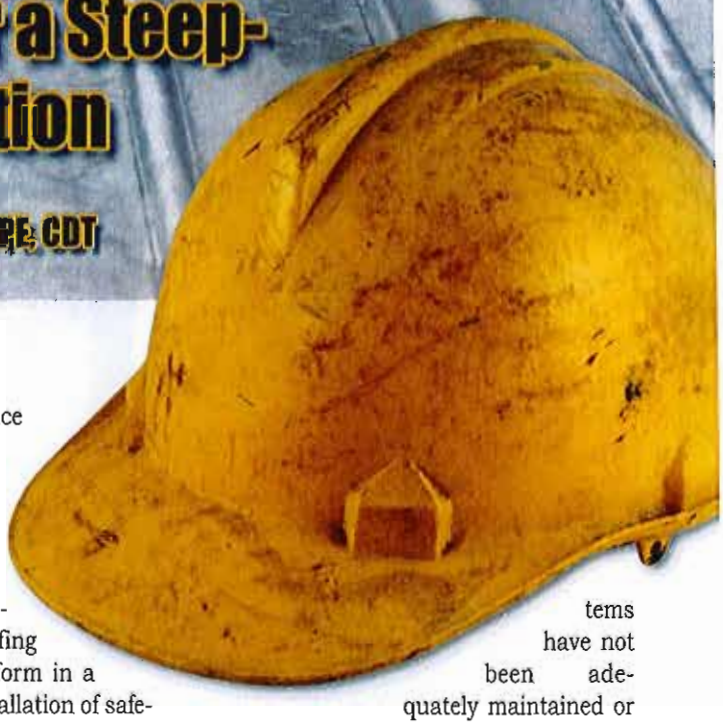
Safety Considerations for a Steep-Slope Metal Roof Restoration

By Josh Tatum, EIT; and Robert Hinojosa, RRC, RWC, RRO, PE, CDT



INTRODUCTION

Safety, safety, safety! As building envelope consultants, we climb all over roofs on high-rise buildings, some with only a small curb or a metal edge around the perimeter. We climb up and down buildings on hard scaffolding, hydraulic scaffolding systems or mast climbers, and swing-stage equipment, almost always set up by someone else. Those who are a little more daring descend the side of a building via rappel equipment or single-handedly set up and ascend a 40-ft ladder on the side of a low-rise building for access (which is not the easiest or safest task). How many of us have grabbed hold of the 1½-in to 2-in standing seams of a steep-slope metal roof and shimmied up to straddle the highest ridge in an attempt to obtain the best vantage point without being properly tied off? I know *I* have, but don't tell my wife!

While safety should always be of the utmost importance during building evaluations, maintenance, or repair of the building envelope, it is often overlooked, either from carelessness or simple misunderstanding of the requirements. In the authors' experience, steep-slope metal roofing can be the most dangerous type of building envelope component to access and to consider when designing, detailing, and performing a roof restoration. When thinking about a steep-slope metal roof restoration, it is important to understand and account for safety requirements—not only for consultants but also for contractors who will be required to access every bit of the roof during a restoration, as well as maintenance, once the project is completed. As consultants—whether one is an architect, engineer, Registered Roof Consultant, or other registered professional—the paramount interest should be to protect the welfare and safety of the persons who will be working on the roof that one designs and specifies, as well as the safety of people in the surrounding area.

THE PROBLEM

In the authors' experience with roof restorations, many steep-slope metal roofs have no proper safety considerations in place after initial construction is completed. Surveying, maintaining, and replacing the roofing system is impossible to perform in a safe manner without the installation of safety equipment. When accessing a project for the first time to perform a survey of the roofing system, several safety equipment problems are typically observed. These are that 1) steep-slope metal roofs are either installed without permanent safety equipment in place after original construction, 2) the permanent equipment that was installed during original construction is inadequate by today's standards, or 3) the permanent equipment that was installed during original construction actually created a penetration that is contributing to the moisture intrusion through the roofing system that the building owner is experiencing.

As for those roofs that do not have any permanently installed safety equipment, there is no safe and cost-effective way to restore or maintain the roofing system, as well as maintain the equipment on top of the roof (i.e., Federal Aviation Association warning lights, air conditioners, lightning protection installations, signage). Given this condition, the consultant should incorporate permanent safety equipment into the design to ensure the safety of those who will perform the restoration and maintenance on the roof system. These considerations must be given during the design process to ensure that the system will adequately resist the applied loads, adhere to current safety requirements, and ensure that the installation of the equipment is watertight.

Those roofs that already have safety equipment incorporated into the system create a completely different set of problems that must be considered. Often, these systems have not been adequately maintained or were inadequate at original construction and must be recertified or inspected by a qualified individual prior to their use. Assuming the safety equipment can be recertified in accordance with current industry standards, the consultant must then determine whether he or she feels that the existing system should be salvaged and incorporated into the roof restoration or that the existing system should be discarded and a new system installed.

INDUSTRY STANDARDS

There are several different options a consultant can consider when establishing how to address the problematic conditions previously mentioned. Before determining the best solution to the problem, the consultant must first know the most current industry standards.

There are multiple agencies in the United States that monitor and enforce safety within the construction industry, most notably the Occupational Safety and Health Administration (OSHA). OSHA has numerous standards that pertain to the requirements of safety equipment on steep-slope metal roofs. These standards and regulations are enumerated in both OSHA 29 CFR 1910 and OSHA 29 CFR 1926, which cover general industry standards and construction industry standards, respectively. However, the OSHA standards and requirements are not outlined as clearly, neither are they as stringent with respect to the testing and certification/inspection process as those standards and requirements

REDESIGNATION TABLE			
Existing		Proposed rule	
§ 1910.21	Definitions	§ 1910.21	Scope, application, and definitions
§ 1910.22	General requirements	§ 1910.22	General requirements
§ 1910.23	Guarding floor and wall openings and holes	§ 1910.23	Ladders
§ 1910.24	Fixed industrial stairs	§ 1910.24	Step bolts and manhole steps
§ 1910.25	Portable wood ladders	§ 1910.25	Stairways
§ 1910.26	Portable metal ladders	§ 1910.26	Dockboards (bridge plates)
§ 1910.27	Fixed ladders	§ 1910.27	Scaffolds (including rope descent systems)
§ 1910.28	Safety requirements for scaffolding	§ 1910.28	Duty to have fall protection
§ 1910.29	Manually propelled mobile ladder stands and scaffolds (towers)	§ 1910.29	Fall protection systems criteria and practices
§ 1910.30	Other working surfaces	§ 1910.30	Training requirements

Table 1 - Redesignation Table outlining existing table of contents versus proposed table of contents for 29 CFR Part 1910, based on proposed rule changes. Table taken from the Federal Register, Volume 75, Number 99, Proposed Rules.

established by the American National Standard Institute (ANSI) and the International Window Cleaning Association (IWCA) in their joint publication, ANSI/IWCA I-14.1. As a matter of fact, OSHA has written citations that reference the ANSI/IWCA publication. Since its release, OSHA has issued 81 citations to contractors for not following the requirements of the publication.[1] Also, many state and local authorities have their own standards and regulations for safety equipment. As such, the consultant should understand and be able to comply with OSHA and ANSI/IWCA standards, as well as any local standards, prior to developing a solution to the problems encountered with the safety equipment on steep-slope metal roofing.

OSHA 29 CFR 1910

Since OSHA is the federal regulatory agency for the United States, this article will outline its standards and regulations first. OSHA has two sections within its 29 CFR publication that pertain specifically to the topic at hand. Those are Part 1910, Subpart D and Subpart I; and Part 1926, Subpart M. Also, to demonstrate OSHA's feelings towards the ANSI/IWCA standard, OSHA is proposing a rule to amend Part 1910, Subparts D and I to reflect several of the requirements set forth by the ANSI/IWCA standard that are not as clearly indicated in Part 1910, Subparts D and I.[2] The changes to these OSHA regulations, if accepted, should be understood and will provide a useful tool to consultants, contractors, and building owners when considering safety equipment on steep-slope metal roofs. They should reference *Table 1* for a list of the proposed modifications to the table of contents and read the docket published by OSHA outlining the proposed changes.

OSHA 29 CFR 1926

The regulations set forth by the existing OSHA standard 29 CFR 1926, Subpart M, are the same, in principle, as the proposed rule changes to 29 CFR 1910, Subparts D and I. The regulations enumerated in Subpart M are meant to establish design, installation, and maintenance requirements and criteria for fall protection in construction workplaces. However, Subpart M defines that the provisions do not apply when

STANDARD DESIGN AND PERFORMANCE REQUIREMENTS	
Standard No.	
1926.502(d)(8)	"Horizontal lifelines shall be designed, installed, and used under the supervision of a qualified person, as part of a complete personal fall-arrest system which [sic] maintains a safety factor of at least two."
1926.502(d)(10)	(i) "...when vertical lifelines are used, each employee shall be attached to a separate lifeline."
1926.502(d)(15)	"Anchorages...shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (22.2 kN) per employee attached, or shall be designed, installed, and used as...(i) part of a complete personal fall-arrest system which maintains a safety factor of at least two and (ii) under the supervision of a qualified person."
1926.502(d)(16)	"Personal fall-arrest systems, when stopping a fall, shall... (ii) limit maximum arresting force on an employee to 1,800 pounds (8 kN) when used with a body harness, (iii) be rigged such that an employee can neither free-fall more than 6 feet (1.8 m) nor contact any lower level (iv) bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet (1.07 m), and (v) have sufficient strength to withstand twice the potential impact energy of an employee free-falling a distance of 6 ft (1.8 m), or the free-fall distance permitted by the system, whichever is less."
1926.502(d)(23)	"Personal fall-arrest systems shall not be attached to guardrail systems, nor [sic] shall they be attached to hoists except as specified in other Subparts of this Part."
1926.502(d)(24)	"When a personal fall-arrest system is used at hoist areas, it shall be rigged to allow the movement of the employee only as far as the edge of the walking/working surface."

Table 2 – This table outlines standards from 29 CFR 1929, Subpart M, as they pertain to the design and performance requirements for design, installation, and maintenance of fall protection equipment on steep-slope metal roofs.

employees are making an inspection, investigation, or assessment of workplace conditions prior to the actual start of construction work or after all construction work has been completed.[3] Because of this clause, Subparts D and I of 29 CFR 1910 would govern the remaining activities listed (i.e., inspection, investigation, and assessment) during the design, restoration, and maintenance processes. Within Subpart M, consultants should pay specific attention to Sections 1926.500, 1926.501, and 1926.502, as well as Appendix C and Appendix D.

When considering the regulations set forth by these sections, consultants should first review Section 1926.500 to understand fully the scope, application, and definitions of the content within the subsequent sections. Specifically, when considering the restoration of a steep-slope metal roof, consultants should understand the definitions for *anchorage, leading edge, lifeline, personal fall-arrest system, positioning-device system, roof, steep roof, unprotected sides and edges, walking/working surface,* and *work area.* For the purpose of the topic at hand, steep-slope roofing is defined by this section of the standard as a roof having a slope greater than 4 in 12 (vertical to horizontal).[4]

Section 1926.501, "Duty to have fall protection," defines that the employer is responsible for providing fall-protection systems. It is not only the responsibility of the employer to supply fall protection, but also the professional responsibility of the consultant—whether an architect, engineer, Registered Roof Consultant, or other registered professional—to consider and incorporate the regulations set forth by the stan-

dard pertaining to safety (i.e., fall protection) into any roof restoration. As evidenced by the proposed rule modifications to 29 CFR 1910, fall protection is becoming largely recognized as an important safety item within the overall building system.

In addition to specifying who is responsible for the safety equipment, Section 1926.501 defines the specific areas that require fall-protection systems, as well as which types of fall-protection systems are acceptable within the noted area. Subsection 1926.501(b)(11) requires that each employee on a steep roof with unprotected sides (which is most steep roofs) and edges 6 ft (1.8 m) or more above lower levels shall be protected from falling by guardrail systems with toeboards, safety-net systems, or personal fall-arrest systems.[5] With steep-slope metal roofing, it is likely that a contractor could use a combination of all three. Consultants should make it their responsibility to ensure that at least one of these is accounted for in their designs. This section of the standard also requires that employees be protected from falling objects, not only by wearing a hard hat but also by one of the following measures: (1) erect toeboards, screens, or guardrail systems to prevent objects from falling from higher levels; (2) erect a canopy structure, and keep potential fall objects far enough from the edge of the higher level so that those objects would not go over the edge if they were accidentally displaced; (3) barricade the area to which objects could fall, prohibiting employees from entering the barricaded area, and keep objects that may fall far enough away from the edge of a higher level so that those objects would not go over the edge if they were accidentally displaced.[6] It is important for consultants to understand and be aware that these requirements exist; however, it is the authors' opinion that it is the sole responsibility of the contractor to account for such safety considerations required by this subsection of the standard.

After a consultant develops an understanding of the general application and the requirements of 1926.500 and 1926.501, he or she is ready to grasp the design criteria and practices established by 1926.502, which specifies the design criteria (i.e., height, material composition, design load) and practice standards (i.e., test-load resistance and deflection parameters) for the guardrails, safety nets, personal fall-arrest systems, and the devices established for protection from falling objects as required for construction on steep-slope roofing by

STANDARD DESIGN AND PERFORMANCE REQUIREMENTS	
Standard No.	
1926.502(e)(1)	Positioning devices shall be rigged such that an employee cannot free-fall more than 2 feet (.9 m).
1926.502(e)(2)	Positioning devices shall be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or 3,000 pounds (13.3 kN), whichever is greater.

Table 3 – This table outlines standards from 29 CFR 1929, Subpart M, as they pertain to the design and performance requirements relating to the design, installation, and maintenance of and criteria for positioning device equipment on steep-slope metal roofs.

Section 1926.501. However, this article will review only the design criteria and practices for personal fall-protection systems and the devices used for protection from falling objects.

Subsection 1926.502(d) provides the requirements for personal fall-protection systems. As a consultant, one should understand all of the requirements within this section but, most important, should understand and be able to account for the requirements set by Sections and Subsections 1926.502(d)(8), 1926.502(d)(10)(i), 1926.502(d)(15), 1926.502(d)(16), 1926.502(d)(23), and 1926.502(d)(24). (Reference *Table 2.*) In the standards referencing the horizontal lifeline and anchorage, a "qualified person" is required to supervise their design, installation, and use. OSHA has defined a "qualified person" as one with a recognized degree or professional certificate and extensive knowledge and experience in the subject field who is capable of design, analysis, evaluation and specifications in the subject work, project, or product.[7] Sections 1926.502(8), 1926.502(15), and 1926.502(16)(ii) and (v) are related to the loading resistance that the system should be able to withstand, whereas 1926.502(10), 1926.502(16)(iii) and (iv), 1926.502(23), and 1926.502(24) are related to the layout of the system.

1926.502(16) specifies multiple requirements that are not easily comprehensible from a design perspective—notably, Subsections 1926.502(16)(ii) and 1926.502(16)(v). Thus, OSHA incorporated a note referencing specific parameters that are to be tested in accordance with Appendix C that, if met qualify the system for compliance.[8] OSHA created Appendix C as a nonmandatory guideline for complying with paragraph (d)(16) of Section 1926.502, which can be applied to personal fall-arrest systems or positioning-device systems. Although the appendix is not mandatory, it can be a useful tool for consultants to determine if systems they have designed are in compliance with the design criteria after installation. It could also be used to evaluate an existing system prior to being put back into service upon entering a new project.

Although not required by Subsection 1926.501(b)(11) for steep-slope roofing, the authors believe positioning-device systems are necessary on select steep-slope roofs, especially when working near edge conditions. Positioning-device systems are systems rigged in such a way as to allow employees to be supported and to work with both hands free while leaning.[9] Positioning-device systems are necessary on steeper roofs where a worker is in jeopardy of losing his or her footing. The requirements set forth by Subsection 1926.501(e) are similar to those of the personal fall-arrest system and are described in *Table 3* as they apply to steep-slope roofing and its design loads. The consultant should remember that the test methods described in Appendix C can be used in testing the positioning-device systems, as previously noted.

One other option for consultants with regard to fall protection systems is covered by Section 1926.502(k). OSHA 29 CFR 1926 clearly states that this option is available only to employees engaged in leading-edge, precast concrete erection, or residential construction work [see 1926.501(b)(2), (b)(12), and (b)(13)] who can demonstrate that it is not feasible or creates a greater hazard to use conventional fall-protection equipment. The standard requires that the plan must be developed by a qualified person and specifically for the site that it will be used. Basically, this is a last resort. Several specifics are included for the use of this method of preparing a fall-protection

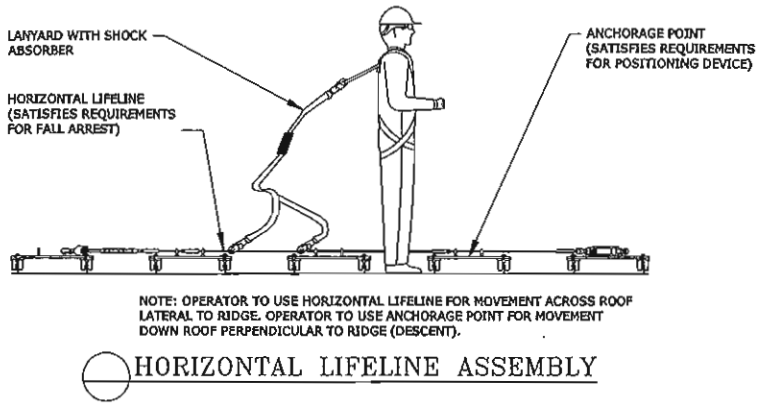


Figure 1 – CAD image of noninvasive anchorage points and horizontal lifeline assembly. System is designed for fall-arrest and position-device requirements.

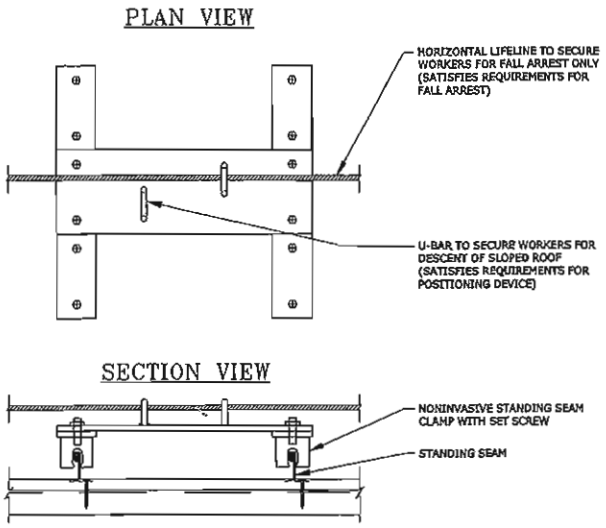


Figure 2 – CAD image of plan view and cross-section view of noninvasive anchorage points and horizontal lifeline. System is designed for fall-arrest and position-device requirements.

plan. Consultants must be aware that if they choose to use this method of fall protection, they must be able to explain the way the standard methods of fall protection (i.e., personal fall-arrest systems, guardrails, safety nets) cannot be used.

ANSI/IWCA I-14.1

In addition to issuing citations that reference their regulations and standards, OSHA has established what is referred to as the *general duty* clause, which enables the agency to issue citations that reference other agencies' or organizations' standards or regulations. This clause declares that each employer shall furnish each of its employees with a place of employment free from recognized hazards that are likely to cause death or serious physical harm and shall comply with occupational safety and health standards promulgated under this Act.[10] The latter part of this section essentially allows OSHA to issue a citation for any published standard related to safety and health in the workplace. As it pertains to safety equipment used in the construction of steep-slope metal roofs and, as previously mentioned, the standard that is becoming notable for citations issued under the umbrella of this act is ANSI/IWCA I-14.1.

Consultants should understand and be able to account for the standards established by I-14.1. Although the standard is written specifically for window washers, it clearly outlines good practices and design requirements for fall-protection equipment for any aspect of the construction industry, which is the reason it is getting so much attention from OSHA. As mentioned previously, OSHA has proposed several rule changes to Part 1910 that were derived from Standard I-14.1. The most notable parts of the I-14.1 standard that are being proposed for adoption are its testing and certification requirements and the responsibility of the building owner to ensure that the safety equipment is in place on the building and is certified and regularly maintained.[11] For this very reason, design professionals should familiarize themselves with this standard. The ANSI/IWCA publication contains a wealth of information that can be applied to the safety equipment on steep-slope metal roofs, including, but not limited to, design requirements, testing recommendations, and application practices. The

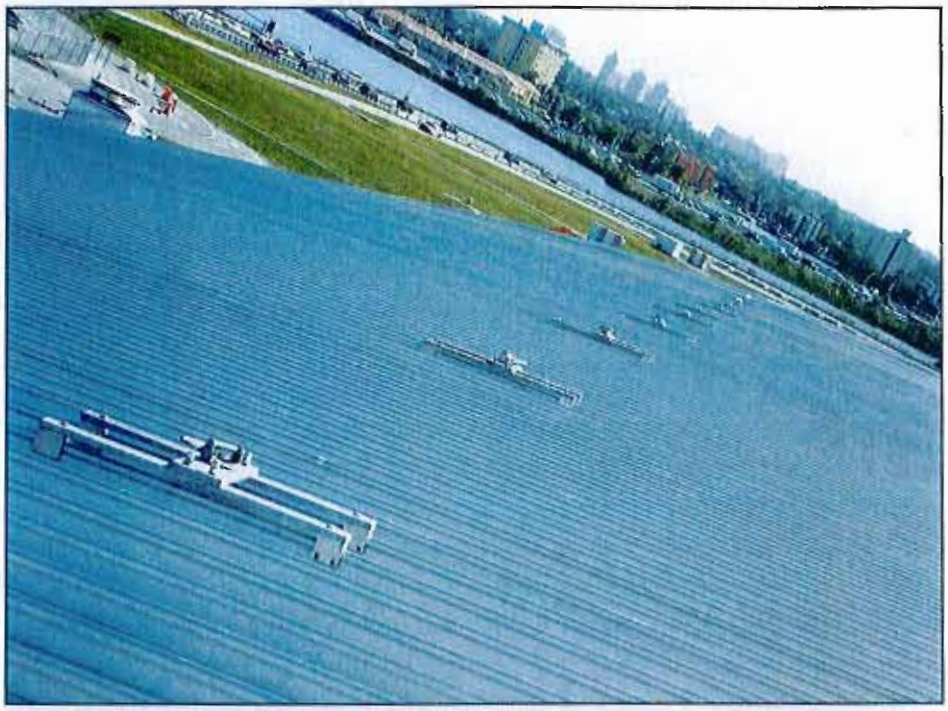


Photo 1 – Example of anchorage points installed on a standing-seam metal roof at Northwest Florida Beaches International Airport (horizontal lifeline not yet installed). System is designed for fall-arrest requirements only. Photograph courtesy of Pro-Bel.

publication is split into two parts: Part A was developed for those who will use the equipment, and Part B was developed for those who will design, manufacture, and install the equipment. Therefore, consultants should have a deep understanding of Part B (most notably, chapters 7, 8, and 9, which cover building requirements, inspection and testing, and anchorage and fall protection, respectively) and be able to apply the standards that it establishes.

One important distinction between the ANSI/IWCA publication and the OSHA standards is that the ANSI/IWCA publication stipulates that a professional engineer must oversee the design, installation, and testing of the safety equipment. Recall that the OSHA standards reference a "qualified person," which is a professional engineer, but is not specifically called out as such.

SOLUTION

For the most part, if the regulations established by the ANSI/IWCA publication are followed, then the regulations established by OSHA will be met or exceeded. Many of the requirements stipulated by the ANSI/IWCA publication expound on the requirements set forth by OSHA. The I-14.1 standard should be used as a guideline because it is more organized and more clearly defines the design requirements, but consultants should make certain that the requirements and criteria set forth by OSHA are followed. One hopes that the rule changes proposed for the 29 CFR 1910 will be accepted, and the important differences between the two standards will be implemented.

Now that all the industry standards are understood, what is the solution to the problem at hand? Let us revisit the problems: 1) steep-slope metal roofs are either installed without permanent safety equipment in place after original construction, 2) the permanent equipment that was installed during original construction is inadequate by today's standards, or 3) the permanent equipment that was installed during original construction creates a penetration for moisture intrusion through the roofing system.

Often during a steep-slope metal roof restoration, the safest, most practical, and most cost-effective option is to discard any safety equipment on an existing roof (unless it has been certified, inspected, and maintained in accordance with ANSI/IWCA I-14.1) and to install new safety equipment. Although there are many solutions to the problem, the authors have found that nearly all steep-slope metal roofs can be permanently equipped with fall-protection and positioning-device systems that include noninvasive, horizontal lifeline systems and anchorage points. The horizontal lifeline system should be used in the fall-protection system, and the positioning-device system should incorporate the anchorage points separately (see *Figures 1* and *2*).

Systems exist today that can be installed to the seams of a standing-seam metal roof without penetrating the roof system and creating a potential leak location

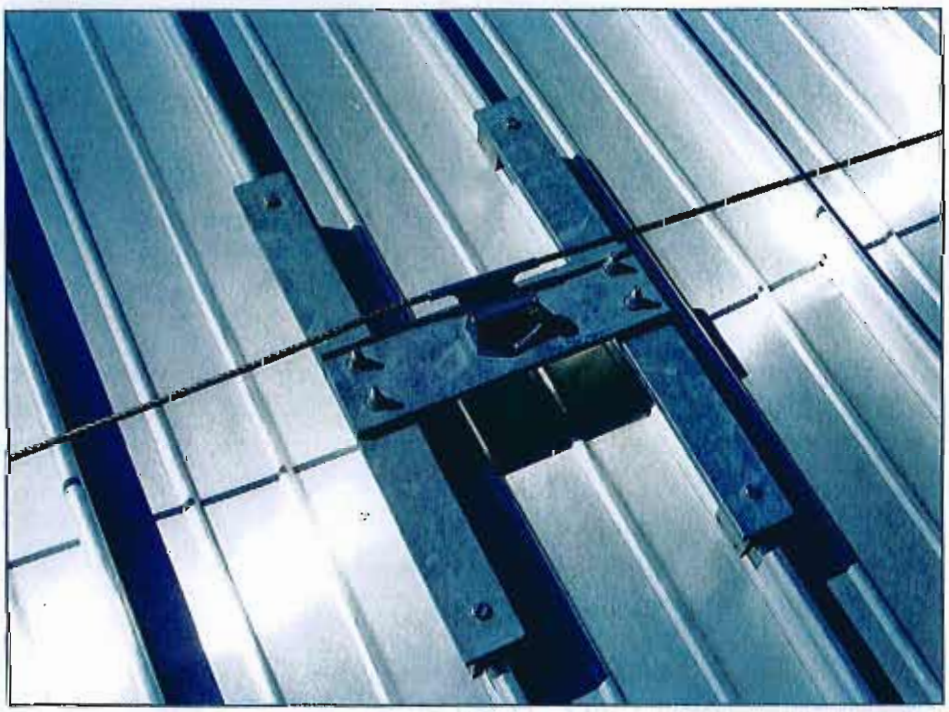


Photo 2 – Example of anchorage points installed on a standing-seam metal roof at Northwest Florida Beaches International Airport (horizontal lifeline not yet installed). Illustrates cross section point of view similar to configuration depicted in Figure 2. System is designed for fall-arrest requirements only. Photograph courtesy of Pro-Bel.

Photo 3 – Example of anchorage points with horizontal lifeline installed on a standing-seam metal roof at Northwest Florida Beaches International Airport. Illustrates plan point of view similar to configuration depicted in Figure 2. System is designed for fall-arrest requirements only. Photograph courtesy of Pro-Bel.

yet still achieve the required load resistance. These clamps are manufactured for most seam types on the market today (see *Photos 1* through *3* and *Figure 2*). If considered during the design, tested, and properly installed, these types of systems will meet the requirements listed previously as included in OSHA 29 CFR 1910 and 1926, as well as ANSI/IWCA I-14.1

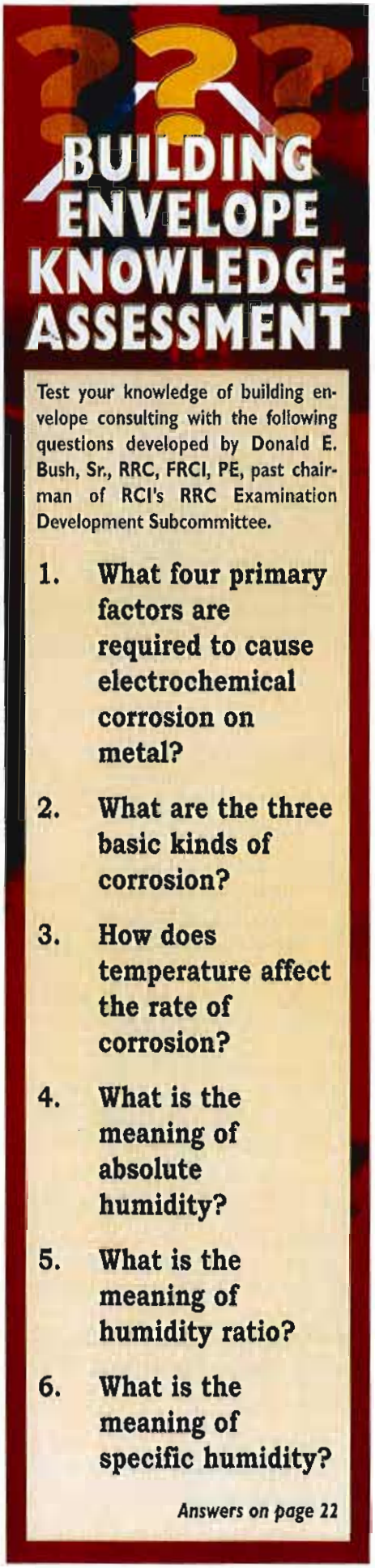
CONCLUSION

When getting involved as a consultant on a steep-slope metal roof restoration, safety before, during, and after should always be of utmost importance. Existing buildings almost always have multiple problems with regard to their existing safety system or lack such a system entirely. We have outlined some of the considerations, discussed upcoming changes being considered, and given lists and locations of the resources that should be understood and accounted for by consultants when designing steep-slope metal roofs.

There are several companies throughout the United States and Canada that specialize in the design, manufacture, and installation of safety equipment on roofing systems in general. Consultants should understand the most current industry standard requirements for safety and consult with one such company when attempting to understand and account for safety equipment in a steep-slope metal roof restoration. At the end of the day, we want to provide a great service to our clients, provide proper safety protection for the workers, and ensure the safety and welfare of those around the project and, most important, make sure everyone goes home at the end of the day. Making sure we adhere to all the considerations outlined is the best way to take care of these issues. We promise our wives not to shimmy up any more steep-slope roofs without proper safety considerations.

REFERENCES

1. "I-14 Window Cleaning Safety Standard, Why It Matters to You," www.iwca.org/content.asp?CID=133, accessed July 14, 2010.
2. "Walking-Working Surfaces and Personal Protective Equipment (Fall-Protection Systems); Proposed Rule, *Federal Register* 75. 99, 2010 www.citationmachine.net/index2.php?start=&reqstyleid=10&reqsrcid=149&mode=form&more=yes&source_title=Online%20Journal%20Article%20-%20One%20Author&source_mod=0^150&stylename=Chicago&more=#, accessed July 14, 2010.
3. *29 CFR 1926.500(a)(1), Subpart M,* January 18, 2001, www.osha.gov/pls/oshaweb/owadisp.show_docum



BUILDING ENVELOPE KNOWLEDGE ASSESSMENT

Answers to questions from page 21:

1. **a. An anode**
   b. A cathode
   c. An electrolyte
   d. An electrical circuit
2. **a. Chemical**
   b. Electrochemical
   c. Physical

   These differ according to the degree of involvement of the ions, electrons, and atoms.
3. **Increasing the temperature of a corrosive system will normally have the effect of increasing corrosion rates.**
4. **The ratio of the mass of water vapor to the total volume of the air sample. In SI (International System of Units) units, absolute humidity is expressed as kg/m³. In in/lb units, it is expressed as lb/ft³.**
5. **The ratio of mass of water vapor to the mass of dry air contained in the sample. In SI units, humidity ratio is expressed as grams (g) of water vapor per kilogram (kg) of dry air.**
6. **The ratio of the mass of water vapor to the total mass of the dry air. In SI units, specific humidity is expressed as kilograms of water vapor per kilogram of dry air.**

REFERENCE:

Professional Roof Consulting class, Section 8, RCI, Inc.

ent?p_table=STANDARDS&p_id=10756, accessed July 14, 2010.

4. *29 CFR 1926.500(b), Subpart M,* January 18, 2001. www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10756, accessed July 14, 2010.
5. *29 CFR 1926.501(b)(11), Subpart M,* January 26, 1995, www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10757, accessed July 14, 2010.
6. *29 CFR 1926.501(c)(1)-(c)(3), Subpart M,* Jan. 26, 1995, www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10757, accessed July 14, 2010.
7. *29 CFR 1910.66 Appendix C, Subpart F, Section I,* www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9730, accessed July 14, 2010.
8. *29 CFR 1910.66, Appendix C, Subpart F, Section II,* www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9730, accessed July 14, 2010.
9. *29 CFR 1926.500(b), Subpart M,* January 18, 2001, www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10756, accessed July 14, 2010.
10. *OSHA Act of 1970 Section 5(a)(1) - (a)(2),* www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=OSHACT&p_id=3359, accessed July 14, 2010.
11. ANSI/IWCA, I-14.1-2006, Window Cleaning Safety, pp. 17-19, 2006.

Josh Tatum, EIT

Josh Tatum, EIT, is a project engineer for Building Engineering-Consultants, Inc. (BE-CI), an engineering consulting firm based in Destin, FL, with offices also in Gulf Shores, AL, and Houston, TX. Mr. Tatum has developed a special interest in suspended scaffolding and fall-arrest equipment and, since working with BE-CI, has headed the development of this area of specialization within the company. He graduated from Auburn University with a BS in civil engineering. He is a member of RCI and will be taking his RRO exam in Orlando, FL, in October 2010.

Robért Hinojosa, PE, RRC, RWC, RRO, CDT

Robért Hinojosa, PE, RRC, RWC, RRO, CDT, is the principal engineer and a primary shareholder of Building Engineering-Consultants, Inc. (BE-CI). Mr. Hinojosa has a BS in civil engineering from Texas A&M University and an MBA from the University of Houston. He is a registered professional engineer in Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, and Arkansas. He is also a Construction Document Technologist (CDT) through CSI. Robért is a member of RCI, CSI, ASCE, and is the current president of the Panhandle Branch of the Florida Chapter of RCI.

HELPING HANDS

Have you or your company donated time, labor, or money to help an individual or nonprofit organization repair its roofs or exterior walls? *Interface* would like to hear about it. Call or write Executive Editor Kristen Ammerman: 800-828-1902 or kammerman@rci-online.org.