



Metal Roof Installation Manual

Chapter 12: Tools & Field Operations

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BUILD LEGACIES
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Chapter 12: Tools and Field Operations

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12. INTRODUCTION

Every job has tools, common and specialty, required to perform the work. Some tools are necessary in order to do the work; other tools make the work simpler, easier, and faster; while others improve the safety and quality of the work performed. Tools may be small hand-held tools or large tools which are set-up and used within a designated area on the job site. In addition to hand tools, tools may be pneumatic, hydraulic, or electrically powered.

This chapter will not cover every possible tool an installer may use on a roofing job, but will focus on a few commonly used tools within the metal roofing trade. Although these tools are common within the trade, they may not be common to the new or inexperienced installer.

The purchase and ownership of such tools will vary across the trade, but It is common practice that the individual installer is expected to provide, and "show up on-site," with their own personal set of tools. These hand and construction tools, like the ones illustrated in Figure 12-1, are considered common to the trades, including the roofing trades. Tools such as hammers, snips, utility knives, tape measures, and screwdrivers are normally purchased based on personal preference, quality, and ability to perform the work required.

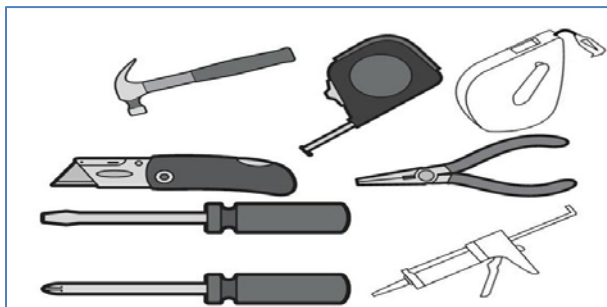


Figure 12-1
Common Hand Tools

Note – The Installer is Normally Required To Provide These and Similar Tools

Important Safety Note

In the United States, tools, including hand tools, are regulated by OSHA. General tool rules are governed by OSHA Part 1910, sub-part P, while construction tools are covered in OSHA Part 1926, sub-part I. Ultimately, the user of the tool, in this case the installer, is responsible for the safety of the tools used. This includes hand tools and power tools.

Often a metal roof installation requires tools specific to the panel type and profile being installed. These specific tools are often rented, leased, or borrowed from the manufacturer or another party. Special provisions are then made for informing and training the appropriate personnel to ensure safe and proper operation of such tools.

Any tools being used by an installer should be used in accordance with all safety rules, including the wearing of appropriate PPE, such as safety glasses and gloves.

5 Basic Rules

Five basic safety rules can help remove most hazards associated with the use of hand and power tools:

- Keep all tools in good condition with regular maintenance.
- Use the right tool for the job.
- Examine each tool for damage before use, and do not use damaged tools.
- Operate tools according to the manufacturer's instructions.
- Provide and properly use the right personal protective equipment.

12.1 Screw Gun – Proper Torque Set-Up

Considering that even the most basic roof assembly requires hundreds, if not thousands, of fasteners, the screw gun is one of the installer's most used tools. The screw gun is the one tool that can save an installer literally hours of time, and provide consistent quality in fastener installation. Unfortunately, this only happens when kept in good working order and properly set-up. When considering or evaluating a screw gun, like the one shown in Figure 12-2, an installer should look for the following minimum requirements and accessories:

- A clutch type screw gun
- 2,000 to 2500 rpm
- Depth sensing nose
- ¼" hex bit
- #2 combination bit (square / Phillips)

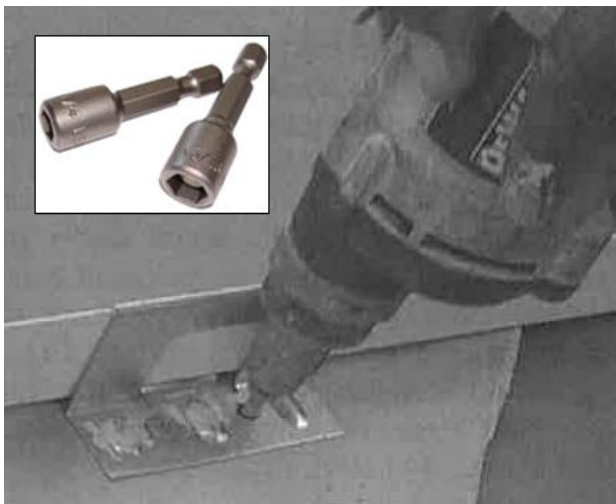


Figure 12-2
Electrically Powered Screw Gun
with Assorted Bits (Inset)

Various panels, materials, decking, and fasteners will require different gun settings, especially for torque. The procedure for setting torque will vary from gun to gun. It is important to read and follow the set-up procedure exactly as described by the manufacturer.

If torque is set too low, the fastener may not insert fully into the material, causing seals on the fastener or panel to improperly seal and leak. Not enough torque may also affect the ability of the roof to withstand uplift stresses and other forces the roof may experience.

If torque is set too high, the fastener may be forced too far into the material causing deformation and damage of the panel. This may cause seals to leak, ponding areas for moisture, or even the fastener to strip. This will visually detract from the appearance of the roof as well as provide areas where leaks and premature corrosion may occur. In addition to leaking, stripped fasteners do not provide any strength to the roof in order to withstand the stresses experienced.

Gun settings should be checked on a regular basis, ideally at least once per shift, and written records should be kept. Written records and proof of a system of checking settings will be invaluable if legal or quality issues should ever develop.

It is important for an installer to always re-check the tool settings whenever a gun is borrowed, returned, or if the tool has been dropped. Improper settings can damage fasteners, panels and cause performance failures of the roof.

12.2 Drill

Although similar in appearance and mechanical function to a screw gun, the portable drill is quite different. The drill is used for making holes in material, such as those required for pop rivets. The drills an installer uses may be electric, as seen in Figure 12-3, battery powered, or pneumatic. Drills will have a higher rpm range than a screw gun, are usually reversible, and may or may not have a clutch-style bit holder.



Figure 12-3
Electrically Powered Drill

12.3 Nibbler

Nibblers are used for general metal cutting, such as cutting the panels in hip and valley areas. The nibbler may be hand powered, for occasional field use, pneumatic, or electrically powered. This is one of several safe and recommended methods of cutting metal roof material.

Installer Caution

Cutting of metal roof material with a circular saw is not recommended and in some cases may jeopardize the roof installation and void portions of the warranty. Abrasive cutting with a circular saw creates several risks for a metal roof:

- Saw-cut edges are jagged, unsightly, and will rust quicker than sheared edges. See (a).



(a)

- Saw cutting creates significant heat which burns the paint and galvanizing around the cut edge, leading to premature rust and corrosion. See (b).



(b)

- Saw cutting produces hot metal filings that can burn and imbed in the paint and finish surface causing rust marks and an area of corrosion. See (c).



(c)

At the time of this writing, recent offerings of circular saw blades which are non-abrasive and do not create heat have not been fully evaluated and reviewed. Approval and recommended use of such blades is not endorsed by the writer of this material, at this time. If there is any doubt, an installer should contact the panel manufacturer since warranties may be affected.

12.4 Shears

Both nibblers and shears are used for the general cutting of metal panels and roofing material. Shears cut the material using a scissors-type method. Although the definition of the term shears may include a type of large scissors, in roofing, shears are normally larger, stand-alone pieces of equipment, like the one illustrated in Figure 12-4. They are designed for longer, straight cuts of material. Shears may be hand, pneumatic or electrically powered.

As with any cutting tool, always wear protective gloves and stay clear of cutting blades.

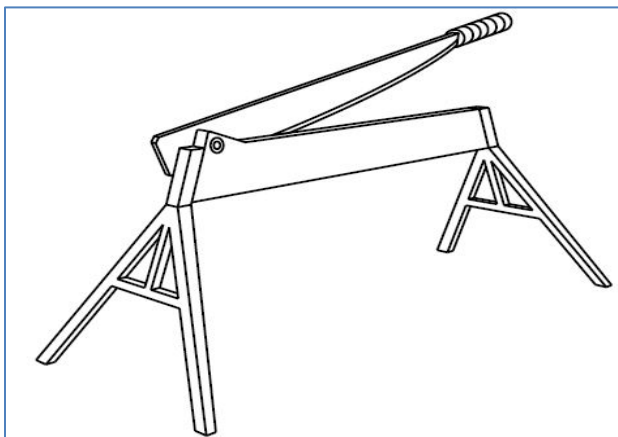


Figure 12-4
Shear, or Trimmer, For On-Site Use

12.5 Snips

Snips are the tool of choice when an installer must do final trimming, or short and curved cuts by hand during an installation. Snips come in three design configurations: left edge, right edge, and centerline (straight) cuts. Snips normally have color coded handles: Red for left edge cuts, green for right edge cuts, and yellow for straight or centerline cuts (Figure 12-5). An installer should have a set which includes all three types. This is one tool where the best quality snip possible should be purchased.

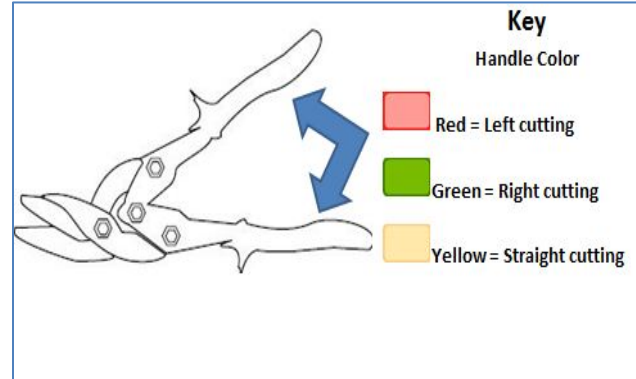


Figure 12-5
Snips, Showing Standard Handle Color Code

12.6 Hemming Tool

Hemming is a bending operation that bends and folds an edge of sheet metal back upon itself. Hemming conceals the sharp edge of sheet metal. The standard procedure for hemming a panel is illustrated in Figure 12-6. A hemming tool provides a quick and safe way to provide a consistent safe bend in the desired metal.

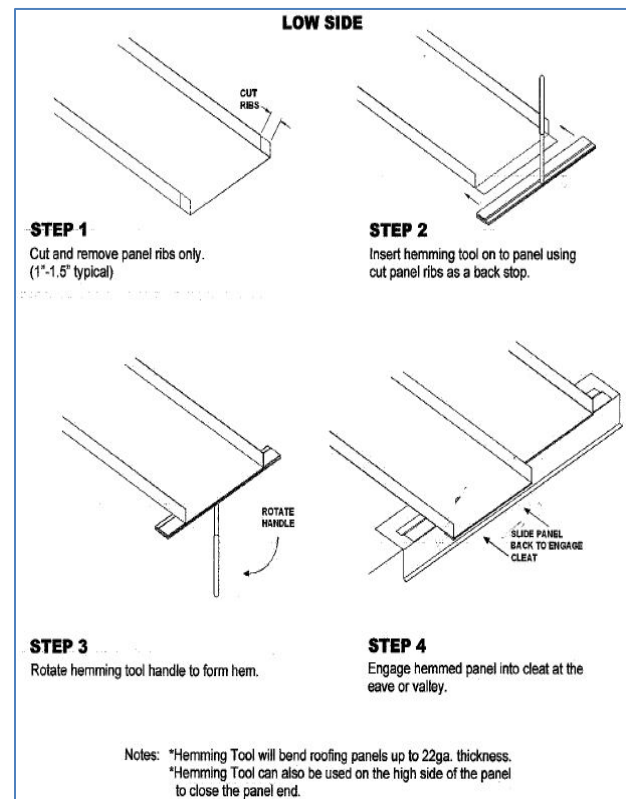


Figure 12-6
Hemming a Panel

Hemming tools come in a variety of sizes and shapes depending on the type panel being installed. As shown in Figure 12-7, some have handles, others do not. Many roof manufacturers offer hemming tools designed specifically for their product, while general purpose hemming tools are also available.



Figure 12-7
Hemming Tools

12.7 Rivet Gun

The rivet gun (Figure 12-8) is used to install pop-style rivets, also referred to as blind rivets, into panels, trim, and flash molding. It is normally a handheld manual tool; however, pneumatic rivet guns are often used when a large amount of rivets are required.



Figure 12-8
Rivet Gun with Nosepiece Adapters

When using either type of rivet gun, the installer must make sure the correct nosepiece adapter is mounted and used in the head of the tool. This is sized to match the shaft, or mandrel, size of the rivet being installed (Figure 12-9). When the correct nosepiece is used, it allows the tool to provide the correct amount of pull which should smoothly snap off the shank, and securely fasten the material.

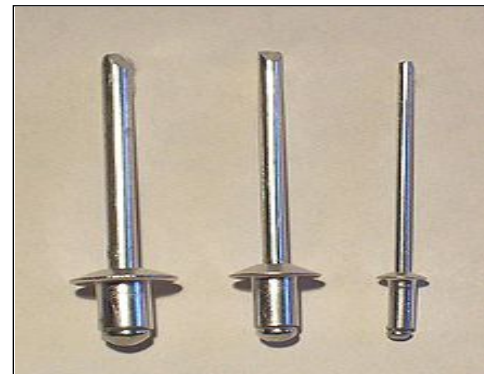


Figure 12-9
Blind Rivets

Note – Nosepiece Adapter of Rivet Gun Must Match the Size of the Rivet Mandrel, or Shaft

12.8 Brake

The purpose of the brake is to bend material in a straight and precise angle. Brakes for roof installations are normally hand-powered, but come in various sizes. The length of the brake will normally determine the length of a single bend allowed at one time. Sizes generally range from around two feet in length, to brakes which allow bends of over 14 feet. The width, or depth, of bend depends on the throat size of the brake, with the largest currently available allowing just over a 20" width.

The brake is designed to be set up and operated on-site. Some styles lay flat on a table; others have legs which support the brake; while still others have wheels mounted on the frame, allowing it to be quickly and easily moved to a better position.

12.9 Seaming Tool

Note: Indented paragraphs in this section are reprinted with permission from the MBMA Metal Roofing Systems Design Manual).

Finishing the seams on some panels requires the use of a seaming tool and is discussed in Chapter 7, *Panel Connections*, Section 7.8, *Mechanically Seamed*. Hand-seamers and crimpers, like the one in Figure 12-10, are available, but are normally used only for small repairs, difficult seam locations, and touch up work.



Figure 12-10
Hand-Seamer/Crimper

When a roof system uses panels which do require machine folding of panel seams, an electric machine seaming tool is used (Figure 12-11). These machines are specific to the seam type and panel profile being installed. They are very expensive, and the adjustments and settings vary by machine. Any installer using a mechanical seaming machine should thoroughly read and understand all instructions provided, and may require additional training specific to the seamer. There are, however, key points and considerations applicable to **any** installation requiring a seaming tool.

Machine characteristics vary from one system to the next. This can be

seen in Figure 12-12. Directionally, some machines seam from eave-to-ridge; others seam from ridge-to-eave; and others operate in either direction. Some seamers can be stopped quite easily and removed midway through a seam, and others cannot. Some machines must be "threaded" on the end of the panel, while others are not. Some machines are reversible; others are not. Many require additional seaming aids, like starting or removal platforms or hand-seamers to manually close or partially close seams at certain areas. The rate of travel is also vastly different from one machine to the next.

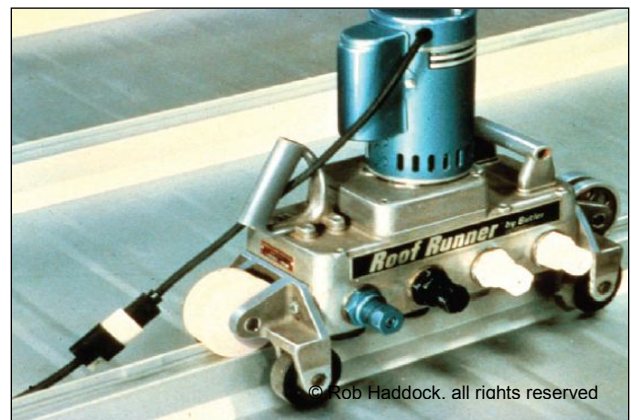


Figure 12-11
Electric Seaming Tool

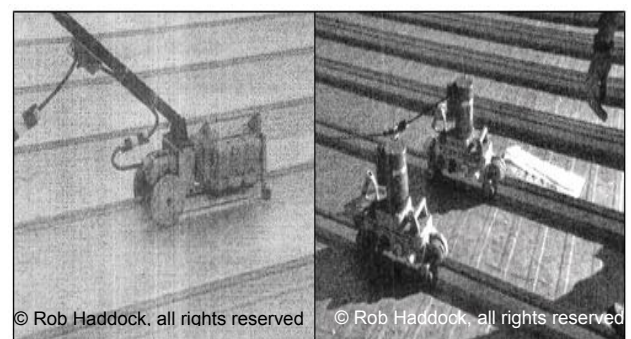


Figure 12-12
Machine Characteristics, Settings, and Procedures, Will Vary Between Seaming Tools

Some machine characteristics may not only have an effect on how the work sequence is scheduled, but on some projects, it may also have an

effect on how flashing interfaces are designed and installed.

For instance, if a roof terminates at a parapet wall, and the seamer must be "threaded" onto the panel end, the detail must allow sufficient room between the wall and the panel end to enable this to happen. Similarly, the last seam location adjacent to a rake parapet must allow clearance for the seaming machine.

Some systems require seaming to be done as the roof installation progresses, while other systems require seaming after the roof is installed. Most (but not all) will seam panels prior to installation of ridge flashing. The sequence of seaming must be known in advance so that arrangements can be made for the procurement of the seaming machine(s) at the appropriate time. If seaming is critical to the roof installation, it is always wise to have a back-up seamer available, as a breakdown will bring the roof installation to a halt.

Because seaming machines are normally proprietary to each system, the roof system manufacturer will have its own policies with respect to the seaming machine. Some may require that the seamer be purchased. Others will rent or lease the seamers. Many offer both options. In some cases, use of the seamer on a loaned basis (for a specified period of time) is included with the sale of the panels. The trend within the industry seems to be away from contractor-owned machines, and toward manufacturer-loaned or rented ones. There are some advantages to this approach. An electric seamer can be a very complex piece

of machinery involving a high degree of sensitive adjustment and critical maintenance. Dies, clearances, and tolerances may have to be adjusted for simple differences like painted vs. unpainted panels, and certainly to compensate for gauge differences.

There is value associated with using a seamer; however, price tags for purchasing such equipment can run up to seven or eight thousand dollars. Not addressing who is responsible for the procurement of the seamer can be a very costly omission. In cases where the installer is an independent contractor, this may be negotiated so that the party furnishing the material also furnishes all specialty equipment including the seaming machine(s).

No matter who furnishes this equipment, there are some general rules an installer should follow with respect to using the seamer:

- Be sure to read and understand the operator's manual before using seamer.
- There should only be one or two individuals responsible for seaming.
- Follow all equipment operating, lubricating, and other maintenance procedures described in operator's manual closely.
- Thoroughly broom-clean the roof of all shavings, dirt, and debris before seaming.
- Be sure that all "pre-seaming" work is complete (e.g. manual seam closing at clip locations or seam starting, if required).

- Seaming always requires 100% monitoring.
- Inspect finished seams carefully to be sure they conform to manufacturer's specifications on finished seam dimensions.

Prior to use; test the seamer on cover sheets or other scrap panels to be sure it is working properly. This also serves as an "operator orientation." Be sure that the test panels are of the same gauge and finish as the actual roof. Some seamers can do irreparable damage to the seam if it is misused, out-of-adjustment, or some malfunction occurs. While in use, it is critical that the operator watches the operation very closely and is always alert, in order to shut down the machine if something goes awry.

When seamer-tooling picks up excesses of sealants, follow the cleaning recommendations set out in the operator's manual. If cleaning instructions are not available, steel tooling can be successfully cleaned by using carburetor cleaner. This is a very aggressive solvent, and will cut through butyl sealants better than any other readily available solvent. However, when so doing, be sure that the roof is protected from this solvent as it will also cut through paint and other panel finishes. WD40 will also work, but is less aggressive, and will require more labor intensive cleaning.

12.10 Helpful Hints

When buying tools, always buy the best tools that can be afforded. Good tools are not cheap, and cheap tools are usually not good. The best tools will help prevent ergonomic (long-term) health issues that

come from long, hard hours of stress on various muscles and joints. Good tools will last a long time, and most hand tools and sockets have lifetime warranties if they ever break or wear out.

When specialty tools are borrowed, rented, or leased, make sure relevant terms of the agreement are communicated and understood by all involved, including the installation members. These terms include scheduled delivery and return dates, procedures if equipment breaks or fails, or if the project is delayed or requires additional time or material.

Summary

A knowledgeable installer with poor tools will not be able to provide the best metal roof installation; neither will an unskilled installer with the best tools. Every metal roof installation requires the use of many tools. Whether the tools are handheld, powered, or large on-site pieces of equipment, they require an installer to properly use them and understand the purpose and limitations of each tool.

Notes:
