



Metal Roof Installation Manual

Chapter 9: Safety Issues

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BUILD LEGACIES
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Chapter 9: Safety Issues

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9. INTRODUCTION

The material in this chapter may be the most important material which will be covered. It has the potential of affecting the business, the job, and the individual installer. **NOT** following the guidelines discussed may cost the business thousands of dollars, force the job to go over budget, the schedule to be past due, and cost the individual installer many dollars in lost wages, pain in injuries, and even death.

Safety is everyone's concern, but the individual installer is the key factor to having a safe working environment. *Knowing* safety and *practicing* safety are quite different. It is critical that each individual installer choose to work safely on every job. As a professional roofing worker, an installer must take proper precautions, not only for themselves, but for the safety of their fellow workers.

This chapter will discuss and review safety issues critical to metal roof installation. The issues covered will be *in addition* to those safety issues common within the construction and roofing industry.

Each installation will have applicable building codes, procedures, and regulations which must be followed. These may be government-directed or project-specific. Regulations such as building codes, OSHA regulations, or engineering specifications are designed to maximize safety and provide protection. **Always follow current building codes, OSHA regulations, or project/device specific instructions for the installation.**

9.1 Job Site Safety

While the main work of the installer takes place on the roof of the structure and a small area on the ground, the job site has its own safety hazards which the installer needs to carefully navigate. Always survey

the work area and be observant of the activity being performed by other roofing members, as well as members of the other trades. As seen in Figure 9-1, this includes such hazards as overhead work, traffic, welding, and fabrication work. Other activities create their own job hazards: open areas like holes and roof penetrations; piles of materials; and wires, pipes, and tools. All these create walking and tripping hazards to an installer.

Read and observe all posted job site rules, including any traffic, parking, caution, and hazard postings.



Figure 9-1
The Job Site Itself Presents Many Hazards

9.2 Chemical and Material Safety

Every proper metal roof installation involves the use of various chemical sealants, adhesives, cleaners, and touch-up materials. These materials present risks to the installer, especially health risks. Be sure to read and follow any instructions related to the material being used. These will advise the installer which materials, methods, Personal Protective Equipment (PPE), and clean-up requirements are necessary and specific to the product being used. There are also Material Safety Data Sheets (MSDS) available for every product used. These MSDSs are available online, or from your job site leader.

There are additional hazards present when working around welding or soldering operations. (Figure 9-2) Do not look directly at a weld arc as it can cause severe, and painful, eye damage. Most welding and soldering hazards involve burns, hot material, and inhalation of the fumes given off when welding or soldering. Proper ventilation is a must when performing welding or soldering.

In case of fire, it is advisable to have a dry chemical fire extinguisher near any welding or soldering work being performed.

Never bypass or disable safety features of tools or equipment. If a safety feature, guard, or shield must be disabled in order to perform the work; it is a probable indication that the wrong tool is being used.

Lead

Solder and some roof materials may contain lead, and present hazardous risks, especially if ingested or inhaled. This risk increases if the installer is involved in remodeling or renovation work.



Figure 9-2

Soldering and Welding Operations Present Their Own Set of Safety Hazards

Most lead exposure occurs when an installer inhales dust from cutting, sweeping, or moving lead-based materials. Ingestion often occurs when an installer fails to wear proper protection such as gloves and coveralls, then fails to wash

their face and hands each time they stop work. The lead is ingested when food is picked up and eaten, or a cigarette is smoked with unwashed hands which were just working with lead-based materials.

Key actions an installer should perform when working with lead include¹:

- Safely setting up the work area
- Protecting self
- Minimizing dust
- Leaving the work area clean
- Controlling the waste
- Verifying work completion with cleaning verification procedure or clearance. (Exterior work, such as a roof, only requires a visual inspection for dust, chips, or debris.)

When working with lead-based materials, there may be other rules, regulations, and procedures that need to be followed, including forms and additional paperwork. These may involve requirements from federal agencies like OSHA (Occupational Safety and Health Administration) and the EPA (Environmental Protection Agency), as well as state and local agencies or governing bodies.

Separate training materials, classes, and certifications on lead safety are available. Depending on the specifics of the job, nature of the work, and other requirements, it may be advisable that the installer receive additional lead safety training.

9.3 Personal Safety

On any job, personal safety is of the utmost importance. When a worker is injured, not only is his ability to perform work lost, but

¹ As mentioned in EPA-740-R-09-001.

also the knowledge, skill, and expertise he brings to the job is lost. In addition to general work and job site safety considerations, there are personal safety areas specific to roof installation. These include fall protection, Personal Protective Equipment (PPE), and the proper handling of metal roof panels. The installer needs to understand and follow these additional safety considerations to minimize, and ideally avoid, personal injury while safely performing the work.

9.3.1 Fall Protection

Falling is a common hazard and risk long associated with roofing. For a metal roof system installation, work is often performed along exposed roof edges. The proper fall protection system should be in place *before* work begins, and an installer must always be aware of his position on the roof in relation to the surroundings.

Depending on the roof's slope, height, and configuration, roof workers may be required to wear a Personal Fall-Arrest system (PFA).



Figure 9-3

A Personal Fall-Arrest System (PFA) Includes a Harness, Lanyard, and Anchor System

A PFA, as shown in Figure 9-3, is a body harness, lanyard, and anchor system that will limit a person's fall to 6 feet or less. PFA's should be checked for wear, damage, deterioration, and broken or deformed D-rings. PFA equipment that is defective, or

has arrested a fall, must be removed from service immediately.

If lifelines are used, each worker must be attached to a separate lifeline. Warning lines, guardrails, or scaffolding may be required. On a steep-slope roof, a guardrail must have a toe board. Also, guardrails must not have surfaces that could snag clothing or puncture a person's skin. A guardrail should have a top rail that is between 39 inches and 45 inches high, a mid-rail that is halfway between the roof surface and the top rail, and a toe board at least 4 inches high.

For a residential steep-slope roof with a slope of 8" to 12" per foot, and an eave height of 25 feet or less, the Occupational Safety and Health Administration (OSHA) Interim Fall Protection Compliance Guidelines for Residential Construction apply. That means a safety monitoring system may be used on metal roof installations. Be aware that OSHA requires other critical work-practices to be followed. For a commercial steep-slope roof, some other type of fall protection, such as guardrails or PFAs, is required.

As mentioned earlier, skylights are a potential hazard. Holes and skylight openings should be securely covered and marked, or have guard rails around them. Smaller openings also create fall hazards, and can cause a worker to lose his balance.

Another potential risk an installer must consider, especially on a metal roof, is the presence of pollen, frost, or dew that can make the surface slippery. Extreme care should be used when walking on any roof surface.

Fall hazards are also present when the installer uses another common piece of construction equipment: the ladder. Whenever a ladder is used, obey the following ladder safety guidelines:

- Maintain a ladder angle ratio of 1:4 as shown in Figure 9-4. This means set the feet of the ladder 1 foot away from the building for every 4 feet of the building's height.
- Never use a ladder on uneven ground
- Secure the base of the ladder. If the surface is slippery or wet, dig a small trench for the ladder's feet or find another way to secure them. If you cannot dig-in the ladder, move it to another location. (Figure 9-4)

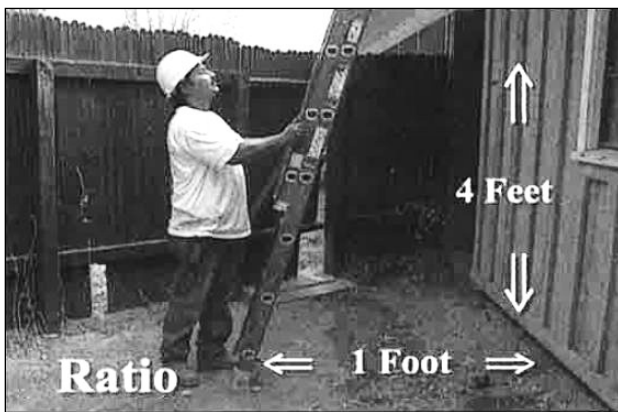


Figure 9-4
Maintain a Safe Ladder Angle Ratio of 1:4

- Extend the ladder at least 3 feet above the eave and tie it off. This is shown in Figure 9-5.



Figure 9-5
Extend the Ladder At Least 3 Feet Above the Eave and Tie It Off

- Never carry anything that could cause you to lose your balance.

9.3.2 Personal Protective Equipment (PPE)

Cuts, slips, and debris are daily hazards for the metal roof installer, and wearing the proper PPE will reduce the risk and severity of any injury.

Cutting – Hand Protection

Simply put, metal roofing material is pre-formed sheet metal. Sheet metal has sharp edges and corners, especially when cut. Gloves should be worn whenever working with metal roofing material. The best injury protection will come from wearing heavy leather gloves. The gloves should be clean and provide a good grip. Dirty gloves can soil and scratch the panel surface. Gloves also protect the hands from burns when handling materials heated by exposure to the sun.



Figure 9-6
Gloves Offer Protection to the Hands and to the Roof Panel.

Additional cut protection is provided when appropriate clothing, such as long sleeve shirts, long pants, and work boots are worn. Although less comfortable than short sleeved shirts and shorts, they offer protection from

sunburn and burns from contact with hot metal during warmer climate installations.

Eyewear

Proper eyewear should be worn at all times. When the proper safety-approved eyewear is worn, the eyes are shielded from dirt and debris as well as flying insects.

Figure 9-7 shows an installer wearing dark-tinted, protective eyewear. This reduces eye strain and glare from metal panels, especially on bright days.

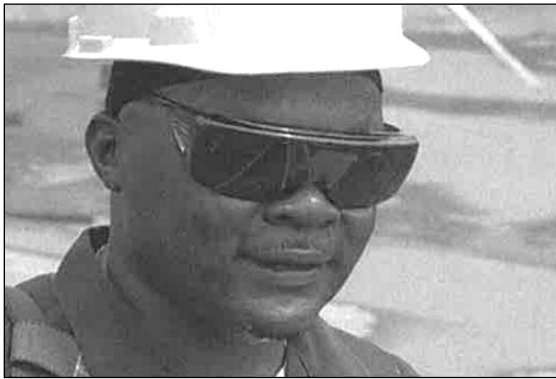


Figure 9-7
Proper Eyewear Should Be Worn at All Times

Footwear / Slip Resistance

When working above ground level, any fall increases the severity risk of an injury. Proper footwear must be considered for any metal roof application. Metal roofs are naturally slippery. Premium finishes are designed to resist the adhesion of dirt, dust and other materials. Technically, their chemical makeup is closely related to the "non-stick" Teflon. This condition is made much worse when condensation, frost, rain, or any other moisture is present on the panel. Dry dust and dirt can also cause a worker to slip and fall. Additional care must be taken when working both on the ground *and* on the roof surface in order to avoid tracking dirt and mud onto the roof surface. This tracked material may also cosmetically damage the panel as shown in Figure 9-8.



Figure 9-8
Inattention to Footwear May Cause Panel Damage

An additional pair of shoes may be necessary, and used only on the roof surface.

9.3.3 Handling Materials

The safe handling of metal roofing materials requires the installer to pay close attention to how these materials are handled. This is especially true in the handling of metal roof panels and longer trim and flashing pieces. In addition to the material being fragile and having sharp edges; environmental factors, like wind and thermal heating of the metal, create a situation where injury and damage can quickly occur if the proper handling precautions are not taken.

Improper handling of panels can also result in cosmetic damage and premature corrosion. For example, galvanized and Galvalume[®] panels can be marked and stained by improper handling and care as seen in Figure 9-9.

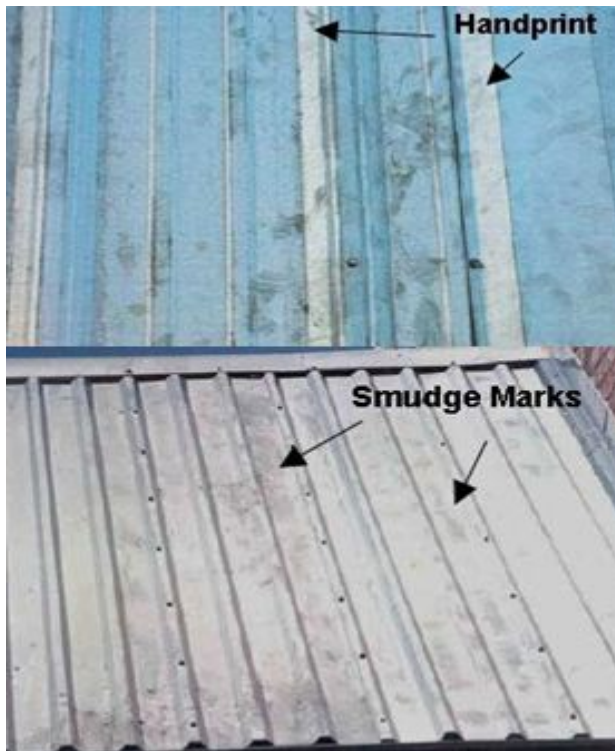


Figure 9-9
Cosmetic Damage Caused By Improper Handling

Some architectural panels also require cotton gloves when handling to prevent fingerprint staining.

Proper Methods of Lifting and Moving Panels

When handling individual metal roof panels, handling practices differ from one product to another. There are several reasons for this difference. Non-structural panels tend to be more fragile due to their smaller rib dimensions. Structural panels with larger trapezoidal rib profiles are also fragile until installed into place and interlocked with the rest of the roof system. Softer metals, like copper, zinc, and annealed stainless steel, are easily damaged in comparison to carbon steel or a high tensile aluminum alloy.

The handling methods discussed in this section will cover the handling of *individual* panels. The movement and storage of panel *bundles* will be handled in Chapter 11, Section 11.3 *Unloading, Receiving, and Storing Materials*. The handling guidelines

discussed here can safely be applied to any metal roof material.

While *metal roofs* are strong and light-weight, the individual *roof panels* are fragile and awkward to handle. Roof panels are long, some up to 30 feet or more in length. Panels should not be handled by one individual, but by two or more persons, depending on the panel style and size. The usual method for handling longer panels is to lift and carry them from a seam edge in front of the chest. Both proper and improper methods of handling are illustrated in Figure 9-10.

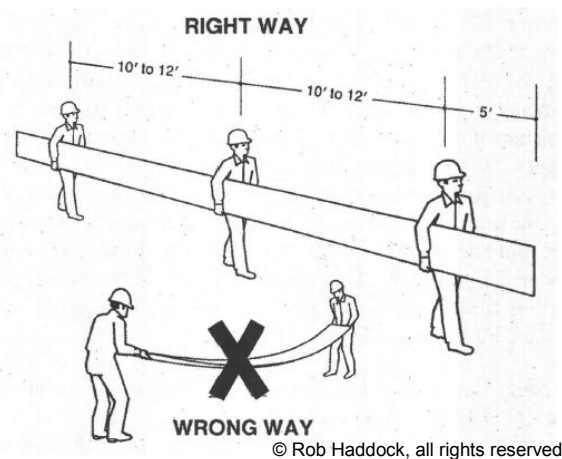


Figure 9-10
Proper Panel Handling Prevents Damage

To prevent panel damage, always use as many workers as necessary, lift and lower in unison, and properly place the panels. When laid down on the ground or roof, long panels require multiple points of support beneath them.

Staging Panels on the Roof

This section will discuss the staging of individual panels for installation. The staging of *bundled* panels will be covered in Chapter 11, Section 11.3, *Unloading, Receiving, and Storing Materials*. The proper staging of material can make the installation process flow quickly, smoothly, and safely. (Figure 9-11)



Figure 9-11
Proper Staging of Material Improves
the Installation Process

Three areas to consider when staging individual panels are:

- **Location**
- **Prevention**
- **Orientation.**

The location of the staged material should:

- Avoid edges or roof openings where there is a trip or fall hazard. (6 foot clearance minimum)
- Be placed in proximity to where it will be used without interfering with the normal path of the roof installation.
- Avoid placement near work being performed by the other trades working on the roof area.
- Not be placed near any exhaust vents currently in use.

Prevention of panel damage should be addressed when staging the material. Many panels are damaged during this process of the installation. Dents, dings, and scratches like the ones in Figure 9-12 are caused by careless staging. Keep the sliding of any panels to a minimum. Lift, move, and place, the panels instead.



Figure 9-12
Improper Staging of Material Will Cause Damage

The panels must be supported in multiple places to prevent buckling of the panel. Some material may require additional support between the individual panels or sheets for protection and ventilation. This is especially true if the panels are not nestable, or if there is a chance of moisture getting between the panels. Failure to do so may result in damage to the panel or its finish as pictured in Figure 9-13. If the panels are going to remain staged for an extended period of time, additional protection, as covered in Chapter 11, Section 11.3.7, should be implemented.

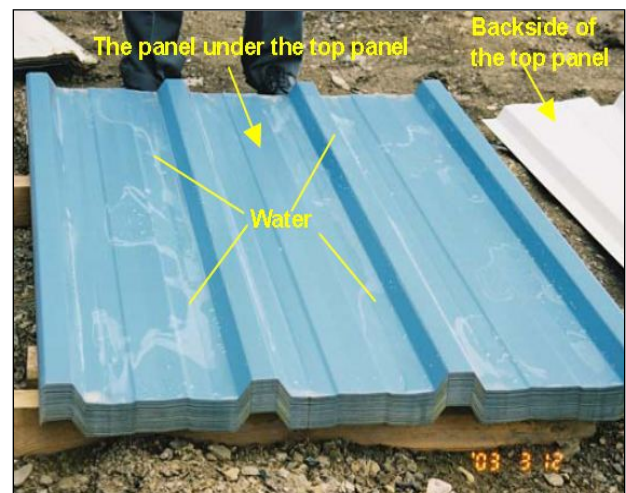


Figure 9-13
Although Properly Supported, Trapped Moisture
Damaged these Panels

New roof panels are slippery. A stack of panels can easily start sliding, injuring workers and causing significant damage. Rarely is the staged surface flat; therefore, stage the material in order to avoid the possibility of any material sliding as the panels are used.

Steps should be taken to protect any staged material on the roof surface from the effects of wind. Windy conditions, or sudden gusts of wind, can send material flying through the air, or cause staged material to shift.

When initially staging the material, consider where and how the panel will be installed on the roof. The orientation of staged material is important and can save time, money, and greatly ease the installation of the panels. Stage the roofing material to avoid having to flip, turn, or rotate the panel in order to install it in place.

Hand Tool Safety

Handling of metal roofing materials often involves the use of hand tools for the cutting, bending, and shaping of material, and may present additional danger to the installer. Approved methods of cutting include aviation snips, sheet metal hand shears, electric sheet metal shears, and pneumatic or electric nibblers. Most of these tools will be discussed in more detail in Chapter 12, *Tools and Field Operations*. Properly using these tools will deliver the cleanest cuts, leave a minimal burr, and cause the least amount of damage to the material. Always remember to wear the necessary PPE to minimize the risk of injury to the installer when using these tools.

Handling Panels in High Wind

The wind is one of the most dangerous hazards an installer faces on a regular basis, especially when working on the roof surface itself. The wind can knock an installer off

balance, blow tools and materials off the roof, and make a stable work area unstable.

The wind can be especially dangerous when handling roof panels. The roof of the structure becomes a hazardous work environment during weather events involving rain, freezing temperatures, snow, and wind. Any roof work during such weather events is strongly discouraged and should be discontinued! When roof work is already in progress and it becomes necessary to prepare for, or react to, such weather events, make sure that all materials are securely tied and weighted down, and that all personnel are off the roof surface.

Summary

Safety is one area that affects each worker personally and individually. Accidents often happen the moment that a person stops concentrating on the job. The safety matters discussed here can be applied to any job, using any material.

Installer Note

When lifting metal panels by hand, use these proper lifting techniques:

- Check the weight of the materials *before* trying to lift them.
- Stand close to the object being lifted.
- When lifting, maintain the back's natural curve, with the head up and both knees bent. (Figure 9-14)
- Plant both feet to maintain good balance.
- Straighten both knees to stand up.
- Hold the object close to the body and walk carefully.
- When setting down the object, bend carefully at the knees.

