TU-01
NRCA Technical Operations Committee: Roofing Industry Technical Issues

Board Approval for Continuing Education Hours: DBPR/CILB No. 0008771
DBPR Course Provider: No. 0003200
Hanley Wood Exhibitions, 6191 N. State Hwy 161, Irving, TX 75038

presented by
Mark Graham, NRCA
Don Guthrie, Waynes Roofing Inc.
David Karel, Garlock-French Roofing Corp.
Allen Lancaster, Metalcrafts Inc.
Jude Laperouse, Edward J. Laperouse Metal Works
Robert Willis, Wehner Roofing & Tinning Co

INTERNATIONAL ROOFING EXPO
hanley wood

INTERNATIONAL ROOFING EXPO
March 6-8, 2007 ✧ Las Vegas Convention Center ✧ Las Vegas, Nevada

Mark Graham
Associate Executive Director of Technical Services
NRCA

Mark Graham is responsible for inquiries for technical information and assistance, serves as the association's technical liaison with outside organizations and develops and maintains the association's technical documents, including The NRCA Roofing and Waterproofing Manual

Don Guthrie
President
Waynes Roofing Inc

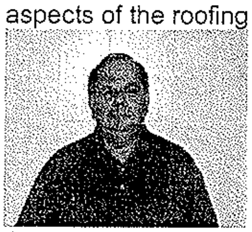
Don Guthrie has worked in the roofing industry and for Wayne's Roofing, Inc. for nearly 35 years. Don started as a yard person, advanced through most all positions in the company and assumed the role of President in 2000. Don is active in the NRCA, WSRCA, RCAW and many contractor advisory councils.

David Karel
President
Garlock-French Roofing Corp.

David Karel has worked for Garlock-French Roofing for 37 years. He is a graduate of the University of Minnesota. David has served two terms as Director of National Roofing Contractors Association, as well as on many NRCA Committees and Task Forces; including Steep Slope, Manual Update, TOC and Steep Slope Management.

Allen Lancaster
President
Metalcrafts Inc

Allen Lancaster responsibilities include estimating, purchasing, marketing, contract negotiation and overseeing all phases of the roofing operation; including job scheduling and head project manager. Mr. Lancaster began as an estimator, became a project manager, directly managed roofing projects, ran the roofing department, oversaw all aspects of the roofing operation and became an owner of Metalcrafts.



Jude Laperouse
President
Edward J. Laperouse

Jude Laperouse has been a member of NRCA since 1977 and is currently serving on NRCA's Technical Operations Committee. He is also the chairman of Architectural Sheet Metal and Metal Roofing Committee and contributor to the Professional Roofing Magazine. Jude is the past president of the National Roofing Legal Resource Center and the National Roofing Foundation as well as Charter Governor of The Roofing Industry Alliance for President and past president of the Louisiana Roofing Contractors Association.

Robert Willis
President
Wehner Roofing & Tinning Co

Robert Willis joined his family owned business, which was established in 1850 and is a sixth generation Vice-President of the company. He is a Past President of Ohio Roofing Contractors and National Roofing Legal Resource Center.

International Roofing Expo
Tuesday, March 6, 2007 – Las Vegas, Nevada

Roofing Industry Technical Issues

presented by

NRCA Technical Operations Committee

NATIONAL ROOFING CONTRACTORS ASSOCIATION

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Learning objectives

Upon completing this program, participants should be knowledgeable of:

- NRCA technical programs, activities and *The NRCA Roofing Manual: Membrane Roof Systems—2007,*
- developing roofing industry technical issues,
- late-breaking roofing industry technical issues,
- NRCA's specific recommendations on developing and late-breaking technical issues.

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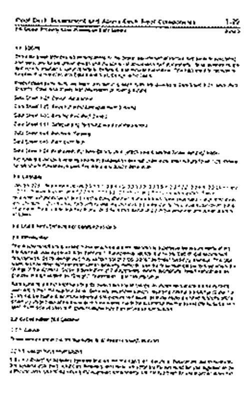
Today's Topics

- FM's revisions
- Roof Wind Designer
- ANSI/SPRI ES-1
- Pressure-treated lumber
- New NRCA technical publications
- Member feedback
- Questions from the audience

FM's revisions

- FM 1-29, "Roof Deck Securement & Above-deck Components":
  - Revised January 2006
  - Revised May 2006
  - Revised February 2007
- FM 1-28, "Design Wind Loads"
  - Revised February 2007
- FM 1-52, "Field Uplift Tests"
  - Revised February 2007



FM 1-29's major revision

January 2006

- Stricter prescriptive fastening enhancement:
  - Perimeter: 1 fastener per 2 ft²
  - Corners: 1 fastener per 1 ft²
- Safety factor to 2.0 for perimeter and corner pressures.
- >I-75 prescriptive fastening no longer applies; use full perimter and corner pressures

Table 1. Recommended Rating of Field, Perimeter, and Corner Areas (Zones 1, 2, and 3) for Enclosed Buildings

Roof Field Area Design Pressure, p, (psf)	Minimum Wind Rating for FM Approved Deck/Above Deck Assembly		
	Roof Field Area Enclosed Bldg	Roof Perimeter Area Enclosed Bldg	Roof Corner Area Enclosed Bldg
15 < p ≤ 30	60	105	150
30 < p ≤ 37.5	75	120	180
37.5 < p ≤ 45	90	150	225
45 < p ≤ 52.5	105	165	270
52.5 < p ≤ 60	120	195	285
60 < p ≤ 67.5	135	225	330
67.5 < p ≤ 75	150	255	360
75 < p ≤ 82.5	165	270	405
82.5 < p ≤ 90	180	285	435
90 < p ≤ 97.5	195	315	480
97.5 < p ≤ 105	210	345	510
105 < p ≤ 112.5	225	360	540
112.5 < p ≤ 120	240	390	585
120 < p ≤ 127.5	255	420	615
127.5 < p ≤ 135 [2]	270	435	660

[1] Base the minimum wind rating on the roof field area rating when perimeter/corner areas are enhanced per this data sheet and other pertinent FM Global Data Sheets (1-29, 1-31, etc.). Base the minimum wind rating on the roof corner area rating when perimeter/corner area enhancements are not done, or are not acceptable.

[2] For roofs with higher field area design pressures, refer to Data Sheet 1-28 and multiply the needed field area design pressure by a safety factor of 2.0 and the respective pressure coefficient for perimeter and corner areas.

NOTE: All perimeter and corner pressures have been increased slightly to provide a full 2.0 safety factor.

FM 1-29 revision

May 2006

- Editorial revision (rounding) in Table 1

FM 1-29's major revisions

February 2007

- Clarification of prescriptive fastening enhancement option
- Clarification of FM design recommendations
- New steel deck span requirements
- New requirement for field uplift testing in hurricane-prone regions on FM insured buildings

Table 1. Recommended Rating of Field, Perimeter, and Corner Areas (Zones 1, 2 and 3) for Enclosed Buildings

Roof Field Area Design Pressure, p, (psf)	Minimum Wind Rating for FM Approved Deck/Above-Deck/Entire[1] Assembly		
	Roof Field Area Enclosed Bldg	Roof Perimeter Area Enclosed Bldg	Roof Corner Area Enclosed Bldg
15 < p ≤ 30	60	105	150
30 < p ≤ 37.5	75	120	180
37.5 < p ≤ 45	90	150	225
45 < p ≤ 52.5	105	180	270
52.5 < p ≤ 60	120	195	300
60 < p ≤ 67.5	135	225	330
67.5 < p ≤ 75	150	255	360
75 < p ≤ 82.5	165	270	405
82.5 < p ≤ 90	180	300	435
90 < p ≤ 97.5	195	315	450
97.5 < p ≤ 105	210	345	510
105 < p ≤ 112.5	225	360	540
112.5 < p ≤ 120	240	390	555
120 < p ≤ 127.5	255	420	615
127.5 < p ≤ 135[2]	270	435	660

[1] Base the minimum wind rating on the roof field area rating when perimeter/corner areas are enhanced per this data sheet and other pertinent FM Global Data Sheets (1-28, 1-31, etc.). Base the minimum wind rating on the roof corner area rating when perimeter/corner area enhancements are not done, or are not acceptable.

[2] For roofs with higher field area design pressures, refer to Data Sheet 1-28 and multiply the needed field area design pressure by a safety factor of 2.0 and the respective pressure coefficient for perimeter and corner areas.

NOTE: All perimeter and corner pressures have been increased slightly to provide a full 2.0 safety factor.

2.2.1.5 Prescriptive Enhancement Options: Perimeter and Corner

2.2.1.5.1

a) For all deck types, where roof covers are adhered to some combination of mechanically fastened insulation, cover board or thermal barrier, prescriptive enhancements may be used for securement of the perimeter and corner areas, as long as one of the conditions below applies:

1. The building is in a nonhurricane-prone region where the design wind speed does not exceed 90 mph and the roof height does not exceed 75 ft (23 m). Note the roof height is limited to 50 ft (15.2 m) if the building is located in surface roughness exposure D (see DS 1-28) and the building is partially enclosed. **Or,**
2. The recommended field of roof rating needed per DS 1-28 does not exceed Class 1-75 (3.6 kPa).

For either of the two situations above, increase the number of fasteners per board over the FM Approved field-of-roof spacing by the following:

- 50% minimum in the roof perimeter, but at least one fastener per 2 ft² (1 per 0.19 m²). It is not necessary to install fasteners closer than one per 1 ft² (1 per 0.09 m²).
- One fastener per 1 ft² (1 per 0.09 m²) in corner areas.
- Round up to the next whole number of fasteners if necessary.

b) For areas where the criteria above are exceeded, ensure the roof system used in the perimeter and corner areas is FM Approved for the specific wind rating recommended in the perimeter and corner areas (see Table 1). Alternatively install either a mechanically attached single-ply membrane, or a multi-ply roof cover with a mechanically attached base sheet in accordance with 2.2.7.2.

2.2.1.4 Wind Uplift Resistance: Design Recommendations

2.2.1.4.1 Determine the roof wind uplift design pressure and recommended FM Approved wind uplift ratings for roof assemblies (decks and above-deck components) per Data Sheet 1-28, *Wind Design* or *RoofNav* Ratings Calculator. Do not use any system beyond its FM Approval rating, except where enhancements are allowed by this document.

2.2.1.4.2 Ensure all new, re-roof, and recover construction uses an appropriate wind-uplift-rated FM Approved roof system where available. Ensure the roof field fastening is per *FM Approvals RoofNav* listing.

Note: For ballasted systems, see sections 2.2.7.4 to 2.2.7.6.

2.2.1.4.3 Because there are higher uplift forces on the roof corners and perimeter, these areas need additional securement over that, which is FM Approved for the field of the roof. Refer to Data Sheet 1-28 for corner/perimeter definitions and dimensions. Ensure any whole or partial insulation board or roof cover/base sheet width (when the roll is parallel to the building edge) that falls within the calculated perimeter or corner has the increased securement applied over the entire board or roof cover/base sheet width. There are several acceptable methods for increasing the uplift resistance of the roof in the corners and perimeters. Do one of the following:

- Where the *FM Approvals RoofNav* listing includes a roof perimeter and/or corner fastening method, it can be used.
- Use a roof system with the appropriate FM Approval wind uplift rating in each area per Table 1.
- Use the appropriate prescriptive recommendation noted in section 2.2.1.5, within the limits of acceptability.
- An alternative is to use an adhered roof cover (adhered across the entire roof) that is adequately wind rated for the field of the roof and, in the perimeter and corner areas, use a mechanically attached roof cover (see Table 1 and 2.2.7.2) that is either:

  a) FM Approved for wind pressures in the perimeter and corner areas, or

  b) FM Approved for the field of roof pressure per Table 1 and enhanced in the perimeter and corner areas per recommendation 2.2.7.2.1 by reducing the distance between rows of fasteners.

In either case (a) or (b) above, fasten a termination bar over the cover or base sheet (with suitable weatherproofing provided) and into the deck every 6 in. (150 mm) on center. Use minimum no. 15 screws at the junction of the fully adhered areas with the adhered and mechanically fastened areas.

2.2.13 Roof Deck Span and Securement for Wind Loads

2.2.13.1 Design Recommendations

2.2.13.1.1 Use FM Approved steel deck for all insulated steel deck roofs. Do not use the deck at spans greater than FM Approved. The FM Approved spans are measured center-to-center. For new construction, ensure the deck span is adequate for wind pressures in all roof areas, including the perimeter and corner areas (see DS 1-28 and examples in section 3.1.10), taking into consideration the following (unless specifically tested and FM Approved):

- For roofs with proposed spans and wind design pressures exceeding Table 11, or where a large spacing between rows of fasteners for mechanically fastened roof covers results in large concentrated loads (as noted below or defined by the RoofNav listing) this may necessitate the use of steel deck with higher yield strength or spans less than the FM Approved maximum limit as noted below may be necessary.
- Use Grade 80 (F_y = 80,000 psi) wide rib minimum 22 ga. (0.0295 in., 0.749 mm) steel deck with a maximum span of 6 ft (1.8 m) when roof systems need an FM Approval rating higher than 1-90, or when the spacing between rows of roof cover fasteners is greater than 5 ft (1.5 m).
- When the FM Approval rating needed for the field of the roof is higher than 1-135, use minimum 22 ga. (0.0295 in., 0.749 mm) Grade 80 (F_y = 80,000 psi), wide rib steel deck. Also, in corner areas, either use spans less than 6 ft (1.8 m), or 20 ga. (0.0358 in., 0.909 mm) or 18 ga. (0.0474 in., 1.204 mm) deck as needed per Table 11 and as adjusted to reflect the higher grade of steel.

Table 11. Allowable Uniform Uplift Pressure

ALLOWABLE UNIFORM UPLIFT PRESSURE (psf) FOR GRADE 33 (Fy = 33,000 psi) STEEL ROOF DECK										
1.5" Type B — WIDE RIB DECK										
Span Type	Gage	SPAN								
		4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"	
SINGLE	22	207	164	132	109	92				
	20	257	211	171	14[illegible]	119	101			
	18	356	281	226	186	156	133	115	103	
DOUBLE	22	202	162	131	108	91				
	20	251	201	163	134	113	96			
	18	345	273	221	183	154	131	113	100	
TRIPLE	22	258	202	164	135	114				
	20	310	251	203	166	141	120			
	18	432	341	276	228	192	163	141	123	

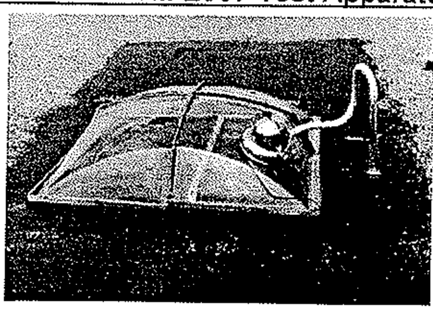
2.2.19 Field Wind Uplift Tests

2.2.19.1 Conduct field uplift tests at FM Global insured client locations, where practical, on all new, re-roofed or re-covered roof installations in hurricane-prone regions where the basic wind speed is at least 100 mph (45 m/s), except where otherwise noted in DS 1-52, *Field Uplift Tests*. Conduct tests in accordance with DS 1-52.

2.2.20 Cold-Process Adhesives

2.2.20.1 Complete installations in regions prone to hurricanes, typhoons, and tropical cyclones in sufficient time for the adhesive to cure prior to the start of hurricane season (June 1 north of the equator, November 1 south of the equator). For some adhesive types, a minimum of 30 days is required for curing; however, when practical, a minimum of 60 days is preferred.

FM 1-52/ASTM E907 Test Apparatus



FM 1-28, "Design Wind Loads

2.2 Roof Design Loads

The following provides an overview of the methodology to determine roof design pressure and minimum FM Approved wind classification ratings (note: the RoofNav Ratings Calculator will calculate the required rating directly):

- Determine basic wind speed (Section 2.2.1 and Figures 1-10).
- Determine Surface Roughness Exposure (Section 2.2.2 and Appendix A).
- Determine building roof height and slope (building or plans).
- Establish basic outward pressure for roof Zone 1 (Section 2.2.3 and Tables 3, 4, or 5) and then apply appropriate pressure multipliers for the roof slope, zone, and enclosed or partially enclosed buildings (Table 6). (See Appendix A and Flow Chart A for definition of enclosed and partially enclosed buildings.) For significant roof overhangs, see Section 2.2.5 and Table 7.
- If the building is adjacent to an escarpment or ridge, modify the design with topographic factor (Section 2.2.4) using ASCE 7 or an equivalent local standard.
- Determine minimum FM Approval rating requirements for field, perimeter, and corners. As an alternative for perimeters and corners, apply relevant Data Sheet. (See Section 2.2.7 and Table 8 and 8A)

The guidelines in this data sheet are derived from the basis provided in ASCE Standard 7. The following exceptions to ASCE 7 have been adopted:

a) Use an importance factor of 1.15 for components, cladding and secondary structural framing.

b) Use surface roughness exposure C for hurricane-prone coastal areas only where basic wind speed ≥ 120 mph (55 m/s). For shoreline areas immediately adjacent to the coast in hurricane-prone regions (see Appendix A) where the basic wind speed is less than 120 mph (55 m/s), use Surface Roughness Exposure D.

c) Wind-borne debris regions are defined in Appendix A.

d) Roof design pressures are based on a maximum 10 ft² (0.9 m²) effective area, regardless of the actual effective area of components and cladding.

...FM guidelines may over-predict wind loads by 15 percent to 49 percent over ASCE 7-05...

FM Approvals' RoofNav

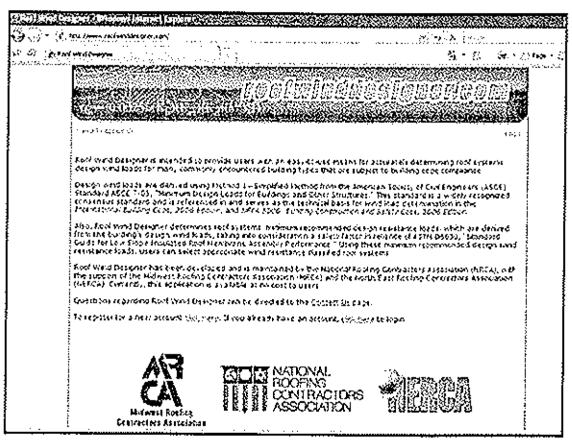
www.roofnav.com

Conclusions

- It is doubtful roofing professionals are capable of truly complying with FM's current guidelines
- Roofing professionals' potential liability is a serious concern
- FM 1-52 is an inappropriate QA/QC measure and its results are not reliable
- Suggest adding language to proposals, bids and contracts excluding compliance with FM guidelines

Roof Wind Designer

www.roofwinddesigner.com



ANSI/SPRI ES-1

Code requirement for testing edge metal flashings

International Building Code, 2006 Edition

1504.5 Edge securement for low-slope roofs. Low-slope membrane roof system metal edge securement, except gutters, shall be designed and installed for wind loads in accordance with Chapter 16 and tested for resistance in accordance with ANSI/SPRI ES-1, except the basic wind speed shall be determined from Figure 1609.

Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

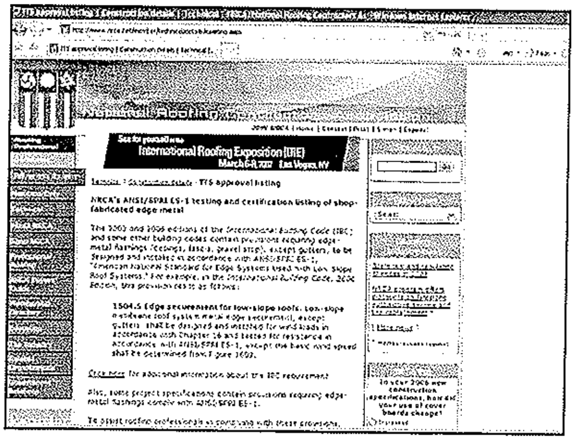
1.0 INTRODUCTION *(See Commentary: 1)*

- Structural integrity of the substrate that anchors the edge (e.g. nailers)
- Wind resistance of the edge detail
- Materials specifications

2.0 GENERAL DESIGN CONSIDERATIONS AND DEFINITIONS *(See Commentary: 2)*

2.1 ROOF SLOPE

2.2 WIND SPEED *(See Commentary: 2.2)*



Does the metal edge fabricator need to be "approved?"

Do metal edge flashings need to be "labeled?"

International Building Code, 2006 Edition

1504.5 Edge securement for low-slope roofs. Low-slope membrane roof system metal edge securement, except gutters, shall be designed and installed for wind loads in accordance with Chapter 16 and tested for resistance in accordance with ANSI/SPRI ES-1, except the basic wind speed shall be determined from Figure 1609.

Typical code language mandating approvals or labeling

"...shall be tested by a code approved testing agency..."

"...shall bear a label..."

NRCA online program

"Edge-metal flashings: Complying with ANSI/SPRI ES-1"
Tuesday, March 20, 2007
10 a.m. (Central)

SPECIAL Report

NATIONAL ROOFING CONTRACTORS ASSOCIATION

Use of treated wood in roof assemblies
February 2005

Treated wood commonly is used in the U.S. construction industry as a component in roof assemblies. In *The NRCA Roofing and Waterproofing Manual, Fifth Edition*, NRCA specifically recommends the use of decay-resistant, treated wood for blocking and nailers at roof perimeters and penetrations for fastening membrane and sheet-metal flashings. Many roof product and system manufacturers also make similar recommendations for the use of treated wood.

Recent changes in the chemical treatments used in treated wood have resulted in reports and concerns about corrosion of fasteners and metals that come in contact with treated wood that use specific, current generation chemical treatments.

In this bulletin, NRCA provides a brief background of this issue and offers specific interim recommendations intended to address the concern of corrosion relating to the use of treated wood.

Background

Since the early 1930s, the most widely used chemical treatment for treated wood has been

STEEL DECK INSTITUTE

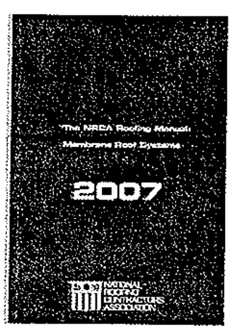
Position Statement

STEEL DECK PRODUCTS IN CONTACT WITH PRESSURE TREATED LUMBER

[illegible]

New NRCA technical publications

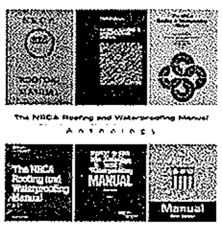
NATIONAL ROOFING CONTRACTORS ASSOCIATION



The NRCA Roofing Manual: Membrane Roof Systems—2007

Chapter 1—Roof decks
Chapter 2—Insulation
Chapter 3—Roof membranes
Chapter 4—Surfacings
Chapter 5—Design guidelines
Chapter 6—Construction details
Appendices

NATIONAL ROOFING CONTRACTORS ASSOCIATION

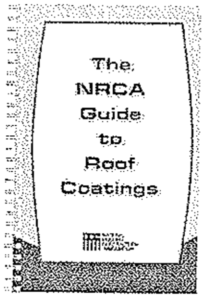


<u>Manual Anthology CD:</u>

Manual of Roofing Practice (1971)
1st Edition (1981)
2nd Edition (1984)
3rd Edition (1989)
4th Edition (1996)
5th Edition (2001)

<u>Steep-slope Materials Guide:</u>

Asphalt shingles
Fiber-cement products
Clay and concrete tile
Metal panels
Wood shakes and shingles
Slate
Underlayment sheets
Warrantees



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