

# Listing and Technical Evaluation Report™

Report No: 1711-01



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## SPAX® 5/16" PowerLags® Fasteners for Use in Deck Ledger Board Applications

Trade Secret Report Holder:

Altenloh, Brinck & Company U.S., Inc.

Phone: 419-636-6715

Website: [www.spax.us](http://www.spax.us)

### CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

Section: 06 11 00 - Wood Framing

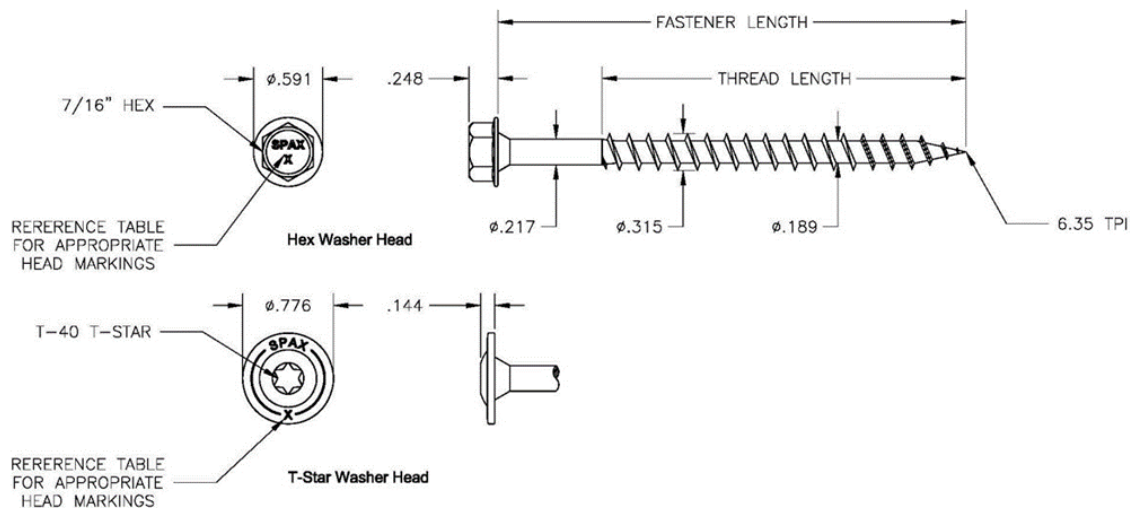
Section: 06 15 00 - Wood Decking

### 1 Innovative Product Evaluated<sup>1</sup>

1.1 SPAX 5/16" PowerLags Fasteners

### 2 Product Description and Materials

2.1 The innovative product evaluated in this report is shown in **Figure 1**.



**Figure 1.** PowerLags Fasteners (in)



- 2.2 PowerLags Fasteners are manufactured with carbon steel grade 1022 or 10B21 wire conforming to ASTM A510, or grade 17MnB3 or 19MnB4 wire conforming to DIN 1654.
- 2.3 PowerLags Fasteners are manufactured using a standard cold-formed process followed by a heat-treating process. Allowable bending yield and critical dimensions are found in **Figure 1** and **Table 1**.
- 2.3.1 PowerLags Fasteners heads are a  $\frac{7}{16}$ " hex drive or a T-40 T-star drive.
- 2.3.2 PowerLags Fasteners have a gimlet point.
- 2.4 PowerLags Fasteners are available with proprietary coatings HCR™ and HCR-X™ that exceed the protection provided by code approved hot-dipped galvanized coatings meeting ASTM A153 (IBC Section 2304.10.6<sup>ii</sup> and IRC Section R317.3).
- 2.4.1 HCR coating is approved for use in ground contact and pressure treated wood (Alkaline Copper Quaternary, ACQ) in general construction (freshwater) applications.
- 2.4.2 HCR-X coating is approved for use in ground contact and pressure treated wood (ACQ) in coastal construction (saltwater) applications.
- 2.5 HCR and HCR-X Coated Fasteners are approved for use in fire-retardant treated lumber, provided the conditions set forth by the fire-retardant treated lumber manufacturer are met, including appropriate strength reductions.
- 2.6 The fasteners evaluated in this report are set forth in **Table 1**.

**Table 1.** Fastener Specifications

Fastener Name	Head (in)				Lengths (in)		Diameters (in)			Bending Yield Strength, <sup>3</sup> f <sub>yb</sub> (psi)
	Style	Marking	Diameter	Thickness	Fastener <sup>1</sup>	Thread <sup>2</sup>	Shank	Minor	Major	
PowerLags Fasteners ( <sup>5</sup> / <sub>16</sub> " )	Hex	4	0.591	0.248	4	2.993	0.217	0.189	0.315	150,000
	T-Star		0.776	0.140		2.375				
	Hex	5	0.591	0.248	5	2.375				
	T-Star		0.776	0.140		2.375				
SI: 1" = 25.4 mm, 1 lb = 4.45 N, 1 psi = 0.00689 MPa										
1. Fastener length is measured from the underside of the head to the tip.										
2. Thread length includes tip; see <b>Figure 1</b> .										
3. Determined in accordance with methods specified in ASTM F1575, based on minor thread diameter using a five percent (5%) offset of the load displacement curves developed from bending tests.										

- 2.7 In-plant quality control procedures, under which the PowerLags Fasteners are manufactured, are audited through an inspection process performed by an approved agency.
- 2.8 As needed, review material properties for design in **Section 6** and to regulatory evaluation in **Section 8**.



### 3 Definitions

- 3.1 New Materials<sup>iii</sup> are defined as building materials, equipment, appliances, systems, or methods of construction not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.<sup>iv</sup> The design strengths and permissible stresses shall be established by tests<sup>v</sup> and/or engineering analysis.<sup>vi</sup>
- 3.2 Duly Authenticated Reports<sup>vii</sup> and Research Reports<sup>viii</sup> are test reports and related engineering evaluations, which are written by an approved agency<sup>ix</sup> and/or an approved source.<sup>x</sup>
- 3.2.1 These reports contain intellectual property and/or trade secrets, which are protected by the Defend Trade Secrets Act (DTSA).<sup>xi</sup>
- 3.3 An approved agency is “approved” when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory.
- 3.4 An approved source is “approved” when a professional engineer (i.e., Registered Design Professional) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.<sup>xii</sup>
- 3.5 Testing and/or inspections conducted for this Duly Authenticated Report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body, and/or a licensed Registered Design Professional (RDP).
- 3.5.1 The Center for Building Innovation (CBI) is ANAB<sup>xiii</sup> ISO/IEC 17025 and ISO/IEC 17020 accredited.
- 3.6 The regulatory authority shall enforce<sup>xiv</sup> the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing<sup>xv</sup> stating the nonconformance and the path to its cure.
- 3.7 The regulatory authority shall accept Duly Authenticated Reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.<sup>xvi</sup>
- 3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope, shall be approved.<sup>xvii</sup> Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.<sup>xviii</sup>
- 3.9 Approval equity is a fundamental commercial and legal principle.<sup>xix</sup>

### 4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation<sup>xx</sup>

#### 4.1 Standards

- 4.1.1 *ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction*
- 4.1.2 *ASTM A153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware*
- 4.1.3 *ASTM A510: Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel*
- 4.1.4 *ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus*
- 4.1.5 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood*
- 4.1.6 *ASTM D2395: Standard Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood-Based Materials*
- 4.1.7 *ASTM D4442: Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials*
- 4.1.8 *ASTM F1575: Standard Test Methods for Determining Bending Yield Moment of Nails*
- 4.1.9 *ASTM G85: Standard Practice for Modified Salt Spray (Fog) Testing*



## 4.2 Regulations

- 4.2.1 IBC – 15, 18, 21: International Building Code®
- 4.2.2 IRC – 15, 18, 21: International Residential Code®
- 4.2.3 IECC – 15, 18, 21: International Energy Conservation Code®

## 5 Listed<sup>xxi</sup>

- 5.1 A nationally recognized testing laboratory such as CBI, states that the materials, designs, methods of construction, and/or equipment have met nationally recognized standards and/or have been tested and found suitable for use in a specified manner.

## 6 Tabulated Properties Generated from Nationally Recognized Standards

- 6.1 PowerLags Fasteners are used for attaching the deck ledger to the band joists of a building in accordance with IBC Section 1604.8.3 and IRC Section R507.9.<sup>xxii</sup>
- 6.2 PowerLags Fasteners are installed without lead holes as prescribed in NDS.
  - 6.2.1 The IRC provides prescriptive fastener spacing for the attachment of a deck ledger to a band joist with 1/2" diameter lag screws or through bolts as shown in IRC Table R507.9.1.3(1). **Table 2** provides PowerLags Fasteners spacing required to provide performance at least equivalent to the lag screws found in IRC Table R507.9.1.3(1), in accordance with IBC Section 104.11, IBC Section 1604.8.3, IRC Section R104.11 and IRC Section R507.9.<sup>xxiii</sup> in accordance with generally accepted engineering practice. **Table 2** provides PowerLags Fasteners spacing for items found in IRC Table R507.9.1.3(1),<sup>xxiv</sup> as well as a wider range of materials commonly used for band joists.
- 6.3 The maximum deck joist spans in ledger connection applications for PowerLags Fasteners are specified in **Table 2** and **Figure 2**.

**Table 2.** PowerLags Fasteners Spacing for Maximum Deck Joist Spans<sup>1,4,5,10</sup>

Loading Condition <sup>6</sup> (psf)	Head Type	Fastener Length <sup>2</sup> (in)	2x Nominal Ledger Species <sup>3,7,8</sup>	Band Joist Material <sup>9</sup>	Maximum Deck Joist Spans						
					Up to 6'	Up to 8'	Up to 10'	Up to 12'	Up to 14'	Up to 16'	Up to 18'
					Maximum On-Center Spacing of PowerLags Fasteners						
LL + DL 40 + 10	T-Star	4 or 5	HF/SPF	Sawn Lumber	22	16	16	15	12	11	10
				1" min EWP	23	17	16	15	13	11	10
			DF/SP	Sawn Lumber	34	25	20	17	13	12	10
				1" min EWP	23	17	16	14	12	11	9
	Hex Head		HF/SPF	Sawn Lumber	28	21	17	12	11	9	8
				1" min EWP	21	14	11	9	8	7	6
			DF/SP	Sawn Lumber	30	22	18	12	10	9	8
				1" min EWP	26	19	16	13	11	10	8
SL + DL 50 + 10	T-Star	HF/SPF	Sawn Lumber	18	16	15	12	10	9	8	
			1" min EWP	19	16	15	12	11	9	8	



**Table 2. PowerLags Fasteners Spacing for Maximum Deck Joist Spans<sup>1,4,5,10</sup>**

Loading Condition <sup>6</sup> (psf)	Head Type	Fastener Length <sup>2</sup> (in)	2x Nominal Ledger Species <sup>3,7,8</sup>	Band Joist Material <sup>9</sup>	Maximum Deck Joist Spans							
					Up to 6'	Up to 8'	Up to 10'	Up to 12'	Up to 14'	Up to 16'	Up to 18'	
					Maximum On-Center Spacing of PowerLags Fasteners							
SL + DL 60 + 10	Hex Head		DF/SP	Sawn Lumber	28	21	17	13	11	10	8	
				1" min EWP	19	16	14	12	10	9	8	
			HF/SPF	Sawn Lumber	24	18	12	10	9	8	7	
				1" min EWP	18	12	9	8	7	6	5	
			DF/SP	Sawn Lumber	25	18	12	10	8	7	6	
				1" min EWP	21	16	13	11	9	8	7	
	T-Star		HF/SPF	Sawn Lumber	16	16	12	10	9	8	7	
				1" min EWP	16	16	13	11	9	8	7	
				DF/SP	Sawn Lumber	24	18	13	11	9	8	7
					1" min EWP	16	15	12	10	9	7	7
			Hex Head	HF/SPF	Sawn Lumber	20	13	11	9	7	6	6
					1" min EWP	14	10	8	7	6	5	4
DF/SP				Sawn Lumber	21	1	10	8	7	6	5	
				1" min EWP	18	14	11	9	8	7	6	
SL + DL 70 + 10	T-Star		HF/SPF	Sawn Lumber	16	14	11	9	8	7	6	
				1" min EWP	16	14	11	9	8	7	6	
			DF/SP	Sawn Lumber	21	15	12	10	8	7	6	
				1" min EWP	16	13	11	9	7	6	6	
	Hex Head		HF/SPF	Sawn Lumber	18	12	9	8	6	6	5	
				1" min EWP	12	9	7	6	5	4	4	
			DF/SP	Sawn Lumber	18	11	9	7	6	5	5	
				1" min EWP	16	12	10	8	7	6	5	



**Table 2. PowerLags Fasteners Spacing for Maximum Deck Joist Spans<sup>1,4,5,10</sup>**

Loading Condition <sup>6</sup> (psf)	Head Type	Fastener Length <sup>2</sup> (in)	2x Nominal Ledger Species <sup>3,7,8</sup>	Band Joist Material <sup>9</sup>	Maximum Deck Joist Spans						
					Up to 6'	Up to 8'	Up to 10'	Up to 12'	Up to 14'	Up to 16'	Up to 18'
					Maximum On-Center Spacing of PowerLags Fasteners						

SI: 1" = 25.4 mm

- Based on load duration of 1.0. Spacing may be adjusted by the applicable load duration as specified in NDS.
- Fasteners are required to have full thread penetration into the main member. Excess fastener length extending beyond the main member is not reflected in the table above.
- Solid sawn ledgers shall be HF/SPF or DFL/SP species (specific gravity of 0.42 and 0.50 respectively), designed by others. Fasteners shall be staggered from the top to the bottom along the length of the ledger while maintaining the required edge and end distances as shown in **Figure 2**.
- Fasteners shall be staggered from the top to the bottom along the length of the ledger while maintaining the required edge and end distances as shown in **Figure 2**.
- A maximum 5/8" structural sheathing may be installed between the ledger and the band joist.
- Table values assume 10-psf dead load.
- Ledger materials assumed to be in wet service condition.
- Minimum ledger board requirements: 1 1/2" thickness and 7 1/2" depth.
- Minimum band joist requirements: SPF (specific gravity of 0.42) solid-sawn lumber 1 1/2" thick and 7 1/2" depth; EWP 1.0" thick and 7 1/4" depth.
- Tabulated on-center spacing values are applicable where a third-party tested plastic washer (i.e., Deck2Wall® Spacer) is installed between the ledger board and band joist at each fastener location. The plastic washer shall be installed per the washer manufacturer instructions and this report. The plastic washer shall be 2" in diameter, 1/2" thick (max), with an approximate 5/16" hole in the center for the PowerLags Fasteners and three 3/16" (approximate) holes for the #8 screws. The plastic washer shall be independently fastened to the ledger with three SPAX #8 x 1 5/8" or three SPAX #8 x 2" screws.

- 6.4 Where the application falls outside of the performance evaluation, conditions of use and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science, and fire science.

## 7 Certified Performance<sup>xxv</sup>

- 7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.<sup>xxvi</sup>
- 7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.<sup>xxvii</sup>

## 8 Regulatory Evaluation and Accepted Engineering Practice

- 8.1 SPAX  $\frac{5}{16}$ " PowerLags Fasteners were evaluated to determine their ability to provide code complying attachment of deck ledger boards to the building structure.
- 8.2 For conventionally framed buildings, the ledger is required to be attached to the band joist in accordance with IBC Section 1604.8.3 and IRC Section R507.9,<sup>xxviii</sup> as applicable.
- 8.2.1 This evaluation provides fastening patterns for PowerLags Fasteners in a format similar to what is presented in IRC Table R507.9.1.3(1).<sup>xxix</sup>
- 8.2.2 Where a band joist is not used, as in some truss installations, an engineered design is required.
- 8.3 Ultimate connection capacities and deflections of typical ledger board connections were match tested and evaluated in accordance with the IRC and IBC.
- 8.4 Corrosion resistance in accordance with ASTM B117 and ASTM G85 Annex A5.

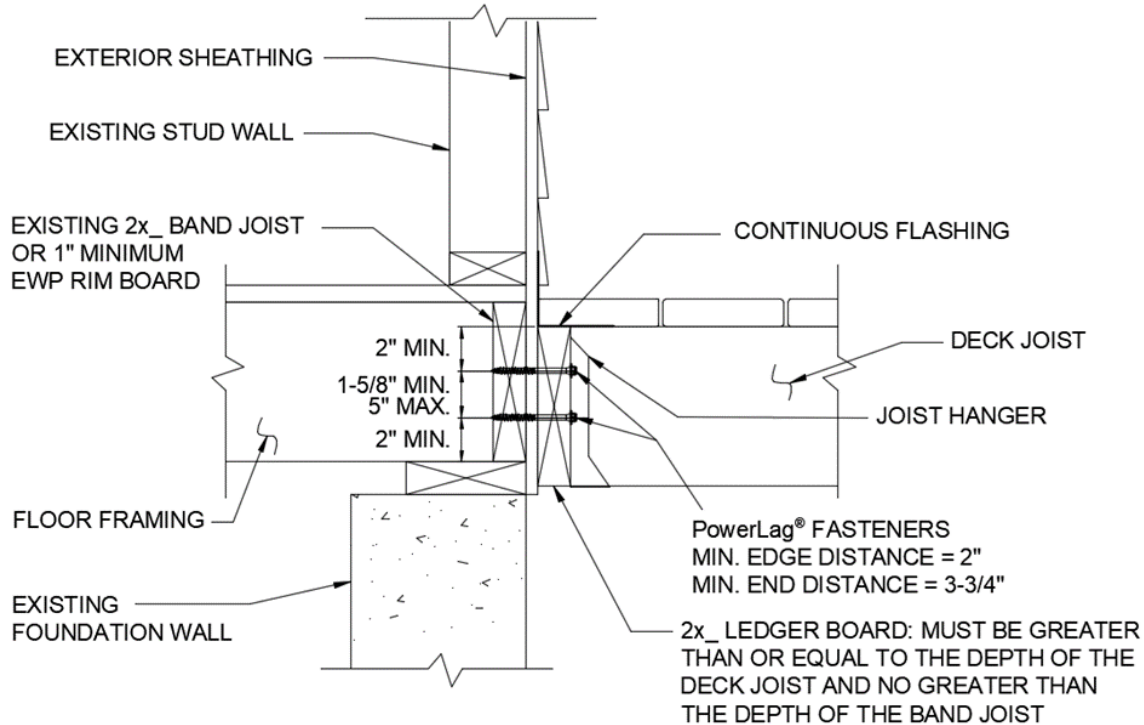




- 8.5 Any building code, regulation, and/or accepted engineering evaluations (i.e., research reports, Duly Authenticated Reports, etc.) that are conducted for this Listing were performed by DrJ Engineering, LLC (DrJ), an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP/approved sources. DrJ is qualified<sup>xxx</sup> to practice product and regulatory compliance services within its scope of accreditation and engineering expertise, respectively.
- 8.6 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which are also its areas of professional engineering competence.
- 8.7 Any regulation specific issues not addressed in this section are outside the scope of this report.

## 9 Installation

- 9.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report and the applicable building code.
- 9.2 In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.
- 9.3 The  $\frac{5}{16}$ " PowerLags structural wood fastener must be installed with a  $\frac{1}{2}$ " (12.7 mm), low rpm/high torque electric drill (450 rpm) or impact wrench using the appropriate driver bit. Drive the fasteners through the ledger and sheathing into the band joist until the built-in washer head is drawn firm and flush to the ledger board. Do not overdrive.
- 9.4 Install PowerLags Fasteners so that the threads fully engage the band joist material and the fastener tip extends beyond the back face of the band joist material when fully seated against the installed ledger.
- 9.4.1 A third-party tested plastic washer (i.e., Deck2Wall Spacer) may be installed between the ledger board and band joist at each fastener location. The plastic washer shall be installed per the washer manufacturer instructions and this report.
- 9.4.1.1 The third-party tested plastic washer shall be 2" in diameter,  $\frac{1}{2}$ " thick (max), with an approximate  $\frac{5}{16}$ " hole in the center for the PowerLags Fasteners and three  $\frac{3}{16}$ " (approximate) holes for the #8 screws.
- 9.4.1.1.1 The third-party tested plastic washer shall be independently fastened to the ledger with three SPAX #8 x  $1\frac{5}{8}$ " or three SPAX #8 x 2" screws.
- 9.5 Lead holes are not required.
- 9.6 **Figure 2** shows a detail of the PowerLags Fasteners deck connection, including minimum edge and end distances.
- 9.7 Stagger the PowerLags Fasteners from the top to the bottom along the length of the ledger while maintaining the required edge and end distances.



**Figure 2.** PowerLags Fasteners Deck Connection

9.8 For applications outside the scope of this report, an engineered design is required.

## 10 Substantiating Data

- 10.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:
  - 10.1.1 Bending yield, shear, and tensile strength testing in accordance with ASTM F1575
  - 10.1.2 Lateral resistance and withdrawal resistance testing in accordance with ASTM D1761
  - 10.1.3 Head pull-through resistance testing in accordance with ASTM D1037
  - 10.1.4 Corrosion resistance testing in accordance with ASTM B117 and ASTM G85, Annex A5
  - 10.1.5 Deck ledger assembly testing in general accordance with ASTM D1761
- 10.2 DCA 6, Prescriptive Residential Wood Deck Construction Guide; AF&PA; 2010
- 10.3 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or RDPs. Accuracy of external test data and resulting analysis is relied upon.
- 10.4 Where pertinent, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.





- 10.5 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, or Duly Authenticated Reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this Duly Authenticated Report, may be dependent upon published design properties by others.
- 10.6 Testing and engineering analysis: The strength, rigidity, and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.<sup>xxxi</sup>
- 10.7 Where additional condition of use and/or regulatory compliance information is required, please search for PowerLags Fasteners on the DrJ Certification website.

## 11 Findings

- 11.1 As outlined in **Section 6**, PowerLags Fasteners have performance characteristics that were tested and/or meet applicable regulations and are suitable for use pursuant to its specified purpose.
- 11.2 When used and installed in accordance with this Duly Authenticated Report and the manufacturer installation instructions, PowerLags Fasteners shall be approved for the following applications:
- 11.2.1 Used as a suitable alternative to the requirements of the IBC Section 1604.8.3 and IRC Section R507.9.<sup>xxxii</sup>
- 11.2.2 PowerLags Fasteners with HCR coating are approved for use in ground contact and pressure treated wood (ACQ) in general construction (freshwater) applications.
- 11.2.3 PowerLags Fasteners with HCR-X coating are approved for use in ground contact and pressure treated wood (ACQ) in coastal construction (saltwater) applications.
- 11.2.4 HCR and HCR-X Coated Fasteners are approved for use in fire-retardant treated lumber, provided the conditions set forth by the fire-retardant-treated lumber manufacturer are met, including appropriate strength reductions.
- 11.3 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Altenloh, Brinck & Company U.S., Inc.
- 11.4 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10)<sup>xxxiii</sup> are similar) in pertinent part states:

**104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code. Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved.

- 11.5 **Approved:**<sup>xxxiv</sup> Building regulations require that the building official shall accept Duly Authenticated Reports.<sup>xxxv</sup>
- 11.5.1 An approved agency is "approved" when it is ANAB ISO/IEC 17065 accredited.
- 11.5.2 An approved source is "approved" when an RDP is properly licensed to transact engineering commerce.
- 11.5.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.



- 11.6 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB-Accredited Product Certification Body – Accreditation #1131.
- 11.7 Through the IAF Multilateral Agreements (MLA), this Duly Authenticated Report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 Duly Authenticated Reports are equivalent.<sup>xxxvi</sup>

## 12 Conditions of Use

- 12.1 Material properties shall not fall outside the boundaries defined in **Section 6**.
- 12.2 As defined in **Section 6**, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.
- 12.3 As listed herein, PowerLags Fasteners shall not be used:
- 12.3.1 With fastener spacing exceeding values set in **Table 2** for code compliance and the installation conditions considered.
- 12.4 When required by adopted legislation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:
- 12.4.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.
- 12.4.2 This report and the installation instructions shall be submitted at the time of permit application.
- 12.4.3 This innovative product has an internal quality control program and a third-party quality assurance program.
- 12.4.4 At a minimum, this innovative product shall be installed per **Section 9** of this report.
- 12.4.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.
- 12.4.6 This innovative product has an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4, and IRC Section R109.2.
- 12.4.7 The application of this innovative product in the context of this report is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2, and any other regulatory requirements that may apply.
- 12.5 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, *“the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new material or assemblies as provided for in Section 104.11,”* all of IBC Section 104, and IBC Section 105.4.
- 12.6 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).
- 12.7 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.



### 13 Identification

- 13.1 The innovative product listed in **Section 1.1** is identified by a label on the board or packaging material bearing the manufacturer name, product name, this report number, and other information to confirm code compliance.
- 13.2 Additional technical information can be found at [www.spax.us](http://www.spax.us).

### 14 Review Schedule

- 14.1 This report is subject to periodic review and revision. For the latest version, visit [drjcertification.org](http://drjcertification.org).
- 14.2 For information on the status of this report, please contact [DrJ Certification](#).

### 15 Approved for Use Pursuant to U.S. and International Legislation Defined in Appendix A

- 15.1 SPAX <sup>5</sup>/<sub>16</sub>" PowerLags Fasteners are included in this report published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services. This report states either that the material, product, or service meets recognized standards or has been tested and found suitable for a specified purpose. This report meets the legislative intent and definition of being acceptable to the AHJ.



## Appendix A

### 1 Legislation that Authorizes AHJ Approval

- 1.1 **Fair Competition:** State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies, and/or methods of construction that:
  - 1.1.1 Advance innovation,
  - 1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints, and
  - 1.1.3 Benefit consumers through lower prices, better quality, and greater choice.
- 1.2 **Adopted Legislation:** The following local, state, and federal regulations affirmatively authorize this innovative product to be approved by AHJs, delegates of building departments, and/or delegates of an agency of the federal government:
  - 1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies, and/or methods of construction. The goal is to “*protect economic freedom and opportunity by promoting free and fair competition in the marketplace.*”
  - 1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies, and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.
  - 1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA),<sup>xxxvii</sup> where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than ten years<sup>xxxviii</sup> and/or a \$5,000,000 fine or 3 times the value of<sup>xxxix</sup> the Intellectual Property (IP) and Trade Secrets (TS).
    - 1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of Listings, certified reports, Technical Evaluation Reports, Duly Authenticated Reports, and/or research reports prepared by approved agencies and/or approved sources.
  - 1.2.4 For new materials<sup>xi</sup> that are not specifically provided for in any regulation, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.
  - 1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.<sup>xli</sup>
  - 1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence provided in writing, that specific legislation have been violated by an individual registered PE.
  - 1.2.7 The AHJ 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>xlii</sup>



- 1.3 **Approved<sup>xliii</sup> by Los Angeles:** The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device, or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards that apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.<sup>xliv</sup> The Superintendent of Building Approved Testing Agency Roster is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a DrJ Listing are LAMC approved. In addition, the Superintendent of Building shall accept Duly Authenticated Reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.<sup>xlv</sup>
- 1.4 **Approved by Chicago:** The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly, and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).
- 1.5 **Approved by New York City:** The 2022 NYC Building Code (NYCBC) states in part that an approved agency shall be deemed<sup>xlvi</sup> an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement<sup>xlvii</sup> (i.e., ANAB, International Accreditation Forum [IAF], etc.).
- 1.6 **Approved by Florida:** Statewide approval of products, methods, or systems of construction shall be approved, without further evaluation by:
- 1.6.1 A certification mark or listing of an approved certification agency,
  - 1.6.2 A test report from an approved testing laboratory,
  - 1.6.3 A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity, or
  - 1.6.4 A product evaluation report based upon testing, comparative or rational analysis, or a combination thereof, developed, signed and sealed by a professional engineer or architect, licensed in Florida.
  - 1.6.5 For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods:
    - 1.6.5.1 A certification mark, listing or label from a commission-approved certification agency indicating that the product complies with the code,
    - 1.6.5.2 A test report from a commission-approved testing laboratory indicating that the product tested complies with the code,
    - 1.6.5.3 A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code,



- 1.6.5.4 A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code, or
- 1.6.5.5 A statewide product approval issued by the Florida Building Commission.
- 1.6.6 The [Florida Department of Business and Professional Regulation \(DBPR\)](#) website provides a listing of companies certified as a [Product Evaluation Agency](#) (i.e., EVLMiami 13692), a [Product Certification Agency](#) (i.e., CER10642), and as a [Florida Registered Engineer](#) (i.e., ANE13741).
- 1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA]):** A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation [553.842](#) and [553.8425](#).
- 1.8 **Approved by New Jersey:** Pursuant to the 2018 Building Code of New Jersey in [IBC Section 1707.1 General](#),<sup>xlviii</sup> it states: “*In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from [approved agencies](#) in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the Uniform Construction Code (N.J.A.C. 5:23)*.”<sup>xlix</sup> Furthermore N.J.A.C 5:23-3.7 states: “*Municipal approvals of alternative materials, equipment, or methods of construction.*”
- 1.8.1 **Approvals:** Alternative materials, equipment, or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment, or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability, and safety of those conforming with the requirements of the regulations.
- 1.8.1.1 A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment, or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of the above.
- 1.8.1.2 Reports of engineering findings issued by nationally recognized evaluation service programs such as but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of the above.
- 1.8.2 The [New Jersey Department of Community Affairs](#) has confirmed that technical evaluation reports, from any accredited entity listed by [ANAB](#), meets the requirements of item the previous paragraph, given that the listed entities are no longer in existence and/or do not provide “*reports of engineering findings.*”
- 1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards:** Pursuant to Title 24, Subtitle B, Chapter XX, [Part 3282.14](#)<sup>i</sup> and [Part 3280](#),<sup>ii</sup> the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform to the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow:
- 1.9.1 “*All construction methods shall be in conformance with accepted engineering practices.*”
- 1.9.2 “*The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.*”
- 1.9.3 “*The design stresses of all materials shall conform to accepted engineering practice.*”





- 1.10 Approval by US, Local and State Jurisdictions in General:** In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:
- 1.10.1 For new materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests.<sup>lii</sup>
  - 1.10.2 For innovative alternatives and/or methods of construction, the building official shall accept Duly Authenticated Reports from approved agencies with respect to the quality and manner of use of new materials or assemblies.<sup>liii</sup>
    - 1.10.2.1 An approved agency is “approved” when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is in the ANAB directory.
    - 1.10.2.2 An approved source is “approved” when an RDP is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.<sup>liv</sup>
  - 1.10.3 The design strengths and permissible stresses of any structural material...shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.<sup>lv</sup>
- 1.11 Approval by International Jurisdictions:** The USMCA and GATT agreements provide for approval of innovative materials, designs, services, and/or methods of construction through the Agreement on Technical Barriers to Trade and the IAF Multilateral Recognition Arrangement (MLA), where these agreements:
- 1.11.1 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.
  - 1.11.2 **Approved:** The purpose of the MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA and subsequently, acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, designs, services, and/or methods of construction.
  - 1.11.3 ANAB is an IAF-MLA signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope, shall be approved.<sup>lvi</sup>
  - 1.11.4 Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.<sup>lvii</sup>
- 1.12** Approval equity is a fundamental commercial and legal principle.<sup>lviii</sup>



- For more information, visit [drcertification.org](https://www.drcertification.org) or call us at 608-310-6748.
- ii [2018 IBC Section 2304.10.5](#)
- iii <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1702>
- iv Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review <https://www.justice.gov/atr/mission> and <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11>
- v <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706>:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests%20as
- vi The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706>:~:text=shall%20conform%20to%20the%20specifications%20and%20methods%20of%20design%20of%20accepted%20engineering%20practice
- vii <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies
- viii <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2>
- ix [https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved\\_agency](https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency)
- x [https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved\\_source](https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source)
- xi <https://www.law.cornell.edu/uscode/text/18/1832> (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of \$5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: [Intellectual Property and Trade Secrets](#).
- xii <https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional> AND <https://apassociation.org/list-of-engineering-boards-in-each-state-archive/>
- xiii <https://www.cbiteest.com/accreditation/>
- xiv <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104>:~:text=to%20enforce%20the%20provisions%20of%20this%20code
- xv <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11>:~:text=Where%20the%20alternative%20material%2C%20design%20or%20method%20of%20construction%20is%20not%20approved%2C%20the%20building%20official%20shall%20respond%20in%20writing%2C%20stating%20the%20reasons%20why%20the%20alternative%20was%20not%20approved AND <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#105.3.1>:~:text=If%20the%20application%20or%20the%20construction%20documents%20do%20not%20conform%20to%20the%20requirements%20of%20pertinent%20laws%2C%20the%20building%20official%20shall%20reject%20such%20application%20in%20writing%2C%20stating%20the%20reasons%20therefore
- xvi <https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>:~: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
- xvii <https://iaf.nu/en/about-iaf-mla/#>:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope
- xviii True for all ANAB accredited product evaluation agencies and all International Trade Agreements.
- xix <https://www.justice.gov/crl/deprivation-rights-under-color-law> AND <https://www.justice.gov/atr/mission>
- xx Unless otherwise noted, all references in this Listing are from the 2021 version of the codes and the standards referenced therein. This material, product, design, service and/or method of construction also complies with the 2000-2021 versions of the referenced codes and the standards referenced therein.
- xxi <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2> (Listed%20or%20certified); <https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#listed> AND <https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled>
- xxii [2015 IRC Section R507.2](#)
- xxiii [2015 IRC Section R507.1](#)
- xxiv [2015 IRC Table R507.2](#)
- xxv <https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4>
- xxvi <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#>:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades
- xxvii <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#>:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur
- xxviii [2015 IRC Section R507.1](#)
- xxix [2015 IRC Table R507.2](#)



- xxx Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.
- xxxi See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.
- xxxii 2015 IRC Section 507.2
- xxxiii 2018 IFC Section 104.9
- xxxiv 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.
- xxxv <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>
- xxxvi Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.
- xxxvii <http://www.drjengineering.org/AppendixC> AND <https://www.drjcertification.org/cornell-2016-protection-trade-secrets>
- xxxviii <https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years>
- xxxix <https://www.law.cornell.edu/uscode/text/18/1832#:~:text=Any%20organization%20that,has%20thereby%20avoided>
- xl <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2>
- xli IBC 2021, Section 1706.1 Conformance to Standards
- xlii IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General
- xliii See Section 11 for the distilled building code definition of **Approved**
- xliv Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES
- xlv <https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1>
- xlvi New York City, The Rules of the City of New York, § 101-07 Approved Agencies
- xlvii New York City, The Rules of the City of New York, § 101-07 Approved Agencies
- xlviii <https://up.codes/viewer/new-jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1>
- xlix <https://www.nj.gov/dca/divisions/codes/codreg/ucc.html>
- i <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14>
- ii <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280>
- iii IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials. Adopted law pursuant to IBC model code language 1706.2.
- iiii IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General. Adopted law pursuant to IBC model code language 1707.1.
- liv <https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional> AND <https://apassociation.org/list-of-engineering-boards-in-each-state-archive/>
- lv IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.
- lvi <https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope>
- lvii True for all ANAB accredited product evaluation agencies and all International Trade Agreements.
- lviii <https://www.justice.gov/crt/deprivation-rights-under-color-law> AND <https://www.justice.gov/atr/mission>