2025 Legal Conference
Atlanta, Georgia – January 22, 2025

NRCA technical update

presented by

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

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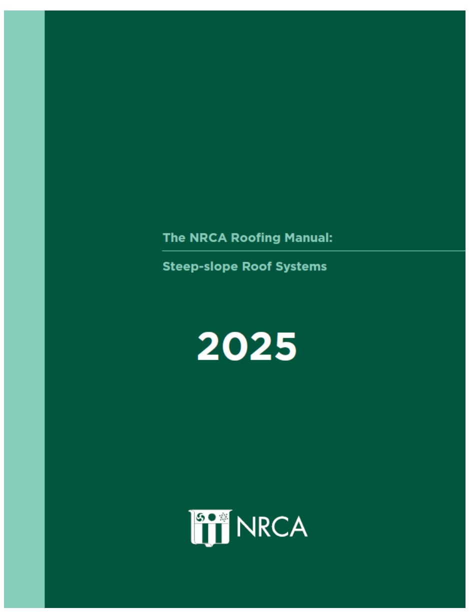

2025 NRCA Manual
Steep-slope Roof Systems

The Manual represents “best practice” guidelines

Link

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Significant revisions

The NRCA Roofing Manual: Steep-slope Roof Systems-2005

- OSB roof decks are no longer recommended
- Nailbase and vented nailbase insulation should be installed in two layers with staggered and offset joints
- Joints in vented nailbase insulation should be taped
- Updated code references to 2024 I-codes
- New appendix addressing IBHS' Fortified program

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TO VIEW, CLICK ON BOOK COVER

The NRCA Roofing Manual—2025 Set

NRCA

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Roof Wind Designer

www.roofwinddesigner.com

NRCA | ROOF WIND DESIGNER

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ROOF WIND DESIGNER

ASCE 7-05, ASCE 7-10, ASCE 7-16 AND ASCE 7-22

Tornado design has been added to Roof Wind Designer

Roof Wind Designer is intended to provide users with an easy-to-use means for determining roof systems' design wind loads for many commonly encountered building types that are subject to building code compliance.

Design-wind loads are derived using the American Society of Civil Engineers (ASCE) Standard ASCE 7, "Minimum Design Loads for Buildings and Other Structures." This standard is a widely recognized consensus standard and is referenced in and serves as the technical basis for wind load determination in the International Building Code and NFPA 5000: Building Construction and Safety Code. Roof Wind Designer allows users to choose between ASCE 7's 2005, 2010, 2016, and 2022 editions. Roof Wind Designer uses ASCE 7-05's Method 1—Simplified Method, ASCE 7-10's Envelope Procedure, Part 2: Low-rise Buildings (Simplified) of Chapter 30, ASCE 7-16's Envelope Procedure, Part 2: Low-rise Buildings (Simplified) of Chapter 30, and Part 4: Buildings with 60ft < h ≤ 160ft (Simplified), and ASCE 7-22's Part 1: Low-rise Buildings, Part 2: Buildings with h > 60 ft [(h > 18.3 m)], and Part 4: Building appurtenances, rooftop structures and equipment. A more detailed explanation of ASCE 7's four editions.

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RESEARCH+TECH

Plywood or OSB?

Moisture-related concerns exist with wood structural panels

by Mark S. Graham

NRCA's technical services staff continues to hear from roofing contractors experiencing moisture-related dimensional stability problems with plywood and oriented strand board structural panel sheathing used with steep-slope roof systems. Following is a brief discussion of moisture mechanics, linear expansion and thickness swell testing, and NRCA's recommendations for plywood and OSB structural panel sheathing roof decks.

Moisture mechanics

Plywood and OSB sheathing, similar to all wood products, are hygroscopic, meaning they tend to absorb and release moisture from their surroundings.

When not exposed to direct wetting, structural panel sheathing's moisture content is a function of its environment's relative humidity and temperature. During construction and its service life, panels may be exposed to direct moisture. When exposed to direct wetting, structural panel sheathing's moisture content is influenced by wetting time and panel variables that affect capillarity, such as veneer species of plywood and wax additives in OSB.

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Standards for wood structural panels

International Residential Code, 2021 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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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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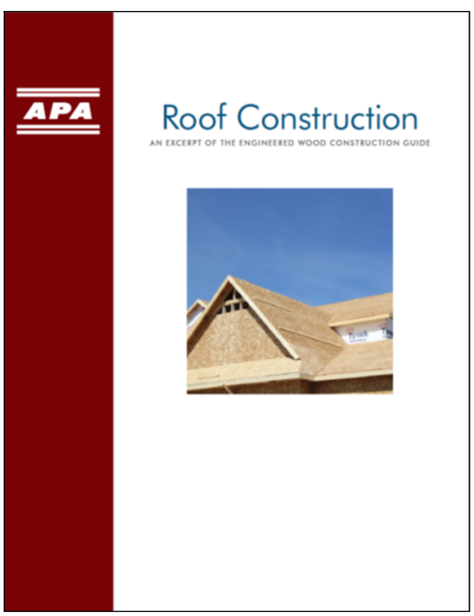

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<u>APA Form E30, "Roof Construction"</u>
--Roofing-specific excerpts from APA's *Engineered Wood Construction Guide* (102 pages)

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Considerations

Lumber, plywood and OSB

- 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 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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"Fully" adhered

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TECH TODAY

The fully adhered misnomer

Terminology can create unrealistic expectations within the roofing industry

by Mark S. Graham

The term "fully adhered" is used by some manufacturers and specifiers to identify adhered single-ply membrane roof system configurations or refer to the adhesion of rigid board insulation to underlying substrates. But this terminology can create application and performance expectations that are unrealistic and likely cannot be achieved.

NRCA recommends the term "fully adhered" be avoided

Definitions

When considering the term "fully adhered," it is important to realize it is not specifically defined by the U.S. roofing industry.

The industry's consensus-based terminology standard, ASTM D1079, "Standard Terminology Relating to Roofing and Waterproofing," does not include terms or definitions for fully adhered, adhered or adhesion.

Similarly, the glossary contained in the appendix of *The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing—2014* does not contain a specific definition for the term fully adhered. The manual defines "adhere" as: "To cause two surfaces to be held together by the combined strength of the molecular forces and the mechanical interlocking achieved between adhesive and the bonded surface … ."

Merriam-Webster defines adhere (and its derivatives adhered and adhering) as "to hold fast or stick by or as if by gluing, suction, grasping, or fusing." Similarly, the term "fully" is defined as "in a full manner or degree; complete."

Although not specifically defined, the implication of fully adhered is 100 percent adhesion between two surfaces or materials.

Realistic expectations

Experienced roofing industry professionals realize the expectation of complete adhesion between two surfaces such as a single-ply membrane and underlying rigid board insulation is unrealistic and likely cannot be achieved in field applications.

Taken at its most literal sense, complete adhesion between a single-ply membrane and a rigid board insulation substrate is impossible because there will not be membrane adhesion at the insulation boards' joints.

Also, thickness variability in insulation boards and its effect on adhesion needs to be considered. For example, the U.S. product standard for polyisocyanurate insulation, ASTM C1289, "Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board," permits a board thickness tolerance of ±1⁄8-inch and crushing and depressions up to 1⁄8 of an inch in depth on up to 10 percent of a polyisocyanurate insulation board's surface area. Because reinforced single-ply membranes tend to lay relatively flat, having an adhered membrane application readily conform to and remain completely adhered to the recognized irregularities in insulation boards is unlikely.

Irregular, nonsmooth roof deck surfaces create similar situations. Because board-type insulation is relatively rigid, it generally will not readily conform to irregularities in roof deck substrates. Individual rigid boards tend to rest on the high points in a roof deck's finished surface and span the low points.

As a result, rigid board insulation seldom is completely adhered to roof deck substrates. It generally is adhered at the relative high points in the roof deck's surface and may be partially or marginally adhered and even unadhered at the relative low points. Specifying smaller insulation board sizes (4 by 4 feet instead of 4 by 8 feet) generally is suggested to minimize rigid insulation boards from spanning substrate low-point irregularities.

In practice

The concept of lacking 100 percent, complete adhesion between two adhered surfaces is not new to the roofing industry; it has long been recognized in the application of built-up roof membranes where voids between plies can occur. To address this, NRCA's *Quality Control Guidelines for the Application of Built-up Roofing* indicates interply moppings are intended to be continuous; however, voids of limited size are permitted provided overlapping voids do not occur between two or more plies. NRCA has maintained this position since the late 1970s, and it has become well-accepted by the roofing industry.

As it applies to adhering rigid board insulation in continuously applied adhesive applications, actual adhesion rates of about 60 to 90 percent are common (even less in some specific instances) in successfully performing adhered roof systems.

On this basis, NRCA recommends the term "fully adhered" be avoided and suggests the term "adhered" for field applications because it is more realistic.

MARK S. GRAHAM is NRCA's vice president of technical services.

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Polyiso. testing

R-value testing

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<u>LTTR</u> – ASTM C1303 and ASTM C518

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

<u>R-value</u> – 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

Sample	R-value (75 F)
1	14.4
2	15.6
3	13.2
4	15.3

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More test results

Sample	R-value (40 F)	R-value (75 F)	R-value (110 F)
1	10.8	14.4	12.8
2	15.4	15.6	13.4
3	12.6	13.2	11.6
4	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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Field wind-uplift testing

Putting the field wind-uplift test to the test

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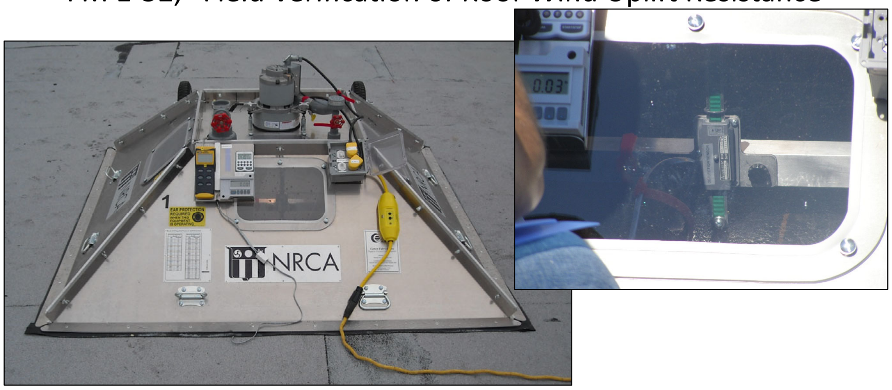
Field wind-uplift testing

- ASTM E907, "Standard Test Method for Field Testing Uplift Resistance for Adhered membrane Roofing Systems"
- FM 1-52, "Field Verification of Roof Wind Uplift Resistance"



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INDUSTRY ISSUE UPDATE

NRCA Member Benefit

Field-uplift testing

ASTM E907 and FM 1-52 tests continue to be problematic

June 2015

NRCA continues to receive a significant number of reports from roofing contractors, manufacturers and designers regarding the use of and problems associated with field-uplift tests as post-installation quality assurance measures for membrane roof systems. NRCA has addressed these testing issues a number of times during the years. Following is a summary of NRCA's previous discussions, as well as updated information and recommendations.

ASTM E907/FM 1-52

There are two recognized field test methods for determining adhered membrane roof systems' uplift resistances: ASTM E907, "Standard Test Method for Field Testing Uplift Resistance of Adhered Membrane Roofing Systems," and FM Global Loss Prevention Data Sheet 1-52 (FM 1-52), "Field Verification of Roof Wind Uplift Resistance."

An example of a test chamber used for negative-pressure uplift testing

Both test methods are similar and provide for affixing a 5- by 5-foot dome-like chamber to a roof surface's topside and applying a defined negative (uplift) pressure inside the chamber to the roof system's exterior-side surface using a vacuum pump (see photo). During the test, membrane surface deflection inside the chamber is visually monitored and measured to determine whether a roof system passes or is "suspect."

Using ASTM E907, a roof system is considered to be suspect if the deflection measured during the test is 25 mm (about 1 inch) or greater. During FM 1-52 testing, a roof system is suspect if the measured deflection is between ¼ of an inch and ⅝ of an inch depending on the maximum test pressure; 1 inch where a thin topping board (cover board) is used; or 2 inches where a thin cover board or flexible, mechanically attached insulation is used.

If an ASTM E907 or FM 1-52 test yields a suspect result, a test cut should be taken in the test area to determine whether failure has occurred and the specific failure mode.

ASTM E907 and FM 1-52 differ notably in their test cycles and maximum test pressures for determining roof system deflections and whether a roof system passes or is suspect. ASTM E907 testing is conducted in 15-pounds per square foot (psf) pressure intervals up to the calculated design wind (uplift) pressure for the specific roof system being evaluated. FM 1-52 testing is conducted using an initial 15-pounds psf pressure followed by 7.5-pound psf increments up to a maximum test pressure of 1.25 times the design uplift pressure for the specific roof system being evaluated.

Considering maximum test loading and allowable test deflections in combination, FM 1-52 requires 25 percent higher test loads, yet only allows as little as ¼ the test deflection of ASTM E907. That said, FM 1-52 is a significantly more stringent test than ASTM E907.

ASTM E907 originally was published as a recognized consensus standard in 1983, and it was revised in 1996. In 2013, ASTM withdrew ASTM E907 because a consensus could not be reached regarding necessary revisions—most significantly, defining the test method's precision and bias (accuracy). ASTM E907-96 still is available for use and can be obtained directly from ASTM's website, www.astm.org.

FM 1-52 is an FM Global-promulgated evaluation method and not a recognized industry-consensus test standard. FM 1-52's scope indicates it only is intended to confirm acceptable wind-uplift resistance on completed roof systems in hurricane-prone regions, where a partial blow-off has occurred or where inferior roof system construction is suspected or known to be present.

FM 1-52 originally was published by FM Global in October 1970. The negative-pressure uplift test was added in August 1980 and has been revised several times. The current edition is dated July 2012 and includes an option for "visual construction observation (VCO)" as an alternative to negative-pressure uplift testing. VCO provides for full-time, third-party monitoring of a roof system application to verify roof system installation in accordance with contract documents.

NRCA "Industry Issue Update," June 2015

NRCA members' experience:

- Most tests not conducted in accordance with ASTM E907 or FM 1-52.
- No correlation between field test vs. lab. results/classifications
- NRCA survey: 55% passing

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RESEARCH+TECH

Revisiting field uplift testing

NRCA's long-standing concerns continue with this issue

by Mark S. Graham

It has been a while since I have written about NRCA's concerns with field uplift testing, which sometimes is inappropriately used as a way to assess the quality of an adhered membrane roof system installation. Despite the time that has passed, NRCA continues to have reservations about field uplift testing, and the test procedure has not yet been revised to address NRCA's concerns.

ASTM E907

In 2013, ASTM International withdrew its consensus-based test method for field uplift testing, ASTM E907, "Standard Test Method for Field Testing Uplift Resistance of Adhered Membrane Roofing Systems."

ASTM International requires its test method standards to include a precision statement addressing two things:

- Known within-laboratory variability, referred to as "repeatability"
- Relative variability of test results obtained from different laboratories, referred to as "reproducibility"

Test methods also are required to include an estimate of bias in test results.

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ASTM Interlaboratory study (ILS)

"Testing the test"

- Built three identical test decks allowing for 24 tests total
- FM Class 90 roof system (FM tested to 90 psf)
- 8 testing entities conducted 3 test each
- Each test run at 15 psf increments up to 90 psf classification
- Membrane deflection is measured
- ASTM ILS staff planned the study and analyzed the test results
- At FM Global's research center in Glocester, RI

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ILS results

"Testing the test"

- Statistical outliers 15-, 30-, 45-, 60- and 90-psf test increments
- Outlier data excluded at 30-, 45- and 90-psf test increments
- 16 of the 24 specimens exhibited failure before completing the 90-psf test increment.
- 5 results at the 45-psf increment and all the tests' results at 60, 75- and 90-psf test increments exceeded FM 1-52's maximum allowable deflection.

All specimens should have exceeded 90 psf

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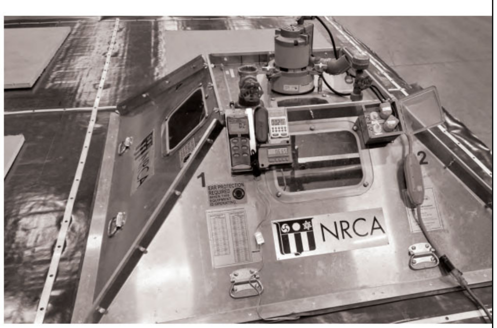

Putting the test to the test

Substantial variability has been found in field-uplift testing

by Mark S. Graham

NRCA participated in an ASTM International interlaboratory study to evaluate the accuracy and precision of the field-uplift test method. The study provides some useful data and information for evaluating the appropriateness and effectiveness of field-uplift testing.

Field-uplift testing

There are two recognized field test methods for determining adhered membrane roof systems' uplift resistances: ASTM E907, "Standard Test Method for Field Testing Uplift Resistance of Adhered Membrane Roofing Systems," and FM Global Loss Prevention Data Sheet 1-52 (FM 1-52), "Field Verification of Roof Wind Uplift Resistance." In each of these test methods, a vacuum is created inside a test chamber mounted on a roof surface and membrane deflections resulting from the induced negative (uplift) pressures inside the chamber are measured.

ASTM E907 has been a consensus-based standard since it was originally published in 1983. ASTM International withdrew the standard in 2013 because it lacked a precision statement, which is required for all ASTM International test methods.

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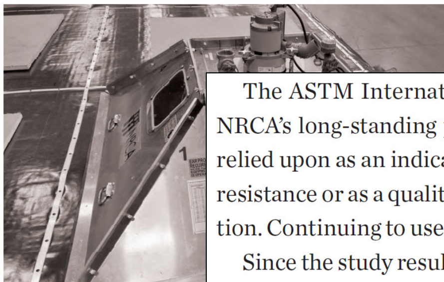

The ASTM International interlaboratory study clearly illustrates NRCA's long-standing position that field-uplift testing should not be relied upon as an indicator of an adhered roof assembly's in situ uplift resistance or as a quality-assurance measure of roof assembly installation. Continuing to use it as such is irresponsible.

Since the study results were released, NRCA's Technical Operations Committee has asked FM Global to immediately discontinue use of FM 1-52's field-uplift test as a quality-assurance measure for roof assembly installation.

Putting the test to the test

Substantial variability has been found in field-uplift testing

by Mark S. Graham

Test Method for Field Testing Uplift Resistance of Adhered Membrane Roofing Systems," and FM Global Loss Prevention Data Sheet 1-52 (FM 1-52), "Field Verification of Roof Wind Uplift Resistance." In each of these test methods, a vacuum is created inside a test chamber mounted on a roof surface and membrane deflections resulting from the induced negative (uplift) pressures inside the chamber are measured.

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Nighttime tie-in and night seal considerations

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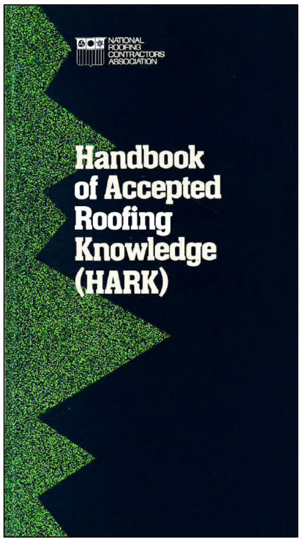

XXI. WATER CUTOFFS AND WEATHER PROTECTION

Water cutoffs are temporary felt courses that are installed to prevent moisture from entering the insulation and membrane during construction. They should be applied at the end of each day's work and whenever work is halted for an indefinite period to protect the membrane from precipitation. They must be removed prior to installing additional insulation.

Temporary flashings should be installed as weather protection if permanent flashings are not in place. All openings in the membrane should be sealed to prevent any moisture from entering the roof system before completing membrane application.

Specifications requiring gravel installation each day are unrealistic and sometimes detrimental to the quality of the completed roof. Where working conditions permit, roofing felts should be "glazed" and sealed at the end of each day's work if final surfacing is not installed.

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With single-ply membrane systems, nighttime tie-ins and night seals have gotten more difficult…

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Some considerations

Nighttime tie-ins and night seals

- Project specific planning…
- Get back to the basics…
  - Water cut-off
  - Night seals
- SA underlayment and base sheet products can work well for cut-offs

Concepts to share?

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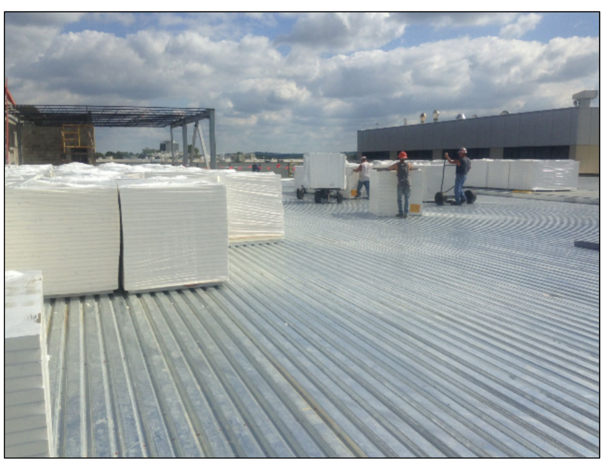

Roof deck loading considerations

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Some examples of roof loading

- Pallet of asphalt shingles (42 bundles): 2,500 to 4,200 lbs.
- Pallet of TPO membrane rolls: 1,400 to 3,450 lbs.
- Pallet of MB cap sheet (20 rolls): About 2,500 lbs.
- Pallet of glass-faced gypsum board (4 x 4): 1,600 to 2,400 lbs.
- Pallet of bonding adhesive (45 pails): 1,800 lbs.
- Bundle of polyiso. (4 x 8): 250 to 500 lbs.

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University of Massachusetts – Amherst

"Roof Live Loads for Low-Slope Roofs"

Joint research

Metal Building Manufacturers Association

National Roofing Contractors Association

Steel Deck Institute

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Some initial considerations

Roof deck loading concerns

- Roofing operations may exceed live load capacity
- Note joist/framing orientation
- Consider avoiding adjacent load placement
- Position loads across joists/framing
- Consider added dunnage across framing
- Also consider rooftop equipment weight

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Radio frequency radiation

Rooftop cell phone transmitters

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CRCA

CANADIAN ROOFING CONTRACTORS ASSOCIATION

Advisory Bulletin

JUNE 2023

Radiofrequency Radiation and Electromagnetic Fields

The increased number of cellular antennas and other communication equipment that generates radiofrequency radiation (RF) and electromagnetic fields (EMF) may be exposing roofers and other contractors to harmful levels of radiations when working on rooftops, sides of buildings and other locations where RF generating antennas are located. This bulletin will focus on radiation types, safety limits and mitigating exposure.

With the ever-increasing use and development of communication technology, there is an increased risk for those working in and around communication devices and equipment that emit radiofrequency electromagnetic fields (EMF) such as smart meters, cell phone towers and equipment using 5G technology. Roof areas are often prime locations for this type of equipment and anyone accessing these roof areas for any reason should be aware of the Occupational Health and Safety requirements and the Safety Code 6. Consult with provincial and/or federal authorities having jurisdiction for further information/guidance for most stringent requirements.

What is Radiofrequency (RF) Radiation?

There are two types of radiation – ionizing radiation and non-ionizing radiation. Both are forms of electromagnetic energy, but ionizing radiation has more energy than non-ionizing radiation. Ionizing radiation, like x-rays or gamma rays, has enough energy to cause chemical changes by breaking chemical bonds. Sources of this type of radiation can be found in hospitals, nuclear energy plants, and nuclear weapons facilities. Non-ionizing radiation causes molecules to vibrate, which generates heat. RF radiation is a type of non-ionizing radiation and is the energy used to transmit wireless information. RF radiation is invisible and power levels of equipment and amount of RF radiation can fluctuate without warning.

About Safety Code 6

Health Canada publishes Safety Code 6[1] which sets out recommended safety limits for human exposure to radiofrequency electromagnetic fields (EMF) in the frequency range from 3 kHz to 300 GHz. This range covers the frequencies used by communications devices and equipment that emit radiofrequency EMF such as: Wi-Fi, cell phones, smart meters, cell phone towers, those using 5G technology.

Safety Code 6 is reviewed on a regular basis to confirm that it continues to provide protection against all known potentially adverse health effects. If new scientific evidence were to show that exposure to radiofrequency EMF below the levels found in Safety Code 6 poses a risk, the Government of Canada would take steps to protect the health of Canadians.

[1] https://www.canada.ca/en/health-canada/services/health-risks-safety/radiation/occupational-exposure-regulations/safety-code-6-radiofrequency-exposure-guidelines.html

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June 2023

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How protect yourself from RF radiation
The risks associated with RF radiation increases with the number of devices present, the closer a worker is to the equipment/device(s), and the more time that is spent in the area. Workers can protect themselves by the following:

How protect yourself from RF radiation
The risks associated with RF radiation increases with the number of devices present, the closer a worker is to the equipment/device(s), and the more time that is spent in the area. Workers can protect themselves by the following:

- Complete a visual assessment of the area to determine if cellular antennas or other RF radiation generating antennas are present. If you are not sure, ask your supervisor, the building owner, or the property manager if RF-generating antennas are present where you need to work. The building owner or property manager should have the information, or know whom to contact for information about antennas, their locations, and the RF radiation levels.
- Look for warning signs posted near RF antennas; the signs should identify the hazard and tell you where to get more information.
- Contact the building owner/manager and the antenna licensee to have the equipment temporarily powered down or moved.

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Recognize the signage

Photos courtesy of Peter Shackford—Hettrick, Cyr & Associates, Inc.

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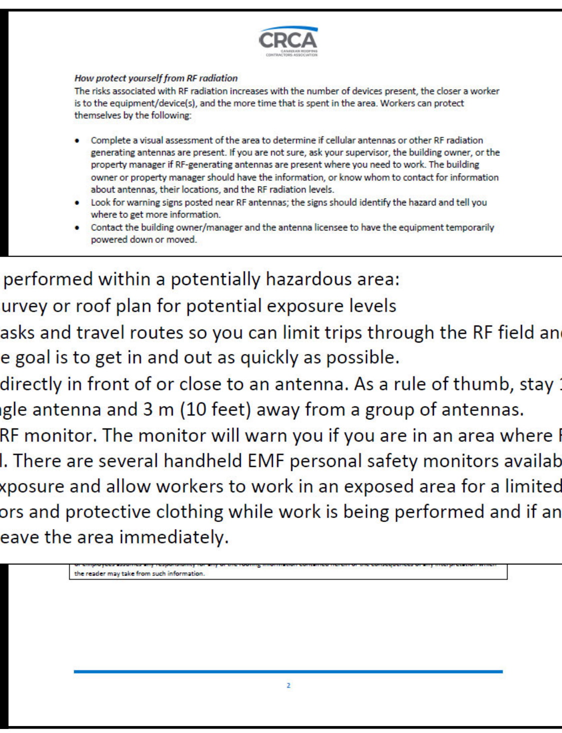

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How protect yourself from RF radiation

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- Look for warning signs posted near RF antennas; the signs should identify the hazard and tell you where to get more information.
- Contact the building owner/manager and the antenna licensee to have the equipment temporarily powered down or moved.

If work needs to be performed within a potentially hazardous area:

- Check the site survey or roof plan for potential exposure levels
- Pre-plan work tasks and travel routes so you can limit trips through the RF field and time spent on tasks there – the goal is to get in and out as quickly as possible.
- Avoid standing directly in front of or close to an antenna. As a rule of thumb, stay 1.5 m (6 feet) away from a single antenna and 3 m (10 feet) away from a group of antennas.
- Use a personal RF monitor. The monitor will warn you if you are in an area where RF radiation is at a dangerous level. There are several handheld EMF personal safety monitors available on the market that measure exposure and allow workers to work in an exposed area for a limited time. Use personal monitors and protective clothing while work is being performed and if an alarm sounds, stop work and leave the area immediately.

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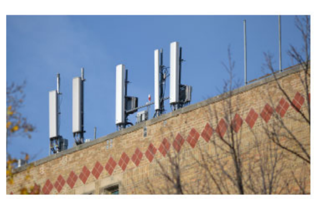
TOOLBOXTALKS

Radio frequency (RF) hazards

According to the Federal Communications Commission (FCC), radio waves and microwaves emitted by transmitting antennae are one form of electromagnetic energy that harm people. Harm from RF exposure will vary according to power levels, length of exposure time and distance from the antennae. Sources of RF energy on a rooftop often are not obvious and usually are not properly marked or defined as danger zones by warning signs. In many cases, antennae are hidden by building elements so workers may not be aware of their presence. Here are some important facts about RF energy and things that you can do to avoid it:

- High levels of RF may heat body tissue and increase body temperature, causing tissue damage because the body cannot cool quickly enough to prevent damage. This is called RF's thermal effects, and your eyes are the most vulnerable part of your body. Actual contact may cause a shock or burn.
- At lower, nonthermal levels of RF exposure, nervous system and immune system problems, kidney damage, neurological disorders and even some cancers may occur.
- Become familiar with what RF transmitters or antennae look like and the dangers of working near them. Be aware that warning signs for RF transmitters may not always be present on a roof.
- Your employer must inquire as to the presence of RF equipment and whether it may be shut down or shielded or other barrier device installed for the duration of the work period roofing workers will be in proximity to the transmitter.
- Symptoms of RF exposure often seem the same as physical exertion and can become heat exhaustion or heat stroke. Removing a worker from the area and cooling the body is important. Trained, professional medical care of the symptoms is critical.



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Some useful references

- CRCA Advisory Bulletin (Link)
- Health Canada's Safety Code 6 (Link)
- Federal Communications Commission (Link)
- Center for Construction Research and Training (Link)

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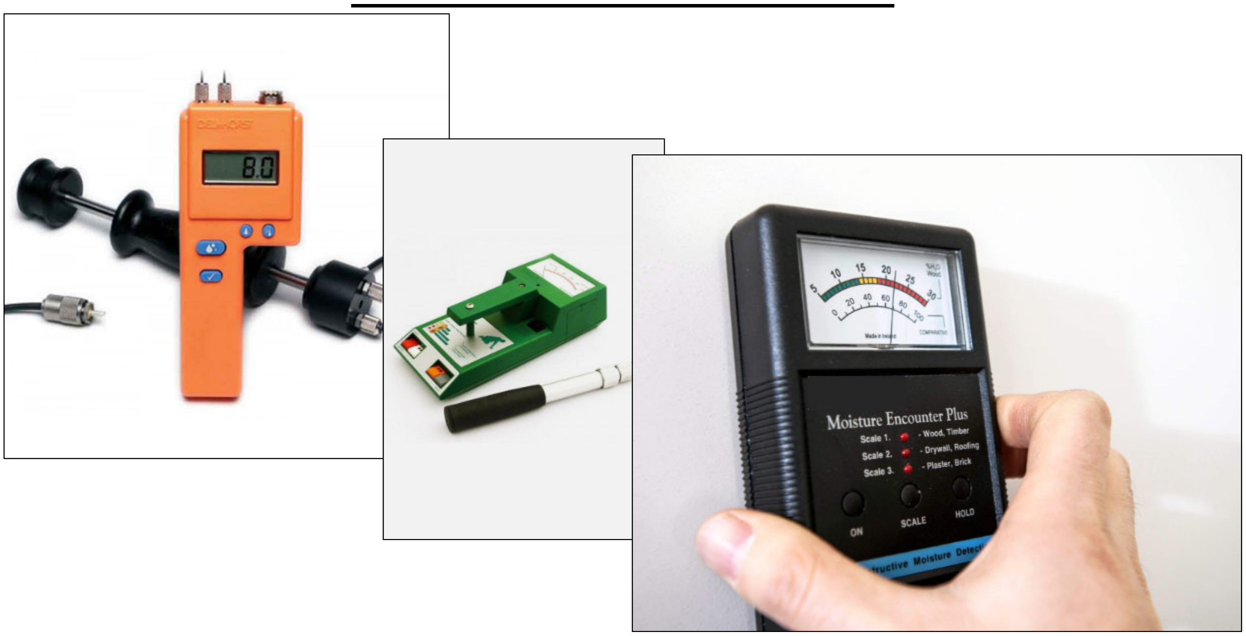
"Moisture" meter concerns



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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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IR thermometers

The same concerns apply:

- Not really measuring temperature
- Emissivity
- Reflectivity
- Devices are sensitive to temperature and humidity changes

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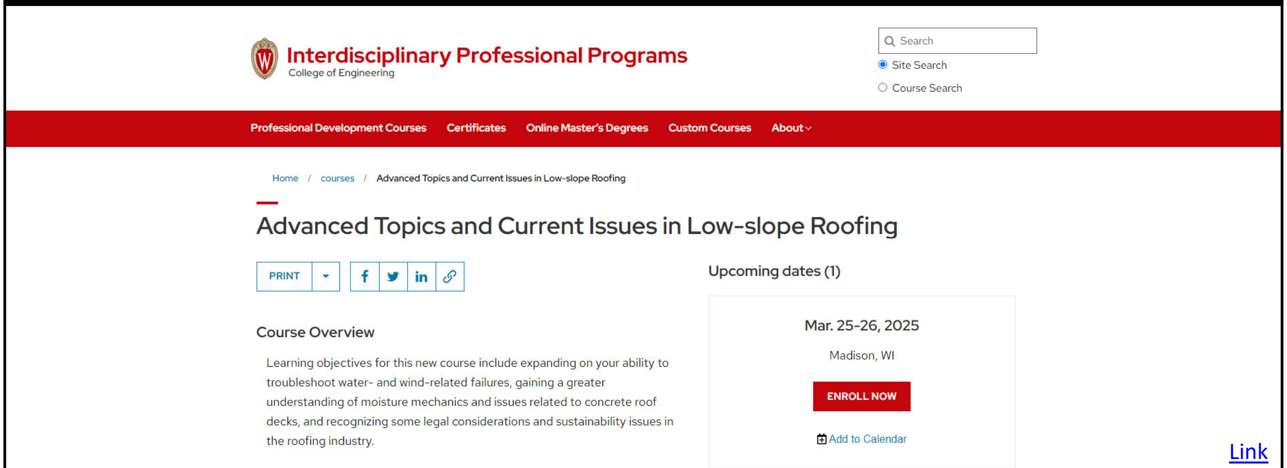

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We're moving! NRCA's new office address as of April 1, 2025…

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