Nonmetallic Plaster Bases (Lath) in Exterior Portland Cement Plaster (Stucco)

By Bill Egan

Exterior Portland cement plaster—or stucco as it's commonly known—is an above-grade, exterior wall cladding that has been used throughout the world since ancient times. Its popularity on commercial and residential buildings continues to endure for many reasons, including cost-effectiveness, availability, durability, and appearance.

Stucco is comprised of a base coat and finish coat that is installed in multiple steps or applications. The base coat is a cementitious material that, when used in vertical wall applications, can range in thickness from ⅜ to ¾ in. The thickness is primarily a function of the type of stucco (factory or field mix), the type of substrate to which the stucco will be applied, and design preference. Factory-mixed stucco is a proprietary product often used in "one-coat" applications and typically applied ⅜ to ½ in. thick. "Three-coat" or field-mixed stucco is typically applied from ⅜ to ¾ in. thick, with the thickness and mix proportions based on ASTM C926, which is the standard for the application of field-mixed Portland cement plaster. For either type of stucco, a coating or finish is applied over the base coat to provide the final appearance and outermost weathering surface.

Stucco can be applied directly to solid substrates such as unit masonry, cast-in-place and precast concrete, or stone, provided there's sufficient suction (ability to absorb water) or roughness for the necessary bond of the stucco. For steel- or wood-framed construction, a lath or netting (which is commonly referred to as a plaster base) is mechanically attached to the framing at specified intervals prior to the stucco application. In framed construction, the plaster base serves a number of purposes, including reinforcement, creation of a mechanical key, and as a support base.

Figure 1 – Nonmetallic plaster bases cut easily.

Plaster bases (lath), which are used in interior and exterior plaster applications, were originally fabricated from wood that was cut into narrow strips. The strips were oriented and fastened to the framing with the long dimension oriented perpendicular to the framing. During installation, spaces were intentionally left between each strip to provide a mechanical key for the plaster. Due to recognized limitations of wood products, wood strip lath was eventually replaced by gypsum or rock lath and metal plaster bases.

Metal plaster bases are used in a variety of applications that require different types or designs to suit the needs of the application. Among the various types, diamond mesh, expanded metal lath, and woven or welded wire are most commonly used in exterior stucco applications. These plaster bases are available in numerous weights or gauges to accommodate different application and performance expectations. For exterior applications, galvanized coatings are available to provide corrosion resistance to the metal. Some metal plaster bases are also manufactured from stainless steel, which, particularly for coastal environments, can provide a higher level of corrosion resistance. Woven or welded wire lath is typically supplied in rolls, while products

Feature	Benefit
Wide rolls	Reduces overlaps, which provides better coverage and increased productivity.
Safety	Pliable and no sharp edges, reducing potential for injuries during handling and installation.
Corrosion resistance	Nonrusting for longevity—particularly in coastal environments.
Cutting	Easily cuts with scissors or a knife (see *Figure 1*).
Cost	Generally stable raw material costs stabilize product costs.
Handling, shipping, and installation	Lightweight rolls are easy to handle and are cost-effective to ship. Many products can be installed vertically or horizontally, providing installation versatility. Overall ease of workability for labor savings and cost-effective installations (see *Figure 2*).
Versatile	Commonly used and code-recognized in various applications, including stucco and masonry stone veneers (see *Figure 3*).
Familiar application methods	Uses the same trim accessories, detailing, and attachment methods as other lath products.
Self-furred	Built-in self-furring features provide excellent mechanical key.

Table 1.

such as expanded lath and diamond metal mesh are generally available in 28-in.-wide by 96-in.-long sheets.

Metal plaster bases generally comply with ASTM standard material specifications; consequently, their appearance and design are often similar between manufacturers. Conversely, nonmetallic lath varies in terms of appearance, design, and material types. The innovative, proprietary technologies are produced in many common, corrosion-resistant materials, including glass fiber, plastic, and entangled nylon filaments. These materials are typically woven, formed, or manufactured into nonmetallic plaster bases that often have three-dimensional profiles that are recognized as self-furred plaster base products.

While some nonmetallic plaster bases are available in sheets, most products are manufactured in wide rolls that are significantly lighter in weight per square foot than products formed from metal. Nonmetallic plaster bases are available from various manufacturers, including BASF Corp.'s Wall Systems, Plastic Components Inc., Spider Lath, and Keene Building Products.

Nonmetallic plaster bases have been available for many years and are gaining traction in the marketplace as an alternative to metal plaster bases. The increased use and popularity can be attributed to some of the recognized limitations of metal plaster base products, along with the typical features and benefits offered by nonmetallic lath technology, such as those described in *Table 1*.

Many construction products, including nonmetallic plaster bases, are considered alternative materials by building codes since they are not specifically referenced in the code. For such materials, it is common for a manufacturer to demonstrate code compliance through an evaluation report, which is based on meeting established acceptance criteria for the particular product or system. The acceptance criteria is typically developed through the International Code Council Evaluation Services (ICC ES), which provides technical evaluations of construction products, methods, and materials. Accredited evaluation agencies such as ICC ES, Intertek, or IAPMO evaluate the manufacturers' data and subsequently issue an evaluation report that indicates conditions of code compliance installation, uses, and limitations.

With regard to acceptance criteria for nonmetallic plaster bases, ICC ES AC 275, *Acceptance Criteria for Glass Fiber Lath Used in Cementitious Coatings or Exterior Cement Plaster (Stucco)*, was published more than ten years ago, and although specific to glass fiber lath technology, it has been adapted for evaluation of other types of nonmetallic plaster base technologies or

Figure 2 – Rolls are lightweight.

Figure 3 – Masonry stone veneer application over a nonmetallic plaster base.

materials. Although not mandatory, holding evaluation reports that meet the requirements of AC 275 is an easy means for manufacturers to demonstrate code compliance for various types of construction, including noncombustible and fire-resistive properties.

ASTM International provides a forum to develop voluntary consensus standards for numerous products, including many of those used in the construction industry. ASTM Committee C11 on Gypsum and Related Building Materials and Systems develops standards for products such as stucco and plaster bases. For some time, ASTM standards have existed for the installation of metal plaster bases or lath used with Portland cement plaster. Also available are material standards for metal plaster bases, including metal lath (C847), welded wire lath (C933), and woven wire plaster bases (C1032), which (as noted previously) are the most common types of metal plaster bases used with stucco applications. Unlike performance-based standards, these standards only prescribe minimum material properties such as weight, gauge, thickness, diameter, and opening size.

Approximately ten years ago, the C11 committee established a task group to develop standards for nonmetallic plaster bases. Although the nonmetallic bases serve the same primary functions as metal plaster bases, they are proprietary and, therefore, differ from manufacturer to manufacturer. Given the differences and a general industry trend towards performance-based requirements, it was best to develop performance-based standards rather than material standards common to metal plaster bases. As the various nonmetallic plaster bases are installed in a similar manner, it was decided that one standard could address the key installation items, such as fastener types and spacing, overlaps, plaster base orientation, etc.

The task group undertook the development of three standards, which have since been published and are listed below. Collectively, these documents provide minimum standards for nonmetallic plaster bases related to installation, performance, and testing, including requirements for wind load, plaster base embedment, fastener pull-through, and vertical load.

- ASTM C1764, *Standard Test Method for Non Metallic Plaster Bases (Lath) Used With Portland Cement Plaster in Vertical Wall Applications*
- ASTM C1787, *Standard Specification for Installation of Non Metallic Plaster Bases (Lath) Used With Portland Cement Plaster in Vertical Wall Applications*
- ASTM C1788, *Standard Specification for Non Metallic Plaster Bases (Lath) Used With Portland Cement Plaster in Vertical Wall Applications*

Although developed outside of the nonmetallic lath task group, it should also be noted that ASTM C926, the application standard for Portland cement plaster, now includes references to installation of metal lath (C1063), as well as nonmetallic lath standards (C1787).

Nonmetallic plaster bases are typically used with traditional three-coat stucco, one-coat stucco, and in the mortar base used with masonry stone veneer applications. Nonmetallic plaster bases are installed over vertical walls and solid substrates, which include concrete, masonry, and framing/sheathing. They see limited use in soffit/ceiling applications; and typically, nonmetallic plaster bases are not used in open-framed applications. In general, fastener spacing and types closely follow the installation methods for metal plaster bases described in C1063, as do the applications of trim accessories such as corner beads, casing beads, and weep screeds. Once the nonmetallic plaster base is installed, the stucco application should proceed as per C926 for field mix products or the stucco manufacturers' instructions for factory-manufactured products.

As the most recent development in the evolution of plaster bases, nonmetallic plaster bases are gaining market share and acceptance—due in part to their many recognized features and benefits (noted above) and their use in stucco or masonry stone veneer applications on all types of structures, ranging from homes to multistory commercial buildings.

Bill Egan

Bill Egan is the manager of engineering and development for BASF Corporation – Wall Systems, a manufacturer of EIFS, stucco, air/water-resistive barriers, architectural coating systems, and nonmetallic plaster bases. Egan holds a BS in civil engineering and has over 35 years of construction experience, most with BASF. He owns numerous patents and is active in various standards groups, including ASTM, where he serves as chairman of the C11.02 Non Metallic Lath Task Group.