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   Updated April, 2015

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Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
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- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL’s Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263
BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

Design No. V311
April 23, 2015

Bearing Wall Rating — 1 Hr
Finish Rating — 18 min

Loaded Per 2012 NDS Supplement, ASD Method, Wall Braced by Sheathing, 48% of Design Load Applied to Wall

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

![Diagram of wall construction](image)

1. Wood Studs — Nom 2 by 6 in., spaced 16 in. OC in with two 2 by 6 in. top and one 2 by 6 in. bottom plates. Studs effectively fire stopped.

2. Gypsum Board* — Nom. 5/8 in. thick, 4 ft. wide, applied vertically, and nailed to studs and bearing plates 6 in. OC. with 1-7/8 in. long 6d cup-head nails. Vertical joints centered over studs and staggered min. 1 stud cavity from the vertical joints of the building units (Item #5).


4. Batts and Blankets* — Any faced or unfaced glass fiber batts, 6-1/4 in. thick, having a min density of 0.43 pcf (min R-13 thermal insulation rating), pressure fit in the wall cavity between stud, plates, and cross bracing.
5. Building Units* — Building units placed with the laminate face away from, and nailed to, the wood framing with 2-1/2 in. long, 8d nails, spaced 6 in. OC. on the perimeter and 12 in. OC. in the field.

BARRIER TECHNOLOGY CORP — Type Blazeguard Plus 1-Side

6. Fill, Void or Cavity Materials (Not shown) — Exterior face joints in Building Units (Item #5) gapped 1/8 in. and filled with caulking, installed in accordance with the manufacturer's Installation Instructions.

3M COMPANY 3M FIRE PROTECTION PRODUCTS — IC 15WB+ Intumescent Caulk

7. Exterior Facings — Installed in accordance with the manufacturer’s Installation Instructions.

A. Steel Wall Panels — Minimum No. 26 MSG, minimum 3/4 in depth, minimum 36 in. wide coated steel panels. Vertical raised rib profiles of adjacent panels are overlapped and attached to each other with self-drilling or self-tapping screws spaced 16 in. o.c. (max.) along the lap. Metal panel attachment to the substrate using self-drilling or self-tapping screws spaced 24” o.c. vertically (max) at every rib.

ASC BUILDING PRODUCTS, DIV OF ASC PROFILES L L C — Delta Rib III

B. Brick Veneer — As an alternative to Item 7, any type of 4 in. wide brick may be used. Brick veneer fastened with corrugated metal wall ties attached over sheathing to wood studs with 1-1/4 in. Type S steel screws spaced not more than each forth course and a max 24 in. OC horizontally. Fastener length must be increased such that penetration into framing members shall be not less than 3/4 in.

C. Stucco — As an alternative to Items 7 and 7A, Portland cement type stucco mixed at a rate of 3 parts sand to 1 part portland cement to 1.7 liters water. Thickness of stucco to be min 3/4 in. as measured to face of netting or lath.

a. Prefurred Stucco Netting — Nom 1-1/2 in. by 1-1/2 in., min 17 MSG galvanized steel netting applied over gypsum sheathing to wood studs with 1-1/4 in. by 1 in. steel staples spaced 7 in. OC. Fastener length must be increased such that penetration into framing members shall be not less than 3/4 in.

b. Metal Lath — As an option to the stucco netting, min 1.7 lb/sq yd expanded steel lath fastened to the wood studs through the gypsum sheathing with 1-1/4 in. long Type 5 lath head steel screws spaced 7 in. OC. Fastener length must be increased such that penetration into framing members shall be not less than 3/4 in.).

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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ENGINEERING EVALUATION

Engineering Extension for the LP UL Design V311

Exterior Wall Assembly

Project No. 10288-02

Prepared for:

Louisiana-Pacific Corporation
414 Union Street
Suite 2000
Nashville, TN

March 10, 2015
Abstract

An evaluation has been performed of the Louisiana-Pacific (LP) 1 hour exterior wall assembly described in Underwriter’s Laboratories Design No. V311. The purpose of this evaluation was to render an opinion regarding the acceptability for the use of fiber cement siding as an allowable exterior veneer in this design. Priest and Associates Consulting (PAC) has successfully determined that fiber-cement siding can be included in the V311 design without detracting from the listed 2 hour fire resistance rating when tested in accordance with ASTM E119 “Standard Test Methods for Fire Tests of Building Construction and Materials”.

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,

Howard Stacy
Senior Scientist

Date: March 9, 2015

Reviewed and Approved,

Deg Priest
President

Date: March 9, 2015
INTRODUCTION

Louisiana-Pacific Corporation (LP) has a 1 hour UL Design Listing, V311, which incorporates LP FlameBlock Plus 1-sided sheathing. The purpose of this analysis is to provide the justification for the allowance of fiber cement siding as an acceptable exterior facing for this design.

REFERENCED DOCUMENTS

1. UL Design No. V311, Underwriters Laboratories Inc. Fire Resistance Directory – Volume 1
4. Intertek Design No. JH/WA 60-04 (James Hardie Building Products).

DESCRIPTION

The published UL V311 one hour fire resistance rated exterior wall design (Ref. 1, included in Appendix A) generally includes the following components and allowances for exterior facings (beginning from the interior):

1. Interior wall membrane (UL Item #2, see Figure 1 and Appendix A): 1 layer of ⅝ in. type X gypsum wallboard (USG Type SCX).
2. Nominal 2x6 wood studs (UL Item #1): spaced 16 inches on center, effectively fire stopped.
3. Wall cavity insulation (UL Item #4): glass fiber insulation, 6 ¼ in. thick, nominal 0.43 pcf density.
4. Exterior sheathing (UL Item #5): 1 layer, 1-sided LP FlameBlock Plus (referred to in the listing as “BlazeGuard Enhanced 1-side”).
5. Exterior Facings (UL Item #7):
   a. Steel Wall Panels – Minimum 26 GA.
   b. Brick Veneer.
   c. Stucco

   Figure 1. Horizontal Section of V311 construction.

EVALUATION

This evaluation is based on the analysis of the following:

1) The fire resistance test report providing the basis for the V311 listing (Ref. 2);
2) Research-scale fire resistance testing of comparable FlameBlock base assemblies with steel and fiber-cement facings; and,
3) The assigned fire resistance time imparted by fiber-cement siding to a fire rated assembly.

The 1 hour loadbearing fire resistance test leading to the V311 listing is described in WFCi Report No. 13098a (Ref. 2). This test was performed with 26 GA. steel wall panels covering the exterior side of the assembly exposed to the conditions of the ASTM E119 fire test. This report shows that the FlameBlock Plus test assembly successfully met the acceptance conditions of the E119 standard for a period of 61
minutes, 23 seconds before the test was terminated. At the time the test was stopped, the assembly was near the point where it could no longer sustain the applied load, with the maximum temperature measured on the unexposed side exceeding the allowable E119 limiting temperature rise endpoint.

The comparative performance of identical base wall assemblies constructed with FlameBlock Plus 1-sided and faced with steel wall panels in one case and fiber cement siding in the other is illustrated by WFCi Report Nos. 13026r1 and 13089br1 (Ref. 3). The testing reported in these two projects demonstrate that a significant improvement in the level of protection provided to the supporting wood stud framing members was attained when fiber cement siding was substituted for steel wall panels. The results are characterized in terms of the remaining unburned section of the wood framing members after exposure to E119 fire conditions for identical exposure periods, and the comparative membrane protection rating (“finish rating”)\(^1\) measured during each test. The results are summarized in Table 1.

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Siding Type</th>
<th>Avg. Residual Unburned Section of Stud (%)</th>
<th>Membrane Protection Rating (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13089br1</td>
<td>26 GA. Steel Panel</td>
<td>34</td>
<td>14</td>
</tr>
<tr>
<td>13026r1</td>
<td>Fiber cement Siding</td>
<td>59</td>
<td>29</td>
</tr>
</tbody>
</table>

Table 1.

These results clearly show the improved fire protection given by the fiber cement panel. The remaining unburned section of the studs in the fiber-cement test showed an increase of 42% over the steel panel test, with a corresponding 15 minute increase in the membrane protection rating.

Finally, the expected improvement in protection imparted by the fiber-cement siding is illustrated in Intertek Design No. JH/WA 60-04, developed for James Hardie fiber-cement siding. The JH/WA 60-04 listing is provided in Appendix B. This design gives a 1 hour fire resistance rating when \(\frac{5}{16}\) inch thick fiber cement lap siding is installed over \(\frac{1}{2}\) inch type X gypsum wallboard. From the literature and Tables 722.6.2(1) and 722.6.2(2) of the IBC (Ref. 5), a wood stud framed wall with a \(\frac{1}{2}\) inch type X gypsum membrane is assigned a 45 minute fire resistance rating. With an exterior facing of fiber-cement board, the rating of this assembly was improved to 1 hour, indicating that the fiber-cement siding added 15 minutes of fire resistance protection.

Therefore, given the demonstrated improvement in fire protection of wood stud framing members with fiber cement board substituted for steel paneling, and the indicated performance of fiber cement siding in the Intertek JH/WA 60-04 listing, it is our opinion that the addition of fiber-cement siding to the LP V311 listing without detracting from the published fire resistance classification is justified.

CONCLUSION

Priest and Associates Consulting (PAC) has successfully determined that fiber-cement siding, when installed in accordance with siding manufacturer instructions or an appropriate code evaluation report, can be substituted for the exterior facings itemized in the UL V311 listing without detracting from the 1 hour fire resistance classification.

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\(^1\) This is described in E119 as a method to determine the thermal protection afforded by membrane elements in a wall assembly through the measurement of the temperature rise occurring between the face of the stud and the protective membrane exposed to the fire. The performance of the membrane is determined as the time at which either the average temperature rise of the set of thermocouples for the element being protected is more than 250°F (139°C), or the temperature rise of any one thermocouple of the set is more than 325°F (181°C) above the initial temperature.
Appendix A – V311 FlameBlock Plus Listing

Design No. V311
May 29, 2014

Bearing Wall Rating — 1 Hr
Finish Rating — 18 min

Loaded Per 2012 NDS Supplement, ASD Method, Wall Braced by Sheathing, 48% of Design Load Applied to Wall

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BSUV or BSUVZ.

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

1. Wood Studs — Nom 2 by 6 in., spaced 16 in. OC in with two 2 by 6 in. top and one 2 by 6 in. bottom plates. Studs effectively fire stopped.

2. Gypsum Board* — Nom. 5/8 in. thick, 4 ft. wide, applied vertically, and nailed to studs and bearing plates 6 in. OC. with 1-7/8 in. lang 6d cup-head nails. Vertical joints centered over studs and staggered min. 1 stud cavity from the vertical joints of the building units (Item #5).

UNITED STATES GYPSUM CO — Type SCK

4. Batts and Blankets® — Any faced or unfaced glass fiber batts, 6-1/4 in. thick, having a min density of 0.43 pcf (min R-13 thermal insulation rating), pressure fit in the wall cavity between stud, plates, and cross bracing.

5. Building Units® — Building units placed with the laminate face away from, and nailed to, the wood framing with 2-1/2 in. long, 8d nails, spaced 6 in. OC. on the perimeter and 12 in. OC. in the field.

**BARRIER TECHNOLOGY CORP** — Type Enhanced Blazeguard 1-Side

6. Fill, Void or Cavity Materials (Not shown) — Exterior face joints in Building Units (Item #5) gapped 1/8 in. and filled with caulk, installed in accordance with the manufacturer’s Installation Instructions.

**3M COMPANY 3M FIRE PROTECTION PRODUCTS** — IC 15WB+ Intumescent Caulk

7. Exterior Facings — Installed in accordance with the manufacturer’s Installation Instructions.

   A. Steel Wall Panels — Minimum No. 26 MSG, minimum 3/4 in depth, minimum 36 in. wide coated steel panels. Vertical raised rib profiles of adjacent panels are overlapped and attached to each other with self-drilling or self-tapping screws spaced 16 in. o.c. (max.) along the lap. Metal panel attachment to the substrate using self-drilling or self-tapping screws spaced 24" o.c. vertically (max) at every rib.

   **ASC BUILDING PRODUCTS, DIV OF ASC PROFILES L L C** — Delta Rib III

   B. Brick Veneer — As an alternative to Item 7, any type of 4 in. wide brick may be used. Brick veneer fastened with corrugated metal wall ties attached over sheathing to wood studs with 1-1/4 in. Type S steel screws spaced not more than each forth course and a max 24 in. OC horizontally. Fastener length must be increased such that penetration into framing members shall be not less than 3/4 in.)

   C. Stucco — As an alternative to Items 7 and 7A, Portland cement type stucco mixed at a rate of 3 parts sand to 1 part portland cement to 1.7 liters water. Thickness of stucco to be min 3/4 in. as measured to face of netting or lath.

      a. Prefurred Stucco Netting — Nom 1-1/2 in. by 1-1/2 in., min 17 MSG galvanized steel netting applied over gypsum sheathing to wood studs with 1-1/4 in. by 1 in. steel staples spaced 7 in. OC. Fastener length must be increased such that penetration into framing members shall be not less than 3/4 in.

      b. Metal Lath — As an option to the stucco netting, min 1.7 lb/sq yd expanded steel lath fastened to the wood studs through the gypsum sheathing with 1-1/4 in. long Type S lath head steel screws spaced 7 in. OC. Fastener length must be increased such that penetration into framing members shall be not less than 3/4 in.)
Appendix B – James Hardie Fiber Cement Siding Listing
1. **Wood Studs** — Nominal 2\" x 4\" solid sawn wood studs located 24\" oc, with two top plates and a single bottom plate.

2. **Insulation (optional)** — R13 glass fiber batt insulation.

3. **Gypsum Wallboard, Side A** — 5/8\" Type X gypsum wallboard, oriented vertically and fastened with 1-3/4\" cup-head gypsum nails, spaced 7\" oc at board edges and in field areas, or 1-1/2\" Type S drywall screws, spaced 8\" oc at board edges and in field areas of boards.

Gypsum Sheathing, Side B — 1/2\" Type X or 5/8\" Type X gypsum sheathing fastened with 1-3/4\" long roofing nails spaced 7\" oc. Sheathing edge joints shall be staggered from those on opposite sides of the wall.

4. **CERTIFIED MANUFACTURER:** James Hardie Building Products Inc.

**CERTIFIED PRODUCT:** HardiePlank Lap Siding, G.F.C. Lap Siding, HardiePlank HZ5 Lap Siding or Artisan Lap Siding.

**Fibre Cement Exterior Siding, Side B** — 5/16\" thick HardiePlank Lap Siding, G.F.C. Lap Siding, HardiePlank HZ5 Lap Siding or Artisan Lap Siding applied horizontally with a 1-1/4\" headlap and fastened with a single 6d corrosion resistant common nail driven through the lapped planks at each stud location.