45TH ANNUAL TEXAS ROOFING CONFERENCE


# ***Update on roofing industry technical issues***

presented by

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

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## Topics

- Steep-slope issues:
  - Synthetic underlayment
  - Attic ventilation
  - Plywood and OSB roof decks
- Low-slope issues:
  - FM VSH hail classification
  - Moisture in concrete roof decks
  - ASCE 7-16 (wind uplift design)
  - IIBEC's *Manual of Practice*
- Questions…

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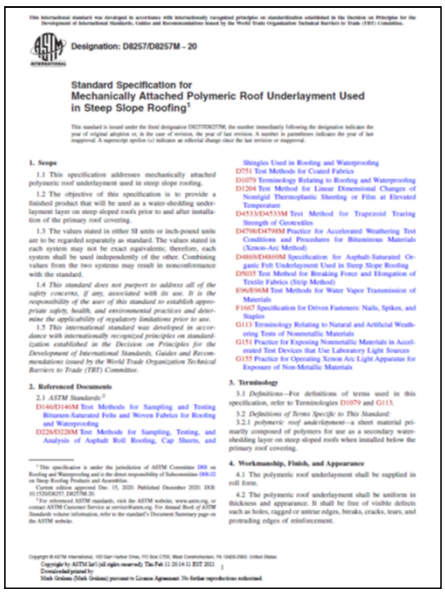

Designation: D8257/D8257M – 20

Standard Specification for
Mechanically Attached Polymeric Roof Underlayment Used in Steep Slope Roofing[1]

**ASTM D8257, "Standard Specification for Mechanically Attached Polymeric Roof Underlayment Used in Steep Slope Roofing"**

Published in December 2020

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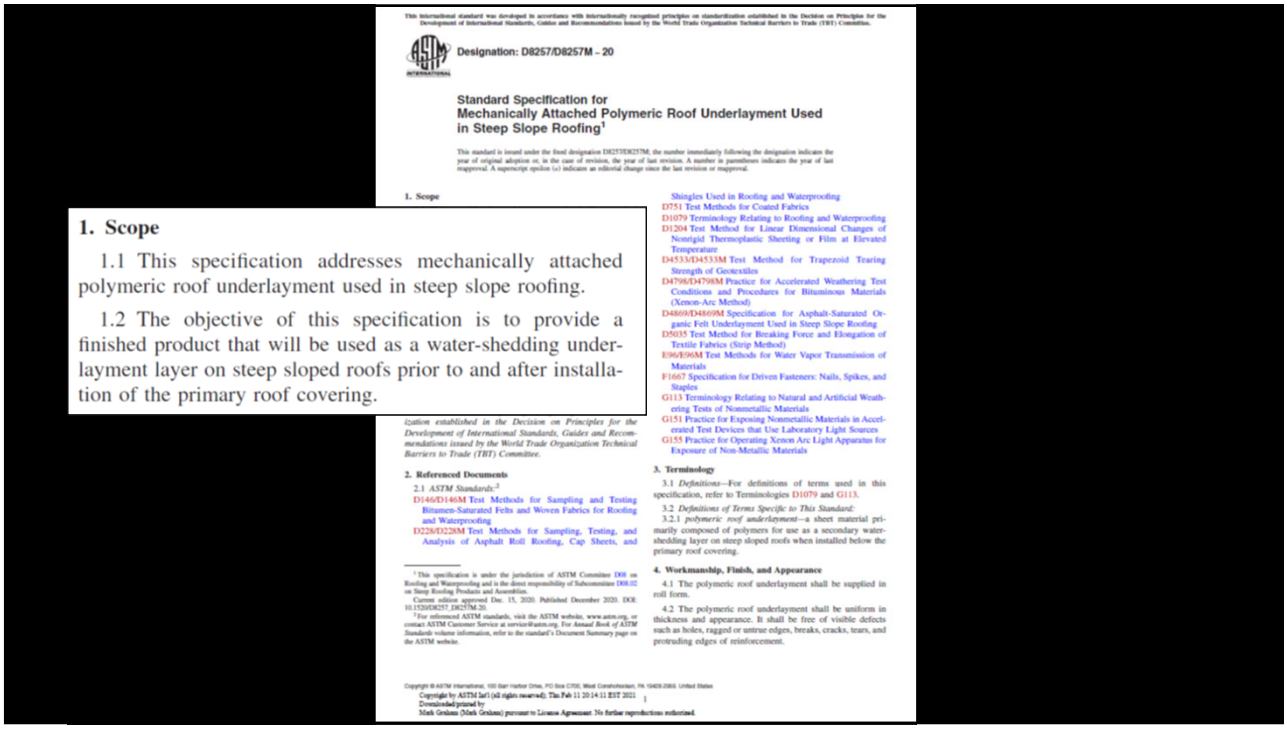

Designation: D8257/D8257M – 20

Standard Specification for
Mechanically Attached Polymeric Roof Underlayment Used in Steep Slope Roofing[1]

**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.

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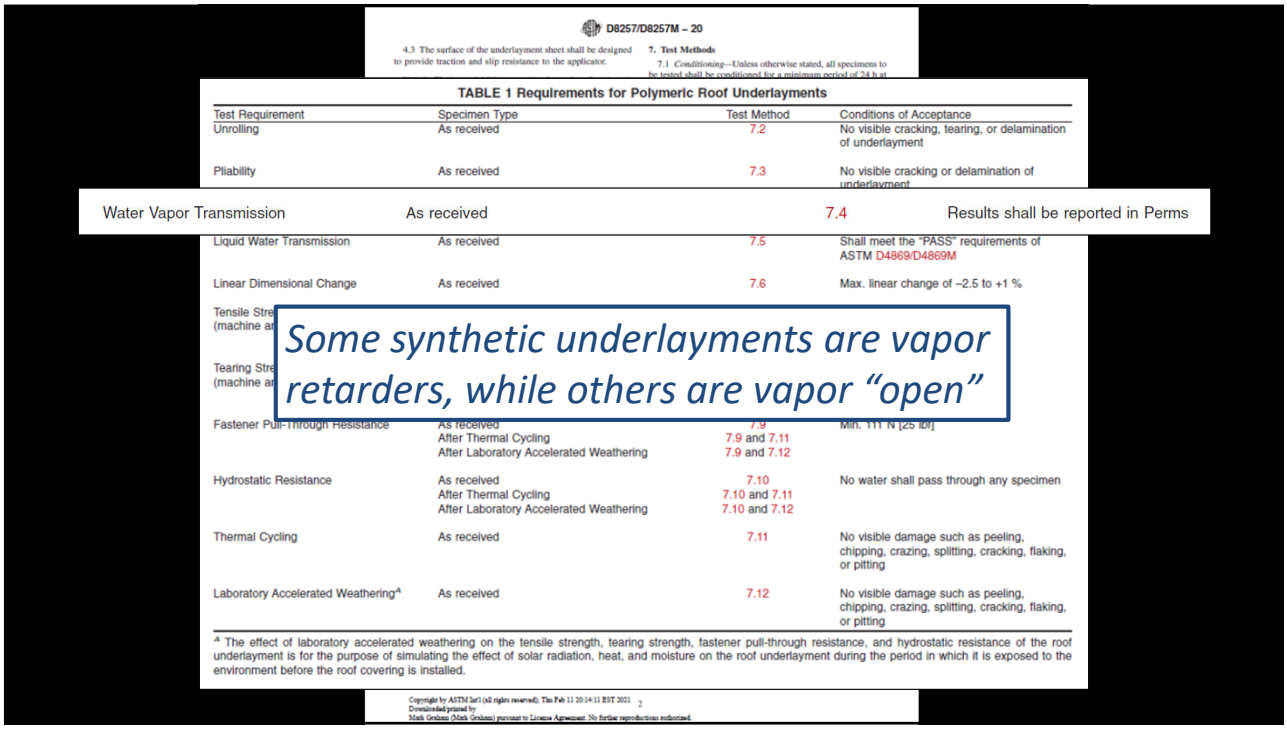

D8257/D8257M – 20

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 Stre (machine ar | | | |
| Tearing Stre (machine ar | | | |
| 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, splitting, cracking, flaking, or pitting |
| Laboratory Accelerated Weathering[A] | As received | 7.12 | No visible damage such as peeling, chipping, crazing, splitting, cracking, flaking, or pitting |

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

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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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RESEARCH+TECH

Clearing the air

Considerations for attic ventilation

by Mark S. Graham

Proper attic ventilation can be an important consideration when designing high-performing, steep-slope roof assemblies. For example, with some asphalt shingle products, proper attic ventilation may be a warranty requirement. Following is a review of code requirements and NRCA's guidelines for attic ventilation in steep-slope roof assemblies.

Code requirements

Code requirements for attic ventilation have varied between the International Building Code® (IBC) and International Residential Code® (IRC) and have changed with each edition up to the 2015 editions.

Beginning with the IBC's and IRC's 2015 editions, both codes require the net free ventilating area (NFVA) to be at least a 1:150 ratio of the space being vented. Any blocking or bridging in attics must not interfere with air movement, and an air space of at least 1 inch must be provided between the bottom of the roof deck and any attic insulation. Vent openings must protect against the entrance of rain and snow and be installed according to manufacturer's installation instructions.

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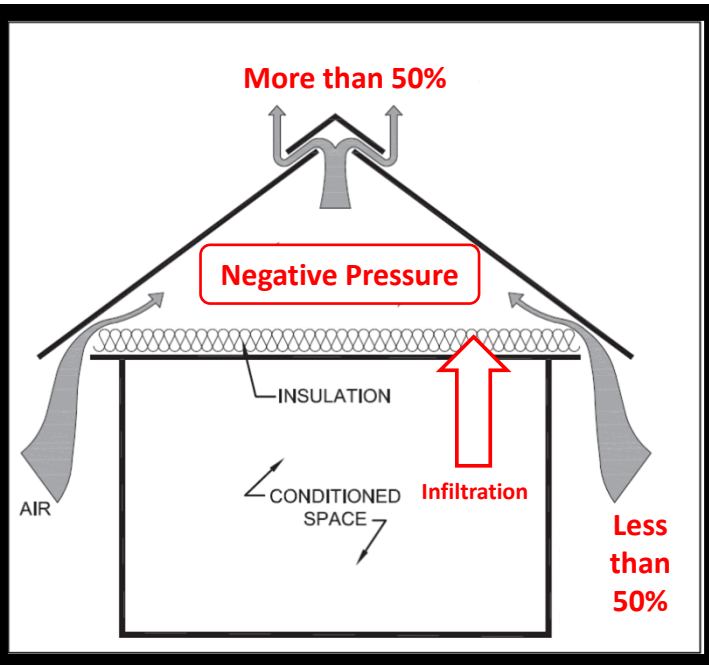


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*Be careful not to install excess amounts of ridge vents…. It can have undesirable consequences.*

*If your company is selling ridge vents, you should also be selling soffit or eave vents.*

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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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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"

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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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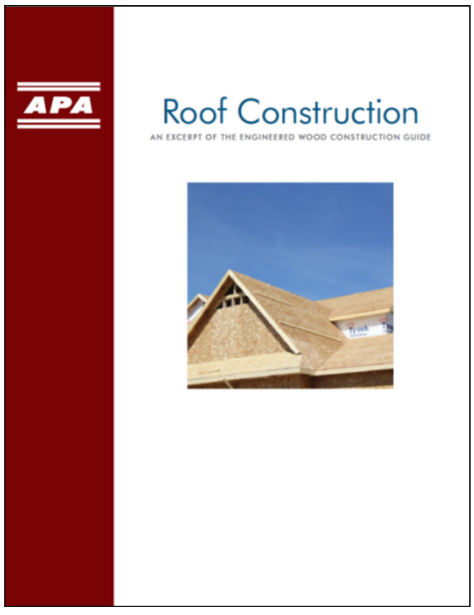


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**APA Form E30, "Roof Construction"**

--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 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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## FM’s very severe hail (VSH) classifications

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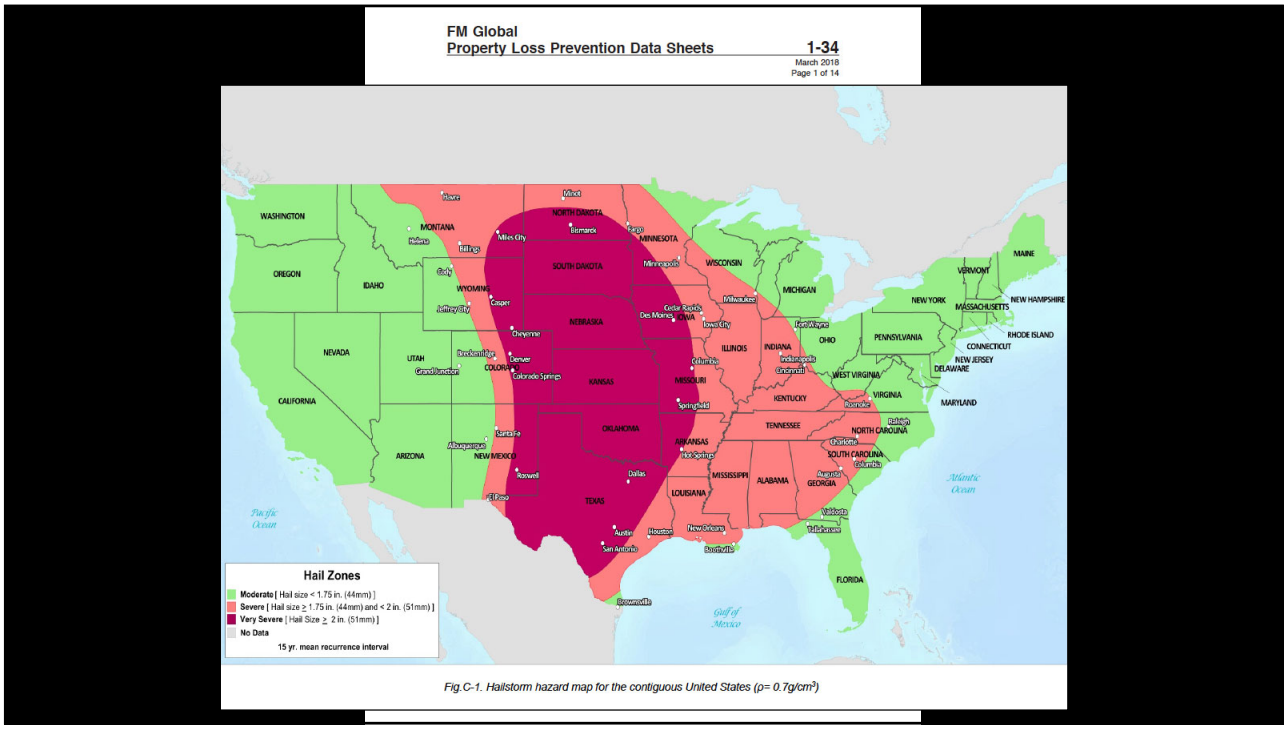


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Of the 1,037,214 roof assemblies in FM's RoofNav, only 11,529 have a VSH classification

As of June 16, 2021

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RESEARCH+TECH

Understanding FM VSH

FM has implemented a new impact-resistance classification

by Mark S. Graham

Commercial and industrial insurer FM Global and its code-approved testing agency subsidiary, FM Approvals, have implemented a Very Severe Hail (VSH) impact-resistance classification that could affect some of the work you do.

FM Global guidelines

FM Global traditionally has recommended its insured building owners use moderate hail- (MH-) and severe hail- (SH-) classified roof systems for buildings located in areas FM Global considers to be susceptible to moderate or severe hail impacts. FM Loss Prevention Data Sheet 1-34 (FM 1-34), "Hail Damage," provides a map identifying those regions.

In recent years, the U.S. insurance industry has experienced increases in losses from hail in terms of the number of claims experienced and costs of those claims. A majority of the hail damage occurs to roof systems and other rooftop components.

In the latest version of FM 1-34, dated October 2014, FM Global has identified a new VSH region, encompassing Oklahoma, Kansas and some northern counties in Texas. FM 1-34's Table 3 identifies the specific northern Texas counties.

To access FM Global Data Sheets, including FM 1-34—"Hail Damage," go to www.professionalroofing.net.

22 www.professionalroofing.net DECEMBER 2017

*Professional Roofing*, December 2017
Link to access this article


RESEARCH+TECH

Designing for hail resistance

Did you know FM Global has updated its hail design guidance?

by Mark S. Graham

In March, property and building loss insurer FM Global updated its Property Loss Prevention Data Sheet 1-34, "Hail Damage" (FM 1-34). If you work on buildings insured by FM Global, you should be aware of its latest hail-resistance guidelines and the effects they may have on roof system selection and design.

FM 1-34

FM 1-34 provides loss-prevention guidelines to minimize the potential for hail damage to buildings, roof-mounted equipment and other outdoor equipment. FM Global intends FM 1-34 and its other Property Loss Prevention Data Sheets to apply to its insured buildings. However, some designers use the Property Loss Prevention Data Sheets as design guidelines for buildings (and roof systems) other than those insured by FM Global.

FM Global contends hailstorms are a widespread hazard affecting many areas of the world that can severely damage buildings' roof systems, rooftop HVAC units and skylights. Cooling towers and exposed glass and plastic components of outdoor equipment also can be

20 www.professionalroofing.net MAY 2018

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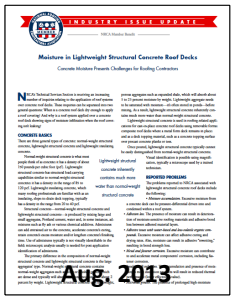
# Moisture in concrete roof decks


Feb. 2010


Sept. 2011


Dec. 2012


Aug. 2013


Dec. 2013


Sept. 2017

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RESEARCH+TECH

| | Deck 1 (no MVRA) | | Deck 2 (with an MVRA) | | Deck 3 (with an MVRA) | |
|---|---|---|---|---|---|---|
| Specimen No. | 1-1 | 1-2 | 2-1 | 2-2 | 3-1 | 3-2 |
| Permeability (U.S. perm) | 1.9 | 1.8 | 3.7 | 3.4 | 3.7 | 3.8 |

Table: Average tested permeability values

Putting it to the test

NRCA conducts testing of moisture vapor reduction admixtures

by Mark S. Graham

tion admixture intended to minimize a concrete roof deck's ability to pass and release moisture vapor. Some background and an overview of NRCA's testing and results follow.

What's an MVRA?

Concrete admixtures intended as MVIRAs are specific chemicals added during concrete's batching and mixing to provide an additional chemical reaction during the concrete's hydration and curing process. MVIRAs use the concrete mix's excess water and chlorides to create a calcium silicate hydrate gel within the concrete. The gel is said to fill the small pores and capillary openings in curing concrete, minimizing the concrete's ability to pass and release moisture vapor. The gel is intended to be permanent and integral throughout the concrete thickness.

MVRAs are available from numerous suppliers and typically added to a concrete mix at the concrete batch plant separately from any other admixtures. Some MVRA suppliers permit their MVRAs to be added to concrete mixers at job sites provided the concrete mixer's drum is rotated for a supplier's recommended minimum amount of time after dosage and before concrete discharge and placement.

26 www.professionalroofing.net FEBRUARY 2020

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February 2020

*"…These test results contradict claims an MVRA minimizes concrete's ability to pass and release moisture vapor…"*

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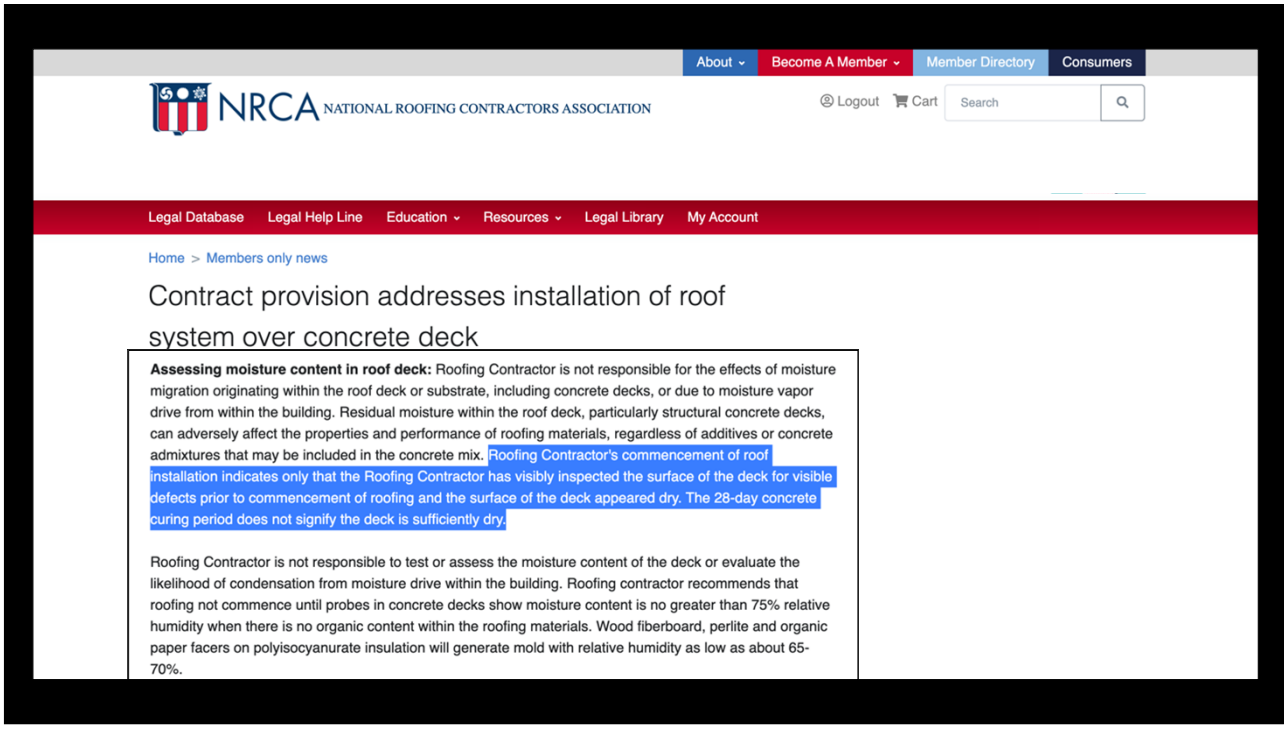


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RESEARCH+TECH

roofwinddesig

CE 7-05, ASCE 7-10 and ASCE 7-16

ASCE 7-16

Increased design wind-uplift loads may present challenges

by Mark S. Graham

24 www.professionalroofing.net MARCH 2018

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March 2018

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## Noteworthy changes in ASCE 7-16

Compared to ASCE 7-10

- Revised basic wind speed map
- Changes (and new) pressure coefficients
- Revised perimeter and corner zones

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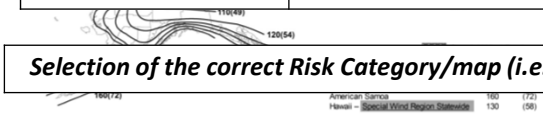
# ASCE 7-16 basic wind speed map

Risk Category II Buildings (MRI = 700 years)


| MRI | | |
|---|---|---|
| **Risk Category** | **ASCE 7-10** | **ASCE 7-16** |
| I (Low) | 300 yrs. | 300 yrs. |
| II (not I, II or IV) | 700 yrs. | 700 yrs. |
| Category III (High risk) | 1,700 yrs. | 1,700 yrs. |
| Category IV (Essential) | 1,700 yrs. | 3,000 yrs. |




***Selection of the correct Risk Category/map (i.e., wind speed) is essential***

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# Comparing $GC_p$ pressure coefficients

h ≤ 60 ft., gable roofs ≤ 7 degrees

| Zone | ASCE 7-10 | ASCE 7-16 | Change |
|---|---|---|---|
| 1’ | n/a | 0.9 | -10% |
| 1 (field) | -1.0 | -1.7 | +70% |
| 2 (perimeter) | -1.8 | -2.3 | +28% |
| 3 (corners) | -2.8 | -3.2 | +14% |

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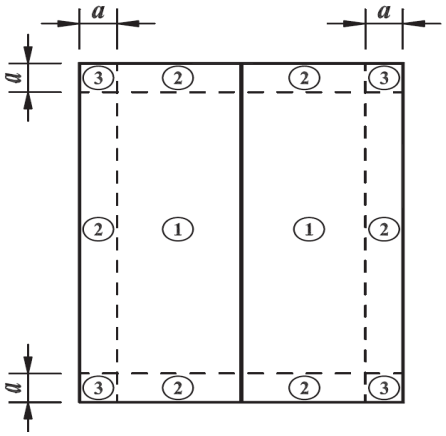
# Zones

h ≤ 60 ft., gable roofs ≤ 7 degrees




**ASCE 7-10**

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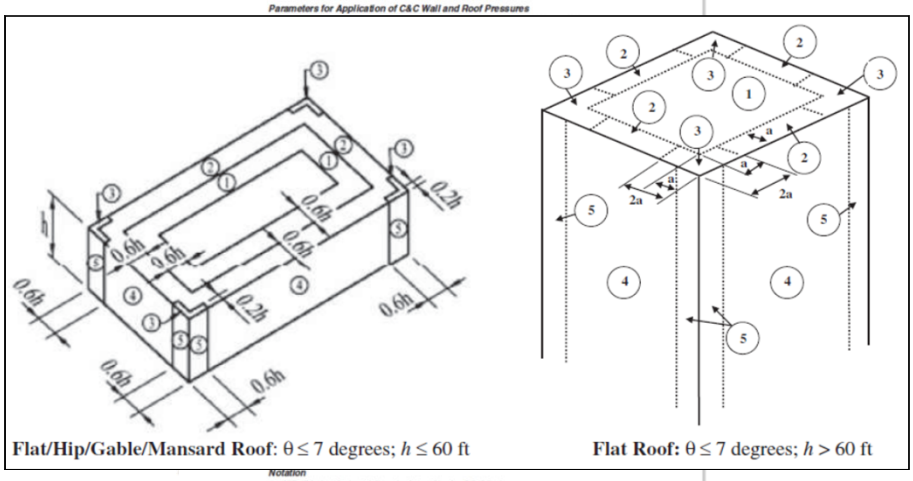
Table 30.6-2 Components and Cladding, Part 4 (h ≤ 160 ft (h ≤ 48.8 m)): C&C Zones for Enclosed Buildings—C&C Wall and Roof Pressures

*Parameters for Application of C&C Wall and Roof Pressures*




**Flat/Hip/Gable/Mansard Roof**: θ ≤ 7 degrees; *h* ≤ 60 ft

**Flat Roof:** θ ≤ 7 degrees; *h* > 60 ft

*Notation*

a = 10% of the least horizontal dimension but not less than 3 ft (0.9 m).
h = Mean roof height, in ft (m).
V = Basic wind speed, in mph (m/s).

*Notes*

1. See Section 30.6.1.1 for tabulated wall and roof pressure from Table 30.6-2 and Fig. 30.4-1, as applicable.
2. For mansard roofs, apply roof pressures on sloped surfaces as tabulated for sloped surfaces of gable roofs; apply roof pressure on flat surfaces (θ < 7°) as tabulated for flat roofs.

continues

Minimum Design Loads and Associated Criteria for Buildings and Other Structures 365

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## Noteworthy changes in ASCE 7-16

Compared to ASCE 7-10

- Revised basic wind speed map
- Changes (and new) pressure coefficients
- Revised perimeter and corner zones

*While center field pressures may be slightly lower, field, perimeter and corner uplift pressures will generally be greater*

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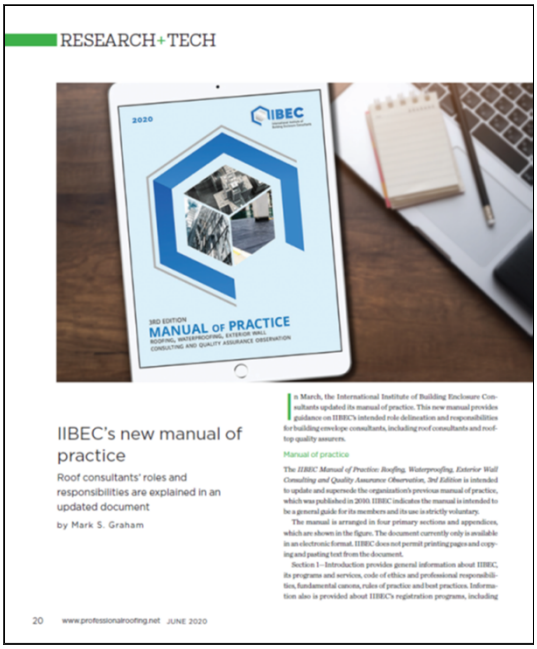
RESEARCH+TECH

IIBEC's new manual of practice

Roof consultants' roles and responsibilities are explained in an updated document

by Mark S. Graham

In March, the International Institute of Building Enclosure Consultants updated its manual of practice. This new manual provides guidance on IIBEC's intended role delineation and responsibilities for building envelope consultants, including roof consultants and roof-top quality assurers.

Manual of practice

The *IIBEC Manual of Practice: Roofing, Waterproofing, Exterior Wall Consulting and Quality Assurance Observation, 3rd Edition* is intended to update and supersede the organization's previous manual of practice, which was published in 2010. IIBEC indicates the manual is intended to be a general guide for its members and its use is strictly voluntary.

The manual is arranged in four primary sections and appendices, which are shown in the figure. The document currently only is available in an electronic format. IIBEC does not permit printing pages and copying and pasting text from the document.

Section 1—Introduction provides general information about IIBEC, its programs and services, code of ethics and professional responsibilities, fundamental canons, rules of practice and best practices. Information also is provided about IIBEC's registration programs, including

20 www.professionalroofing.net JUNE 2020

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June 2020

Link

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

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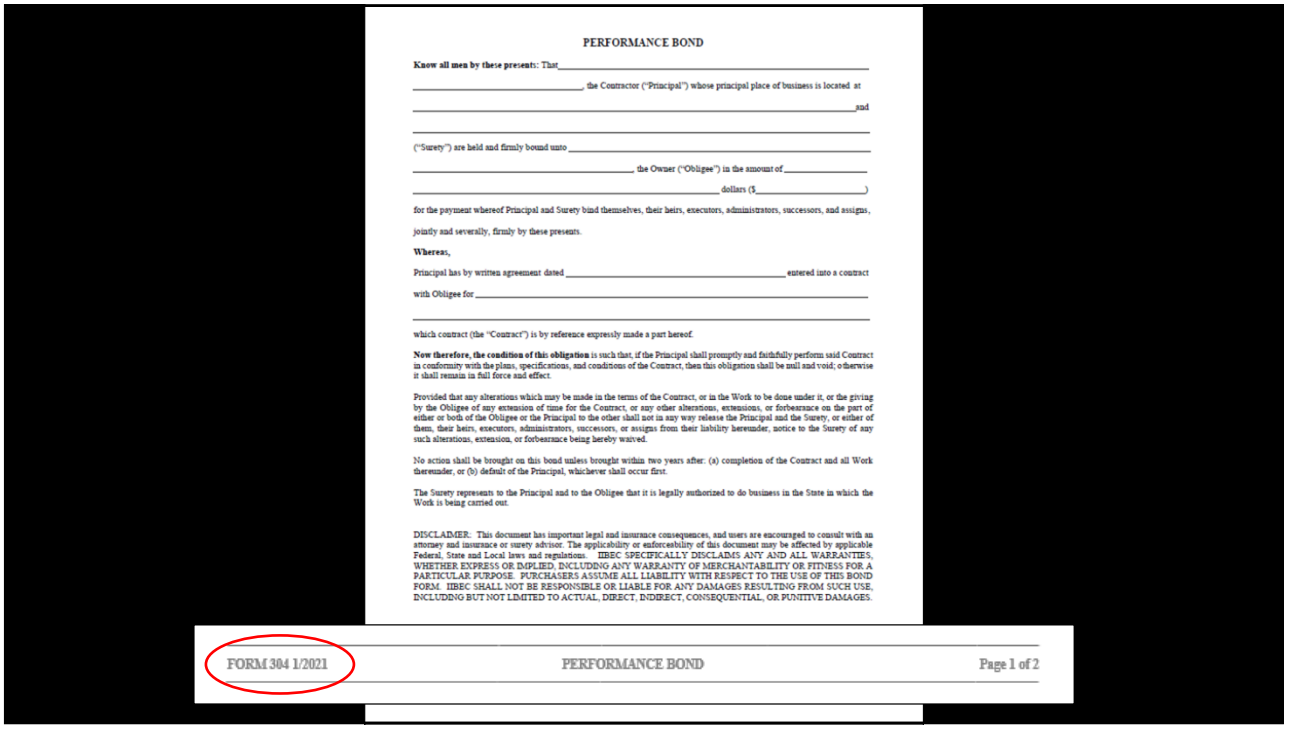

PERFORMANCE BOND

**Know all men by these presents:** That_____

_____, the Contractor ("Principal") whose principal place of business is located at

_____and

_____

("Surety") are held and firmly bound unto _____

_____, the Owner ("Obligee") in the amount of _____

_____ dollars ($_____)

for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

**Whereas,**

Principal has by written agreement dated _____ entered into a contract with Obligee for _____

_____

which contract (the "Contract") is by reference expressly made a part hereof.

**Now therefore, the condition of this obligation** is 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.

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.

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.

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.

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. IIBEC 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. IIBEC 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.

FORM 304 1/2021 PERFORMANCE BOND Page 1 of 2

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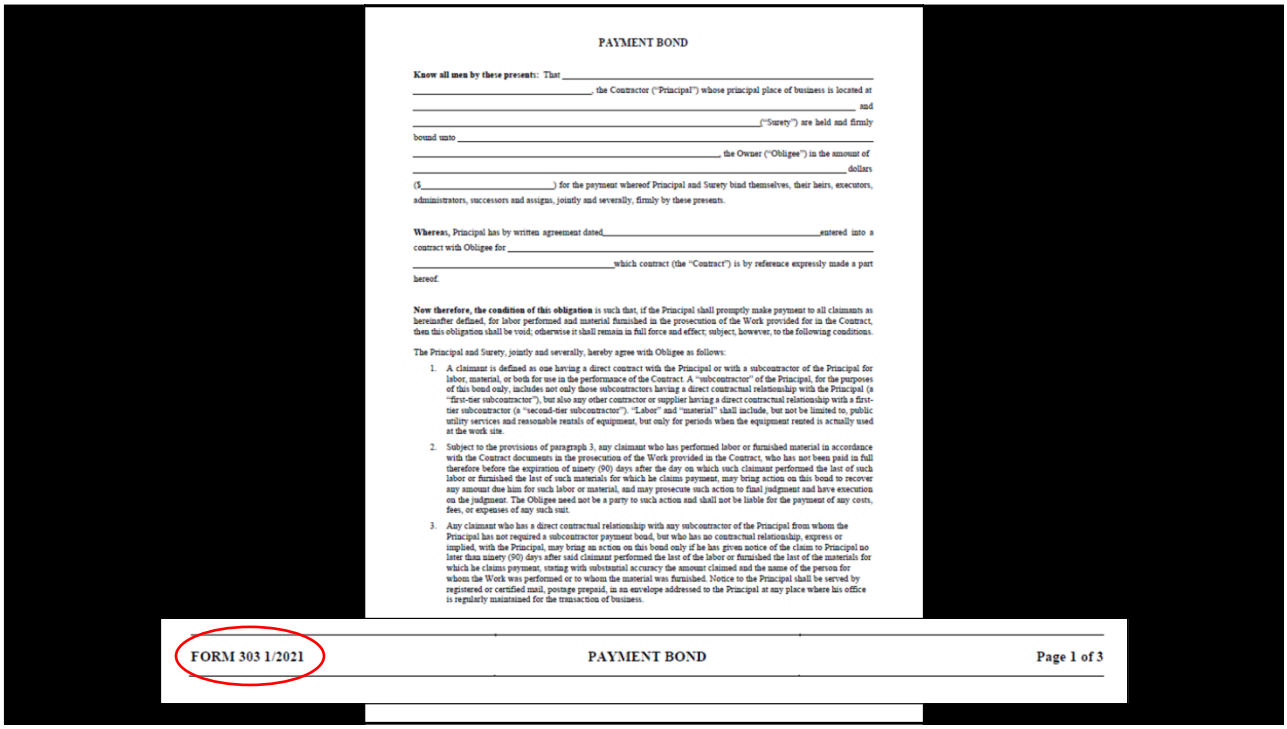

PAYMENT BOND

**Know all men by these presents:** That _____, the Contractor ("Principal") whose principal place of business is located at _____ and _____ ("Surety") are held and firmly bound unto _____, the Owner ("Obligee") in the amount of _____ dollars ($_____) for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

**Whereas,** Principal has by written agreement dated _____ entered into a contract with Obligee for _____ which contract (the "Contract") is by reference expressly made a part hereof.

**Now therefore, the condition of this obligation** is 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.

The Principal and Surety, jointly and severally, hereby agree with Obligee as follows:

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 rentals of equipment, but only for periods when the equipment rented is actually used at the work site.
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.
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.

FORM 303 1/2021 PAYMENT BOND Page 1 of 3

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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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**Questions…**

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