 4) Jumpstart HWMP-90A | |



Note1: The test report for HWMP-110A should have been labeled HWHP90A. Ref – Name Change Request from Jumpstart – pdf dated March 16, 2017 is on file.)

Note 2: Per request September 2019, HWMP-110A cone test report was renamed HWMP-105A. Thus HWMP-90A in Rev 2 is now called HWMP-105A in Rev 3.

WRBs Applied over Exterior Insulation

Cone Calorimeter data has been analyzed (Ref. 3) for this condition and all of the Jumpstart WRB products listed above are less flammable than at least one if the WRB’s listed for this location and may also be used over the exterior insulation. Since the Jumpstart WRB’s are allowed over the exterior insulation (due to their low relative flammability), this allows “None” to be an option for Exterior Insulation.

CONCLUSIONS

Based on the discussion above, the following Tables of NFPA 285 Assemblies shall apply to Jumpstart.

The following tables shows the relevant content for specific WRBs for use with Hunter or Atlas insulation based on the referenced EEVs. The modified table does not allow “None” for exterior gypsum sheathing since a substrate is needed for WRBs on the base wall surface.

Four pcf (min.), one inch thick (min.) mineral wool may replace the polyiso since mineral wool is noncombustible. If no insulation is used, only the WRBs allowed for use over the insulation may be used on the base wall surface.

ATLAS Insulations

TABLE OF SUBSTITUTIONS

| Wall Component | |
|--|--|
| Base Wall – Use either 1, 2 or 3 | 1) 1" min. Cast Concrete Walls 2) 1" min. CMU Concrete Walls 3) 20 GA (min.) 3 ⁵ / ₈ " (min.) steel studs spaced 24" OC (max.) 5 ⁸ / ₈ in. type X Gypsum Wallboard Interior |
| Fire-Stopping in Stud Cavity at floor-lines | 1) None 2) 4 lb/cu ft mineral wool (e.g., Thermafiber) in each stud cavity at each floor line – attached with Z-clips or equivalent |
| Cavity Insulation Use any item 1-15 Note: Cavity Insulations 5 - 9 must use floor line fire-stopping Item 2 and 5 ⁸ / ₈ " exterior gypsum sheathing. | 1) None 2) Any noncombustible insulation per ASTM E136 3) Any mineral fiber (Board type Class A ASTM E84 faced or unfaced) 4) Fiberglass (Batt type Class A ASTM E84 faced or unfaced) 5) 5 ¹ / ₂ " (max.) Icynene LD-C-50 spray foam in 6" deep studs (max.) full fill without an air gap 6) 5 ¹ / ₂ " (max.) Icynene MD-C-200, 2 pcf spray foam in 6" deep studs (max.) full fill without an air gap 7) 5 ¹ / ₂ " (max.) Icynene MD-R-210, 2 pcf spray foam in 6" deep studs (max.) full fill without an air gap 8) 6" (max.) SWD Urethane QS 112, 2 pcf spray foam in 6" deep studs (max.) or partial fill with a maximum 2 ¹ / ₂ " air gap 9) 3 ¹ / ₂ " (max.) Gaco Western 183M spray foam in 3 ⁵ / ₈ " deep studs (max.) 10) Gaco Western F1850 (3 ¹ / ₂ " max.). Use with 5 ⁸ / ₈ " exterior sheathing in 3 ⁵ / ₈ " deep studs (max.) 11) Demilec SEALECTION 500 (3 ⁵ / ₈ " max). Use with 5 ⁸ / ₈ " exterior sheathing in 3 ⁵ / ₈ " deep studs (max.) 12) Demilec HeatLok Soy 200 Plus (3.4" max). Use with 5 ⁸ / ₈ " exterior sheathing in 3 ⁵ / ₈ " deep studs (max.) 13) Bayer Bayseal (3" max). Use with 5 ⁸ / ₈ " exterior sheathing. 14) Lapolla FoamLok FL 2000 (3" max). Use with 5 ⁸ / ₈ " exterior sheathing in 3 ⁵ / ₈ " deep studs (max.) |



| | |
|--|--|
| | <p>15) BASF SprayTite 81206 or WallTite (US & US-N) (3⁵/₈" max). Use with 5⁵/₈" exterior sheathing in 3⁵/₈" deep studs (max.)</p> |
| <p>Exterior Sheathing – Use either 1, 2, 3 or 4</p> | <p>1) ½" or thicker exterior gypsum sheathing 2) None – when cavity SPF insulation is not used. 3) 2" precast concrete panels attached to structural elements of building. 4) GP DensElement – ½" or thicker sheathing with integrated WRB</p> <p>Note: When SPF is used in cavity, exterior sheathing must be used. See specific sheathing thicknesses above.</p> |
| <p>WRB Over Sheathing – Use either 1 - 7</p> | <p>1) Jumpstart HWW-65A 2) Jumpstart HWW-65B 3) Jumpstart HWHP-80A 4) Jumpstart HWMP-90A 5) Jumpstart HWD2-72A 6) Jumpstart HWHPT-92A 7) Jumpstart HWMPC-105A</p> |
| <p>Exterior Insulation – Use either 1, 2, 3, 4 or 5</p> | <p>1) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) 2) 4" (max.) EnergyShield Pro (or Pro2). 3) 4" (max.) RBoard Pro (or EnergyShield CGF Pro). 4) 4³/₄" (max.) EnergyShield Ply Pro (4" EnergyShield CGF Pro with 5⁵/₈" or 3⁴/₄" FRT Plywood) 5) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 noncombustible testing.</p> <p>Note: ½ inch (min.) exterior gypsum sheathing may be attached to exterior side of any item listed above.</p> |
| <p>WRB Over Exterior Insulation – Use any Item 1 - 8</p> | <p>1) None 2) Jumpstart HWW-65A 3) Jumpstart HWW-65B 4) Jumpstart HWHP-80A 5) Jumpstart HWMP-90A 6) Jumpstart HWD2-72A 7) Jumpstart HWHPT-92A 8) Jumpstart HWMPC-105A</p> |
| <p>Exterior Cladding – Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 or 13</p> <p>Note: Cladding 8 (Zinc) may only be used with EnergyShield Pro or Pro2).</p> | <p>1) Brick – Nominal 4" clay brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 2) Stucco – minimum ¾" thick exterior cement plaster and lath. A secondary WRB (WRB items above allowed over foam) can be installed between the insulation and lath and must not be full coverage asphalt or butyl based self-adhering membranes. 3) Limestone – minimum 2" thick 4) Natural Stone Veneer – minimum 2" thick 5) Cast Artificial Stone – minimum 1½" thick complying with ICC-ES AC 51 6) Terra Cotta Cladding – minimum 1¼" thick 7) Any ACM that has successfully passed NFPA 285 8) Uninsulated sheet metal building panels including aluminum, steel, copper or zinc (see note) 9) Uninsulated fiber-cement siding (min. ¼" thick) 10) Stone/Aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria 11) Autoclaved-aerated-concrete (AAC) panels (min. 1½" thick) 12) Reynobond ZCM Zinc metal composite panel 13) Terreal Zephir Evolution Rainscreen System (terra cotta), minimum 9¹⁶/₁₆" thick</p> |



**Hunter Insulations
TABLES OF SUBSTITUTIONS**

Xci Foil (Class A) or Xci-286 Exterior Insulation

| Wall Component | |
|--|--|
| <p>Base Wall – Use either 1, 2, 3 or 4</p> | <ol style="list-style-type: none"> 1) Cast Concrete Walls 2) CMU Concrete Walls 3) 25 GA. min. 3⁵/₈" (min.) steel studs spaced 24" OC (max.) <ol style="list-style-type: none"> a. 5/8" type X Gypsum Wallboard Interior b. Lateral Bracing every 4 ft 4) FRTW (Fire-retardant-treated wood) studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.) <ol style="list-style-type: none"> a. 5/8 in. type X Gypsum Wallboard Interior b. Bracing as required by code |
| <p>Fire-Stopping at floor lines – Use 1 or 2</p> | <ol style="list-style-type: none"> 1) Any approved mineral fiber based safing insulation in each stud cavity at floor line. Safing thickness must match stud cavity depth. 2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction. |
| <p>Cavity Insulation – Use Items 1 - 11</p> <p>Use only exterior sheathing Option 1 with SPF.</p> | <ol style="list-style-type: none"> 1) None 2) 1½" (min.) of Carlisle SPI SealTite PRO (up to full cavity thickness) 3) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 4) Any noncombustible insulation per ASTM E136 5) Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved T_{ign}, Pk. HRR) than Covestro EcoBay CC or BASF Walltite 8) NCFI InsulBloc SPF (up to full cavity thickness) 9) Icynene MD-C-200v3 (Proseal) up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quik-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches. 11) 1½" (min.) ThermoSeal 2000 (up to full cavity thickness) |
| <p>Exterior Sheathing – Use either 1, or 2</p> | <ol style="list-style-type: none"> 1) ½" or thicker exterior gypsum sheathing 2) ½" (min.) FRTW structural panels in Type III construction |
| <p>WRB Over Base Wall Surface – use any Item 1 - 7</p> | <ol style="list-style-type: none"> 1) Jumpstart HWW-65A 2) Jumpstart HWW-65B 3) Jumpstart HWHP-80A 4) Jumpstart HWMP-90A 5) Jumpstart HWD2-72A 6) Jumpstart HWHPT-92A 7) Jumpstart HWMPC-105A |
| <p>Exterior Insulation – Use 1, 2, 3 or 4</p> | <ol style="list-style-type: none"> 1) 3½" thick (max.) Xci Foil (Class A) or Xci-286 for all claddings 2) 4" thick Xci Foil (Class A) or Xci-286 for claddings 1-6 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) |
| <p>WRB Over Insulation – Use any item 1 - 8</p> | <ol style="list-style-type: none"> 1) None 2) Jumpstart HWW-65A 3) Jumpstart HWW-65B 4) Jumpstart HWHP-80A 5) Jumpstart HWMP-90A 6) Jumpstart HWD2-72A 7) Jumpstart HWHPT-92A 8) Jumpstart HWMPC-105A |



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| <p>Exterior Cladding - Use Items 1 - 17</p> <p>Item 7 may use any tested/approved installation technique.</p> <p>Items 8, 9 or 12 may use any standard installation technique.</p> | <ol style="list-style-type: none"> 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 2) Stucco – minimum ¾" thick exterior cement plaster and lath with an optional secondary water resistive barrier between the exterior insulation and lath. The secondary barrier shall not be full coverage asphalt or self-adhered butyl membrane. 3) Limestone – minimum 2" thick using any standard non-open joint installation technique such as shiplap 4) Natural Stone Veneer – minimum 2" thick using any standard non-open joint installation technique such as grouted/mortared stone 5) Cast Artificial Stone – minimum 1½" thick complying with ICC-ES AC 51 using any standard non-open joint installation technique such as shiplap. 6) Terra Cotta Cladding – minimum 1¼" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap 7) Any MCM that has successfully passed NFPA 285 8) Uninsulated sheet metal building panels including steel, copper, aluminum or zinc 9) ¼" (min.) uninsulated fiber cement siding, or porcelain or ceramic tile mechanically attached 10) Stone, porcelain, ceramic/aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria 11) Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 criteria 12) Terra Cotta Cladding – Any Rain-screen Terra Cotta (min. ½" thick) with ventilated shiplap 13) ½" Stucco – Any one coat stucco (½" min.) which meets AC11 acceptance criteria or is approved for use in Type I-IV construction or has been tested per NFPA 285 or stays in place when tested per ASTM E119 (stucco exposed to fire) for at least 30 minutes 14) Thin brick/cultured stone set in thin set adhesive and metal lath that has been tested to ASTM E119 (brick exposed to furnace) and remains in place for a minimum of 30 minutes, or has passed an NFPA 285 test. Minimum ¾" with an optional secondary water resistive barrier between the exterior insulation and lath. The secondary barrier shall not be full coverage asphalt or self-adhered butyl membrane. 15) Glen Gery Thin Tech Elite Series Masonry Veneer or TABS II Panel System with ½" thick bricks using TABS Wall Adhesive 16) Natural Stone Veneer – minimum 1¼" thick using any standard installation technique 17) FunderMax M.Look– minimum ¼ inch thick using any standard installation technique |
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Xci-CG or Xci-CG (Class A) Exterior Insulation

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| <p>Wall Component</p> <p>Base Wall – Use either 1, 2, 3 or 4</p> | <ol style="list-style-type: none"> 1) Cast Concrete Walls 2) CMU Concrete Walls 3) 25 GA. min. 3⁄8" (min.) steel studs spaced 24" OC (max.) <ol style="list-style-type: none"> a. 5⁄8" type X Gypsum Wallboard Interior b. Lateral Bracing every 4 ft 4) FRTW (Fire-retardant-treated wood) studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.) <ol style="list-style-type: none"> a. 5⁄8 in. type X Gypsum Wallboard Interior b. Bracing as required by code |
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| <p>Fire-Stopping at Floor Lines</p> | <ol style="list-style-type: none"> 1) Any approved mineral fiber based safing insulation in each stud cavity at floor line. Safing thickness must match stud cavity depth. 2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction. |
| <p>Cavity Insulation – Use either: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11</p> <p>Use only exterior sheathing option 1 with SPF.</p> | <ol style="list-style-type: none"> 1) None 2) 1½" (min.) of Carlisle SPI SealTite PRO (up to full cavity thickness) 3) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 4) Any noncombustible insulation per ASTM E136 5) Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved T_{ign}, Pk. HRR) than Covestro EcoBay CC or BASF Walltite 8) NCFI InsulBloc SPF (up to full cavity thickness) 9) Icynene MD-C-200v3 (Proseal) up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quik-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches. 11) 1½" (min.) ThermoSeal 2000 (up to full cavity thickness) |
| <p>Exterior Sheathing Use 1 or 2</p> | <ol style="list-style-type: none"> 1) ½" or thicker exterior gypsum sheathing 2) ½" (min.) FRTW structural panels in Type III construction |
| <p>WRB on Base Wall Surface – use any item 1 - 7</p> | <ol style="list-style-type: none"> 1) Jumpstart HWW-65A 2) Jumpstart HWW-65B 3) Jumpstart HWHP-80A 4) Jumpstart HWMP-90A 5) Jumpstart HWD2-72A 6) Jumpstart HWHPT-92A 7) Jumpstart HWMPC-105A |
| <p>Exterior Insulation – Use 1, 2, 3 or 4</p> | <ol style="list-style-type: none"> 1) 3½" thick (max.) Xci CG (Class A) for all claddings 2) 4" thick (max.) Xci-CG (Class A) for Claddings 1 - 6 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) |
| <p>WRB Over Insulation – Use any item 1 - 8</p> | <ol style="list-style-type: none"> 1) None 2) Jumpstart HWW-65A 3) Jumpstart HWW-65B 4) Jumpstart HWHP-80A 5) Jumpstart HWMP-90A 6) Jumpstart HWD2-72A 7) Jumpstart HWHPT-92A 8) Jumpstart HWMPC-105A |
| <p>Exterior Cladding - Use Items 1 - 17</p> <p>Item 7 may use any tested/approved installation technique.</p> <p>Items 8, 9 or 12 may use any standard installation technique</p> | <ol style="list-style-type: none"> 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 2) Stucco – minimum ¾" thick exterior cement plaster and lath with an optional secondary water resistive barrier between the exterior insulation and lath. The secondary barrier shall not be full coverage asphalt or self-adhered butyl membrane. 3) Limestone – minimum 2" thick using any standard non-open joint installation technique such as shiplap 4) Natural Stone Veneer – minimum 2" thick using any standard non-open joint installation technique such as grouted/mortared stone 5) Cast Artificial Stone – minimum 1½" thick complying with ICC-ES AC 51 using any standard non-open joint installation technique such as shiplap |



| | |
|--|---|
| | <ol style="list-style-type: none"> 6) Terra Cotta Cladding – minimum 1¼" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap 7) Any MCM that has successfully passed NFPA 285 8) Uninsulated sheet metal building panels including steel, copper, aluminum 9) ¼" (min.) uninsulated fiber cement siding or porcelain or ceramic tile mechanically attached 10) Stone, porcelain, ceramic/aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria 11) Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 criteria 12) Terra Cotta Cladding – Any Rain-screen Terra Cotta (min. ½" thick) with ventilated shiplap 13) ½" Stucco – Any one coat stucco (½" min.) which meets AC11 acceptance criteria or is approved for use in Type I-IV construction or has been tested per NFPA 285 or stays in place when tested per ASTM E119 (stucco exposed to fire) for at least 30 minutes 14) Thin brick/cultured stone set in thin set adhesive and metal lath that has been tested to ASTM E119 (brick exposed to furnace) and remains in place for a minimum of 30 minutes, or has passed an NFPA 285 test. Minimum ¾" with an optional secondary water resistive barrier between the exterior insulation and lath. The secondary barrier shall not be full coverage asphalt or self-adhered butyl membrane. 15) Glen Gery Thin Tech Elite Series Masonry Veneer or TABS II Panel System with ½" thick bricks using TABS Wall Adhesive 16) Natural Stone Veneer – minimum 1¼" thick using any standard installation technique 17) FunderMax M.Look– minimum ¼ inch thick using any standard installation technique |
|--|---|

Xci-Ply or Xci-Ply (Class A) Exterior Insulation

| Wall Component | |
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| Base Wall – Use either 1, 2, 3 or 4 | <ol style="list-style-type: none"> 1) Cast Concrete Walls 2) CMU Concrete Walls 3) 25 GA. min. 3⅝" (min.) steel studs spaced 24" OC (max.) <ol style="list-style-type: none"> a. ⅝" type X Gypsum Wallboard Interior b. Lateral Bracing every 4 ft 4) FRTW (Fire-retardant-treated wood) studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.) <ol style="list-style-type: none"> a. ⅝ in. type X Gypsum Wallboard Interior b. Bracing as required by code |
| Fire-Stopping at floor lines | <ol style="list-style-type: none"> 1) Any approved mineral fiber based safing insulation in each stud cavity at floor line. Safing thickness must match stud cavity depth. 2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction. |
| Cavity Insulation – Use Items 1 - 11 Use only exterior sheathing Option 1 with SPF. | <ol style="list-style-type: none"> 1) None 2) 1½" (min.) of Carlisle SPI SealTite PRO (up to full cavity thickness) 3) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 4) Any noncombustible insulation per ASTM E136 5) Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved T_{ign}, Pk. HRR) than Covestro EcoBay CC or BASF Walltite. 8) NCFI InsulBloc SPF (up to full cavity thickness) |



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| | <ul style="list-style-type: none"> 9) Icynene MD-C-200v3 (Proseal) up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quik-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches. 11) 1½" (min.) ThermoSeal 2000 (up to full cavity thickness) |
| <p>Exterior Sheathing – Use either 1 or 2</p> | <ul style="list-style-type: none"> 1) ½" or thicker exterior gypsum sheathing 2) ½" (min.) FRTW structural panels in Type III construction. |
| <p>WRB Over Base Wall Surface – use any Item 1 - 7</p> | <ul style="list-style-type: none"> 1) Jumpstart HWW-65A 2) Jumpstart HWW-65B 3) Jumpstart HWHP-80A 4) Jumpstart HWMP-90A 5) Jumpstart HWD2-72A 6) Jumpstart HWHPT-92A 7) Jumpstart HWMPC-105A |
| <p>Exterior Insulation – Use Item 1, 2, 3 or 4.</p> | <ul style="list-style-type: none"> 1) 4¼" (max.) Xci Ply (Class A) (3½" foam max., ¾" FR Plywood max.) with all claddings 2) 4¾" (max.) Xci Ply (Class A) (4" foam max., ¾" FR Plywood max.) may be used with Claddings 1 – 6 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 noncombustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) |
| <p>WRB over Insulation – Use any item 1 - 8</p> | <ul style="list-style-type: none"> 1) None 2) Jumpstart HWW-65A 3) Jumpstart HWW-65B 4) Jumpstart HWHP-80A 5) Jumpstart HWMP-90A 6) Jumpstart HWD2-72A 7) Jumpstart HWHPT-92A 8) Jumpstart HWMPC-105A |
| <p>Exterior Cladding - Use Items 1 - 17</p> <p>Item 9 may use any tested/approved installation technique.</p> <p>Items 10, 11 or 14 may use any standard installation technique.</p> | <ul style="list-style-type: none"> 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 2) Stucco – minimum ¾" thick exterior cement plaster and lath with an optional secondary water resistive barrier between the exterior insulation and lath. The secondary barrier shall not be full coverage asphalt or self-adhered butyl membrane. 3) Limestone – minimum 2" thick using any standard non-open joint installation technique such as shiplap 4) Natural Stone Veneer – minimum 2" thick using any standard non-open joint installation technique such as grouted/mortared stone 5) Cast Artificial Stone – minimum 1½" thick complying with ICC-ES AC 51 using any standard non-open joint installation technique such as shiplap. 6) Terra Cotta Cladding – minimum 1¼" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap 7) Thin brick/cultured stone set in thin set adhesive and metal lath that has been tested to ASTM E119 (brick exposed to furnace) and remains in place for a minimum of 30 minutes, or has passed an NFPA 285 test. Minimum ¾" with an optional secondary water resistive barrier between the exterior insulation and lath. The secondary barrier shall not be full coverage asphalt or self-adhered butyl membrane. 8) Glen Gery Thin Tech Elite Series Masonry Veneer or TABS II Panel System with ½" thick bricks using TABS Wall Adhesive 9) Any MCM that has successfully passed NFPA 285 10) Uninsulated sheet metal building panels including steel, copper, aluminum |



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| | <ol style="list-style-type: none"> 11) ¼" (min.) uninsulated fiber-cement siding or porcelain or ceramic tile mechanically attached 12) Stone, porcelain, ceramic/aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria 13) Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 criteria 14) Terra Cotta Cladding – Any Rain-screen Terra Cotta (min. ½ " thick) with ventilated shiplap 15) ½" Stucco – Any one coat stucco (½" min.) which meets AC11 acceptance criteria or is approved for use in Type I-IV construction or has been tested per NFPA 285 or stays in place when tested per ASTM E119 (stucco exposed to fire) for at least 30 minutes 16) Natural Stone Veneer – minimum 1¼" thick using any standard installation technique 17) FunderMax M.Look– minimum ¼ inch thick using any standard installation technique |
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Xci Foil Exterior Insulation

| Wall Component | |
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| Base Wall – Use either 1, 2 or 3 or 4 | <ol style="list-style-type: none"> 1) Cast Concrete Walls 2) CMU Concrete Walls 3) 25 GA. min. 3⅝" (min.) steel studs spaced 24" OC (max.) <ol style="list-style-type: none"> a. ⅝" type X Gypsum Wallboard Interior b. Lateral Bracing every 4 ft 4) FRTW (Fire-retardant-treated wood) studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.) <ol style="list-style-type: none"> a. ⅝ in. type X Gypsum Wallboard Interior b. Bracing as required by code |
| Fire-Stopping at floor lines | <ol style="list-style-type: none"> 1) Any approved mineral fiber based safing insulation in each stud cavity at floor line. Safing thickness must match stud cavity depth. 2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction. |
| Cavity Insulation – Use either: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11. Items 2, 3, 8, 9, 10 and 11 may only be used with exterior sheathing 1. | <ol style="list-style-type: none"> 1) None 2) 1½" (min.) of Covestro EcoBay CC SPF (up to full cavity thickness) 3) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 4) Any noncombustible insulation per ASTM E136 5) Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved T_{ign}, Pk. HRR) than Covestro EcoBay CC or BASF Walltite. 8) NCFI InsulBloc SPF (up to full cavity thickness) 9) Icynene MD-C-200v3 (Proseal) up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quik-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches. 11) 1½" (min.) ThermoSeal 2000 (up to full cavity thickness) |
| Exterior Sheathing Use 1 or 2 | <ol style="list-style-type: none"> 1) ½" or thicker exterior gypsum sheathing. 2) ½" (min.) FRTW structural panels in Type III construction allowed in place of gypsum sheathing when combustible cavity insulation is not used. |
| WRB Over Base Wall Surface – Use any item 1-7 | <ol style="list-style-type: none"> 1) Jumpstart HWW-65A 2) Jumpstart HWW-65B 3) Jumpstart HWHP-80A 4) Jumpstart HWMP-90A 5) Jumpstart HWD2-72A |



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| | <ul style="list-style-type: none"> 6) Jumpstart HWHPT-92A 7) Jumpstart HWMPC-105A |
| <p>Exterior Insulation – Use item 1, 2 or 3</p> | <ul style="list-style-type: none"> 1) 4" thick (max.) Xci Foil 2) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 noncombustible testing. 3) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) |
| <p>WRB Over Exterior Insulation – Use any item 1 - 8</p> | <ul style="list-style-type: none"> 1) None 2) Jumpstart HWW-65A 3) Jumpstart HWW-65B 4) Jumpstart HWHP-80A 5) Jumpstart HWMP-90A 6) Jumpstart HWD2-72A 7) Jumpstart HWHPT-92A 8) Jumpstart HWMPC-105A |
| <p>Exterior Cladding - Use either 1, 2, 3, 4, 5 or 6</p> | <ul style="list-style-type: none"> 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 2) Stucco – minimum ¾" thick exterior cement plaster and lath with an optional secondary water resistive barrier between the exterior insulation and lath. The secondary barrier shall not be full coverage asphalt or self-adhered butyl membrane. 3) Limestone – minimum 2" thick using any standard non-open joint installation technique such as shiplap 4) Natural Stone Veneer – minimum 2" thick using any standard non-open joint installation technique such as grouted/mortared stone 5) Cast Artificial Stone – minimum 1½" thick complying with ICC-ES AC 51 using any standard non-open joint installation technique such as shiplap 6) Terra Cotta Cladding – minimum 1¼" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap |

~ End of Report ~

