

# Technical Evaluation Report™

**TER 1504-04**

**ECOMAXci® Ply**

**Rmax®**

**Product:**

**Rmax® ECOMAXci® Ply**

**Issue Date:**

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**Revision Date:**

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January 1, 2024



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DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

SECTION: 06 16 00 - Sheathing

SECTION: 06 16 13 - Insulated Sheathing

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

SECTION: 07 20 00 - Thermal Protection

SECTION: 07 21 00 - Thermal Insulation

SECTION: 07 27 00 - Air Barriers

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## 1 Product Evaluated<sup>1,2</sup>

1.1 Rmax® ECOMAXci® Ply

## 2 Applicable Codes and Standards<sup>3</sup>

### 2.1 Codes

- 2.1.1 *IBC—15, 18, 21: International Building Code®*
- 2.1.2 *IRC—15, 18, 21: International Residential Code®*
- 2.1.3 *IECC—15, 18, 21: International Energy Conservation Code®*

### 2.2 Standards and Referenced Documents

- 2.2.1 *AISI S100: North American Specification for the Design of Cold-formed Steel Structural Members*
- 2.2.2 *ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction*
- 2.2.3 *ASTM C90: Standard Specification for Loadbearing Concrete Masonry Units*
- 2.2.4 *ASTM C1019: Standard Test Method for Sampling and Testing Grout for Masonry*
- 2.2.5 *ASTM C1289: Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board*
- 2.2.6 *ASTM E136: Standard Test Methods for Behavior of Materials in a Vertical Tube Furnace*

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<sup>1</sup> For more information, visit [drjcertification.org](http://drjcertification.org) or call us at 608-310-6748.

<sup>2</sup> This TER is a code defined [research report](#) provided by an [approved source](#) (see [IBC Section 1703.4.2](#)) and an [approved agency](#) (see [IBC Section 1703.1](#)). Given that this TER is for new materials, as defined in [IBC Section 1702](#), for which there are no approved rules or standards, [IBC Section 1707.1](#) states that, "In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports (i.e. [research reports](#)) from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in [IBC Section 104.11](#)". A professional engineer is approved as an approved source when that professional engineer is properly licensed to transact engineering commerce.

<sup>3</sup> Unless otherwise noted, all references in this TER are from the 2021 version of the codes and the standards referenced therein. This material, design, or method of construction also complies with the 2000-2018 versions of the referenced codes and the standards referenced therein.

- 2.2.7 *ASTM E1354: Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*
- 2.2.8 *ASTM E2178: Standard Test Method for Air Permeance of Building Materials*
- 2.2.9 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*
- 2.2.10 *AWC TR 12: General Dowel Equations for Calculating Lateral Connection Values*
- 2.2.11 *DOC PS 2: Performance Standard for Wood-based Structural-use Panels*
- 2.2.12 *NFPA 285-12: Standard Fire Test Method for the Evaluation of Fire Propagation Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components<sup>4</sup>*
- 2.2.13 *UL 263: Standard for Fire Tests of Building Construction and Materials*

### 3 Performance Evaluation

- 3.1 Testing and related engineering evaluations are defined as intellectual property and/or trade secrets.
- 3.2 Rmax® ECOMAXci® Ply was evaluated to determine the following uses in Type I-IV construction:
  - 3.2.1 Foam plastic insulation performance in accordance with [IBC Section 2603](#).
  - 3.2.2 Performance for use as an air barrier in accordance with [IECC Section C402](#).
  - 3.2.3 Flame spread and smoke-developed index ratings in accordance with [IBC Section 2603.5.4](#).
  - 3.2.4 Vertical and lateral fire propagation in accordance with [2018 IBC Section 2603.5.5](#).
  - 3.2.5 Connection to light-frame cold-formed steel framing to support cladding weight in accordance with [IBC Section 1609.1.1](#).
  - 3.2.6 Connection to light-frame fire-retardant treated wood construction framing to support cladding weight in accordance with [IBC Section 1604.2](#) and [IRC Section R301.1.3](#).
  - 3.2.7 Connection to concrete substrate to support cladding weight in accordance with [IBC Section 1901.3](#).
  - 3.2.8 Performance for use in a fire resistance rated assembly in accordance with [IBC Section 2603.5.1](#).
- 3.3 ECOMAXci® Ply is not designed as a structural bracing material. Adequate building bracing shall be provided through other means and methods.
- 3.4 Design of cladding fastening to ECOMAXci® Ply is outside the scope of this TER.
- 3.5 Engineering evaluations are conducted with DrJ's ANAB [accredited ICS code scope](#), which are also its areas of professional engineering competence.
- 3.6 Any regulation specific issues not addressed in this section are outside the scope of this TER.

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<sup>4</sup> References to NFPA 285-12 in this TER are code compliant through the 2018 version of the IBC.

## 4 Product Description and Materials

4.1 The product evaluated in this TER is shown in Figure 1.



**Figure 1.** ECOMAXci® Ply

4.2 ECOMAXci® Ply is a composite product whose core consists of Rmax® rigid, closed-cell polyisocyanurate (Polyiso) foamed plastic insulation board with inorganic, polymer coated glass fiber mat facers. This insulation board is bonded to fire-retardant treated (FRT) plywood with liquid adhesive.

4.2.1 Rmax® Polyiso foam insulation conforms to ASTM C1289 in accordance with [IBC Section 2603](#).

4.2.2 The FRT plywood is manufactured in accordance with DOC PS 2 and treated for compliance with [IBC Section 2303.2](#).

4.2.3 The rigid insulation portion of ECOMAXci® Ply is available in the following thicknesses:

4.2.3.1 0.75" (19 mm) through 4.5" (114 mm).

4.2.3.2 The FRT plywood portion is available in  $\frac{5}{8}$ " (0.625") and  $\frac{3}{4}$ " (0.75") thicknesses

4.2.3.3 Standard product width: 48" (1,219 mm).

4.2.3.4 Standard product length: 96" (2,438 mm).

## 5 Applications

5.1 ECOMAXci® Ply is a composite insulation panel for use in the following applications:

5.1.1 Exterior walls of buildings of any height and of Type I-IV construction in accordance with [IBC Section 2603.5](#).

5.1.2 Continuous insulation on buildings constructed in accordance with the IBC for light-frame cold-formed steel construction, metal buildings, concrete masonry buildings, concrete buildings, or FRT wood framed buildings.

5.1.3 Continuous insulation providing a nail base for cladding materials used in light-frame cold-formed steel construction, metal buildings, concrete masonry buildings, concrete buildings, or FRT wood framed buildings.

5.2 The Environmental Product Declaration (EPD) for ECOMAXci® is available at [polyiso.org](http://polyiso.org).

5.3 *Thermal Insulation*

5.3.1 ECOMAXci® Ply is intended for use as an exterior continuous insulation under any type of permitted cladding.

5.4 Air Barrier

5.4.1 ECOMAXci® Ply meets the requirements of [IECC Section C402](#) for use as a component of the air barrier (Table 1) when installed in accordance with the manufacturer installation instructions and this TER and with all seams, including the top and bottom edges, sealed.

**Table 1.** Air Barrier Properties<sup>1</sup>

Product	Air Permeance [L/(s*m <sup>2</sup> )]
ECOMAXci® Ply	< 0.02
1. Tested in accordance with ASTM E2178	

5.4.2 The air permeance of an air barrier material is defined by the IECC and the Air Barrier Association of America (ABAA) as being no greater than 0.02 liter per second per square meter [L/(s\*m<sup>2</sup>)] at 75 Pa pressure difference when tested in accordance with ASTM E2178.

5.5 Fire Safety Performance

5.5.1 Surface Burn Characteristics:

5.5.1.1 The components of ECOMAXci® Ply have the flame spread and smoke developed characteristics shown in Table 2.

**Table 2.** Surface Burn Characteristics<sup>1,2</sup>

Product	Flame Spread	Smoke Developed
ECOMAXci® Ply Polyiso Core <sup>1</sup> <1"	≤ 40	≤ 250
ECOMAXci® Ply Polyiso Core <sup>1</sup> ≥1"	≤ 25	≤ 160
FRT Plywood	≤ 25	≤ 450
1. Tested in accordance with ASTM E84 2. Flame spread and smoke developed numbers are shown for comparison purposes only and are not intended to represent the performance of ECOMAXci® Ply and related components under actual fire conditions.		

5.5.2 Thermal Barrier (IRC and IBC Buildings):

5.5.2.1 Except as noted in Section 5.5.2.2, ECOMAXci® Ply panels up to 4.5" (114 mm) in foam thickness may be installed within the building envelope (including, but not limited to, attics, crawlspaces, and wall assemblies) of all building types when separated from the interior with a thermal barrier. The thermal barrier shall consist of a minimum ½" gypsum wallboard or an approved equivalent in accordance with [IBC Section 2603.4](#) and [IRC Section R316.4](#).<sup>5</sup>

5.5.2.2 The thermal barrier required by Section 5.5.2.1 is not required in the following applications:

- 5.5.2.2.1 ECOMAXci® Ply is covered by a minimum 1" thickness of concrete or masonry separating the interior of the building from the sheathing, in accordance with [IBC Section 2603.4.1](#) and [IRC Section R316.5.1](#).
- 5.5.2.2.2 Walk-in coolers in accordance with [IBC Section 2603.4.1.3](#).
- 5.5.2.2.3 Attic, crawlspace, or other uninhabitable space applications in accordance with [IBC Section 2603.4.1.6](#), [IRC Section R316.5.3](#) and [IRC Section R316.5.4](#).

<sup>5</sup> 2015 IRC also allows for 23/32" wood structural panel.

5.5.2.2.4 Where an ignition barrier is permitted in lieu of a thermal barrier, such as attic, crawlspace, or other uninhabitable space applications, ECOMAXci® Ply may be installed on walls only up to 4.5" in thickness of the rigid insulation portion, without a thermal barrier or ignition barrier in accordance with IBC Section 2603.4.1.6, IRC Section R316.5.3 and IRC Section R316.5.4.

5.5.2.2.5 For thicknesses greater than 4.5" in thickness of the rigid insulation portion, an ignition barrier is required.

5.5.3 *Vertical and Lateral Fire Propagation:*

5.5.3.1 ECOMAXci® Ply has been tested to assess its performance with regard to vertical and lateral fire propagation in accordance with NFPA 285 and 2018 IBC Section 2603.5.5.

5.5.3.2 Engineering analysis has also been conducted to assess substitution of other products within the approved wall assemblies.

5.5.3.3 The wall assemblies listed in Table 3 are approved for use in Type I-IV, light-frame cold-formed steel construction or metal buildings.

**Table 3. Approved NFPA 285 Wall Assemblies<sup>1</sup>**

Wall Component	Materials
<b>Base Wall System</b> Use either 1, 2, 3, or 4  Note: May use 4 optionally when FRTW framing is allowed by code.	1. Cast Concrete Walls 2. CMU Concrete Walls 3. 20 ga (min.) 3 <sup>5</sup> / <sub>8</sub> " (min.) steel studs spaced 24" OC (max.) a. 5 <sup>8</sup> / <sub>8</sub> " (min.) type X Gypsum Wallboard Interior 4. Where allowed in Types I, II, III or IV construction, FRTW (Fire-retardant-treated wood) studs complying with IBC Section 2303.2, min. nominal 2x4 dimension, spaced 24" OC (max.) a. 5 <sup>8</sup> / <sub>8</sub> " type X Gypsum Wallboard Interior b. Bracing as required by code
<b>Fire-Stopping in Stud Cavity at Floor Lines</b>  As an option, use 2 with Fire Retardant Treated Wood (FRTW) framing	1. 4 pcf mineral fiber insulation installed with z-clips 2. FRTW fire blocking at floor line in accordance with applicable code requirements
<b>Cavity Insulation</b> Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15  Note: Items 5-15 are SPF Foam Type  EZ FLO may be used inside the box headers and jamb studs for NFPA 285 assemblies requiring SPF in stud cavities	1. None 2. Any noncombustible insulation per ASTM E136 3. Any Mineral Fiber (board type Class A, faced or un-faced meeting ASTM E84) 4. Any Fiberglass (batt type Class A, faced or un-faced meeting ASTM E84) 5. 5 <sup>1</sup> / <sub>2</sub> " (max.) Icynene LD-C-50 spray foam in 6" deep studs (max.). Use with 5 <sup>8</sup> / <sub>8</sub> " exterior sheathing 6. 5 <sup>1</sup> / <sub>2</sub> " (max.) Icynene MD-C-200 2 pcf spray foam in 6" deep studs (max.) full fill without an air gap. Use with 5 <sup>8</sup> / <sub>8</sub> " exterior sheathing 7. 5 <sup>1</sup> / <sub>2</sub> " (max.) Icynene MD-R-210 2 pcf spray foam in 6" deep studs (max.) full fill without an air gap. Use with 5 <sup>8</sup> / <sub>8</sub> " exterior sheathing 8. SWD Urethane QS 112 2 pcf spray foam in 6" deep studs (max.) partial fill with a maximum 2 <sup>1</sup> / <sub>2</sub> " air gap or full fill. Use with 5 <sup>8</sup> / <sub>8</sub> " exterior sheathing 9. Gaco Western 183M (3 <sup>1</sup> / <sub>2</sub> " max.). Use with 5 <sup>8</sup> / <sub>8</sub> " exterior sheathing 10. Gaco Western F1850 (3 <sup>1</sup> / <sub>2</sub> " max.). Use with 5 <sup>8</sup> / <sub>8</sub> " exterior sheathing 11. Demilec SEALECTION 500 (3 <sup>5</sup> / <sub>8</sub> " max.). Use with 5 <sup>8</sup> / <sub>8</sub> " exterior sheathing 12. Demilec HeatLok Soy 200 Plus (3.4" max.). Use with 5 <sup>8</sup> / <sub>8</sub> " exterior sheathing 13. Bayer Bayseal (3" max.) Use with 5 <sup>8</sup> / <sub>8</sub> " exterior sheathing 14. Lapolla FoamLok FL 2000 (3" max.) Use with 5 <sup>8</sup> / <sub>8</sub> " exterior sheathing 15. BASF SprayTite 81206 or WallTite (US & US-N) (3 <sup>5</sup> / <sub>8</sub> " max.). Use with 5 <sup>8</sup> / <sub>8</sub> " exterior sheathing
<b>Exterior Sheathing-</b>	1. 1/2" thick or thicker, exterior type gypsum board sheathing

Wall Component	Materials
<p>Use either 1, 2, or 3</p> <p>Note – Exterior FRTW sheathing or gypsum board is optional for Base Walls 1 and 2. When SPF is used, 5/8" exterior gypsum sheathing must be used</p>	<ol style="list-style-type: none"> <li>2. 1/2" (min.) FRTW structural panels complying with IBC Section 2303.2 and installed in accordance with code allowances for Types I, II, III, or IV construction</li> <li>3. None (only when exterior insulation FRT plywood is on interior side attached direct to studs)</li> </ol>
<p><b>Weather-Resistive Barrier Installed over Exterior Sheathing</b></p> <p>Use either option 1 or 2 installed per the manufacturer installation instructions</p> <p>Note 1: Sopraseal Xpress G may replace exterior sheathing, Item 1 above but WRB over Sopraseal Xpress G may not be used since it already incorporates a pre-installed WRB.</p> <p>NLA = No longer available. Replaced with Spraywrap MVP</p>	<ol style="list-style-type: none"> <li>1. None</li> <li>2. Any WRB tested in accordance with ASTM E1354 (at a minimum of 20 kW/m<sup>2</sup> heat flux) and shown by analysis to be less flammable (improved T<sub>ign</sub>, Pk. HRR) than the tested WRB. The following WRB products are allowed:             <ol style="list-style-type: none"> <li>a. Carlisle CCW Fire Resist 705FR-A, Barritech NP™, or Barritech VP</li> <li>b. Dorken Systems Inc. Delta Stratus SA</li> <li>c. Dorken Systems Inc. Delta@-Maxx/Plus</li> <li>d. Dorken Systems Inc. Delta@-Fassade S</li> <li>e. Dorken Systems Inc. Delta@-Foxx/Plus</li> <li>f. Dorken Systems Inc. Delta@-Vent S/Plus</li> <li>g. Dorken Systems Inc. Delta@-Vent SA</li> <li>h. Dow Dowsil™ DefendAir 200 (or LT version) or DefenderAir 200C (Charcoal)</li> <li>i. Dryvit Backstop® NT™</li> <li>j. DuPont™ Tyvek® (Various per ESR 2375)</li> <li>k. DuPont™ WeatherMate™ Housewrap or WeatherMate™ Plus Housewrap</li> <li>l. GCP PERM-A-BARRIER® Aluminum Wall Membrane</li> <li>m. GCP PERM-A-BARRIER® NPL 10</li> <li>n. GCP PERM-A-BARRIER® VPL</li> <li>o. GCP PERM-A-BARRIER® VPL 50 Membrane</li> <li>p. GCP PERM-A-BARRIER® VPL Low Temperature</li> <li>q. GCP PERM-A-BARRIER® VPS</li> <li>r. Henry® Air-Bloc® 17</li> <li>s. Henry® Air-Bloc® 21 FR</li> <li>t. Henry® Air-Bloc® 31 MR</li> <li>u. Henry® Air-Bloc® 32 MR</li> <li>v. Henry® Air-Bloc® 33 MR</li> <li>w. Henry® Blueskin® Metal Clad®</li> <li>x. Henry® Blueskin® SA</li> <li>y. Henry® Blueskin® VP160</li> <li>z. Henry® EnviroCap</li> <li>aa. Henry® FoilSkin</li> <li>bb. Henry® Super Jumbo Tex 60 Minute® (Fortifiber)</li> <li>cc. Henry® WeatherSmart® Drainable Housewrap (Fortifiber)</li> <li>dd. Kingspan (Pactiv) GreenGuard® Max Building Wrap</li> <li>ee. MasterSeal® AWB 660 (Formerly BASF Enershield® HP)</li> <li>ff. MasterSeal® AWB 660 I (Formerly BASF Enershield® I)</li> <li>gg. NaturaSeal Airseal NS-A-250HP™</li> <li>hh. NaturaSeal Airseal NS-A-250LP™</li> <li>ii. Parex WeatherSeal Spray &amp; Roll-On</li> <li>jj. Pecora ProPerm VP</li> <li>kk. Pecora XL-Perm<sup>ULTRA</sup> NP</li> <li>ll. Pecora XL-Perm<sup>ULTRA</sup> VP (10 mil DFT)</li> <li>mm. Prosoco R-Guard MVP (NLA)</li> <li>nn. Prosoco R-Guard Spray Wrap (NLA)</li> <li>oo. Prosoco R-Guard® Cat 5™</li> <li>pp. Prosoco R-Guard® Spray Wrap MVP</li> <li>qq. Prosoco R-Guard® VB</li> <li>rr. Siga Majvest® 500 SA</li> </ol> </li> </ol>

Wall Component	Materials
	ss. Sika Sikagard®-530 tt. Sika Sikagard®-535 uu. Soprema Sopraseal® LM 204 VP vv. Soprema Sopraseal® Stick 1100T ww. Soprema Sopraseal® Stick VP xx. Soprema Sopraseal® Xpress G yy. Soprema Soprasolin® HD zz. Vaproshield RevealShield SA® aaa. Vaproshield WrapShield SA® bbb. W.R. Meadows® Air-Shield™ LMP (Black) ccc. W.R. Meadows® Air-Shield™ LMP (Gray) ddd. W.R. Meadows® Air-Shield™ LSR eee. W.R. Meadows® Air-Shield™ SMP fff. W.R. Meadows® Air-Shield™ TMP
<b>Exterior Insulation</b> Installation may use FRT plywood on exterior side (installed over exterior sheathing) or interior side (applied direct to studs). This option (plywood on interior) negates use of exterior sheathing since the FRT ply acts as the sheathing.	1. Rmax® ECOMAXci® Ply, 4½" (max.) foam with ⅝" (min.) FRT plywood.  Note: FRT plywood may be applied in the field or factory applied. Adhesive must not be full coverage.
<b>Weather-Resistive Barrier Installed over Exterior Insulation or FRTW</b> Use any in item 1) or 2) depending on cladding used  Note: Exterior WRB Items 1) b-d are not traditional WRB products, but are insulation panel joint tapes. The insulation panel joints shall be staggered.  NLA = No longer available. Replaced with Spraywrap MVP	1) For use with all cladding options. a. None b. 6" (max.) Venture Tape CW over insulation joints c. 6" (max.) Rmax® R-SEAL 3000, R-SEAL 6000 or R-SEAL 2000 LF over insulation joints d. 6" (max.) asphalt or butyl based tape or liquid flashing over insulation joints e. Pactiv Green Guard®Max Building Wrap f. DuPont™ Tyvek® (Various per ESR 2375) g. DuPont™ WeatherMate™ Housewrap h. DuPont™ WeatherMate™Plus Housewrap i. Henry® FoilSkin j. Henry® Blueskin® Metal Clad® k. Prosoco R-Guard® Spray Wrap MVP l. Soprema Soprasolin® HD m. Carlisle CCW Fire Resist 705FR-A n. GCP PERM-A-BARRIER® Aluminum Wall Membrane 2) For use with cladding options 1-6 (heavy masonry) a. Henry® Air Bloc 31MR b. Henry® Envirocap c. Henry® Air-Bloc® 33MR d. Henry® Air-Bloc® 21 FR e. Henry® Air-Bloc® 17 f. Henry® Blueskin® VP 160 g. Soprema Sopraseal® Stick VP h. Carlisle CCW Fire Resist Barritech NP™ i. Carlisle CCW Fire Resist Barritech VP j. Prosoco R-Guard® Spray Wrap (NLA) k. Prosoco R-Guard® MVP (NLA) l. Prosoco R-Guard® VB m. Prosoco R-Guard® Cat 5™ n. Vaproshield RevealShield SA® o. Vaproshield WrapShield SA®



Wall Component	Materials
	<ul style="list-style-type: none"> <li>p. Pecora XL-Perm<sup>ULTRA</sup> VP (10 mil DFT)</li> <li>q. Pecora XL-Perm<sup>ULTRA</sup> NP</li> <li>r. Pecora ProPerm VP</li> <li>s. GCP PERM-A-BARRIER® VPL</li> <li>t. GCP PERM-A-BARRIER® VPL Low Temperature</li> <li>u. GCP PERM-A-BARRIER® VPS</li> <li>v. Dryvit Backstop® NT™</li> <li>w. W.R. Meadows® Air-Shield™ LMP (Gray)</li> <li>x. W.R. Meadows® Air-Shield™ LMP (Black)</li> <li>y. W.R. Meadows® Air-Shield™ TMP</li> <li>z. W.R. Meadows® Air-Shield™ LSR</li> <li>aa. W.R. Meadows® Air-Shield™ SMP</li> <li>bb. Siga Majvest® 500 SA</li> <li>cc. Sika SikaGard®-535</li> <li>dd. Dow Dowsil™ DefendAir 200 (or LT version) or DefendAir 200C (Charcoal)</li> <li>ee. Dorken Systems Inc. Delta®-Vent S/Plus</li> <li>ff. Dorken Systems Inc. Delta®-Fassade S</li> <li>gg. Dorken Systems Inc. Delta®-Foxy/Plus</li> <li>hh. Dorken Systems Inc. Delta®-Maxx/Plus</li> <li>ii. Fortifiber WeatherSmart Drainable</li> <li>jj. Fortifiber Super Jumbo Tex 60 minute (only with Cladding #2 min. ¾" stucco)</li> <li>kk. Parex WeatherSeal Spray &amp; Roll-On</li> </ul>
<p><b>Exterior Cladding</b> Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, or 14</p>	<ol style="list-style-type: none"> <li>1. Brick – Nominal 4" thick clay brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.)</li> <li>2. Stucco – Minimum ¾" thick, exterior cement plaster and lath. A secondary WRB shall be installed between the exterior insulation and the lath to provide a bond break. The secondary WRB shall not be full-coverage asphalt or butyl-based self-adhered membranes</li> <li>3. Limestone – Minimum 2" thick using any standard installation technique</li> <li>4. Natural Stone Veneer – Minimum 2" thick using any standard installation technique</li> <li>5. Cast Artificial Stone, Precast Concrete Panels or CMU – Minimum 1½" thick, using any standard installation technique. Cast stone complying with ICC-ES AC 51.</li> <li>6. Terracotta cladding – Minimum 1¼" thick using any standard installation technique</li> <li>7. Any MCM or ACM (aluminum, steel copper, zinc) (w/ 2½" max air gap) that has successfully passed NFPA 285 using any standard installation technique</li> <li>8. Uninsulated sheet metal building panels including aluminum, steel or copper using any standard installation technique</li> <li>9. Uninsulated fiber-cement panel siding using any standard installation technique</li> <li>10. Stone/ Aluminum honeycomb composite building panels that have passed NFPA 285 or equivalent such as Stone Panels Inc., Stone Lite Panel System</li> <li>11. Autoclaved Aerated Concrete (AAC) panels that have successfully passed NFPA 285 using any standard installation technique</li> <li>12. Thin set brick such as Glen Gery ThinTech Elite or Tabs II Panel System with ½ inch bricks using Tabs Wall Adhesive</li> <li>13. Natural Stone Veneer – minimum 1¼ inch (adhered with mortar or concrete/cement based adhesive).</li> <li>14. FunderMax M.Look using the manufacturer standard installation technique. The air gap between cladding and insulation or WRB must not exceed 1 ½ inches.</li> </ol>
<ol style="list-style-type: none"> <li>1. All WRBs shall be installed at recommended application rates and per the manufacturer installation instructions.</li> <li>2. Window headers for all wall assemblies shall incorporate minimum 20 ga. steel flashing to cover air gaps between the exterior sheathing or exterior insulation and the exterior veneer. All fenestrations and penetrations shall be flashed in accordance with the applicable code using asphalt, acrylic, or butyl-based flashing tape or liquid flashing, R-SEAL 6000, or R-SEAL 2000 LF up to 12" maximum width.</li> </ol>	

#### 5.5.4 Fire Resistance Ratings:

5.5.4.1 ECOMAXci® Ply has been tested and meet the requirements of UL 263 in accordance with [IBC Section 2603.5.1](#) for use in the following assembly designs when installed in accordance with the manufacturer installation instructions and this TER:

5.5.4.1.1 45 minutes: [U424](#), [U425](#), [V321](#), [V499](#), [W456](#)

5.5.4.1.2 1 hour: [U026](#), [U326](#), [U330](#), [U354](#), [U355](#), [U364](#), [U424](#), [U425](#), [U460](#), [V302](#), [V303](#), [V454](#), [V499](#), [W307](#), [W417](#), [W456](#)

5.5.4.1.3 1.5 hour: [U424](#), [U425](#), [V499](#), [W456](#)

5.5.4.1.4 2 hour: [U349](#), [U424](#), [U425](#), [U905](#), [U906](#), [V332](#), [V499](#), [W456](#)

5.5.4.1.5 3 hour: [U904](#), [U907](#)

5.5.4.1.6 4 hour: [U902](#), [U907](#)

#### 5.6 Fastener Attachments to Wood and Steel Framing for ECOMAXci® Ply to Support Cladding Weight

5.6.1 Fasteners are required to attach the ECOMAXci® Ply sheathing to the wall framing to carry the cladding weight.

5.6.1.1 See Table 4 and Table 5 allowable cladding loads for various fastener types and sheathing thicknesses for light-frame cold-formed steel construction.

5.6.1.1.1 Minimum allowable penetration into wall framing is the steel thickness plus three threads plus the tip.

5.6.1.1.2 See Table 6 through Table 7 for allowable cladding loads for various fastener types and sheathing thicknesses for wood stud framing.

5.6.1.1.3 Minimum allowable penetration into FRT wood wall framing is 1¼".

5.6.2 The fasteners attaching the ECOMAXci® Ply sheathing to the wall framing shall have a minimum size and maximum spacing as shown in Table 4 through Table 7 and all panel edges shall be supported by framing or blocking.

5.6.3 For attaching to cold-form steel studs, fasteners with equal or greater design properties shall be permitted:

5.6.3.1 #8 screw: 0.164" shank diameter, 0.3125" head diameter.

5.6.3.2 #10 screw: 0.190" shank diameter, 0.363" head diameter.

5.6.3.3 #12 screw: 0.216" shank diameter, 0.414" head diameter.

5.6.3.4 Rmax® Nail Board Fastener SIP LD: 0.189" shank diameter, 0.625" head diameter.

5.6.3.5 Rmax® Nail Board Fastener SIP HD: 0.189" shank diameter, 0.625" head diameter.

5.6.3.6 TRUFAST SIP LD: 0.189" shank diameter, 0.625" head diameter.

5.6.3.7 TRUFAST SIP HD: 0.189" shank diameter, 0.635" head diameter.

5.6.3.8 FastenMaster HeadLOK: 0.191" shank diameter, 0.625" head diameter.

5.6.4 For attaching to FRT wood studs, fasteners with equal or greater design properties shall be permitted:

5.6.4.1 Rmax® Nail Board Fastener SIP TP: 0.189" shank diameter, 0.625" head diameter.

5.6.4.2 12d nail (0.148" x 3.25"): 0.312" head diameter.

5.6.4.3 Simpson Strong-Drive SDWS22: 0.22" shank diameter, 0.435" head diameter.

5.6.4.4 FastenMaster HeadLOK: 0.191" shank diameter, 0.625" head diameter.

5.6.4.5 TRUFAST SIP TP: 0.189" shank diameter, 0.625" head diameter.



5.6.5 Fasteners shall be coated to protect against FRT wood per IBC Section 2304.10.6.<sup>6</sup>

**Table 4.** ECOMAXci® Ply with 5/8" or 3/4" Fire Treated Plywood – Vertical Steel Studs 16" o.c.<sup>3,4,5,6</sup>

Framing Member	Fastener Type and Min. Size <sup>2</sup>	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Max. Vertical Fastener Spacing <sup>1</sup> (in)					
			Cladding Weight (psf)					
			5	10	15	20	25	30
20 ga. structural (33 mil)	Rmax® Nail Board Fastener SIP LD	1.00	24	16	12	8	8	6
		1.50	24	16	8	8	6	4
		2.00	24	12	8	6	4	4
		2.50	16	8	6	4	4	-
		3.00	16	8	6	4	-	-
		3.50	12	6	4	-	-	-
		4.00	6	-	-	-	-	-
	HeadLOK	1.00	24	16	12	8	8	6
		1.50	24	16	8	8	6	4
		2.00	24	12	8	6	4	4
		2.50	24	12	8	6	4	4
		3.00	16	8	6	4	-	-
		3.50	12	6	4	-	-	-
		4.00	8	4	-	-	-	-
	#12 common	1.00	24	16	12	8	8	6
		1.50	24	16	12	8	6	6
		2.00	24	16	8	8	6	4
		2.50	24	12	8	6	4	4
		3.00	24	12	8	6	4	4
		3.50	16	8	6	4	-	-
	#10 common or TRUFAST SIP LD	1.00	24	16	12	8	8	6
		1.50	24	16	12	8	8	6
		2.00	24	16	8	8	6	4
		2.50	24	12	8	6	4	4
	TRUFAST SIP LD	3.00	16	8	6	4	4	-
		3.50	16	8	6	4	-	-
		4.00	12	6	4	-	-	-
	#8 common	0.75	24	16	12	8	6	6
		1.00	24	16	8	8	6	4
		1.50	24	12	8	6	4	4
2.00		24	12	8	6	4	4	
2.50		16	8	6	4	-	-	
		0.75	24	24	16	12	12	8

<sup>6</sup> 2018 IBC Section 2304.10.5

Framing Member	Fastener Type and Min. Size <sup>2</sup>	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Max. Vertical Fastener Spacing <sup>1</sup> (in)					
			Cladding Weight (psf)					
			5	10	15	20	25	30
18 ga. structural (43 mil)	Rmax® Nail Board Fastener SIP LD	1.00	24	24	16	12	8	8
		1.50	24	24	16	12	8	8
		2.00	24	16	12	8	8	6
		2.50	24	16	8	8	6	4
		3.00	24	12	8	6	4	4
		3.50	16	8	6	4	-	-
		4.00	8	4	-	-	-	-
	HeadLOK	1.00	24	24	16	12	12	8
		1.50	24	24	16	12	8	8
		2.00	24	16	12	8	8	6
		2.50	24	16	12	8	6	6
		3.00	24	12	8	6	4	4
		3.50	16	8	6	4	4	-
		4.00	12	6	4	-	-	-
#12 common	1.00	24	24	16	16	12	8	
	1.50	24	24	16	12	8	8	
	2.00	24	24	16	12	8	8	
	2.50	24	16	12	8	8	6	
	3.00	24	16	12	8	6	6	
	3.50	24	12	8	6	4	4	
#10 common or TRUFAST SIP LD	1.00	24	24	16	12	8	8	
	1.50	24	24	16	12	8	8	
	2.00	24	16	12	8	8	6	
	2.50	24	16	8	8	6	4	
TRUFAST SIP LD	3.00	24	12	8	6	4	4	
	3.50	16	8	6	4	-	-	
	4.00	8	4	-	-	-	-	
#8 common	0.75	24	16	12	8	6	6	
	1.00	24	16	8	8	6	4	
	1.50	24	12	8	6	4	4	
	2.00	24	12	8	6	4	4	
	2.50	16	8	6	4	-	-	
16 ga. structural	Rmax® Nail Board Fastener SIP HD	1.00	24	24	24	24	16	16
		1.50	24	24	24	16	16	12
		2.00	24	24	16	16	12	8
		2.50	24	24	16	12	8	8
		3.00	24	16	12	8	8	6

Framing Member	Fastener Type and Min. Size <sup>2</sup>	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Max. Vertical Fastener Spacing <sup>1</sup> (in)					
			Cladding Weight (psf)					
			5	10	15	20	25	30
16 ga. structural (54 mil)		3.50	24	12	8	6	6	4
		4.00	16	8	6	4	-	-
		4.50	4	-	-	-	-	-
	HeadLOK	0.75	24	24	24	24	16	16
		1.00	24	24	24	24	16	16
		1.50	24	24	24	16	16	12
		2.00	24	24	16	16	12	8
		2.50	24	24	16	12	8	8
		3.00	24	16	12	8	8	6
		3.50	24	16	8	8	6	4
		4.00	16	8	6	4	4	-
		4.50	6	-	-	-	-	-
		#12 common	1.00	24	24	16	16	12
	1.50		24	24	16	12	8	8
	2.00		24	24	16	12	8	8
	2.50		24	16	12	8	8	6
	3.00		24	16	12	8	6	6
	3.50		24	12	8	6	4	4
	#10 common	1.00	24	24	16	12	8	8
		1.50	24	24	16	12	8	8
		2.00	24	16	12	8	8	6
		2.50	24	16	8	8	6	4
	#8 common	0.75	24	16	12	8	6	6
		1.00	24	16	8	8	6	4
		1.50	24	12	8	6	4	4
		2.00	24	12	8	6	4	4
		2.50	16	8	6	4	-	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m<sup>2</sup>

1. The maximum vertical fastener spacing along each stud spaced 16" o.c. to support the specified cladding weight (psf)
2. Minimum fastener penetration into stud is steel thickness plus three threads plus the tip.
3. The specified cladding weight shall include all supported materials, including the ECOMAXci® Ply.
4. ECOMAXci® Ply is installed with foam directly to the studs.
5. Screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
6. Proprietary fastener properties are per published data or testing.



**Table 5. ECOMAXci® Ply with 5/8" or 3/4" Fire Treated Plywood – Vertical Steel Studs 24" o.c.<sup>3,4,5,6</sup>**

Framing Member	Fastener Type and Min. Size <sup>2</sup>	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Max. Vertical Fastener Spacing <sup>1</sup> (in)					
			Cladding Weight (psf)					
			5	10	15	20	25	30
20 ga. structural (33 mil)	Rmax® Nail Board Fastener SIP LD	1.00	24	12	8	6	4	4
		1.50	16	8	6	4	4	-
		2.00	16	8	6	4	-	-
		2.50	12	6	4	-	-	-
		3.00	12	6	4	-	-	-
		3.50	8	4	-	-	-	-
		4.00	4	-	-	-	-	-
	HeadLOK	1.00	24	12	8	6	4	4
		1.50	16	8	6	4	4	-
		2.00	16	8	6	4	-	-
		2.50	16	8	4	4	-	-
		3.00	12	6	4	-	-	-
		3.50	8	4	-	-	-	-
		4.00	4	-	-	-	-	-
	#12 common	0.75	24	12	8	6	6	4
		1.00	24	12	8	6	4	4
		1.50	24	12	8	6	4	4
		2.00	16	8	6	4	4	-
		2.50	16	8	6	4	-	-
		3.00	16	8	4	4	-	-
		3.50	12	6	4	-	-	-
	#10 common or TRUFAST SIP LD	1.00	24	12	8	6	4	4
		1.50	16	8	6	4	4	-
		2.00	16	8	6	4	-	-
		2.50	12	6	4	-	-	-
	TRUFAST SIP LD	3.00	12	6	4	-	-	-
		3.50	8	4	-	-	-	-
		4.00	4	-	-	-	-	-
	#8 common	0.75	24	12	8	6	4	4
		1.00	16	8	6	4	4	-
1.50		16	8	6	4	-	-	
2.00		16	8	4	4	-	-	
2.50		12	6	4	-	-	-	



Framing Member	Fastener Type and Min. Size <sup>2</sup>	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Max. Vertical Fastener Spacing <sup>1</sup> (in)					
			Cladding Weight (psf)					
			5	10	15	20	25	30
18 ga. structural (43 mil)	Rmax® Nail Board Fastener SIP LD	0.75	24	16	12	8	8	6
		1.00	24	16	12	8	6	6
		1.50	24	16	8	8	6	4
		2.00	24	12	8	6	4	4
		2.50	16	8	6	4	4	-
		3.00	16	8	6	4	-	-
		3.50	12	6	4	-	-	-
		4.00	6	-	-	-	-	-
	HeadLOK	1.00	24	16	12	8	8	6
		1.50	24	16	8	8	6	4
		2.00	24	12	8	6	4	4
		2.50	24	12	8	6	4	4
		3.00	16	8	6	4	-	-
		3.50	12	6	4	-	-	-
		4.00	8	4	-	-	-	-
	#12 common	1.00	24	16	12	8	8	6
		1.50	24	16	12	8	6	6
		2.00	24	16	8	8	6	4
		2.50	24	12	8	6	4	4
		3.00	24	12	8	6	4	4
		3.50	16	8	6	4	-	-
	#10 common or TRUFAST SIP LD	0.75	24	16	12	8	8	6
		1.00	24	16	12	8	6	6
		1.50	24	16	8	8	6	4
		2.00	24	12	8	6	4	4
		2.50	16	8	6	4	4	-
	TRUFAST SIP LD	3.00	16	8	6	4	-	-
		3.50	12	6	4	-	-	-
		4.00	6	-	-	-	-	-
	#8 common	0.75	24	12	8	6	4	4
1.00		16	8	6	4	4	-	
1.50		16	8	6	4	-	-	
2.00		16	8	4	4	-	-	
2.50		12	6	4	-	-	-	

Framing Member	Fastener Type and Min. Size <sup>2</sup>	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Max. Vertical Fastener Spacing <sup>1</sup> (in)					
			Cladding Weight (psf)					
			5	10	15	20	25	30
16 ga. structural (54 mil)	Rmax® Nail Board Fastener SIP HD	1.00	24	24	16	16	12	8
		1.50	24	24	16	12	8	8
		2.00	24	16	12	8	8	6
		2.50	24	16	12	8	6	6
		3.00	24	12	8	6	6	4
		3.50	16	8	6	4	4	-
		4.00	12	6	4	-	-	-
	HeadLOK	1.00	24	24	16	16	12	8
		1.50	24	24	16	12	8	8
		2.00	24	16	12	8	8	6
		2.50	24	16	12	8	6	6
		3.00	24	12	8	6	6	4
		3.50	16	8	6	4	4	-
		4.00	12	6	4	-	-	-
	#12 common	1.00	24	16	12	8	8	6
		1.50	24	16	12	8	6	6
		2.00	24	16	8	8	6	4
		2.50	24	12	8	6	4	4
		3.00	24	12	8	6	4	4
		3.50	16	8	6	4	-	-
	#10 common	0.75	24	16	12	8	8	6
		1.00	24	16	12	8	6	6
		1.50	24	16	8	8	6	4
		2.00	24	12	8	6	4	4
		2.50	16	8	6	4	4	-
	#8 common	0.75	24	12	8	6	4	4
		1.00	16	8	6	4	4	-
1.50		16	8	6	4	-	-	
2.00		16	8	4	4	-	-	
2.50		12	6	4	-	-	-	



Framing Member	Fastener Type and Min. Size <sup>2</sup>	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Max. Vertical Fastener Spacing <sup>1</sup> (in)					
			Cladding Weight (psf)					
			5	10	15	20	25	30
SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m <sup>2</sup> 1. The maximum vertical fastener spacing along each stud spaced 24" o.c. to support the specified cladding weight (psf). 2. Minimum fastener penetration into stud is steel thickness plus three threads plus the tip. 3. The specified cladding weight shall include all supported materials, including the ECOMAXci® Ply. 4. ECOMAXci® Ply is installed with foam directly to the studs. 5. Screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap. 6. Proprietary fastener properties are per published data or testing.								

**Table 6.** ECOMAXci® Ply with 5/8" or 3/4" Fire Treated Plywood – Vertical FRT Wood Studs 16" o.c.

Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight <sup>2</sup> (psf)					
		5	10	15	20	25	30
Rmax® Nail Board Fastener SIP TP	0.75	24	24	20	16	12	8
	1.00	24	20	16	12	8	8
	1.50	24	20	12	8	8	8
	2.00	24	16	12	8	8	6
	2.50	16	12	8	6	6	4
	3.00	12	8	6	6	4	4
	3.50	8	8	6	4	4	-
	4.00	8	6	4	4	-	-
12d (0.148" x 3.25")	0.75	24	16	8	8	6	6
	1.00	20	12	8	6	6	4
TRUFAST SIP TP	0.75	24	24	20	16	12	8
	1.00	24	20	16	12	8	8
	1.50	24	16	12	8	8	6
	2.00	16	12	8	6	6	4
	2.50	12	8	6	6	4	4
	3.00	8	8	6	4	4	-
	3.50	8	6	4	4	-	-
	4.00	8	4	4	-	-	-
FastenMaster HeadLOK	0.75	24	24	24	16	12	12
	1.00	24	24	20	16	12	8
	1.50	24	16	12	8	8	8
	2.00	20	12	8	8	6	6

Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight <sup>2</sup> (psf)					
		5	10	15	20	25	30
	2.50	16	12	8	6	6	4
	3.00	12	8	6	6	4	4
	3.50	8	8	6	4	4	-
	4.00	8	6	4	4	-	-
	4.50	8	4	4	-	-	-
Simpson Strong-Drive SDWS22	0.75	24	24	24	20	16	16
	1.00	24	24	24	20	16	12
	1.50	24	24	16	12	12	8
	2.00	24	16	12	8	8	8
	2.50	20	12	8	8	6	6
	3.00	16	12	8	6	6	4
	3.50	12	8	8	6	6	4
	4.00	12	8	6	6	4	4
	4.50	8	8	6	4	4	4

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m<sup>2</sup>

1. Minimum fastener penetration into the stud is 1 ¼".
2. The weight of ECOMAXci® Ply is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the ECOMAXci® Ply.
3. ECOMAXci® Ply is installed directly to the studs with the plywood to the exterior of the structure.
4. FRT wood studs shall be a minimum of 2x4 and have a minimum specific gravity of 0.42.
5. The tabulated calculations are based on a strength design reduction factor of 0.90 for fasteners in FRT wood. Confirm reduction factor per the FRT manufacturer code evaluation report.
6. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
7. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

**Table 7. ECOMAXci® Ply with 5/8" or 3/4" Fire Treated Plywood – Vertical FRT Wood Studs 24" o.c.**

Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight <sup>2</sup> (psf)					
		5	10	15	20	25	30
Rmax® Nail Board Fastener SIP TP	0.75	24	16	12	8	8	6
	1.00	24	12	8	8	6	6
	1.50	16	8	8	6	4	4
	2.00	12	8	6	4	4	-
	2.50	8	6	4	4	-	-
	3.00	6	4	4	-	-	-
	3.50	6	4	-	-	-	-



Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight <sup>2</sup> (psf)					
		5	10	15	20	25	30
	4.00	4	-	-	-	-	-
	4.50	4	-	-	-	-	-
12d (0.148" x 3.25")	0.75	16	8	6	6	4	4
	1.00	12	8	6	4	4	-
TRUFAST SIP TP	0.75	24	16	12	8	8	6
	1.00	24	12	8	8	6	6
	1.50	16	8	8	6	4	4
	2.00	12	8	6	4	4	-
	2.50	8	6	4	4	-	-
	3.00	6	4	4	-	-	-
	3.50	6	4	-	-	-	-
	4.00	4	-	-	-	-	-
	4.50	4	-	-	-	-	-
FastenMaster HeadLOK	0.75	24	20	16	12	8	8
	1.00	24	16	12	8	8	6
	1.50	16	12	8	6	6	4
	2.00	12	8	6	6	4	4
	2.50	8	8	6	4	4	-
	3.00	8	6	4	4	-	-
	3.50	6	4	4	-	-	-
	4.00	6	4	-	-	-	-
	4.50	4	-	-	-	-	-
Simpson Strong-Drive SDWS22	0.75	24	24	20	12	12	8
	1.00	24	20	16	12	8	8
	1.50	24	16	12	8	8	6
	2.00	16	12	8	6	6	4
	2.50	12	8	6	6	4	4
	3.00	8	8	6	4	4	-
	3.50	8	6	4	4	4	-
	4.00	8	6	4	4	-	-
	4.50	6	4	4	-	-	-

Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight <sup>2</sup> (psf)					
		5	10	15	20	25	30
SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m <sup>2</sup> 1. Minimum fastener penetration into the stud is 1¼". 2. The weight of ECOMAXci® Ply is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the ECOMAXci® Ply. 3. ECOMAXci® Ply is installed directly to the studs with the plywood to the exterior of the structure. 4. FRT wood studs shall be a minimum of 2x4 and have a minimum specific gravity of 0.42. 5. The tabulated calculations are based on a strength design reduction factor of 0.90 for fasteners in FRT wood. Confirm reduction factor per the manufacturer code evaluation report. 6. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap. 7. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.							

**5.7 Fastener Attachments to Concrete and Masonry Substrates for ECOMAXci® Ply to Support Cladding Weight**

5.7.1 Fasteners are required to attach the ECOMAXci® Ply sheathing to the substrate to carry the cladding weight listed in the tables below. The cladding weight shall include the weight of the ECOMAXci® Ply sheathing as well as any additional cladding attached to the sheathing. The tables below only consider the gravity (dead) loads corresponding to the tabulated cladding weights.

5.7.1.1 See Table 8, Table 9, and Table 10 for allowable cladding loads for various fastener types and sheathing thicknesses for connection to minimum 2,500 psi concrete (at 28 days).

5.7.1.2 See Table 11, Table 12, and Table 13 for allowable cladding loads for various fastener types and sheathing thicknesses for connection to concrete masonry unit (CMU) block.

5.7.1.2.1 All fasteners shall be installed into the face of CMU block.

5.7.2 For attaching to concrete substrate, fasteners with equal or greater design properties shall be permitted:

5.7.2.1 ITW Buildex Tapcon® Hex: 3/16" nominal diameter.

5.7.2.2 Hilti KH-EZ C: ¼" nominal diameter.

5.7.2.3 Simpson Strong-Tie® Titen HD®: 0. ¼" nominal diameter.

5.7.3 For attaching to CMU block, fasteners with equal or greater design properties shall be permitted:

5.7.3.1 ITW Buildex Tapcon® Hex: 3/16" nominal diameter.

5.7.3.2 Hilti KH-EZ C: ¼" nominal diameter.

5.7.3.3 Simpson Strong-Tie® Titen HD®: ¼" nominal diameter.

5.7.3.4 TRUFAST SIP LD: 0.189" shank diameter.

**Table 8. Maximum Vertical Fastener Spacing for ECOMAXci® Ply Attached to Concrete (Horizontally Spaced at 16" o.c.)**

Substrate Material	Screw Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight <sup>4</sup> (psf)					
			5	10	15	20	25	30
Concrete (f <sub>c</sub> ' = 2,500 psi)	3/16" ITW Buildex Tapcon® Hex <sup>1</sup>	3/4	24	24	24	16	12	12
		1	24	24	20	16	12	8
		1½	24	24	20	12	12	8
		2	24	24	16	12	8	8
		2½	24	20	12	8	8	6
		3	24	16	8	8	6	4
		3½	24	12	8	6	4	4
		4	16	8	4	4	-	-
		4½	8	4	-	-	-	-
	¼" Hilti KH-EZ C <sup>2</sup>	3/4	24	24	24	20	16	12
		1	24	24	24	16	12	12
		1½	24	24	20	16	12	8
		2	24	24	20	12	12	8
		2½	24	24	16	12	8	8
		3	24	20	12	8	8	6
		3½	24	20	12	8	8	6
		4	24	16	8	8	6	4
		4½	24	12	8	6	4	4
	¼" Simpson Strong-Tie® Titen HD® <sup>3</sup>	3/4	24	24	16	12	8	8
		1	24	24	16	12	8	8
		1½	24	20	12	8	8	6
		2	24	20	12	8	8	6
		2½	24	16	12	8	6	6
		3	24	16	8	8	6	4
		3½	24	12	8	6	4	4
		4	20	8	6	4	4	-
		4½	16	8	4	4	-	-

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psf = 47.88 N/m<sup>2</sup>

1. Minimum nominal embedment depth of 2" and minimum edge distance of 2".
2. Minimum nominal embedment depth of 1½" and minimum edge distance of 1.5".
3. Minimum nominal embedment depth of 1½" and minimum edge distance of 1.5".
4. The cladding weight shall include the weight of the ECOMAXci® Ply sheathing as well as any additional cladding attached to the sheathing.

**Table 9.** Maximum Vertical Fastener Spacing for ECOMAXci® Ply Attached to Concrete  
(Horizontally Spaced at 24" o.c.)

Substrate Material	Screw Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight <sup>4</sup> (psf)					
			5	10	15	20	25	30
Concrete (f <sub>c</sub> ' = 2,500 psi)	3/16" ITW Buildex Tapcon® Hex <sup>1</sup>	3/4	24	24	16	12	8	8
		1	24	20	12	8	8	6
		1½	24	20	12	8	8	6
		2	24	16	8	8	6	4
		2½	24	12	8	6	4	4
		3	20	8	6	4	4	-
		3½	16	8	4	4	-	-
		4	8	4	-	-	-	-
		4½	4	-	-	-	-	-
	¼" Hilti KH-EZ C <sup>2</sup>	3/4	24	24	16	12	8	8
		1	24	24	16	12	8	8
		1½	24	20	12	8	8	6
		2	24	20	12	8	8	6
		2½	24	16	12	8	6	6
		3	24	12	8	6	6	4
		3½	24	12	8	6	4	4
		4	20	8	6	4	4	-
		4½	16	8	4	4	-	-
	¼" Simpson Strong-Tie® Titen HD® <sup>3</sup>	3/4	24	16	12	8	6	6
		1	24	16	8	8	6	4
		1½	24	12	8	6	6	4
		2	24	12	8	6	4	4
		2½	24	12	8	6	4	4
		3	20	8	6	4	4	-
		3½	16	8	6	4	-	-
		4	12	6	4	-	-	-
		4½	8	4	-	-	-	-

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psf = 47.88 N/m<sup>2</sup>

1. Minimum nominal embedment depth of 2" and minimum edge distance of 2".
2. Minimum nominal embedment depth of 1½" and minimum edge distance of 1.5".
3. Minimum nominal embedment depth of 1½" and minimum edge distance of 1.5".
4. The cladding weight shall include the weight of the ECOMAXci® Ply sheathing as well as any additional cladding attached to the sheathing.

**Table 10.** Maximum Vertical Fastener Spacing for ECOMAXci® Ply Attached to Concrete  
(Horizontally Spaced at 48" o.c.)

Substrate Material	Screw Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight <sup>4</sup> (psf)					
			5	10	15	20	25	30
Concrete (f <sub>c</sub> ' = 2,500 psi)	3/16" ITW Buildex Tapcon® Hex <sup>1</sup>	3/4	24	12	8	6	4	4
		1	20	8	6	4	4	-
		1½	20	8	6	4	4	-
		2	16	8	4	4	-	-
		2½	12	6	4	-	-	-
		3	8	4	-	-	-	-
		3½	8	4	-	-	-	-
		4	4	-	-	-	-	-
	¼" Hilti KH-EZ C <sup>2</sup>	3/4	24	12	8	6	4	4
		1	24	12	8	6	4	4
		1½	20	8	6	4	4	-
		2	20	8	6	4	4	-
		2½	16	8	6	4	-	-
		3	12	6	4	-	-	-
		3½	12	6	4	-	-	-
		4	8	4	-	-	-	-
	¼" Simpson Strong-Tie® Titen HD® <sup>3</sup>	3/4	16	8	6	4	-	-
		1	16	8	4	4	-	-
		1½	12	6	4	-	-	-
		2	12	6	4	-	-	-
		2½	12	6	4	-	-	-
		3	8	4	-	-	-	-
		3½	8	4	-	-	-	-
		4	6	-	-	-	-	-
		4½	4	-	-	-	-	-

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psf = 47.88 N/m<sup>2</sup>

1. Minimum nominal embedment depth of 2" and minimum edge distance of 2".
2. Minimum nominal embedment depth of 1 5/8" and minimum edge distance of 1.5".
3. Minimum nominal embedment depth of 1 5/8" and minimum edge distance of 1.5".
4. The cladding weight shall include the weight of the ECOMAXci® Ply sheathing as well as any additional cladding attached to the sheathing.

**Table 11. Maximum Vertical Fastener Spacing for ECOMAXci® Ply Attached to CMU Block (Horizontally Spaced at 16" o.c.)**

Substrate Material	Screw Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight <sup>5</sup> (psf)					
			5	10	15	20	25	30
CMU Block	3/16" ITW Buildex Tapcon® Hex <sup>1</sup>	3/4	24	12	8	6	6	4
		1	24	12	8	6	4	4
		1 1/2	24	12	8	6	4	4
		2	20	8	6	4	4	-
		2 1/2	16	8	4	4	-	-
		3	12	6	4	-	-	-
		3 1/2	8	4	-	-	-	-
		4	4	-	-	-	-	-
	1/4" Hilti KH-EZ C <sup>2</sup>	3/4	24	24	24	24	24	20
		1	24	24	24	24	24	20
		1 1/2	24	24	24	24	20	16
		2	24	24	24	24	16	16
		2 1/2	24	24	24	20	16	12
		3	24	24	20	16	12	8
		3 1/2	24	24	16	12	8	8
		4	24	20	12	8	8	6
	1/4" Simpson Strong-Tie® Titen HD® <sup>3</sup>	3/4	24	24	24	24	24	20
		1	24	24	24	24	24	20
		1 1/2	24	24	24	24	20	16
		2	24	24	24	24	16	16
		2 1/2	24	24	24	20	16	12
		3	24	24	24	16	12	12
		3 1/2	24	24	20	12	12	8
		4	24	24	16	12	8	8
	TRUFAST SIP LD <sup>4</sup>	3/4	24	24	24	20	16	12
		1	24	24	24	20	16	12
		1 1/2	24	24	20	16	12	8
		2	24	24	16	12	8	8
		2 1/2	24	20	12	8	8	6
		3	24	16	12	8	6	6



Substrate Material	Screw Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight <sup>5</sup> (psf)					
			5	10	15	20	25	30
		3½	24	16	8	8	6	4
		4	24	12	8	6	4	4
		4½	24	12	8	6	4	4

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psf = 47.88 N/m<sup>2</sup>

1. Allowable connection design strength is based on attachment to minimum Grade N, Type II, medium- or normal-weight CMU (conforming to ASTM C90) filled with 2,000 psi grout (conforming to ASTM C1019) and a minimum embedment of 1", edge distance of 4", and spacing of 3".
2. Allowable connection design strength is based on attachment to minimum Grade N, Type II, lightweight CMU (conforming to ASTM C90) filled with 2,000 psi grout (conforming to ASTM C1019) and a minimum embedment of 1½" edge distance of 4", and spacing of 4". At 28 days, the compressive strength of masonry,  $f_m$ , shall be a minimum of 1,500 psi.
3. Allowable connection design strength is based on attachment to minimum Grade N, Type II, lightweight CMU (conforming to ASTM C90) filled with 2,000 psi grout (conforming to ASTM C1019) and a minimum embedment of 2½", edge distance of 4", and spacing of 4". At 28 days, the compressive strength of masonry,  $f_m$ , shall be a minimum of 1,500 psi.
4. Tabulated values do not consider the masonry strength in holding the fastener as a post-installed embedment. Minimum nominal embedment depth shall be determined in accordance with accepted practice.
5. The cladding weight shall include the weight of the ECOMAXci® Ply sheathing as well as any additional cladding attached to the sheathing.

**Table 12.** Maximum Vertical Fastener Spacing for ECOMAXci® Ply Attached to CMU Block (Horizontally Spaced at 24" o.c.)

Substrate Material	Screw Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight <sup>5</sup> (psf)					
			5	10	15	20	25	30
CMU Block	¾" ITW Buildex Tapcon® Hex <sup>1</sup>	¾	20	8	6	4	4	-
		1	16	8	6	4	-	-
		1½	16	8	4	4	-	-
		2	12	6	4	-	-	-
		2½	8	4	-	-	-	-
		3	8	4	-	-	-	-
		3½	6	-	-	-	-	-
	¼" Hilti KH-EZ C <sup>2</sup>	¾	24	24	24	20	16	12
		1	24	24	24	20	16	12
		1½	24	24	24	16	12	12
		2	24	24	20	16	12	8
		2½	24	24	16	12	8	8
		3	24	20	12	8	8	6
		3½	24	16	12	8	6	6
		4	24	12	8	6	4	4
		4½	16	8	4	4	-	-
	¼" Simpson Strong-Tie® Titen HD® <sup>3</sup>	¾	24	24	24	20	16	12
		1	24	24	24	20	16	12
		1½	24	24	24	16	12	12

Substrate Material	Screw Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight <sup>5</sup> (psf)					
			5	10	15	20	25	30
		2	24	24	20	16	12	8
		2½	24	24	16	12	8	8
		3	24	24	16	12	8	8
		3½	24	20	12	8	8	6
		4	24	16	8	8	6	4
		4½	24	12	8	6	4	4
	TRUFAST SIP LD <sup>4</sup>	¾	24	24	20	12	12	8
		1	24	24	20	12	12	8
		1½	24	20	12	8	8	6
		2	24	16	12	8	6	6
		2½	24	12	8	6	6	4
		3	24	12	8	6	4	4
		3½	20	8	6	4	4	-
		4	16	8	6	4	-	-
		4½	16	8	4	4	-	-

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psf = 47.88 N/m<sup>2</sup>

1. Allowable connection design strength is based on attachment to minimum Grade N, Type II, medium- or normal-weight CMU (conforming to ASTM C90) filled with 2,000 psi grout (conforming to ASTM C1019) and a minimum embedment of 1", edge distance of 4", and spacing of 3".
2. Allowable connection design strength is based on attachment to minimum Grade N, Type II, lightweight CMU (conforming to ASTM C90) filled with 2,000 psi grout (conforming to ASTM C1019) and a minimum embedment of 1½" edge distance of 4", and spacing of 4". At 28 days, the compressive strength of masonry,  $f_m$ , shall be a minimum of 1,500 psi.
3. Allowable connection design strength is based on attachment to minimum Grade N, Type II, lightweight CMU (conforming to ASTM C90) filled with 2,000 psi grout (conforming to ASTM C1019) and a minimum embedment of 2½", edge distance of 4", and spacing of 4". At 28 days, the compressive strength of masonry,  $f_m$ , shall be a minimum of 1,500 psi.
4. Tabulated values do not consider the masonry strength in holding the fastener as a post-installed embedment. Minimum nominal embedment depth shall be determined in accordance with accepted practice.
5. The cladding weight shall include the weight of the ECOMAXci® Ply sheathing as well as any additional cladding attached to the sheathing.

**Table 13.** Maximum Vertical Fastener Spacing for ECOMAXci® Ply Attached to CMU Block (Horizontally Spaced at 48" o.c.)

Substrate Material	Screw Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight <sup>5</sup> (psf)					
			5	10	15	20	25	30
CMU Block	¾" ITW Buildex Tapcon® Hex <sup>1</sup>	¾	8	4	-	-	-	-
		1	8	4	-	-	-	-
		1½	8	4	-	-	-	-
		2	6	-	-	-	-	-
		2½	4	-	-	-	-	-
		3	4	-	-	-	-	-
	¼" Hilti KH-EZ C <sup>2</sup>	¾	24	20	12	8	8	6

Substrate Material	Screw Fastener Type & Minimum Size	Max. Nominal Thickness of the Polyiso Portion of ECOMAXci® Ply (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight <sup>5</sup> (psf)					
			5	10	15	20	25	30
		1	24	20	12	8	8	6
		1½	24	16	12	8	6	6
		2	24	16	8	8	6	4
		2½	24	12	8	6	4	4
		3	20	8	6	4	4	-
		3½	16	8	6	4	-	-
		4	12	6	4	-	-	-
		4½	8	4	-	-	-	-
	¼" Simpson Strong-Tie® Titen HD® <sup>3</sup>	¾	24	20	12	8	8	6
		1	24	20	12	8	8	6
		1½	24	16	12	8	6	6
		2	24	16	8	8	6	4
		2½	24	12	8	6	4	4
		3	24	12	8	6	4	4
		3½	20	8	6	4	4	-
		4	16	8	4	4	-	-
	TRUFAST SIP LD <sup>4</sup>	¾	24	12	8	6	6	4
		1	24	12	8	6	6	4
		1½	20	8	6	4	4	-
		2	16	8	6	4	-	-
		2½	12	6	4	-	-	-
		3	12	6	4	-	-	-
		3½	8	4	-	-	-	-
		4	8	4	-	-	-	-
	4½	8	4	-	-	-	-	

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psf = 47.88 N/m<sup>2</sup>

1. Allowable connection design strength is based on attachment to minimum Grade N, Type II, medium- or normal-weight CMU (conforming to ASTM C90) filled with 2,000 psi grout (conforming to ASTM C1019) and a minimum embedment of 1", edge distance of 4", and spacing of 3".
2. Allowable connection design strength is based on attachment to minimum Grade N, Type II, lightweight CMU (conforming to ASTM C90) filled with 2,000 psi grout (conforming to ASTM C1019) and a minimum embedment of 1⅝" edge distance of 4", and spacing of 4". At 28 days, the compressive strength of masonry,  $f_m$ , shall be a minimum of 1,500 psi.
3. Allowable connection design strength is based on attachment to minimum Grade N, Type II, lightweight CMU (conforming to ASTM C90) filled with 2,000 psi grout (conforming to ASTM C1019) and a minimum embedment of 2½", edge distance of 4", and spacing of 4". At 28 days, the compressive strength of masonry,  $f_m$ , shall be a minimum of 1,500 psi.
4. Tabulated values do not consider the masonry strength in holding the fastener as a post-installed embedment. Minimum nominal embedment depth shall be determined in accordance with accepted practice.
5. The cladding weight shall include the weight of the ECOMAXci® Ply sheathing as well as any additional cladding attached to the sheathing.

- 5.8 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.

## 6 Installation

- 6.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this TER, and the applicable building code.
- 6.2 In the event of a conflict between the manufacturer installation instructions and this TER, the more restrictive shall govern.
- 6.3 *Installation Procedure*
- 6.3.1 *Orientation*
- 6.3.1.1 ECOMAXci® Ply may be installed vertically or horizontally over cold-formed steel studs or FRT wood studs, with framing that has a nominal thickness of not less than 2" (51 mm) and spaced a maximum of 24" (610 mm) o.c.
- 6.3.1.2 ECOMAXci® Ply may be installed vertically or horizontally over concrete or CMU block in accordance with Table 8, Table 9, Table 10, Table 11, Table 12, or Table 13.
- 6.3.2 *Attachment*
- 6.3.2.1 Fasteners shall be installed with a nominal edge distance of  $\frac{3}{8}$ " (9.5 mm), unless noted otherwise.
- 6.3.2.2 Fasteners, including nuts and washers, for FRT wood used in exterior applications or wet or damp locations shall be of hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze, or copper in accordance with IBC Section 2304.10.6<sup>7</sup> for FRT wood.
- 6.3.2.3 Fasteners shall be installed with the maximum on-center spacing as indicated in Table 4 through Table 13.
- 6.3.2.4 Bending yield strength of commodity fasteners shall be as shown in NDS Table 12N, Footnote 2. Bending yield of proprietary fasteners are as published by the fastener manufacturer.
- 6.3.2.5 See footnotes of Table 8 through Table 13 for more installation information into concrete and masonry substrates.
- 6.3.2.5.1 All fasteners installed in masonry shall be in the face of CMU block.

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<sup>7</sup> 2018 IBC Section 2304.10.5

## 7 Substantiating Data

- 7.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:
  - 7.1.1 Air permeance in accordance with ASTM E2178.
  - 7.1.2 Flame spread and smoke developed ratings in accordance with ASTM E84.
  - 7.1.3 Fire performance criteria in accordance with NFPA 285.
  - 7.1.4 Fire resistance ratings in accordance with UL 263.
- 7.2 Foam Sheathing Committee Tech Matters, Guide to Attaching Exterior Wall Coverings through Foam Sheathing to Wood or Steel Framing.
- 7.3 New York State Energy Research and Development Authority (NYSERDA), *Fastening Systems for Continuous Insulation*, Apr. 2010.
- 7.4 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies (i.e. ANAB accredited agencies), approved sources (i.e., registered design professionals [RDP]), and/or professional engineering regulations. Accuracy of external test data and resulting analysis is relied upon.
- 7.5 Where pertinent, DrJ's analysis is based upon provisions that have been codified into law through state or local adoption of codes and standards. The developers of these codes and standards are responsible for the reliability of published content. DrJ's engineering practice may use a code-adopted provision as the control sample. A control sample versus a test sample establishes a product as being equivalent to the code-adopted provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.
- 7.6 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, Listings, certified reports, duly authenticated reports from approved agencies, and research reports prepared by approved agencies and/or approved sources provided by the suppliers of any raw materials. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this TER, may be dependent upon published design properties by others.
- 7.7 Testing and engineering analysis. 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.<sup>8</sup>

## 8 Findings

- 8.1 As delineated in Section 3, Rmax® ECOMAXci® Ply has performance characteristics that were tested and/or meet pertinent standards and is suitable for use pursuant to its specified purpose.
- 8.2 When used and installed in accordance with this TER and the manufacturer installation instructions, Rmax® ECOMAXci® Ply shall be approved for the following applications:
  - 8.2.1 ECOMAXci® Ply is approved for use in exterior walls of buildings when installed in accordance with the IBC for Type I-IV construction.
  - 8.2.2 Use as a nailbase for cladding materials when installed in accordance with the manufacturer installation instructions and this TER.
  - 8.2.3 Performance of foam plastics in accordance with IBC Section 2603 and IRC Section R316.
  - 8.2.4 Performance for use as an air barrier in accordance with IECC Section C402.5.1.
  - 8.2.5 Flame spread and smoke developed indices in accordance with IBC Section 2603.5.4 and IRC Section R316.3.

<sup>8</sup> See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.

- 8.2.6 Vertical and lateral fire propagation in accordance with 2018 IBC Section 2603.5.5.
- 8.2.7 Performance for use in a fire resistance rated assembly in accordance with IBC Section 2603.5.1.
- 8.3 This product has been evaluated in the context of the codes listed in Section 2 and is compliant with all known state and local building codes. Where there are known variations in state or local codes applicable to this TER, they are listed here.
- 8.3.1 No known variations
- 8.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Rmax®.
- 8.5 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10<sup>9</sup> are similar) in pertinent part states:
- 104.11 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.
- Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved.
- 8.6 Approved<sup>10</sup>: Building codes require that the building official shall accept duly authenticated reports<sup>11</sup> or research reports<sup>12</sup> from approved agencies and/or approved sources (i.e., licensed RDP) with respect to the quality and manner of use of new products, materials, designs, services, assemblies or methods of construction.
- 8.6.1 Acceptability of an approved agency, by a building official, is performed by verifying that the agency is accredited by a recognized accreditation body of the International Accreditation Forum (IAF).
- 8.6.2 Acceptability of a licensed RDP, by a building official, is performed by verifying that the RDP and/or their business entity is listed by the licensing board of the relevant jurisdiction.
- 8.6.3 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, as denial without written reason deprives a protected right to free and fair competition in the marketplace.
- 8.7 DrJ is an engineering company, employs RDPs and is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131.
- 8.8 Through ANAB accreditation and the IAF Multilateral Agreements, this TER can be used to obtain product approval in any jurisdiction or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – “certified once, accepted everywhere.”

## 9 Conditions of Use

- 9.1 Material properties shall not fall outside the boundaries defined in Section 3.
- 9.2 As defined in Section 3, 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.
- 9.3 When ECOMAXci® Ply is used as a nailbase for the cladding, fastening of the cladding to the ECOMAXci® Ply shall be designed to resist the weight of the cladding and the imposed wind pressure. Walls shall be fully braced with other materials in accordance with IBC Section 2308.6.4 or IRC Section R602.10.

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<sup>9</sup> 2018 IFC Section 104.9

<sup>10</sup> 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 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

<sup>11</sup> <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>

<sup>12</sup> <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2>

- 9.4 A separate WRB shall be installed in accordance with IBC Section 1403.2<sup>13</sup> and IRC Section R703.2.
- 9.5 Walls shall not be used to resist horizontal loads from concrete and masonry walls.
- 9.6 ECOMAXci® Ply may be used as a nail base for cladding. Fastener size and spacing shall be in accordance with Table 4 through Table 7.
- 9.7 When required by regulation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:
  - 9.7.1 Any calculations, incorporated into the construction documents that are required to show compliance with this TER, shall conform to accepted engineering practice, and shall be approved when requirements of the pertinent regulations are met.
  - 9.7.2 This TER and the installation instructions shall be submitted at the time of permit application.
  - 9.7.3 This product has an internal quality control program and a third-party quality assurance program.
  - 9.7.4 At a minimum, this product shall be installed per Section 6 of this TER.
  - 9.7.5 The review of this TER, by the AHJ, shall be in compliance with IBC Section 104 and Section 105.4.
  - 9.7.6 This product has an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4 and IRC Section R109.2.
  - 9.7.7 The application of this product in the context of this TER 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.
- 9.8 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.
- 9.9 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (e.g., owner or RDP).
- 9.10 The actual design, suitability, and use of this TER, for any particular building, is the responsibility of the owner or the owner's authorized agent.

## 10 Identification

- 10.1 The product listed in Section 1.1 is identified by a label on the board or packaging material bearing the manufacturer name, product name, TER number, and other information to confirm code compliance.
- 10.2 Additional technical information can be found at rmax.com.

## 11 Review Schedule

- 11.1 This TER is subject to periodic review and revision. For the most recent version, visit drjcertification.org.
- 11.2 For information on the current status of this TER, contact DrJ Certification.

## 12 Approved for Use Pursuant to US and International Legislation Defined in Appendix A Section 9

- 12.1 Rmax® ECOMAXci® Ply is included in this TER published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services, and whose TER Listing states either that the material, product, or service meets identified standards or has been tested and found suitable for a specified purpose. This TER meets the legislative intent and definition of being acceptable to the AHJ.

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<sup>13</sup> 2015 IBC Section 1404.2

## 1 Appendix A: Legislation that Authorizes AHJ Approval

- 1.1 **Fair Competition:** State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies and/or methods of construction that:
  - 1.1.1 Advance Innovation,
  - 1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints, and
  - 1.1.3 Benefit consumers through lower prices, better quality, and greater choice.
- 1.2 **Adopted Legislation:** The following local, state, and federal regulations affirmatively authorize Rmax® ECOMAXci® Ply to be approved by AHJs, delegates of building departments, and/or delegates of an agency of the federal government:
  - 1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies and/or methods of construction. The goal is to “protect economic freedom and opportunity by promoting free and fair competition in the marketplace.”
  - 1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation, and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.
  - 1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA).
    - 1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of listings, certified reports, Technical Evaluation Reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources.
  - 1.2.4 For new materials<sup>14</sup> that are not specifically provided for in any building code, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.
  - 1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.<sup>15</sup>
- 1.3 **Approved**<sup>16</sup> **by Los Angeles:** The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device, or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards, which apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.<sup>17</sup> The Superintendent of Building roster of approved testing agencies is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a CBI Listing are LAMC approved. In addition, the Superintendent of Building 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 the California Building Code (CBC) Section 1707.1.<sup>18</sup>

<sup>14</sup> <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2>

<sup>15</sup> [IBC 2021, Section 1706.1 Conformance to Standards](#)

<sup>16</sup> See section 8.3 for the distilled building code definition of Approved.

<sup>17</sup> [Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES](#)

<sup>18</sup> <https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1>



- 1.4 **Approved by Chicago:** The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).
- 1.5 **Approved by New York City:** The NYC Building Code 2022 (NYCBC) states in pertinent part that an approved agency shall be deemed<sup>19</sup> an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement<sup>20</sup> (i.e., ANAB, International Accreditation Forum (IAF), etc.).
- 1.6 **Approved by Florida:** Statewide approval of products, methods, or systems of construction shall be approved, without further evaluation, by 1) A certification mark or listing of an approved certification agency, 2) A test report from an approved testing laboratory, 3) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity; 4) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a professional engineer or architect, licensed in Florida. For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods; 1) A certification mark, listing, or label from a commission-approved certification agency indicating that the product complies with the code; 2) A test report from a commission-approved testing laboratory indicating that the product tested complies with the code; 3) A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code; 4) A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code; 5) A statewide product approval issued by the Florida Building Commission. The Florida Department of Business and Professional Regulation (DBPR) website provides a listing of companies certified as a Product Evaluation Agency (i.e., EVLMiami 13692), a Product Certification Agency (i.e., CER10642), and as a Florida Registered Engineer (i.e., ANE13741).
- 1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA]):** A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation 553.842 and 553.8425.

<sup>19</sup> New York City, The Rules of the City of New York, § 101-07 Approved Agencies

<sup>20</sup> New York City, The Rules of the City of New York, § 101-07 Approved Agencies

- 1.8 **Approved by New Jersey:** Pursuant to Building Code 2018 of New Jersey in IBC Section 1707.1 General,<sup>21</sup> it states: “In the absence of approved rules or other approved standards, 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 the administrative provisions of the Uniform Construction Code (N.J.A.C. 5:23)”.<sup>22</sup> Furthermore N.J.A.C 5:23-3.7 states: Municipal approvals of alternative materials, equipment, or methods of construction. **(a) Approvals:** Alternative materials, equipment, or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment, or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability and safety of those conforming with the requirements of the regulations.
1. A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment, or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of (a) above.
  2. Reports of engineering findings issued by nationally recognized evaluation service programs, such as, but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of (a) above. The New Jersey Department of Community Affairs has confirmed that technical evaluation reports, from any accredited entity listed by ANAB, meets the requirements of item 2 given that the listed entities are no longer in existence and/or do not provide “reports of engineering findings”.
- 1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards:** Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14<sup>23</sup> and Part 3280,<sup>24</sup> the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform with the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow: 1) “All construction methods shall be in conformance with accepted engineering practices”; 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.”; and 3) “The design stresses of all materials shall conform to accepted engineering practice.”
- 1.10 **Approved by US, Local, and State Jurisdictions in General:** In all other local and state jurisdictions, the regulations require approval per Sections 8.4, 8.5, and 8.6 above.
- 1.11 **Approved by International Jurisdictions:** The USMCA and GATT agreements provide for approval of innovative materials, products, designs, services, assemblies and/or methods of construction through the Technical Barriers to Trade agreements and the International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA), where these agreements:
- 1.11.1 Permit participation of conformity assessment bodies located in the territories of other Members (defined as GATT Countries) under conditions no less favourable than those accorded to bodies located within their territory or the territory of any other country,
  - 1.11.2 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.

<sup>21</sup> [https://up.codes/viewer/new\\_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1](https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1)

<sup>22</sup> <https://www.nj.gov/dca/divisions/codes/codereg/ucc.html>

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

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

- 1.11.3 State that conformity assessment procedures are not prepared, adopted, or applied with a view to or with the effect of creating unnecessary obstacles to international trade. This means that conformity assessment procedures shall not be more strict or be applied more strictly than is necessary to give the importing Member adequate confidence that products conform to the applicable technical regulations or standards.
- 1.11.4 **Approved:** The purpose of the IAF MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA, and subsequently acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, products, designs, services, assemblies and/or methods of construction. Accreditations granted by IAF MLA signatories are recognised worldwide based on their equivalent accreditation programs, therefore reducing costs and adding value to businesses and consumers.