

DrJ Research Report

Report No: DRR 23-0147



Issue Date: June 27, 2023

Revision Date: May 15, 2026

TechWood 4400 (TW4400) Fire Retardant and Preservative Treated Wood Protection^{1,2,3}

Report Holder:

Chemical Technologies Holding Corporation

Address: 20533 Biscayne Blvd Ste 4-629
Aventura, FL 33180-1529

Phone: 772-242-8939

Email: info@chemtechholding.com

Product Information

TW4400 (Custom Blended Product)

1. TW4400 is an approved fire-retardant treatment that meets the requirements where surface burning and smoke developed index values are required to be tested in accordance with [IBC Section 2303.2](#), [IRC Section R302.9](#), and [2021 IRC Section R802.1.5](#), in accordance with:
 - a. ASTM E2768; and
 - b. ASTM E84 extended to 30 minutes (having a listed flame spread index of 25 or less and shows no evidence of significant progressive combustion when the test is continued for an additional 20-minute period and the flame front does not progress more than 10½ feet [3200 mm] beyond the centerline of the burners at any time during the test).
2. TW4400 is an approved wood treatment where protection against decay is required in accordance with [IBC Section 2304.12](#) and [IRC Section R304](#).
3. TW4400 is an approved wood treatment where protection against termite attack is required in accordance with [IBC Section 2304.12](#) and [IRC Section R305](#).
4. The following wood species and wood structural products have been approved:
 - a. SPF, HF, DF, and SP solid sawn lumber
 - b. DF Glued Laminated lumber
 - c. DF Laminated Veneer Lumber
 - d. SP and Plywood
5. TW4400 is a custom blended wood protection product prepared from EPA-registered components—including Disodium Octaborate Tetrahydrate (DOT), biocides for mold abatement, and fire-retardant additives—that are blended to customer specifications and used to permanently impregnate various wood substrates.

- a. TW4400 is not a coating application as the term coating is used in the context of its use in IBC Chapter 2, and is not a paint or stain pursuant to IBC Chapter 2, where there is no contextual definition.
6. Custom-blended products have fourfold protection against mold growth, fungal decay, termites, and fire. For SPF, HF, and DF lumber, DF LVL, and DF GLB, this is a one-step treatment process with the final retention rate of the products listed in **Table 1**. For SP lumber, SP plywood panels undergo a two-step treatment process of FRC12 (fire protection) and then TW2200 (mold, fungal, termite, and fire protection) with the final retention rate of the products listed in **Table 1**. The combination of both FRC12 and TW2200 comprise the TW4400 product.

Table 1. Retention Levels for TechWood 4400 Products

Product	Wood Products Covered	Final Retention Level
TW4400 Fire Retardant and Preservative Treated Wood Protection	SPF, HF, DF Lumber	11.5 g/ft ²
	SP Lumber	23 g/ft ² (FRC12) + 11.5 g/ft ² (TW2200)
	SP Plywood	57.6 g/ft ² (FRC12) + 11.5 g/ft ² (TW2200)
	DF Plywood	43.2 g/ft ²
	DF LVL	36.4 g/ft ²
	DF GLB	11.5 g/ft ²

7. Protected products are acceptable for use in the following AWPA Use Categories:
- a. UC1 – Interior/Dry – millwork and finishing
 - b. UC2 – Interior/Damp – interior beams, timbers, flooring, framing, millwork, and sill plates
 - c. UC3A – Above Ground (Exterior) Protected – coated millwork, siding, and trim
8. Protected wood products are suitable for aboveground applications not subject to contact with liquid water.
- a. When used in exterior applications, products treated with TW4400 must be protected from direct wetting. A minimum of one coat of primer and two coats of exterior grade finish paint, or equivalent, shall be used.
9. TW4400 wood protection treatment is supplied by Chemical Technologies Holding Corporation as a custom blended product in compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and 40 CFR Part 167, to treat wood members in accordance with the manufacturer requirements.
10. TW4400 has regulatory approval through the use of an ANAB ISO/IEC 17065 accredited duly authenticated report⁴ and is further certified by an approved source pursuant to state professional engineering regulations.

General Certification Basis

1. IBC Section 104.2.3 (IRC Section R104.2.2 and IFC Section 104.2.3⁵ are similar) in pertinent part state:

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

2. **Approved:**⁶ Building regulations require that the building official shall accept duly authenticated reports.
 - a. An approved agency is “*approved*” when it is ANAB ISO/IEC 17065 accredited.
 - b. An approved source is “*approved*” when an RDP is properly licensed to transact engineering commerce.
 - c. Federal law, Title 18 US Code Section 242, requires that, where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

Approval of TW4400 as Alternative to FRTW

TechWood 4400 uses Disodium Octaborate Tetrahydrate (DOT), biocides for mold abatement, and fire-retardant additives to permanently impregnate members by zero to low pressure chemical delivery.

1. The results of the proprietary application process and procedures are found in the figure below.
2. The photos show the penetration of borate and phosphorous chemicals into regular framing lumber tested at two-week and four-week periods after initial treatment.
3. Both two-part tracing reagents cause color dye reactions showing the chemicals penetration depth of $\frac{3}{16}$ " – $\frac{9}{32}$ " with both boron and phosphorus chemicals.
4. This demonstrates that TechWood 4400 treatment provides permanent protection to all surfaces of the wood product.

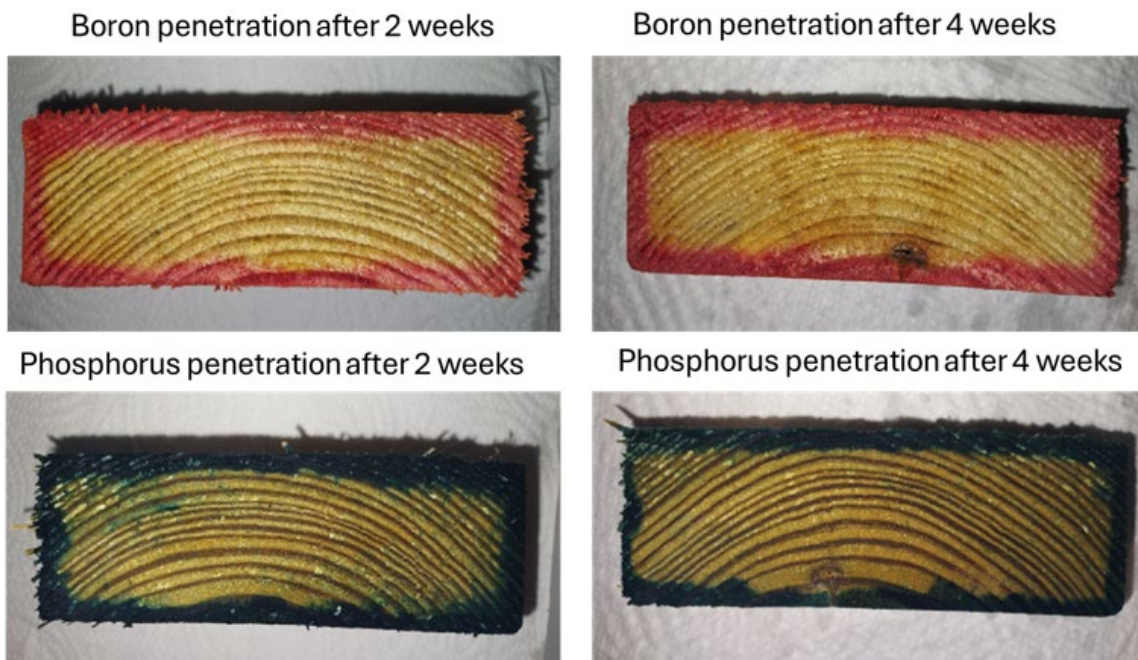


Figure 1. Dye reaction method shows chemical penetration in wood substrate. Red color indicates borate penetration, while dark blue color indicates phosphates penetration following AWP A3-05 Standard Methods for Determining Penetration of Preservatives and Fire Retardants.



TW4400 protected products would fall under the requirements of IBC Section 2303.2.3:

2303.2.3 Other Means During Manufacture For wood products impregnated with chemicals by other means during manufacture, the treatment shall be an integral part of the manufacturing process of the wood product. The treatment shall provide permanent protection to all surfaces of the wood product. The use of paints, treatments, stains or other surface treatments are not an *approved* method of protection as required in this section.

For any wood products with factory-treated wood protection to be eligible for use in construction, they need to meet key performance characteristics, summarized as follows:

1. Factory-treated wood products shall have a listed flame spread index of 25 or less.
2. Factory-treated wood products shall pass ASTM E2768, or the equivalent modification of ASTM E84 extended to 30 minutes (having a listed flame spread index of 25 or less and shows no evidence of significant progressive combustion when the test is continued for an additional 20-minute period and the flame front does not progress more than 10½ feet (3200 mm) beyond the centerline of the burners at any time during the test).
 - a. Factory-treated wood structural panels shall be tested with a ripped or cut longitudinal gap of ¼ inch (3.2 mm).

TW4400 Performance Summary

1. Products protected by TW4400 meet code requirements where surface burning and smoke developed index values are to be tested in accordance with ASTM E84/UL 723 for an extended 20 minutes, NFPA 255 for an extended 20 minutes, and/or UBC 8-1 for an extended 20 minutes.
2. TW4400 meets ASTM E2768 requirements for SPF, HF, DF, SP lumber, and SP plywood products.
3. TW4400 has no effect on the internal chemistry of any of the products it is being applied to.
4. Field cuts, notches, or bored holes must be site treated in accordance with the manufacturer instructions and AWPA M4, in accordance with IRC Section R304.1.1 and IRC Section R305.1.2.
5. Since TW4400 is a topically applied treatment and not a pressure treatment, the wood is not incised; therefore, the NDS Incising Factor is not applicable.
6. **Table 2** identifies the flame spread and smoke developed indexes for these lumber species.

Table 2. Surface Burn Characteristics¹

Lumber Species	Flame Spread Index	Smoke Developed Index
SPF	≤25	≤450
HF	≤25	≤450
DF	≤25	≤450
DF GLB	≤25	≤450
SP	≤25	≤450
SP Plywood	≤25	≤450
1. TW4400 applied at minimum 11.5 g/ft ²		



Connections:

Lateral loads for nails, screws, and bolts and withdrawal loads for nails and screws installed in TW4400 protected products shall be in accordance with NDS using the specific gravity for the wood species used.

Fasteners:

Fasteners used with TW4400 protected products include nails, screws, bolts, nuts/washers, clips, staples, and glues and shall be in accordance with ChemTech installation instructions.

Aluminum fasteners are permitted when the products are used in interior applications.

The exception noted in IBC Section 2304.10.6.1 allows plain carbon steel fasteners, including nuts and washers, in SBX/DOT and zinc borate preservative-treated wood in an interior dry environment.

Given the facts regarding what FRTW is and the regulatory acceptance criteria that defines the required performance of FRTW, TW4400 complies with all regulatory requirements of an FRTW and is a treatment that creates an FRTW product.

Therefore, TW4400 can be used in Type I and Type II (as well as exterior walls in Type III and IV) construction⁷ as follows:

2303.2.10 Type I and II Construction Applications

See Section 603.1 for limitations on the use of fire-retardant-treated wood in buildings of Type I or II construction.

603.1 Allowable Materials

Combustible materials shall be permitted in buildings of Type I or II construction in the following applications and in accordance with Sections 603.1.1 through 603.1.3:

Fire-retardant-treated wood shall be permitted in:

1. Nonbearing partitions where the required fire-resistance rating is 2 hours or less except in shaft enclosures within Group I-2 occupancies and ambulatory care facilities.
2. Nonbearing exterior walls where fire-resistance-rated construction is not required.
3. Roof construction, including girders, trusses, framing, and decking.

Exceptions:

1. In buildings of Type IA construction exceeding two stories above grade plane, fire-retardant-treated wood is not permitted in roof construction where the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).
2. Group I-2, roof construction containing fire-retardant-treated wood shall be covered by not less than a Class A roof covering or roof assembly, and the roof assembly shall have a fire-resistance rating where required by the construction type.



Summary, Code Approval, and Evaluation Conclusion

A professional engineering analysis of the use of lumber treated by TW4400 as delineated in the foregoing assessment, including all intellectual property (IP) and trade secrets (TS)⁸ provided for review, affirms that TW4400 can be used in any appropriate FRTW application per TW4400 manufacturer instructions. TW4400 is prepared as a custom blended product in accordance with 40 CFR Part 167.3 under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

Lumber and WSP treated with TW4400 require NO lumber design property adjustments when used with any software to create any structural member resistance design. Lumber design properties are found in the National Design Specification (NDS) for Wood Construction, NDS Supplement. WSP design properties can be found in the Manual for Engineered Wood Construction.

Given the IBC Structural Committee reason statement and this engineering analysis, it is clear that the intent of the IBC and IRC is to allow treatments, such as TW4400, when approved as an alternative material using an alternative method of manufacturing FRTW as provided for in the IBC as follows:

Section 1706 Design Strengths of Materials

1706.1 Conformance to Standards

The design strengths and permissible stresses of any structural material that are identified by a manufacturer's designation as to manufacture and grade by mill tests, or the strength and stress grade is otherwise confirmed to the satisfaction of the building official, shall conform to the specifications and methods of design of accepted engineering practice or the approved rules⁹ in the absence of applicable standards.¹⁰

1707.1 General

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 Section 104.2.3.

This report is created by an approved testing, inspection, and product evaluation/certification agency, and a professional engineering (PE) approved source. This report contains a PE review of ChemTech IP and TS. Please find the ChemTech ISO/IEC 17065 product evaluation/certification at this location: TER 1510-01.

DrJ has undertaken its engineering evaluation under all relevant professional engineering law and also under the auspices of our ANSI National Accreditation Board (ANAB) ISO/IEC 17065 product evaluation process.

DrJ's procedures are fully compliant with the ISO/IEC 17065 certification process and DrJ's scope of expertise.

Should there be an issue with respect to the "approval of use" of this product, any disapproval shall be based upon specific provisions of adopted legislation and shall be provided in writing stating the reasons why the alternative was not approved¹¹ with reference to any legislation or regulations that have been violated.

DrJ is unaware of any additional legislation or regulations that relate to the approval of TW4400. Based on this professional engineering analysis, TW4400 meets all of the requirements that have been adopted into law and is approved for use where regulations require the use of an FRTW.¹²

If there are any additional questions or concerns regarding the use of TW4400, a professional engineering¹³ and ANAB ISO/IEC 17065 accredited¹⁴ approved agency response can be provided. Pursuant to the IBC Section 1707.1¹⁵ and IBC Section 104.2.3,¹⁶ it is always appreciated to gain knowledge of the specific sections of the adopted building code and/or professional engineering law that an engineering evaluation does not comply with, so an accurate cure for non-compliance can be created. From specifics, a regulatory compliance path forward can be delineated, as this will serve the best interests of free and fair market competition.¹⁷

Notes

- ¹ The scope of work contained herein is limited to the specific engineering and/or code compliance analysis undertaken in this duly authenticated report, which is also known as a technical evaluation, evaluation report, research report, accepted evaluation to a reasonable degree of engineering certainty, and so forth. This work has been prepared by an Approved Source, who is a Registered Design Professional (RDP). No representation or warranty is expressed or implied by this duly authenticated report beyond the scope of work performed. Information, data, and/or analysis that becomes available in the future may justify modifications to this professional evaluation report.
- ² Approval of an RDP takes place when the RDP is properly licensed in the pertinent jurisdiction. Commercial and professional engineering laws affirm that the RDP has the ability to undertake commerce applying engineering principles in their area of expertise without restraint or discrimination. Ohio has set legal precedent.
- ³ Capitalized terms are defined in the building code, reference standards, TPI 1, the NDS, AISI S202, professional engineering law, Appendix A: Definitions/Commentary, and the National Building Code of Canada. Otherwise, terms not defined shall have ordinarily accepted meanings as the context implies.
- ⁴ ASTM definition - Duly Authenticated Report, n – A report written by an ISO/IEC 17020, ISO/IEC 17025, or ISO/IEC 17065 accredited certification entity and/or certification agency, a licensed professional architect, licensed professional engineer or technical expert. ASTM Committee E36.95
- ⁵ 2021: <https://up.codes/viewer/wyoming/ibc-2021/chapter/1/scope-and-administration#104.11>
- ⁶ Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 (<https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#201.4>) where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.
- ⁷ <https://www.woodworks.org/resources/using-wood-in-types-i-and-ii-construction/>
- ⁸ All ideas, engineering analysis, and test data are proprietary intellectual property (IP) and trade secrets (TS) and should not be provided to anyone. In particular, public regulatory officials are subject to freedom of information act requests – federal and state public records acts. This means that IP and TS will be in the public domain when any information is provided. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA), where providing test reports, engineering analysis, and/or other related IP/TS is subject to prison of not more than 10 years and/or a \$5,000,000 fine or 3 times the value of the IP and TS. To follow DTSA and to comply with state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please visit <http://www.drjengineering.org/AppendixC> and <https://www.drjcertification.org/cornell-2016-protection-trade-secrets>.
- ⁹ Approve rules is an undefined term but generally means rules surrounding the use of any product in the context of accepted engineering practice where engineering is defined as work by a code defined approved source.
- ¹⁰ There is no specific standard that is applicable to the make-up of TW4400 because it contains proprietary trade secret chemistry and protected intellectual property.
- ¹¹ Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have alternative to code-referenced materials, products, services, designs, and/or methods of construction approved for use in commerce. Disapproval of alternative to code applications shall be based upon specific provisions of adopted legislation and shall be provided in writing stating the reasons why the alternative was not approved with reference to legislation violated. Disapproval or denial of free and fair commerce without Utah legislative justification is discrimination.
- ¹² Approved: Building codes require that the building official shall accept duly authenticated reports or research reports 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. 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). 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. 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.
- ¹³ APPROVED SOURCE. An independent person, firm or corporation, approved by the building official, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses. https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source
- ¹⁴ APPROVED AGENCY. An established and recognized agency that is regularly engaged in conducting tests, furnishing inspection services or furnishing product certification where such agency has been approved by the building official. https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency
- ¹⁵ 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 IBC Section 104.11.
- ¹⁶ Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved.
- ¹⁷ <https://www.justice.gov/atr/mission>