NRCA University Webinar
May 15, 2014

Technical Roofing Industry Update

presented by

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Topics

- Update on IECC 2012 adoption
- Concerns with steel roof decks
- Attic ventilation
- LTTR
- Mopping asphalt
- Designers and consultants
- Answer questions

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International Energy Conservation Code, 2012 Edition

Status of states' adoptions

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Federal Register, May 17, 2012

29322 Federal Register / Vol. 77, No. 96 / Thursday, May 17, 2012 / Notices

statements on the agenda. The Chairperson of the Committee will conduct the meeting to facilitate the orderly conduct of business. Public comment will follow the 10-minute rule.

Minutes: The NEC will prepare meeting minutes within 45 days of the meeting. The minutes will be posted on the NEC Web site at *http://www.nationalenergycouncil.org/*.

Dated: Issued at Washington, DC, on May 11, 2012.

LaTanya R. Butler,
Acting Deputy Committee Management Officer.

[FR Doc. 2012-11917 Filed 5-16-12; 8:45 am]

BILLING CODE 6450-01-P

DEPARTMENT OF ENERGY

[Docket No. EERE-2011-BT-DET-0057]

RIN 1904-AC59

Updating State Residential Building Energy Efficiency Codes

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notice of final determination.

SUMMARY: The Department of Energy (DOE or Department) has determined that the 2012 edition of the International Code Council (ICC) International Energy Conservation Code (IECC) (2012 IECC or 2012 edition) would achieve greater energy efficiency in low-rise residential buildings than the 2009 IECC. Upon publication of this affirmative final determination, States are required to file certification statements to DOE that they have reviewed the provisions of their residential building code regarding energy efficiency and made a determination as to whether to update their code to meet or exceed the 2012 IECC. Additionally, this Notice provides guidance to States on how the codes have changed from previous versions, and the certification process.

DATES: Certification Statements by the States must be provided by May 17, 2014.

ADDRESSES: Certification Statements must be addressed to the Building Technologies Program Building Energy Codes Program Manager, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Forrestal Building, Mail Station EE–2J, 1000 Independence Avenue SW., Washington, DC 20585–0121.

FOR FURTHER INFORMATION CONTACT: Michael Erbesfeld, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Forrestal Building, Mail Station EE–2J, 1000 Independence Avenue SW., Washington, DC 20585–0121, (202) 287–1874, email: michael.erbesfeld@ee.doe.gov. For legal issues contact Kavita Vaidyanathan, U.S. Department of Energy, Office of the General Counsel, Forrestal Building, GC–71, 1000 Independence Avenue SW., Washington, DC 20585, (202) 586–0669, email: kavita.vaidyanathan@hq.doe.gov.

SUPPLEMENTARY INFORMATION:

I. Introduction
A. Statutory Requirements
B. Background
C. Public Comments on the Preliminary Determination
D. DOE's Final Determination Statement
II. Discussion of Changes in the 2012 IECC
A. Changes in the 2012 IECC That Increase Energy Efficiency
B. Changes in the 2012 IECC That Decrease Energy Efficiency
C. Changes in the 2012 IECC That Have an Unclear Impact on Energy Efficiency
D. Changes in the 2012 IECC That Do Not Affect Energy Efficiency
III. Filing Certification Statements With DOE
A. Who Must Submit
B. Certifications
C. Request for Extensions
IV. Regulatory Analysis
A. Review Under Executive Order 12866
B. Review Under the Regulatory Flexibility Act
C. Review Under the National Environmental Policy Act of 1969
D. Review Under Executive Order 13132, Federalism
E. Review Under the Unfunded Mandates Reform Act of 1995
F. Review Under the Treasury and General Government Appropriations Act of 1999
G. Review Under the Treasury and General Government Appropriations Act of 2005
H. Review Under Executive Order 13211
I. Review Under Executive Order 13175

I. Introduction

A. Statutory Requirements

Title III of the Energy Conservation and Production Act, as amended (ECPA), establishes requirements for the Building Energy Standards Program. (42 U.S.C. 6831–6837) Section 304(a) of ECPA provides that when the 1992 Model Energy Code (MEC), or any successor to that code, is revised, the Secretary must determine, not later than 12 months after the revision, whether the revised code would improve energy efficiency in residential buildings and must publish notice of the determination in the **Federal Register**. (42 U.S.C. 6833(a)(1)(A)) The Department, following precedent set by the IOC and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) considers high-rise (greater than three stories) multifamily residential buildings and hotel, motel, and other transient residential building types of any height as commercial buildings for energy code purposes. Low-rise residential buildings include one- and two-family detached and attached buildings, duplexes, townhouses, row houses, and low-rise multifamily buildings (not greater than three stories) such as condominiums and garden apartments.

If the Secretary determines that the revision would improve energy efficiency then, not later than 2 years after the date of the publication of the affirmative determination, each State is required to certify that it has compared its residential building code regarding energy efficiency to the revised code and made a determination whether it is appropriate to revise its code to meet or exceed the provisions of the successor code. (42 U.S.C. 6833(a)(1)(B)) State determinations are to be made: (1) After public notice and hearing; (2) in writing; (3) based upon findings included in such determination and upon evidence presented at the hearing; and (4) available to the public. (See, 42 U.S.C. 6833(a)(5)(C)) In addition, if a State determines that it is not appropriate to revise its residential building code, the State is required to submit to the Secretary, in writing, the reasons, which are to be made available to the public. (See, 42 U.S.C. 6833(a)(5)(C))

B. Background

The ICC's IECC establishes a national model code for energy efficiency requirements for buildings. In 1997, the Council of American Building Officials (CABO) was incorporated into the ICC and the MEC was renamed to the IECC. A previous **Federal Register** notice, 59 FR 36179, July 15, 1994, announced the Secretary's determination that the 1993 MEC increased energy efficiency relative to the 1992 MEC for residential buildings. Similarly, another **Federal Register** notice, 61 FR 64727, December 6, 1996, announced the Secretary's determination that the 1995 MEC is an improvement over the 1993 MEC. **Federal Register** notice 66 FR 1964, January 10, 2001, simultaneously announced the Secretary's determination that the 1998 IECC is an improvement over the 1995 MEC and the 2000 IECC is an improvement over the 1998 IECC. **Federal Register** notice 76 FR 42868, July 19, 2011, announced the Secretary's determination that the 2003 IECC was not a substantial improvement over its predecessor, while the 2006 and 2009 editions were a substantial improvement over its predecessors. A map depicting the

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Key points:

- US DOE has determined IECC 2012 will achieve greater energy efficiency in low-rise residential buildings than IECC 2009
- States must certify by May 17, 2014 their energy code meets or exceeds the levels of IECC 2012

This typically trigger states to update their state energy code

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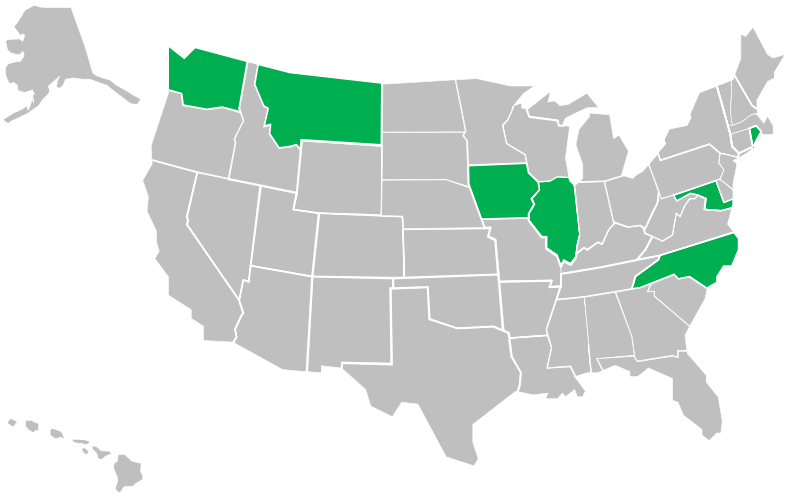
Status of states' adoptions

Adoption of IECC 2012 before May 17, 2014



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Status of states' adoptions

Adoption of IECC 2012 before Jan. 1, 2015

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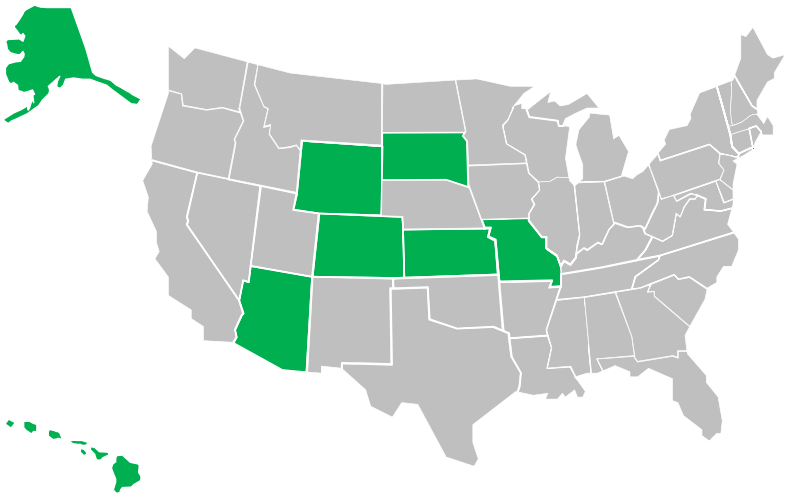
Status of states' adoptions

States without state energy codes



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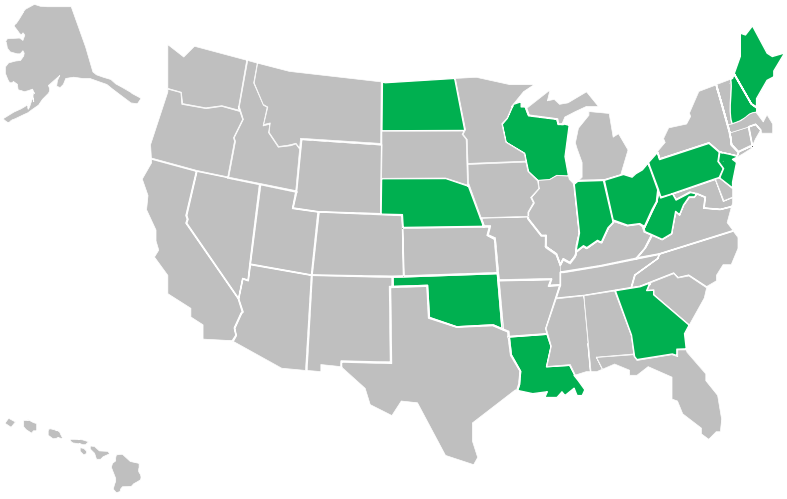
Status of states' adoptions

Do not intend to adopt IECC 2012



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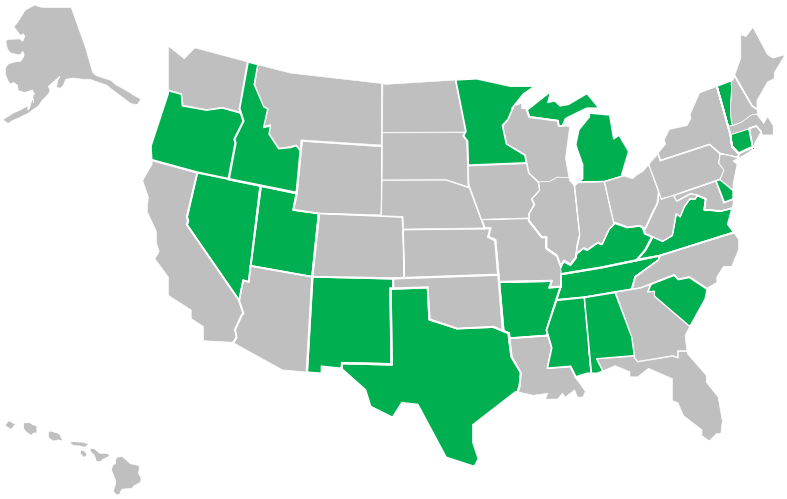
Status of states' adoptions

IECC 2012 adoption date unknown



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Beware of the status of your States' energy code adoption

www.nrca.net/Technical/EnergyCodes

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Determining your States' energy code

www.nrca.net/Technical/EnergyCodes

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Determining your States' energy code

www.nrca.net/Technical/EnergyCodes

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Steel roof decks

We now know the rationale for FM Approval's 2013 classification changes

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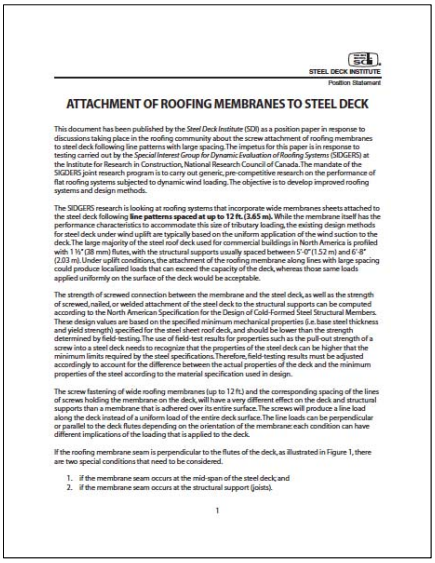
SDI bulletin



STEEL DECK INSTITUTE
Position Statement

ATTACHMENT OF ROOFING MEMBRANES TO STEEL DECK

This document has been published by the *Steel Deck Institute* (SDI) as a position paper in response to discussions taking place in the roofing community about the screw attachment of roofing membranes to steel deck following line patterns with large spacing. The impetus for this paper is in response to testing carried out by the *Special Interest Group for Dynamic Evaluation of Roofing Systems* (SIDGERS) at the Institute for Research in Construction, National Research Council of Canada. The mandate of the SIDGERS joint research program is to carry out generic, pre-competitive research on the performance of flat roofing systems subjected to dynamic wind loading. The objective is to develop improved roofing systems and design methods.

The SIDGERS research is looking at roofing systems that incorporate wide membranes sheets attached to the steel deck following **line patterns spaced at up to 12 ft. (3.65 m).** While the membrane itself has the performance characteristics to accommodate this size of tributary loading, the existing design methods for steel deck under wind uplift are typically based on the uniform application of the wind suction to the deck. The large majority of the steel roof deck used for commercial buildings in North America is profiled with 1 ½" (38 mm) flutes, with the structural supports usually spaced between 5'-0" (1.52 m) and 6'-8" (2.03 m). Under uplift conditions, the attachment of the roofing membrane along lines with large spacing could produce localized loads that can exceed the capacity of the deck, whereas those same loads applied uniformly on the surface of the deck would be acceptable.

The strength of screwed connection between the membrane and the steel deck, as well as the strength of screwed, nailed, or welded attachment of the steel deck to the structural supports can be computed according to the North American Specification for the Design of Cold-Formed Steel Structural Members. These design values are based on the specified minimum mechanical properties (i.e. base steel thickness and yield strength) specified for the steel sheet roof deck, and should be lower than the strength determined by field-testing. The use of field-test results for properties such as the pull-out strength of a screw into a steel deck needs to recognize that the properties of the steel deck can be higher that the minimum limits required by the steel specifications. Therefore, field-testing results must be adjusted accordingly to account for the difference between the actual properties of the deck and the minimum properties of the steel according to the material specification used in design.

The screw fastening of wide roofing membranes (up to 12 ft.) and the corresponding spacing of the lines of screws holding the membrane on the deck, will have a very different effect on the deck and structural supports than a membrane that is adhered over its entire surface. The screws will produce a line load along the deck instead of a uniform load of the entire deck surface. The line loads can be perpendicular or parallel to the deck flutes depending on the orientation of the membrane: each condition can have different implications of the loading that is applied to the deck.

If the roofing membrane seam is perpendicular to the flutes of the deck, as illustrated in Figure 1, there are two special conditions that need to be considered.

1. if the membrane seam occurs at the mid-span of the steel deck; and
2. if the membrane seam occurs at the structural support (joists).

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- Decks designed for joist spacing between 5’ and 6’ 8” o.c.
- Steel decks designed for uniform loading
- Seam-fastened single-ply membranes are a concern

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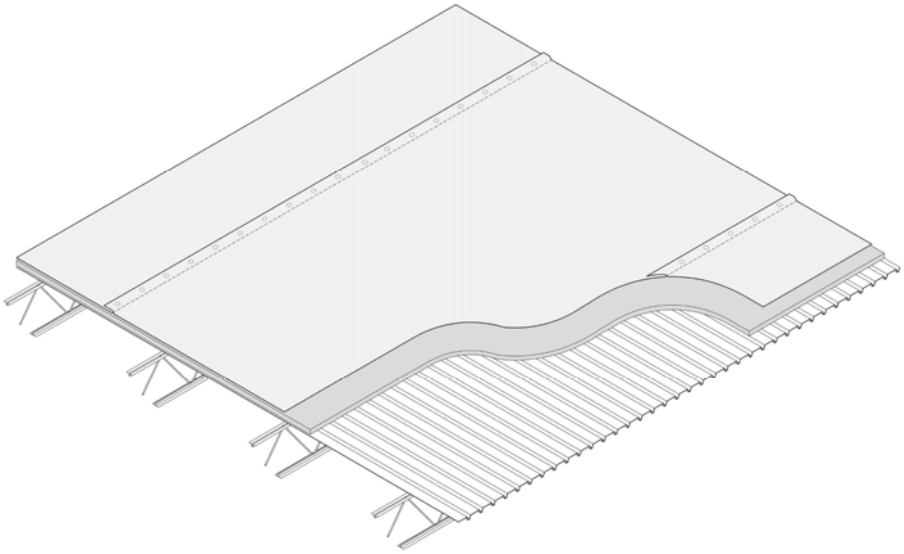
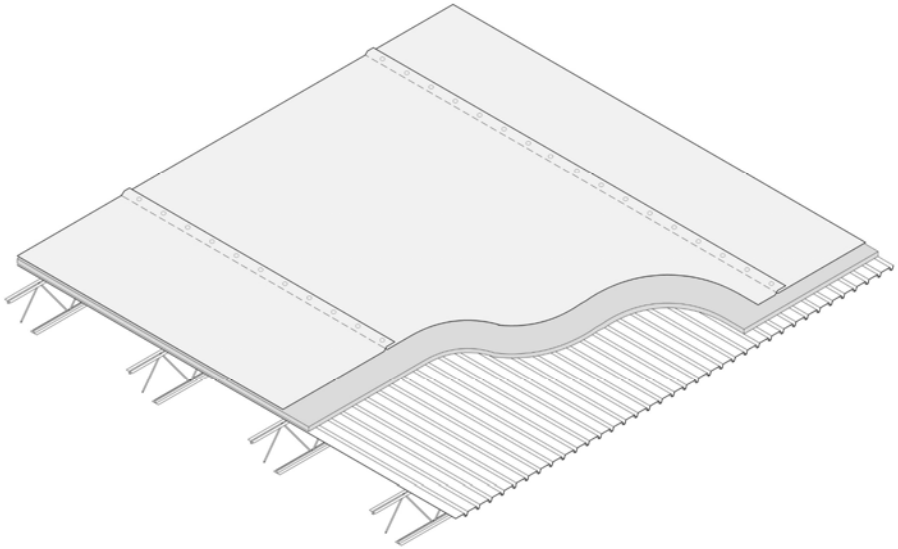
Membrane seams across deck flutes



SDI: 3.8 X moment (deck); 2 X load (joists)

Membrane seams in deck flute direction



SDI: 12 X bending moment and shear (deck)

SDI bulletin -- Conclusion

"…SDI does not recommend the use of roofing membranes attached to the steel deck using line patterns with large spacing unless a structural engineer has reviewed the adequacy of the steel deck and the structural supports to resist to wind uplift loads transmitted along the lines of attachment. Those lines of attachment shall only be perpendicular to the flutes of the deck."

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NRCA interim recommendations

- Beware of the situation
- NRCA is investigating further…

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Attic ventilation

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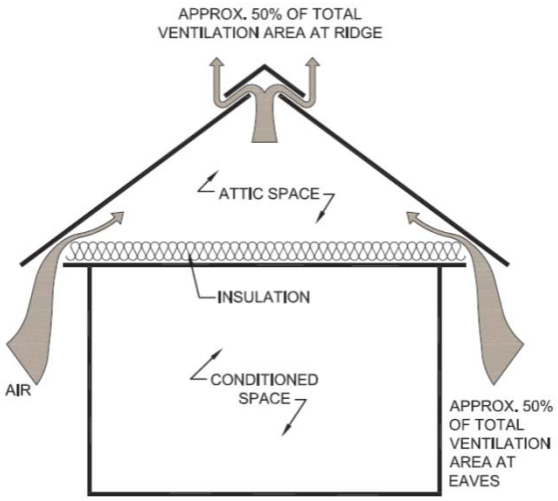
Conventional attic ventilation

Ridge vent configuration show



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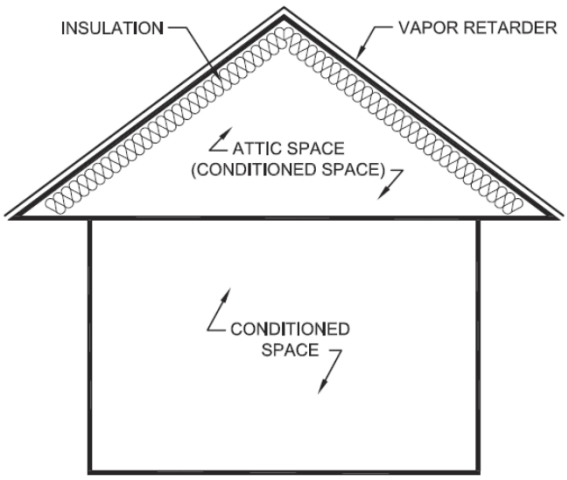
Unvented attic



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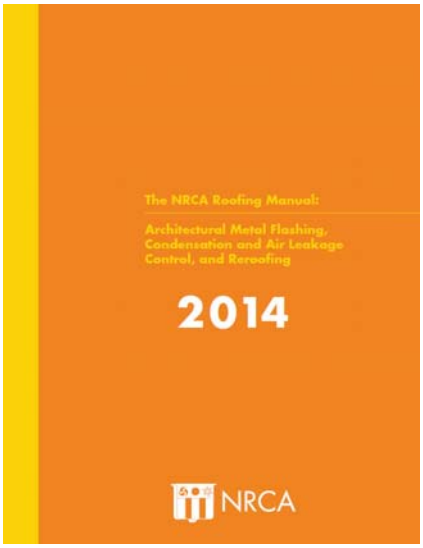
The NRCA Roofing Manual (2014)



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LTTR for polyiso.

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New minimum LTTR values

PIMA Quality Mark[cm] program (minimum values) effective January 1, 2014

Revised LTTR values		
Thickness (inches)	**New LTTR values per inch thickness**	**New LTTR values per thickness**
1	5.6	5.6
2	5.7	11.4
3	5.8	17.4
4	5.9	23.6

"Tech today," *Professional Roofing,* August 2013

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Thicknesses for required LTTR values

R-20: Two layers of 1.8-inch-thick polyiso.

R-25: Two layers of 2.2-inch-thick polyiso.

R-30: Two layers of 2.6-inch-thick polyiso.

R-35: Two layers of 3.1-inch-thick polyiso.

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Board tolerances

- ASTM C1289:
  - Board length and width: ±¼ inch
  - Thickness tolerance: "…shall not exceed ⅛ in. (3.2 mm), and the thickness of any two boards shall not differ by more than ⅛ in (3.2 mm)…
- Equivalent LTTR of thickness tolerance: ±0.7
- Equivalent LTTR of 0.1-inch-thickness: 0.56

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NRCA recommends designers specify polyisocyanurate insulation by thickness

– not R-value or LTTR.

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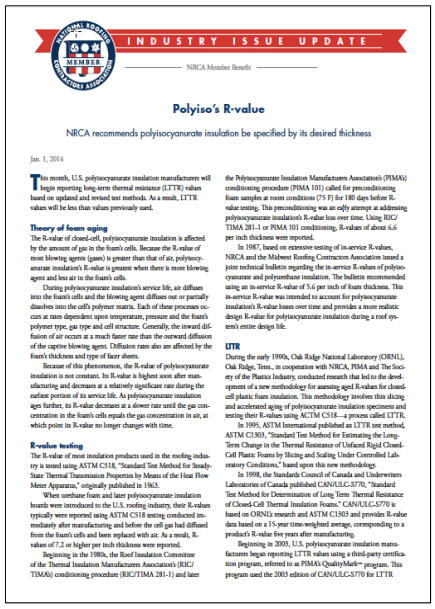
***Industry Issue Update*, January 2014**



INDUSTRY ISSUE UPDATE

NRCA Member Benefit

Polyiso's R-value

NRCA recommends polyisocyanurate insulation be specified by its desired thickness

Jan. 1, 2014

This month, U.S. polyisocyanurate insulation manufacturers will begin reporting long-term thermal resistance (LTTR) values based on updated and revised test methods. As a result, LTTR values will be less than values previously used.

Theory of foam aging

The R-value of closed-cell, polyisocyanurate insulation is affected by the amount of gas in the foam's cells. Because the R-value of most blowing agents (gases) is greater than that of air, polyisocyanurate insulation's R-value is greatest when there is more blowing agent and less air in the foam's cells.

During polyisocyanurate insulation's service life, air diffuses into the foam's cells and the blowing agent diffuses out or partially dissolves into the cell's polymer matrix. Each of these processes occurs at rates dependent upon temperature, pressure and the foam's polymer type, gas type and cell structure. Generally, the inward diffusion of air occurs at a much faster rate than the outward diffusion of the captive blowing agent. Diffusion rates also are affected by the foam's thickness and type of facer sheets.

Because of this phenomenon, the R-value of polyisocyanurate insulation is not constant. Its R-value is highest soon after manufacturing and decreases at a relatively significant rate during the earliest portion of its service life. As polyisocyanurate insulation ages further, its R-value decreases at a slower rate until the gas concentration in the foam's cells equals the gas concentration in air, at which point its R-value no longer changes with time.

R-value testing

The R-value of most insulation products used in the roofing industry is tested using ASTM C518, "Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus," originally published in 1963.

When urethane foam and later polyisocyanurate insulation boards were introduced to the U.S. roofing industry, their R-values typically were reported using ASTM C518 testing conducted immediately after manufacturing and before the cell gas had diffused from the foam's cells and been replaced with air. As a result, R-values of 7.2 or higher per inch thickness were reported.

Beginning in the 1980s, the Roof Insulation Committee of the Thermal Insulation Manufacturers Association's (RIC/TIMAs) conditioning procedure (RIC/TIMA 281-1) and later the Polyisocyanurate Insulation Manufacturers Association's (PIMAs) conditioning procedure (PIMA 101) called for preconditioning foam samples at room conditions (75 F) for 180 days before R-value testing. This preconditioning was an early attempt at addressing polyisocyanurate insulation's R-value loss over time. Using RIC/TIMA 281-1 or PIMA 101 conditioning, R-values of about 6.6 per inch thickness were reported.

In 1987, based on extensive testing of in-service R-values, NRCA and the Midwest Roofing Contractors Association issued a joint technical bulletin regarding the in-service R-values of polyisocyanurate and polyurethane insulation. The bulletin recommended using an in-service R-value of 5.6 per inch of foam thickness. This in-service R-value was intended to account for polyisocyanurate insulation's R-value losses over time and provides a more realistic design R-value for polyisocyanurate insulation during a roof system's entire design life.

LTTR

During the early 1990s, Oak Ridge National Laboratory (ORNL), Oak Ridge, Tenn., in cooperation with NRCA, PIMA and The Society of the Plastics Industry, conducted research that led to the development of a new methodology for assessing aged R-values for closed-cell plastic foam insulation. This methodology involves thin slicing and accelerated aging of polyisocyanurate insulation specimens and testing their R-values using ACTM C518—a process called LTTR.

In 1995, ASTM International published an LTTR test method, ASTM C1303, "Standard Test Method for Estimating the Long-Term Change in the Thermal Resistance of Unfaced Rigid Closed-Cell Plastic Foams by Slicing and Scaling Under Controlled Laboratory Conditions," based upon this new methodology.

In 1998, the Standards Council of Canada and Underwriters Laboratories of Canada published CAN/ULC-S770, "Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulation Foams." CAN/ULC-S770 is based on ORNL's research and ASTM C1303 and provides R-value data based on a 15-year time-weighted average, corresponding to a product's R-value five years after manufacturing.

Beginning in 2003, U.S. polyisocyanurate insulation manufacturers began reporting LTTR values using a third-party certification program, referred to as PIMA's QualityMark™ program. This program used the 2003 edition of CAN/ULC-S770 for LTTR

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Mopping asphalt

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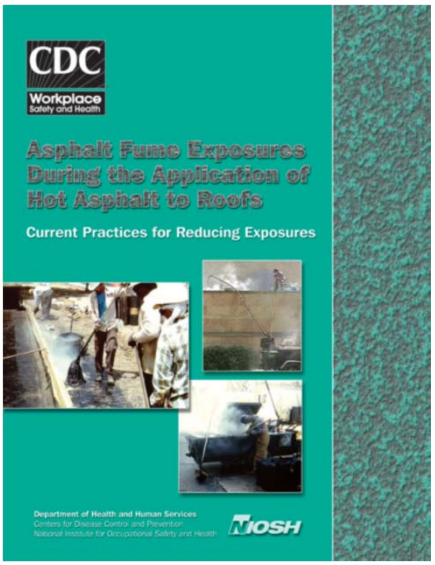
Asphalt

June 2003



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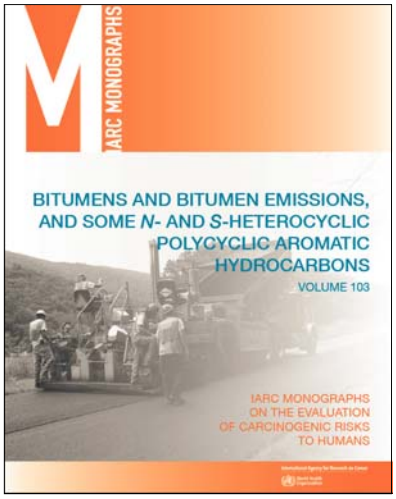
Asphalt

May 2013



IARC Monograph – 103:

- Group 2A –Probably carcinogenic to humans
- Pgs. 160 – 165 specific to "Roofing workers exposed to bitumens"

No new regulation (yet)

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NRCA asphalt testing -- 1989

- 26 asphalt samples
- EVTs:
  - Type III (125 cps) 400 – 430 F
  - Type III (75 cps) 420 – 470 F
  - Type IV (125 cps) 420 – 455 F
  - Type IV (75 cps) 445 – 485 F
- FPs:
  - Not reported

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NRCA asphalt testing -- 2000

- 19 asphalt lots sampled
- EVTs:
  - Type III (mop) 390 – 440 F
  - Type III (spreader) 415 – 475 F
- FPs: 585 – 640 F
- ASTM D312 compliance:
  - 10 of 19 did not comply

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NRCA asphalt testing – 2014 (to date)

- 14 asphalt lots (7 suppliers) sampled
- EVTs:
  - Type III (mop) 424 – 462 F
  - Type III (spreader) 452 – 486 F
  - Type IV (mop) 455 – 482 F
  - Type IV (spreader) 480 – 506 F
- FPs: 615 – 660 F
- 10 of 14 do not comply with ASTM D312's physical property requirements

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Proposed revision to ASTM D312

Currently being balloted

- Maximum heating temp.: 550 F (575 F min. FP)
- Maximum EVTs:
  - Type III (mop) 430 F
  - Type III (spreader) 455 F
  - Type IV (mop) 470 F
  - Type IV (spreader) 485 F
- Lot-specific package labeling of EVT

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NRCA's interim recommendations

- Consult manufacturers' installation requirements and MSDS.
- Carefully select asphalt
- Beware of actual FPs; max. heating temp. should be FP – 25 F
- Beware of actual EVTs
- Make field crews aware

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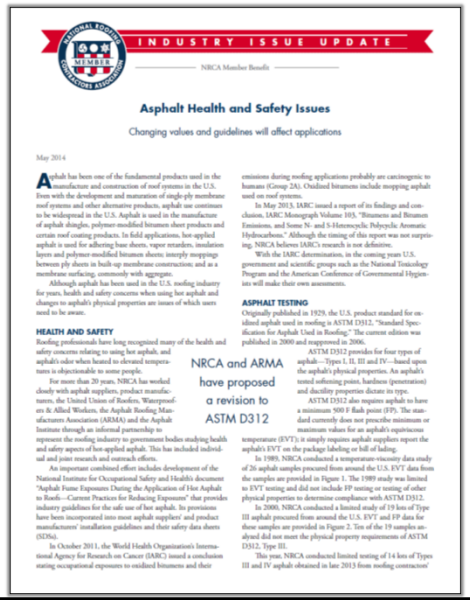
Industry Issue Update

May 2014



INDUSTRY ISSUE UPDATE

NRCA Member Benefit

Asphalt Health and Safety Issues

Changing values and guidelines will affect applications

May 2014

Asphalt has been one of the fundamental products used in the manufacture and construction of roof systems in the U.S. Even with the development and maturation of single-ply membrane roof systems and other alternative products, asphalt use continues to be widespread in the U.S. Asphalt is used in the manufacture of asphalt shingles, polymer-modified bitumen sheet products and certain roof coating products. In field applications, hot-applied asphalt is used for adhering base sheets, vapor retarders, insulation layers and polymer-modified bitumen sheets; interply moppings between ply sheets in built-up membrane construction; and as a membrane surfacing, commonly with aggregate.

Although asphalt has been used in the U.S. roofing industry for years, health and safety concerns when using hot asphalt and changes to asphalt's physical properties are issues of which users need to be aware.

HEALTH AND SAFETY

Roofing professionals have long recognized many of the health and safety concerns relating to using hot asphalt, and asphalt's odor when heated to elevated temperatures is objectionable to some people.

For more than 20 years, NRCA has worked closely with asphalt suppliers, product manufacturers, the United Union of Roofers, Waterproofers & Allied Workers, the Asphalt Roofing Manufacturers Association (ARMA) and the Asphalt Institute through an informal partnership to represent the roofing industry to government bodies studying health and safety aspects of hot-applied asphalt. This has included individual and joint research and outreach efforts.

An important combined effort includes development of the National Institute for Occupational Safety and Health's document "Asphalt Fume Exposures During the Application of Hot Asphalt to Roofs—Current Practices for Reducing Exposures" that provides industry guidelines for the safe use of hot asphalt. Its provisions have been incorporated into most asphalt suppliers' and product manufacturers' installation guidelines and their safety data sheets (SDSs).

In October 2011, the World Health Organization's International Agency for Research on Cancer (IARC) issued a conclusion stating occupational exposures to oxidized bitumens and their emissions during roofing applications probably are carcinogenic to humans (Group 2A). Oxidized bitumens include mopping asphalt used on roof systems.

In May 2013, IARC issued a report of its findings and conclusion, IARC Monograph Volume 103, "Bitumens and Bitumen Emissions, and Some N- and S-Heterocyclic Polycyclic Aromatic Hydrocarbons." Although the timing of this report was not surprising, NRCA believes IARC's research is not definitive.

With the IARC determination, in the coming years U.S. government and scientific groups such as the National Toxicology Program and the American Conference of Governmental Hygienists will make their own assessments.

ASPHALT TESTING

Originally published in 1929, the U.S. product standard for oxidized asphalt used in roofing is ASTM D312, "Standard Specification for Asphalt Used in Roofing." The current edition was published in 2000 and reapproved in 2006.

ASTM D312 provides for four types of asphalt—Types I, II, III and IV—based upon the asphalt's physical properties. An asphalt's tested softening point, hardness (penetration) and ductility properties dictate its type.

ASTM D312 also requires asphalt to have a minimum 500 F flash point (FP). The standard currently does not prescribe minimum or maximum values for an asphalt's equiviscous temperature (EVT); it simply requires asphalt suppliers report the asphalt's EVT on the package labeling or bill of lading.

In 1989, NRCA conducted a temperature-viscosity data study of 26 asphalt samples procured from around the U.S. EVT data from the samples are provided in Figure 1. The 1989 study was limited to EVT testing and did not include FP testing or testing of other physical properties to determine compliance with ASTM D312.

In 2000, NRCA conducted a limited study of 19 lots of Type III asphalt procured from around the U.S. EVT and FP data for these samples are provided in Figure 2. Ten of the 19 samples analyzed did not meet the physical property requirements of ASTM D312, Type III.

This year, NRCA conducted limited testing of 14 lots of Types III and IV asphalt obtained in late 2013 from roofing contractors'

NRCA and ARMA have proposed a revision to ASTM D312

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Designers/Consultants

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Designers' role in proper wind design

- Specification of, for example, "…FM 1-90…" alone is not proper wind design
- Specification of a wind warrantee alone is not proper wind design

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The building code is clear
on responsibilities

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International Building Code

IBC 2012, Chapter 15-Roof Assemblies and Rooftop Structures

1504.1 Wind resistance of roofs. Roof decks and roof coverings shall be designed for wind loads in accordance with Chapter 16 and Sections 1504.2, 1504.3 and 1504.4.

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International Building Code

IBC 2012, Chapter 16-Structural loads

Section 1603

CONSTRUCTION DOCUMENTS

1603.1 General. *Construction documents* shall show the size, section and relative locations of structural members with floor levels, column centers and offsets dimensioned. The design loads and other information pertinent to the structural design required by Sections 1603.1.1 through 1603.1.9 shall be indicated on the *construction documents*.

[continued…]

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1603.1.4 Wind design data. The following information related to wind loads shall be shown, regardless of whether wind loads govern the design of the lateral force resisting system of the structure:

1. Ultimate design wind speed, V_{ult}, (3-second gust), miles per hour (km/hr) and nominal design wind speed, V_{asd}, as determined in accordance with Section 1609.3.1.
2. *Risk category.*
3. Wind exposure. Where more than one wind exposure is utilized, the wind exposure and applicable wind direction shall be indicated.
4. The applicable internal pressure coefficient.
5. Components and cladding. The design wind pressures in terms of psf (kN/m^2) to be used for the design of exterior component and cladding materials not specifically designed by the *registered design professional*.

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NRCA recommendation

- Seek out clarifications from Designers
- Use www.roofwinddesigner.com and submit to Designer for approval

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"Tech today" column, March 2014

TECH TODAY

Specifying wind design

Many roof system designers inadequately address wind loads in contract documents

by Mark S. Graham

NRCA is receiving an increasing number of reports indicating project drawings and specifications incompletely, inadequately or inaccurately address proper wind design for low-slope membrane roof systems. Some designs, according to reports, only include a specification requirement for the roof system manufacturer to provide a wind warranty.

But there are minimum requirements for proper wind design of low-slope membrane roof systems.

Specifying wind speed warranties is not a substitute for code-required wind design data

Code requirements

Building codes typically provide specific requirements for reporting design loads, including wind loads, in contract documents.

The *International Building Code®, 2012 Edition* (IBC 2012), Chapter 16-Structural Design, Section 1603-Contract Documents, indicates contract documents need to include a roof system's live load, snow load data, wind design data and any special loads.

Required wind design data includes identifying the ultimate design wind speed, nominal design wind speed, risk category, wind exposure and applicable internal pressure coefficient. For component and cladding systems that are not specifically designed by a registered design professional, design wind pressures in terms of psf (pounds per square foot) also are required. Roof systems typically are considered component and cladding systems. Design wind pressures in the field, perimeter and corner regions of roof areas should be noted in contract documents.

IBC's previous editions include similar contract document requirements.

For new construction projects, design loads most commonly will be identified on structural drawings in the project drawing set. For projects without specific structural drawings, design loads may be provided on architectural drawings or drawing notes or in project specifications.

ANSI/SPRI ES-1

ANSI/SPRI ES-1, "Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems," which is referenced in IBC 2012, includes two primary elements: determination of design wind loads at roof edges (fascia, copings) and testing for resistance loads of copings and fascia.

Designers should not simply specify compliance with ANSI/SPRI ES-1 in project specifications; they should determine and clearly include design wind loads at roof edges in contract documents.

IBC 2012 indicates in Section 1504.5 Edge Securement for Low-slope Roofs design wind loads should be determined using the ultimate design wind speed and IBC 2012's Chapter 16, which is based on ASCE 7-10, "Minimum Design Loads for Buildings and Other Structures."

IBC 2012 references ANSI/SPRI ES-1-03. ANSI/SPRI ES-1-03 is based upon ASCE 7-02, which is not an ultimate design wind speed-based method. Therefore, the design wind load determination method contained in ANSI/SPRI ES-1 does not satisfy IBC 2012's requirements for design wind loads at roof edges.

Design wind loads at roof edges should be determined using IBC 2012's Chapter 16 and be clearly noted in contract documents.

Responsibilities

Designers should not place the responsibility for determining roof system or individual component design wind loads on manufacturers, component suppliers or installers, or roofing contractors.

Also, designers' sole reliance on specifying wind speed warranties is not a substitute for code-required wind design data. Such warranties typically do not address consideration of ultimate and nominal design wind speeds, building height, risk category, wind exposure and internal pressure coefficients applicable to the specific building necessary for properly determining roof systems' design wind loads.

Responsibility for properly determining and clearly identifying wind design data, including design wind loads for roof systems, is required by the building code and is clearly that of roof system designers. Designers may retain a structural engineer or qualified consultant to help them fulfill their design responsibilities.

To help designers determine wind loads for commonly encountered low-slope roof systems, NRCA, the Midwest Roofing Contractors Association and NorthEast Roofing Contractors Association have developed and offer a free online application, Roof Wind Designer.

Roof Wind Designer is a web application that allows users to determine design wind loads using ASCE 7s, "Minimum Design Loads for Buildings and Other Structures," 2005 or 2010 editions.

Roof Wind Designer is accessible at www.roofwinddesigner.com.

MARK S. GRAHAM is NRCA's associate executive director of technical services.

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Concerns with rooftop quality assurance observers (QAOs)

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A QAO is not a “field superintendent” and should never direct roofing work/operations

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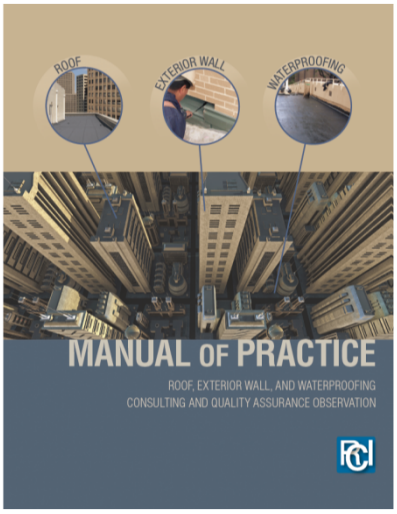

Manual of Practice:

- Sec. 1: Introduction
- Sec. 2: Recommended practices for consulting
- Sec. 3: Recommended practices for QAO
- Sec. 4: Specialized areas of practice
- Appendixes

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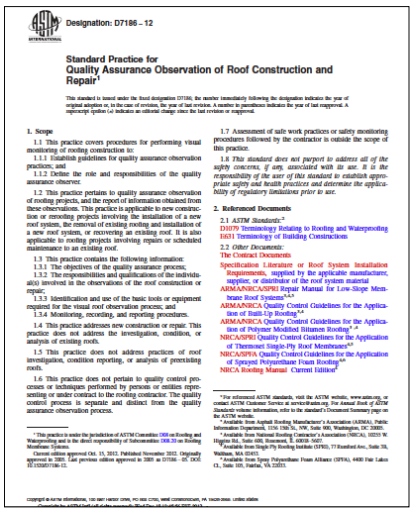
ASTM D7186-12



Designation: D7186 – 12

Standard Practice for Quality Assurance Observation of Roof Construction and Repair[1]

This standard is issued under the fixed designation D7186; 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 practice covers procedures for performing visual monitoring of roofing construction to:

1.1.1 Establish guidelines for quality assurance observation practices; and

1.1.2 Define the role and responsibilities of the quality assurance observer.

1.2 This practice pertains to quality assurance observation of roofing projects, and the report of information obtained from these observations. This practice is applicable to new construction or reroofing projects involving the installation of a new roof system, the removal of existing roofing and installation of a new roof system, or recovering an existing roof. It is also applicable to roofing projects involving repairs or scheduled maintenance to an existing roof.

1.3 This practice contains the following information:

1.3.1 The objectives of the quality assurance process;

1.3.2 The responsibilities and qualifications of the individual(s) involved in the observations of the roof construction or repair;

1.3.3 Identification and use of the basic tools or equipment required for the visual roof observation process; and

1.3.4 Monitoring, recording, and reporting procedures.

1.4 This practice addresses new construction or repair. This practice does not address the investigation, condition, or analysis of existing roofs.

1.5 This practice does not address practices of roof investigation, condition reporting, or analysis of preexisting roofs.

1.6 This practice does not pertain to quality control processes or techniques performed by persons or entities representing or under contract to the roofing contractor. The quality control process is separate and distinct from the quality assurance observation process.

1.7 Assessment of safe work practices or safety monitoring procedures followed by the contractor is outside the scope of this practice.

1.8 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1079 Terminology Relating to Roofing and Waterproofing

E631 Terminology of Building Constructions

2.2 *Other Documents:*

The Contract Documents

Specification Literature or Roof System Installation Requirements, supplied by the applicable manufacturer, supplier, or distributor of the roof system material

ARMA/NRCA/SPRI Repair Manual for Low-Slope Membrane Roof Systems[3,4,5]

ARMA/NRCA Quality Control Guidelines for the Application of Built-Up Roofing[3,4]

ARMA/NRCA Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing[3,4]

NRCA/SPRI Quality Control Guidelines for the Application of Thermoset Single-Ply Roof Membranes[4,5]

NRCA/SPFA Quality Control Guidelines for the Application of Sprayed Polyurethane Foam Roofing[4,6]

NRCA Roofing Manual: Current Edition[4]

- Experience
- Role: observe and report
- Reporting procedures
- QAO shall maintain on-site contract documents
- QAO shall have insurance
- QAO shall provide and maintain PPE and fall protection equipment

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"Tech today" column, February 2014

TECH TODAY

Quality-assurance guidelines

Quality-assurance observers have specific project roles and responsibilities

by Mark S. Graham

Proper quality assurance during roof system installation can be an important element for long-term performance.

Quality assurance—unlike quality control, which is performed by roofing contractors—is the responsibility of a building owner or his or her designated representative, such as a licensed design professional, roof consultant or general contractor. The purpose of quality assurance is to verify the scope and intent of a project's contract documents are being met and roof system materials are being installed in accordance with contract documents, manufacturers' installation instructions and accepted industry practices.

The most effective means of providing quality assurance is visually observing materials and procedures

NRCA asserts the most effective means of providing quality assurance is by visually observing materials and procedures used at the time of roof system installation. The person performing visual observation often is referred to as a quality-assurance observer (QAO).

ASTM D7186

ASTM D7186, "Standard Practice for Quality Assurance Observation of Roof Construction and Repair," establishes the role and responsibilities of those performing quality-assurance observation, as well as procedures for observation and reporting.

A QAO's function is to provide on-site observation and reporting of a roof system's construction process in a clear, accurate and objective manner; a QAO should not direct or order any work. A QAO should:

- Observe and record the general condition of the job site and roof areas under construction and materials used and stored
- Note pre-existing property damage or damage that can occur and the substrate condition and repair or replacement procedures
- Observe and record the installation of roofing materials and any other components specified in the contract documents, and flashing installation and detailing
- Record weather conditions, roofing crew size, foreman's name and all job-site visitors

A QAO should prepare a daily written report with photographs; this report should be made available to all parties involved in the roofing project. A copy of the report should be provided to the roofing contractor no later than the commencement of work the following day. ASTM D7186 includes sample pre-construction damage, material delivery, daily construction and progress summary, and unit cost tracking report forms for use by QAOs when completing the documentation necessary to provide proper quality assurance.

A QAO also should keep on-site copies of contract documents, including project specifications, the roof plan, construction detail drawings and any addenda, as well as stamped material submittals and minutes from the pre-bid, pre-construction and project meeting minutes.

A QAO is responsible for providing and maintaining the tools and equipment required to perform his or her work, including any necessary safety equipment, such as personal protective equipment and fall protection. A QAO should follow all applicable safe work practices.

A QAO or the firm providing the quality-assurance observations must provide insurance and submit a certificate of insurance showing coverage for workers' compensation, comprehensive general liability, automobile insurance and, if applicable, professional liability insurance. Insurance limits shall be the statutory amounts or higher amounts if required in the contract.

NRCA guidelines

ASTM D7186 references the following NRCA documents that provide industry-accepted guidelines for evaluating roof system application:

- *Quality Control Guidelines for the Application of Built-up Roofing*
- *Quality Control Guidelines for the Application of Polymer-modified Bitumen Roofing*
- *Quality Control Guidelines for the Application of Thermoset Single-ply Roof Membranes*
- *Quality Control Guidelines for the Application of Spray Polyurethane Foam-based Roofing*
- *Quality Control Guidelines for the Application of Asphalt Shingle Roof Systems*

NRCA recommends these documents be used with ASTM D7186 to provide effective quality assurance.

When a QAO will be present on a job site, NRCA recommends his or her role be clearly defined and understood by all parties, including the building owner, licensed design professional, general contractor or construction manager, and roof consultant. NRCA encourages referencing ASTM D7186 for this purpose.

All NRCA documents referenced can be purchased by accessing the NRCA Bookstore at shop.nrca.net.

MARK S. GRAHAM is NRCA's associate executive director of technical services.

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NRCA's recommendations

- Confirm/clarify QAO's role and responsibilities
- Use "Tech today" column and/or ASTM D7186 in seeking our clarifications
- Get QAO's daily reports
- Document any situation where a QAO directs your work/operations

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Questions

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