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Aurora, Colorado -- December 11, 2025

Roofing Technical Update

presented by

Mark S. Graham
Vice President, Technical Services
National Roofing Contractors Association (NRCA)
NRCA

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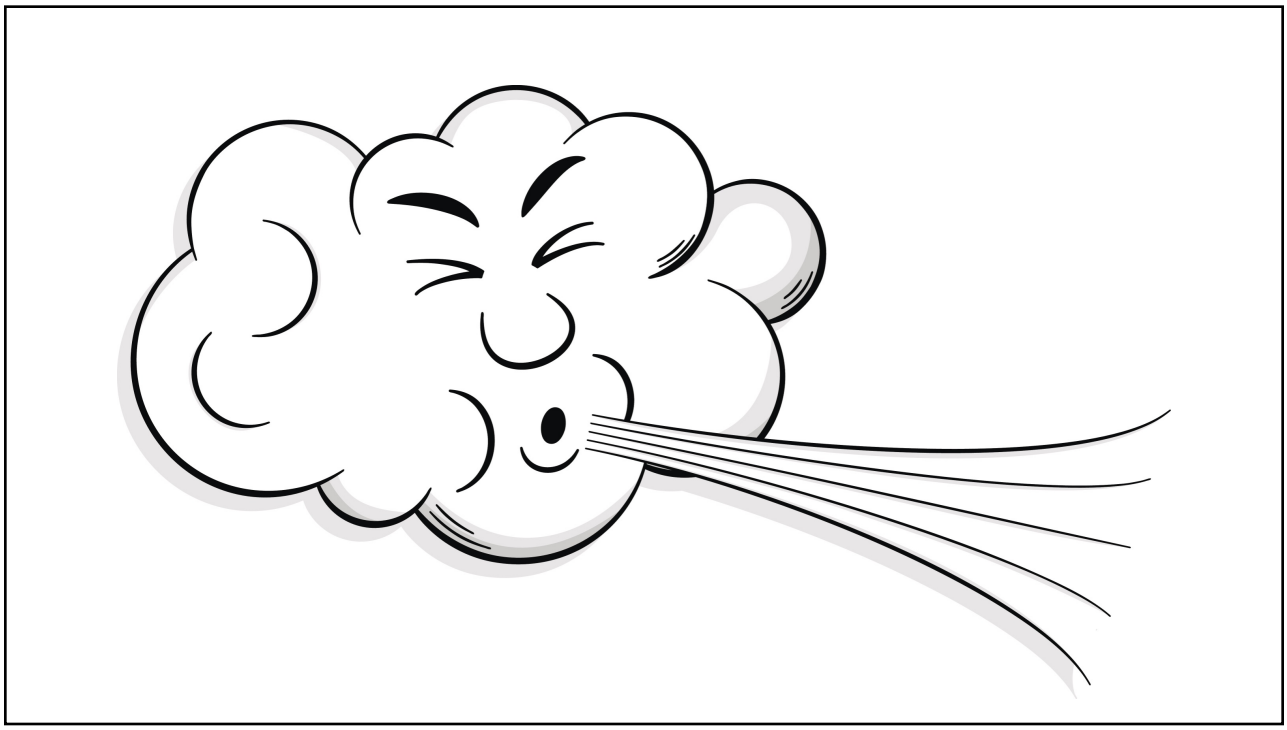

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Beaufort wind scale

Force	Wind Speed (mph)	Description	Characteristics
0	0-1	Calm	Smoke rises vertically
1	1-3	Light air	Direction of smoke drift
2	4-7	Light breeze	Wind felt of face; leaves rustle
3	8-12	Gentle breeze	Wind extends a light flag
4	13-18	Moderate breeze	Small branches are moved
5	19-24	Fresh breeze	Small trees in leaf begin to sway
6	25-31	Strong breeze	Large branches in motion
7	32-38	Near gale	Whole trees in motion
8	39-46	Gale	Breaks twigs off trees
9	47-54	Severe gale	Slight structural damage occurs
10	55-63	Storm	Trees uprooted; structural damage
11	64-72	Violent storm	Wide-spread damage
12	73-83	Hurricane	See Saffir-Simpson Hurricane Scale

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Saffir-Simpson Hurricane Wind Scale

Category	Wind Speed (mph)	Characteristics
1	74-95	Very dangerous winds produce some damage
2	96-110	Extremely dangerous winds will cause extensive damage
3	111-129	Devastating damage will occur
4	130-156	Catastrophic damage will occur
5	157 and higher	Catastrophic damage will occur

5

Enhanced Fujita Tornado Scale (EF scale)

Category	Wind Speed (mph)
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	Over 200

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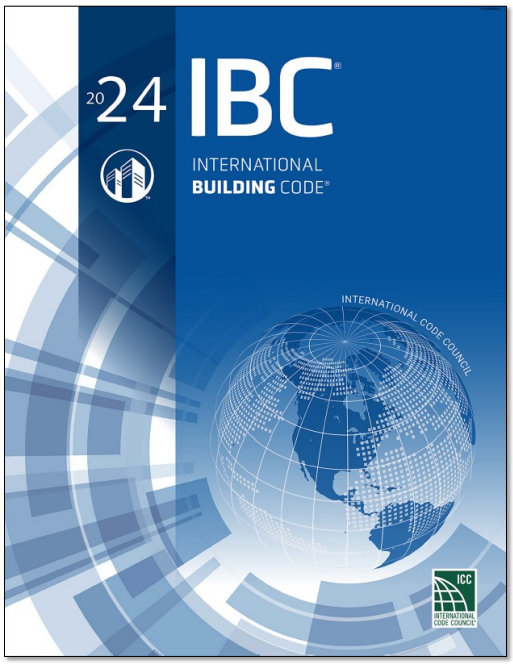

International Building Code, 2024 Edition

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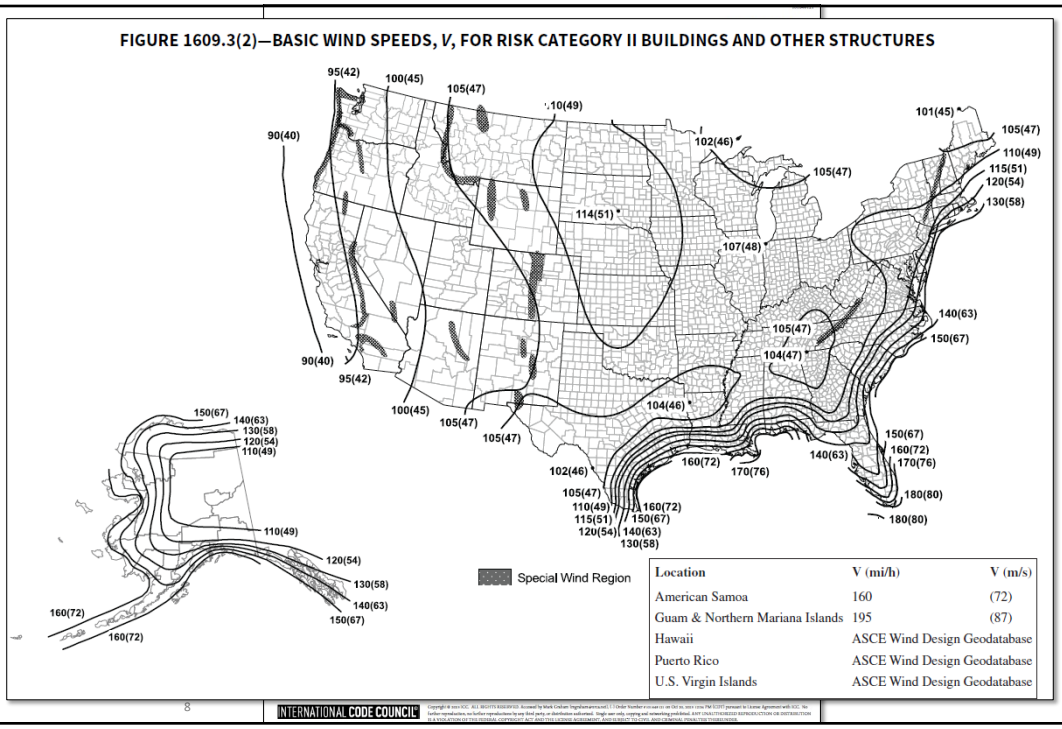

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Mean recurrence interval

MRI dictates a building's Risk Category → Basic wind speed (3-sec. peak gust) map

Risk Category I	300-year MRI
Risk Category II	700-year MRI
Risk Category III	1,700-year MRI
Risk Category IV	3,000-year MRI

9

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Manufacturers' warranties

- Typically limit wind coverage to 56 mph
- "…sole and exclusive warranty…"

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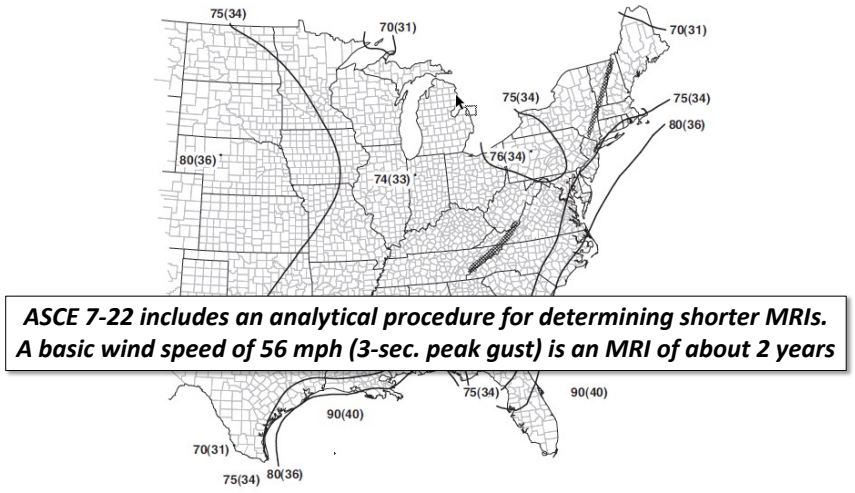

ASCE 7-22 includes an analytical procedure for determining shorter MRIs. A basic wind speed of 56 mph (3-sec. peak gust) is an MRI of about 2 years

Location	Vmph	(m/s)
American Samoa	105	(47)
Guam	110	(49)
Hawaii	ASCE Wind Design Geodatabase	
Puerto Rico	ASCE Wind Design Geodatabase	
U.S. Virgin Islands	ASCE Wind Design Geodatabase	

Figure CC.2-2 (*Continued*). 10-year MRI 3 s gust wind speed in mi/h (m/s) at 33 ft (10 m) above ground in Exposure C.

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Considerations…

- Manufacturers are increasingly using wind speed history to void their warranties… and avoid responsiblities
- Contractors face some liability:
  - Wind speeds between the manufacturer's warranty limit and the design wind speed (i.e., building code)
  - Non-wind-related issues when the warranty limit is exceeded
- Building owners may better served without a manufacturer's warranty with a low wind speed limit
- Contractors can consider wind speed limitations in their warranties

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“Moisture” meter concerns

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These meters do not read moisture…
…they are reading relative conductivity, which can be correlated to specific materials in specific conditions when properly calibrated.

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Considerations

"Moisture" meters

- Read/understand the instruction manual
- Understand device sensitivity
- Understand proper operating conditions
- Proper calibration/recalibration is critical
- Don't overstate the meter's capability
- Verify job-specific results with gravimetric analysis

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Installation

Apply only as many DensDeck® Roof Boards as can be covered by a roof membrane system in the same day.

DensDeck® Roof Boards of any thickness do not require gapping. Board edges and ends should be butted tightly together. When installed on a structural metal deck, edge joints should be located on and parallel to top flutes, so that edges are supported.

Independent evaluations have demonstrated that hot mopping to DensDeck® Roof Boards is an acceptable method of bonding membranes. However, the product must be dry prior to commencing installation of hot asphalt application, with free moisture content less than 1% using a moisture meter that has been set to the gypsum scale.

- When using DensDeck® Roof Board or DensDeck® Prime Roof Board, Georgia-Pacific Building Products recommends maximum asphalt application temperatures of 425°F (218°C) to 450°F (232°C). Application temperatures above these recommended temperatures may adversely affect roof system performance. Consult and follow roofing system manufacturer's specifications for full mopping applications and temperature requirements.
- Follow accepted roofing industry guidelines for full mopping applications such as EVT temperature guidelines, brooming and proper application rates of asphalt.

DensDeck® Prime Roof Board and DensDeck® StormX™ Prime Roof Board may be flood mopped to a substrate followed by a flood mopped application of membrane using these guidelines:

- DensDeck® Prime Roof Board and substrate must be dry.
- Asphalt used to install DensDeck® Prime Roof Board should be allowed to cool prior to mopping base sheet to top of boards.
- Allow base ply to cool before mopping additional plies or cap sheet to limit the amount of direct heat that is applied to boards.

18 Recommendations and Limitations for Use | PRODUCT | DensDeck® Roof Board | DensDeck® Prime Roof Board | DensDeck® StormX Prime Roof Board

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GYPSUM ASSOCIATION

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Moisture in Gypsum Panel Products

The number of inquiries to the Gypsum Association about water-damaged gypsum panels always increases during the winter, early spring, after hurricane season or after any other significant water exposure event. Answers to many of these questions are found in an Association document revised in 2019, GA-231 *Assessing Water Damage to Gypsum Board*.

Gypsum panels can occasionally be subjected to moisture. Sometimes, this exposure is unintentional and due to a flood or hurricane. On occasion, a panel is intentionally dampened so that it can be used to create a curved surface. In each case, gypsum panels must not be overexposed to excessive moisture levels.

Once exposed to moisture, a panel must be evaluated. It is the recommendation of the Gypsum Association and its member companies that panels exposed to water should always be replaced unless all of the following conditions are met:

- The source of the water is identified and eliminated.
- The water to which any gypsum panel was exposed was uncontaminated.
- The gypsum panels can be dried thoroughly before mold growth begins (typically 24 to 48 hours depending on environmental conditions).
- The gypsum panel is structurally sound and there is no evidence of rusting fasteners or physical damage to the framing that would diminish the physical properties of the gypsum panel or system.

All of this is immaterial, however, when it comes to panels that have been exposed to floodwater. Since floodwater is almost certainly contaminated with extremely high levels of bacteria and pollutants, the industry recommends that gypsum panels exposed to floodwater shall be replaced. The same is true if it is believed that a panel has been exposed to sewage or wastewater.

All of the above is contained in Gypsum Association document GA-231 *Assessing Water Damage to Gypsum Board*, along with recommendations for creating acceptable drying conditions and a list of additional information resources. Quite simply, if there is ever doubt about whether to keep or replace gypsum panels that have been exposed to water, replace them.

Beyond a flood or natural disaster, gypsum panels can be exposed to water in a number of ways, including improper installation, missing flashing, ruptured pipes, bathtub overflows, and general water leaks. The Association does periodically receive requests for instructions on how to establish the moisture content of gypsum panels if they have been subjected to potentially damaging levels of water exposure. These generally involve the use of moisture meters.

Moisture meters operate on the principle that the electrical resistance and dielectric properties of materials vary consistently with moisture content changes. Calibrating a moisture meter to a substance such as wood is relatively straightforward because wood has relatively uniform composition throughout the thickness. Moreover, calibration curves are often quite consistent for different species of wood, (i.e. between spruce, pine, or fir).

Using a moisture meter on gypsum panels presents a significantly different physical situation. In this case, volume includes two materials with quite different responses to moisture. It is important to recognize that, unlike lumber, a gypsum panel consists of an inorganic core comprising the bulk of panel thickness with thin paper or glass mat facers laminated to the front and back of the panel. The measurement volume includes a thin hygroscopic layer (in the case of a paper facer), and a much larger volume of inorganic mineral (the gypsum core). These materials have quite dissimilar moisture adsorption and electrical properties. As such, a moisture meter calibrated using the techniques commonly applied for wood can yield misleading results for quantifying the moisture content of a gypsum panel. Similarly, the facer of glass-mat gypsum panels affects moisture meters differently than the paper facer on gypsum board. Further, the hydrophobic additives incorporated in the paper and core of water- and mold-resistant gypsum panels can introduce even more complications.

Link

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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, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: C1789 – 24

Standard Test Method for Calibration of Hand-Held Moisture Meters on Gypsum Panels[1]

This standard is issued under the fixed designation C1789; 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 reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This test method applies to the calibration of hand-held moisture meters for gypsum board, glass faced gypsum panels and fiber-reinforced gypsum panels by means of electrical conductance and dielectric meters. The test uses wetted test specimens which are dried down in at least five (5) steps to determine the moisture content based on the weight loss in comparison to the dry weight. The test also supplies the ERH values for each of the drying steps.

1.2 This test method has not been evaluated for the influence of paint or wall covering materials on the indicated moisture content of a gypsum board or panel substrate.

1.3 The values stated in SI (metric) are to be regarded as standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not considered 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, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C473 Test Methods for Physical Testing of Gypsum Panel Products

C1177/C1177M Specification for Glass Mat Gypsum Substrate for Use as Sheathing

C1178/C1178M Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel

C1278/C1278M Specification for Fiber-Reinforced Gypsum Panel

C1396/C1396M Specification for Gypsum Board

D4442 Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials

D4444 Test Method for Laboratory Standardization and Calibration of Hand-Held Moisture Meters

2.2 *ASHRAE Standard:*[3]

2009 ASHRAE Handbook – Fundamentals, Chapter 1 – Psychrometrics, American Society of Heating, Refrigerating and Air-conditioning Engineers

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *absolute humidity, d_a, n*—the ratio of the mass of water vapor to the total volume of the moist air sample.

3.1.2 *admittance, n*—inverse of impedance, a measure of how easily an electric current can flow through a material.

3.1.3 *conductance meters, n*—conductance meters are those that measure predominantly ionic conductance between points of applied voltage, usually dc.

3.1.3.1 *Discussion*—Conductance meters generally have pins that penetrate into the material being measured. Direct-current conductance meters are commonly referred to as "resistance" meters. Most commercial conductance meters are high-input impedance (about 10^{12} Ω), wide-range (10^4 to 10^{12} Ω) ohmmeters. Their scales are generally calibrated to read directly in moisture content (oven-dry mass basis) for a particular calibration material and at a specific reference temperature.

3.1.4 *dew-point temperature, t_d, n*—the temperature at which a sample of moist air being cooled at constant pressure and moisture content reaches 100 % relative humidity.

[1] This test method is under the jurisdiction of ASTM Committee C11 on Gypsum and Related Building Materials and Systems and is the direct responsibility of Subcommittee C11.01 on Specifications and Test Methods for Gypsum Products.

Current edition approved April 1, 2024. Published April 2024. Originally approved in 2013. Last previous edition approved in 2018 as C1789 – 14 (2018). DOI: 10.1520/C1789-24.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, http://www.ashrae.org.

*A Summary of Changes section appears at the end of this standard

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Considerations…

- Be extra cautious of handheld moisture meters
- The “dryness” of gypsum board products is somewhat unknown
- NRCA cautions mopped- or torch-application to gypsum board products

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Polyiso. testing

R-value testing
Facer sheet adhesion (with the Chicago Roofing Contractors Association)

20

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LTTR – ASTM C1303 and ASTM C518

- A 15-year time-weighted average R-value
- The predicted R-value after 5-years (under controlled laboratory conditions)

R-value – ASTM C518

- R-value at the time of the test

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- LTTR and R-value is typically tested and reported at 75 F.
- NRCA tests at 75 F, but we also test at 40 F and 110 F.

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Test results

Physical properties

Manufacturer	Apparent density (lb/ft^3)	Thickness (inches)
1c	2.726	2.578
1p	2.002	2.594
2c	3.254	2.576
2p	2.024	2.585
3p	2.218	2.500
4p	2.057	2.735

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Test results

R-value

Manufacturer	R-value (75 F)
1c	14.4
1p	13.9
2c	13.6
2p	15.6
3p	13.2
4p	15.3

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More test results

R-value

Manufacturer	R-value (40 F)	R-value (75 F)	R-value (110 F)
1c	10.8	14.4	12.8
1p	8.9	13.9	12.0
2c	14.5	13.6	12.1
2p	15.4	15.6	13.4
3p	12.6	13.2	11.6
4p	16.9	15.3	13.1

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Preliminary conclusions

- Tested R-values vary
- Some tested R-values are already lower than LTTR
- Some samples are exhibiting different characteristics

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Preliminary recommendations

- Specify, purchase and sell polyisocyanurate insulation (and all insulation products) based on their thicknesses, not its R-values

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Polyiso facer sheet adhesion

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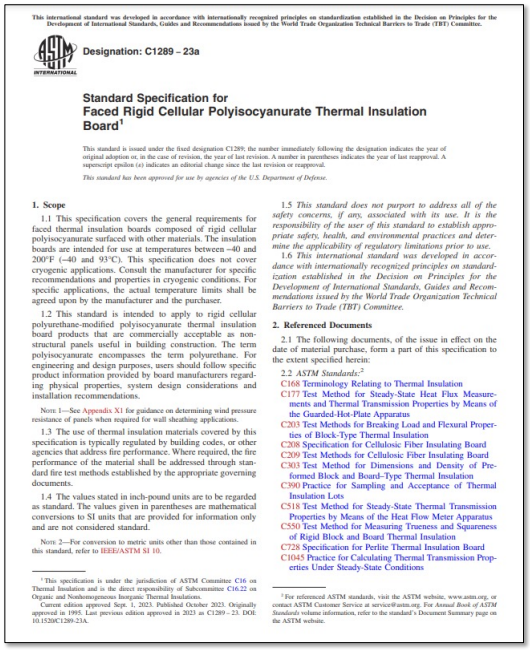

This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade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

Designation: C1289 – 23a

Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board[1]

This standard is issued under the fixed designation C1289; 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 reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers the general requirements for faced thermal insulation boards composed of rigid cellular polyisocyanurate surfaced with other materials. The insulation boards are intended for use at temperatures between −40 and 200°F (−40 and 93°C). This specification does not cover cryogenic applications. Consult the manufacturer for specific recommendations and properties in cryogenic conditions. For specific applications, the actual temperature limits shall be agreed upon by the manufacturer and the purchaser.

1.2 This standard is intended to apply to rigid cellular polyurethane-modified polyisocyanurate thermal insulation board products that are commercially acceptable as non-structural panels useful in building construction. The term polyisocyanurate encompasses the term polyurethane. For engineering and design purposes, users should follow specific product information provided by board manufacturers regarding physical properties, system design considerations and installation recommendations.

NOTE 1—See Appendix X1 for guidance on determining wind pressure resistance of panels when required for wall sheathing applications.

1.3 The use of thermal insulation materials covered by this specification is typically regulated by building codes, or other agencies that address fire performance. Where required, the fire performance of the material shall be addressed through standard fire test methods established by the appropriate governing documents.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

NOTE 2—For conversion to metric units other than those contained in this standard, refer to IEEE/ASTM SI 10.

1.5 *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.*

1.6 *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, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 The following documents, of the issue in effect on the date of material purchase, form a part of this specification to the extent specified herein:

2.2 *ASTM Standards:*[2]

C168 Terminology Relating to Thermal Insulation
C177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
C203 Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation
C208 Specification for Cellulosic Fiber Insulating Board
C209 Test Methods for Cellulosic Fiber Insulating Board
C303 Test Method for Dimensions and Density of Preformed Block and Board–Type Thermal Insulation
C390 Practice for Sampling and Acceptance of Thermal Insulation Lots
C518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
C550 Test Method for Measuring Trueness and Squareness of Rigid Block and Board Thermal Insulation
C728 Specification for Perlite Thermal Insulation Board
C1045 Practice for Calculating Thermal Transmission Properties Under Steady-State Conditions

[1] This specification is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.22 on Organic and Nonhomogeneous Inorganic Thermal Insulations.
Current edition approved Sept. 1, 2023. Published October 2023. Originally approved in 1995. Last previous edition approved in 2023 as C1289 – 23. DOI: 10.1520/C1289-23A.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

ASTM C1289-23a

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11.6 *Tensile Strength Perpendicular to Board Surface*— Tensile strength perpendicular to the major board surfaces of the faced board product shall be tested in accordance with Test Method C209, Tensile Strength Perpendicular to Surface, or Test Method D1623 (Type C), utilizing a 250°F (121°C) hot melt adhesive system for sample preparation. Molten adhesive shall be uniformly applied over each faced sample surface and allowed to cool in 73°F (23°C) laboratory air for 24 h before testing.

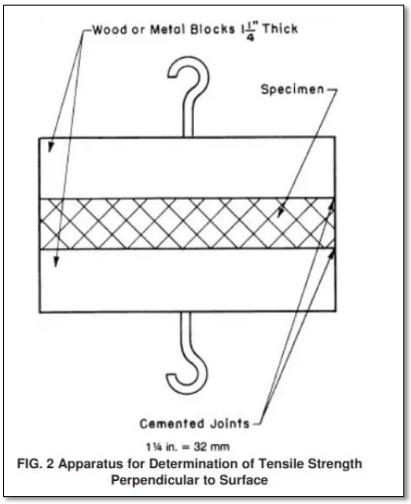

FIG. 2 Apparatus for Determination of Tensile Strength Perpendicular to Surface

Tensile strength, psf (kPa), min Perpendicular to board surface	500 (24)	500 (24)	500 (24)	500 (24)	500 (24)	2000 (95)

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Test results

ASTM C209 tensile strength

Manufacturer	Tensile strength Average (psf)	Standard deviation (psf)
1c	1,888	556
1p	2,041	909
2c	1,874	730
2p	1,301	409
3p	1,029	495
4p	1,185	327

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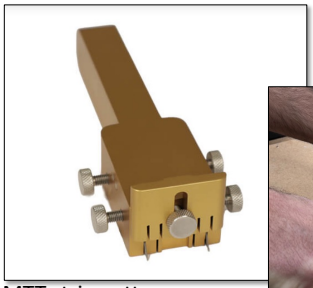
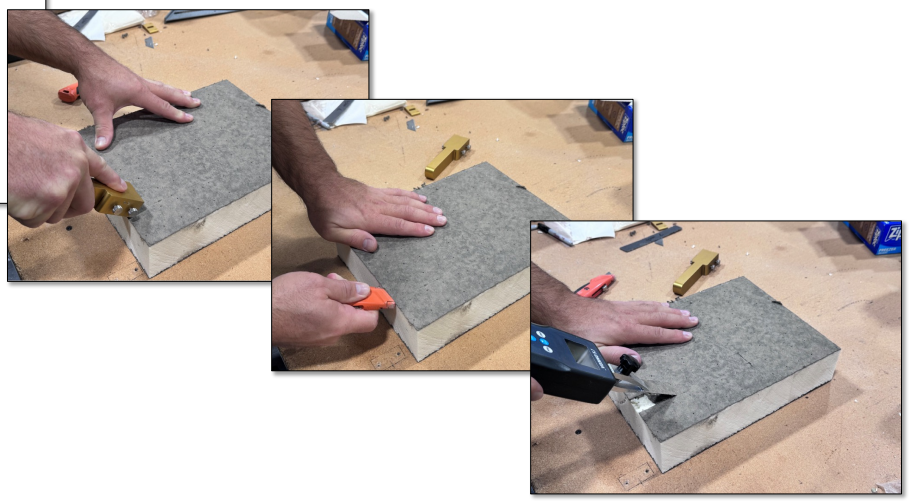
Peel test

Internally-developed evaluation method
No ASTM standard



MTT strip cutter



33

Test results

Manufacturer	Peel strength Average (psi)	Standard deviation (psi)
1c	2.78 MD 3.03 XMD	0.62 MD 0.44 XMD
1p	2.52 MD 2.89 XMD	0.78 MD 0.94 XMD
2c	2.30 MD 2.30 XMD	0.31 MD 0.28 XMD
2p	2.52 MD 2.36 XMD	0.61 MD 0.53 XMD
3p	2.83 MD 2.97 XMD	0.59 MD 0.57 XMD
4p	2.61 MD 2.19 XMD	0.56 MD 0.76 XMD
Average	2.59 MD 2.62 XMD	

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Preliminary conclusions

- Our peel test method seems viable
  - More refinement of the test method may be needed
- Peel values are only about 10% of tensile values
- Peel values seem low
- More testing is planned:
  - More polyiso. specimens (production lots, plants)
  - Board top vs. board bottom
  - Impact of knit lines
  - Other faced insulation boards

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Polyiso. storage

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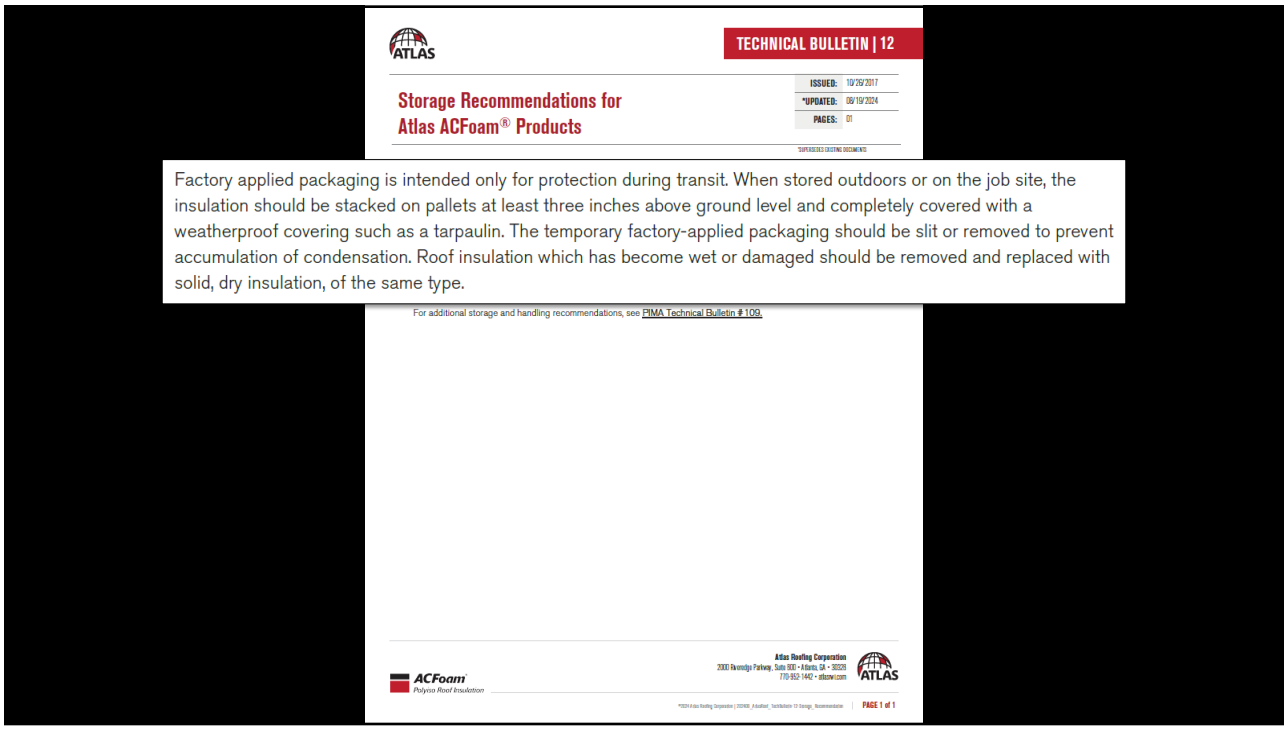
ATLAS
TECHNICAL BULLETIN | 12
Storage Recommendations for Atlas ACFoam® Products
ISSUED: 10/25/2017
*UPDATED: 08/19/2024
PAGES: 01
Factory applied packaging is intended only for protection during transit. When stored outdoors or on the job site, the insulation should be stacked on pallets at least three inches above ground level and completely covered with a weatherproof covering such as a tarpaulin. The temporary factory-applied packaging should be slit or removed to prevent accumulation of condensation. Roof insulation which has become wet or damaged should be removed and replaced with solid, dry insulation, of the same type.
For additional storage and handling recommendations, see PIMA Technical Bulletin # 109.
ACFoam
Polyiso Roof Insulation
Atlas Roofing Corporation
ATLAS
PAGE 1 of 1

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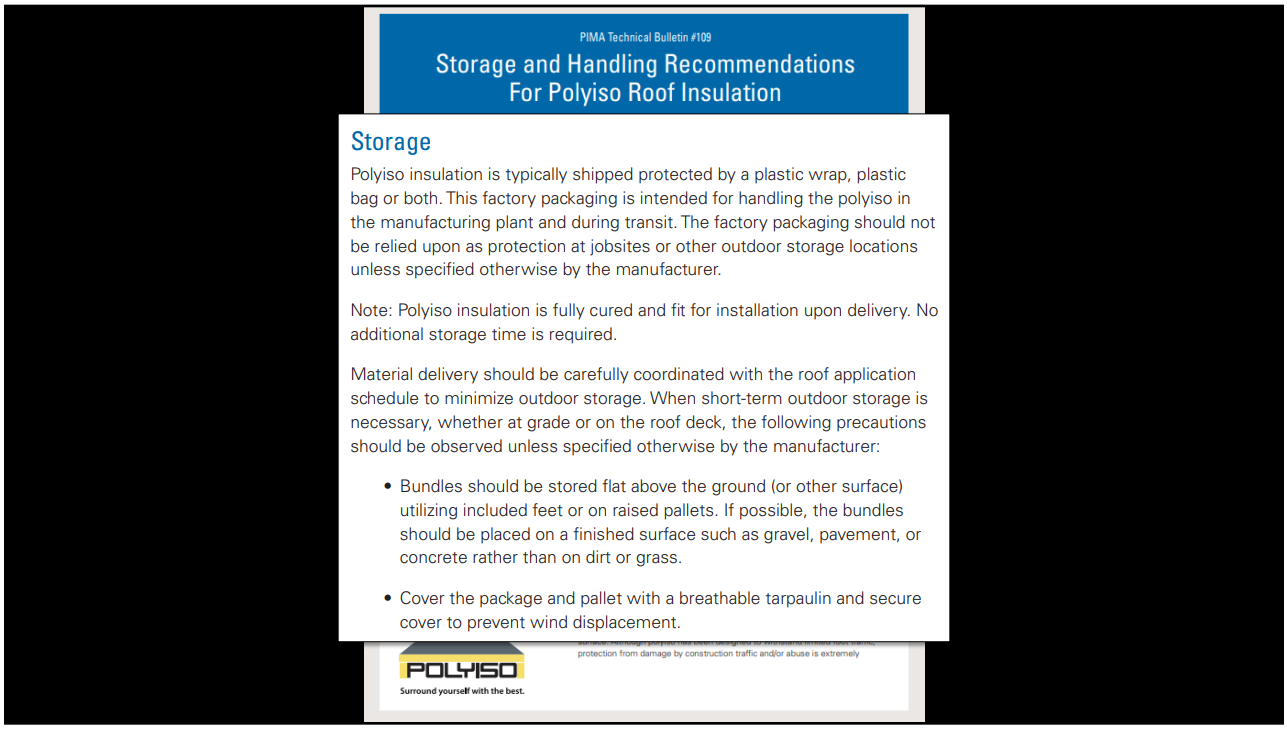
PIMA Technical Bulletin #109
Storage and Handling Recommendations For Polyiso Roof Insulation
Storage
Polyiso insulation is typically shipped protected by a plastic wrap, plastic bag or both. This factory packaging is intended for handling the polyiso in the manufacturing plant and during transit. The factory packaging should not be relied upon as protection at jobsites or other outdoor storage locations unless specified otherwise by the manufacturer.
Note: Polyiso insulation is fully cured and fit for installation upon delivery. No additional storage time is required.
Material delivery should be carefully coordinated with the roof application schedule to minimize outdoor storage. When short-term outdoor storage is necessary, whether at grade or on the roof deck, the following precautions should be observed unless specified otherwise by the manufacturer:
• Bundles should be stored flat above the ground (or other surface) utilizing included feet or on raised pallets. If possible, the bundles should be placed on a finished surface such as gravel, pavement, or concrete rather than on dirt or grass.
• Cover the package and pallet with a breathable tarpaulin and secure cover to prevent wind displacement.
protection from damage by construction traffic and/or abuse is extremely
POLYISO
Surround yourself with the best.

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Wood sheathing

Plywood and oriented strand board, and nailbase insulation

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Standards for wood structural panels

International Residential Code, 2024 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”

42

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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Attachment of Wood Panels: The *International Residential Code, 2024 Edition's* Table R602.3(1)-Fastening Schedule provides minimum fastener and fastener spacing requirements for wood structural panels into roof framing shown in Figure 6.1.

Item	Description of building elements	Number and type of fasteners	Spacing of fasteners	
			Edges (inches)	Intermediate supports (inches)
Wood structural panels, roof sheathing to framing and particle board wall sheathing to framing				
31	3/8- to ½-inch-thick	6d common or deformed nail (2" x 0.113" x 0.281" head)	6	6
		8d common nail (2½" x 0.131" x 0.281" head), or RSRS-01 nail (2⅜" x 0.113" x 0.281" head)	6	6
32	19/32- to ¾-inch thick	8d common nail (2½" x 0.131" x 0.281" head), or RSRS-01 nail (2⅜" x 0.113" x 0.281" head)	6	6
33	7/8- to 1¼-inch thick	10d common nail (3" x 0.148" x 0.281" head), or 2½" x 0.131" x 0.281" head deformed nail	6	12

Figure 6-1. Roof sheathing-specific excerpt from International Residential Code, 2024 Edition's Table R602.3(1)-Fastening Schedule

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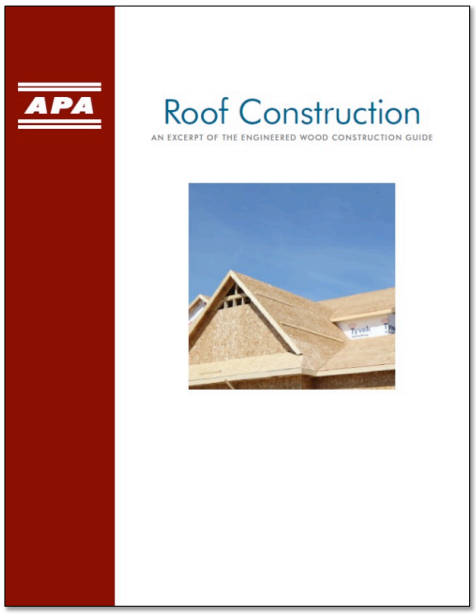

APA Form E30, "Roof Construction"
--Roofing-specific excerpts from APA's *Engineered Wood Construction Guide* (102 pages)

Link

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Considerations

Lumber, plywood and OSB roof decks

- Be extra cautious of plywood and OSB roof decks
- Limit your deck acceptance responsibilities
- Consider more proactive plywood and OSB deck replacement
- Consider pull tests for plywood and OSB roof decks when using mechanically-attached membrane systems

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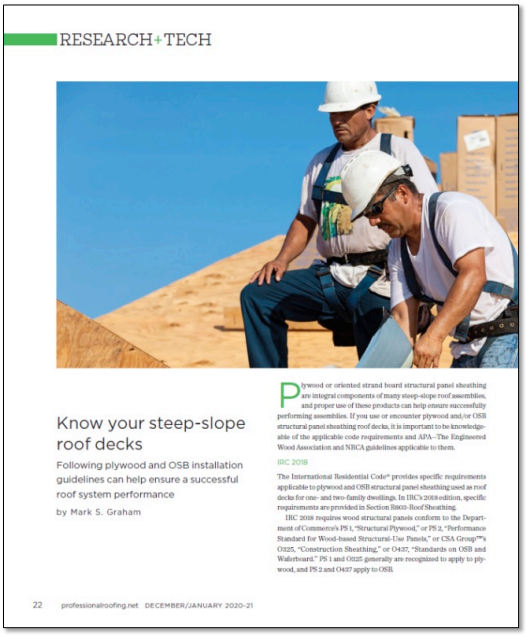

RESEARCH+TECH

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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RESEARCH + TECH

Know the options

Proper specification is essential for nail-base insulation

by Mark S. Graham

In roof assembly configurations with nailable roof coverings, such as asphalt shingles and metal panels, factory-fabricated, nail-base insulation is becoming more common as a component of insulation entirely above the roof deck. Because nail-base insulation serves multiple functions, including being a roof covering substrate and thermal insulation layer, proper design and specification are essential for roof assembly performance.

The basics

Nail-base insulation is composed of a layer of rigid board insulation factory-adhered or laminated to a layer of structural wood panel sheathing, such as plywood or oriented strand board.

The U.S. product standard for nail-base insulation is ASTM C1289, "Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board," Type V. It provides requirements for a polyisocyanurate insulation foam core

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Nailbase insulation considerations

- Double layer design and application
- Taped joints can control vapor leaks/underlayment wrinkling at board joints
- Pressure-tested and FRT nailbase are not good ideas for nailbase

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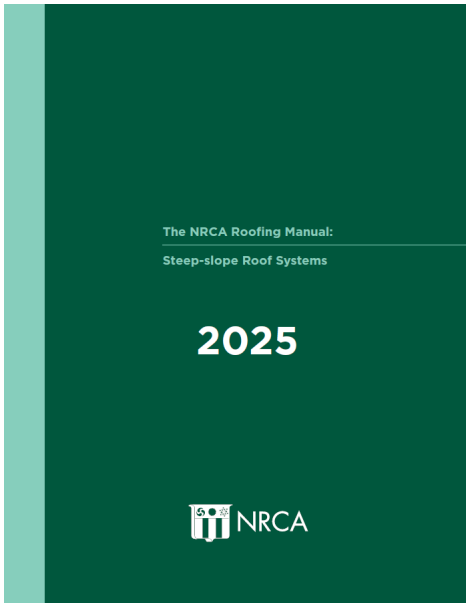

2025 NRCA Manual

Steep-slope Roof Systems

The Manual represents "best practice" guidelines

Link

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NRCA has concerns about the long-term performance of OSB panels, including those addressed by PS 2 used as substrates for asphalt shingle roof systems. Although NRCA acknowledges the widespread use of OSB panels for constructing roof deck substrates, experience has shown OSB panels are subject to dimensional changes, ridging and fastener backout resulting from changing moisture conditions the roof decks typically encounter. NRCA has received reports of asphalt shingle roof assemblies constructed with OSB panel decks experiencing panel edge swelling, warping and buckling. NRCA also is concerned about the effects on OSB panels of repeated fastener removal and new fastener installation as existing roof systems are removed and replacement roof systems are installed during a roof deck's life. Because of these reasons, NRCA does not recommend using OSB panels as a substrate for asphalt shingle roof systems.

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Recent and common technical inquires

Requests of NRCA for technical assistance

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Fastener issues

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Roof drain issues

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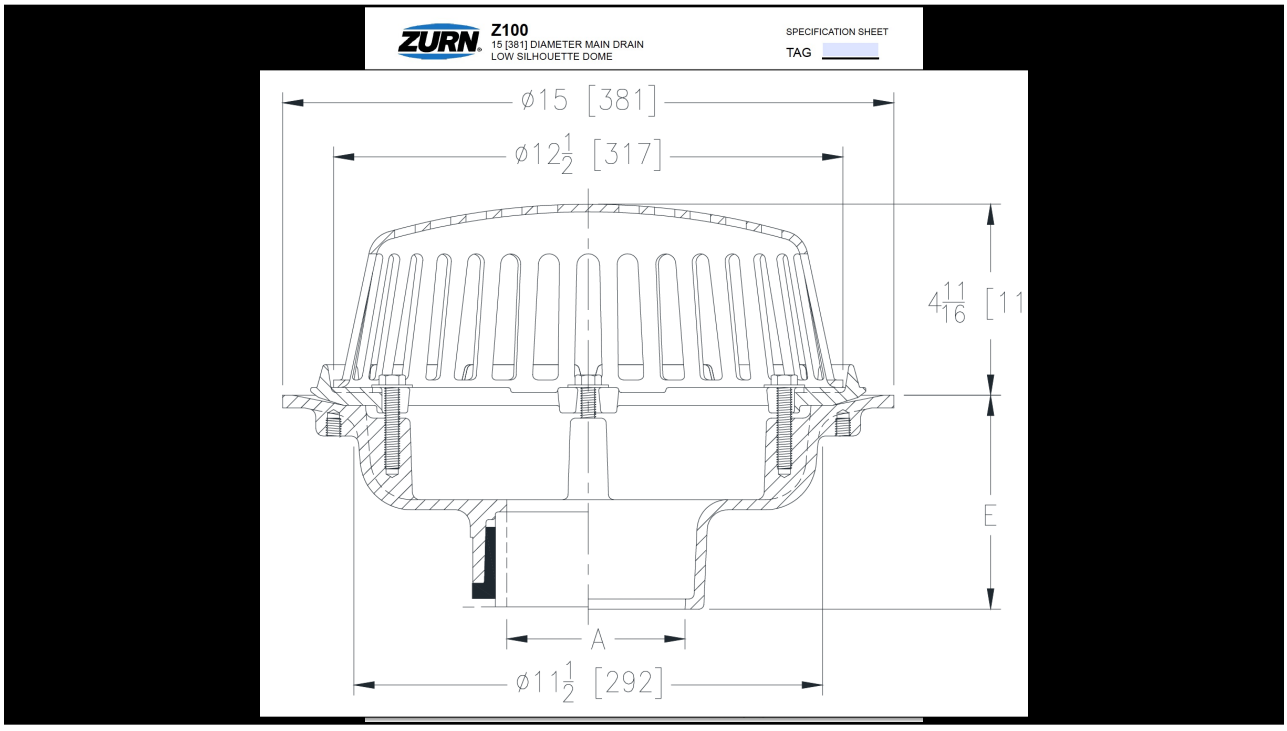

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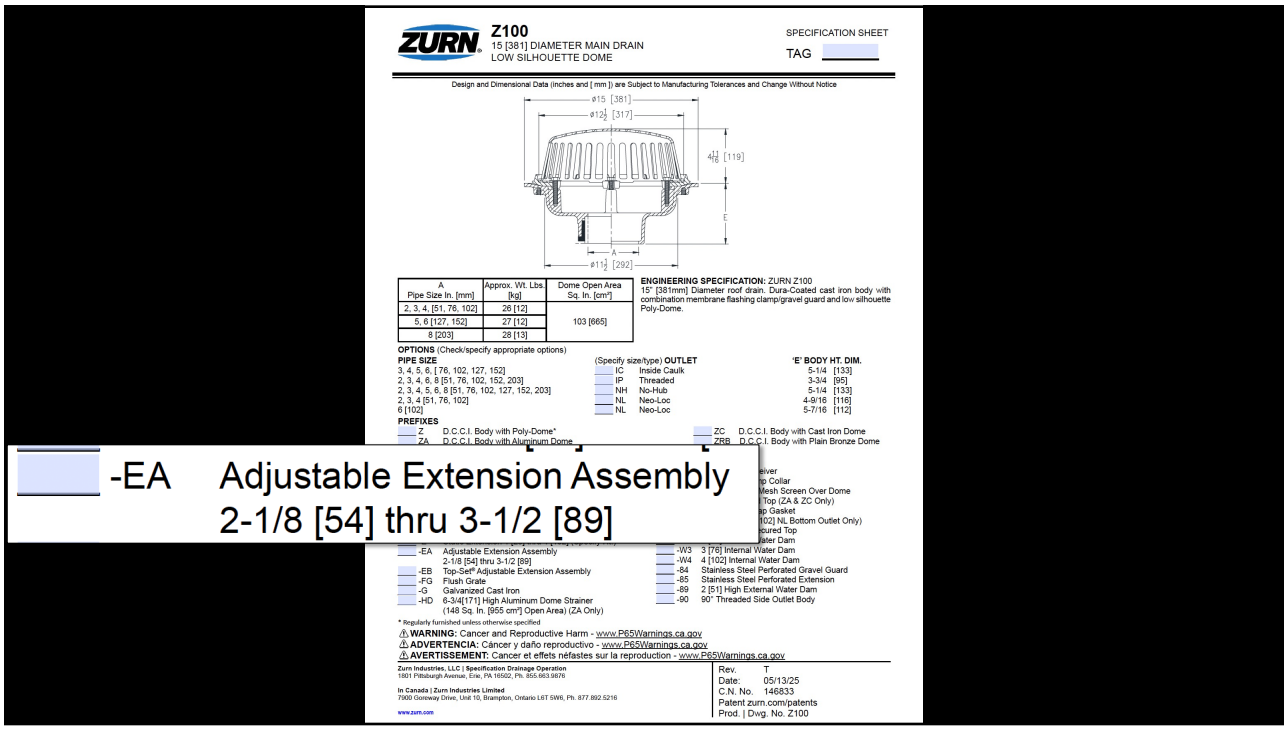
ZURN Z100
15 [381] DIAMETER MAIN DRAIN
LOW SILHOUETTE DOME
SPECIFICATION SHEET
TAG
Design and Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice
ø15 [381]
ø12½ [317]
4⅝ [119]
E
A
ø11½ [292]
A Pipe Size In. [mm]
Approx. Wt. Lbs [kg]
Dome Open Area Sq. In. [cm²]
2, 3, 4, [51, 76, 102] 26 [12]
5, 6 [127, 152] 27 [12]
8 [203] 28 [13]
103 [665]
ENGINEERING SPECIFICATION: ZURN Z100
15" [381mm] Diameter roof drain. Dura-Coated cast iron body with combination membrane flashing clamp/gravel guard and low silhouette Poly-Dome.
OPTIONS (Check/specify appropriate options)
PIPE SIZE
3, 4, 5, 6, [76, 102, 127, 152]
2, 3, 4, 6, 8 [51, 76, 102, 152, 203]
2, 3, 4, 5, 6, 8 [51, 76, 102, 127, 152, 203]
2, 3, 4 [51, 76, 102]
6 [102]
(Specify size/type) OUTLET
IC Inside Caulk
IP Threaded
NH No-Hub
NL Neo-Loc
NL Neo-Loc
'E' BODY HT. DIM.
5-1/4 [133]
3-3/4 [95]
5-1/4 [133]
4-9/16 [116]
5-7/16 [112]
PREFIXES
Z D.C.C.I. Body with Poly-Dome*
ZA D.C.C.I. Body with Aluminum Dome
ZC D.C.C.I. Body with Cast Iron Dome
ZRB D.C.C.I. Body with Plain Bronze Dome
-EA Adjustable Extension Assembly 2-1/8 [54] thru 3-1/2 [89]
-EB Top-Set® Adjustable Extension Assembly
-FG Flush Grate
-G Galvanized Cast Iron
-HD 6-3/4[171] High Aluminum Dome Strainer (148 Sq. In. [955 cm²] Open Area) (ZA Only)
-W3 3 [76] Internal Water Dam
-W4 4 [102] Internal Water Dam
-84 Stainless Steel Perforated Gravel Guard
-85 Stainless Steel Perforated Extension
-89 2 [51] High External Water Dam
-90 90° Threaded Side Outlet Body
* Regularly furnished unless otherwise specified
WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov
ADVERTENCIA: Cáncer y daño reproductivo - www.P65Warnings.ca.gov
AVERTISSEMENT: Cancer et effets néfastes sur la reproduction - www.P65Warnings.ca.gov
Zurn Industries, LLC | Specification Drainage Operation
1801 Pittsburgh Avenue, Erie, PA 16502, Ph. 855.663.9876
In Canada | Zurn Industries Limited
7900 Goreway Drive, Unit 10, Brampton, Ontario L6T 5W6, Ph. 877.892.5216
www.zurn.com
Rev. T
Date: 05/13/25
C.N. No. 146833
Patent zurn.com/patents
Prod. | Dwg. No. Z100
-EA Adjustable Extension Assembly
2-1/8 [54] thru 3-1/2 [89]

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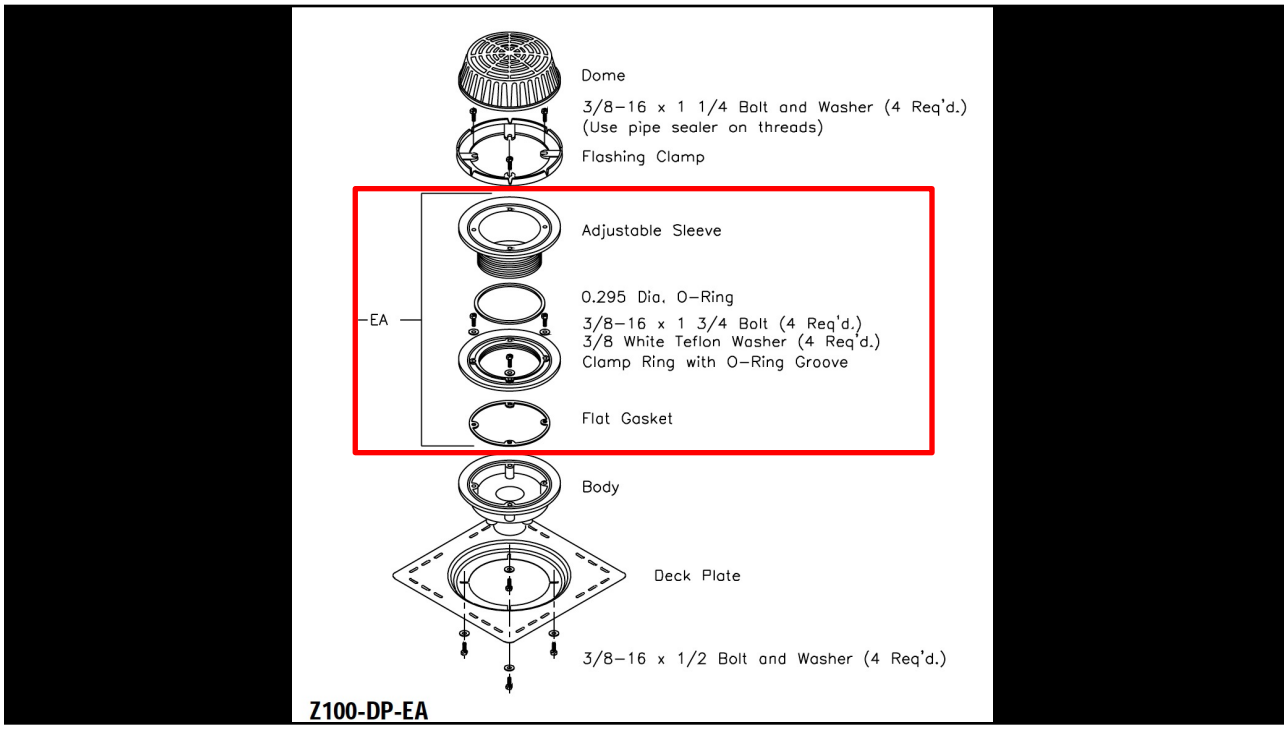
Dome
3/8–16 x 1 1/4 Bolt and Washer (4 Req'd.)
(Use pipe sealer on threads)
Flashing Clamp
Adjustable Sleeve
0.295 Dia. O–Ring
3/8–16 x 1 3/4 Bolt (4 Req'd.)
3/8 White Teflon Washer (4 Req'd.)
Clamp Ring with O–Ring Groove
Flat Gasket
-EA
Body
Deck Plate
3/8–16 x 1/2 Bolt and Washer (4 Req'd.)
Z100-DP-EA

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Membrane discoloration

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Other topics and your questions

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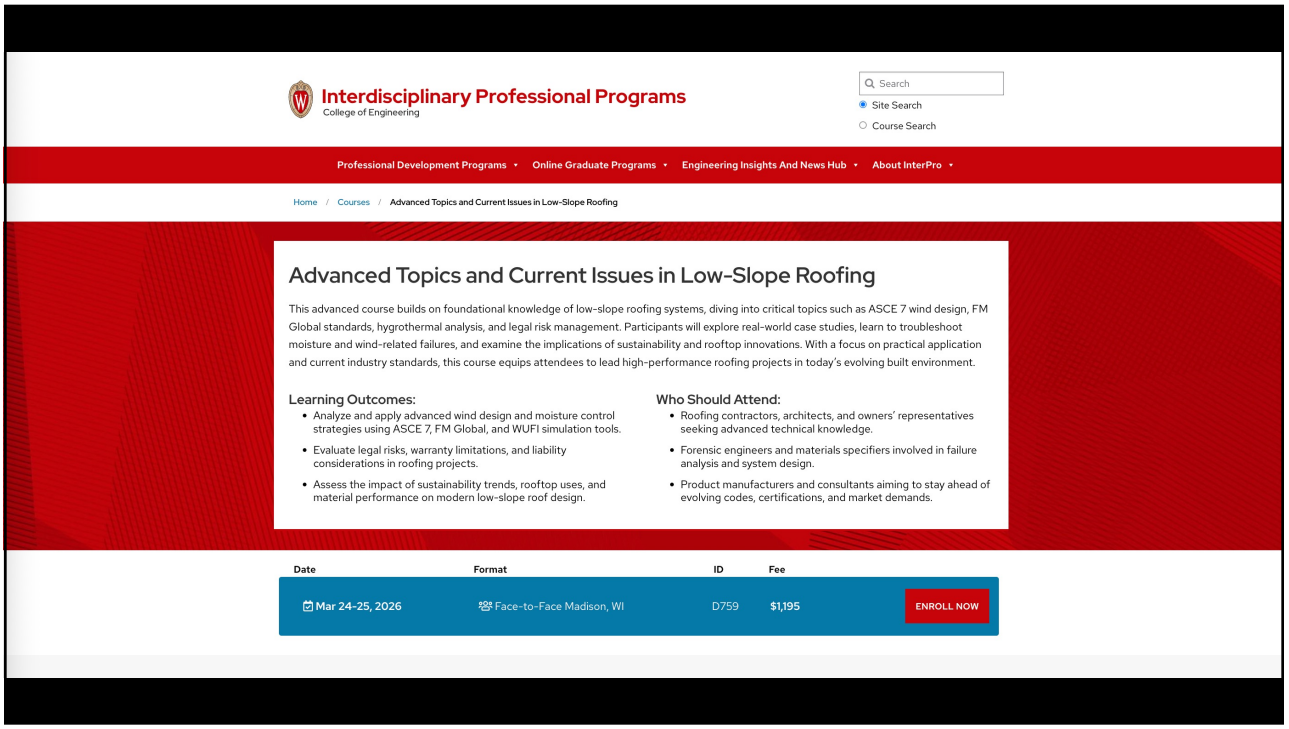

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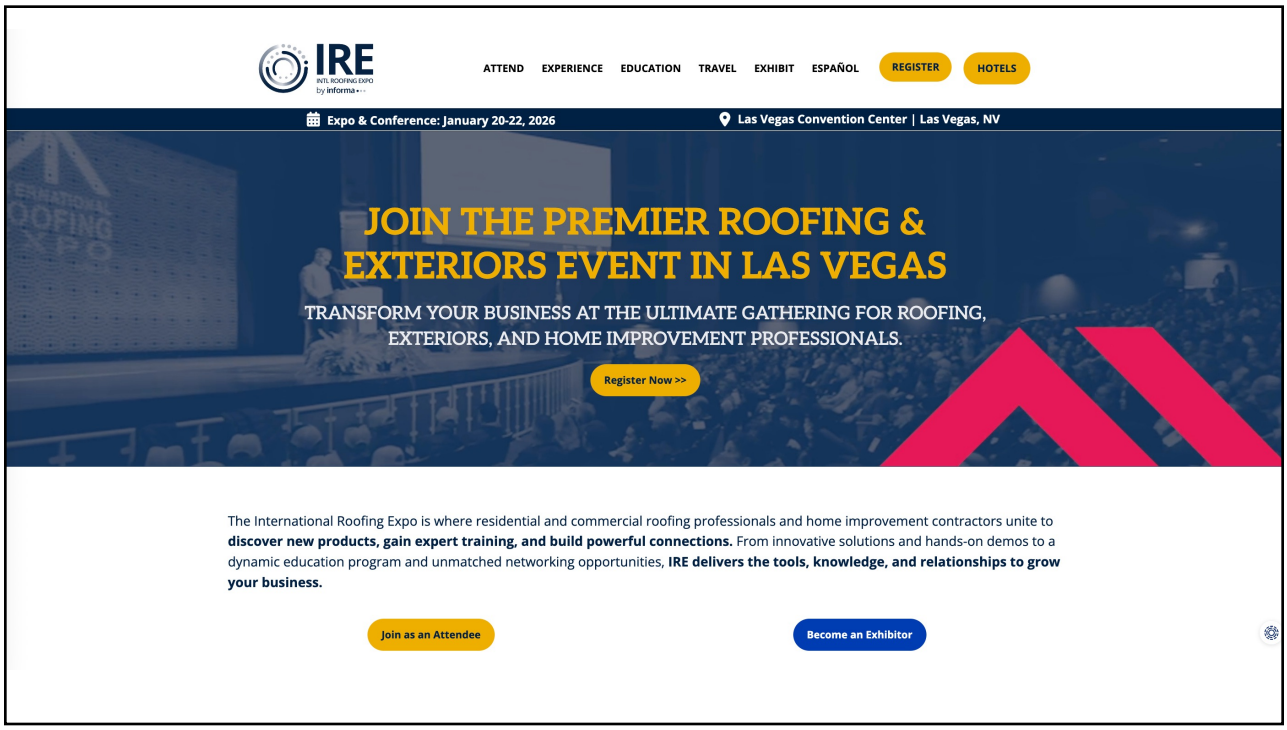

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Questions…

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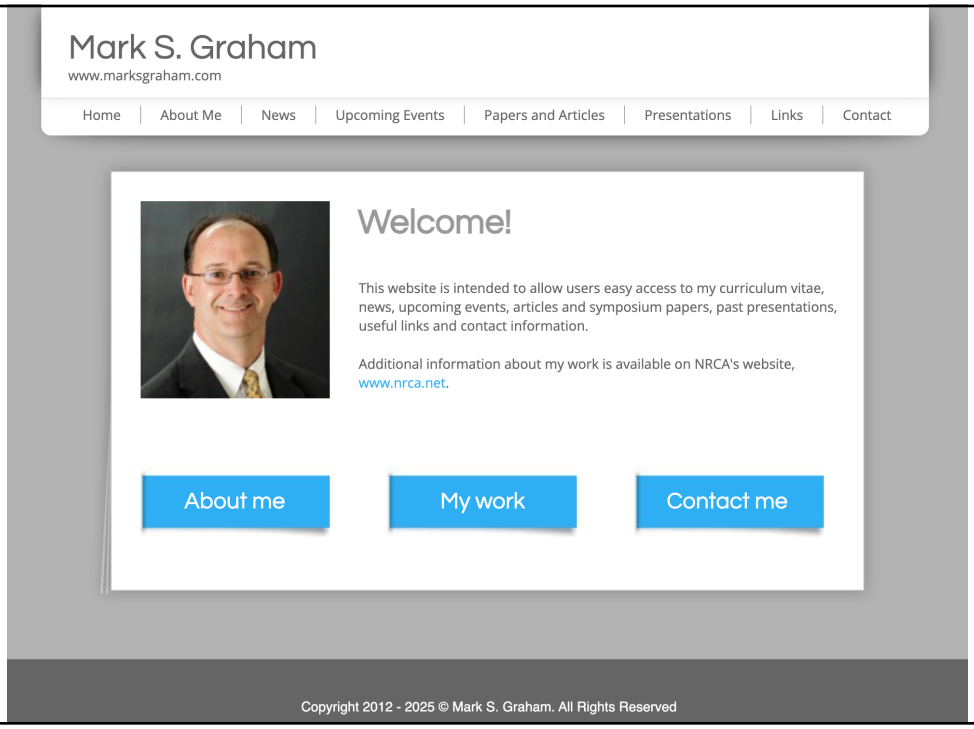

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