Project Manager/Estimator Meeting
Oglebay Resort, Wheeling, WV
February 24, 2022

Emerging Technical Issues and Risks

Mark S. Graham
Vice President, Technical Services
National Roofing Contractors Association
Rosemont, Illinois

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Topics

- Roof decks… and acceptance
- FM Global-insured projects
- Construction-generated moisture
- Material availability and price volatility
- Questions (and other topics)

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Roof decks… and acceptance

- Concrete roof decks
- Steel roof decks
- Wood roof decks
- Other roof decks

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Concrete roof decks

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Some things we (now) know…

- Concrete requires a water-to-cement ration of about 0.24 for proper hydration; additional water is added to facilitate handling and placement
- Actual field measured water-to-cement ratios of 0.5 up to 0.75 are not unusual
- Concrete will continue to cure when it's RH is about 80% or higher and its temperature is about 40 F or higher

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- Concrete's porosity is at its highest shortly after placement and its porosity gradually decreases over time (curing)
- Fly ash (a concrete additive) typically reduces concrete's porosity
- Concrete finishing techniques can impact concrete's porosity
- Many concrete admixtures will retard concrete drying
- Power finishing air-entrained concrete mixes can result in surface dusting, crazing and spalling.
- Re-wetting (precipitation) has a significant impact on concrete's drying rate
- Concrete is a highly variable construction material

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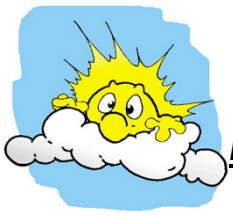
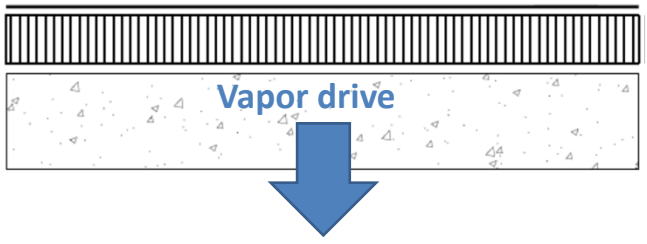


Moisture mechanics -- Summer conditions

Warm outside air



"Cool" conditioned air

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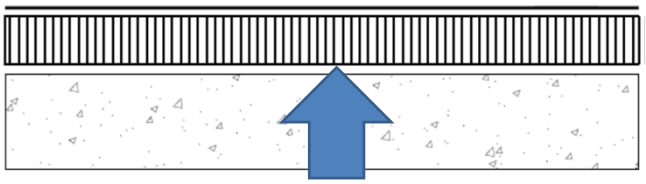
Cool outside air

Winter conditions



Vapor drive

Warm inside air

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Conclusions…

- It's not the roofing industry's water
- We shouldn't take responsibility (or be held responsible) for concrete deck water
- Roofing contractors typically do not have the expertise or project-specific knowledge to make "dryness" or "when to roof" decisions on concrete roof decks

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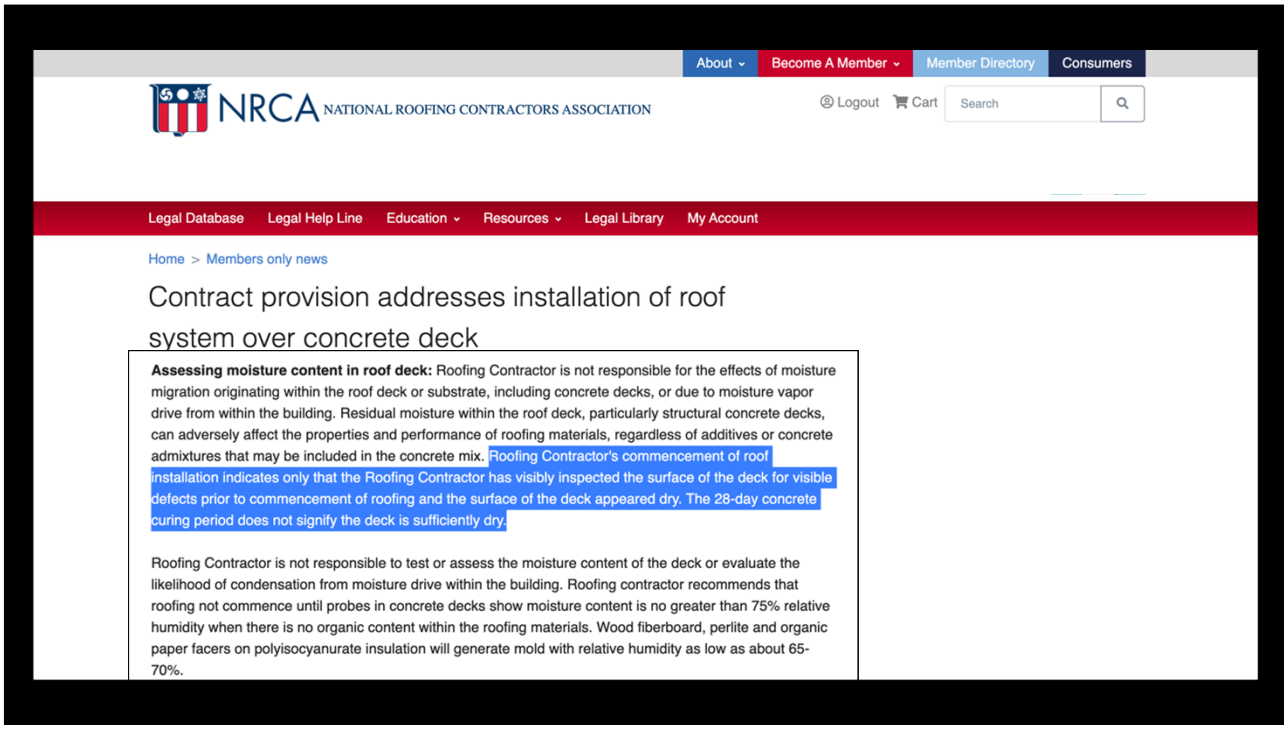

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Steel roof decks

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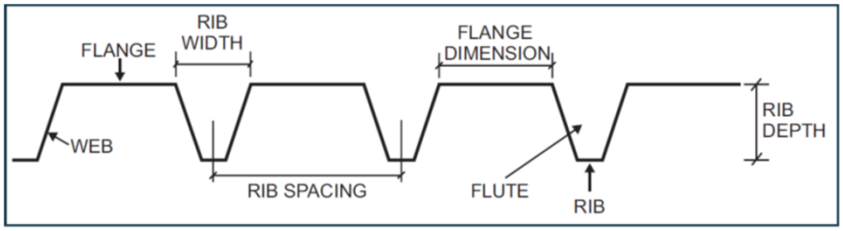
Terminology -- Steel roof decks



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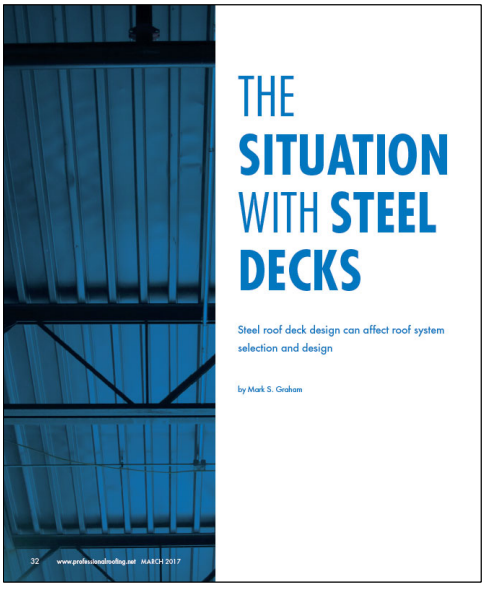

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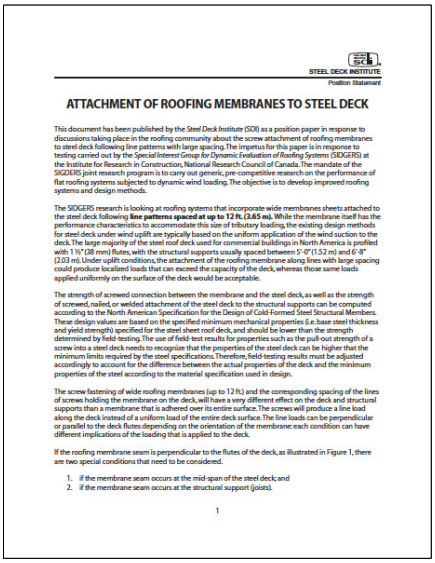
SDI bulletin

2009



STEEL DECK INSTITUTE
Position Statement

ATTACHMENT OF ROOFING MEMBRANES TO STEEL DECK

This document has been published by the *Steel Deck Institute* (SDI) as a position paper in response to discussions taking place in the roofing community about the screw attachment of roofing membranes to steel deck following line patterns with large spacing. The impetus for this paper is in response to testing carried out by the *Special Interest Group for Dynamic Evaluation of Roofing Systems* (SIDGERS) at the Institute for Research in Construction, National Research Council of Canada. The mandate of the SIGDERS joint research program is to carry out generic, pre-competitive research on the performance of flat roofing systems subjected to dynamic wind loading. The objective is to develop improved roofing systems and design methods.

The SIDGERS research is looking at roofing systems that incorporate wide membranes sheets attached to the steel deck following **line patterns spaced at up to 12 ft. (3.65 m).** While the membrane itself has the performance characteristics to accommodate this size of tributary loading, the existing design methods for steel deck under wind uplift are typically based on the uniform application of the wind suction to the deck. The large majority of the steel roof deck used for commercial buildings in North America is profiled with 1 ½" (38 mm) flutes, with the structural supports usually spaced between 5'-0" (1.52 m) and 6'-8" (2.03 m). Under uplift conditions, the attachment of the roofing membrane along lines with large spacing could produce localized loads that can exceed the capacity of the deck, whereas those same loads applied uniformly on the surface of the deck would be acceptable.

The strength of screwed connection between the membrane and the steel deck, as well as the strength of screwed, nailed, or welded attachment of the steel deck to the structural supports can be computed according to the North American Specification for the Design of Cold-Formed Steel Structural Members. These design values are based on the specified minimum mechanical properties (i.e. base steel thickness and yield strength) specified for the steel sheet roof deck, and should be lower than the strength determined by field-testing. The use of field-test results for properties such as the pull-out strength of a screw into a steel deck needs to recognize that the properties of the steel deck can be higher that the minimum limits required by the steel specifications. Therefore, field-testing results must be adjusted accordingly to account for the difference between the actual properties of the deck and the minimum properties of the steel according to the material specification used in design.

The screw fastening of wide roofing membranes (up to 12 ft.) and the corresponding spacing of the lines of screws holding the membrane on the deck, will have a very different effect on the deck and structural supports than a membrane that is adhered over its entire surface. The screws will produce a line load along the deck instead of a uniform load of the entire deck surface. The line loads can be perpendicular or parallel to the deck flutes depending on the orientation of the membrane: each condition can have different implications of the loading that is applied to the deck.

If the roofing membrane seam is perpendicular to the flutes of the deck, as illustrated in Figure 1, there are two special conditions that need to be considered.

1. if the membrane seam occurs at the mid-span of the steel deck; and
2. if the membrane seam occurs at the structural support (joists).

1

- Decks designed for joist spacing between 5’ and 6’ 8” o.c.
- Deck designed for uniform loading
- Seam-fastened single-ply membranes are a concern

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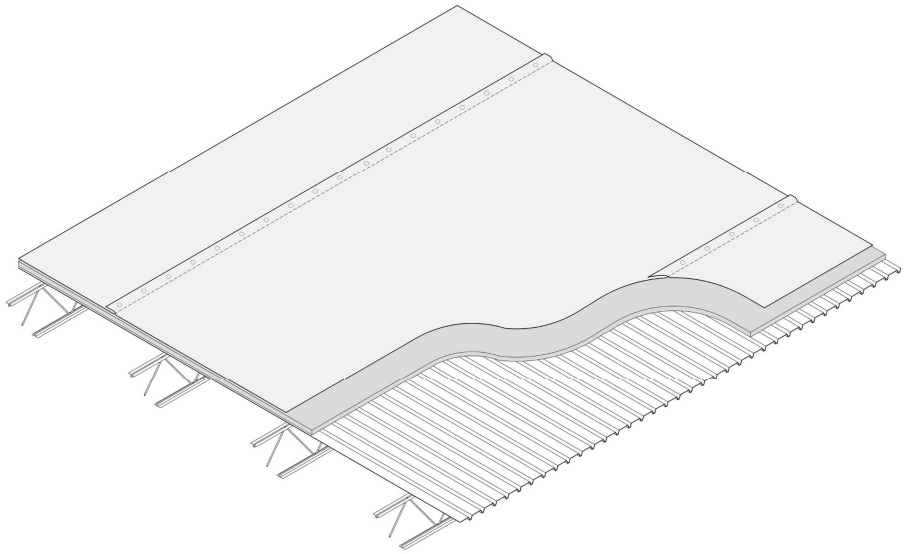
Membrane seams across deck flutes



SDI: 3.8 X moment (deck); 2 X load (joists)

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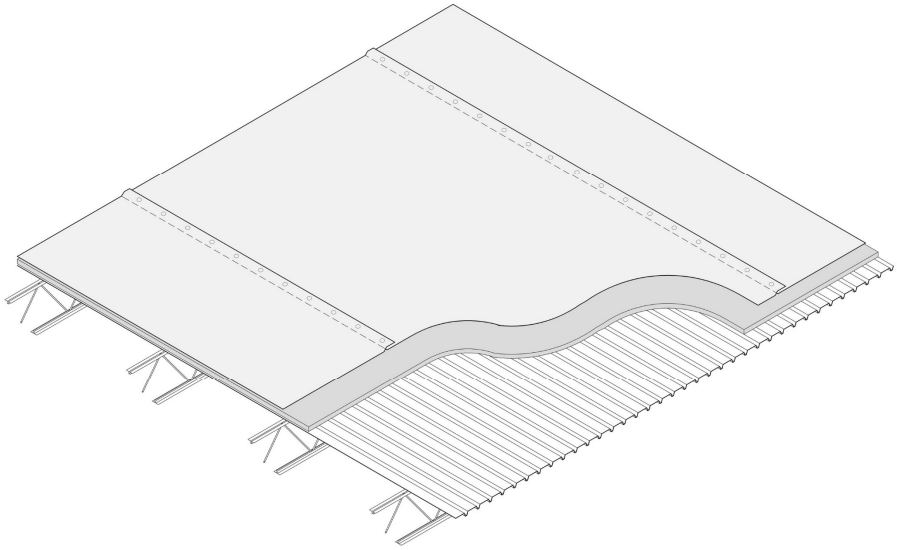
Membrane seams in deck flute direction



SDI: 12 X bending moment and shear (deck)

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SDI Technical Note-No. 7 (Nov. 2019)

Mechanical attachment of single-ply roofing membranes to steel roof deck: Implications for steel deck design

Link

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SDI's *Roof Deck Design Manual, Second Edition*

Link

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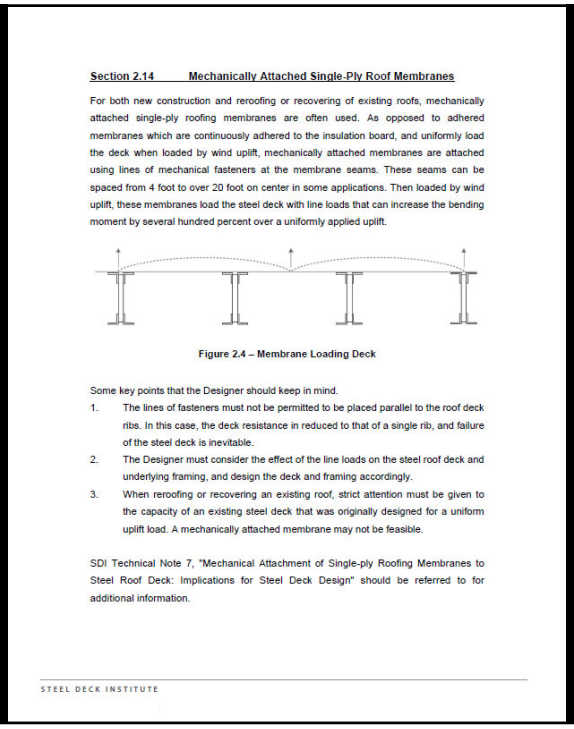

Section 2.14 Mechanically Attached Single-Ply Roof Membranes

For both new construction and reroofing or recovering of existing roofs, mechanically attached single-ply roofing membranes are often used. As opposed to adhered membranes which are continuously adhered to the insulation board, and uniformly load the deck when loaded by wind uplift, mechanically attached membranes are attached using lines of mechanical fasteners at the membrane seams. These seams can be spaced from 4 foot to over 20 foot on center in some applications. Then loaded by wind uplift, these membranes load the steel deck with line loads that can increase the bending moment by several hundred percent over a uniformly applied uplift.

Some key points that the Designer should keep in mind.

1. The lines of fasteners must not be permitted to be placed parallel to the roof deck ribs. In this case, the deck resistance in reduced to that of a single rib, and failure of the steel deck is inevitable.
2. The Designer must consider the effect of the line loads on the steel roof deck and underlying framing, and design the deck and framing accordingly.
3. When reroofing or recovering an existing roof, strict attention must be given to the capacity of an existing steel deck that was originally designed for a uniform uplift load. A mechanically attached membrane may not be feasible.

SDI Technical Note 7, "Mechanical Attachment of Single-ply Roofing Membranes to Steel Roof Deck: Implications for Steel Deck Design" should be referred to for additional information.

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Mechanically Attached Membrane:

Mechanically Attached Membrane	$M_{n\,max} / \Phi M_n$	Moment Increase over Adhered Membrane	$M_{p\,max} / \Phi M_p$	Moment Increase over Adhered Membrane
Zone 1 (Interior)	0.86	430%	0.34	143%
N-S Perimeter in Zone 2 (Edge)	0.52	175%	0.42	109%
N-S Perimeter in Zone 3 (Corner)	0.80	179%	0.63	106%
E-W Perimeter, attached parallel to deck ribs	3.18	1065%	4.17	1065%

Observations:

1. A mechanically attached membrane greatly increases the flexural demand on the deck over an adhered membrane. Except where attached parallel to the deck ribs in the E-W perimeter, the 40 ksi WR deck has adequate flexural capacity. Lower strength 33 ksi deck may have been overloaded in flexure in Zone 1 and 3.
2. It is important that the membrane width be decreased in the edge zones as defined in ASCE 7. If the 10 foot membrane width was continued in the edge zones, the deck would have been overloaded in flexure in Zones 2 and 3.
3. Membrane width is important. A 12 foot membrane width, as opposed to the 10 foot width in this example, would have most likely overloaded the deck in flexure. Membranes much wider than 12 foot are currently in use.
4. The effect on deck securement to the support framing, and the uplift loads on the support framing, also need to be considered.
5. Deck formed from steel of higher strength than 40 ksi, or thicker gage, may be considered in new construction.
6. Careful analysis of existing structures being re-roofed or re-covered with a mechanically attached membrane, that originally had an adhered membrane, must be performed. Narrower membrane widths may be needed.

SECTION 6 | EXAMPLES

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STEEL ROOF DECK FINISHES

Steel roof decks typically are manufactured (rolled) using uncoated black steel or galvanized (zinc-coated) steel. Uncoated steel roof decks typically are delivered to a job site mill-primed on one or both sides with the intent of providing some degree of corrosion protection until job-site placement (erection). In some situations, steel roof decks are shop-painted before erection.

The Steel Deck Institute (SDI) indicates the finish of a steel roof deck should be suitable for the environ-

"…NRCA recommends steel roof decks have a minimum G-90 galvanized coating companying with ASTM A653, "Standard Specification of Steel Sheet, Zinc-coated (Galvanized) or Zinc Alloy-coated (Galvannealed) by the Hot-dip Process."

The technical bulletin was supported by The American Institute of Architects, Asphalt Roofing Manufacturers Association, Institute of Roofing and Waterproofing Consultants, and RCI.

NRCA currently maintains its position: NRCA recommends steel roof decks have a minimum G-90 galvanized coating complying with ASTM A653, "Standard Specification of Sheet Steel, Zinc-Coated (Galvanized) of Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process."

Additional information regarding steel roof decks is contained in *The NRCA Roofing Manual: Membrane Roof Systems—2015.*

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NRCA's recommendations

Uniformly-loaded vs. non-uniform, linear pattern loaded steel roof decks

- Do not make representations regarding the structural adequacy steel roof decks.
- May want to raise the question whether a steel roof deck has been designed using FM 1-29, SDI's Technical Note No. 7 (November 2019) or SDI's Roof Deck Design Manual, Second Edition (June 2020)

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Plywood and OBS roof deck concerns

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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

Plywood 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 NRCA guidelines applicable to them.

IRC 2018

The International Residential Code® provides specific requirements applicable to plywood and OSB structural panel sheathing used as roof decks for one- and two-family dwellings. In IRC's 2018 edition, specific requirements are provided in Section R803–Roof Sheathing.

IRC 2018 requires wood structural panels conform to the Department of Commerce's PS 1, "Structural Plywood," or PS 2, "Performance Standard for Wood-based Structural-Use Panels," or CSA Group™'s O325, "Construction Sheathing," or O437, "Standards on OSB and Waferboard." PS 1 and O325 generally are recognized to apply to plywood, and PS 2 and O437 apply to OSB.

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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"

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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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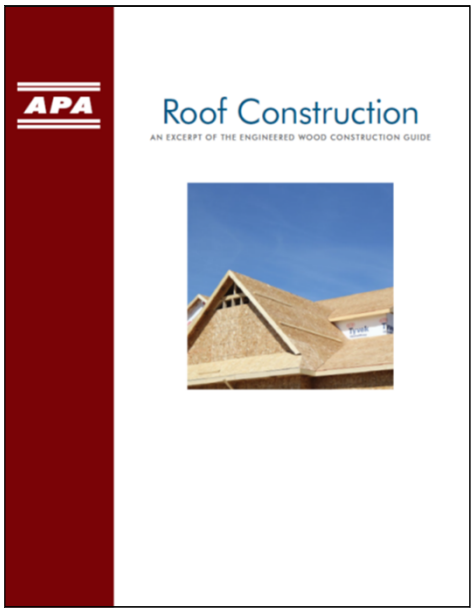

APA Form E30, "Roof Construction"
--Roofing-specific excerpts from APA's *Engineered Wood Construction Guide* (102 pages)

Link

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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
  - Prepare building owners for the need for deck replacement and/or deck reattachment

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FM Global-insured roofing project process

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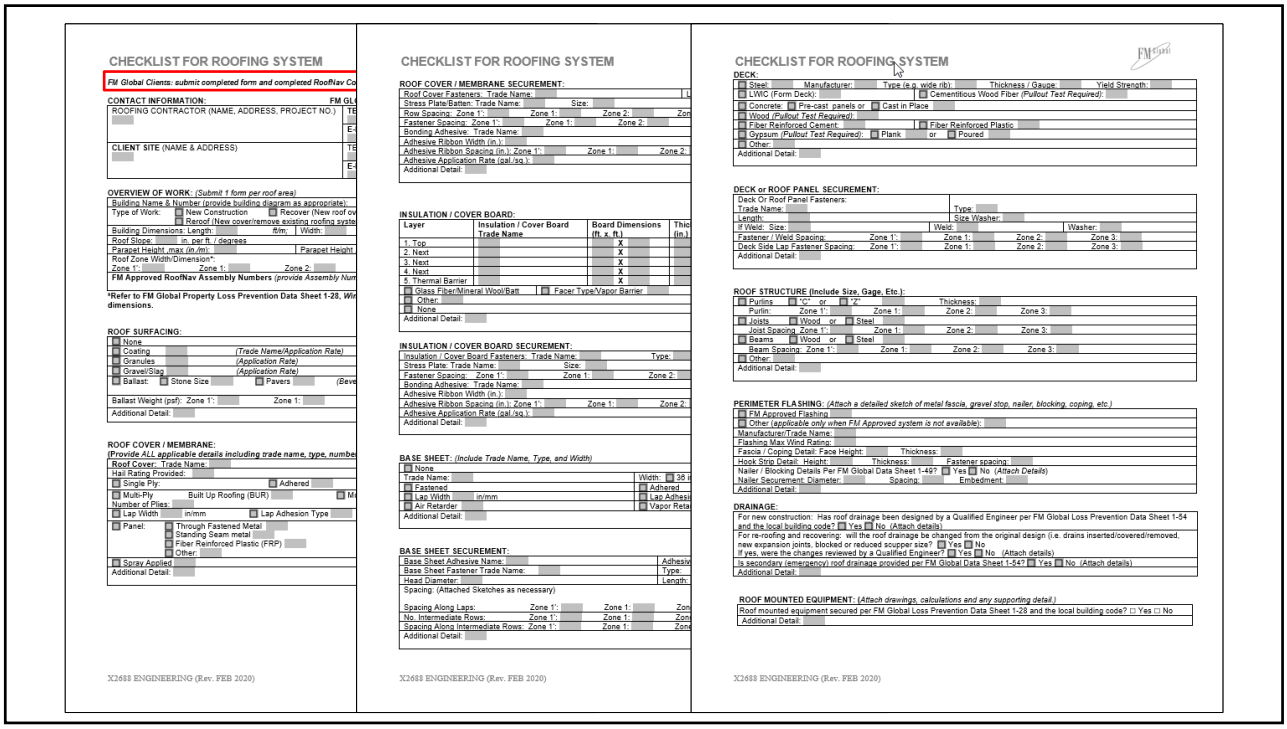

CHECKLIST FOR ROOFING SYSTEM

FM Global Clients: submit completed form and completed RoofNav Co

CONTACT INFORMATION: FM GL

ROOFING CONTRACTOR (NAME, ADDRESS, PROJECT NO.) | TE

CLIENT SITE (NAME & ADDRESS) | TE | E-

OVERVIEW OF WORK: *(Submit 1 form per roof area)*

Building Name & Number (provide building diagram as appropriate):

Type of Work: New Construction Recover (New roof ov Reroof (New cover/remove existing roofing syste

Building Dimensions: Length ft/m Width:

Roof Slope: in. per ft. / degrees

Parapet Height, max (in./m): Parapet Height

Roof Zone Width/Dimension*:

Zone 1': Zone 1: Zone 2:

FM Approved RoofNav Assembly Numbers *(provide Assembly Num*

***Refer to FM Global Property Loss Prevention Data Sheet 1-28, *Wi* dimensions.**

ROOF SURFACING:

None

Coating *(Trade Name/Application Rate)*

Granules *(Application Rate)*

Gravel/Slag *(Application Rate)*

Ballast: Stone Size Pavers *(Beve*

Ballast Weight (psf): Zone 1': Zone 1:

Additional Detail:

ROOF COVER / MEMBRANE:

(Provide ALL applicable details including trade name, type, numbe

Roof Cover: Trade Name:

Hail Rating Provided:

Single Ply: Adhered

Multi-Ply Built Up Roofing (BUR) M

Number of Plies:

Lap Width: in/mm Lap Adhesion Type

Panel: Through Fastened Metal

Standing Seam metal

Fiber Reinforced Plastic (FRP)

Other:

Spray Applied

Additional Detail:

X2688 ENGINEERING (Rev. FEB 2020)

CHECKLIST FOR ROOFING SYSTEM

ROOF COVER / MEMBRANE SECUREMENT:

Roof Cover Fasteners: Trade Name: L

Stress Plate/Batten: Trade Name: Size:

Row Spacing: Zone 1': Zone 1: Zone 2: Zon

Fastener Spacing: Zone 1': Zone 1: Zone 2:

Bonding Adhesive: Trade Name:

Adhesive Ribbon Width (in.):

Adhesive Ribbon Spacing (in.): Zone 1': Zone 1: Zone 2:

Adhesive Application Rate (gal./sq.):

Additional Detail:

INSULATION / COVER BOARD:

Layer	Insulation / Cover Board Trade Name	Board Dimensions (ft. x. ft.)	Thic (in.)
1. Top		X	
2. Next		X	
3. Next		X	
4. Next		X	
5. Thermal Barrier		X	

Glass Fiber/Mineral Wool/Batt Facer Type/Vapor Barrier

Other:

None

Additional Detail:

INSULATION / COVER BOARD SECUREMENT:

Insulation / Cover Board Fasteners: Trade Name: Type:

Stress Plate: Trade Name: Size:

Fastener Spacing: Zone 1': Zone 1: Zone 2:

Bonding Adhesive: Trade Name:

Adhesive Ribbon Width (in.):

Adhesive Ribbon Spacing (in.): Zone 1': Zone 1: Zone 2:

Adhesive Application Rate (gal./sq.):

Additional Detail:

BASE SHEET: *(Include Trade Name, Type, and Width)*

None

Trade Name: Width: 36 i

Fastened Adhered

Lap Width: in/mm Lap Adhesi

Air Retarder Vapor Reta

Additional Detail:

BASE SHEET SECUREMENT:

Base Sheet Adhesive Name: Adhesiv

Base Sheet Fastener Trade Name: Type:

Head Diameter: Length:

Spacing: (Attached Sketches as necessary)

Spacing Along Laps: Zone 1': Zone 1: Zon

No. Intermediate Rows: Zone 1': Zone 1: Zon

Spacing Along Intermediate Rows: Zone 1': Zone 1: Zone

Additional Detail:

X2688 ENGINEERING (Rev. FEB 2020)

CHECKLIST FOR ROOFING SYSTEM

DECK:

Steel Manufacturer: Type (e.g. wide rib) Thickness / Gauge: Yield Strength:

LWIC (Form Deck): Cementitious Wood Fiber *(Pullout Test Required)*:

Concrete: Pre-cast panels or Cast in Place

Wood *(Pullout Test Required)*:

Fiber Reinforced Cement: Fiber Reinforced Plastic

Gypsum *(Pullout Test Required)*: Plank or Poured

Other:

Additional Detail:

DECK or ROOF PANEL SECUREMENT:

Deck Or Roof Panel Fasteners: Type:

Trade Name: Size Washer:

Length:

If Weld: Size: Weld: Washer:

Fastener / Weld Spacing: Zone 1': Zone 1: Zone 2: Zone 3:

Deck Side Lap Fastener Spacing: Zone 1': Zone 1: Zone 2: Zone 3:

Additional Detail:

ROOF STRUCTURE (Include Size, Gage, Etc.):

Purlins: "C" or "Z" Thickness:

Purlin: Zone 1': Zone 1: Zone 2: Zone 3:

Joists: Wood or Steel

Joist Spacing: Zone 1': Zone 1: Zone 2: Zone 3:

Beams: Wood or Steel

Beam Spacing: Zone 1': 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:

Fascia / Coping Detail: Face Height: Thickness:

Hook Strip Detail: Height: Thickness: Fastener spacing:

Nailer / Blocking Details Per FM Global Data Sheet 1-49? Yes No *(Attach Details)*

Nailer Securement: Diameter: Spacing: 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 and 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)*

Is secondary (emergency) 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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The problem…

FM Global's X2688 form is typically completed *after* the roof system has been designed, bids are received and a Contract for the work is signed

…any resulting changes should be addressed by a Change Order

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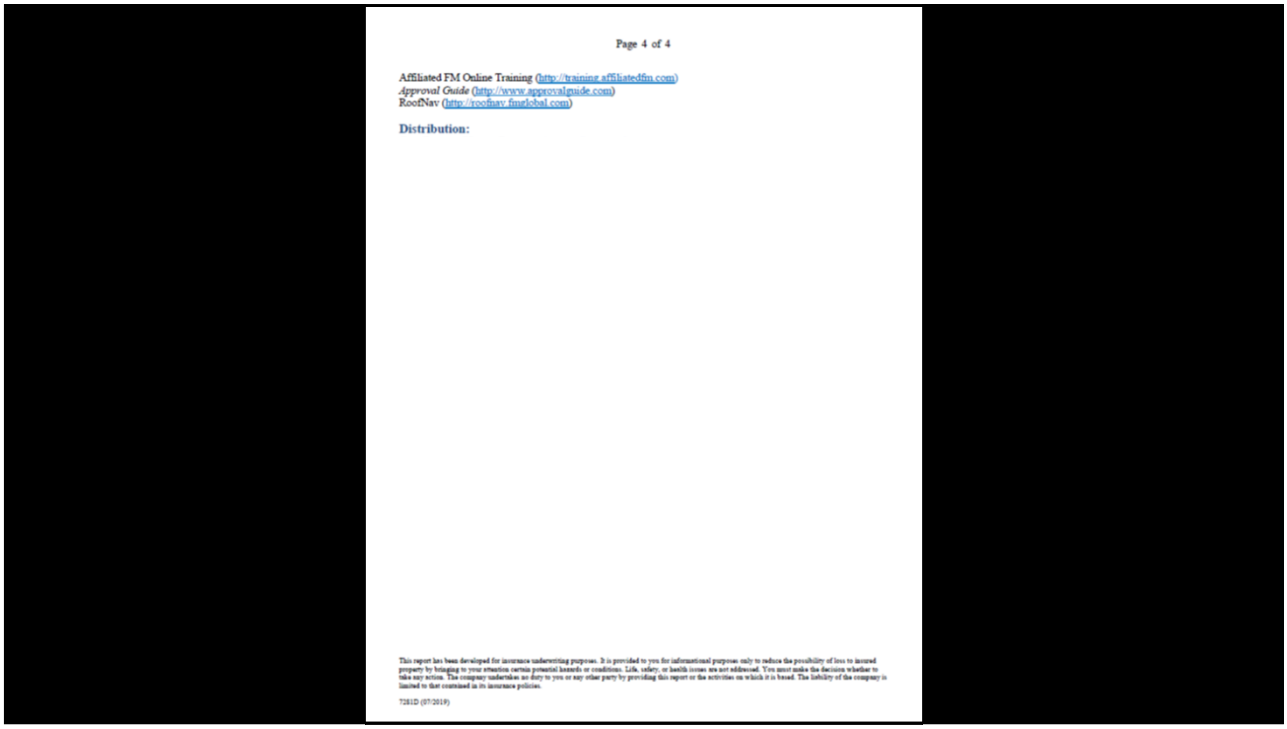

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Approval Guide (http://www.approvalguide.com)
RoofNav (http://roofnav.fmglobal.com)

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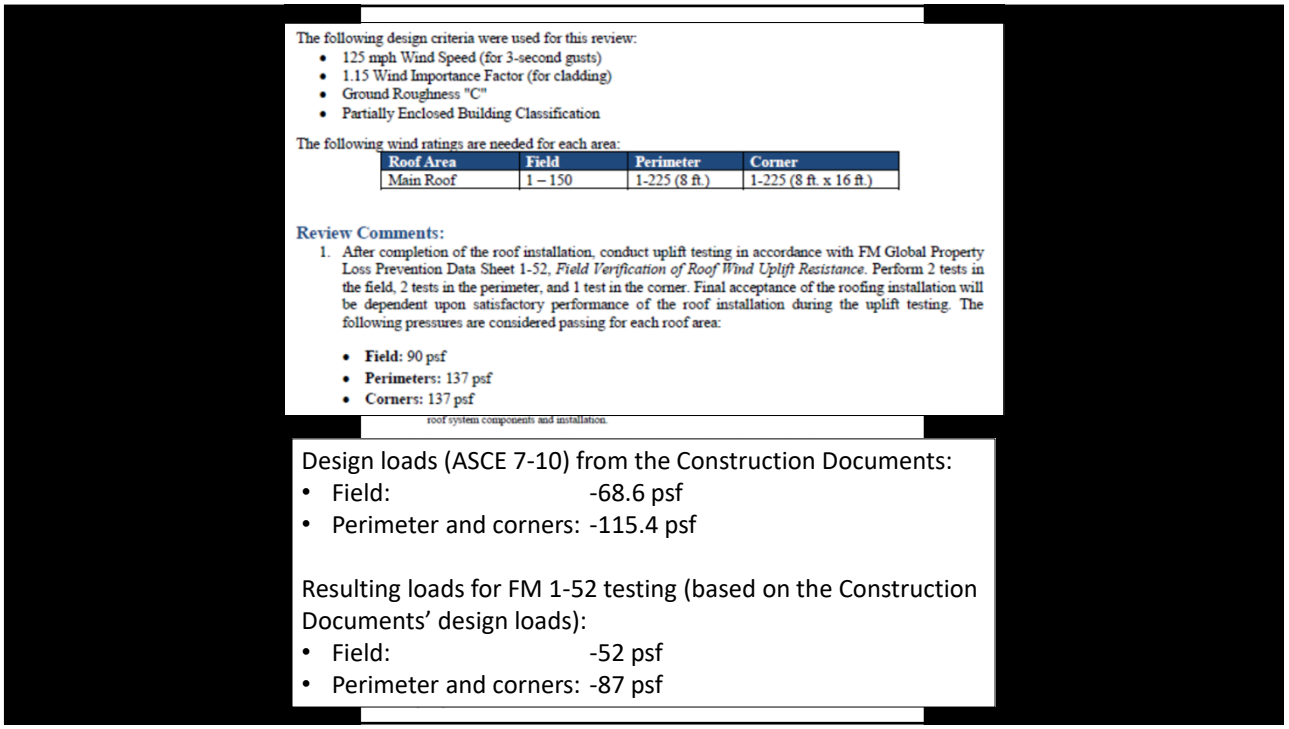

The following design criteria were used for this review:

- 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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- Situations like this are commonplace on FM Global-insured projects
- I'm aware of a project where a replacement FM Global field engineer was brought in during a project… and FM Global issued a new Plan Review Letter with significant revisions

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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

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 30 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's 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 adhesives

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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
- Concrete admixtures typically 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
- When construction-generated moisture cannot be controlled, use a vapor retarder at the deck level

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Material and product shortages and price volatility

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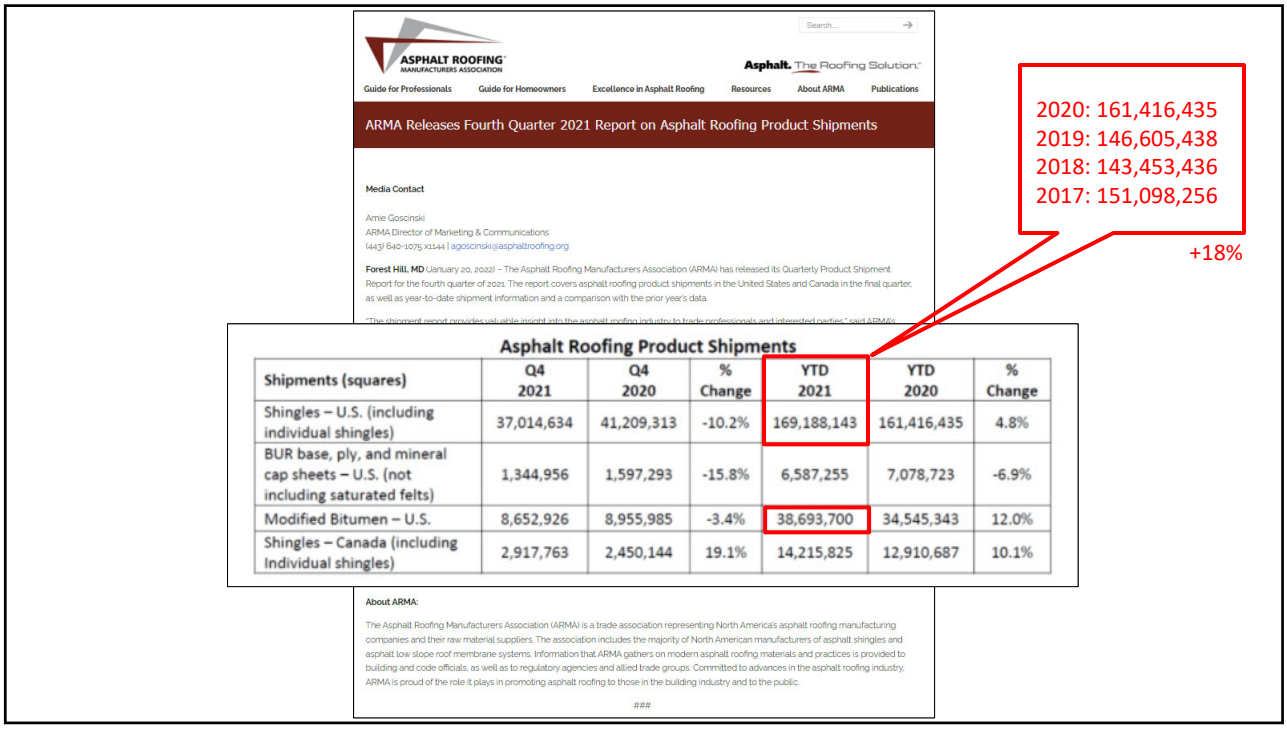

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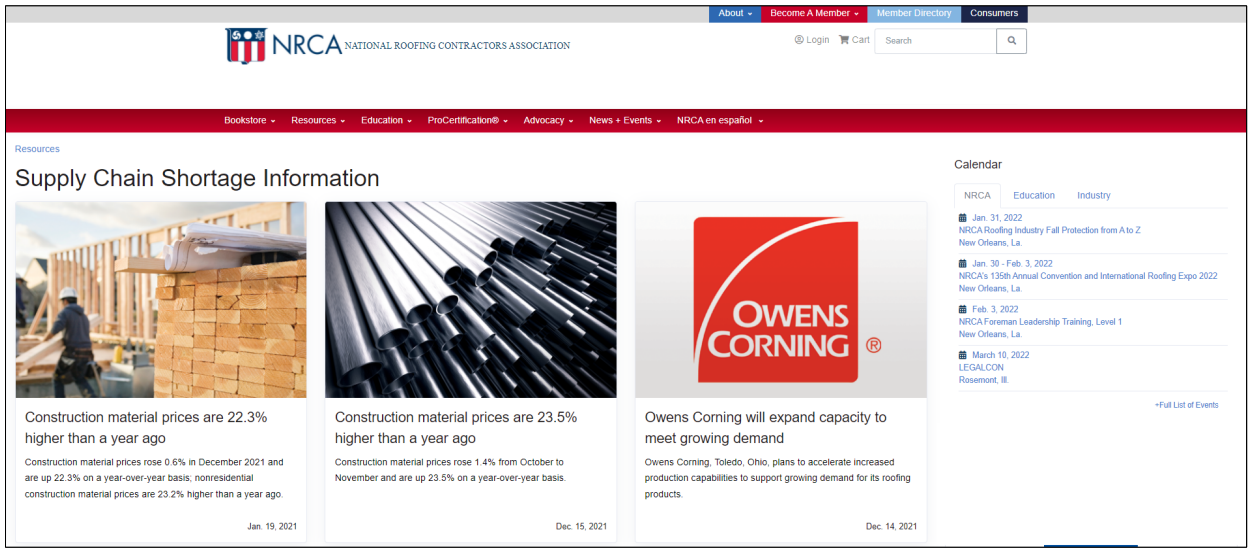
Material and product shortages and price volatility



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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 affiliates 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 reroofing 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 value 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 level of roofing material and product in inventory shrunk considerably

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 invested in reroofing 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 in inventory shrunk considerably. Roofing material suppliers and distributors reduced their material and product inventories. Since the start of the pandemic, far more 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 fasteners 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

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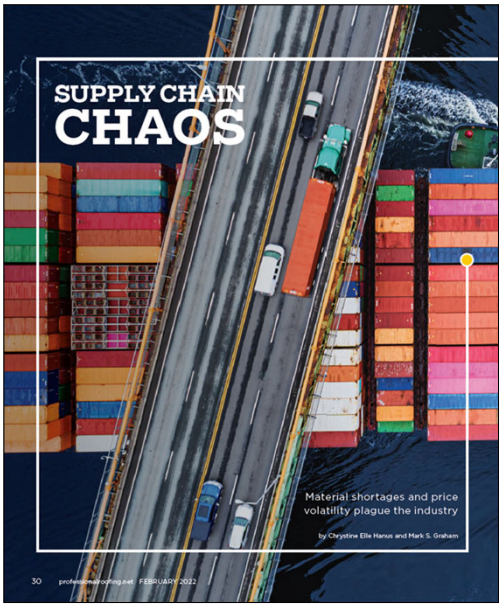

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February 2022

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We are now learning a new term….

"…allocation…"

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Some common substitutions…

- Fasteners
- Adhesives
- Insulation

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Recommended substitution process…

- Owner approval
  - Change order
- Manufacturer approval
  - Documented in writing
- Code approval
  - Code official acceptance (Documented in writing)

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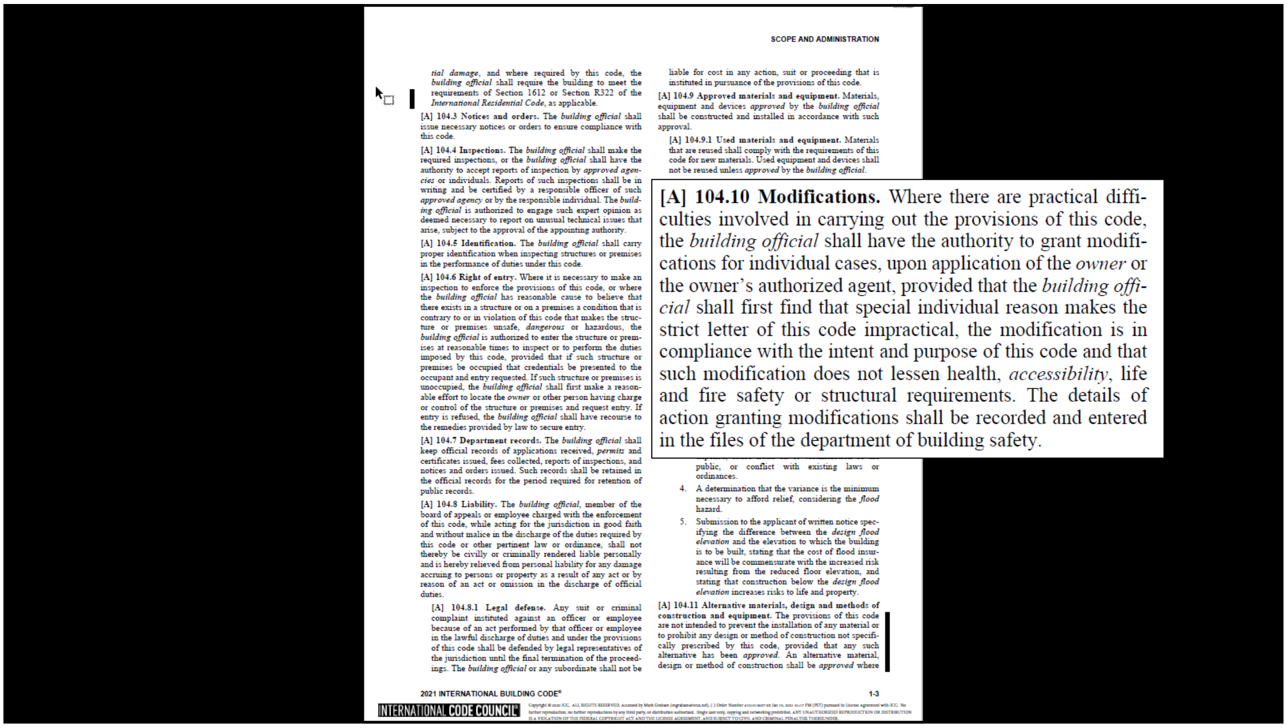

SCOPE AND ADMINISTRATION

tial damage, and where required by this code, the *building official* shall require the building to meet the requirements of Section 1612 or Section R322 of the *International Residential Code*, as applicable.

[A] 104.3 Notices and orders. The *building official* shall issue necessary notices or orders to ensure compliance with this code.

[A] 104.4 Inspections. The *building official* shall make the required inspections, or the *building official* shall have the authority to accept reports of inspection by *approved agencies* or individuals. Reports of such inspections shall be in writing and be certified by a responsible officer of such *approved agency* or by the responsible individual. The *building official* is authorized to engage such expert opinion as deemed necessary to report on unusual technical issues that arise, subject to the approval of the appointing authority.

[A] 104.5 Identification. The *building official* shall carry proper identification when inspecting structures or premises in the performance of duties under this code.

[A] 104.6 Right of entry. Where it is necessary to make an inspection to enforce the provisions of this code, or where the *building official* has reasonable cause to believe that there exists in a structure or on a premises a condition that is contrary to or in violation of this code that makes the structure or premises unsafe, *dangerous* or hazardous, the *building official* is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises is unoccupied, the *building official* shall first make a reasonable effort to locate the *owner* or other person having charge or control of the structure or premises and request entry. If entry is refused, the *building official* shall have recourse to the remedies provided by law to secure entry.

[A] 104.7 Department records. The *building official* shall keep official records of applications received, *permits* and certificates issued, fees collected, reports of inspections, and notices and orders issued. Such records shall be retained in the official records for the period required for retention of public records.

[A] 104.8 Liability. The *building official*, member of the board of appeals or employee charged with the enforcement of this code, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be civilly or criminally rendered liable personally and is hereby relieved from personal liability for any damage accruing to persons or property as a result of any act or by reason of an act or omission in the discharge of official duties.

[A] 104.8.1 Legal defense. Any suit or criminal complaint instituted against an officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by legal representatives of the jurisdiction until the final termination of the proceedings. The *building official* or any subordinate shall not be liable for cost in any action, suit or proceeding that is instituted in pursuance of the provisions of this code.

[A] 104.9 Approved materials and equipment. Materials, equipment and devices *approved* by the *building official* shall be constructed and installed in accordance with such approval.

[A] 104.9.1 Used materials and equipment. Materials that are reused shall comply with the requirements of this code for new materials. Used equipment and devices shall not be reused unless *approved* by the *building official*.

[A] 104.10 Modifications. Where there are practical difficulties involved in carrying out the provisions of this code, the *building official* shall have the authority to grant modifications for individual cases, upon application of the *owner* or the owner's authorized agent, provided that the *building official* shall first find that special individual reason makes the strict letter of this code impractical, the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, *accessibility*, life and fire safety or structural requirements. The details of action granting modifications shall be recorded and entered in the files of the department of building safety.

public, or conflict with existing laws or ordinances.

4. A determination that the variance is the minimum necessary to afford relief, considering the *flood* hazard.
5. Submission to the applicant of written notice specifying the difference between the *design flood elevation* and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the *design flood elevation* increases risks to life and property.

[A] 104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where

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RESEARCH+TECH

Consider alternatives

Code interpretations, modifications and alternatives provide some code compliance flexibility

by Mark S. Graham

Building codes by their nature tend to be relatively restrictive; they limit designs, materials and construction methods to those specifically prescribed in codes and meeting the codes' performance requirements. However, most codes also contain provisions that allow code officials to accept limited, project-specific modifications and alternatives to code requirements.

You should be aware of a code's interpretation, modification and alternative acceptance provisions because these may provide a basis for acceptance of roof system designs and roofing products that do not specifically comply with a code's requirements.

Alternative acceptance

In Chapter 1-Scope and Administration of the *International Building Code,® 2018 Edition*, Section 104-Duties and Powers of Building Official grants a code official the authority to enforce the code, render interpretations and adopt procedures to clarify the code's provisions. Such interpretations and procedures are not intended to waive code requirements.

Section 104.10-Modifications gives a code official authority to

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Some proposed purchase order language…

Stephen M. Phillips
Hendrick, Phillips, Salzman & Siegel, P.C.

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Potential Provision to Be Included in Purchase Orders
Issued by Roofing Contractors

[This might be used when ordering insulation, cover board or other products directly from individual manufacturers or suppliers rather than through the membrane manufacturer as part of a total system.]

PURCHASE ORDER

In consideration for payment for the materials described herein, Vendor agrees to furnish the following materials in accordance with the prices stated herein and the plans and specifications for the Project identified below. All materials shall be accordance with ASTM, manufacturer's product data and industry standards applicable to such materials. By shipping materials, Vendor agrees that the materials are suitable for this Project and are compatible with the other materials identified below scheduled to be installed at this Project.

Project: Roof Specification:
Location: Deck:

Description and Use of Materials to Be Furnished:

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Or, a simpler approach…

Materials shall be suitable to serve their intended purpose on this Project.

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Questions (and other topics)

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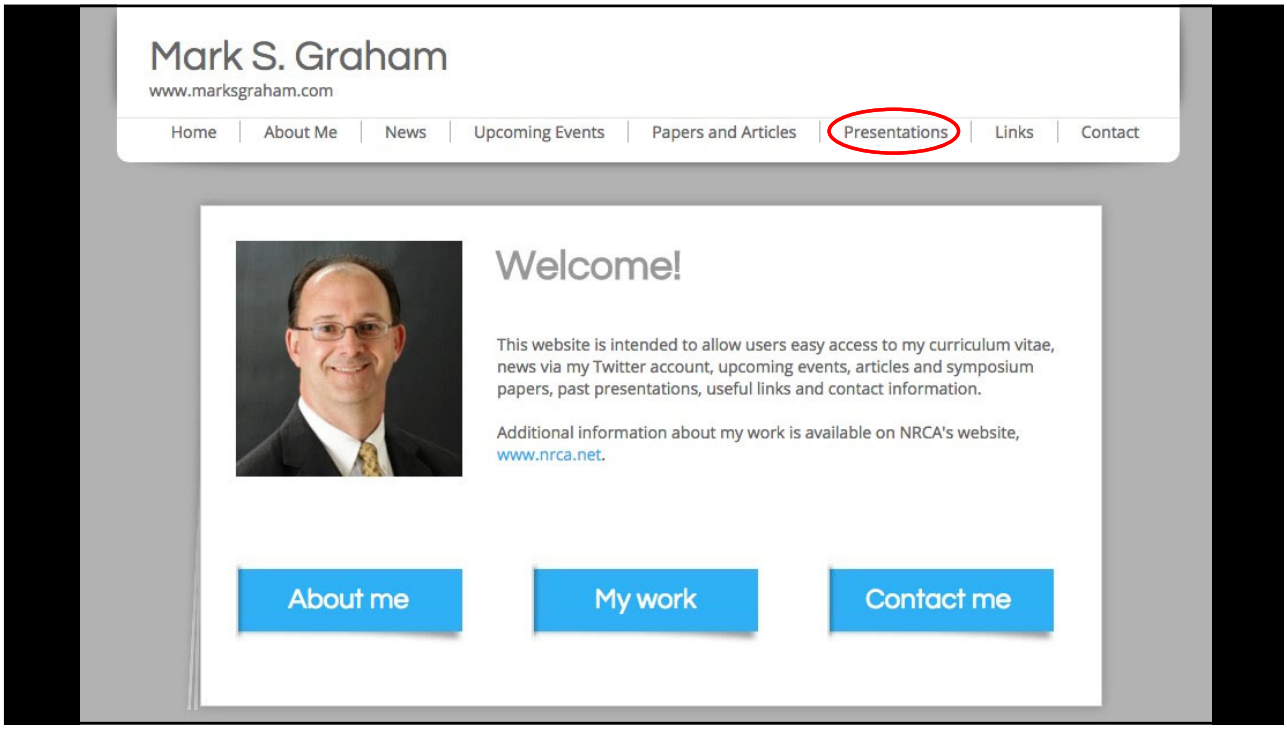

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