THE SUCCESSFUL USE OF ARCHITECTURAL PANELS ON METAL BUILDINGS

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Chances are, when someone mentions metal building panels, you think of the old traditional "R", "M" or "A" panel. These three panel profiles have been the most commonly used panels in the metal building industry for many years. Times have changed for the better. Metal buildings are not used just for barns and garages anymore. Today, churches, shopping centers, doctors' offices and schools, to name a few, are utilizing metal buildings to reduce both building costs and construction time. The designer is looking for ways to "dress up" the building to keep it from looking like just another metal building.

That's where architectural metal roof and wall panels excel. Architectural panels differ from standard metal building panels in three basic ways:

1. Architectural panels generally have concealed fasteners. Eliminating exposed fasteners is an important consideration in any architectural application. This is achieved with a hidden clip that also allows for thermal movement.

2. There are many different panel profiles. Roof panels are available with round, square, beveled or pencil ribs. These ribs can be an integral part of the panel or in the form of a "snap on" or "seam on" batten. These panels also are generally available in a variety of widths to accommodate the designer's preference of rib spacing. Wall panels are available that produce a flat appearance or a wide variety of shadow lines or reveals.

3. Architectural panels are available in an array of colors and finishes. On large jobs, custom colors can be efficiently produced.

Each of these architectural panel systems has its own unique characteristics and

installation procedures. Because of this, the design professional, erector and panel manufacturer must work together to insure that the building owner receives a product that looks and performs as it was designed.

DESIGNER RESPONSIBILITIES

The design professional will want to make sure that the panels being considered will be used in the proper application. Some of the questions that need to be addressed or considered include:

1. Will the panel meet the design loads? While this seems an obvious question, some times the panel being considered meets the loading criteria in the middle or main portion of the roof, but would require so much extra support at the high wind areas that it becomes too expensive to consider.

2. Is the panel being installed on open framing or over solid deck? Some architectural panels are able to span open framing while others must be installed on a solid deck. Those that can span open framing may not always be able to span the 5'-0" purlin or joist spacing that is common on metal buildings.

3. Does the roof pitch meet the manufacturer's minimum roof slope? Many architectural roof systems are hydrokinetic, which means these systems are designed to perform only in a water shedding capacity. Consequently, the minimum recommended roof slope is usually 3:12. However, there are also some hydrostatic systems that are designed to perform under standing water. The minimum roof slope for these systems can be as low as ?:12.

4. Will the roof handle the expected amount of thermal movement? On extremely long runs, the roof may expand and contract more than the panel clip is designed to handle. In this instance, a step up in the eave height will be required. This step up in eave height can also be a very attractive design element. In some cases, the panel may be attached to the substructure at mid span, allowing it to float toward both the eave and ridge, thereby doubling the total amount of allowable roof movement.

5. How well can the panel handle hips, valleys, dormers, roof to fascia transitions,

etc., that are typically incorporated into architectural roof designs? Vertical rib panels are typically easier to flash at hips and valleys. Dormers are easier flashed to roofs with low rib heights. Some panels are designed to allow a transition from roof to fascia by cutting the panel seams and bending the pan portion of the panel. These systems have die-formed rib covers which are riveted to the panel ribs where they were cut. These rib covers and rivets are color matched to the panel. Batten style panels are able to transition by cutting and bending the batten before it is attached to the panel. These systems do not require rib covers. With these panels, it is possible to have a roof, fascia and soffit from one continuous panel.

6. Have the acoustics been considered? You have probably been in a gymnasium or a similar building that had bad acoustics. This problem can usually be remedied with a perforated liner panel over batt insulation installed on the inside of the wall and/or roof. The sound waves enter the holes in the panels and the insulation absorbs them. Another acoustical problem that not everyone knows about involves metal roof panels over rigid board insulation over metal deck. This occurs in buildings with the metal deck exposed or with a finished ceiling that has openings in it. It becomes most evident in buildings that are normally quiet, i.e., churches or libraries. Typically, in the morning when the sun first hits the roof panels, the panels begin to expand. The normally inaudible vibrations created by the panel sliding along the clips are transferred by the clip fasteners through the rigid board to the metal deck. The metal deck then amplifies this vibration enough to make it audible in the room below. To avoid this problem, install a finished ceiling of some type to seal off these noises from the interior of the building.

7. Is the insulation to be used compatible with the roof or wall system specified? For example, if more than the manufacturer's maximum recommended insulation thickness is installed between the panels and the purlins, the insulation can cause the panel to "bulge out" at each purlin or girt. Some roof panel systems are not designed for metal building (blanket) insulation to be installed between the panel and purlin. If blanket insulation is to be used with these systems, install it between the purlins instead of across them. There are several insulation retention systems available that work well in this application. Another option is to use rigid board insulation on top of the purlins. A bearing plate is then installed under the panel clip to prevent it from sinking down into the rigid board.

8. Is the specified panel capable of withstanding the environment to which it will be subjected? For example, on some buildings, it is not a good idea to consider a panel that utilizes battens or an "S" lock in areas that experience extreme icing in the winter. Due to heat loss through the attic, ice can melt on the upslope end of

the roof and run down the panel to the eave where it can re-freeze. If this water runs under a batten or into an "S" lock before it freezes, it can force a batten from the panel or an "S" lock apart. Panels that do not have snap-on battens or an "S" lock would be more appropriate in this situation.

9. Does the roof meet all applicable wind uplift and/or fire rating requirements? Keep in mind that a UL90 wind uplift rating is not affected by what is done at the eave, rake or ridge. However, the new Corps of Engineers' uniform static air pressure differential test requires that the system be tested as constructed. The manufacturer should provide UL Construction Numbers for the designer's approval.

10. If applicable, can the roof be warranted for weathertightness as designed? If a roof requires a weathertightness warranty, the manufacturer's standard details should be used. If it is necessary to deviate from these standard details, be sure to get the manufacturer's approval first.

11. Are all pertinent accessories compatible with the panel system? If the panels you use are Galvalume coated, do not allow them to come into contact with lead or copper or water run-off from lead or copper. This includes plumbers hats for vent pipe penetrations and copper gutter or trim. Where exposed, use long-life fasteners painted to match panels. Pop rivets should be stainless steel and also painted to match panel or trim color. Also, any accessories that can, should be installed by the panel installer. Roof curbs are a good example of this type of item. Installers of other accessories such as plumbers (vent stacks) and lightning rod installers should coordinate with the panel installer to insure that these items are installed at the proper time and place. You don't want vent stacks in the middle of panel seams or lightning rod penetrations in the middle of a valley.

Once these questions have been resolved, choices can be made on color and type of paint. Final color selection should always be made from a color chip (an actual piece of painted coil), not the color chart. Small lengths of panels can also be provided to assist in the selection of panel gauge and width, rib height and finish (smooth, embossed, striated, beads, etc.). The designer should be aware that heavier gauges, narrower panel widths, embossing, beads and striations all help to reduce oil canning.

ERECTOR RESPONSIBILITIES

The erector's job is to install the panels in accordance with the construction drawings and the manufacturer's instructions. These documents are intended to provide the erector with guidelines that will insure that both the aesthetic and performance requirements of the roof or wall system are met. Because the roof and/or wall panels are a focal point of the building in architectural applications, the erector must pay considerable attention when installing these products. Among the things he should keep in mind are:

1. Minimize oil canning - This phenomenon is inherent in metal panels with wide flat areas, which architectural panels tend to have. However, the erector can take steps to minimize oil canning.

The most common cause of oil canning is the application of panels to a misaligned or uneven substructure. On roofs, whether open framing or solid deck, the substructure must be on-plane. Before beginning panel installation, the erector should pull string lines at various locations to check the substructure. Any areas that are more than ?" out-of-plane should be corrected before panel installation begins. Carefully check any roof that has long span joists. These joists are typically fabricated with camber built in. However, each joist may not have precisely the same amount of camber once installed. On walls, girts can be out of alignment with the eave strut and base angle. Girts can also roll, particularly if they are flange bolted, causing them to become out of alignment.

Other causes of oil can include overdriving fasteners, overengagement of panel sidelaps, mishandling of panels and fixing panels to the substructure at each end that were designed to float. The designer should be aware that heavier gauges, narrower widths and embossing minimize oil canning.

2. Limit foot traffic - When installing architectural roof panels, the erector should take precautions to protect the in-place panels during roof installation and the "trim out" process. This is especially true on panels installed over open framing. Most metal building erectors are accustomed to using the in-place roof panels as a work platform as work progresses. With architectural panels, this will result in loose spots being walked into the panels, as well as damage to the panel finish. To prevent this, use deck pads or walk boards during the roof installation.

3. Know the product - Architectural panel systems generally require a greater degree of skill, knowledge and patience to install than standard metal building panels. Also, while many panel systems are similar, they each have their own subtle differences. For these reasons, it is a good idea to learn as much as possible about the product to be installed. This would include becoming familiar with any product literature available, especially installation manuals. Being trained and certified by the panel manufacturer in the installation of the prescribed panel system can provide invaluable information in avoiding problems, reducing installation time and improving the quality of the finished installation.

MANUFACTURER'S RESPONSIBILITIES

In addition to providing quality products in a timely manner, a panel manufacturer should also provide the following:

1. Design support - Provide support to the architectural and contracting community. Manufacturers should be able to provide assistance in developing budget criteria, initial product selection, reliable estimating, timely bidding, prompt submittals as well as professionally prepared shop drawings. On-staff engineers assist in providing wind uplift and other loading information, guidelines on air and water infiltration and compliance of specific code requirements. Published information such as color charts, section properties, loading charts, warranty information, and product application charts should be available. Sample kits containing panel profiles and other parts pertinent to the system are also helpful.

2. Installation support - Provide installation manuals for each system as well as a technical representative to answer installation questions and handle field problems. Certified erector programs, as mentioned earlier, are an excellent way to provide the erector with the knowledge and training needed to install the prescribed product in a workmanlike manner. This program should involve "hands on" training and testing to insure that each participant has become thoroughly familiar with the product.

By working together, design professionals, erectors and panel manufacturers will insure the success of the project.