



DECKS to DOCKETS
VIRTUAL LEGAL CONFERENCE

OCT. 13-15

Emerging Technical Issues Posing Liability Risks to Roofing Contractors



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FM Global/FM Approvals changes

- Revised FM Global Loss Prevention Data Sheets
 - Published/effective on February 26, 2020
- FM Global has “trained” their field engineers
- New generation
 - Multiple significant retirements/new hires
- Concerns with FM’s “behavior”
- We need to change how we handle FM Global-insured projects

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Tomorrow at 2 p.m. (CT)



DECKS to DOCKETS
VIRTUAL LEGAL CONFERENCE **OCT. 13-15**

***Understanding Factory Mutual requirements,
wind uplift, roof assembly delamination and
roofing contractor liability***

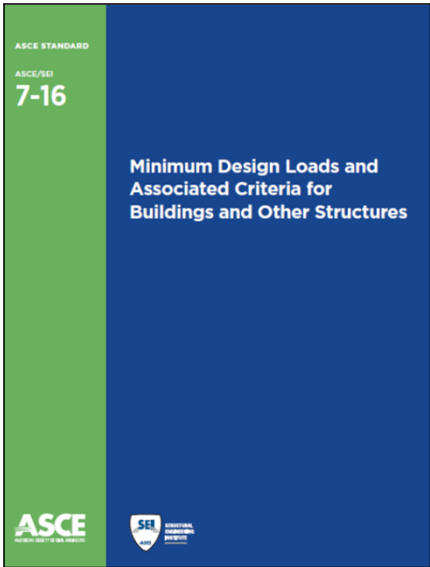
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Implementation of ASCE 7-16

Wind design

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American Society of Civil Engineers Standard 7, “Minimum Design Loads and Associated Criteria for Buildings and Other Structures” (ASCE 7-16)

www.asce.org

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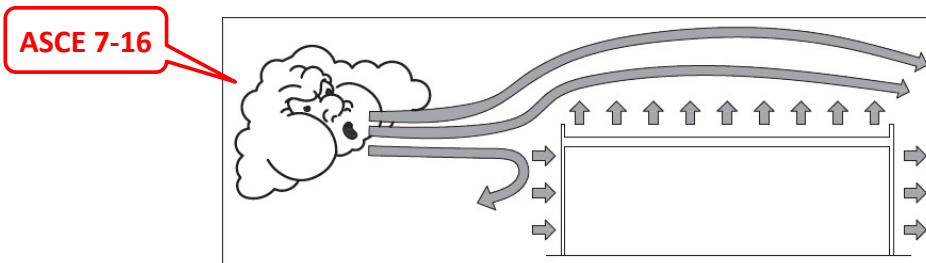


International Building Code, 2018 Edition

www.iccsafe.org

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The fundamental concept of wind design



Wind creates pressures/forces acting on building elements

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

Example: A low-rise office building (Risk Category II) is located in Chicago, IL. The building is an enclosed structure with a mean roof height of 60 ft. The building is located in an open terrain area that can be categorized as Exposure Category C.

Document	Basic wind speed (mph)	Design wind pressure (psf)			
		Zone 1' (Center)	Zone 1 (Field)	Zone 2 (Perimeter)	Zone 3 (Corners)
ASCE 7-05	$V_{ASD} = 90$	--	24	40	58
ASCE 7-10 Ult.	$V_{ULT} = 115$	--	39	65	97
ASCE 7-10 ASD	$V_{ASD} = 90$	--	23	39	58
ASCE 7-16 Ult.	$V_{ULT} = 105$	30	51	67	92
ASCE 7-16 ASD	$V_{ASD} = 90$	18	31	47	72

30% increase

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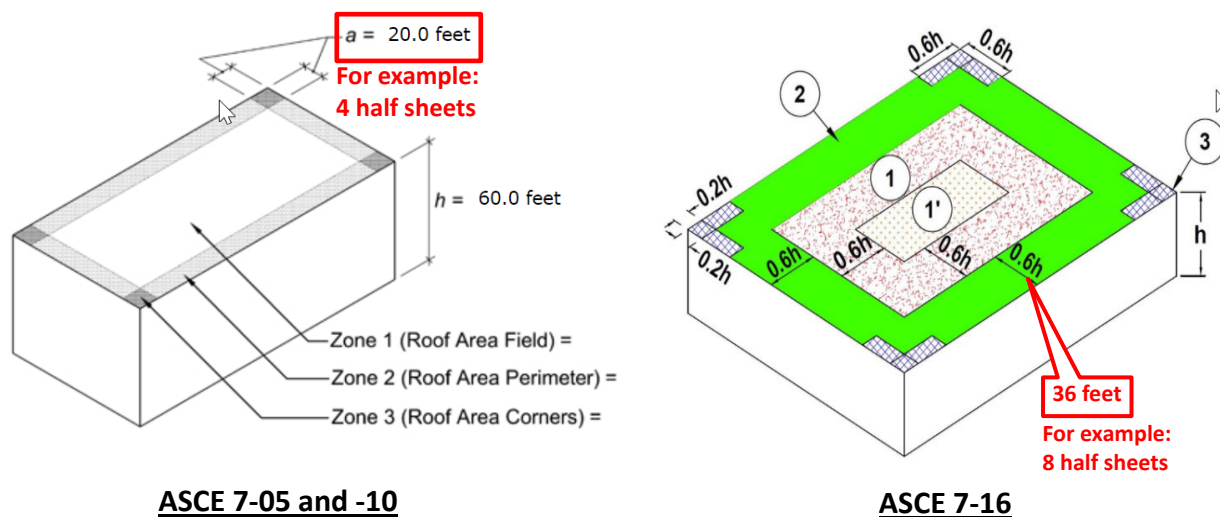
Comparing ASCE 7-05, ASCE 7-10 and ASCE 7-16

Example: A low-rise office building (Risk Category II) is located in Chicago, IL. The building is an enclosed structure with a mean roof height of 60 ft. The building is located in an open terrain area that can be categorized as Exposure Category C.

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ASCE 7-10 Ult.	$V_{ULT} = 115$	--	39		97
ASCE 7-10 ASD	$V_{ASD} = 90$	--	23	FM 1-60	58
ASCE 7-16 Ult.	$V_{ULT} = 105$	30	51		92
ASCE 7-16 ASD	$V_{ASD} = 90$	18	31	FM 1-75 or FM 1-90	

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ASCE 7-16's impact on perimeter and corner zones



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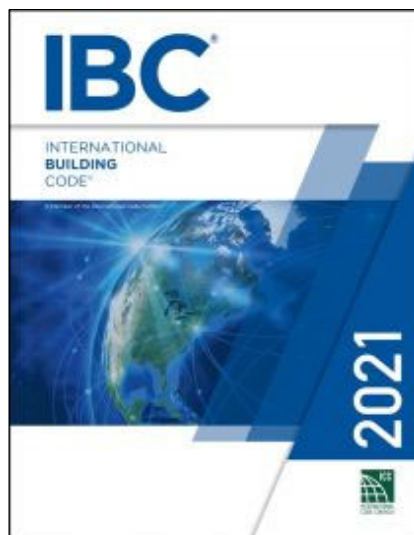
ASCE 7-16's impact

- Higher wind loads (typically)
- New, more complicated zone layout
- Larger perimeter zones
- More fasteners (typically)
- More half sheets

There is a roof application labor impact associated with ASCE 7-16...

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New 2021 I-codes



- Publication delayed:
 - Appeals
- Publication expected shortly
- Delays may impact early adoption jurisdictions

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Overview of roofing-related changes

2021 I-codes

- Reformatted single ply section
- Reformatted and new liquid-applied membrane requirements
- Reformatted and new roof coating requirements
- New gutter testing requirement (ANSI/SPRI GT-1)
- Roof zones required in Construction Documents
- Reformatted Energy Code roofing-related requirements
 - U-value method now usable for roof assemblies
- Tapered insulation R-value by the “average R-value method”

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Moisture in concrete roof decks


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What we know...

- 28-day cure time doesn't correlate with concrete's dryness
- Concrete's slow drying rate is long recognized
 - H.W. Brewer, 1965
 - Howard Kanare, 2008
- Moisture mechanics different between roof decks and floors
 - Moisture migration in its vapor phase is of concern
- Concrete mix designs vary
 - Aggregates: Normal weight vs. lightweight
 - Water-to-cement ratios and added free water
 - Admixtures

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RESEARCH+TECH



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February 2020

“...These test results contradict claims an MVRA minimizes concrete's ability to pass and release moisture vapor...”

[Link](#)

	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

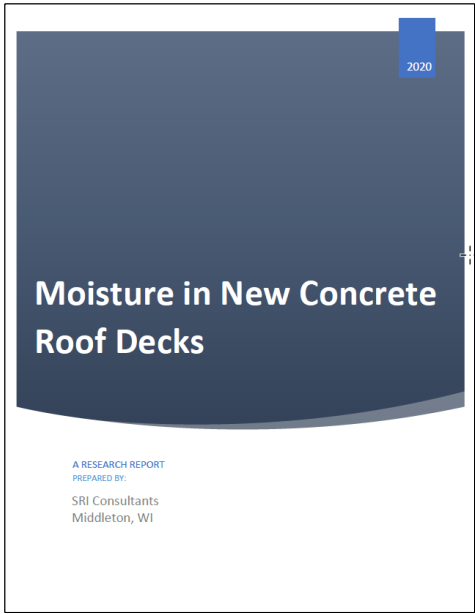
Putting it to the test
NRCA conducts testing of moisture vapor reduction admixtures
by Mark S. Graham

Non admixtures 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 MVRA's are specific chemicals added during concrete's batching and mixing to provide an additional chemical reaction during the concrete's hydration and curing process. MVRA's 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, maintaining the concrete's ability to pass and release moisture vapor. The gel is intended to be permanent and integral throughout the concrete thickness.

MVRA's 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 MVRA's 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.

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The image shows the cover of a research report titled "Moisture in New Concrete Roof Decks". The cover is dark blue with white text. At the top right, it says "2020". The title "Moisture in New Concrete Roof Decks" is prominently displayed in the center. Below the title, it says "A RESEARCH REPORT PREPARED BY: SRI Consultants Middleton, WI". To the right of the report cover, there is a "Link" text.

Findings include:

- Permeabilities vary with mix design and curing
- A vapor retarder is needed in all Climate Zones to restrict moisture vapor transfer

[Link](#)

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NRCA's recommendations
New concrete roof decks

- Designs should include a well adhered, low-perm rating vapor retarder
- Consider avoiding organic content roofing materials and water-based adhesives
- Roofing contractors should not make the when to roof decision
 - Consider contract or disclaimer language

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The screenshot shows the NRCA website interface. At the top, there is a navigation bar with links for 'About', 'Become A Member', 'Member Directory', and 'Consumers'. Below this is a search bar with 'Logout' and 'Cart' icons. A secondary navigation bar includes 'Legal Database', 'Legal Help Line', 'Education', 'Resources', 'Legal Library', and 'My Account'. The main content area features a breadcrumb trail 'Home > Members only news' and the article title 'Contract provision addresses installation of roof system over concrete deck'. The article text discusses moisture content in roof decks and the contractor's responsibility.

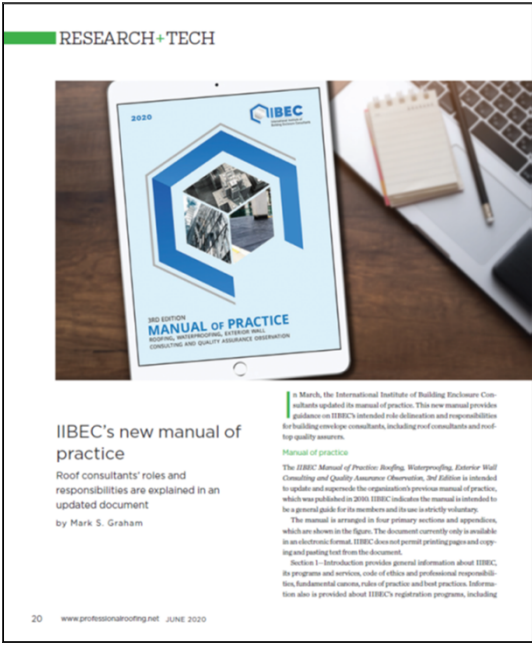
Assessing moisture content in roof deck: Roofing Contractor is not responsible for the effects of moisture migration originating within the roof deck or substrate, including concrete decks, or due to moisture vapor drive from within the building. Residual moisture within the roof deck, particularly structural concrete decks, can adversely affect the properties and performance of roofing materials, regardless of additives or concrete admixtures that may be included in the concrete mix. Roofing Contractor's commencement of roof installation indicates only that the Roofing Contractor has visibly inspected the surface of the deck for visible defects prior to commencement of roofing and the surface of the deck appeared dry. The 28-day concrete curing period does not signify the deck is sufficiently dry.

Roofing Contractor is not responsible to test or assess the moisture content of the deck or evaluate the likelihood of condensation from moisture drive within the building. Roofing contractor recommends that roofing not commence until probes in concrete decks show moisture content is no greater than 75% relative humidity when there is no organic content within the roofing materials. Wood fiberboard, perlite and organic paper facers on polyisocyanurate insulation will generate mold with relative humidity as low as about 65-70%.

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The image shows the cover of the 'IIBEC Manual of Practice'. The cover is light blue and features a central graphic of a blue hexagon with a white border, containing a photograph of a construction site. The text on the cover includes '2020' in the top left, the IIBEC logo (International Institute of Building Enclosure Technicians) in the top right, and '3RD EDITION MANUAL OF PRACTICE ROOFING, WATERPROOFING, EXTERIOR WALL CONSULTING AND QUALITY ASSURANCE OBSERVATION' at the bottom.

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RESEARCH+TECH

2020

IIBEC

3RD EDITION
MANUAL OF PRACTICE
ROOFING, WATERPROOFING, EXTERIOR WALL
CONSTRUCTION AND QUALITY ASSURANCE OBSERVATION

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 assessors.

Manual of practice

The IIBEC Manual of Practice: Roofing, Waterproofing, Exterior Wall Construction and Quality Assurance Observations, 3rd Edition is intended to update and supersede the organization's previous manual of practice, which was published in 2009. IIBEC indicates the manual is intended to be a general guide for its members and its use is entirely voluntary.

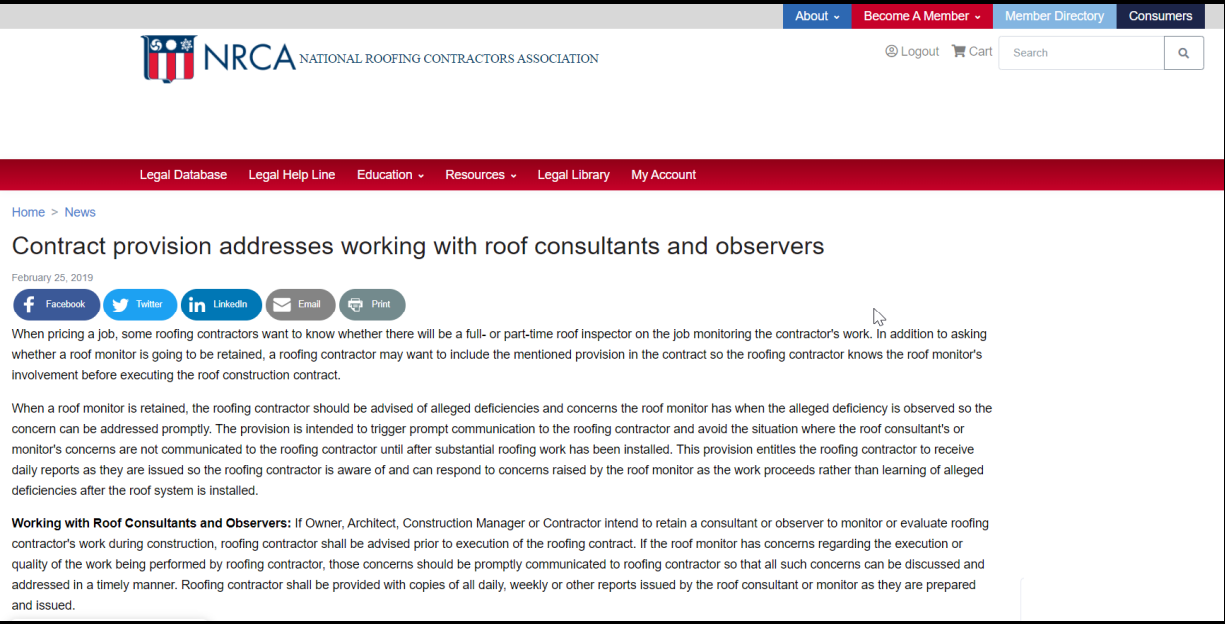
The manual is arranged in four primary sections and appendices, which are shown in the figure. The document currently only is available in an electronic format. IIBEC does not permit printing, copying and posting text from the document.

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

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June 2020

[Link](#)

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Contract provision addresses working with roof consultants and observers

February 25, 2019

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When pricing a job, some roofing contractors want to know whether there will be a full- or part-time roof inspector on the job monitoring the contractor's work. In addition to asking whether a roof monitor is going to be retained, a roofing contractor may want to include the mentioned provision in the contract so the roofing contractor knows the roof monitor's involvement before executing the roof construction contract.

When a roof monitor is retained, the roofing contractor should be advised of alleged deficiencies and concerns the roof monitor has when the alleged deficiency is observed so the concern can be addressed promptly. The provision is intended to trigger prompt communication to the roofing contractor and avoid the situation where the roof consultant's or monitor's concerns are not communicated to the roofing contractor until after substantial roofing work has been installed. This provision entitles the roofing contractor to receive daily reports as they are issued so the roofing contractor is aware of and can respond to concerns raised by the roof monitor as the work proceeds rather than learning of alleged deficiencies after the roof system is installed.

Working with Roof Consultants and Observers: If Owner, Architect, Construction Manager or Contractor intend to retain a consultant or observer to monitor or evaluate roofing contractor's work during construction, roofing contractor shall be advised prior to execution of the roofing contract. If the roof monitor has concerns regarding the execution or quality of the work being performed by roofing contractor, those concerns should be promptly communicated to roofing contractor so that all such concerns can be discussed and addressed in a timely manner. Roofing contractor shall be provided with copies of all daily, weekly or other reports issued by the roof consultant or monitor as they are prepared and issued.

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Testing polymer-modified bitumen sheet products

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Previous testing

Polymer-modified bitumen sheet products

- 2011 testing
 - Six of 16 products tested complied
- 2015 testing
 - Nine of 13 product tested complied

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Polymer-modified bitumen test results		
Sample (Manufacturer and product)	Low-temperature flexibility (F) (as received)	Granule loss (g) (as received)
SBS products		
1-A	-13	0.56
3-A	-27	NA
3-B	-15	0.48
4-A	-16	1.13
5-A	-15	2.05
6-A	-13	0.34
6-B	-13	0.53
6-C	-9	0.55
8-A	-20	0.09
9-A	-8	0.53
10-A	Less than -40	1.16
ASTM specification	0 (maximum)	2.0 (maximum)
APP products		
2-A	21	0.95
2-B	10	NA
2-C	14	0.60
2-D	10	0.65
2-E	9	NA
7-A	Greater than 41	0.10
7-B	Greater than 41	0.88
ASTM specification	32 (maximum)	2.0 (maximum)

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August 2020


To address this concern, NRCA suggests designers, specifiers and purchasers of polymer-modified bitumen sheet products seek out manufacturers and products with third-party certifications of compliance with applicable ASTM International product standards.

[Link](#)

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Testing synthetic underlayment products

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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.

[Link](#)

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NRCA testing
Synthetic underlayment products

- 18 products tested
- 17 of 18 passed the water shedding test
- Dimensional stability values widely varied
- Some products are vapor permeable and some are non-permeable (a vapor retarder)

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Recommendation
Synthetic underlayment products
... use with caution...

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Questions....

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