



**Carolinas Mid-winter Roofing Expo**  
January 19, 2022

## **Roofing Technical Update**

presented by

**Mark S. Graham**

Vice President, Technical Services  
National Roofing Contractors Association (NRCA)




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### **Topics**

- Lumber concerns
- Wood roof deck concerns
- Synthetic underlayment
- FM Global-insured roofing projects
- Construction-generated moisture
- IIBEC Manual of Practice and forms
- Material availability
- Questions... and other topics

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RESEARCH+TECH



Considering substitutions

Be aware of potential consequences with product substitution

by Mark S. Graham

20 professionalroofing.net SEPTEMBER 2021

Professional Roofing

September 2021

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## N.C. Building Code Council warns of the use of European lumber in North Carolina

RALEIGH  
Jun 15, 2021

North Carolina Insurance Commissioner Mike Causey today has issued an alert about the use of European lumber in the construction of homes and buildings throughout the state. The N.C. Department of Insurance regulates the state's building codes and oversees the N.C. Building Code Council.

The council has determined European lumber, which is being imported to help with the nation's lumber shortage, does not meet N.C. building code requirements and, in some cases, could cause catastrophic failures in wall, floor and roof framing.

A primary concern is the specific gravity or wood density that affects the performance of fastening devices, such as nails, screws or gusset plates. A lower specific gravity may result in a decreased resistance capacity of a shear wall designed to withstand wind and seismic loads, lower gripping strength of a truss metal plate, or lower bending strength that could affect wall height.

There are also concerns with the differences between U.S. and imported lumber milling processes.

The American Lumber Standard Committee (ALSC) requires the lumber species to be identified in the grade stamp on each piece of lumber. The structural properties widely vary by species and the origin where the wood was grown and harvested.

"Contractors should be aware that, despite a piece of lumber bearing a 'No. 2' stamp, there can be significant differences in the wood's engineering properties depending on where it came from," said Commissioner Causey. "I urge builders to know the difference between imported and domestic 'No. 2' stamped lumber so they don't mistakenly use the wood in an unsafe manner that does not meet code."

As a result of these significant issues, the N.C. Building Code Council has issued an advisory that European lumber can only be used as an alternate material that must be reviewed by the code enforcement official before it is used. This does not mean European wood products are prohibited; it simply requires additional supporting documentation to assure the wood characteristics are properly reflected in the overall project design.

Code enforcement officials must ensure the documentation includes the testing or evaluation performed on the lumber to support compliance with the building code requirements. Without the documentation, the use of European lumber products will require an engineering analysis and subsequent seal to verify code compliance.

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**AMERICAN WOOD COUNCIL**

CODES & STANDARDS | ENVIRONMENTAL REGULATION | SUSTAINABILITY | EDUCATION | PUBLIC POLICY

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### AWC Response to NCDOI Press Release

Jun 18, 2021

LEESBURG, VA. – On June 11, the North Carolina Department of Insurance (NCDOI) issued a news release warning of the use of European lumber in North Carolina. The news release identified several potential use issues given the building community’s lack of familiarity with European lumber and served to alert suppliers, designers, builders, and regulators that lumber should be used in accordance with applicable codes and standards; however, there were several statements that need to be clarified or corrected. The Pacific Lumber Inspection Bureau has prepared a detailed response to the NCDOI new release and can be located at the following link: [PLIB’s Response to North Carolina DOI warning notice | Pacific Lumber Inspection Bureau.](#)

Prescriptive provisions in the building codes that cover wood-frame construction are primarily based on the four major commercial species combinations: Douglas Fir-Larch, Hem-Fir, Southern pine, and Spruce-Pine-Fir (SPF) from Canada. These prescriptive provisions provide species- and grade-specific span tables for common loading conditions for the four major species combinations or the requirements are based on the minimum properties for certain grades of the four major species combinations. However, the building code allows the use AWC’s [Span Tables for Joists and Rafters \(STJR\)](#) for other grades and species of lumber and for other loading conditions. The span tables in STJR are species independent and only require the user to know the adjusted design values for the grade and species of lumber. Where European lumber has the same or higher design values than North American lumber, the material can be directly substituted.

In areas where the basic wind speeds are 130 mph or less (in some locations less than 140 mph), prescriptive provisions in the building codes that address wall studs and connection requirements have been considered to be independent of the lumber species. However, in areas where the basic wind speeds are greater than 130 mph, including coastal areas of North Carolina, the prescriptive provisions of the building codes don’t typically apply and the user is directed to use the pre-engineered wood-frame construction provisions in AWC’s *Wood Frame Construction Manual for One- and Two-Family Dwellings (WFCM)* or ICC’s Standard for Residential Construction in High-Wind Regions (ICC 600) or to design the structure in accordance with the loads in ASCE’s Minimum Design Loads for Buildings and Other Structures (ASCE 7). When designing to the wind loads in ASCE 7, AWC’s *National Design Specification® for Wood Construction (NDS®)* is used, which includes design values for all North American and non-North American species approved by the American Lumber Standards Committee, including European lumber species. Adequate resources exist for use by plans examiners, builders, and designers to accommodate the use of European lumber with these standards.

**AWC In the News**

- New Report Aids in Compliance With Sound Transmission Code Provisions**  
Feb 19, 2019 | *Construction Executive*
- Milwaukee Developer Wants To Build One Of World’s Tallest Wooden Structures**  
Jan 29, 2019 | *Wisconsin Public Radio*
- CLT and Engineered Wood Products Poised for Growth in 2019**  
Jan 16, 2019 | *Forest2Market*
- Code Corner: New Year, New Code Developments**  
Jan 16, 2019 | *Simpson Strong-Tie SE Blog*
- Construction’s 2019 Political Forecast**  
Jan 14, 2019 | *Building Forward*
- Reliant Funding’s 2019 Top Apps for Construction Businesses**  
Jan 11, 2019 | *Reliant Funding*

**Categories**

- Air Burden
- AWC Operations
- Biobased
- Boiler MACT
- Carbon
- Neutrality/Biomass
- Chemicals
- Codes & Standards
- Education
- Energy Efficiency
- Fire Technology
- Fly-In
- Green Building
- Health & Safety
- Jobs
- Marketplace
- NAAGS
- NHSM
- Resiliency
- Sustainability
- Tall Wood
- Wind/Seismic

**Years**

- 2021
- 2020

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NC Department of Insurance  
Office of the State Fire Marshal - Engineering Division  
1202 Mail Service Center, Raleigh, NC 27699-1202  
919-647-0000

#### Element of a Grade Stamp

Mill number

Grading Agency Symbol

Indicates the species or combination of species of lumber.

Photo #2 Lumber Grade Stamp

Mill 54321

NO. 2

N. SPR-SC P(I) GER ROM KD-HT

Lumber is graded based on the quality and appearance of the wood. No. 2 lumber is the most common grade for framing. However, lumber with the same No. 2 grade could have different wood properties.

For species imported from outside North America, the grade stamp will include the designation "(I)", indicating imported".

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**Example:**

DESIGNED BY

**TP NO.2**

AT00 AS-SCP(1)AUS KDHT

What is the code allowable span for this European 2x10 floor joist spaced 16 inches on center?

**Design Criteria:**  
 10 psf Dead Load  
 40 psf Live Load (Table R301.5)  
 Live Load Deflection limit = L/360 (Table R301.7)

From PLIB Simplified Span Tables for Light Frame Construction Imported Species:

| Species and Grade                    | Resilience Class (RC) Group |    |    |    |    |                  |    |    |    |    |
|--------------------------------------|-----------------------------|----|----|----|----|------------------|----|----|----|----|
|                                      | RC Group 1 (1.0)            |    |    |    |    | RC Group 2 (2.0) |    |    |    |    |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
| European Spruce, Fir, & Pine (S-P-F) | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
| European Larch                       | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
| European Douglas Fir                 | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
| European Redwood                     | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
| European Fir                         | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
| European Pine                        | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
| European Spruce                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
| European Fir                         | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
| European Pine                        | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
| European Spruce                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
| European Fir                         | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
| European Pine                        | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |
|                                      | 10                          | 12 | 14 | 16 | 18 | 10               | 12 | 14 | 16 | 18 |

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## Recommendations

Imported lumber

- Beware of imported lumber and its possibly lower properties
- You should not make representations of roof deck's or wood blocking's strength

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**RESEARCH+TECH**  
**Know your steep-slope roof decks**  
 Following plywood and OSB installation guidelines can help ensure a successful roof system performance  
 by Mark S. Graham

**P**lywood or oriented strand board structural panel sheathing are integral components of many steep-slope roof assemblies, and proper use of these products can help ensure successfully performing assemblies. If you use or encounter plywood and/or OSB structural panel sheathing roof decks, it is important to be knowledgeable of the applicable code requirements and APA-The Engineered Wood Association and NWCA guidelines applicable to them.

**ICC 2018**  
 The International Residential Code® provides specific requirements applicable to plywood and OSB structural panel sheathing used as roof decks for new and new-family dwellings. In ICC's introduction, specific requirements are provided in Section 603.0 Structural Sheathing.

ICC 2018 requires wood structural panels conform to the Department of Commerce PS-1, "Structural Plywood," or PS-2, "Performance Standard for Wood-based Structural-use Panels," or CSA Group's OSB, "Construction Sheathing," or OSB, "Standards on OSB and Waferboard." PS-1 and OSB generally are required to apply to plywood, and PS-2 and OSB apply to OSB.

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December/January 2020-21

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## Standards for wood structural panels

*International Residential Code, 2018 Edition*

Plywood:

- U.S. Department of Commerce PS-1, "Structural Plywood"
- CSA Group O325, "Construction Sheathing"

Oriented-strand board (OSB):

- U.S. Department of Commerce PS-2, "Performance Standard for Wood-based Structural-use Panels"
- CSA Group O437, "Standards for OSB and Waferboard"

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## **Common, but not referenced in the Code**

### **Plywood and OSB:**

- APA-The Engineered Wood Association Standard PRP-108, "Performance Standards and Policies for Structural-Use Panels"

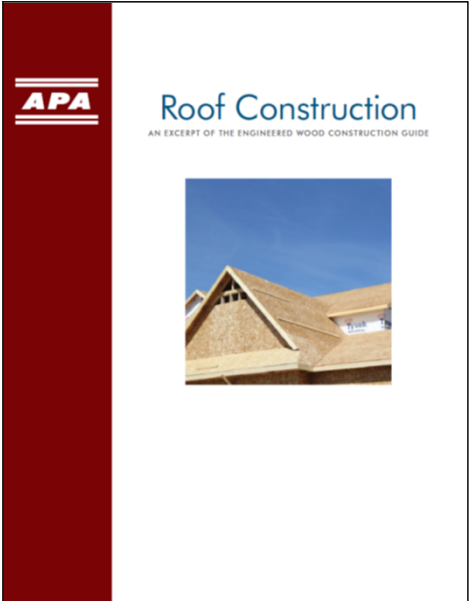
11

## **Roof sheathing attachment**

### **IRC 2018 Table 602.3(1), Rows 30-32 (minimum attachment):**

- Panel edges:
  - 2½-inch-long 8d common nails at 6 inches o.c. at supported panel edges
- Intermediate supports:
  - 2½-inch-long 8d common nails at 12 inches o.c. at intermediate supports

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**APA Form E30, "Roof Construction"**  
--Roofing-specific excerpts from APA's *Engineered Wood Construction Guide* (102 pages)

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## **Recommendations**

Roof sheathing attachment

- **New construction:**
  - Be careful with deck "acceptance".
  - Deck acceptance should be limited to the visual surface and no visual presence of moisture on the surface
  
- **Reroofing:**
  - Since deck condition and attachment typically cannot be determined until roof covering tear-off, consider unit price or T & M pricing for deck replacement and/or deck re-fastening

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**TECH TODAY**


Understanding underlayments  
Some roofing underlayment products may not be code-compliant

If use of a nonasphaltic or synthetic underlayment product is being considered for a specific project, code acceptance can be sought by making a specific request to the authority having jurisdiction (AHJ). AHJs typically will request an evaluation report, such as those provided by ICC Evaluation Service or Underwriters Laboratories Inc. AHJs may grant code acceptance for alternative underlayment products on a project-by-project basis and typically not a blanket acceptance applying to all future projects in a specific jurisdiction.

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December 2016

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Designation: D8257/D8257M - 20

**Standard Specification for Mechanically Attached Polymeric Roof Underlayment Used in Steep Slope Roofing**

This standard is based on the final designation D8257/D8257M, the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of its reapproval. A superscript indicates an editorial change since the last revision or reapproval.

**1. Scope**

1.1 This specification addresses mechanically attached polymeric roof underlayment used in steep slope roofing.

1.2 The objective of this specification is to provide a finished product that will be used as a water-shedding underlayment layer on steep sloped roofs prior to and after installation of the primary roof covering.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

1.4 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

1.5 This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guidelines and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

**2. Referenced Documents**

2.1 ASTM Standards:<sup>1</sup>

- D1462/D1462M Test Methods for Sampling and Testing Bitumen-Saturated Felt and Glass-Fiber Reinforced Waterproofing
- D2252/D2252M Test Methods for Sampling, Testing, and Analysis of Asphalt Roll Roofing, Cap Sheets, and

<sup>1</sup>The specification is under the jurisdiction of ASTM Committee D08 on Building and Roofing and the technical responsibility of Subcommittee D08.02 on Synthetic and Polymeric Roofing. Current edition approved Dec. 15, 2020. Published December 2020. DOI: 10.1520/D8257-20(2020)

<sup>2</sup>For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service for more information. For annual book of ASTM standards, visit the standard's Technical Summary page on the ASTM website.

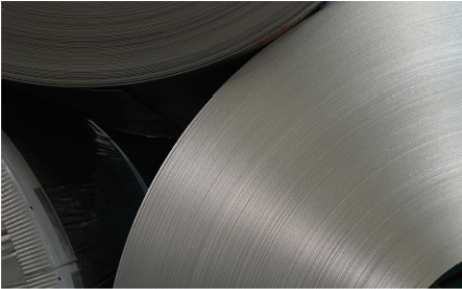
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## ASTM D8257, “Standard Specification for Mechanically Attached Polymeric Roof Underlayment Used in Steep Slope Roofing”

Published in December 2020

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RESEARCH+TECH



**A new standard**  
Guidelines for synthetic underlayments  
by Mark S. Graham

After more than eight years in development, in December 2020 ASTM International published the first U.S. product standard applicable to synthetic, steep-slope underlayment products. If you are involved with the design or installation of steep-slope roof systems, I encourage you to become familiar with this standard and begin to use it when specifying and procuring steep-slope underlayment products.

**ASTM D8257**  
ASTM D8257, “Standard Specification for Mechanically Attached Polymeric Roof Underlayment Used in Steep Slope Roofing,” addresses mechanically attached synthetic underlayment used in steep-slope roof systems.  
The standard defines polymeric underlayment as a sheet material primarily composed of polymers for use as a secondary water-shedding layer on steep-slope roofs when installed below a primary roof covering. The standard’s objective is to provide a finished product that will be used as a water-shedding underlayment layer before and after the installation of a primary steep-slope roof covering.

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Designation: D8257/D8257M - 20

### Standard Specification for Mechanically Attached Polymeric Roof Underlayment Used in Steep Slope Roofing<sup>1</sup>

This standard is issued under the final designation D8257/D8257M, the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last approval. A superscripted number (s) indicates an editorial change since the last revision or approval.

**1. Scope**

1.1 This specification addresses mechanically attached polymeric roof underlayment used in steep slope roofing.

1.2 The objective of this specification is to provide a finished product that will be used as a water-shedding underlayment layer on steep sloped roofs prior to and after installation of the primary roof covering.

**2. Referenced Documents**

2.1 ASTM Standards<sup>2</sup>

- D1460/D1460M Test Methods for Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing
- D2262/D2262M Test Methods for Sampling, Testing, and Analysis of Asphalt Roll Roofing, Cap Sheets, and

**3. Terminology**

3.1 Definitions—For definitions of terms used in this specification, refer to Terminologies D1079 and G113.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *polymeric roof underlayment*—a sheet material primarily composed of polymers for use as a secondary water-shedding layer on steep sloped roofs when installed below the primary roof covering.

4.1 The polymeric roof underlayment shall be supplied in roll form.

4.2 The polymeric roof underlayment shall be uniform in thickness and appearance. It shall be free of visible defects such as holes, ragged or uneven edges, breaks, cracks, tears, and protruding edges of reinforcement.

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4.3 The surface of the underlayment sheet shall be designed to provide traction and slip resistance to the applicator.

**7. Test Methods**

7.1 Conditioning—Unless otherwise stated, all specimens to be tested shall be conditioned for a minimum period of 24 h at

**TABLE 1 Requirements for Polymeric Roof Underlayments**

| Test Requirement                                       | Specimen Type   | Test Method                            | Conditions of Acceptance  |
|--|---|--|---|
| Unrolling  | As received   | 7.2                                    | No visible cracking, tearing, or delamination of underlayment                                 |
| Pliability   | As received   | 7.3                                    | No visible cracking or delamination of underlayment   |
| Water Vapor Transmission                               | As received   | 7.4                                    | Results shall be reported in Perms  |
| Liquid Water Transmission                              | As received   | 7.5                                    | Shall meet the "PASS" requirements of ASTM D4869/D4869M                                       |
| Linear Dimensional Change                              | As received   | 7.6                                    | Max. linear change of -2.5 to +1 %  |
| Tensile Strength (machine and cross-machine direction) | As received<br>After Thermal Cycling<br>After Laboratory Accelerated Weathering | 7.7<br>7.7 and 7.11<br>7.7 and 7.12    | Min. 3.5 kN/m [20 lbf/in.]  |
| Tearing Strength (machine and cross-machine direction) | As received<br>After Thermal Cycling<br>After Laboratory Accelerated Weathering | 7.8<br>7.8 and 7.11<br>7.8 and 7.12    | Min. 67 N [15 lbf]  |
| Fastener Pull-Through Resistance                       | As received<br>After Thermal Cycling<br>After Laboratory Accelerated Weathering | 7.9<br>7.9 and 7.11<br>7.9 and 7.12    | Min. 111 N [25 lbf]   |
| Hydrostatic Resistance                                 | As received<br>After Thermal Cycling<br>After Laboratory Accelerated Weathering | 7.10<br>7.10 and 7.11<br>7.10 and 7.12 | No water shall pass through any specimen  |
| Thermal Cycling  | As received   | 7.11                                   | No visible damage such as peeling, chipping, crazing, spitting, cracking, flaking, or pitting |
| Laboratory Accelerated Weathering <sup>A</sup>         | As received   | 7.12                                   | No visible damage such as peeling, chipping, crazing, spitting, cracking, flaking, or pitting |

<sup>A</sup> The effect of laboratory accelerated weathering on the tensile strength, tearing strength, fastener pull-through resistance, and hydrostatic resistance of the roof underlayment is for the purpose of simulating the effect of solar radiation, heat, and moisture on the roof underlayment during the period in which it is exposed to the environment before the roof covering is installed.

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**D8257/D8257M - 20**

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|--|---|---------------|--|
| Unrolling                                      | As received                             | 7.2           | No visible cracking, tearing, or delamination of underlayment                                  |
| Pliability                                     | As received                             | 7.3           | No visible cracking or delamination of underlayment  |
| Water Vapor Transmission                       | As received                             | 7.4           | Results shall be reported in perms   |
| Liquid Water Transmission                      | As received                             | 7.5           | Shall meet the "PASS" requirements of ASTM D4869/D4869M  |
| Linear Dimensional Change                      | As received                             | 7.6           | Max. linear change of -2.5 to +1 %   |
| Tensile Strength (machine as received)         | As received                             | 7.9           | Min. 111 N (25 lbf)  |
| Tearing Strength (machine as received)         | As received                             | 7.9 and 7.11  |  |
| Fastener Pull-Through Resistance               | As received                             | 7.9 and 7.11  |  |
|  | After Thermal Cycling                   | 7.9 and 7.12  |  |
|  | After Laboratory Accelerated Weathering | 7.9 and 7.12  |  |
| Hydrostatic Resistance                         | As received                             | 7.10          | No water shall pass through any specimen   |
|  | After Thermal Cycling                   | 7.10 and 7.11 |  |
|  | After Laboratory Accelerated Weathering | 7.10 and 7.12 |  |
| Thermal Cycling                                | As received                             | 7.11          | No visible damage such as peeling, chipping, crazing, splitting, cracking, flaking, or pitting |
| Laboratory Accelerated Weathering <sup>a</sup> | As received                             | 7.12          | No visible damage such as peeling, chipping, crazing, splitting, cracking, flaking, or pitting |

<sup>a</sup> The effect of laboratory accelerated weathering on the tensile strength, tearing strength, fastener pull-through resistance, and hydrostatic resistance of the roof underlayment is for the purpose of simulating the effect of solar radiation, heat, and moisture on the roof underlayment during the period in which it is exposed to the environment before the roof covering is installed.

*Some synthetic underlayments are vapor retarders, while others are vapor "open"*

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*Where would a "breathable" underlayment be preferred over a "non-breathable" underlayment?*

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## **Conclusions and recommendations**

### Synthetic underlayments

- Specify, select and purchase synthetic underlayments based upon ASTM D8257
- Beware of specific products' vapor retarder or vapor "open" characteristics
- ASTM D8257 will first be introduced into IBC 2024 and IRC 2024
  - Until then, code official "acceptance" is still needed

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## **FM Global-insured roofing project process**

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### CHECKLIST FOR ROOFING SYSTEM

**FM Global Clients: submit completed form and completed RoofNav CD**

**CONTACT INFORMATION:** FM CD  
 Roofing Contractor (Name, Address, Project No.)

**CLIENT SITE (Name & Address):**

**OVERVIEW OF WORK:** (Submit 1 form per roof area)  
 Subdiv. Name & Number (provide building diagram as appropriate)  
 Type of Work:  New Construction  Recover (New roof or Resurf./New cover/retrofit existing roofing system)  
 Roof Slope:  in. per ft. / degrees  ft. / Width  
 Building Dimensions: Length  Parapet Height   
 Roof Zone Width Dimension:   
 Zone 1:  Zone 2:   
 FM Approved RoofNav Assembly Numbers (provide Assembly Numbers)  
 Refer to FM Global Property Loss Prevention Data Sheet 1-28, Wind dimensions.

**ROOF SURFACING:**  
 None  
 Gravel (Trade Name/Application Rate)  
 Granules (Application Rate)  
 Gravel/Gravel  
 Ballast:  Stone Size  Pavers (Bene)  
 Ballast Weight (pcf): Zone 1:  Zone 2:   
 Additional Detail:

**ROOF COVER / MEMBRANE:**  
 Provide ALL applicable details including trade name, type, number  
 Roof Cover: Trade Name:   
 Nail Rating Provided:  Adhered  M  
 Single-Ply  Built Up Roofing (BUR)  Multi-Ply  
 Number of Plys:   
 Lap Width:  in/mm  Lap Adhesion Type  
 Panel:  Through Fastened Metal Standing Seam metal  Fiber Reinforced Plastic (FRP)  
 Other:   
 Spray Applied  
 Additional Detail:

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### CHECKLIST FOR ROOFING SYSTEM

**ROOF COVER / MEMBRANE SECUREMENT:**  
 Roof Cover Fasteners: Trade Name:  Size:   
 Stress Plate/Batten: Trade Name:  Size:   
 Row Spacing: Zone 1:  Zone 2:  Zone 3:   
 Fastener Spacing: Zone 1:  Zone 2:   
 Bonding Adhesive: Trade Name:  Zone 1:  Zone 2:   
 Adhesive Ribbon Width (in.):   
 Adhesive Application Rate (gal./sq. ft.):   
 Additional Detail:

**INSULATION / COVER BOARD:**  

| Layer                            | Insulation / Cover Board Trade Name | Board Dimensions (ft. x ft.) | Thick (in.) |
|----------------------------------|-------------------------------------|------------------------------|-------------|
| 1. Top                           |                                     |                              | X           |
| 2. Next                          |                                     |                              | X           |
| 3. Next                          |                                     |                              | X           |
| 4. Next                          |                                     |                              | X           |
| 5. Thermal Barrier               |                                     |                              | X           |
| 6. Glass Fiber/Mineral Wool/Batt |                                     |                              | X           |
| 7. Other:                        |                                     |                              |             |
| 8. Vapor Barrier                 |                                     |                              |             |
| 9. Other:                        |                                     |                              |             |
| 10. None                         |                                     |                              |             |

 Additional Detail:

**INSULATION / COVER BOARD SECUREMENT:**  
 Insulation / Cover Board Fasteners: Trade Name:  Size:  Type:   
 Stress Plate: Trade Name:  Size:   
 Fastener Spacing: Zone 1:  Zone 2:   
 Bonding Adhesive: Trade Name:  Zone 1:  Zone 2:   
 Adhesive Ribbon Width (in.):   
 Adhesive Application Rate (gal./sq. ft.):   
 Additional Detail:

**BASE SHEET: (Include Trade Name, Type, and Width)**  
 None  
 Trade Name:  Width:  36"  
 Fastened  Adhered  Lap Adhes  
 Lap Width:  in/mm  Lap Adhes  
 Air Retarder  Vapor Retard  
 Additional Detail:

**BASE SHEET SECUREMENT:**  
 Base Sheet Adhesive Name:  Adhes  
 Base Sheet Fastener Trade Name:  Type:   
 Head Diameter:  Length:   
 Spacing (Attach sketches as necessary)  
 Spacing Along Laps: Zone 1:  Zone 2:  Zone 3:   
 No. Intermediate Rows: Zone 1:  Zone 2:  Zone 3:   
 Spacing Along Intermediate Rows: Zone 1:  Zone 2:  Zone 3:   
 Additional Detail:

XC688 ENGINEERING (Rev. FEB 2020)

### CHECKLIST FOR ROOFING SYSTEM

**DECK:**  
 Steel  Manufacturer:  Type (e.g. wide flk)  Thickness:  Gauge:  Yield Strength:   
 LWC Form Deck  Cementitious Wood Fiber (Pultrud Test Required)  
 Concrete  Pre-cast panels or  Cast in Place  
 Wood: Particle Board/plywood  Fiber Reinforced Gypsum  Fiber Reinforced Plastic  
 Gypsum (Pultrud Test Required)  Plank or  Poured  
 Other:   
 Additional Detail:

**DECK OR ROOF PANEL SECUREMENT:**  
 Deck Or Roof Panel Fasteners:  Type:   
 Trade Name:  Size:  Washer:   
 Length:  Size:  Washer:   
 Fastener / Washer Spacing: Zone 1:  Zone 2:  Zone 3:   
 Deck Side Lap Fastener Spacing: Zone 1:  Zone 2:  Zone 3:   
 Additional Detail:

**ROOF STRUCTURE (Include Size, Gauge, Etc.):**  
 Purlin:  2" or  2" Thickness:   
 Purlin: Zone 1:  Zone 2:  Zone 3:   
 Joist:  Wood or  Steel  Joist Spacing: Zone 1:  Zone 2:  Zone 3:   
 Beams:  Wood or  Steel  Beam Spacing: Zone 1:  Zone 2:  Zone 3:   
 Other:   
 Additional Detail:

**PERIMETER FLASHING: (Attach a detailed sketch of metal fascia, gravel stop, nailer, blocking, coping, etc.)**  
 FM Approved Flashing  
 Other (Applicable only when FM Approved system is not available):   
 Manufacturer/Trade Name:   
 Flashing Max Wind Rating:   
 Flashing / Coping Detail: Face Height:  Thickness:   
 Hook Strip Detail: Height:  Thickness:  Fastener spacing:   
 Nailer / Blocking Details Per FM Global Data Sheet 1-42?  Yes  No (Attach Details)  
 Nail: Spacing:  Diameter:  Embedment:   
 Additional Detail:

**DRAINAGE:**  
 For new construction: Has roof drainage been designed by a Qualified Engineer per FM Global Loss Prevention Data Sheet 1-54 for the local building code?  Yes  No (Attach details)  
 For re-roofing and recovering: will the roof drainage be changed from the original design (i.e. drains inserted/covered/removed, new expansion joints, blocked or reduced scupper size)?  Yes  No  
 If yes, were the changes reviewed by a Qualified Engineer?  Yes  No (Attach details)  
 Secondary (intermittent) roof drainage provided per FM Global Data Sheet 1-54?  Yes  No (Attach details)  
 Additional Detail:

**ROOF MOUNTED EQUIPMENT: (Attach drawings, calculations and any supporting detail.)**  
 Roof mounted equipment secured per FM Global Loss Prevention Data Sheet 1-28 and the local building code?  Yes  No  
 Additional Detail:

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Affiliated FM Online Training (<http://training.affiliatedfm.com>)  
 Approval Guide (<http://www.approvalguide.com>)  
 RoofNav (<http://roofnav.fmatglobal.com>)

**Distribution:**

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T081D (07/2019)

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The following design criteria were used for this review:

- 125 mph Wind Speed (for 3-second gusts)
- 1.15 Wind Importance Factor (for cladding)
- Ground Roughness "C"
- Partially Enclosed Building Classification

The following wind ratings are needed for each area:

| Roof Area | Field | Perimeter     | Corner                 |
|-----------|-------|---------------|------------------------|
| Main Roof | 1-150 | 1-225 (8 ft.) | 1-225 (8 ft. x 16 ft.) |

**Review Comments:**

1. After completion of the roof installation, conduct uplift testing in accordance with FM Global Property Loss Prevention Data Sheet 1-52, *Field Verification of Roof Wind Uplift Resistance*. Perform 2 tests in the field, 2 tests in the perimeter, and 1 test in the corner. Final acceptance of the roofing installation will be dependent upon satisfactory performance of the roof installation during the uplift testing. The following pressures are considered passing for each roof area:
  - Field: 90 psf
  - Perimeters: 137 psf
  - Corners: 137 psf

roof system components and installation.

Design loads (ASCE 7-10) from the Construction Documents:

- Field: -68.6 psf
- Perimeter and corners: -115.4 psf

Resulting loads for FM 1-52 testing (based on the Construction Documents' design loads):

- Field: -52 psf
- Perimeter and corners: -87 psf

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## Conclusions and recommendations


FM Global-insured roofing project process

- FM Global/FM Approvals is not likely a party to the Contract for roofing work
  - FM Global makes recommendations to their insureds/building owner clients
  - FM Global should not be dictating to the Roofing Contractor
- A FM Global-insured roof assembly is a premium product
  - It is typically (well) above minimum code requirements
- Actively manage roofing projects for FM Global-insured clients


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# Construction-generated moisture

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**RESEARCH+TECH**



**Construction-generated moisture**  
Unintended moisture accumulation can affect roof system performances  
by Mark S. Graham

**Professional Roofing**  
December 2021/January 2022

[Link](#)

24 professionalroofing.net DECEMBER/JANUARY 2021-22

The process of constructing buildings and certain building systems and finishes can result in the generation and release of relatively large amounts of moisture. Left unaccounted for and allowed to become entrapped within a building, this moisture can result in premature deterioration of some building systems and materials, including roof systems. Following is a brief discussion of some construction-generated moisture sources and examples of how their effects can be mitigated.

**Moisture sources**

During construction, large amounts of water are used in the manufacture and installation of certain building materials. For example, a normal weight structural concrete mix with a water-to-cement ratio of 0.45 contains about 50 gallons of water per cubic yard of concrete. In some instances, additional water is added to ease the transport and placement of concrete. About half of this water will be consumed during the concrete hydration and curing process. The remaining water is left to dissipate by evaporation and moisture vapor transport over time.

Similarly, many building construction finish materials contain large amounts of water. Plaster, drywall, drywall compounds, some adhesive

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### **Some things we know...**

Construction-generated moisture

- Cooler temperatures are more challenging than warmer temperatures
  - Cool air holds less moisture
- Some “modern” materials are less moisture tolerant
- Water-based products release moisture; more than solvent-based materials
- Concrete is placed using much more water than is necessary for proper hydration
- Many concrete admixtures slow moisture release

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### **Some things we know (cont.)...**

Construction-generated moisture

- Temporary enclosures can trap moisture/prevent moisture release
- Temporary heating can be problematic
  - Propane heaters release large amounts of moisture vapor
- Bringing warm, stored materials out into a cold environment can result in surface condensation


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## Recommendations

Construction-generated moisture

- Realize practical (and physical) limitations
- Consider appropriate contract provision language so you don't take on additional liability

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**Professional Roofing**  
June 2020

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|                 |  |             |
|-----------------|--|-------------|
|                 | <p><b>PERFORMANCE BOND</b></p> <p>Know all men by these presents: That _____<br/>         _____, the Contractor ("Principal") whose principal place of business is located at _____ and _____<br/>         ("Surety") are held and firmly bound unto _____<br/>         _____, the Owner ("Obligee") in the amount of _____<br/>         _____ dollars (\$ _____)</p> <p>for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.</p> <p><b>Whereas,</b><br/>         Principal has by written agreement dated _____ entered into a contract with Obligee for _____<br/>         _____<br/>         which contract (the "Contract") is by reference expressly made a part hereof.</p> <p><b>Now therefore, the condition of this obligation is</b> such that, if the Principal shall promptly and faithfully perform said Contract in conformity with the plans, specifications, and conditions of the Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.</p> <p>Provided that any alterations which may be made in the terms of the Contract, or in the Work to be done under it, or the giving by the Obligee of any extension of time for the Contract, or any other alterations, extensions, or forbearance on the part of either or both of the Obligee or the Principal to the other shall not in any way release the Principal and the Surety, or either of them, their heirs, executors, administrators, successors, or assigns from their liability hereunder, notice to the Surety of any such alterations, extension, or forbearance being hereby waived.</p> <p>No action shall be brought on this bond unless brought within two years after: (a) completion of the Contract and all Work thereunder, or (b) default of the Principal, whichever shall occur first.</p> <p>The Surety represents to the Principal and to the Obligee that it is legally authorized to do business in the State in which the Work is being carried out.</p> <p><small>DISCLAIMER: This document has important legal and insurance consequences, and users are encouraged to consult with an attorney and insurance or surety advisor. The applicability or enforceability of this document may be affected by applicable Federal, State and Local laws and regulations. IBEC SPECIFICALLY DISCLAIMS ANY AND ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. PURCHASERS ASSUME ALL LIABILITY WITH RESPECT TO THE USE OF THIS BOND FORM. IBEC SHALL NOT BE RESPONSIBLE OR LIABLE FOR ANY DAMAGES RESULTING FROM SUCH USE, INCLUDING BUT NOT LIMITED TO ACTUAL, DIRECT, INDIRECT, CONSEQUENTIAL, OR PUNITIVE DAMAGES.</small></p> |             |
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|                 |  |             |
|-----------------|--|-------------|
|                 | <p><b>PAYMENT BOND</b></p> <p>Know all men by these presents: That _____<br/>         _____, the Contractor ("Principal") whose principal place of business is located at _____ and _____<br/>         ("Surety") are held and firmly bound unto _____<br/>         _____, the Owner ("Obligee") in the amount of _____<br/>         _____ dollars (\$ _____)</p> <p>for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.</p> <p><b>Whereas,</b> Principal has by written agreement dated _____ entered into a contract with Obligee for _____<br/>         _____<br/>         which contract (the "Contract") is by reference expressly made a part hereof.</p> <p><b>Now therefore, the condition of this obligation is</b> such that, if the Principal shall promptly make payment to all claimants as hereinafter defined, for labor performed and material furnished in the prosecution of the Work provided for in the Contract, then this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions.</p> <p>The Principal and Surety, jointly and severally, hereby agree with Obligee as follows:</p> <ol style="list-style-type: none"> <li>1. A claimant is defined as one having a direct contract with the Principal or with a subcontractor of the Principal for labor, material, or both for use in the performance of the Contract. A "subcontractor" of the Principal, for the purposes of this bond only, includes not only those subcontractors having a direct contractual relationship with the Principal (a "first-tier subcontractor"), but also any other contractor or supplier having a direct contractual relationship with a first-tier subcontractor (a "second-tier subcontractor"). "Labor" and "material" shall include, but not be limited to, public utility services and reasonable rental of equipment, but only for periods when the equipment rented is actually used at the work site.</li> <li>2. Subject to the provisions of paragraph 3, any claimant who has performed labor or furnished material in accordance with the Contract documents in the prosecution of the Work provided in the Contract, who has not been paid in full therefore before the expiration of ninety (90) days after the day on which such claimant performed the last of such labor or furnished the last of such materials for which he claims payment, may bring action on this bond to recover any amount due him for such labor or material, and may prosecute such action to final judgment and have execution on the judgment. The Obligee need not be a party to such action and shall not be liable for the payment of any costs, fees, or expenses of any such suit.</li> <li>3. Any claimant who has a direct contractual relationship with any subcontractor of the Principal from whom the Principal has not required a subcontractor payment bond, but who has no contractual relationship, express or implied, with the Principal, may bring an action on this bond only if he has given notice of the claim to Principal no later than ninety (90) days after said claimant performed the last of the labor or furnished the last of the materials for which he claims payment, stating with substantial accuracy the amount claimed and the name of the person for whom the Work was performed or to whom the material was furnished. Notice to the Principal shall be served by registered or certified mail, postage prepaid, in an envelope addressed to the Principal at any place where his office is regularly maintained for the transaction of business.</li> </ol> |             |
| FORM 303 1/2021 | PAYMENT BOND   | Page 1 of 3 |

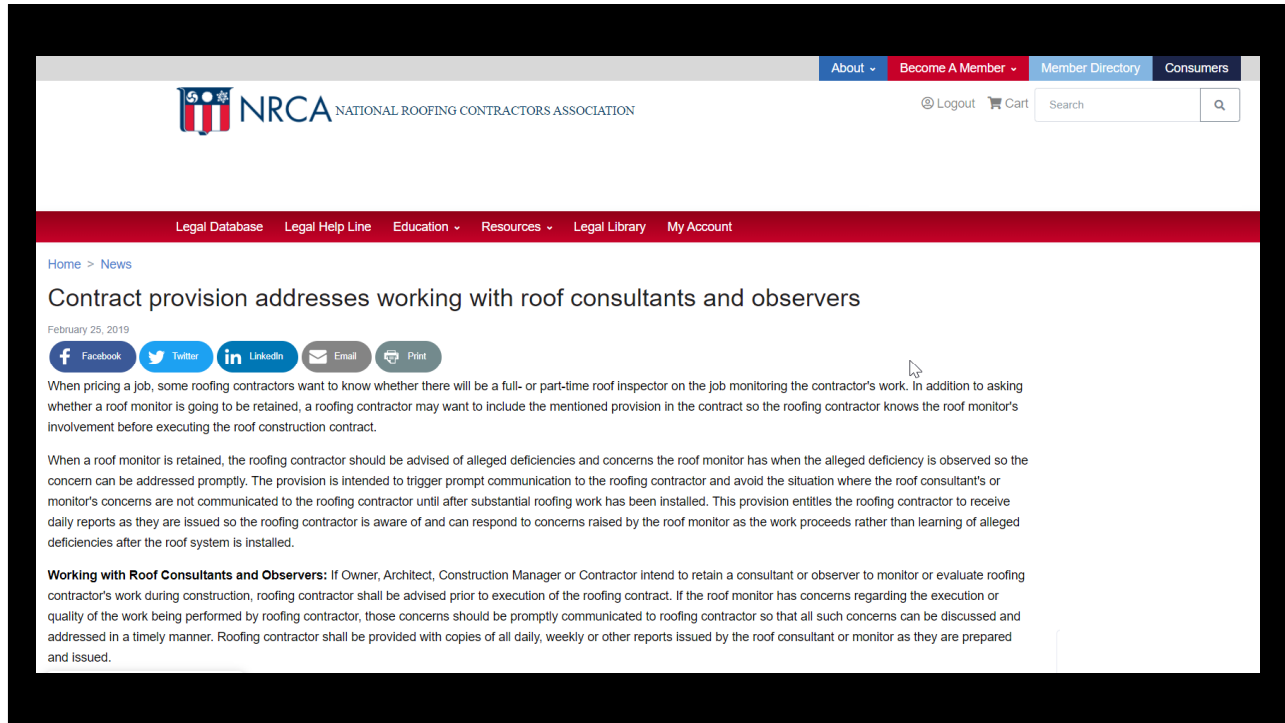
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*NRCA has concerns with IIBEC's Performance Bond (Form 304) and Payment Bond (Form 303) and suggest their use be avoided.*

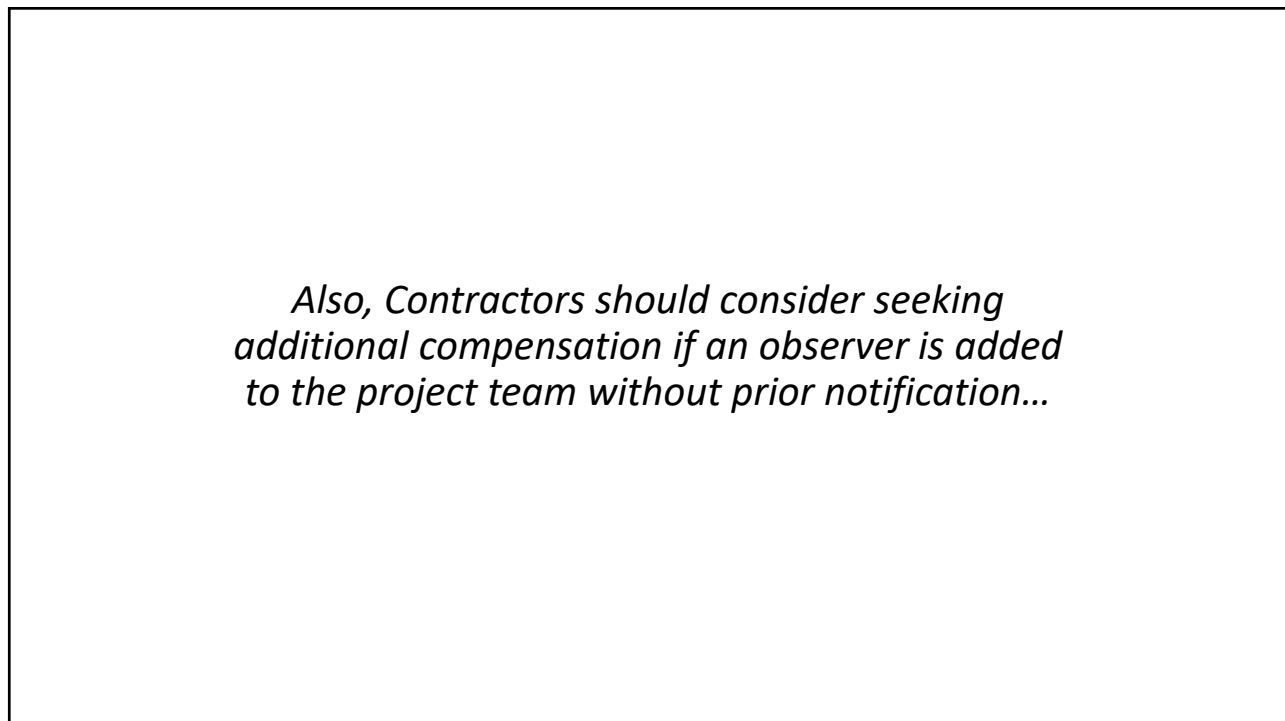
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*NRCA has long supported the use of AIA Documents (and ConsensusDoc®), and we prefer their use over the IIBEC contract documents...*

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# Material and product shortages and price volatility

Visit the Supply Chain Shortage Information page. [LEARN MORE](#)

NRCA NATIONAL ROOFING CONTRACTORS ASSOCIATION

Bookstore Resources Education ProCertification® Advocacy News + Events NRCA en español

## Supply Chain Shortage Information

- CA sends letter to Department of Energy
- AGC offers Construction Inflation Alert
- Supply Chain Shortage Town Hall Recording

Calendar

- NRCA Education Industry
- Oct. 13-15 NRCA's Legal Conference Virtual
- Nov. 9-12 NRCA Fall Committee Meetings Chicago
- Jan. 30 - Feb. 3, 2022 NRCA's 135th Annual Convention and International Roofing Expo 2022s New Orleans
- March 10, 2022 LEGALCON

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**INDUSTRY ISSUE UPDATE**

NRCA Member Benefit

### Roofing material shortages and price volatility

September 2021

The U.S. roofing industry is experiencing unprecedented shortages of roofing materials and products and significant price volatility. NRCA is providing this Industry Issue Update to help its members with building owners, facility managers, general contractors and construction managers involved in roof purchasing decisions.

Although this information is intended to apply specifically to the U.S. roofing market, based on NRCA's communications with its affiliate and partners in Canada, Mexico and elsewhere worldwide, shortages of roofing materials and products and price volatility appear to be global issues.

**BACKGROUND**

Compared with other industries, the U.S. roofing industry is domestic in nature. With few exceptions, a vast majority of roofing products and materials used are manufactured in the U.S. from U.S.-sourced raw materials, delivered by U.S. suppliers and distributors, and installed by U.S. roofing contractor companies. Although the global economy has some effect on many purchasing decisions, the U.S. roofing industry is largely driven by the U.S. economy, interest rates and consumer sentiment.

During the past decade, the U.S. roofing industry has experienced a period of consistent, moderate growth. The roofing materials and products supply chain has expanded in capacity and roofing contractors have added field personnel and capability to fill this growing need. In many regions of the U.S., additional roofing industry growth has been limited by a lack of adequately trained field personnel.

At the same time, energy code requirements and sustainability incentive programs have resulted in a demand for more energy-efficient roof systems. For example, when retrofitting a building, it is not unusual to replace an existing, aged roof system having an R-10 insulation value with a new roof system with an energy code mandated minimum R-20, R-25, R-30 or R-35 insulation value. Such increases in

insulation values necessitate using greater amounts of and thicker insulation, usually in multiple layers, longer fasteners, more layers of insulation adhesive and additional material handling and installation labor.

**THE CURRENT SITUATION**

The U.S. roofing industry responded and adapted to the onset of the COVID-19 pandemic remarkably well. The U.S. roofing industry quickly was considered "essential," and at the start of the pandemic, the roofing materials and products supply chain functioned with only minimal interruptions. Roofing contractors adapted to additional safe work practices necessary to perform work on occupied buildings during the pandemic.

By many measures, 2020 was a productive year for the U.S. roofing industry. For example, 2020 was a near historic record level year for asphalt shingle installations. Homeowners limited to traveling and maintaining their homes during the pandemic, spurred in part by low interest rates and the availability of stimulus funding, and the roofing industry responded to several weather events involving high winds and hail. The institutional and industrial segments of the U.S. roofing industry also experienced similar levels of activity.

However, one noticeable change in the level of roofing material and product inventory demand considerably. Roofing material suppliers and distributors reduced their material and product inventories. Since the start of the pandemic, for many roofing materials and products are being shipped on a job-specific basis. This especially is the case with roof insulation and roof covering products and certain specialty products, such as ballistics and adhesives. A few years ago, many roofing jobs often could be carried out with roofing materials and products held in inventory, but manufacturers now are shipping roofing materials and products on a job-specific basis with fewer roofing materials and products being stocked in inventory.

## NRCA Industry Issue Update: Roofing Material Shortages and Price Volatility

[Link](#)

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**Questions... and other topics**

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