

# *Poultry Engineering, Economics & Management*

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## National Poultry Technology Center, Auburn University

***Critical Information for Improved Bird Performance Through Better House  
and Ventilation System Design, Operation and Management***

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## Choosing Poultry House External Roof & Siding Metal Sheathing

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Metal roofing and siding panels have long been a durable and economical choice for exterior protection of agricultural buildings and commercial poultry housing. Building a new poultry facility is a long-term business endeavor with an expected useful life now exceeding 30 years with minimal maintenance. Growers and integrators generally recognize that achieving that goal requires adhering to proper building standards, based on a professionally engineered structural design for the location.

However, steel and coating prices do fluctuate, and there are always various choices of materials at different price levels offered by the steel and coating industries. Therefore, it is natural for anyone considering new construction to look for suitable lowest-cost materials. In order to last for the life of the building, metal sheathing and roofing panels must meet specific quality standards. The mistake to be avoided is considering only lowest initial costs that may not meet the quality standard required for longevity.

This newsletter explains the most important facts about metal roofing and siding panel options for poultry operations, providing a guide to making the wisest possible 30-plus-year investment decision.

The two most important metal sheathing criteria for poultry growers and builders are metal sheet thickness and anticorrosion coatings.

### Metal Sheet Thickness

All metal roofing and sheathing panels start as a roll or coil of metal sheet. These coils are unrolled and shaped to add ribs or crimps for lengthwise rigidity and then cut to length. Metal sheet thickness is most often expressed as "gauge." The lower the gauge number, the thicker the panel.

For poultry applications, metal classified as 29 gauge has long been the accepted rated thickness, effectively balancing durability and cost. The term "29 gauge" represents a generally accepted range of metal thickness between 0.014 and 0.015 inches. It is not a single standardized thickness. This means that not all metal called



**An AZ55 Galvalume® metal roof such as this one appears no different than similar G90 galvanized roofing metal. Either material meeting the thickness and coating quality standards needed is suitable for poultry housing. Growers and builders should compare prices carefully before making a purchase. As market conditions change, one or the other of these materials may be significantly less expensive.**

**Whether used for roofing or siding, thickness of metal panels should be in the upper part of the 29 gauge thickness range (0.014 - 0.015 inches). Panels measuring less than 0.0145 inches are significantly lighter and less sturdy, and should not be used.**

“29 gauge” is equal and some may be significantly thinner than expected. To optimize durability and life of all metal sheathing in the poultry industry, it is better to avoid any with an average thickness at or below the bottom of this range. In fact, many high quality metal panels will have thicknesses averaging in the middle of the range (0.0145”) or higher. We recommended that growers have this discussion with their builder prior to the construction process and consider having a thickness specification stating “0.0145” average thickness or better” spelled out in the construction contract. It is also a good idea for builders and growers to verify this specified thickness of metal before accepting delivery. If only “29 gauge” is specified, then metal at or below the bottom of this range could be what you get.

## Anticorrosion Coatings

Anti-corrosion coatings have changed over the years. Currently there are two types of anticorrosion coatings readily available in the US market which are acceptable for exterior sheathing in poultry housing: standard galvanized (zinc only) coated and AZ (aluminum/zinc combination) coated. The AZ coatings fall under trade names like Galvalume®, Aluzinc®, ZincAL® - just to name a few. Though neither coating typically carries an agricultural specific warranty, both of these products have proven functional and sufficient for most commercial poultry house applications.

Both galvanized and AZ based coatings are considered a “sacrificial layer of protection” – meaning that it is fully expected and anticipated that the coating will wear away eventually but will protect the underlying metal from corrosion in the meantime. This system balances cost with useful life. The level or grade of these coatings is specified as weight of coating per square foot of metal panel.

There are other alternative types of anticorrosion coatings prevalent in Europe and other areas worldwide. Some offer agriculture warranties. Most of these have not made it into the mainstream U.S. poultry housing for various market driven reasons including higher cost, but they may warrant further testing here in the future to expand the choices of US poultry growers.

## Standard Galvanized Coating

Standard galvanized (zinc only) coatings have been around for many years in agricultural applications. Using a continuous high-speed hot-dip process, the thickness of the zinc coating dictates how long the underlying steel is protected from the environment. For standard galvanized metal, the coating thickness is stated as a “G” number in accordance with ASTM A653 standards. For example, G90 galvanized metal has a coating thickness of 0.90 ounces per square foot total (both sides), or approximately 0.76 mils thick per side.



For poultry applications, G90 rated galvanized coating is the minimum amount allowable. Any less would not yield good long-term protection. Higher levels, while providing more protection, would be cost prohibitive.

**Photo shows “white rust” on galvanized metal caused by improper handling or storage before installation. White rust is a post-galvanizing phenomenon. Responsibility for its prevention lies in the manner in which the metal is packed, handled, and stored prior to the galvanized product’s installation and use.**

**White rust prevention is the responsibility of all those involved in the supply chain to ensure that the causes of white rust are recognized and the risks of its occurrence minimized on newly galvanized steel.**



**A simple set of digital calipers (or other thickness measuring gauge) can be used to check the thickness of metal to be certain it meets specifications.**

## AZ (Aluminum/Zinc Combination) Coatings

AZ coated steel (Galvalume®, Aluzinc®, ZincAL® and others) uses a highly corrosion resistant coating of nominally 55% aluminum, 43% zinc alloy, often with Silicone also listed, applied with a continuous high-speed hot-dip coating process. In many corrosion tests, AZ coatings have shown to be superior in corrosion resistance over simple galvanized sheets. For this reason AZ coatings have captured much of the residential and commercial metal sheathing market in the US.

However, AZ coatings have not been fully accepted for confinement agricultural applications due to premature corrosion seen in some animal confinement situations. These problems are seen most often and most severely in confinement swine and dairy operations. Because of this, the mainstream commercial poultry market has avoided AZ coatings as a matter of utmost caution. Certainly this should be a concern when and where commercial poultry houses are built such that bare metal is exposed to the inside poultry environment.

But if the metal is not exposed to the inside environment, as in the modern dropped ceiling, insulated sidewall broiler, breeder and pullet houses, AZ coatings can be installed as an exterior sheathing with confidence. In fact, Galvalume® AZ coated metal has been in place for 10 or more years on the exterior of many poultry houses in the southeastern U.S. without any detrimental effects being observed. The minimum criteria for AZ coatings in poultry should be AZ55 for exterior use, which equals 0.55 ounces per square foot total (both sides). AZ coated metal should still be avoided where the metal is in direct contact with the bird environment.

Also available is a mill-applied additional acrylic coating on the surfaces of many AZ steels that further enhances the corrosion resistance, and it is recommended for poultry, if available.

One often-touted benefit of AZ coatings over G90 is the much lower occurrence of “white rust” or wet storage stain. “White rust” occurs when moisture gets between sheets of stacked galvanized metal at the supply yard or while stored at the job site awaiting installation. “White rust” may also occur on the underside of roof metal in some poultry house attics where conditions favoring condensation exist. “White rust” is both unattractive in appearance and can lead to premature corrosion of the underlying steel.

## Painted Metal

Often growers choose painted metal panels for sidewall and end-wall sheathing and trim on poultry housing for appearance reasons. And like all coatings, painted metal should meet minimum criteria to be acceptable in poultry house applications.

Most painted metal coils are first thin coated with a zinc or AZ coating. Then primer and paint are applied over that zinc or AZ coating and the painted coils are then roll formed.

The first concern is that the paint coat thickness can be unequal from one side to the other, often with the exterior facing side having a heavier coat of paint than the interior. This is an effort to lower the cost of the panel and is unacceptable for agricultural applications. For maximum expected life, both sides of the metal need to have equal paint thickness applied.

Next, the paint itself must also meet minimum criteria to achieve the expected life. All paints are subject to many tests for reliability and longevity. For purposes of poultry usage, color retention, or resistance to color fade, is usually of most concern. This is purely an appearance characteristic, but if a grower chooses to use painted metal on



**Photo shows white rust on the interior of a poultry house attic roof metal. This attic has conditions present for condensation due to leaks in the poultry house ceiling which allow warm moist air to condense on the cold roofing metal and causing the white rust.**

**AZ coated metal has been shown to be far more resistant to white rust than is G90.**

a poultry house, the colors chosen are important to him and he wants them to last for many years. For poultry housing, the two most used paint systems are either polyester or silicone-modified polyester (SMP) paints.

Simple polyester paint systems are the lowest tier for price and performance for exterior metal. While polyester paints have improved, they have not been shown to match the color performance of SMP paints over time. It is generally accepted that polyester systems will perform well for approximately 10 -15 years before color fade becomes a concern.

SMP paint systems typically yield a much longer resistance to color fade. For SMP's, 20-30 years is a standard expectation, with some paint companies offering as much as 40 year warranties for their SMP paint. (However, it must be noted that most of these companies do not offer these warranties for agricultural applications or explicitly exclude agriculture in their warranty.) If poultry growers are considering painted metal for the exterior of their houses, it is recommended they choose an SMP paint system applied over a good AZ undercoating to get the expected life and color retention. This is also true when choosing to use painted metal on the interior of certain types of poultry housing such as breeder or layer houses.

## Secondary Criteria to Consider

Metal thickness and coating are the primary concerns for most poultry growers and builders to consider. However, other possible variables need consideration when choosing metal sheathing. The height and number of the major ribs on a panel contribute to the strength of the panel and are part of the parameters used to determine the spacing of the roof purlins. Most often, roof panel ribs on poultry houses are ¾ inch high with five major ribs per 36-inch coverage panel. Major ribs smaller or fewer than this could result roof metal problems like sagging. In addition, the purlin spacing should match the roof manufacturer's specifications and the engineered housing design for the farm.

## Bottom Line

Make a wise investment and protect it. Choosing the appropriate roof and siding metal for poultry housing is a very important decision. Growers and builders should follow these guidelines for evaluating metal sheathing to get the maximum expected life from the investment. The best options currently available are to use 29 gauge metal with an average thickness of 0.0145 inches or thicker, coated with either G90 galvanized or AZ55 Galvalume® or equivalent coating for roof metal. The same metal coating can be used for sidewalls and end walls, or choose an SMP painted metal for appearance purposes.

The price difference between G90 and AZ coated steels can fluctuate greatly, resulting in thousands of dollars difference for a poultry house. Growers need to make a smart, informed economic decision, assuming comparable high quality of both choices..

If growers and builders follow the criteria discussed, and properly install the product on the exterior of the modern constructed commercial poultry house, they can expect great useful life from the metal sheathings, keeping the poultry houses looking good and protecting their investment for many years to come.

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*Our mission: To improve the bottom line profitability of the live production sector of the US poultry industry by providing timely applied research and education, resulting in increased efficiencies in housing, equipment, energy, and environmental control.*



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