



▶ Best Practices for Selection and Installation of Expanded Metal Lath Products

By ClarkDietrich™ Building Systems

January 2014

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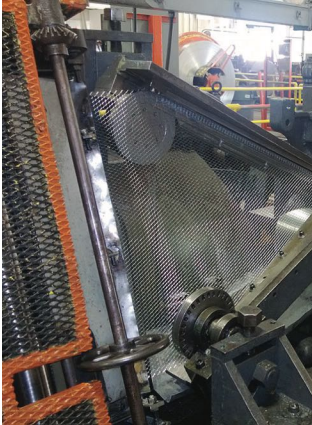
SPECIFYING THE APPROPRIATE METAL LATH PRODUCT for the application and installing it properly has a dramatic impact on the long-term stability of a building's exterior cladding. Fortunately, there are various building codes and industry standards that are excellent guides to best practices for product specification and installation.

The purpose of this article is to take a closer look at the aforementioned codes and standards and their recommendations for selecting and installing the best-quality expanded metal lath products for specific applications—in addition to highlighting common installation errors and their consequences. As such, we hope to provide project teams with a resource that will help them produce more stable, long-lasting exterior wall assemblies.

▶ INTRODUCTION

For more than 50 years, expanded diamond-mesh metal lath has been regarded as an integral component of stucco building exteriors, which consist of cement or gypsum plaster applied over wood or gypsum sheathing. At first glance, it appears to be a fairly simple material, and very few changes have been made to its manufacturing process over the years. However, the expanded metal lath product specified and the way it is installed has a huge impact on the long-term stability of the plaster it supports.

► SPECIFYING QUALITY PRODUCTS



Lath machine that shows the coil being slit, stretched and pulled into the finished goods lath.

Like all other building components, selecting and specifying the right product greatly reduces the potential for job failures. With such high stakes involved, it is important to ensure that the specified product has first been examined and tested by an accredited third-party certifying body to verify its compliance with the International Building Code (IBC), the International Residential Code (IRC) and the industry standards they reference. The industry standards most widely used by the IBC and IRC to gauge the product performance needed for code compliance are: ASTM C847, *Standard Specification for Metal Lath*; and ASTM C1063, *Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster*. Appropriately, the measure of an expanded metal lath product's quality begins during the manufacturing process.

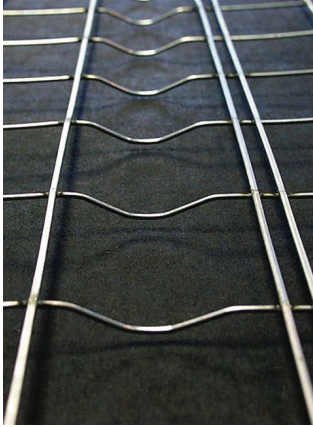
► MANUFACTURING TO ASTM SPECIFICATIONS

In general, the manufacturing of expanded metal lath begins when a small (< 12 inches) G-60 galvanized steel coil (meeting ASTM A653) is gradually uncoiled and fed into the cutting rollers of a large rotary expanding machine. The cutting rollers apply a force of more than 100,000 pounds (445 kN) to slice through the sheets, creating the diamond configuration. Stretcher arms on the machine attach to the coil and expand the sheet into compacted diamond-pattern sheets, 27 inches (696 mm) in width. The machine will have a sheet end cutter that can be set to various lengths—typically, 97 inches (2,464 mm) is the minimum length for packaging as a standard sheet, per ASTM C847-10 requirements. Manufacturers are required to maintain cutting rollers to ensure clean cuts and prevent formation of unexpanded diamonds or the fracturing of diamonds in configuration (see photo left).



This illustration shows where the lath product has crimped on the ends due to cutter-tooling wear.

Self-furring laths require an additional step in the manufacturing process: the machine embosses the sheet with either dimples or V-grooves, providing 1/4 inch (6.4 mm) of furring, measured from the back of the dimple or groove to the face of the lath strands. The furring tools are monitored by the manufacturer, as worn tools can cause a sheet's furring to fall below the 1/4-inch length required by ASTM C1063. If the tools are found to produce furring below the required length, they are replaced.



Welded wire lath that's self-furred, per ASTM C933.

Alternate Metal Plaster Bases

One commonly used expanded metal lath material is welded wire, produced to ASTM C933, *Standard Specification for Welded Wire Lath*. This welded wire lath can be manufactured self-furred, thereby providing full embedment of the plaster scratch coat, which is ideal for expansive wall panels where the stucco will be machine applied, or sprayed. Another lesser wire material is woven wire, more commonly known as “chicken wire,” which is produced to ASTM C1032, *Standard Specification for Woven Wire Plaster Base*. This product is typically used on single-story mass-production housing and usually has to be furred to the substrate.

BUILDING CODE REQUIREMENTS

The IBC and IRC call upon ASTM C847 to define the expanded metal lath product's physical properties required for code compliance. This standard lists minimum lengths, widths, lath thicknesses and weights for products, as well as allowable tolerances. In order to meet these criteria, metal lath manufacturers have to pay close attention to a variety of details in their product design, including: the base thickness of the galvanized steel coil, cutter configurations and the pull force applied to the galvanized steel coil while being stretched.

ASTM C847 calls for metal lath to be manufactured from cold-rolled carbon steel sheets, per ASTM A653, *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*. In addition, ASTM A653 requires hot-dipped galvanized lath to have a coating of at least G-60, signifying a zinc content of 0.6 ounces/square feet (183 grams/square meter).

While the minimum galvanized coating required by ASTM C847 is G-60, it is possible to use other materials to protect metal lath from corrosion. One example of this is increasing the galvanization to G-90—where zinc content rises to 0.9 ounces/square feet (274 grams/square meter)—or using pure zinc alloy (99 percent pure zinc) protective coating.

▶ EXPANDED METAL LATH ACCESSORIES

The accessory material selected for a particular expanded metal lath application depends largely on the climate of the building's location, along with the type of plaster/stucco or stone application used to form the façade. For instance, the higher humidity and salty air of coastal environments often demands a higher zinc alloy, or possibly PVC, for exterior skin components. However, in drier climates, galvanized accessories are more acceptable. Specifiers should note though, there may be trade-offs with certain materials. For example, while zinc alloy offers greater corrosion resistance, the material is considerably softer than galvanized steel. And, while PVC accessories are non-corrosive, they may not fit the building owner's aesthetic preferences. Another important thing to remember is that grouping incompatible materials in the final specification of lath, fasteners and accessories can increase the possibility of galvanic corrosion (i.e., electrolysis) or inconsistent corrosion protection, which threatens the stability of the building's cladding.



Illustration of a corner application, showing lath applied with scratch-coat on the left, and lath applied around the corner over two layers of weather-resistant barrier, consisting of synthetic wrap over Grade D paper.

The specifier and installer should be aware that physical characteristics of lath products being installed fully comply with ASTM C847-10 requirements. Examples of these “below-code” characteristics are lath weight, length, width and low galvanization (i.e., G-40). Products with the markings of “utility” or “nominal,” should be avoided for use in inspected facilities or code-compliant construction. The negative effects of lesser galvanizing and lath weight are quite apparent—below-minimum zinc coatings invite corrosion, while lower-than-minimum lath weights can compromise the building exterior's resistance to structural and wind loads. However, the effect of shorter lath lengths may not appear so obvious at first glance. Lath sheets are traditionally manufactured in 97-inch (2,464 mm) lengths to accommodate framing member spacing of 16 or 24 inches (406 or 610 mm) on-center, with an extra 1-inch (25 mm) end lap stipulated by ASTM C1063, Table 3. Simply put, use of 96-inch (2,438 mm) long sheet lath over standard framing member spacing will not provide the specified lath overlap, which, as a result, can cause cracking through the stucco finish.

▶ PROPER INSTALLATION IS KEY

Proper lath installation is of equal importance to the longevity of plaster-based building exteriors. Below are some of the most common lath-related installation errors and how they can be avoided.



Picture showing lath applied to the wall with v-groove self-furring and weather-resistant barrier behind the lath. The fasteners are attached into the groove and spaced at proper widths to achieve ASTM C-1063 installation standards.

Improper Plywood Sheathing Installation

According to the American Plywood Association, plywood sheathing should be installed with a minimal gap of 1/8 inch between sheets to accommodate any expansion that may occur in the wood as a result of moisture intrusion. It is important to note that in any case where large amounts of moisture enter the exterior wall assembly, the plywood may delaminate or swell significantly, ultimately causing the stucco cladding to deteriorate. The best protection against these liabilities is an effective moisture management strategy within the exterior wall assembly, consisting of high-performance insulation, air barriers and vapor retarders or barriers.

Improper Installation of Water-Resistive Barriers

Chapter 25 of the IBC—“Gypsum Board and Plaster,” Section 2510.6-Water-resistive Barriers”—states that exterior wall assemblies shall include two independent layers equivalent to Grade D paper that serve as water-resistive barriers. The only exception is the use of 60-minute Grade paper and a non-water-absorbing layer drainage plane, or rain screen.

Improper Metal Lath Installation

Some of the more severe metal lath installation errors involve improper lapping attachment to the framing members, improper installation of paper-backed lath, incorrect fastening of the adjoining sheets at the laps and the improper orientation of the lath sheets. A well-defined installation primer for laths with or without paper can be found in ASTM C1063, or the Expanded Metal Lath Association’s *Guide Specifications for Metal Lathing and Furring* (EMLA 920-09) and can guide the contractor toward a successful installation.



Metal lath attached to wall with PVC accessories.

Improper Fastening of Metal Lath

Improper fastening of metal lath is the most common installation error and is often a result of the lath being randomly stapled or nailed to the sheathing instead of the structural member. ASTM C1063 requires lath fastening at minimal intervals of 7 inches on-center. Lath accessories' flanges must directly touch the lath, with no weather barrier sandwiched in-between.

Improper Installation of, or an Inadequate Number of, Expansion & Control Joints

ASTM C1063, Annex A1.2, defines control joints as one-piece joints used to provide crack control for stucco shrinkage, drying and thermal expansion. The same standard describes expansion joints as two-piece joints used to accommodate some degree of movement in the stucco membrane caused by movement in the building or its components. Fastening the expansion joint flanges to sheathing, or leaving the lath un-cut behind the joint, negates the lath's effectiveness. Just like all accessories, the expansion joints must be wire-tied to lath edges or, in some applications, attached to supports at spacing that ensures stability. On large, vertical surfaces, it is wise to make vertical joints continuous and cut horizontal joints to abut the verticals, with proper care taken to prevent the horizontal joints from impeding the vertical joints' movement.

Improper Installation of Flashing or Sealants at Potential Points of Water Entry

Any poorly installed or omitted flashing in areas where water can enter the exterior wall assembly can easily cause the cladding, sheathing and wood framing members to deteriorate. Mold growth may also result from extended moisture exposure, causing indoor air quality problems inside the building. Though flashing is generally not the responsibility of the lath contractor, lath contractors are advised to notify the general contractor if they see improperly installed flashing or areas where flashing was left uninstalled.

► CONCLUSION

In order to provide customers with high-performance, long-lasting building exteriors and minimize liabilities, it is imperative for building and design professionals to be well informed of all applicable building codes and ASTM standards. Adherence to the guidelines covered in this paper will produce healthier, more stable and sustainable buildings and reduce callbacks to a minimum.

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