



Technical Evaluation Report

TO ASSIST WITH CODE COMPLIANCE

Eco Red Shield™ Fire Treated (FT) Wood Protection Coating

TER No. 1510-01

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Eco Building Products, Inc.

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DIVISION: 06 00 00 – WOOD, PLASTICS, AND COMPOSITES

Section: 06 05 83 – Shop–Applied Wood Coatings

Section: 06 11 00 – Wood Framing

Section: 06 17 00 – Shop-Fabricated Structural Wood

Additional Listees:

Guthrie Lumber & Distribution, Inc.
3300 Gonzales Street
Austin, TX 78702

Northern Crossarm Co, Inc.
PO Box 34
Chippewa Falls, WI 54729

Rocky Mountain Wood Protection
5440 Franklin Street
Denver, CO 80216

Structural Technologies, LLC
126 South Lynnhaven Road
Virginia Beach, VA 23452

1. Product Lines Evaluated:

1.1. Eco Red Shield™ Fire Treated (FT) wood protection coating.

1.1.1. Eco Red Shield™ (FT) is intended for use when fire-retardant treated lumber is required by the applicable code.

1.2. For the most recent version of this report, visit drjengineering.org. For more detailed state professional engineering and code compliance legal requirements and references, visit drjengineering.org/statelaw. DrJ is fully compliant with all state professional engineering and code compliance laws.

DrJ is a Professional Engineering Approved Source

 **Learn more about DrJ's Accreditation**

- DrJ is an ISO/IEC 17065 accredited product certification body through ANSI Accreditation Services.
- DrJ provides certified evaluations that are signed and sealed by a P.E.
- DrJ's work is backed up by professional liability insurance.
- DrJ is fully compliant with IBC Section 1703.



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2. Applicable Codes and Standards:¹

- 2.1. 2009, 2012 and 2015 International Building Code (IBC)
- 2.2. 2009, 2012 and 2015 International Residential Code (IRC)
- 2.3. ANSI/AWC – National Design Specification (NDS) for Wood Construction
- 2.4. ASTM D198 – Standard Test Methods of Static Tests of Lumber in Structural Sizes
- 2.5. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- 2.6. ASTM D4587 – Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings
- 2.7. ASTM D5590 – Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay
- 2.8. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials
- 2.9. ASTM E2768 – Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials
- 2.10. AWWA E1 – Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites
- 2.11. AWWA E10 – Standard Method of Testing Wood Preservatives by Laboratory Soil-Block Cultures
- 2.12. AWWA E12 – Standard Method of Determining Corrosion of Metal in Contact with Treated Wood
- 2.13. AWWA E21 – Standard Field Test Method for the Evaluation of Wood Preservatives to be Used for Interior Applications (UC1 and UC2); Full-size Commodity Termite Test
- 2.14. AWWA M4 – Standard for the Care of Preservative-Treated Wood Products
- 2.15. AWWA U1 – Use Category System: User Specification for Treated Wood
- 2.16. NFPA 255 – Standard Method of Test of Surface Burning Characteristics of Building Materials
- 2.17. NIST PS-1 – Structural Plywood
- 2.18. NIST PS-2 – Performance Standard for Wood-Based Structural-Use Panels
- 2.19. UBC 8-1 – Test Method for Surface-Burning Characteristics of Building Materials
- 2.20. UL 723 – Standard for Test for Surface Burning Characteristics of Building Materials
- 2.21. UL 2818 – 2013 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

3. Performance Evaluation:

- 3.1. Eco Red Shield™ (FT) has been evaluated to determine its suitability to treat structural wood products used in above ground applications where they are required by code to provide the following:
 - 3.1.1. Preservative-treated wood as required by [IBC Section 2303.1.8](#) and [IRC Section R317](#) and [Section R318](#).
 - 3.1.2. Fungal Decay resistance where required by [IBC Section 2304.11](#)² and [IRC Section R317](#).
 - 3.1.3. Mold growth inhibition in accordance with *ASTM D5590* and *D3273*.
 - 3.1.4. Subterranean Termites (including Formosan) where required by [IBC Section 2304.11](#)² and [IRC Section R318](#).
 - 3.1.5. Flame spread index and smoke developed index properties where required by [IBC Section 2303.2.2](#) and [IBC Section 1403.5](#) and [IRC Section R302.9](#) and [Section R802.1.3](#)³.

¹ Unless otherwise noted, all references in this code compliant technical research report (TER) are from the 2012 version of the codes and the standards referenced therein, including, but not limited to, ASCE 7, SDPWS and WFCM. This product also complies with the 2000-2009 and 2015 versions of the IBC and IRC and the standards referenced therein. As required by law, where this research report is not approved, the building official shall respond in writing, stating the reasons this research report was not approved. For variations in state and local codes, if any, see [Section 8](#).

² [IBC 2015 Section 2304.12](#)

³ [IRC 2015 Section R802.1.5](#)

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- 3.1.6. Flexure (MOR/MOE) of solid sawn and engineered lumber after treating in accordance with *ASTM D198*.
- 3.1.7. Low emissions of volatile organic compounds in compliance with *UL 2818* for indoor commercial, educational, residential and healthcare environments. Tested in accordance to *ASTM D5116* – Small Scale Environmental Chamber Determinations of Organic Emissions from indoor Materials and *D5197* – Test Method for Determination of Formaldehyde and other Carbonyl Compounds in Air. Meets California 01350 limits for formaldehyde emissions.

3.2. Any code compliance issues not specifically addressed in this section are outside the scope of this report.

4. Product Description and Materials:



Figure 1: Eco Red Shield™ Product



Figure 2: Eco Red Shield™ Acceptable Product Stamp – Example

- 4.1. Eco Red Shield™ (FT) is a factory applied wood protection™ coating that uses disodium octaborate tetrahydrate (DOT) and fire-retardant additives to coat wood members.
- 4.2. The wood products covered in this TER include:
 - 4.2.1. Kiln Dried or Green dimensional lumber and timber species up to 30% MC including Douglas Fir lumber or any other species as delineated by the QAI listing.
 - 4.2.2. Glued Laminated Beams (GLB manufactured from Doug Fir).
- 4.3. Eco Red Shield™ (FT) provides a minimum DOT loading of 0.00975 g/in² (minimum application rate) and a minimum total coating coverage of 11.5 g/ft².

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- 4.4. Eco Red Shield™ (FT) protected products are acceptable for use in the following *AWPA*⁴ Use Categories:
- 4.4.1. UC1 – Interior construction – millwork and finishings.
 - 4.4.2. UC2 – Interior construction – interior beams, timbers, flooring, framing, millwork, and sill plates.
 - 4.4.3. UC3A – Exterior – Coated millwork, siding, and trim.
- 4.5. Eco Red Shield™ (FT) wood protection coating is supplied by Eco Building Products, Inc. and is used by the additional [listees](#) above to coat wood members in accordance with the manufacturer's requirements.

5. Applications:

- 5.1. Eco Red Shield™ (FT) is a protective coating for solid sawn Douglas Fir lumber or any other species as delineated by the QAI listing used as floor, roof and wall structural members.
- 5.1.1. Structural applications include but are not limited to use as beams, columns, headers, joists, rafters, chords and webs of trusses, and wall studs.
 - 5.1.2. Use as sill plates in direct contact with concrete or masonry is approved.
- 5.2. Eco Red Shield™ (FT) protected wood products are suitable for above ground applications not subject to contact with liquid water.
- 5.2.1. When used in exterior applications, products treated with Eco Red Shield™ (FT) must be protected from direct wetting. A minimum of one coat of primer and two coats of finish paint, or equivalent shall be used.
- 5.3. Products protected by Eco Red Shield™ (FT) meet the requirements of [IBC Section 2304.11](#)⁵ and [IRC Section R317](#) where protection against decay is required.
- 5.4. Products protected by Eco Red Shield™ (FT) meet the requirements of [IBC Section 2304.11](#)⁵ and [IRC Section R318](#) where protection against termite attack is required.
- 5.5. Products protected by Eco Red Shield™ (FT) meet the requirements where surface burning and smoke developed index values are required to be tested by [IBC Section 2303.2](#) and [IRC Section R302.9](#) and [Section R802.1.3](#)⁶ in accordance with *ASTM E84* extended 20 minutes, *UL 723* extended 20 minutes, *NFPA 255* extended 20 minutes, *UBC 8-1* extended 20 minutes, and *ASTM E2768* as follows for Doug-Fir lumber products or any other species as delineated by the [QAI listing](#):
- 5.5.1. Flame spread index – maximum of 15.
 - 5.5.2. Smoke developed index – maximum of 15.
- 5.6. Field cuts, notches, or bored holes must be site treated in accordance with the manufacturer's instructions and *AWPA M4* in accordance with [IRC Section R317.1.1](#) and [Section R318.1.2](#).
- 5.7. Design
- 5.7.1. Allowable design stresses for Eco Red Shield™ (FT) protected products for dry conditions of use are the same as the wood product before treatment.
 - 5.7.2. Since Eco Red Shield™ (FT) is a topically applied coating treatment, not a pressure treatment; the wood is not incised, so the *ANSI/AWC NDS* Incising Factor (Section 4.3.8) is not applicable.
 - 5.7.3. Maximum duration of load design stress increase shall not exceed 1.6. Duration of load design stress increase equal to or less than 1.6 shall be in accordance with Section 2.3.4 of *ANSI/AWC NDS*.
 - 5.7.4. The design provisions for wood construction noted in [IBC Section 2301.2](#) and [IRC Section R301.1.3](#) apply to Eco Red Shield™ (FT) protected products unless otherwise noted in this report.

⁴ These are *AWPA* designated wood preservation systems and retentions (pressure impregnation processes only) which have been determined to be effective in protecting wood products under specified exposure conditions. The use of Eco Red Shield™ protective wood coatings, while purposely not included in the *AWPA*'s specification, satisfies and complies with the intent of the Building Code, and is an equivalent treated material in quality, strength, effectiveness, durability and safety. Therefore, Eco Red Shield™ protective wood coatings treated articles are deemed to be Non-*AWPA* Standardized; however, the intent of the building code has been satisfied and is adequately supported by third-party verified data and accredited testing protocols. See 2012 [IBC Section 104.11](#) for methods of obtaining "Alternative Materials Approval" via Building Official Authority.

⁵ [IBC 2015 Section 2304.12](#)

⁶ [IRC 2015 Section R802.1.5](#)

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5.7.5. Connections

5.7.5.1. Lateral loads for nails, screws, bolts, and withdrawal loads for nails and screws, installed in Eco Red Shield™ (FT) protected products shall be in accordance with *ANSI/AWC NDS* using the species specific gravity.

5.7.6. Fasteners

5.7.6.1. Fasteners used with Eco Red Shield™ (FT) protected products shall be in accordance with [IBC Section 2304.9.5⁷](#) and [IRC Section R317.3](#), except that aluminum fasteners are permitted when the products are used in interior applications.

5.7.6.2. Exception as noted in [IBC Section 2304.9.5.1⁸](#) allows plain carbon steel fasteners, including nuts and washers, in SBX/DOT and zinc borate preservative-treated wood in an interior, dry environment.

6. Installation:

6.1. Products treated with Eco Red Shield™ (FT) shall be installed in accordance with the applicable code, the approved construction documents, this TER, the manufacturer's instructions and standard framing practice as applied to solid-sawn Douglas Fir lumber or any other species as delineated by the QAI listing, as applicable.

6.1.1. In the event of a conflict between any of the above and this TER, the more restrictive shall govern.

7. Test and Engineering Substantiating Data:

7.1. Test reports and data supporting the following properties:

7.1.1. Flame spread index and smoke developed index in accordance with *ASTM E84*, *UL 723*, *NFPA 255*, *UBC 8-1*, or *ASTM E2768* by QAI Laboratories per the [QAI listing](#).

7.1.2. Fungal decay in accordance with *AWPA E10* by the Wood Durability Lab (SDL) at the LSU Agricultural Center.

7.1.3. Mold growth inhibition in accordance with *ASTM D5590* and *D3273* by Siva Microbiological Solutions.

7.1.4. Termite resistance in accordance with *AWPA E1* by Wood Durability Lab (SDL) at the LSU Agricultural Center.

7.1.5. Reaction with metals in accordance with *AWPA E12* Wood Durability Lab (SDL) at the LSU Agricultural Center.

7.1.6. Flexure (MOR/MOE) of LVL/EWP in accordance with *ASTM D198* by Wood Durability Lab (SDL) at the LSU Agricultural Center.

7.1.7. Low emissions of volatile organic compounds in compliance with *UL 2818* for indoor commercial, educational, residential and healthcare environments. Tested in accordance to *ASTM D5116* – Small Scale Environmental Chamber Determinations of Organic Emissions from indoor Materials and *D5197* – Test Method for Determination of Formaldehyde and other Carbonyl Compounds in Air. Meets California 01350 limits for formaldehyde emissions.

7.2. The product(s) evaluated by this TER falls within the scope of one or more of the model, state or local building codes for building construction. The testing and/or substantiating data used in this TER is limited to buildings, structures, building elements, construction materials and civil engineering related specifically to buildings.

7.3. The provisions of model, state or local building codes for building construction do not intend to prevent the installation of any material or to prohibit any design or method of construction. Alternatives shall use consensus standards, performance-based design methods or other engineered alternative means of compliance. This TER assesses compliance with defined standards, generally accepted engineering analysis, performance-based design methods, etc. in the context of the pertinent building code requirements.

7.4. Some information contained herein is the result of testing and/or data analysis by other sources, which Dr.J relies on to be accurate as it undertakes its engineering analysis.

⁷ [IBC 2015 Section 2304.10.5](#)

⁸ [IBC 2015 Section 2304.10.5.1](#)

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- 7.5. DrJ has reviewed and found the data provided by other professional sources credible. This information has been approved in accordance with DrJ's procedure for acceptance of data from approved sources.
- 7.6. DrJ's responsibility for data provided by approved sources is in accordance with professional engineering law.
- 7.7. Where appropriate, DrJ relies on the derivation of design values, which have been codified into law through codes and standards (e.g., *IRC*, *WFCM*, *IBC*, *SDPWS*, etc.). This includes a review of code provisions and any related test data that helps with comparative analysis or provides support for equivalency to an intended end-use application.

8. Findings:

- 8.1. When used in accordance with the manufacturer's installation instructions and this TER, Eco Red Shield™ (FT) protected products comply with, or are a suitable alternative to, the requirements of [IBC Chapter 23](#); [IRC Chapter 5](#), [6](#) and [8](#) as follows:
 - 8.1.1. Eco Red Shield™ (FT) protection does not affect the allowable design stresses allowed for untreated lumber as applied to solid sawn Douglas Fir lumber or any other species as delineated by the QAI listing.
 - 8.1.2. Use as sill plates in direct contact with concrete or masonry is approved.
 - 8.1.3. Eco Red Shield™ (FT) protected products are suitable for above ground applications not subject to continuous contact with liquid water.
 - 8.1.4. When used in exterior applications, products coated with Eco Red Shield™ (FT) must be protected from direct wetting. Flashing required for horizontal applications. A minimum of one coat of primer and two coats of finish paint, or equivalent shall be used.
 - 8.1.5. Mold growth inhibition in accordance with *ASTM D5590* and *D3273* by Siva Microbiological Solutions.
 - 8.1.6. Products protected with Eco Red Shield™ (FT) meet the requirements of [IBC Section 2304.11](#)⁹ and [IRC Section R317](#) where protection against decay is required.
 - 8.1.7. Products protected with Eco Red Shield™ (FT) meet the requirements of [IBC Section 2304.11](#)⁹ and [IRC Section R318](#) where protection against termite attack is required.
 - 8.1.8. Douglas Fir lumber or any other species as delineated by the [QAI listing](#) protected with Eco Red Shield™ (FT) meet the requirements where surface burning characteristics are required to be tested by [IBC Section 2303.2](#) and [IRC Section R302.9](#) and [Section R802.1.3](#)¹⁰ in accordance with *ASTM E84* extended 20 minutes, *UL 723* extended 20 minutes, *NFPA 255* extended 20 minutes, *UBC 8-1* extended 20 minutes, and *ASTM E2768* :
 - 8.1.8.1. Flame spread index – maximum of 15.
 - 8.1.8.2. Smoke developed index – maximum of 15.
- 8.2. [IBC Section 104.11](#) and [IRC Section R104.11](#) ([IFC Section 104.9](#) is similar) state:

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, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in 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*.¹¹
- 8.3. This product has been evaluated with 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 that are applicable to this report, they are listed here:
 - 8.3.1. No known variations

⁹ [IBC 2015 Section 2304.12](#)

¹⁰ [IRC 2015 Section R802.1.5](#)

¹¹ The last sentence is adopted language in the 2015 codes.

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- 8.4. This TER uses professional engineering law, the building code, ANSI/ASTM consensus standards and generally accepted engineering practice as its criteria for all testing and engineering analysis. DrJ's professional engineering work falls under the jurisdiction of each state Board of Professional Engineers when signed and sealed.

9. Conditions of Use:

- 9.1. Where required by the authority having jurisdiction (AHJ) in which the project is to be constructed, this report and the installation instructions shall be submitted at the time of permit application.
- 9.2. Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the code official for review and approval.
- 9.3. Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.
- 9.4. Products treated with Eco Red Shield™ (FT) shall be installed in accordance with the applicable code, the approved construction documents, this TER and the manufacturer's installation instructions. If there is a conflict between this report and the manufacturer's instructions, the more restrictive shall govern.

Eco Red Shield™ (FT) complies with, or is a suitable alternative to the treatment required for Douglas Fir lumber or any other specie as delineated by the QAI listing as permitted by the codes listed in [Section 2](#), subject to the following conditions:

- 9.4.1. The service conditions for Eco Red Shield™ (FT) are any above ground application not subject to exposure to liquid water, unless painted in accordance with [Section 5.2.1](#).
- 9.4.2. Fastener design values shall be determined using the specific gravity of the lumber species used in the coated product.
- 9.4.3. Cutting and notching of Eco Red Shield™ (FT) coated products is permitted where allowed by the applicable building code, the manufacturer's recommendations, this TER or where the effects of such alterations are specifically considered in the design of the member by a Registered Design Professional.
- 9.4.3.1. Field cuts, notches, or bored holes must be site treated in accordance with the manufacturer's instructions and AWPA M4 in accordance with [IRC Section R317.1.1](#) and [Section R318.1.2](#).
- 9.4.4. Duration of load increases shall be in accordance with the limitations of the applicable building code for sawn lumber, but not greater than 1.6.
- 9.4.5. Eco Red Shield™ (FT) wood protection coating is provided by Eco Building Products in their Tacoma, WA facility or other facilities or affiliates with quality control inspections by an approved third-party quality control inspection agency.

9.5. Design

9.5.1. Building Designer Responsibility

9.5.1.1. Unless the AHJ allows otherwise, the Construction Documents shall be prepared by a Building Designer (e.g., Owner, Registered Design Professional, etc.) for the Building and shall be in accordance with [IRC Section R106](#) and [IBC Section 107](#).

9.5.1.2. The Construction Documents shall be accurate and reliable and shall provide the location, direction and magnitude of all applied loads and shall be in accordance with [IRC Section R301](#) and [IBC Section 1603](#).

9.5.2. Construction Documents

9.5.2.1. Construction Documents shall be submitted to the Building Official for approval and shall contain the plans, specifications and details needed for the Building Official to approve such documents.

9.6. Responsibilities

- 9.6.1. The information contained herein is a product, engineering or building code compliance research report performed in accordance with the referenced building codes, testing and/or analysis through the use of accepted engineering procedures, experience, and technical judgment.

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- 9.6.2. DrJ research reports provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated section.
- 9.6.3. The engineering evaluation was performed on the dates provided in this TER, within DrJ's professional scope of work.
- 9.6.4. This product is manufactured under a third-party quality control program in accordance with [/IRC Section R104.4](#) and [R109.2](#) and [/IBC Section 104.4](#) and [110.4](#).
- 9.6.5. The actual design, suitability and use of this research report for any particular building are the responsibility of the Owner or the Owner's authorized agent, and the report shall be reviewed for code compliance by the Building Official.
- 9.6.6. The use of this TER is dependent on the manufacturer's in-plant QC, the ISO/IEC 17020 third-party inspection process, proper installation per the manufacturer's instructions, the Building Official's inspection and any other code requirements that may apply to assure accurate compliance with the applicable building code.

10. Identification:

- 10.1. Eco Red Shield™ (FT) wood protective coating described in this TER is identified by a label on the material itself or the packaging material bearing the manufacturer's name, product name, TER number, and other information to confirm code compliance as stated in [/IBC Section 2303.2.4](#).
- 10.2. Products treated with Eco Red Shield™ (FT) shall be identified with "FT" on the label or otherwise marked on the product.
 - 10.2.1. Example of acceptable product stamp, see [Figure 2](#).
- 10.3. Where intended for use where Formosan Termites are a concern, the label shall identify the product as suitable for this application as part of the product marking.
- 10.4. Additional technical information can be found at www.ecob.net.

11. Review Schedule:

- 11.1. This TER is subject to periodic review and revision. For the most recent version of this TER, visit drjengineering.org.
- 11.2. For information on the current status of this TER, contact [DrJ Engineering](#).



- [Mission and Professional Responsibilities](#)
- [Product Evaluation Policies](#)
- [Product Approval – Building Code, Administrative Law, and P.E. Law](#)