steelscape

METAL ROOF BUYER'S GUIDE

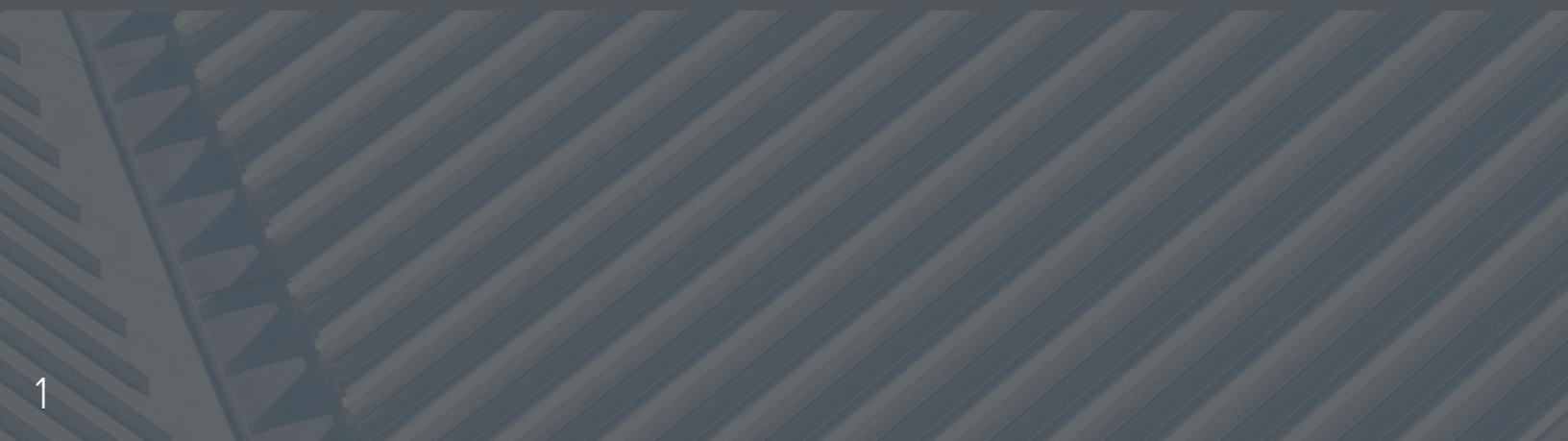
WANT A GREAT ROOF? START WITH METAL

Metal offers a number of benefits as a construction material. It is fire resistant, 100% recyclable, can be formed into a multitude of shapes and is one the most durable products available on the market. Most importantly, metal is available in an endless array of color and finish options to enable the fulfillment of almost any design vision.

This guide is designed to step end-users through the process of selecting the right metal product for roof applications. There are a number of factors to consider when selecting and installing the right solution. This selection is critical to achieving the right aesthetic and securing long term performance.

The vast array of technical terms associated with metal roofing can be overwhelming to end-users, however not all of these are critical to the purchase decision. This guide is designed to provide an overview of key insights and steps to follow as part of the buying journey. Specifically, this guide is designed for homeowners, residential remodelers and do-it-yourselfers. For help with more technical elements associated with metal roofs, please contact Steelscape, your preferred installer, or end product manufacturer.

- **For further help selecting the right color, or finding the right design inspiration, visit steelscape.com.**



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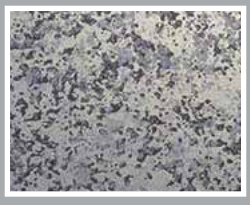

Weathered Zinc

WHO IS STEELSCAPE?

Steelscape produces, coats and paints metal - fundamental steps in the creation of beautiful and durable products.

Why is the coating process so important? Metal is one of the few products where the paint or finish is applied before it is made into a final roof or wall product. End product manufacturers form this finished material through a variety of processes including stamping, roll-forming, folding, or manual manipulation. Producing painted finishes in this manner ensures two things: first, the paints used must be highly durable to withstand the forming process and secondly, it ensures high product consistency and tight quality control as the paint is applied in an automated, highly controlled environment.

The consistent finish of your metal roof, its warranty, corrosion performance, long-term durability and finally, the color, are all fundamental elements Steelscape creates by coating metal. Steelscape has been doing this for more than 50 years, with our material supplied to thousands of roofs and walls throughout the US.

- **So what material is your roof made from?**

Vintage®

FIVE STEPS FOR METAL SUCCESS

This guide summarizes the metal roof purchasing journey into FIVE simple steps. We'll explore each step in detail and provide a glossary on important metal terms.

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UNDERSTAND YOUR APPLICATION

Identify and understand important considerations of your specific roof project.

STEP TWO

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SELECT YOUR MATERIAL AND FINISH

Review the material and finish options available, and select the best option for your home.

STEP THREE

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SELECT YOUR PRODUCT

Understand the different products available, their advantages and differences.

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FINE-TUNE ATTRIBUTES

Review additional product options which may improve the overall solution for your home.

STEP FIVE

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FIND THE RIGHT INSTALLER

Know what to ask and look for in your metal roof contractor.

ZINCALUME® Plus

STEP ONE
UNDERSTAND YOUR APPLICATION

Metal is a highly versatile product available in many shapes, sizes and configurations. Knowing the details of your specific application in advance will strongly influence your finish choice and product selection.

Application considerations are summarized in the table below. The specifics of your home and the environment in which it is based will impact a number of product and finish considerations when selecting metal. What is your budget? What look are you trying to achieve? Are there environmental considerations such as proximity to the salt water? These are a few of the important considerations to evaluate.

	CONSIDERATIONS	MORE INFORMATION
AESTHETICS		
What look do you want to achieve?	• Identify the elements of the structure you want to complement or contrast through roof and trim color. • Identify the shapes, colors and designs of surrounding structures you want to complement or contrast. • Identify the brightness, contrast and reflective preferences of the finish. • Identify the desired fastener type - visible or concealed. This selection can alter the installed aesthetics.	Metal products will create different aesthetics through the height, size and repetition of panel ribs or seams – both in the shadows cast and flat surface areas. See step 2, 3 and 4 for finish and product options to maximize the aesthetic appearance. See the Steelscape Color Guide for more color inspiration. Review the accent features of panels relative to the size of the structure.
STRUCTURE TYPE		
What are the characteristics of the structure that this roof will be applied?	• The type of structure will determine the needs of the finish – is it highly visible, anticipated lifespan, etc. • The slope of the roof, the curvature of the roof, and other design elements will impact product selection. • If this is an open structure, (attached to battens) or if the material be installed over a solid base (e.g. plywood, OSB deck, etc.) - This will influence product selection. • Evaluate environmental and energy saving considerations for the structure.	Section 2 provides an outline of paint durability and energy saving finishes. Section 3 provides an outline of product differences and optimum installed locations.

	CONSIDERATIONS	MORE INFORMATION
ENVIRONMENTAL		
What is the environment where the roof will be installed?	• High corrosion environments such as those in close proximity to salt spray or industrial environments may degrade metal faster; product options exist to improve environmental protection. • Metal products are engineered to withstand environmental conditions in different ways including fire protection, wind performance, hail damage, thermal expansion and weather tightness - Different products and how they are attached to the structure will influence performance. • Metal can include optional accessories to optimize performance for snow loading, including snow retention devices or by reducing clip spacing for greater loads.	Section 2 outlines the different metal and metal finish options to improve solution performance. Section 3 outlines the key performance differences between the different product types available. Section 5 outlines topics to discuss with the installer. Product manufacturers will also be able to address design considerations such as clip spacing to achieve specific wind speed needs or snow loads.
FINANCIAL		
What is your budget?	• Metal type, thickness, and paint system will be drivers of material price. • Standing seam (concealed fastener) versus exposed fastener panels will be drivers of product price and installation costs. • Use of clips for improved performance will add to installation cost. • Complexity of the area (e.g. multiple roof planes) will influence installation costs.	Section 2 provides an outline of paint durability and energy saving finishes. Section 3 provides an outline of product differences and optimum installed locations.
Code and Regulation		
What are the regulations of the area?	• Home Owner Associations (HOAs) or covenants may have restrictions on the use of metal or certain gloss or glare provisions. • Individual jurisdictions or building codes may dictate if certain performance rated products are required. • Individual jurisdictions may also dictate other installation elements such as the type of underlayment or metal coating. • Insurance companies may also outline requirements for a roof, or may suggest ways to reduce your premiums when installing a new roof.	Inquire with your HOA for restrictions . Steelscape can provide gloss and other technical data if required. Inquire with your local city code for requirements, and product manufacturers for specifications.

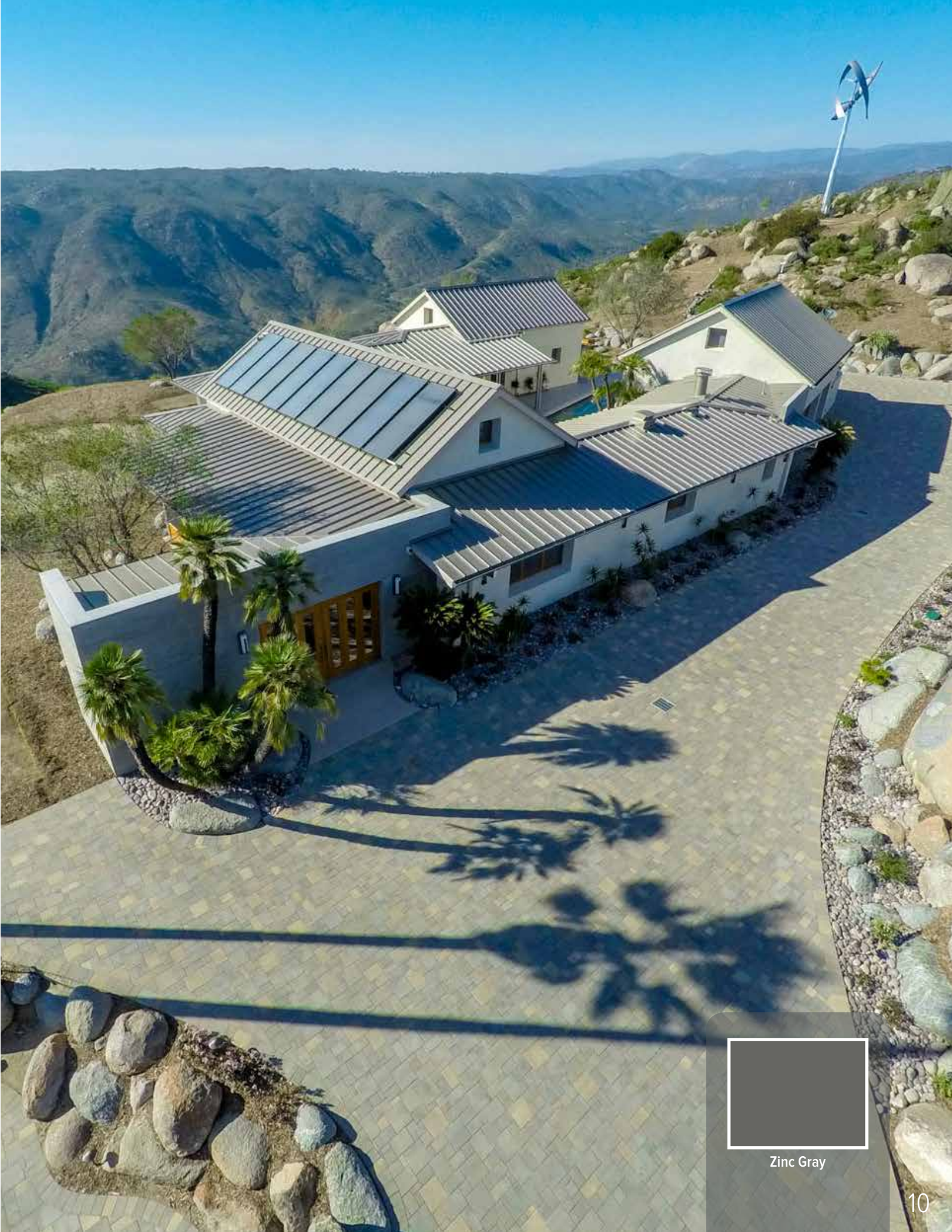
STEP ONE (continued)

UNDERSTAND YOUR APPLICATION

SECTION SUMMARY

- By understanding the specifics of your metal roof application, you will be better positioned to select the right product.
- Key considerations for installation include aesthetic preferences, structural characteristics, roof environment, project budget and the broader regulatory environment.
- Each of these considerations will be addressed in the following sections of this guide.

Don’t forget, this guide is just the beginning, there are plenty of other resources available at steelscape.com.



Zinc Gray

STEP TWO
SELECT YOUR MATERIAL AND FINISH

The selection of the base metal and the type of paint finish will significantly impact product performance, price, and long-term aesthetic appeal.

The primary material options for metal roof products are steel, aluminum, copper and zinc.

Steel is the most economical product for roof applications and when applied with the correct metallic coating, it is highly resistant to corrosion. Steel is an exceptionally strong product and is the most widely used product for metal roofs due to the variety of finish options, availability, price, performance, and accommodating nature when formed into finished products.

Aluminum is a lighter metal that offers superior corrosion resistance to steel and is often used for coastal applications. Aluminum is softer and more malleable than steel, which means it can be used to make more complex shapes such as stamped shingles or shakes. This also means it is easier to deform and does not offer the same wind performance attributes as steel, unless a thicker more costly grade of aluminum is used.

Copper and zinc are considered exotic materials for most roof applications due to their distinctive appearance, yet significantly higher price point.

MATERIAL	PROS	CONS	PRICE
STEEL	Price, corrosion resistance, durability, widely availability, comes in a variety of shapes and colors, contractor familiarity, recyclability.	Can rust prematurely if installed or cut incorrectly, some products not suitable in coastal applications, harder to from into complex shapes.	**$**
ALUMINUM	Lightweight, very rarely corrodes, comes in a variety of shapes and colors, malleability, and easy to cut and form, recyclability.	Softness and impact on product performance including prone to denting and weaker wind uplift performance, more expensive compared to steel for comparable products.	**$$**
COPPER	Distinctive look, including aged patina color, never rusts, easy to cut and form, performance, lightweight, can be soldered.	Cost, skilled installation needed to allow for greater thermal movement, runoff staining of surrounding areas.	**$$$$**
ZINC	Classic color, never rusts, longevity of 60+ years, less energy intensive production process, reflectivity, easy to form, ease of care and maintenance.	Cost, requires more skilled installation - underside corrosion if installed incorrectly and need to allow for greater thermal movement, more restrictive color palette.	**$$$$**

IMPROVING STEEL PERFORMANCE

THE ROLE OF THE METALLIC COATING

Prior to painting, metals including zinc and aluminum are applied as a metallic coating over steel to provide a protective layer to stop or reduce corrosion. Metallic coatings act as a barrier to corrosion and sacrifice themselves to protect the base steel from oxidization.

Hot-dip galvanized (zinc) and aluminum-zinc (Al-Zn) alloys are the most widely used coatings for the corrosion protection of steel. Galvalume® and ZINCALUME® are two common trademarked names for a 55% aluminum-zinc (Al-Zn) alloy coated steel product. Aluminum is inert and provides a protective rather than sacrificial barrier compared to zinc. Hot-dip galvanizing adds a coating of 100% zinc to the surface of the steel and does not offer the long-term performance of a 55% Al-Zn alloy coated product.

Aluminum offers enhanced protection against corrosion in certain environments and prevents corrosion from spreading within the metal. Most importantly, ZINCALUME® or Galvalume® products will offer a substrate warranty, which is a warranty against corrosion, typically for 20-30 years. Galvanized products do not offer a corrosion warranty.

STEP TWO (continued)

SELECT YOUR MATERIAL AND FINISH

NOT ALL PAINT IS EQUAL

Across painted metal products for roof applications, there are three primary paint systems. These paint systems will range both in their longevity of performance, cost, and which elements they warrant. The three common paint systems include:

- **Standard polyester**
- **Silicone modified polyester** (also known as SMP or enhanced polyester)
- **Fluorocarbon/ polyvinylidene fluoride** (known as PVDF, Kynar 500® and Hylar 5000®)

Paint systems range in performance from good (polyester), to better (SMP), to best (PVDF). Modern paint system development has narrowed the differences between a high-end standard polyester system and a SMP system.

STANDARD POLYESTER PAINT SYSTEMS are typically the most economical and offer the lowest level of UV resistance when compared to SMP and PVDF systems. As a result, they usually offer the shortest product warranties. Their paint structure can be modified to accommodate a wide range of performance qualities and their flexibility means they can be offered in a variety of color and gloss options.

SMP PAINT SYSTEMS are more durable compared to standard polyesters. They are modified with a different resin structure to improve their UV resistance qualities. SMP systems provide good weatherability (resistance to moisture, sunlight, and temperature changes) and offer a greater resistance to chalking and fading compared to polyester systems. Most residential roofing products sold today use SMP systems due to their balance of performance and affordability.

PVDF PAINT SYSTEMS are known by several different names, including polyvinylidene fluoride, Kynar 500® or Hylar 5000®, but they all use the same polymer and provide the most durable paint system. PVDF systems exhibit exceptional chemical, chalk, and fade resistance and can resist degradation when exposed to aggressive weather elements such as urban grime, air pollutants, salt, high temperatures, and humidity. Their high formability mean they can be used on a wide range of pre-formed shapes, which is why they are often used for high-end architectural and high-profile commercial projects. PVDF systems will cost more than other systems and the end-user will need to determine whether this added performance is required and worth the cost.

SELECT YOUR MATERIAL AND FINISH

Metal is painted in a continuous, efficient process, resulting in tight quality control and high product consistency. The process involves extensive production equipment and large quantities, which is why most metal roof manufacturers will offer a limited color range compared to the paint varieties offered amongst interior household paints. Despite this, metal can be painted in an endless array of colors and finishes – if a end-user desires a specific color to fit a project need, custom colors can be ordered but will be subject to additional cost, minimum quantities, and longer lead times. Contact Steelscape for more information on how we can produce a custom color to suit your projects' exact needs.

If you are having a difficult time assessing which paint system to use or the system being offered by your installer or product manufacturer, please contact Steelscape.

PAINT SYSTEM	POLYESTER	SMP	PVDF
OVERALL	Good to better	Better	Best
PRICE POINT	Cost effective	Moderate	Higher
WARRANTY	None to moderate	Long	Longest
DURABILITY	Limited to good	Medium to high. Improved weatherability	Highest
APPLICATION	Versatile, but typically low exposure applications such as agricultural and industrial buildings.	Wide range of construction applications including residential and commercial.	High-end, high-profile, architectural and commercial projects.
OTHER ATTRIBUTES	Wide range of colors and gloss options.	Wide range of colors and gloss options.	Excellent chalk and fade resistance and chemical resistance, wide range of colors and gloss options.

STEP TWO (continued)

SELECT YOUR MATERIAL AND FINISH

WHICH COLOR?

You may have your favorite color selected, but before making a final decision, there are a number of things to consider, including:

IS IT A 'COOL' COLOR? 'Cool' colors are coatings with pigments that have been altered chemically and physically to reflect Near Infrared (NIR) wavelengths. NIR light, which is not visible to the human eye, is responsible for heat generation. Reflecting NIR wavelengths means heat is reflected from the surface, improving the structures energy efficiency by reducing cooling costs.

IS IT DARK OR LIGHT? Irrespective of pigment technology, dark colors will be more inefficient, and absorb heat compared to lighter colors. If you are looking to maximize structure efficiency and reduce heating costs, a light color is recommended. This does not mean just white – bright silvers or bare products such as ZINCALUME® are also highly efficient. Lighter colors will show dirt and dust more readily compared to darker finishes.

Use the Solar Reflectance Index (SRI) value, typically published on color cards to differentiate between colors. The higher the SRI value the more efficient the color is. Certain green building standards, such as LEED will mandate minimum SRI values.

HOW DO YOU WANT IT TO LOOK UNDER NATURAL LIGHT CONDITIONS? Light Reflectance Value (LRV), often referred to as glare, measures the amount of visible or usable light that reflects from a surface. LRV is expressed as a percentage from 0 to 100; the higher the number the more visible light that is reflected. Typically, lighter colors will have a higher value than dark colors, but texture or 'matte' finishes can reduce LRV. These values are also often published on color cards. Reducing LRV values may be required in order to meet HOA requirements or for better structure integration.

IS IT A METALLIC FINISH? Metallic finishes, due to the unique characteristics of their pigments are highly sensitive and can vary between manufacturing batches. Additional care is required by the product installer to ensure batches are not mixed or panels installed in differing directions.

OTHER OPTIONS

CORROSIVE OR COASTAL ENVIRONMENTS – Additional clear coat layers and high build primers can add extra protection from the elements such as coastal spray or industrial chemicals.

RETAINING BRIGHT COLORS – Bright colors are made of organic pigments which fade faster when exposed to UV light. Select a PVDF paint system for superior fade resistance. For certain high visibility installs, consider an additional clear coat layer to maximize bright color retention.

WANT TO BE DISTINCTIVE? Consider more than standard solid colors alone. Modern metal paint technology allows for a variety of inspiring designs and finishes to be applied to metal. Look at the Design and Color Solutions section of the Steelscape website for more information.

PEACE OF MIND

WHAT A PAINT WARRANTY COVERS

Pre-painted metal can offer some of the most durable finishes and longest warranties in the building product industry. Warranty periods can extend to up to 40 years. Pre-painted metal finishes can be subject to three warrantable types of excessive deterioration. They are excessive chalking, color fade, and delamination of the topcoat or primer.

CHALKING is caused by the degradation of the resin system on the surface, mainly due to UV rays. As the resin breaks down, resin particles along with imbedded pigment particles lose adhesion and take on a white appearance. The physical similarity of these particles to chalk underpins the term ‘chalking’.

FADING is caused when UV rays and substances in the environment attack the pigments in the paint and cause their color to change. Color change is typically assessed based on its variance to the base state when new.

DELAMINATION is the loss of paint adhesion to the metal or between the primer and the topcoat. It can be visually apparent in a number of forms including bubbling, peeling, checking, chipping, cracking, or complete loss of the top coat.

Coverage against these three items, and the length of this coverage will vary significantly between paint system types. For example, a polyester system will likely have little or no paint fade warranty coverage compared to a PVDF system. Always ensure you read the warranty being offered along with proposed remedial actions. The failure of a paint system can be due to improper application, poor formulation, poor coater quality control, or site-specific environmental conditions.

STEP TWO (continued)

SELECT YOUR MATERIAL AND FINISH

SECTION SUMMARY

- Homeowners can choose from four common metal types: steel, aluminum, copper, and zinc, each with their own unique strengths. Steel is the most common due to its combination of cost and performance.
- Not all paints are the same. There are three common metal paint types: polyester, SMP and PVDF systems. SMP systems are used most commonly in residential applications due to their mix of performance and cost.
- There are a number of things to consider when selecting a color including its efficiency and reflectance of light. Colors can be modified at an extra cost to better accommodate certain extreme environments.
- There are a number of things to consider when selecting a color including its efficiency and reflectance of light. Colors can be modified at an extra cost to better accommodate certain extreme environments.

Check out the Steelscape Color Guide for more color inspiration. Download it at steelscape.com.

Zactique

STEP THREE
SELECT YOUR PRODUCT

A key benefit of metal is its versatility. Painted metal can be formed into almost any shape or size. Typically, it is produced in shapes that suit roll-forming, the common process for producing metal profiles. In this process the metal is progressively formed into its finished state in a consistent and efficient process without damaging the paint.

Selecting the right roof product by comparing different manufacturer offerings can be a challenge. While the list of product names may appear exhaustive, often products are variations of the same profile and fall into broad product types. The following section is designed to provide a straightforward overview of these different types. These include:

SNAP LOCK STANDING SEAM

MECHANICAL LOCK STANDING SEAM

EXPOSED FASTENER PANELS

METAL TILE AND SHINGLE

Standing Seam (also known as concealed fastener roofing)

Standing seam is the most common metal roof type for both residential and commercial applications. The seam is the vertical rib which interlocks between each profile and is raised from the flat base pan of the panel. The fasteners that attach these panels to the structure underneath are covered in the installation process, which is why they offer superior weather-tightness and are also called concealed fastener roofing.

Standing seam panels reflect one continuous piece from ridge to eave and are available in a variety of widths from 12 to 20 inches. The wider the panel the faster it can be installed, however, panel widths have a significant impact on the installed appearance. Panel width also impacts wind uplift performance as there are fewer roof attachment points in wider panels. For most residential structures, 16 inch profiles provide the optimum configuration between desirable roof aesthetic, performance and speed of installation. Evaluating the rib height (height of the seam above the pan) is also important when making a product selection. Most residential products offer a 1 inch rib height, while some standing seam profiles for commercial applications offer 2 inches or more. A taller rib height will cast a more dominant shadow, creating greater visual distinction. For most smaller, residential applications, the shorter rib height is selected so as not to create dominant lines that may clash with other structure aesthetics.

WHY DO I SEE SO MUCH STANDING SEAM?

Standing seam is by far the most prolific profile used for residential homes in the US. But why? Standing seam offers a number of benefits, including:

- Attractive, clean appearance that integrates well with a broad range of residential home styles.
- Installs over a base deck (such as OSB, plywood etc.) similar to other roofing materials.
- Can allow for thermal expansion (expansion and contraction of metal without damage).
- Offers a mix of strong performance relative to a cost effective price point.

STEP THREE (continued)

SELECT YOUR PRODUCT

COMMON STANDING SEAM TYPES INCLUDE:

SNAP SEAM OR SNAP LOCK – These profiles typically have a nailing flange to affix the profile to the roof, with seams that snap together to form the interlock. The nailing flange is affixed using a drill and is covered by the next lapped panel. These can be installed by hand and are the most prolific profile used for residential applications due to their combination of performance and ease of installation. Select versions of snap standing seam panels use a clip rather than a nailing flange to affix to the base deck for additional product performance. A clip system adds to the installation time and cost of the roof. Clips allow for greater thermal movement of the panel. Thermal movement can lead to oil canning, the undesired waviness of a flat metal surface. This is why many standing seam panels with nailing flanges have striations (very minor linear ridges) as they reduce the visual effect of oil canning. If a true flat pan look is desired, consider a standing seam roof that uses clips and a thicker metal. Some panels also incorporate factory applied sealant for additional weather-tightness.

MECHANICAL SEAM – These profiles feature seams that are mechanically attached together by 'rolling over' one seam with another by hand using special tools or with a mechanical seamer. This offers superior weather-tightness and structural performance including high wind environments. Mechanically seamed installations use clips to allow for greater thermal movement. This roof type can also be used in low slope roof applications down to ¼:12 inches. These types of standing seam are more expensive as they have a more labor intensive installation process, which can include a singular fold or a double fold for additional roof performance. Some mechanically seamed products are structural stranding seam panels which means they can be applied over open framing rather than attached to a substrate – this is typically for industrial or commercial projects.

OTHER BATTEN-STYLE PRODUCTS – These panels are attached using clips with a batten applied over the connection to form the 'standing seam'. The batten refers to the c shaped piece of metal that conceals the panel connection. These type of panels are more straightforward to manufacture and lend themselves to greater flexibility in pan and batten width. This affords greater structure design flexibility including the ability to take on complex shapes including curved or tapered shapes, and conical and radius style roofing. Radius designs reflects a normal barrel shape whereas conical style roofing reflects a design similar to the ridges of an umbrella, where the straight seams all lead from even spacing to a central point. This process is more labor intensive to install and may require gaskets or sealants for additional weather-tightness. This panel is typically used for design accents such as entryways and window awnings.

EXPOSED FASTENER PANELS

These type of panels are lapped, or overlapped, one over another, with the fastener attached from the outside and driven directly through the metal. These panels are highly versatile and can be installed over a variety of substrates including lumber, plywood, steel deck and even masonry. Unlike many standing seam roofs, these profiles can be installed over open framing. This option is more economical as the individual sheets are cheaper to manufacture and package, provide broader coverage, and are faster to install. Since the fasteners are driven from the outside, they are visible once installed.

Exposed fastener panels will vary based on their configuration of ribs, that is the design and spacing of the raised parts of the panel. In general, these panels don't have large spacing between the ribs, as these ribs and their frequency, add strength to the panel, which is important once installed and when being handled. Agricultural and commercial applications are common for this type of panel where speed of installation and cost effectiveness are important factors.

This type of profile is attached using screws with washers and rubber grommets to create a weather-tight seal. These fasteners must be placed strategically and with the right torque to ensure structural integrity and a correct seal. For additional weather-tightness, some installers will place sealant between the seams. Exposed fastener roof panels are not suitable for low-sloped roof applications. Some exposed fastener panel configurations include:

R-PANEL, U-PANEL AND OTHER SIMILAR PANEL TYPES – These profiles are known by many different names and are commonly used in agricultural, light commercial and economical residential applications. The shape of the panel is designed to add maximum panel structural strength while optimizing coverage for faster installation. Panels include major ribs, usually at 9 to 12 inch intervals and minor ribs for additional strength. Rib height can vary from ¾ to 1 inch.

5V CRIMP – This panel looks similar in appearance when installed to a standing seam roof due to their flat pan and raised rib but are applied using the exposed fastened approach. While economical, these panels do not exhibit the performance qualities of traditional standing seam roofs and will have the noticeable exposed fasteners. Due to these reasons, this profile is mostly used in cost conscious, light commercial and entry-level residential applications.

STEP THREE (continued)

SELECT YOUR PRODUCT

CORRUGATED – A more traditional exposed fastener panel with ribs of equal or similar size and shape, to create aesthetically pleasing patterns and shadow lines. These come in a variety of configurations including:

- **TRADITIONAL SINUSOIDAL SHAPE**
  This roofing panel has repeating curved grooves and is often called 'Corrugated'. Used for decades in metal roofing, the curved edges can reduce the harshness of shadows and accent lines and blend well with traditional structures and environments.

- **TRAPEZOID SHAPES** (including angles from 45 to 90 degrees)
  Most often found with 60-70 degree angled ribs, these panels are commonly referred to as Box Rib, V-Rib and other similar names. This type of profile is used in modern building designs, as well as urban and industrial settings as the angular lines create more distinct shadow lines. The rib height of these profiles can be up to 2 inches, which makes them more suitable for larger surfaces such as commercial installations.

METAL TILE, SHAKE OR SHINGLES

Metal tile, shake and shingle roofing products can take on shapes including those of traditional roofing materials such as tile, shake, or shingles. These products can be installed as sheets or as individual pieces much like traditional materials such as tiles or shingles. The benefit of these products is that they offer the durability, recyclability, energy efficiency and other long-term benefits of metal but with the appearance of traditional roofing materials. The downside of these products is that they are harder to trim, shape and finish in the field compared to the products they substitute and as a result, the total installed cost can be higher. Some variations of these products are available with a 'stone-coated' finish. Stone coating involves applying small granules (similar to asphalt shingles granules) to the steel to provide a more authentic traditional appearance.

METAL TILE TYPES INCLUDE:
Painted, tile, shingle and shake
Stone coated tile, shingle and shake
Sheet metal roof tile (pictured)

MYTHBUSTING
METAL ROOF FALLACIES

METAL ROOFS ARE NOISY – If properly insulated and the correct sheathing is installed, rain or hail on metal roofs is no louder than other roofing materials.

METAL ROOFS ATTRACT LIGHTNING – Metal roofs will not attract lightning to the structure any more than other roofing materials.

METAL DENTS EASILY – Typical hail will not dent a metal roof and in fact may be more hail damage resistant than tile or asphalt alternatives.

METAL ROOFS MAKE BUILDINGS HOT – Metal roofs are often cooler than other materials due to their superior long-term reflectivity. Modern 'cool' paint technology and bright colors can be used to offer superior heat reflection compared to other material types, reducing building cooling costs.

METAL ROOFS RUST – Modern metallic coating and paint system technology ensures that properly installed and maintained metal roofs last the test of time and will not corrode. Metal is one of the most durable roof options available lasting from 30 to 50 years and beyond.

METAL ROOFS ONLY SUIT CERTAIN HOUSE STYLES – Metal is available in a wide array of designs and finishes meaning there is an appropriate product for almost any application.

METAL ROOFS ARE EXPENSIVE – While the initial purchase cost may be higher, metal roofs typically last 2-3 times longer than an asphalt roof, which may result in a lower lifecycle cost.

METAL DOESN'T WORK WITH SOLAR – Metal roofs can often reduce the cost to install solar as clamps have been specifically designed to attach solar arrays to the seams of standing seam panels. The added benefit of this approach is that it doesn't require any penetrations though the roof, which can risk weather-tightness.

STEP THREE (continued)

SELECT YOUR PRODUCT

SECTION SUMMARY

- Despite a variety of different product names, there are four common metal roof product types, the most popular of which is standing seam roofing.
- The major difference between metal product types is the way they are attached to the structure and interlocked with each other - this impacts weather-tightness, product cost and installation cost.
- Within standing seam and exposed fastener panel families, there are a variety of product variations. Products vary in their performance, installation complexity and the look they create on the roof.
- A number of myths exist about metal roofs, most of which are incorrect including metal's propensity for noise, attracting lightning, dents and rust.

For more information about the different product types and for information on end product manufacturers in your area, contact us through steelscape.com.

Colonial Red

STEP FOUR
FINE-TUNE SOLUTION ATTRIBUTES

There are often a number of product attributes to consider when selecting a metal roof product. The following section details some of the common attributes to be fine tuned or reviewed prior to purchase.

GAUGE (thickness) – Gauge (sometimes spelled as gage, or simply ga) refers to the thickness of the base steel. A smaller gauge correlates to a thicker metal. For example, 22ga is thicker metal than 29ga. 22ga-29ga are the most common gauges for metal roof and wall building applications. Material thickness is a key driver of product cost, and more importantly contributes to the structural performance of the panel, which is its ability to withstand wind and gravity loads. Thinner panels are also more prone to oil canning--the unwanted waviness of a flat metal surface. The most common residential metal roofing products are 26ga while some manufacturers offer higher performance 24ga products for certain applications. Agricultural applications typically use 29ga products. Commercial projects requiring more demanding performance attributes use 22ga and 20ga.

STRIATIONS (standing seam only) – A number of standing seam profiles come with the option for striations or pencil ribs. These additional ridges on the flat part of the panel serve to reduce unintentional oil canning. For most residential applications of standing seam, striations are recommended.

PANEL WIDTH – End-users may be able to select panel width from a few options for standing seam profiles. The panel width selected will impact the overall installed look, due to the ratio between flat area and the shadows cast by the repeat of the seam. The selection of an end product will depend on the desired appearance to be achieved. This choice will also impact installation costs and performance. For exposed fastener profiles with a repetitive rib, this is usually not an option.

PANEL RIB HEIGHT – Not all profiles will have a variable rib height but for many standing seam panels this may be an option. A taller rib height will lead to a more pronounced panel design which can cast more prominent lines and shadows on the structure.

COATING WEIGHT – The coating weight is not typically an option for end-users to choose from but determined by the manufacturer. The coating weight refers to the thickness of the metallic coating to prevent corrosion. Common Galvalume® or ZINCALUME®) coating weights are AZ50 or AZ55. These products will typically carry a corrosion warranty of 20 to 30 years. Be cautious of low-cost, non-licensed products such as those with a thinner AZ35 coating weight. This thinner coating is not optimized to prevent corrosion and will not carry a corrosion warranty. The most common coating weights for galvanized products are G60 or G90. Galvanized products do not carry a corrosion warranty.

For more information about solution attributes, visit product manufacturer websites to understand the different options available. Product manufacturers can be found online or through industry groups such as the Metal Roofing Alliance (MRA), Metal Construction Association (MCA), Metal Building Manufacturers Association (MBMA), or Cool Metal Roofing Coalition (CMRC). Steelscape also has several reputable, preferred end-product manufacturers it can refer upon request.

Once you're ready to select a final product, it's a good idea is to collect roofing samples, typically available from the end-product manufacturer. Steelscape provides color samples by request.

HOW DO I FIND OUT
THE OPTIONS AVAILABLE?

Standing seam is by far the most prolific profile used for residential homes in the US. But why? Standing seam offers a number of benefits, including:

- Individual product pages on manufacturer websites or request product literature direct.
- Third-party materials and homebuilding websites.
- Roofing and hardware distributors, including large home improvement stores.
- Speak to a roofer or roofing contractor.

STEP FOUR (continued)

FINE-TUNE SOLUTION ATTRIBUTES

THE STRENGTH OF METAL

PROTECTION AGAINST THE ELEMENTS

Most manufacturers will have installation and trim guides and can provide guidance on the right tools required for installation. There is also a wide variety of educational content online and in remodeling publications. Unlike other products such as asphalt shingles, metal roofing materials must be handled with special care to avoid marring or scratching. These products are also not as forgiving if prepared or installed incorrectly.

- **SNOW AND ICE** – Metal sheds light snow and ice exceptionally well due to its slippery surface. This helps prevent the creation of ice dams. Metal roofs can also be readily fitted with various accessories to provide a superior surface for all snow and ice conditions. Snow retention clamps can help prevent heavy snow from dangerously falling from roofs or from tearing other items such as chimneys and vents from the roof surface.
- **WIND** – Most end-product manufacturers will have product performance data for wind conditions as well as test and approval reports to support this information. The advantage of metal roofs is that through product selection or product options such as seam type and clip spacing, metal roof performance can be modified to suit geographic-specific needs.
- **FIRE** – Metal is an excellent material choice for wildfire impact prevention. Products from most reputable manufacturers when used in conjunction with the appropriate underlay will achieve a Class A fire rating.
- **HAIL** – Most metal products from reputable manufacturers will qualify with the Severe Hail (SH) requirement as specified by insurance companies.
- **RAIN** – Unlike other material types, metal won't attract algae or be permanently discolored by frequent rain conditions. Always ensure you clean a metal roof in accordance with the manufacturer's suggestions typically found in the product warranty.

SECTION SUMMARY

- Outside of the specific product, homeowners have the flexibility to select certain product attributes to ensure the product is best suited for their home installation.
- Common attributes that can be selected include material thickness, panel width, striations, and panel rib height.
- Selected attributes will impact the cost, performance and aesthetic appearance on the metal roof.
- Manufacturers can provide guidance on the different product options they offer.

For more guidance on reputable manufacturers or to learn more about specific product attributes, contact Steelscape at steelscape.com.

STEP FIVE
SELECT THE RIGHT INSTALLER

Metal is an engaging and long-lasting product. However, it requires care and experience during the installation process to ensure the structure is weather-tight, appropriately prepared for its surrounding environment, and attractive.

Contractor experience is the first element to consider when selecting the right metal roof installer. Contractors with a specialty centered on installing asphalt, tile, or wood may not have the required experience to effectively complete a metal project. A metal roof installer understands unique installation factors such as storage and how to cut panels in the field, as well as affixing fasteners and trim detailing. The methods in which these details are completed can significantly influence the longevity of a metal roof.

End-users and building owners can use several approaches to identify quality, qualified contractors. There are three top elements to consider when vetting contractors.

FIRST – Seek a pre-qualified contractor through industry organizations such as the Metal Roofing Alliance or Roofing Contractor Associations.

SECOND – Seek referrals through peer-rated internet reviews such as Angie's List, Yelp, or HomeAdvisor. Also, ask family, friends, or those in the community who may have recommendations.

THIRD – Talk with product manufacturers, roofing wholesalers, designers, and architects. Everyone involved in your metal roofing project wants to achieve a successful installation. Design professionals and product manufacturers will have insights or preferred contractors with experience or expertise they can refer to.

CONTRACTOR EVALUATION
USEFUL INFORMATION TO COLLECT

WHEN SELECTING THE RIGHT INSTALLER, USEFUL SOURCES OF INFORMATION TO EVALUATE INCLUDE:

- Contractor's Better Business Bureau (BBB) rating.
- Contractor's license, insurance and other certifications.
- Samples of the contractor's previous work or locations where it can be observed. Previous work may be listed online, including Houzz, Pinterest, Instagram, Facebook or their own website.
- Tenure in the industry and years experience with metal.
- Warranties offered on workmanship.

Informed consumers can improve the success of their metal roofing project. Being prepared to discuss items such as those listed below, can contribute to project success.

SIZE OF THE ROOF (SQUARE FEET) – Typically the key factor in assessing the cost of the installed solution and a good baseline for cost.

ROOF PITCH/SLOPE – Roof slope or pitch is typically expressed as a fraction, represents the vertical rise of the roof over the span of the structure. Often expressed as low slope, medium slope or steep slope. The steeper the slope the more material will be required and typically the greater the complexity of the install process. Roofs of a low slope or pitch (generally below 3:12) may be restricted as to the type of products available to ensure appropriate weather-tightness.

SHAPE OF THE ROOF – Complexity of the roof can strongly influence solution cost. Complexity arises from the way different elements of the roof intersect or cross. Features such as dormered rooflines, mansard roofs, and other complex hip, ridge, gable or eave designs can influence overall complexity. Understanding the number of different planes (flat surface areas) the roof area incorporates is a good way to evaluate complexity.

ROOFING UNDERLAYMENT – This is a water-resistant barrier designed to improve overall weatherability. This barrier contributes to weather-tightness, offers cold protection, and fire rating all of which are required by common building codes. The roofing underlayment is installed directly onto the structure prior to the metal roof panels. Quality and performance attributes can vary widely by brand and material.

ROOF SUBSTRUCTURE – The contractor may identify if the plywood sheathing, OSB or battens under the roof need repairing as part of the replacement. Internal water damage or sagging roofs are a common sign this may need to be examined and repaired.

DESIRED PROFILE – Discuss with the contractor the desired profile and obtain their opinion on your preference. Design differences, installation experience, propensity for oil canning and other factors should be considered. If the contractors views differs to your own, consider consulting the product manufacturer.

FLASHING DESIGNS – Flashing details also influence complexity and cost. Identifying the proposed flashing layout, the materials of proposed gutters and downspouts and final drainage locations near the structure are good items to discuss with your metal roofing installer.

PENETRATIONS – Penetrations including vents, chimneys and drains are often the weak spot for weather-tightness in any metal installation. These penetrations represent holes or gaps in the material that requires proper sealing techniques. Understanding how the contractor plans to accommodate for roof penetrations will provide an overview of the complexity of the work involved and a point of reference for the amount of consideration given by the contractor.

STEP FIVE (continued)
SELECT THE RIGHT INSTALLER

VENTILATION REQUIREMENTS – Metal does not bring any real differences to other materials, but proper ventilation is always key to improving structure cooling costs and reducing condensation. Intake vents, gable vents or ridge vents may provide sufficient venting. Exhaust vents may also be required.

SKYLIGHTS – Skylights can introduce additional light into the structure but also present another penetration in the roofing structure. If desired, discuss with the contractor how these will be handled and flashed (edged) to prevent water infiltration.

COLOR – An experienced roofing contractor will have design insights for consumers when selecting colors. This includes how a color may integrate with the structure and its surrounding environment.

MATERIAL SOURCING – Not all metal is created equal. Some contractors source cheaper, imported material. Imported material may not be produced to ASTM (American Society for Testing and Materials) standards and fail to offer a durable and long-term product. Metal produced outside of the US may be difficult to obtain a remedial warranty. Genuine Steelscape steel is proudly produced in the US and offers easy to reach customer service with extensive industry knowledge in the event that remedial solutions are required.

COSTS – It's important to understand precisely what's included in an estimate (and what's not included). Some costs include material, labor, accessories, old roof tear-off, waste disposal, and/or a workmanship warranty.

TIME – A project timeline has many parts including the scope of work, the time needed for each task, milestones, and more. These parts are important to understanding the differences between contractor quotes, the overall project, and impact on your home environment.

INSTALLATION METHODS – An important component to ensure compliance with a product warranty is to validate the metal roofing contractor's method of installation. If a contractor does not follow the manufacturer's recommendations, the product may not be warranted.

WARRANTIES – Corrosion, workmanship and paint finish will be some of the different warranties available for a metal roof. A professional metal roofing contractor should provide relevant warrant documentation to customers. It is important to identify the primary cause of the defect if an issue arises. This can be a time-consuming process but having warranty information in advance saves time.

IMPACT ON THE HOUSE – Large roofing projects have a significant impact on your home environment including noise, dust, and the contractor's access to power. Understanding these impacts in advance helps streamline the installation process.

ACCEPTANCE PROCESS – Homeowners do not have to accept improper or incorrect metal roofing installations. Understand the contractor's acceptance criteria in advance. This information illustrates the contractor's integrity and professionalism. When in doubt, product manufacturers can offer guidance on acceptable metal roofing installations.

DO IT YOURSELF
TO DIY OR NOT TO DIY?

Most manufacturers will have installation and trim guides and can provide guidance on the right tools required for installation. There is also a wide variety of educational content online and in remodeling publications. Unlike other products such as asphalt shingles, metal roofing materials must be handled with special care to avoid marring or scratching. These products are also not as forgiving if prepared or installed incorrectly.

ITEMS TO CONSIDER FOR DIY INSTALLS:

- Most standing seam roof panels are manufactured in custom lengths, specific to the structure. This avoids field cutting which is not as clean as a manufacturer's shear. Damage and subsequent panel replacement in the field may lead to significant delays.
- Some paint systems are batch sensitive. Consequently, replacement panels may not be an exact color match.
- Metal fastener attachment and placement, penetration installs and integration with trim and flashing are generally more complex than other roofing materials.
- Incorrect attachment can lead to visual defects such as oil canning and performance loss through things such as water infiltration.
- Research and identify the right tools and skills needed for the metal roofing project.
- If you plan to DIY, start with a more forgiving metal product in a smaller application. An exposed fastener product for a small area is a great way to learn the metal install process and to evaluate your skills.

STEP FIVE (continued)

SELECT THE RIGHT INSTALLER

SECTION SUMMARY

- Metal is not the same as an asphalt or tile roof. Select an experienced metal roof contractor to ensure your roof is installed correctly.
- Seek a pre-qualified installer. Reviewing feedback, references and reviews is a good way to help validate contractor expertise.
- Be an informed consumer. Understanding the different elements of a roof install will help obtain an accurate estimate, assess the expertise of a contractor and ensure the end result aligns with expectations.
- An option for installing metal is to Do-It-Yourself. Metal is not forgiving and individuals should assess their skill level first. Doing a simple install with an exposed fastener product is a good way to start.

To obtain further guidance on your metal roof project contact Steelscape or a metal roof manufacturer. Visit steelscape.com for more information.

THANK YOU

Thank you for taking the time to read through this guide and the various considerations outlined when selecting a metal roof. We hope you found this guide useful in your journey towards selecting a metal roof.

This guide serves as an introductory guide and does not cover all of the topics associated with metal roofing. Visit steelscape.com for more information, design inspiration, and design resources.

At Steelscape we also welcome your feedback. To provide feedback on this guide or for suggestions on the development of future content, please email productinfo@steelscape.com or use the 'Ask Steelscape' functionality on the Steelscape website.

KEY TERM GLOSSARY

ASTM STANDARDS – The American Society for Testing and Materials is an independent standards organization that regularly publishes testing and performance specifications for a wide variety of industrial products.

BACKERS – Backers provide the underside of painted metal used in metal roofs and walls with base color, some protection, and a substrate (basis) for adhesives. A backer is typically white or neutral color.

BONDERIZED – Bonderized refers to the thin layer of Zinc Phosphate on the surface of the sheet that is a weldable product and provides a surface to which paint will readily adhere. This is typically used in rainwater goods such as gutters and flashings for metal roofs.

CHALKING – Chalking is the degradation of the resin system at the surface of the finish on a metal roof or wall, due predominantly to prolonged UV ray exposure. As the resin breaks down, resin particles along with embedded pigment particles lose adhesion and take on a white appearance.

CLEAR COAT – A clear coat is an optional layer for metal roofs and metal walls applied over the paint top coat designed to add perceived depth to the surface, enhance gloss, or provide an additional layer of protection for extreme environments such as coastal or industrial environments.

CONCEALED FASTENER ROOFING – See Standing Seam

COOL COLORS – Cool colors refer to a coating for metal roofs which utilize infrared (IR) reflective pigments that have been altered chemically and physically to reflect IR wavelengths while still absorbing the same visible light. Reflecting infrared light reduces the heat buildup in structures, thus reducing building cooling costs.

CORRUGATED – Corrugated is a common type of metal roof or wall panel design, which incorporates ribs of equal or similar size and shape to create aesthetically pleasing shapes and shadow lines.

CUT-TO-LENGTH – Cut-to-length is a manufacturing process in which metal products, typically metal coil, are cut to the exact specifications of an end-user or manufacturer for use in metal roof and wall products.

DELAMINATION – Delamination is the loss of paint film adhesion to the substrate or between the primer and the topcoat. It can be visually apparent in several forms including bubbling, peeling, checking, chipping, cracking, or complete loss of the top coat on a metal roof.

DIRECTIONAL PAINT SYSTEM – Due to the unique shape of the pigments in the paint, common to metallic paints, a directional paint system catches light in a specific way that can vary between batches and orientation. This guidance is given for certain colors to avoid mixing orientation or batches to provide a clean uniform look once installed on a metal roof or wall.

EMBOSSING – Embossing is the process of creating a raised texture to the surface of the metal. Undertaken in a continuous process for metal applications such as metal walls.

EMISSIVITY – Emissivity is the amount of heat a surface can dissipate away from itself. This is expressed as a percentage between 0-100%. Used in the calculation of the Solar Reflectance Index for metal roofs.

EXPOSED FASTENER OR LAP SEAM PANELS – Exposed Fastener or Lap Seam Panels are metal roof and wall panels which are lapped with one over the other, with the fastener then attached from the outside and driven directly through the metal.

KEY TERM GLOSSARY

FADING – Fading occurs to metal roof and metal wall products when UV rays and substances in the environment attack the pigments in the paint and cause their color to change. Color change is typically assessed based on its variance to the base state when new, represented by Delta E (dE or ΔE).

FILM THICKNESS – Film thickness or dry film thickness (DFT) refers to the thickness of paint film on the strip surface, once the paint has cured. Typical dry film thicknesses for painted steel for metal roof and metal products range from 0.0005" (0.5 mil) to 0.0015" (1.5 mil).

FLEXOGRAPHIC ROLL PRINTING – Flexographic roll printing is the process Steelscape employs to impart its distinctive colors and designs, such as Rustic and Aged Metallics onto metal for metal roof and wall products.

GALVALUME® – See ZINCALUME®

GALVANIZING – Galvanizing is the process of coating a thin layer of zinc to steel to improve corrosion resistance. Referred to by Steelscape as TruZinc®. For most metal roof and metal wall products that use galvanizing this is applied before the paint layer.

GAUGE – Gauge refers to the thickness of metal. A smaller gauge correlates to a thicker metal. For example, 22ga reflects thicker metal than 29ga. 22ga-29ga are also the most common gauges for metal roof and metal wall building applications. Sometimes spelled as gage.

GLOSS AND SHEEN – Gloss and sheen are two terms used to describe how well a surface reflects visible light. Gloss is measured at a 60° angle from the surface, while sheen is measured at 85°.

GRAFFITI RESISTANCE – Graffiti resistance, for Steelscape applications, refers to a painted metal wall surface in which aerosol or marker-based graffiti can be removed from the surface.

LEED – Leadership in Energy and Environmental Design (LEED), is a green building rating system developed based on a pre-developed framework for healthy, efficient and environmentally sustainable structures.

LIGHT REFLECTANCE VALUE (LRV) – Light Reflectance Value measures the amount of visible or usable light that reflects from a surface. LRV is expressed as a percentage from 0 to 100; the higher the number, the more visible light that is reflected. Used for both metal roofs and metal walls.

MECHANICAL SEAM – Mechanical seam refers to metal roof products where the seams are mechanically attached together by 'rolling over' one seam with another by hand using special tools or with a mechanical seamer. This offers superior weather-tightness and product performance in extreme environments.

METALLIC COATING – Metallic coating refers to the process of applying additional metal elements, typically Zinc (galvanizing) or Aluminum and Zinc (ZINCALUME® or Galvalume®) to steel to improve corrosion performance of metal roofs and walls.

MICA – Mica is a specially formulated pigment that is added to paint for metal roofs and metal walls to create a sparkling or light-catching effect. This creates the effect of metal flakes in paint but with higher durability.

OIL CANNING – Oil canning is a visual phenomenon seen as waviness or distortions in the flat surfaces of metal roofing and metal siding products. This effect is created by a range of different factors including stresses in the base material, improper fastener pressure, misaligned panels, and thermal expansion.

KEY TERM GLOSSARY

PRE-PAINTED METAL – Pre-painted metal is the continuous process of coating steel rolls, called coils, with paint (also called coil coating). This type of metal is used in metal roofs and walls. The paint is applied to the metal before it is formed into a finished product by a product manufacturer is called pre-painted metal.

PAINT – Paint refers to the film applied to a surface to achieve a desired aesthetic and to protect the material underneath. Metal roof and wall paints typically consists of resins, solvents and pigments. Pigments add color, resins are the binder and add physical and chemical attributes, and solvents dissolve this combination into a liquid form.

PAINT SYSTEM – The paint system consists of a combination of the different painted layers, namely the pretreatment, primer and top coat to create a total finish solution. Paint systems can be modified to achieve different aesthetic or performance characteristics.

POLYESTER PAINT – Polyester Paint is the most economical metal roof paint system and offers the lowest level of UV resistance when compared to SMP (Silicon Modified Polyester) and PVDF (Polyvinylidene fluoride) systems. Versatile and easy to form, their paint structure can be modified to suit a wide range of performance qualities and their flexibility means they can be offered in a variety of color and gloss options.

PRE-TREATMENT – Pre-treatment refers to a coating process applied before painting in which the surface of the metal is cleaned to improve paint adhesion attributes to improve the longevity of painted metal roof and wall products.

PVDF (Polyvinylidene fluoride also known as Fluorocarbon or Kynar 500® and Hylar 5000®) – Polyvinylidene fluoride (PVDF) is the highest performing of the three common metal paint systems. It offers exceptional chemical, chalk, and fade resistance and can resist degradation when exposed to aggressive weather elements such as urban grime, air pollutants, salt, high temperatures and humidity. PVDF can be used on a wide range of preformed shapes, which is why they are often used for high-end architectural and high-profile commercial metal roof and wall projects.

PRIMERS – Primers refers to a coating that prepares the substrate for painting by providing 'bite' for adhesion and directly supports topcoat color and flexibility. Primers also provide corrosion resistance for metal roof and wall products.

REVERSE IMPACT TEST – A reverse impact test is a stress test that is performed to determine if any paint adhesion is lost through a direct impact from the underside of the material. Like the T bend test, this simulates final forming into the finished metal roof and wall product.

ROLL FORMING – Roll forming is the process used to manufacture the majority of metal roof and wall products. A continuous production process where material is fed through a series of progressive rollers to form it into a finished state. Enables the end panels to be manufactured to desired end-user's length.

SILICON MODIFIED POLYESTER (SMP) – Silicon Modified Polyester is a paint system with a different resin structure to improve their UV resistance qualities compared to traditional polyester systems. SMPs offer a greater resistance to chalk and fade compared to traditional polyester systems and commonly used in residential metal roof applications.

SLITTING – Slitting is a manufacturing process in which the width of a metal coil is trimmed to a desired size, or which one metal coil is slit to form multiple narrower coils for use in metal roof and wall products.

SNAP SEAM OR SNAP LOCK ROOFING – Snap Seam or Snap Lock Roofing is a type of standing seam metal roof profile which typically has a nailing flange to affix the profile to the roof deck and the seams snap together to form the interlock.

KEY TERM GLOSSARY

S**OLAR REFLECTANCE (SR) –** Solar Reflectance refers to the amount of solar radiation reflected off a metal roof or wall surface. This is expressed as a percentage between 0-100%.

SOLAR REFLECTANCE INDEX (SRI) – Solar Reflectance Index is the most common index used to measure the reflectivity effectiveness of a color for a metal roof or wall. The consolidated value calculated from solar reflectance and emissivity with factors such as air flow considered. The higher the value the greater the reflectance. This is expressed as a range, therefore a standard black surface has an initial SRI of 0, where as a standard white surface has an initial SRI of 100.

SPANGLE – Spangle is a term to describe the distinctive finished appearance of unpainted ZINCALUME® steel as commonly used in metal roofs and walls.

STAMPED METAL TILE, SHAKE, OR SHINGLES – Stamped Metal Tile, Shake, or Shingles refers to the modular metal roof products manufactured using a stamping process to take on shapes of traditional roofing materials.

STANDING SEAM ROOFING – Standing seam roofing is a common metal roof type for both residential and commercial applications. The seam, is the vertical rib which interlocks between each profile and is raised from the flat base pan of the panel. The fasteners that attach these panels to the structure underneath are covered in the installation process, which is why these profiles are also called concealed fastener roofing profiles. Standing seam reflects one continuous piece from ridge to eave and are available in a variety of widths from 12" up to 20" and beyond.

STRIATION – Striations refers to the small ridges formed in flat areas of metal surfaces used to reduce the visual impact of oil canning in metal roof and wall products.

SWARF – Swarf refers to the small metallic filings created when metal roofing products are pierced or cut with friction saws, discs, or drills. If these tiny particles are left on a metal surface, they can corrode and cause rust stains.

T BEND TEST – The T Bend Test simulates forming of metal into metal roof and wall products and assesses the flexibility of painted metal. During this test, a bend is formed in the test sample and inspected for any cracking.

TENSION LEVELING – Tension leveling is an in-line process on Steelscape's Metallic Coating Lines and the Kalama Pickle Line, which induces tension into the strip in excess of the yield strength. Tension leveling results in a flatter product with improved properties for subsequent forming into metal roof and wall products.

TOLL FORMING – Toll forming is the process of coating or painting metal in which the base metal is provided or owned by the end-user.

TOP COAT – The top coat refers to the top painted layer of metal which provides metal roofs and wall with the visual color, offers protection from the outside elements, in addition to durability, and weatherability.

TRUZINC® – TruZinc® is the terminology used to refer to Steelscape's computer controlled galvanizing process for metal roof and wall products.

YIELD STRENGTH – Yield strength represents the stress at which materials transition from elastic to plastic deformation. Once a material has been loaded past its yield point, it is permanently deformed making it unsuitable for use in metal roof and wall products.

ZINCALUME® (Galvalume®) – ZINCALUME® refers to a metallic coating consisting of 55% Aluminum and 44% Zinc to offer superior corrosion resistance. Coatings using the aluminum-zinc alloy offer a number of advantages to zinc alone. Aluminum is inert and provides a protective rather than sacrificial barrier.

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