

DrJ Research Report: 23-DrJ-0147 for ChemTech  
June 27, 2023

## TechWood 4400 (TW4400) Wood Protection Treatment Approved Alternative to Fire-Retardant-Treated Wood<sup>1,2,3</sup>

### Introduction

TechWood 4400 (TW4400) is formerly known as WoodProTech 8000<sup>TM</sup>.

TW4400 wood protection treatment products are factory-applied wood protection that use disodium octaborate tetrahydrate (DOT) and fire-retardant additives to treat wood members via a proprietary treatment process. The final product has a pH of 7, so it has no effect on the internal chemistry of the products to which it is being applied.

The TW4400 treatment process does not use a vacuum pressure impregnation<sup>4</sup> manufacturing procedure.

The American Wood Council (AWC)<sup>5</sup>, in their 2022 Fire Design Standard (FDS)<sup>6</sup>, defines Fire Retardant Treated Wood (FRTW) as follows; “**2.3.3 Fire-retardant-treated Wood:** Fire-retardant-treated wood (FRTW) shall meet the conditions of classification specified in ASTM E2768<sup>7</sup>. FRTW shall be impregnated with chemicals by a pressure process or other means during manufacture.”

This type of manufacturing generally alters the cellular structure of lumber and/or wood structural panels (WSP), requiring strength reduction factors to be used for engineered design purposes.

For code compliance purposes, TW4400 is NOT an FRTW product. Therefore, none of the FRTW prescriptive building code provisions apply to TW4400.

<sup>1</sup> The scope of work contained herein is limited to the specific engineering and/or code compliance analysis undertaken in this Research Report, which is also known as a duly authenticated report. 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 Research Report beyond the scope of work performed. Information, data, and/or analysis that becomes available in the future may justify modifications to this Research Report.

<sup>2</sup> Approval of an RDP takes place when the RDP is properly licensed in this state. Professional engineering laws grant the RDP the ability to undertake commerce applying engineering principles in their area of expertise.

<sup>3</sup> Capitalized terms are defined in the building code, reference standards, TPI 1, the NDS, AISS S202, professional engineering law, and Appendix A: Definitions/Commentary. Otherwise, terms not defined shall have ordinarily accepted meanings as the context implies.

<sup>4</sup> <https://imprexusa.com/about-vacuum-pressure-impregnation>

<sup>5</sup> <https://awc.org/about/> AWC states that they are the nationally recognized technical authority and advocate for the sustainable wood building products industry in the codes, standards, legislative, regulatory, and climate policy arenas.

<sup>6</sup> [https://awc.org/wp-content/uploads/2021/12/AWC\\_FDS2022\\_20221219\\_AWCWEBSITE.pdf](https://awc.org/wp-content/uploads/2021/12/AWC_FDS2022_20221219_AWCWEBSITE.pdf)

<sup>7</sup> Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials (30 min Tunnel Test) <https://www.astm.org/e2768-11r18.html>



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Rather, TW4400 is an alternative material using an alternative method of manufacturing, where the International Building Code (IBC) Section 1702 New Materials<sup>8</sup>, Section 1707 Alternative Test Procedures<sup>9</sup> and Section 104.11 Alternative Materials, Design and Methods of Construction and Equipment<sup>10</sup> apply.

TW4400 is an alternative material using an alternative method of manufacturing when compared to traditional FRTW pressure impregnated manufacturing concepts.

For code compliance purposes, TW4400 is equivalent in performance to FRTW, Therefore, TW4400 is International Code Council (ICC) approved for use as an innovative material and method of fire-retardant treatment (FRT).

TW4400 is intended for use when FRT lumber is required by the applicable code, along with providing preservative-treatment, fungal decay resistance, mold growth inhibition, and protection from subterranean termites.

## Executive Summary

TW4400:

1. Is an approved fire-retardant treatment that has been tested in accordance with ASTM E84. It has 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 10-1/2 feet (3200 mm) beyond the centerline of the burners at any time during the test.
2. Is not manufactured by a pressure impregnation process.
3. Has a pH of 7 so it has no effect on the internal chemistry of the products it is being applied to.
4. Fully treats lumber and WSPs using a proprietary and innovative manufacturing process.
5. Does not change lumber or WSP design properties.
6. Has regulatory approval through the use of an ANAB ISO/IEC 17065 accredited duly authenticated report<sup>11</sup> and is further certified by an approved source<sup>12</sup> pursuant to state professional engineering regulations.

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<sup>8</sup> <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1702>

<sup>9</sup> <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707>

<sup>10</sup> <https://up.codes/viewer/wyoming/ibc-2021/chapter/1/scope-and-administration#104.11>

<sup>11</sup> 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

<sup>12</sup> 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.

## How is FRTW and TW4400 as an FRTW Defined?

The American Wood Council (AWC)<sup>13</sup>, in their 2022 Fire Design Standard (FDS)<sup>14</sup> defines Fire Retardant Treated Wood (FRTW) as follows:

“2.3.3 Fire-retardant-treated Wood Fire-retardant-treated wood (FRTW) shall meet the conditions of classification specified in ASTM E2768<sup>15</sup>. FRTW shall be impregnated with chemicals by a pressure process or other means during manufacture.”

2303.2 Fire-Retardant-Treated Wood is defined as follows:

Fire-retardant-treated wood is any wood product that, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with ASTM E84 or UL 723, a listed flame spread index of 25 or less. Additionally, the ASTM E84 or UL 723 test shall be continued for a 20-minute period and the flame front shall not progress more than 10½ feet (3200 mm) beyond the centerline of the burners at any time during the test.

When reviewing code language, code definitions and the code section’s scope statement define regulatory applicability. In the case of section 2303.2, pertinent language follows:

**FIRE-RETARDANT-TREATED WOOD**.<sup>16</sup> Wood products that, when impregnated with chemicals by a pressure process or other means during manufacture, exhibit reduced surface-burning characteristics and resist propagation of fire.

Fire-retardant-treated wood is any wood product impregnated with chemicals by a pressure process or other means during manufacture.

The operative words in the AWC definition, building code regulatory definition and applicable wood construction section are “by a pressure process or other means during manufacture.”

2303.2.2 Other Means During Manufacture is defined as follows:

For wood products impregnated with chemicals by other means during manufacture, the treatment shall be an integral<sup>17</sup> 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, coating, stains or other surface treatments is not an approved method of protection as required in this section.

TW4400 falls outside of the term “impregnated with chemicals by other means during manufacture.” The “other means during manufacture” section of the building code was created specifically for products that treat the wood fibers (e.g., strands used to make OSB, veneers used to make LVL, etc.) prior to the manufacture of a finished product.

TW4400 falls outside of all AWC and building code definitions, which means it is a true alternative material using an alternative method of manufacturing.

<sup>13</sup> <https://awc.org/about/> AWC states that they are the nationally recognized technical authority and advocate for the sustainable wood building products industry in the codes, standards, legislative, regulatory, and climate policy arenas.

<sup>14</sup> [https://awc.org/wp-content/uploads/2021/12/AWC\\_FDS2022\\_20221219\\_AWCWEBSITE.pdf](https://awc.org/wp-content/uploads/2021/12/AWC_FDS2022_20221219_AWCWEBSITE.pdf)

<sup>15</sup> Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials (30 min Tunnel Test) <https://www.astm.org/e2768-11r18.html>

<sup>16</sup> [https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#fire-retardant-treated\\_wood](https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#fire-retardant-treated_wood)

<sup>17</sup> Definition of integral – adjective 1. of, relating to, or belonging as a part of the whole; constituent or component. For example wood flakes are produced, then the FRTW treatment is applied to the wood flakes, then adhesive is added as a binder and the wood flake are pressed to create a finished panel product. The FRTW is integral to the manufacturing process.



TW4400 fully treats lumber and WSPs using a proprietary and innovative manufacturing process.

TW4400 does fall under the following definition:

**FIRE RESISTANCE.** That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use.

Why? Because TW4400 retards flames under conditions of use as follows:

When TW4400 is tested in accordance with ASTM E84, it has 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.

Additionally, the flame front does not progress more than 10½ feet (3200 mm) beyond the centerline of the burners at any time during the test.

With its proprietary chemistry, TW4400 meets the regulatory criteria of being an FRTW, and also an FRT, because TW4400 uniquely treats lumber and WSPs in a manner that meets or exceeds the ASTM E84 criteria. Therefore, lumber and WSPs treated with TW4400 can be used in all applications where FRTW is allowed or required.

In addition, since TW4400 does not use a pressure process and its pH is 7 (neutral)<sup>18</sup>, its application chemistry allows lumber and/or WSP design properties to be unaffected by the TW4400 application. Hence, lumber used in any engineered design process can use lumber design properties found in the National Design Specification (NDS) for Wood Construction, NDS Supplement.

Regulatory approval is based on the following approval language adopted into the law of most 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 Section 104.11.<sup>19</sup>

A duly authenticated report is an ANAB ISO/IEC 17065 accredited report.

The TW4400 duly authenticated report is the ANAB ISO/IEC 17065 report called TER 1510-01. This duly authenticated report is further certified by an approved source<sup>20</sup> pursuant to state professional engineering regulations.

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Accredited under  
ISO/IEC 17065  
by ANSI National  
Accreditation Board (ANAB)

TW4400 is a factory-applied wood protection that uses disodium octaborate tetrahydrate (DOT) and fire-retardant additives to treat wood members, and therefore, is approved as a code compliant (ICC approved) alternative material using an alternative method of manufacturing FRT.

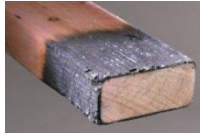
<sup>18</sup> <https://www.e-education.psu.edu/rocco/node/2041>

<sup>19</sup> <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1.1>:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.11

<sup>20</sup> 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.

## Why is TW4400 an Approved FRTW?

In general, FRTW is treated with chemicals that react to the combustible gas released from the burning wood to create carbon dioxide, water, and a carbon char layer to slow down the burning process as shown in Figure 1.



**Figure 1.** FRTW carbon char example

Lumber pyrolysis reactions are endothermic due to decreasing dehydration and increasing CO formation from porous char reactions with H<sub>2</sub>O and CO<sub>2</sub> with increasing temperature. During this “low-temperature pathway” of pyrolysis, the exothermic reactions of exposed char and volatiles with atmospheric oxygen are manifested as glowing combustion. Many fire retardants work by shifting wood degradation to the “low-temperature pathway,” which reduces the volatiles available for flaming combustion.<sup>21</sup>

In simple terms, FRTW speeds up the wood surface fire protection by lowering the temperatures for this wood protection to be triggered.

For any FRTW to be eligible for use in construction where FRTW is required, FRTW needs to meet key performance characteristics, summarized as follows:

1. FRTW treated wood fiber shall have an extended flame spread index of 25 or less.
2. FRTW wood structural panels shall be tested with a ripped or cut longitudinal gap of ⅛ inch (3.2 mm).

An area of confusion with respect to the language used in the IBC follows:

2303.2.2 Other Means During Manufacture For wood products impregnated with chemicals by other means during manufacture.....The use of paints, coating, stains or other surface treatments is not an approved method of protection as required in this section.

The statement, “The use of paints, treatment, stains or other surface treatments is not an approved method of protection as required in this section” is not intended to prohibit the use of these materials as a substitute for FRTW. The intent is solely to clarify that these other products do not fall within the IBC definition of the “other means during manufacture” category.

To add further clarification of this IBC language, IBC code change proposal number S262-16 is the code change proposal that modified the IBC Section 2303.2.2 language. The modification and the IBC structural committee reason statement follow:

**Modification: 2303.2.2 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.

<sup>21</sup> [https://www.fpl.fs.usda.gov/documnts/fplgtr/fplgtr190/chapter\\_18.pdf](https://www.fpl.fs.usda.gov/documnts/fplgtr/fplgtr190/chapter_18.pdf) page 18-9

**Committee Reason:** This code change adds a necessary (sic) clarification to the use of surface treatments for wood. **The modification makes the use of such materials possible as an alternate method<sup>22</sup>** (bold text for emphasis).

A summary of the key facts surrounding the performance of TW4400 follow:

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 SPF, HF, DF, SP plywood products.
3. TW4400 has a pH of 7 so it has no effect on the internal chemistry of any of the products it is being applied to.
4. Table 1 identifies the flame spread and smoke developed indexes for these lumber species.

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

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

- 1 Field cuts, notches, or bored holes must be site treated in accordance with the manufacturer instructions.
- 2 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.

#### 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 species specific gravity.

#### 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.

<sup>22</sup> TW4400 is an alternative material using an alternative method of manufacturing, where the International Building Code (IBC) [Section 1702 New Materials](#), [Section 1707 Alternative Test Procedures](#) and [Section 104.11 Alternative Materials, Design and Methods of Construction and Equipment](#) apply.



TW4400 has been evaluated as a treatment for structural wood products and has been found to work well:

1. With kiln-dried or green dimensional lumber and timber species up to 30% MC including Spruce-Pine-Fir (SPF), Hem-Fir (HF), Douglas Fir (DF), and Southern Pine (SP).
2. With WSP manufactured from SP.
3. With glued Laminated Beams (GLB) manufactured from DF.
4. As a preservative-treatment for wood.
5. As a fungal decay resister.
6. As a mold growth inhibitor.
7. To provide protection from subterranean termites (including Formosan).
8. To provides normal flexure (MOR/MOE) properties of solid sawn and engineered lumber after treatment.
9. To not cause wood fiber to become brash.
10. As a low emissions of volatile organic compounds (VOCs) in compliance with UL 2818 for indoor commercial, educational, residential, and healthcare environments.
11. As a California 01350 limited formaldehyde emissions product.
12. When used in the following AWPAs<sup>23</sup> 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

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, Type II (as well as exterior walls in Type III and IV) construction<sup>24</sup> as follows:

### **2303.2.9 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.

<sup>23</sup> These are AWPAs 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 TECHWOOD protective wood coatings, while purposely not included in the AWPAs' 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, TECHWOOD 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 IBC Section 104.11 for methods of obtaining "Alternative Materials Approval" via building official authority.

<sup>24</sup> <https://www.woodworks.org/resources/using-wood-in-types-i-and-ii-construction/>

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.
4. Balconies, porches, decks and exterior stairways not used as required exits on buildings three stories or less above grade plane.

Finally, the IBC has specific labeling requirements for FRTW as follows:

### **2303.2.4 Labeling**

The label shall contain the following items (see Figure 2):

1. The identification mark of an approved agency in accordance with Section 1703.5.
2. Identification of the treating manufacturer.
3. The name of the fire-retardant treatment.
4. The species of wood treated.
5. Flame spread and smoke-developed index.
6. Method of drying after treatment.
7. Conformance with appropriate standards in accordance with Sections 2303.2.5 through 2303.2.8.
8. For fire-retardant-treated wood exposed to weather, damp or wet locations, include the words “No increase in the listed classification when subjected to the Standard Rain Test” (ASTM D2898).

<b>Product Name and Manufacturer Treating Plant</b> Treating standards Reference adjusted design values Conforms to <a href="#">IBC Sections 2303.2.5 - 8</a> Drying Method	<b>Approved Agency Name and Logo</b> Product Species Surface Burning Characteristics Flame spread 25 or less; Smoke developed 450 or less Duration test (should be 30 minutes)
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**Figure 2.** FRTW Label layout example



## 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)<sup>25</sup> provided for review, affirms that TW4400 can be used in any appropriate FRTW application per TW4400 manufacturer instructions.

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 and method of manufacturing code compliant FRTW as provided for in the IBC as follows:

### Section 1702 New Materials

1702.1 General New building materials, equipment, appliances, systems or methods of construction not provided for in this code<sup>26</sup>, and any material of questioned suitability proposed for use in the construction of a building or structure, shall be subjected to the tests prescribed in this chapter and in the approved rules<sup>27</sup> to determine character, quality and limitations of use.

### 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 rules<sup>28</sup> in the absence of applicable standards.<sup>29</sup>

#### 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 104.11. The cost of all tests and other investigations required under the provisions of this code shall be borne by the owner or the owner's authorized agent.

<sup>25</sup> 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 and that means that IP and TS are in the public domain when any information is provided. 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)<sup>25</sup>, where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than 10 years<sup>25</sup> and/or a \$5,000,000 fine or 3 times the value of<sup>25</sup> the IP and TS. For more information please visit the following websites: <http://www.drjengineering.org/AppendixC> and <https://www.drjcertification.org/cornell-2016-protection-trade-secrets>.

<sup>26</sup> TW4400 contains proprietary trade secret chemistry and protected intellectual property and will never be provided for in the building code.

<sup>27</sup> 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.

<sup>28</sup> 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.

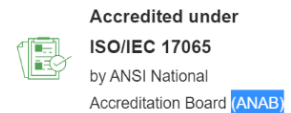
<sup>29</sup> There is no specific standard that is applicable to the make-up of TW4400 because it contains proprietary trade secret chemistry and protected intellectual property.



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<sup>30</sup>.

DrJ's code compliance work has been performed in concert with "ICC's Product Approval Check List for Code Officials," which is found in Appendix A. 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, which is the identical ANSI-accredited certification approval process listed in the checklist. ANAB accreditation is often promoted by others stating that they are "ICC Approved." In addition, DrJ's ANAB accredited scope<sup>31</sup> of expertise is found in Appendix B.

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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 alternative material using an alternative method of FRT manufacturing, 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 approved<sup>32</sup> 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.<sup>33</sup>

If there are any additional questions or concerns regarding the use of TW4400, a professional engineering<sup>34</sup> and ANAB ISO/IEC 17065 accredited<sup>35</sup> approved agency response can be provided. Pursuant to the IBC section 1707.1<sup>36</sup> and 104.11,<sup>37</sup> 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 everyone's free and fair market<sup>38</sup> competition's best interests.

<sup>30</sup> <https://www.drjcertification.org/report/download/1094>

<sup>31</sup> [https://www.drjcertification.org/sites/default/files/uploads/attachments/node/1717/Accredited\\_Certification\\_Body\\_Scope\\_Comparison-Construction.pdf](https://www.drjcertification.org/sites/default/files/uploads/attachments/node/1717/Accredited_Certification_Body_Scope_Comparison-Construction.pdf)

<sup>32</sup> 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.

<sup>33</sup> Approved: Building codes require that the building official shall accept duly authenticated reports<sup>33</sup> or research reports<sup>33</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. 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.

<sup>34</sup> 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](https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source)

<sup>35</sup> 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](https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency)

<sup>36</sup> 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.

<sup>37</sup> 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.

<sup>38</sup> <https://www.justice.gov/atr/mission>, <https://www.justice.gov/atr/mission#:~:text=The%20goal%20of,by%20anticompetitive%20restraints>

## Appendix A



### PRODUCT APPROVAL CHECKLIST FOR CODE OFFICIALS

Product:	
Manufacturer:	
Date:	

This "Product Approval Checklist" provides suggested items for building officials to consider when they utilize an evaluation report or listing in deciding whether to approve a product for use in the field. The items on the checklist are suggestions only. It is the responsibility and authority of the appropriate reviewing officials to determine (a) what matters to consider, (b) the reliability, relevance, and effect of any evaluation report or listing, (c) the applicability of any codes and standards, and (d) whether the product in question should be approved for use.

#### Basic Approval Criteria

- ☐ The **report or listing** relates to the specific product and manufacturer at hand.
- ☐ The **report or listing** has not expired.
- ☐ The **report or listing** references a code, standard or criteria covering the entire product, material or method.

#### Other Important Items to Consider

- ☐ The product has been evaluated to a code and/or standard and/or criteria.
- ☐ The code edition referenced in the report or listing is the code currently used in the jurisdiction.
- ☐ The standard or criteria referenced in the report or listing is the latest version.

#### Accreditation Verification

- ☐ The product has **proof of compliance** for the specific installation, **in the form of a report or listing** an **accredited Certification Body**.

Some entities that provide accreditation to Certification Bodies include:

IAS <https://www.iasonline.org/>  
 A2LA <https://portal.a2la.org/search>  
 ANSI <https://anab.ansi.org/>  
 ema [https://www.ema.org.mx/portal\\_v3](https://www.ema.org.mx/portal_v3)  
 SCC <https://www.scc.ca/en/accreditation>

- ☐ The **scope of the Certification Body's accreditation covers the code, standard or criteria referenced** in the report A Certification Body's scope of accreditation information may be available on the accrediting entity's website or may otherwise be obtained by contacting the accrediting entity.

Notes:



## Appendix B

### ANAB Accredited Certification Body



## Approved. Sealed. Code Compliant.

IN MARKET TERMS, DrJ IS "ICC-APPROVED"

DrJ simplifies the code compliance process for innovators and is the only ANAB Accredited Certification Body to stand behind certifications with a PE seal.

**VERIFICATION PROCESS:** 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). Examples include DrJ, ICC-ES, IAPMO, Intertek, and UL. Each accredited certification body, as a code-defined approved agency, is qualified to practice within their specified "accredited scopes."

**CODE ACCEPTANCE FOR NEW PRODUCTS:** Building codes require that the building official shall accept duly authenticated reports or research reports from approved agencies and/or approved sources, including licensed Registered Design Professionals (RDs), with respect to the quality and manner of use of new products, materials, designs, services, assemblies, or methods of construction. See DrJ's scope of expertise below.

ICS No.	ICS Description	DrJ	ICC-ES	IAPMO	Intertek	UL
<b>Section 13: ENVIRONMENT, HEALTH PROTECTION, SAFETY</b>						
13.220	Protection Against Fire	✓	✓		✓	✓
13.220.01	Protection against fire in general	✓			✓	✓
13.220.10	Fire-fighting	✓			✓	✓
13.220.20	Fire protection	✓	✓		✓	✓
13.220.40	Ignitability & burning behaviour of materials & products	✓	✓		✓	✓
13.220.50	Fire-resistance of building materials & elements	✓	✓		✓	✓
13.220.99	Other standards related to protection against fire	✓			✓	
<b>Section 21: MECHANICAL SYSTEMS &amp; COMPONENTS FOR GENERAL USE</b>						
21.060	Fasteners	✓	✓			
21.060.01	Fasteners in general	✓	✓			
21.060.10	Bolts, screws, studs	✓	✓			
21.060.20	Nuts	✓	✓			
21.060.30	Washers, locking elements	✓				
21.060.40	Rivets	✓	✓			
21.060.50	Pins, nails	✓	✓			
21.060.60	Rings, bushes, sleeves, collars	✓				
21.060.70	Clamps & staples	✓	✓			
21.060.99	Other fasteners	✓	✓			
<b>Section 27: ENERGY &amp; HEAT TRANSFER ENGINEERING</b>						
27.010	Energy & Heat Transfer Engineering in General	✓	✓	✓		
27.160	Solar Energy Engineering	✓	✓	✓	✓	✓
<b>Section 29: ELECTRICAL ENGINEERING</b>						
29.035	Insulating Materials	✓		✓	✓	✓
29.035.01	Insulating materials in general	✓				✓
29.035.10	Paper & board insulating materials	✓			✓	✓
29.035.20	Plastics & rubber insulating materials	✓		✓	✓	✓
29.035.30	Glass & ceramic insulating materials	✓			✓	✓
29.035.99	Other insulating materials	✓				✓

Current as of 4/13/2023

ICS No.	ICS Description	DrJ	ICC-ES	IAPMO	Intertek	UL
<b>Section 71: CHEMICAL TECHNOLOGY</b>						
71.100	Products of the Chemical Industry	✓	✓	✓	✓	✓
71.100.50	Wood-protecting chemicals	✓	✓			
<b>Section 77: METALLURGY</b>						
77.060	Corrosion of Metals	✓	✓			✓
77.140	Iron & Steel Products	✓	✓	✓		
77.140.01	Iron & steel products in general	✓		✓		
77.140.10	Heat-treatable steels	✓				
77.140.15	Steels for reinforcement of concrete	✓	✓			
77.140.20	Stainless steels	✓				
77.140.25	Spring steels	✓				
77.140.30	Steels for pressure purposes	✓				
77.140.35	Tool steels	✓				
77.140.40	Steels w/ special magnetic properties	✓				
77.140.45	Non-alloyed steels	✓				
77.140.50	Flat steel products & semi-products	✓	✓			
77.140.60	Steel bars & rods	✓	✓			
77.140.65	Steel wire, wire ropes & link chains	✓	✓			
77.140.70	Steel profiles	✓	✓			
77.140.75	Steel pipes & tubes for specific use	✓		✓		
77.140.80	Iron & steel castings	✓				
77.140.85	Iron & steel forgings	✓				
77.140.99	Other iron & steel products	✓		✓		
77.150	Products of Non-Ferrous Metals	✓	✓	✓		
77.150.01	Products of non-ferrous metals in general	✓	✓	✓		
77.150.10	Aluminum products	✓	✓	✓		
77.150.20	Magnesium products	✓	✓			
77.150.30	Copper products	✓	✓	✓		
77.150.40	Nickel & chromium products	✓	✓			
77.150.50	Titanium products	✓	✓			
77.150.60	Lead, zinc & tin products	✓	✓			
77.150.70	Cadmium & cobalt products	✓	✓			
77.150.99	Other products of non-ferrous metals	✓	✓	✓		

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ICS No.	ICS Description	DrJ	ICC-ES	IAPMO	Intertek	UL
<b>Section 79: WOOD TECHNOLOGY</b>						
79.040	Wood, Sawlogs & Sawn Timber	✓	✓		✓	
79.060	Wood-Based Panels	✓	✓			✓
79.060.01	Wood-based panels in general	✓	✓			
79.060.10	Plywood	✓	✓			✓
79.060.20	Fibre & particle boards	✓	✓			✓
79.060.99	Other wood-based panels	✓	✓			
79.080	Semi-Manufactures of Timber	✓	✓			
<b>Section 81: GLASS &amp; CERAMICS INDUSTRIES</b>						
81.040	Glass	✓	✓		✓	
81.040.01	Glass in general	✓				
81.040.10	Raw materials & raw glass	✓				
81.040.20	Glass in building	✓	✓			✓
81.040.30	Glass products	✓	✓			
<b>Section 83: RUBBER &amp; PLASTIC INDUSTRIES</b>						
83.080	Plastics	✓	✓	✓	✓	✓
83.080.01	Plastics in general	✓	✓	✓		✓
83.080.10	Thermosetting materials	✓		✓	✓	✓
83.080.20	Thermoplastic materials	✓	✓	✓	✓	✓
83.100	Cellular Materials	✓	✓	✓	✓	✓
83.120	Reinforced Plastics	✓	✓	✓	✓	✓
83.140	Rubber & Plastics Products	✓	✓	✓	✓	✓
83.140.01	Rubber & plastics in general	✓		✓		✓
83.140.10	Films & sheets	✓	✓	✓		✓
83.140.20	Laminated sheets	✓	✓			✓
83.140.99	Other rubber & plastics products	✓	✓	✓	✓	✓
83.180	Adhesives	✓	✓	✓	✓	✓
<b>Section 91: CONSTRUCTION MATERIALS &amp; BUILDING</b>						
91.010	Construction Industry	✓	✓	✓		
91.010.01	Construction Industry in general	✓	✓	✓		
91.010.10	Legal aspects	✓	✓	✓		
91.010.20	Contractual aspects	✓	✓	✓		
91.010.30	Technical aspects	✓	✓	✓		
91.010.99	Other aspects	✓	✓	✓		
91.040	Buildings	✓				✓
91.040.01	Buildings in general	✓				
91.040.10	Public buildings	✓				
91.040.20	Buildings for commerce & industry	✓				
91.040.30	Residential buildings	✓				
91.040.99	Other buildings	✓				✓
91.060	Elements of Buildings	✓	✓	✓	✓	✓
91.060.01	Elements of buildings in general	✓	✓	✓		
91.060.10	Walls, Partitions, Façades	✓	✓	✓	✓	✓
91.060.20	Roofs	✓	✓	✓	✓	✓
91.060.30	Ceilings, Floors, Stairs	✓	✓	✓	✓	✓
91.060.40	Chimneys, shafts, ducts	✓	✓	✓	✓	✓
91.060.50	Doors & windows	✓	✓	✓	✓	✓
91.060.99	Other elements of buildings	✓	✓	✓	✓	
91.080	Structures of Buildings	✓	✓	✓	✓	
91.080.01	Structures of buildings in general	✓	✓	✓	✓	
91.080.10	Metal structures	✓	✓	✓	✓	
91.080.17	Aluminum structures	✓	✓			
91.080.20	Timber structures	✓	✓	✓	✓	
91.080.30	Masonry	✓	✓	✓		
91.080.40	Concrete structures	✓	✓	✓		
91.080.99	Other structures	✓	✓	✓		
91.090	External Structures	✓	✓	✓	✓	✓
91.100	Construction Materials	✓	✓	✓	✓	✓
91.100.01	Construction materials in general	✓	✓	✓	✓	
91.100.10	Cement, Gypsum, Lime, Mortar	✓	✓	✓	✓	
91.100.15	Mineral materials & products	✓	✓	✓		
91.100.23	Ceramic tiles	✓	✓	✓		
91.100.25	Terracotta building products	✓	✓	✓	✓	
91.100.30	Concrete & concrete products	✓	✓	✓	✓	
91.100.40	Products in fibre-reinforced cement	✓	✓	✓	✓	
91.100.50	Binders, Sealing materials	✓	✓	✓	✓	✓
91.100.60	Thermal & sound insulating materials	✓	✓	✓	✓	✓
91.100.99	Other construction materials	✓	✓	✓		
91.120	Protection of & in Buildings	✓	✓	✓	✓	✓
91.120.01	Protection of & in buildings in general	✓	✓	✓		
91.120.10	Thermal insulation of buildings	✓	✓	✓	✓	✓
91.120.20	Acoustics in building, Sound insulation	✓	✓	✓	✓	✓
91.120.25	Seismic & vibration protection	✓	✓	✓		
91.120.30	Waterproofing	✓	✓	✓	✓	✓
91.120.40	Lightning protection	✓	✓	✓	✓	✓
91.120.99	Other standards related to protection of & in buildings	✓	✓	✓		
91.180	Interior Finishing	✓	✓	✓		
91.190	Building Accessories	✓	✓	✓	✓	✓
91.200	Construction Technology	✓				
<b>Section 93: CIVIL ENGINEERING</b>						
93.010	Civil Engineering in General	✓				
93.020	Earthworks, Excavations, Foundation Construction, Underground Works.	✓	✓		✓	

\* ICC's approval procedure is called the ICC Product Approval Checklist for Code Officials. "ICC Approved" can also be termed ICC Accepted, ICC Report, ICC Evaluation, HUD Approved, OSHA Approved, NY Approved, Title 24 Approved, CA Approved, FL Approved, Los Angeles Approved, NYC Approved, DCA Approved, Chicago Approved, San Francisco Approved, Miami Dade Approved, as well as other terms specific to given markets. **These market-specific terms all refer to the acceptance of accredited agencies.**

**For additional information, please call 608-310-6748 or visit [drjcertification.org](http://drjcertification.org).**





January 13, 2020

Mr. Larry Wainright  
Vice President  
DrJ Engineering, LLC  
6300 Enterprise Lane  
Madison, WI 53719

Re: ANSI National Accreditation Board (ANAB) Accreditation process in accordance with the ISO/IEC 17065 Conformity assessment: requirements for bodies certifying product, process and services

Dear Mr. Wainright

Effective December 28, 2018 the American National Standards Institute (ANSI) acquired full interest in the ANSI-ASQ National Accreditation Board (ANAB), strengthening ANSI's and ANAB's abilities to provide the highest quality third-party accreditation services for diverse global markets. ANAB is a wholly owned subsidiary of ANSI, registered as a separate legal entity and renamed the ANSI National Accreditation Board (ANAB).

ANAB has initiated steps to integrate legacy ANSI Accreditation Services into the ANSI National Accreditation Board, this transition period will continue over the next five years. During this time both the ANSI logo, "ANSI Accredited" symbol, current version of the ANAB logo and symbol, as well as the revised ANAB logo and accreditation symbol will be in the marketplace and remain valid.

The ANSI National Accreditation Board (ANAB) is a non-governmental organization that provides accreditation services and training to public- and private-sector organizations, serving the global marketplace. ANAB is the largest accreditation body in North America and provides services in more than 75 countries. Our business depends on focusing on customers so all users will continue to value our service and have confidence in the ANAB accreditation symbol.

ANAB is a signatory of the International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC) multilateral [recognition](#) arrangements.

ANAB provides accreditation services to [Product Certification Bodies](#) in accordance with the requirements of ISO/IEC 17065 entitled "Conformity assessment -- Requirements for bodies certifying products, processes and services". All Product Certification Bodies that are accredited by ANAB are required to adhere to the same ANAB assessment requirements in accordance with International Standards and ANAB accreditation requirements. ANAB provides a [directory](#) of all Product Certification Bodies that have been accredited under ISO/IEC 17065. Each certification body listed provides services in their areas of expertise as defined by their "Scopes of Accreditation". ANAB's objective is to "promote consistency and demonstrate equivalence of assessments via mutual recognition based on peer review and to reduce multiple audits and remove barriers to trade in working towards the goal of "certified once – accepted everywhere."

[www.anab.org](http://www.anab.org) | Milwaukee, WI | Alexandria, VA | Fort Wayne, IN | Cary, NC | Washington, DC

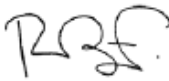


Users can rely upon technical evaluations by any of the ANAB accredited Product Certification Bodies [listed](#) as competent in their area of expertise.

DrJ Engineering, LLC located at 6300 Enterprise Lane, Madison, WI 53719 is a Certification Body duly accredited by ANAB in accordance with ISO/IEC 17065, ANAB's accreditation requirements, and other technical requirements related to the operation of their Certification Program.

DrJ Engineering original accreditation date was granted on December 29, 2014. This accredited certification body is accredited to offer product certification for the scopes that are reflected by the ICS Codes listed in the Certificate of Accreditation as publicly shown within the ANAB Accreditation Directory of Product Certifiers. While the listed Certificate of Accreditation still displays the ANSI logo and mark, upon expiration it will be replaced with a new certificate containing the new corporate logo.

If you have any questions, please do not hesitate to contact me.  
Sincerely,



Reinaldo Figueiredo Senior Program Director  
Product/Process/Services Accreditation Programs  
ANSI National Accreditation Board

