


Secrets of the Research for Alternate Building Materials




**Alternate
Materials
IBC & IRC**

Wednesday am_3/13/2024

Instructor: Russell Thornburg

INSTRUCTOR:



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Background:
 Building Contractor - 1984 to present
 Building Inspector Technician - 1997 - 2 years
 Field Inspector - 1997 - 2020
 Residential Plans Examiner - 1997 - to present
 Code Development Committee - started 2001
 Instructor - 1998 - present
 Code Consultant - 2008 to present
 Program Manager - Short Stint

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"Disclaimer"

- The opinions expressed in this presentation are the opinions of the presenter Russell Thornburg and do not represent the official opinion of the International Code Council (ICC) or that of the administrative authority of any jurisdiction. As always, the Building Official of the Jurisdiction, County or State has the final authority.
- This presentation is used as a guideline for the instructor and no part of this work may be reproduced, distributed or transmitted in any form or by any means, including, without limitation, electronic, optical or mechanical, without advance written permission from Russell Thornburg and from those who gave Russell permission.

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"Disclaimer"

- The text in this presentation does not necessarily represent actual code language. The presented text may summarize, highlight or generalize the code section. Additional provisions or exceptions may be included in the actual code section. References to the code sections are given for the purpose of verifying the complete provisions of the code section. ←
- Participants of the code are responsible for reading, studying, (reading & studying) interpreting (attending code panels & discussions), and enforcing the code as directed by the administrators of their code. ←


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In Reference to all: Materials / Products / Illustrations / Pictures and comments of this Presentation

"Do not Assume:"

- ...that any picture in this presentation is in compliance of code, manufacturer's listing etc...
- ...that any product has been fully researched to the intent of the code
- ...that any product that can be sold / purchased meets any code requirements
- ...that any one product has been tested and meets the intent of any past/current adopted codes
- ...that any product has been properly installed unless you have done a complete thorough research of that product through the manufacturer's installation instruction, approved acceptable tested listing, and have reviewed its current evaluation report requirements by approved testing agency.

The Fine Print




- There are times when the code is vague or silent.
- You may get my opinion.
- You have yours!
- We can disagree!

Bottom line: the AHJ makes the final interpretation.

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Today's Agenda:

1. Define "Alternative"
2. Provide tools required to assess an alternative.
3. Discuss the processes used to approve alternatives.
4. Review a few alternates



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What is an alternate, anyway?



- Building Material
- Design
- Method
- Equipment
- Anything that is not specified or addressed within code or any code.
- But may be found in Appendix

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Why Alternates?



- Building codes always lags behind creativity...
- Product Development
- Architectural Design Practices
- Market Demands

Malls - Alternative Design until 1982

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Administration


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...

R104.11 Alternative materials

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Administration



- ...provided that any such alternative has been approved.

R104.11 Alternative materials

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Administrative - General

...The purpose of this code is to establish minimum requirements to **to safeguard the public safety**, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment, and to provide safety to fire fighters and emergency responders during emergency operations. 2015 IRC

...The purpose of this code is to establish the minimum requirements to **provide a reasonable level of safety**, health and general welfare through affordability, structural strength, means of egress, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards and to provide **a reasonable level of safety** to fire fighters and emergency responders during emergency operations.

R101.3 ~~Interim~~ Purpose IRC & IBC of 2021

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Prescriptive Assessment

- We need to assess the prescriptive requirements to derive *intent*.
- With *intent* we can find the performance equivalency.

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Prescriptive v. Performance

- Prescriptive is where a **specific requirement** is established that uses language that allows for **consistent application**, most commonly a dimension.
 - Typically the only **disagreement** about a prescriptive provision is **if there is any tolerance permitted** when it is applied, such as a minimum guard rail height or corridor width.

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Prescriptive v. Performance

- **Performance** is a much **broader category**, it can be a provision where there may be multiple solutions, it may not be quantifiable, it may be intended to give the building official the ability to establish the requirement, etc.
 - A performance provision can often be viewed as **having multiple acceptable solutions**, as well as **unacceptable**, and the building official has greater responsibility in making an appropriate decision.
 - The provisions for locks and latches are typically performance provisions.

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Prescriptive v. Performance

- What is the difference between:
 1. Prescriptive
 2. Performance

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Prescriptive Codes

- Generic occupancy groups
- Employ fixed values
 - Area
 - Occupant capacity
- Cover buildings and systems
- Assume requirements describe acceptable risk

Cookbook

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Effective Use of the International Residential Code

- **The IRC is a prescriptive-oriented (specification) code with some examples of performance code language.** It has been said that the IRC is the **complete cookbook** for residential construction.
- Section R301.1, for example, is written in performance language, **but** states that the prescriptive requirements of the code will achieve such performance.

Page vii of the 2015 IRC, Effective Use

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R104.11 Alternative Materials, Design and Methods of Construction



Fasteners for Preservative-Treated Wood

TABLE R507.2.3
FASTENER AND CONNECTOR SPECIFICATIONS FOR DECKS

ITEM	MATERIAL	MINIMUM FINISH/COATING
Nails and timber nails	In accordance with ASTM F1607	Hot-dipped galvanized per ASTM A153
Butt/	In accordance with ASTM A307 (bolts, including nuts and washers)	Hot-dipped galvanized per ASTM A153, Class C (Class D for 1/2-inch diameter and less) or mechanically galvanized per ASTM A653, Class 55 or 400 stainless steel
Lag screws*	In accordance with ASTM A307 (bolts, including nuts and washers)	ASTM A653 type D 160 zinc coated galvanized steel or hot-dipped galvanized per ASTM A153 providing a minimum average coating weight of 3.0 oz./ft. ² (total both sides)
Metal connectors	Per manufacturer's specification	

- a. *Fastening methods, spacing and fasten shall be provided.*
- b. *Fasteners and connectors exposed to salt water or located within 100 feet of a salt water shoreline shall be stainless steel.*
- c. *Nails in fields shall be fully encased in concrete, and all fasteners shall be larger than for field.*
- d. *Lag screws, nuts and washers shall be provided to avoid wood splitting per the National Design Specification (NDS) for Wood Construction.*
- e. *Fastener end fibers between shall be in accordance with ASTM 1607.*



Applicability

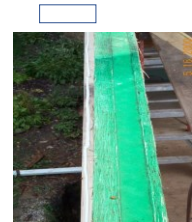
- Conflict: general and specific = specific
- Differences: code and referenced standards = code
- Where: specific and code = most restrictive shall govern
- When: code and standard violates listing = listing and manufacturer's shall apply

vs. R317.3.1

Alternate Material



AC-124 Rim Board sect. 1.4.3



I-Joist Acceptance Criteria



ACCEPTANCE CRITERIA FOR PREFABRICATED WOOD I-JOISTS

AC14

Approved October 2007
Effective February 1, 2008

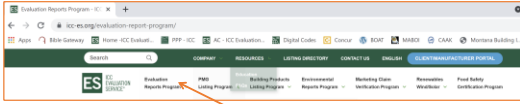
(Editorially revised February 2010)

Previously approved June 2004, October 2003, September 2003

I-Joist AC 14

- References ASTM D 5055
- Structural Testing
- Web Material and adhesives
- Also:
 - Hole Allowances
 - Fire Resistance (optional)
 - Insect Resistance (optional)

How to obtain the report



Click <https://icc-es.org>

Click on 1

2 evaluating building products for fire and sustainability attributes

3 ICC-ES has a proven track record of excellence in product evaluations

ICC-ES News and Articles

- ICC-ES Expands Its Expertise in Fire Resistance and Flameability Requirements
- Cascadian Marketing, a Premier Manufacturer of Toilets and Lavatories, Is the Label to Take Advantage of the ICC-ES FMG Transfer and Save Program
- ICC-ES Experts to Speak at Singapore Conference on Green Buildings
- Standards Council of Canada Accredits ICC-ES FMG

Reports Directory

Reports arranged by CSI (Construction Specifications Institute)

How to read an ICC-ES Evaluation Report

SEARCH REPORTS

Report Number:

Manufacturer:

Product: Wood Joist

Code Edition: All

ICC-ES Evaluation Report

ESR-1153

Report Only Copy

This report is subject to renewal May 2023

WOOD-PLASTIC COMPOSITE - WOOD-PLASTIC AND COMPOSITE WOOD JOIST

REPORT HOLDER: WEYERHAEUSER

ADDITIONAL LISTE: REGULUM LLC

EVALUATION SUBJECT: TOP PREPARED WOOD JOISTS

1.0 EVALUATION SCOPE

2.0 DESIGN VALUES

4.0 DESIGN AND INSTALLATION

Click on the product Report number that is of interest.

<https://icc-es.org/evaluation-report-program/reports-directory>

ICC-ES Evaluation Report

ESR-1153

Report Only Copy

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1.0 EVALUATION SCOPE

2.0 DESIGN VALUES

4.0 DESIGN AND INSTALLATION

Is this the right report?

- Check for:
- Report Holder
- Subject

Check Report Holder - Subject

Is this the right report?

- Check for appropriate code.

WEYERHAEUSER
ADDITIONAL LISTEES:
EACOM TIMBER CORPORATION
REDBUILT™ LLC
EVALUATION SUBJECT:
TJI® PREFABRICATED WOOD I-JOISTS

1.0 EVALUATION SCOPE
Compliance with the following codes:
 ■ 2018, 2015, 2012 and 2009 *International Building Code®* (IBC)
 ■ 2018, 2015, 2012 and 2009 *International Residential Code®* (IRC)
 ■ 2013 *Abu Dhabi International Building Code (ADIBC)*¹

¹The ADIBC is based on the 2009 IBC, 2009 IRC code sections referenced in this report are the same sections in the ADIBC.
 For evaluation for compliance with codes adopted by the Los Angeles Department of Building and Safety (LADBS), see [ESR-1153 LABC and LARC Supplement](#).

What do they look like?

3.0 DESCRIPTION
3.1 General:
 TJI joists are prefabricated wood I-joists having wood or wood-based flanges and Performance Plus™ oriented strand board (OSB) webs. Either the top and bottom flanges are parallel, forming a constant-depth joist or the top flange has a single taper, forming a variable-depth joist. The web panels have the face grain oriented vertically, and the web-to-web connection is either butt jointed or serrated and glued to form a continuous web. The web-to-flange connection is a proprietary tongue-and-groove glued joint. Refer to Table 1 for TJI joist series and material descriptions.

3.2 Material Specifications:
3.2.1 Flanges: Flange material is either Microlam™ laminated veneer lumber (LVL), TimberStrand® laminated strand lumber (LSL) or machine stress rated lumber (MSR). Microlam LVL and TimberStrand LSL are recognized in evaluation report ESR-1387. Table 1 of this report specifies flange widths and depths. Flange material and grades are as specified in the quality control manual that contains Weyerhaeuser manufacturing standards.

Material Specifications

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3.2.2 Webs: Web material is Performance Plus™ OSB conforming to DOC Voluntary Product Standard P82, Exposure 1, along with further requirements set forth in the quality-control manual that contains Weyerhaeuser manufacturing standards. Web material thickness requirements are noted in Table 1 of this report.

3.2.3 Adhesives: Adhesives are of the types specified in the quality control manual that contains Weyerhaeuser manufacturing standards.

Bearing Assumptions

MINIMUM BEARING DISTANCE

4.2 Design Values:
 Table 3 specifies reference design moments, reactions, vertical shear forces, and joint stiffness (E_j). Reference design reactions are based on minimum bearing lengths of 1 1/2 inches, 2 1/2 inches and 3 1/2 inches (41 and 88 mm) for simple spans, and 3 1/2, 5 1/4, and 7 inches (89, 133 and 178 mm) at intermediate support points for continuous spans. When joists are used as multiple span members, the calculated shear, used for design at the intermediate support, may be reduced by the percentage determined from the following formula and limited to the depths shown in Table 4.

$R = W \cdot K_{wv} \leq 18\%$
 where:
 $K_{wv} = V_{12} + 100$
 $R =$ The percent reduction.
 $V_{12} =$ The reference design shear for an 11 1/2-inch-deep (302 mm) joist (pounds).
 $W =$ The uniform load (plf).

The reference design shear at the interior supports of multiple-span member TJI joists up to 12 inches (305 mm) deep, used in residential floor construction, is permitted to be increased by 10 percent. This increase in reference design shear does not apply to the design shear at the ends of the joists.

Web Stiffeners

WEB STIFFENER ATTACHMENT

(1) 1/2\"/>

(2) The nails may be driven from one side only

ESR-1153 | Most Widely Accepted and Trusted Page 5 of 21

TABLE 1—REFERENCE DESIGN VALUES FOR T-JOISTS**

JOIST DEPTH (inches)	JOIST WEIGHT (lb/ft)	MOMENT INE (ft.-lb./ft.)	SHEAR INE (lb./ft.)	EI (in.-lb./ft.)	END REACTION R _u (lb.) [†]		INTERMEDIATE REACTION R _u (lb.) [†]								
					P _u [‡]	P _u [‡]	P _u [‡]	P _u [‡]							
8 1/2	2.7	3030	1320	200	4.5	1000	144	1300	844	NA	2410	1342	2760	162	NA
11 1/4	3.0	4210	1850	347	4.5	1000	1420	1485	1655	3.84	2410	2780	2760	3150	3.84
14	3.3	4960	1840	500	4.5	1000	1420	1485	1640	3.84	2410	2760	2760	3150	3.84
16	3.5	5710	2190	691	4.5	1000	1420	1485	1640	3.84	2410	2760	2760	3150	3.84

Hole Size and Placement

How Factors and Locations Chart

Round Hole Size (inches)	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Rectangular Hole Size (inches)	1 1/2	1 1/2	2 1/4	3	3 1/4	4	4 1/2	5 1/4	6	6 1/2	7	7 1/2	8	9 1/4	10	10 1/2	11 1/4	11 1/2	12

Notes to Figure 2:

- Charts are based on center spans and uniform load applications or applicable loading code provisions for concentrated loads (2000 lbs. over 2' spans less than 20' and dead load and 20' and greater load).
- For uniformly loaded multiple span applications holes must be located 3' clear of the face of the support for each foot of post span. Then the spans are treated as 1' clear.
- Holes are not allowed in cantilever areas unless specifically designed for a specified design professional.
- Spans more than one hole is to be cut in the web, the clear distance between holes must be based on the length of the largest dimension of the largest adjacent hole.
- Holes shall be open on both ends, not dead ends.
- Reinforcing web ends are based on measurement of the largest hole.
- Web locations are measured from inside face of post support to nearest edge of hole. See Figure 3.
- For 8": 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Minimum Distance From...

TABLE 1—MINIMUM DISTANCE FROM INSIDE FACE OF END SUPPORT TO NEAREST EDGE OF HOLE

JOIST DEPTH (inches)	TYP. JOIST SERIES	ROUND HOLE SIZE (inches)					SQUARE OR RECTANGULAR HOLE SIZE (inches)				
		2	3	4	5 1/4	6	2	3	4	5 1/4	6
9 1/2"	T-8-110	1 1/2"	1 1/2"	2 1/4"	3"	3 1/4"	1 1/2"	1 1/2"	2 1/4"	3"	3 1/4"
	T-8-230	1 1/2"	1 1/2"	2 1/4"	3"	3 1/4"	1 1/2"	1 1/2"	2 1/4"	3"	3 1/4"
	T-8-110	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2 1/4"	1 1/2"	1 1/2"	2 1/4"	3"	3 1/4"
11 1/4"	T-8-210	1 1/2"	1 1/2"	2 1/4"	3"	3 1/4"	1 1/2"	1 1/2"	2 1/4"	3"	3 1/4"
	T-8-230	1 1/2"	1 1/2"	2 1/4"	3"	3 1/4"	1 1/2"	1 1/2"	2 1/4"	3"	3 1/4"
	T-8-360	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2 1/4"	1 1/2"	1 1/2"	2 1/4"	3"	3 1/4"

Fire Resistance

ESR-1153 | Most Widely Accepted and Trusted

FIGURE 4A—ASSEMBLY A (One-hour Fire-Resistive-rated Roof-ceiling or Floor-ceiling Assembly)

FIGURE 4—ONE-HOUR FIRE-RESISTIVE ASSEMBLY DETAILS

Component	Component Specifications	Installation
Assemblies	• Joist face of support is 1/2" thick, 1/2" long, and 1/2" wide. Minimum thickness is 1/2" in all directions and 1/2" in all directions. All assemblies, except those listed in Table 1, shall be tested and approved for use in accordance with Section 1903.1.1.1. All assemblies shall be tested and approved for use in accordance with Section 1903.1.1.1. All assemblies shall be tested and approved for use in accordance with Section 1903.1.1.1.	All fast points of the assembly shall be located over framing members.
Joist Series	• Minimum depth shall be 11 1/4 inches.	Assemble in accordance with this report, at a minimum spacing of 24 inches on center.
Finish	• See Recommended Light Fixture Installation.	See Recommended Light Fixture Installation.
Recommended Joints	• All joints shall be fire-resistive. • The assembly shall be fire-resistive for the full duration of the fire test.	• Installed in the ceiling. • Above the ceiling, the assembly is installed below the ceiling. • All joints shall be fire-resistive. • The assembly shall be fire-resistive for the full duration of the fire test.

Alternative materials, design and methods of construction and equipment. R104.11

The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved...

❖ The building official is responsible for determining whether a requested alternative provides the equivalent level of quality, strength, effectiveness, fire resistance, durability, and safety as required by the code. In order to make that determination, the building official may require that test data or evaluation reports pertaining to the proposed alternative be submitted in order to make an informed decision about its use.

1908.0110 - DUTIES AND POWERS OF BUILDING OFFICIAL
Subp. 13 Alternative materials, design, and methods of construction and equipment.
The code is not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by the code, provided that any alternative has been approved. An alternative material, design, or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the code, and that the material, method, or work offered is, for the purpose intended, at least the equivalent of that prescribed in the code in quality, strength, effectiveness, fire resistance, durability, and safety. The details of any action granting or denying approval of an alternate shall be recorded and entered in the files of the Department of Building Safety. The permit applicant may request written documentation of the denial, including the reasons for the denial.

Alternate Materials & Methods

➤ ... approved... may be used provided they meet the intent of the code and are the equivalent in:

- quality
- strength
- effectiveness
- fire resistance
- durability
- safety

Thermomass
www.Thermomass.com

email ESR 1746

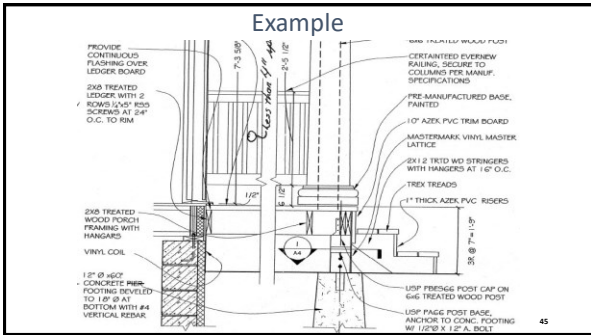
Actual Evaluation
Submitted
Front Porch

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Work exempt from permit

- Exemption from permit requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction.

R105.2 / MI - R408.30505 44



ESR 1190-05 Example

4.2.2.2 Deck Boards Used as Stair Treads: Trex® 2-inch-by-6-inch (51 mm by 152 mm) and 2-inch-by-8-inch (51 mm by 203 mm) composite lumber, when used as a stair tread, is satisfactory to resist the code-prescribed concentrated load of 300 lbf (1.33 kN) when installed at a maximum center-to-center spacing of 12 inches (305 mm), and shall have a minimum of three continuous spans over four supports. Trex® 5/8-inch-by-6-inch (32 mm by 152 mm) composite lumber, when used as a stair tread, is satisfactory to resist the code-prescribed concentrated load of 300 lbf (1.33 kN) when installed at a maximum center-to-center spacing of 10.5 inches (267 mm), and shall have a minimum of two continuous spans over three supports.

www.iccc-es.org ESR 1190-09

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GRK FASTENERS®
The Industry's Toughest Screws

GRK Screw Selection Guide:
Your Project just Got Easier

CLIMATEK coated screws have been independently tested and approved for use in treated wood products. Our fasteners come with a limited Lifetime Warranty. For details see www.grkfasteners.com. For best performance use PHEINUS stainless steel screws by GRK. Always build your project according to current ICC International Code Council specifications. GRK's ClimateK coating conforms with ICC-IES Report # NER-643 which allows for use of **stainless steel screws** in contact with ACQ treated wood.

Pressure Treated Lumber Decking: Use #9 or #10 gauge GRK R4 to lock wood in place. For best performance use **PHEINUS stainless steel screws by GRK**.

Cedar & Redwood Decking: Use #9 or #10 gauge GRK R4 to lock wood in place. Use stainless steel screws by 1/8" and 3/16" and seal wood immediately with a quality sealer to keep the likelihood of toxic acid stains. For best performance use PHEINUS stainless steel screws by GRK.

Tropical Wood Decking: Use PHEINUS stainless steel screws by GRK. Due to movements of these woods many properties are covered preservative.

Composite & Plastic Decking: For best performance use PHEINUS Trim Head stainless steel screws by GRK.

Ledge Boards & Structural Parts: Use R55 Structural Screws by GRK as a lag screw alternative to get exceptional strength.

NO PRE-DRILLING FOR R4, R55 CARBIDE AND TRIM HEAD SCREWS, EXCEPT WHERE WOOD LIMITATIONS REQUIRE. ALWAYS PLACE TRIM HEADS WITH OTHER TRIM HEADS. ALWAYS USE GRK CLIMATEK COATING. CONTACT US AT 1-800-368-5643 FOR MORE INFORMATION. CONTACT US AT 1-800-368-5643 FOR MORE INFORMATION.

Visit www.grkfasteners.com for more information.
GRK Fasteners, 1499 Rosilyn Road, Thunder Bay, ON P7E 6W1, Canada
P: 1-800-368-5643 F: 1-800-888-3146

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Example

Page 2 of 4		NER-643
3.5 Quality Assurance	4.3 Fasteners	The fasteners used with the product shall be hot dip galvanized, stainless steel or triple coated zinc polymer materials.
Treatment of materials by others is beyond the scope of this report.		
3.6 Corrosion	4.4 Structural	The maximum load duration factor allowed for structural members pressure-treated with ACO Preserve® and ACO Preserve Plus® Preservatives shall be 1.0 in accordance with section 2.3 of the AFPA, National Design Specification for Wood Construction.
Metals used in contact with ACO Preserve® and ACO Preserve Plus® pressure treated wood shall be hot dip galvanized, stainless steel or triple coated zinc polymer materials. Carbon steel, aluminum, red brass and bronze shall not be used in contact with ACO Preserve® and ACO Preserve Plus® treated wood products.		

www.iccc-es.org NER-643*

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SECTION 4: STANDARDIZED PRESERVATIVES

Preservatives for Pressure Treatment Processes

Preservative Abbreviation	Manufacturer Reference	Preservative	Manufacturer Health, Safety, and Environmental
CR	P1/P1.1	Organic and Organometallics	Chromates
CR-S	P2	Chromate Solution	Chromates
CR-PS	P3	Chromate/Pentachloro Solution	Chromates
PCP-A	P6/P9	Pentachlorophenol (Penta) Solvent - A	PCP
PCP-C	P6/P9	Pentachlorophenol (Penta) Solvent - C	PCP
CuK	P6/P9	Copper Copper	Copper
CuN	P6/P9	Copper Naphthenate	Copper
TRV1	P6/P9	Tri-Cresyl Borate (Tri-Cresyl Borate)	Not Available
CTL	P6/P9	Chlorinated	Not Available
CPF	P6/P9	Chlorophenol (para-chlorophenol)	Not Available
CCA	P2	Chromated Copper Arsenate Types A, B, C	Metal Oxides
ACC	P2	Acid Copper Chromate (ACC)	Metal Oxides
ACZA	P2	Waterborne, All-alkali based (Acetic/Sulfamic)	Metal Oxides
ACZA-A	P2	Ammoniated Copper Zinc Arsenate (ACZA-A)	Metal Oxides
ACZA-B	P2	Ammoniated Copper Zinc Arsenate (ACZA-B)	CuZn + Quat
EC	P2	Ammoniated Copper Chloride (EC)	CuZn + Chlorine
ACZC	P2	Alkylating Copper Quat (ACZC)	CuZn + Quat
ACZD	P2	Amine Copper Quat (ACZD)	CuZn + Quat
CBK-A	P2	Copper Amine Type A (CBK-A)	Cu + Amine + Quat
CBK-B	P2	Copper Amine Type B (CBK-B)	Cu + Amine
SWK	P2	Waterborne, Other	Bio-Cide
CBDC	P2	Copper Hexafluorophosphate (CBDC)	Copper
FR-1	FR-1	Fluoroborates	Not Available
FR-2	FR-2	Fluoroborates	Not Available

AWPA 2003/2006

www.icc-es.org

Example

ER-5883
Reissued June 1, 2005

GRK CANADA LTD.
1498 ROSSELIN ROAD
THUNDER BAY, ONTARIO P7E 6W1
CANADA

4.0 FINDINGS

That the RSS wood screws described in this report comply with the 1997 Uniform Building Code™, subject to the following conditions:

4.1 The products are manufactured, identified and installed in accordance with this report.

4.2 The installation and design using the RSS screws comply with this report and Part IX of the NDS.

4.3 The RSS screws are produced in accordance with the details noted in this report and the approved quality control manual.

4.4 Calculations demonstrating that loads applied to screws are less than allowable design values are submitted to the building official for approval.

This report is subject to re-examination in two years.

ESR-2442

DIVISION 06 00 00 WOOD, PLASTIC AND COMPOSITES

06 05 23 - Wood, Plastic, and Composite Fastenings

Report Number	Org./Code	Manufacturer	Product	Codes
ESR-2442		GRK Fasteners, a Division of Tark North, Inc.	RSG® RIGID STRUCTURAL SCREWS, RSG PEX® STAINLESS STEEL SCREWS, ANCHOR BUSHING SCREWS AND CLUSTER SCREWS	ICC ESR-2442
ESR-2211		GRK Fasteners, a Division of Tark North, Inc.	RSG® Multi-Purpose Screws, Flat-Top® Screws, Kwik-Set® Screws, RT Composites® Screws and Green® Quality	ICC ESR-2211

GRK FASTENERS

RSS™ Rugged Structural Screws

0.65 psi p(CA-C) Above Ground ESR-1723

Georgia-Pacific

101 Footing

Alternate Material Evaluation

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R317.3.1

Fasteners for preservative-treated wood shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Coating types and weights for connectors in contact with preservative-treated wood shall be in accordance with the connector manufacturer's recommendations. In the absence of manufacturer's recommendations, a min. of ASTM A 653 type G185 zinc-coated galvanized steel, or equivalent, shall be used.

Example

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How do I know the product I want to use meets the intent of the code:

- 1) Code Book Listing
- 2) ICC Report – www.icc-es.org
- 3) Third party testing – meeting the intent of the code
- 4) Verification – Acceptable Criteria Standards <http://www.icc-es.org/CriteriaIndex.cfm>
- 5) Check to see if the testing agency is accredited <http://www.icc-es.org/LabsIndex.shtml>
- 6) Review third party testing results not PR
- 7) Compare Acceptable Criteria Standards to Third Party Report.

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Supplier gave the information to the department

Total Pages: 10

Here are the documents that I referred to regarding the coating and its compliance in contact with ACO treated lumber.

Pages 2-4 of this fax are relevant portions of ICC Acceptance Criteria (AC308) for evaluating wood. It outlines the use of E12 testing to evaluate fastener coatings (see section 4.6).

Pages 6-10 are the E12 testing where (example 5) was tested/evaluated and found to meet the "2 or less" benchmark for acceptance under AC308.

Please contact me with any additional questions regarding this documentation or the proper use of our fastener in this application. Thank You



ESR: [redacted]

Revised February 1, 2007
This report is subject to an acceptance in lieu plan.

ICC Evaluation Service, Inc.
www.iccsa.org

1000 Riverchase Blvd., Suite 2000, Atlanta, GA 30328
800-451-9913
www.iccsa.org

SECTION 05 - WOOD AND PLASTICS
Section 05100 - Wood and Plastic Fastenings

REPORT HOLDER:
[redacted]

[redacted]

[redacted]

EVALUATION SUBJECT:
THREADED WOOD FASTENERS

1.1 EVALUATION SCOPE
Compliance with the following code:
• 2005 International Building Code® (IBC)
• 2005 International Residential Code® (IRC)

Properties evaluated:
Structure:
• [redacted] Series fasteners described in this report are used in accordance with the test procedures used for wood-to-wood connections.

1.2 DESCRIPTION
1.2.1 General
[redacted] Series fasteners described in this report are used in accordance with the test procedures used for wood-to-wood connections.

4.0 DESIGN AND INSTALLATION
4.1 Design
Design values for closed bearing strength are specified in Table 2 of this report. Design values for withdrawal resistance are specified in Table 3 of this report. Design values for pull-through and edge separation are specified in Table 4 of this report. Design values for lateral resistance in wood-to-wood connections are specified in Table 5 of this report.

4.2 Installation
The fastener shall be installed with a 1/8" (12.7 mm) hole through the member and a 1/4" (6.3 mm) hole through the connector. The fastener shall be installed in the hole through the member and the hole through the connector.

4.3 Conditions of Use
The fastener shall be used in accordance with the test procedures used for wood-to-wood connections.

4.4 Testing
The fastener shall be tested in accordance with the test procedures used for wood-to-wood connections.

4.5 Acceptance
The fastener shall be accepted in accordance with the test procedures used for wood-to-wood connections.

4.6 Notes
[redacted]



ICC EVALUATION SERVICE, INC.
Evaluation • Section • Project



ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

AC308

Approved May 2006

Effective January 1, 2007

Previously approved October 2005

PREFACE

Evaluation records issued by ICC Evaluation Service, Inc. (ICC-ES) are based upon performance features of the International Building Code and other widely adopted code books, including the Uniform Code of Building Regulations, the 2003 National Code, and the 2003 International Building Code.

4.0 TEST METHODS AND PERFORMANCE REQUIREMENTS

The performance characteristics of the proprietary wood preservative system shall be documented by testing. The testing and performance requirements listed in this criteria document treated wood used in the following exposure conditions: contact with ground (AWPA UC4A, AWPA UC4B), above ground weather-exposed (AWPA UC3B) and above ground damp but not in contact with liquid water (AWPA UC2). Use categories are further defined in AWPA Standard U1. Testing and performance shall be noted in the proprietary wood preservative criteria for the product uses and exposure conditions. Testing shall be in accordance with AWPA, ASTM and CEN standards and test procedures listed in proprietary wood preservative criteria, and shall demonstrate resistance to fungal decay and to subterranean termites. Product sampling shall be in accordance with Section 2.4 of this criteria. The following documentation (Sections 4.1 to 4.7) is needed to substantiate the performance characteristics of the wood-preservative products for the listed use category.

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

Conditions of Acceptance: Testing shall demonstrate efficacy of the recommended level of wood preservative for the products and uses listed in this criteria.

4.3 Field Tests: Aboveground field testing for use category UC3B shall be in accordance with one of the following: ground-to-ground (Section 4.3.1), lap joint (Section 4.3.2) or L-joint (Section 4.3.3). Ground-to-ground field testing for use categories UC4A and UC4B shall be in accordance with Section 4.3.4. All testing shall be conducted on associated specimens.

Conditions of Acceptance: Testing shall demonstrate efficacy of the recommended levels of the wood preservative for the products and uses listed in this criteria. Results from the tests shall be accepted as valid provided that the nominal mean rating of the joint surfaces for the untreated controls is beyond the midpoint of the rating scale for that test procedure.

Analysis shall be submitted. The analysis shall be signed, sealed and dated by the responsible engineer.

4.6 Corrosion: Testing indicated in Sections 4.6.1 and 4.6.2 shall be performed for all use categories.

Conditions of Acceptance: The testing shall document the types of fasteners, coatings and metals (such as joint fasteners) that are used with the wood preservative, e.g., stainless steel, hot dip galvanized, zinc polymer, carbon steel, aluminum, red brass, bronze, copper, and any other fasteners, coatings and metals to be specified by the report applicant. Fasteners, coatings and metals listed for use with the wood preservative shall have an average visual inspection rating of 2 or less in accordance with Section 4.6.2 of this criteria.

4.6.1 Corrosion of metal contacts by treated wood testing in accordance with ANP-AE12, with a minimum of 90 cycles per metal.



UL-17

(Commodity Specification A, Special Requirement 2.2)

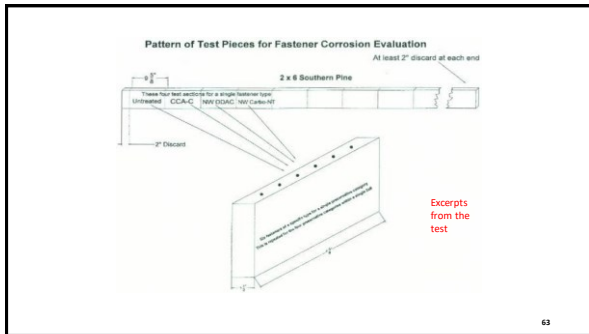
Accelerated Fastener Corrosion Test Results
Michigan State University

Company: [redacted]
Contact: [redacted]
Products: 1.) PW0212; Gray 2-1/2" Screw
2.) G002212; 2-1/2" Screw
3.) M00212; Green 2-1/2" Screw
4.) P00212; Gold Zinc Plated 2-1/2" Screw
5.) L1350; Black E-Coat Clear Top Coat 4" Screw
6.) BFM60 (Hot Dipped Galvanized 3/8" Lag Bolt)
7.) A1-FM2 (Hot Dipped Galvanized 1/2" Nut)

Excerpts from the test

INTRODUCTION

Michigan State University was contracted by [redacted] to conduct corrosion testing of seven commercially available fasteners, using an accelerated laboratory procedure (included at the end of this document), in wood treated to above ground conditions with ACC Type D formulated with DGA carbamate quat (DGA-DAC, WPA-DAC in photograph files), and CCA-C preservative systems. The three preservative systems are listed in American Wood Preservers' Association Standard PS-04. Untreated wood was included for reference. An effort was made to acquire wood with characteristics in accordance with Section 4.1 Guidelines of the American Wood Preservers' Association (AWPA) Standard E7 with the exception of the requirement for freedom from knots. For each fastener type, four test pieces, machined by wood substrates, were tested and placed within one of the four preservative treatment categories. This allowed for the comparison of corrosion across the four treatment categories, within a matched wood substrate, for a specific fastener. A diagram of the test piece configuration is included in this document (Figure 1).

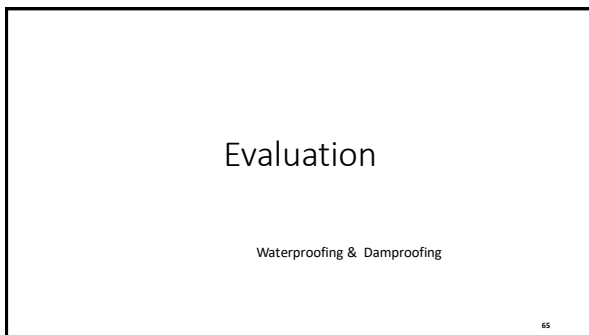


RESULTS
The results of this testing are reported as an average weight loss and average visual rating using six replicates of each fastener for each of the treatment variables. The results of this testing are summarized below.

Weight Loss Results

Fastener	Average Percent Weight Loss by Treatment (Standard Deviation)				
	Untreated	CCA-C	ACQ-DDAC	ACQ-DDA Carbamate	Unexposed Control
PW9212; Gray 2-1/2" Screw	0.42 (0.079)	3.43 (0.071)	1.83 (0.073)	2.36 (0.186)	0.19 (0.072)
GOQ212; 2-1/2" Screw	0.97 (0.063)	1.63 (0.114)	0.91 (0.062)	1.77 (0.263)	0.02 (0.022)
MOK212; Green 2-1/2" Screw	0.80 (0.053)	2.20 (0.122)	1.53 (0.042)	2.32 (0.890)	0.04 (0.067)
PDM212; Gold, Zinc Plate; 2-1/2" Screw	0.70 (0.142)	2.17 (0.224)	0.69 (0.068)	2.28 (0.136)	0.02 (0.018)
LL358; Black, E-Coat + Clear Top Coat; 4" Screw	0.22 (0.064)	0.55 (0.164)	0.34 (0.078)	0.41 (0.098)	0.16 (0.067)
8-PM-6 (Hot Dipped Galvanized 3/8" Lag Bolt)	1.70 (0.125)	2.33 (0.165)	1.23 (0.104)	2.10 (0.190)	0.28 (0.072)
9-PM-7 (Hot Dipped Galvanized 1/2" Nails)	2.77 (0.147)	1.69 (0.140)	3.05 (0.165)	1.25 (0.088)	0.04 (0.042)

The percent weight loss was calculated as follows:
% Weight Loss = [(Weight before exposure - Weight after exposure) / Weight before exposure] * 100



Foundation Waterproofing and Dampproofing

- Dampproofing of foundation walls is required where retaining earth and enclosing habitable or usable spaces below grade
- Masonry walls to be parged with at least 3/8 inch Portland cement
 - Parging to be dampproofed by bituminous coating, acrylic modified cement, surface-bonding mortar, or one of listed methods for waterproofing.
- Concrete walls to be dampproofed by any listed dampproofing or waterproofing materials

R406.2 Concrete and masonry foundation waterproofing

- Walls shall be water proofed in accordance with one of the following:
 1. 2 ply hot mopped felts
 2. ~~55 pound roll roofing~~
 3. 6-mil polyvinyl chloride
 4. 6-mil polyethylene
 5. 40-mil polymer-modified asphalt
 6. 60-mil flexible polymer cement
 7. 1/8 inch cement-based, fiber-reinforced, waterproof coating
 8. 60-mil solvent-free liquid-applied synthetic rubber Exception applies to ICF walls

Foundation Waterproofing - R406.2



- Requires dampproofing or waterproofing for all concrete and masonry foundations that retain earth and enclose interior spaces and floors below grade.

Dampproofing/waterproofing

When a **manufactured product**, such as **foundation dampproofing** and **foundation waterproofing** is proposed to be used **instead** of the conventional bituminous coating on the foundation wall, the building official will need to **verify compliance** with the specific code requirements, and any national "standard" pertaining to the product.

The process of getting a product approved is the responsibility of the designer/builder, not the Building Official. The Building Official may look for **testing or Evaluation Service reports to determine compliance**.

Dampproofing/waterproofing

The Building Official **can** consider ⁽¹⁾ Evaluation Service Reports **from any model code agency**, ⁽²⁾ independent testing, or ⁽³⁾ any other source that provides the necessary data needed to **verify compliance with the code and appropriate standards**.

There are also standards established by American Society for Testing and Materials (ASTM) for dampproofing and waterproofing products.

Dampproofing/waterproofing

The International Code Council Evaluation Service, Inc. website also lists the "ICC Acceptance Criteria."

Acceptance criteria are documents developed by the ICC Evaluation Service as the basis for evaluating type of product, and establishing conditions of acceptance, when the product is not clearly regulated by existing codes and code related documents.

<http://www.icc-es.org>

<http://www.icc-es.org/Criteria/index.cfm>

Dampproofing/waterproofing

ICC EVALUATION SERVICE, INC.
 Products • Reports • Present



http://www.icc-es.org/criteria/pdf_files/ac29.pdf

ACCEPTANCE CRITERIA FOR GOLF, LIQUID-APPLIED, BELOW-GRADE, EXTERIOR DAMP-PROOFING AND WATERPROOFING MATERIALS

AC29

Approved February 2004

Effective March 1, 2004

(Essentially revised January 2008)

Previously approved October 1997, January 1994

PREFACE

Evaluation reports issued by the ICC Evaluation Service, Inc. (ICC-ES), are based upon performance histories of the proposed family of construction materials, laboratory testing, field performance, and other data. The ICC-ES is not responsible for the design or construction of any building or structure, or for the selection of any materials or the manner in which they are used.

The provisions of this code are intended to provide the capabilities of any materials in the product and design or construction of any building or structure, or for the selection of any materials or the manner in which they are used. The ICC-ES is not responsible for the design or construction of any building or structure, or for the selection of any materials or the manner in which they are used.

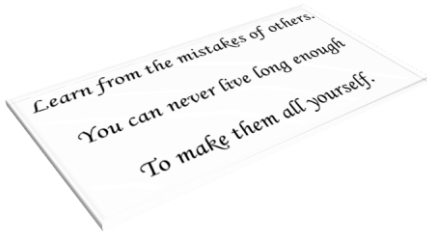
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Short Cuts



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