TECHNICAL PUBLICATION
METAL ROOFING

Metal roofing systems have gained popularity and are specified on numerous projects, including both commercial and residential buildings. Steep roof slope designs are very attractive coupled with the aesthetic value of a metal roofing system. Metal roofing panels have been in the marketplace for scores of years, and popularity of value and aesthetics have been proven. Thus, the industry is skyrocketing. The standing seam and batten profile are the most common panel types in use.

METAL TYPES

One of the first issues that must be decided is what type of metal should be used. There are a number of choices, such as copper, terne, aluminum, steel and zinc. All have pros and cons.

Copper has a life expectancy with proven performance over centuries, is costly, has few structural characteristics, and calls for a high degree of installation ability. Terne also has a high life expectancy and requires maintenance. Terne-coated stainless requires no maintenance but bears a very high price tag.

Aluminum is more affordable, has some structural capabilities, and has a high coefficient of expansion, which causes a great deal of movement. Steel is least costly, has excellent structural characteristics, but rusts – so a protective coating must be selected. Coated steel is the most common choice for metal roofing.

ALLOY COATINGS

Galvalume®, an aluminum/zinc formulation, is the most popular formulation used worldwide. This concept has superior weathering properties and field studies indicate that when properly formulated the coating will outlive its warranted life in friendly environments.

APPLIED FINISHES (PRE-PAINTED METAL)

There are many applied paint films and laminates available within the marketplace, but a few paint types dominate most applications. Factory painting of aluminum and steel panels is accomplished through the "coil coating" process. This process produces a high quality finish that is typically warranted against chipping, cracking, checking, peeling, fading and chalking for various time periods.

All pigments will fade over a period of time, some more than others. One of the most common formulations is known by the trade name Kynar®. Trade names for 70 percent PVDF resins are Kynar 500®.

FABRICATION

Metal roofing panels are manufactured in a manufacturing facility and shipped to the project site. Continuous lengths of panels may be prohibited due to shipping capabilities. Metal panels can be jobsite fabricated by an on-site roll former. Coil stack material is purchased and inserted into the former, producing the panel on the jobsite to the specified length. This concept eliminates costly delays in the availability of fabricated panels and allows the completion of a project in a timely fashion.

INSTALLATION

Metal panels are installed in various lengths and widths. One continuous length is common resulting in no lap seams. Although lap seams are very common, the lap is just another location for water intrusion. A continuous span may be more aesthetically appealing however. Panels widths vary and typically the wider panels will result in "oil canning". Oil canning is a rippling effect in the panel surface caused by stress. Oil canning can be resolved by reducing the panel width, using a panel profile with stiffening flutes, and ensuring that thermal movement is adequately provided for within the systems design.

Installation methods are critical for performance to include underlayment, exposed or concealed fasteners or clips, flashings and design details at all penetrations.

Design, details and installation methods to include thermal movement and weather integrity should never be sacrificed for economy or convenience. For example, the installer must comply with wind uplift measures to eliminate a "blow off" of the system and folded and cleated details must be implemented to achieve the intended results. Continuous cleats for

exposed flashings and correct design details at all penetrations will eliminate the majority of all exposed fasteners, resulting in integrity of the roofing system, thus enhancing the aesthetics of the entire project. Flashings must always be set into an acceptable sealant prior to mechanically fastening. Concealed clips to roof panels are to be installed at specified intervals to comply with wind uplift calculations.

Canned construction details and specifications can be outright unconscionable, whereas specifications and design details will pertain to the individuality of each project.

SPECIFICATIONS AND DETAILS

Specifications clearly direct the installer on every aspect of the metal roofing system. The following items must be defined in order to achieve the intended results:

- Underlayment type and fastening
    a. Corners
    b. Sides
    c. Field
- Slip sheet prior to panel installation
- Metal panel
    a. Metal type
    b. Finish
    c. Gauge
- Metal flashing
    a. Metal type
    b. Finish
    c. Gauge
- Sealant
    a. Factory applied
    b. Field applied

- Installation method
    a. Slip sheet
    b. Metal panel attachment
    c. Concealed clips
    d. Exposed fasteners
    e. Fastener type, finish, length

The purpose of specifications is to clearly outline all products required for the project and direct the installer at all areas relevant to the installation.

Detailed drawings depict the finished product and clearly show fasteners, sealant and all intended configurations of flashings and panel design. Details show areas of penetration, such as a soil stack, or sections through all intersecting changes in the roof plane – vertical walls, eaves, gutters, expansion joints, exhaust vents, etc., are a few areas. These detailed areas are the most vulnerable to water intrusion and must be correctly detailed.

A complete and well documented set of specifications and detail drawings will result in a superior roofing system.

THE INSTALLER

The installer must have a clear understanding of roofing, sheet metal and metal roofing systems. Roof panel layout, flashing components and installation methods are defined in the form of specifications and detail drawings for the installer to follow. The combination of a good installer and well defined specifications and drawings result in a properly installed metal roof.

SUMMARY

A metal roofing system can be aesthetically pleasing and perform for the traditional twenty (20) year period and beyond. Metal type, finish and design are the beginning criteria to consider. Properly prepared specifications and detail drawings will direct the installer at every location. DETAILS…DETAILS…DETAILS are the major factor for the success of performance, both short and long term. The installer must be well versed in the roofing industry in general and a specialist in all of the aspects of metal roofing systems. A lead sheet metal mechan-

ic and experienced crew is a must for a successful project. A properly specified and designed metal roofing system will not contain generic and/or typical information, but specific installation methods and procedures, to include specific detail drawings.

Improperly designed and installed metal roofing systems result in water intrusion and premature failure. Circumstances on existing installations may allow a complete redesign of the sheet metal flashings and salvaging the roofing system, resulting in tremendous cost savings.

A qualified design professional should be engaged to specify and design your project.

Scott D. Bonk and Associates, Inc.