

WHITE PAPER

Safe. Strong. Secure.

How the Versatility of Expanded Metal Meets the Unique Demands of the Construction Industry

A construction worker wearing a red hard hat and a blue long-sleeved shirt is working on a structure covered in expanded metal mesh. The worker is positioned on the left side of the frame, and the mesh extends across the entire scene. The background is slightly blurred, showing more of the structure and some greenery. The overall lighting is bright, suggesting an outdoor setting.

OVERVIEW

“It is not the beauty of a building you should look at; it’s the construction of the foundation that will stand the test of time.”

—David Allan Coe

Architects may design environments to improve the quality of life, but it’s the construction industry that makes those concepts a reality. A fundamental aspect to sound construction is selecting the correct materials, and one that has been gaining more attention for its strength and versatility is expanded metal. Although there are similar materials that can be used, this narrative will explore and illustrate how it is an excellent choice to protect, safeguard, and enhance.

WHAT IS EXPANDED METAL?

In short, expanded metal is a versatile metal mesh that is strong and lightweight. Ideal for use in both construction and architectural applications, the Shear-FormSM service of manufacturing expanded metal results in a uniform diamond-patterned mesh. A coil of flattened metal is unrolled and is fed under a set of knives which slits and simultaneously stretches— not punches the metal. Because of this single-piece composition, it has a very high strength-to-weight ratio. Applicable for multiple uses, it can be made from aluminum, steel, or other corrosion-resistant metal and various post-production coatings can be applied.

WHY USE EXPANDED METAL?

Safe. Strong. Secure.

Safeguarding jobsite workers from accidents is imperative. According to OSHA, falls— such as through an unprotected skylight are leading cause of deaths in the construction industry. Per 2016 data from the Bureau of Labor Statistics, of the 991 construction fatalities, 370 were caused by falls. All were preventable.

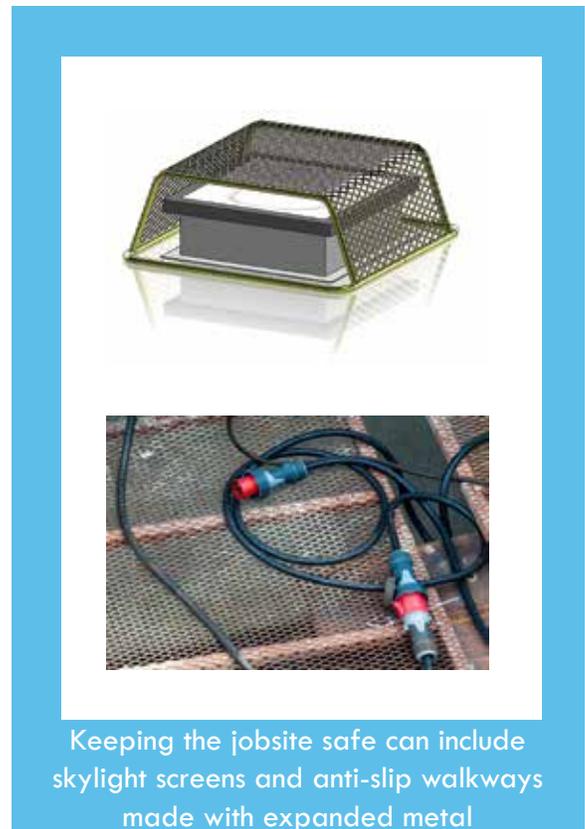
OSHA mandates that “Skylight screens shall be of such construction and mounting that they are capable of withstanding a load of 200 pounds applied perpendicular at any one area of the screen.” In California, 400 pounds is the minimum. When properly implemented, skylight screens using expanded metal can meet rooftop safety requirements.

Falls caused by slips can be reduced by using traction control measures. Expanded metal has inherent anti-slip properties that are useful when secure footing is critical such as scaffolding, elevated walkways, and stairs, or anywhere oils, ice, or other slick substances pool.

Almost as important as keeping jobsite workers safe is preventing accidents from welcomed and unwelcomed guests. Expanded metal security fencing serves as a powerful deterrent against theft, vandalism, and unauthorized access. For those not familiar with a construction site, there are many visible and unseen dangers. Left accessible, accidents, death, and lawsuits may result.

Jobsite theft is a crime of opportunity with an estimated annual value of stolen equipment between \$300 million to \$1 billion. The most common preventative measure is to enclose the jobsite with chain link fencing. Since it’s made from interwoven wires, it can easily be cut and unraveled. It also features large openings which if left uncovered, yield unobstructed views of valuable materials and equipment.

Perimeter fencing made from expanded metal panels



Keeping the jobsite safe can include skylight screens and anti-slip walkways made with expanded metal



Security cages made with expanded metal provide superior protection from theft and vandalism

offer better protection. Since it's constructed from a sheet of metal, it is difficult to cut and cannot be unraveled. The tops can be left with random shears that are sharper than chain link, prohibiting someone from climbing over. The openings can be adjusted to restrict views of expensive equipment and materials kept on the worksite. At the end of the job, it can be left in place for use as a permanent fence.

Additional anti-theft security measures include tool cribs, lockers, and equipment/material cages. Because it has no points that can separate, it will take quite a while for someone to cut through each strand. When applied to windows and doors as a security screen, it is very effective in prohibiting crimes of opportunity—such as a “smash and grab”. Its small openings restrict fingers or cables from being inserted, preventing its removal.

Expanded metal is equally effective to secure the inside of buildings. For specs that require additional defense such correctional facilities, expanded metal can be added to cells, doors, and walls to prevent a security breach.

ADDITIONAL USES FOR THE JOBSITE Filtration and Ventilation

Jobsites are dirty. Dust and other airborne contaminants require specialized filtration. A significant advantage for using expanded metal in filters is that it is extremely strong. When used to filter lubricants such as oil or grease for heavy equipment, expanded metal functions as a pre-filter by straining large particulates from reaching the filter media. This not only maximizes the filter's efficiency, but also increases its lifecycle.

Keeping HVAC systems running at optimum levels require that filters be changed at regular intervals. Expanded metal is the industry choice for metal backing in pleated filters. Since its introduction in 1975, it replaced the need for welded wire with a significant cost savings, and ensures a uniform media pleat element to deliver consistent performance.

When the application requires the filtration of fuels, vapors, or gasses, micro meshes with openings 0.125” and smaller are extremely effective.



Incorporating expanded metal into pleated HVAC filters maintains pleat uniformity to deliver consistent performance

For ventilation, expanded metal has a lower cost over other open area metals. External vents, rooftop HVAC units, blowers, and louvers are typically screened with woven wire. It's made of thin, flexible wire with hexagonal openings that rodents or birds can squeeze through— or even gnaw through— to access attics and crawl spaces. Once settled, they quickly make a mess of feathers, droppings, and nesting materials. Allowed to accumulate, this can require the expense of removing the animals, cleaning the area, and repairing any damage.

When used for interior ventilation, expanded metal can be used as ceiling diffuser grilles, louvers, and vent mesh which offer a greater open area yielding less air restriction. This reduces the amount of energy needed to run HVAC systems and optimizes proper air circulation, leading to reduced energy costs. Should the specs call for a



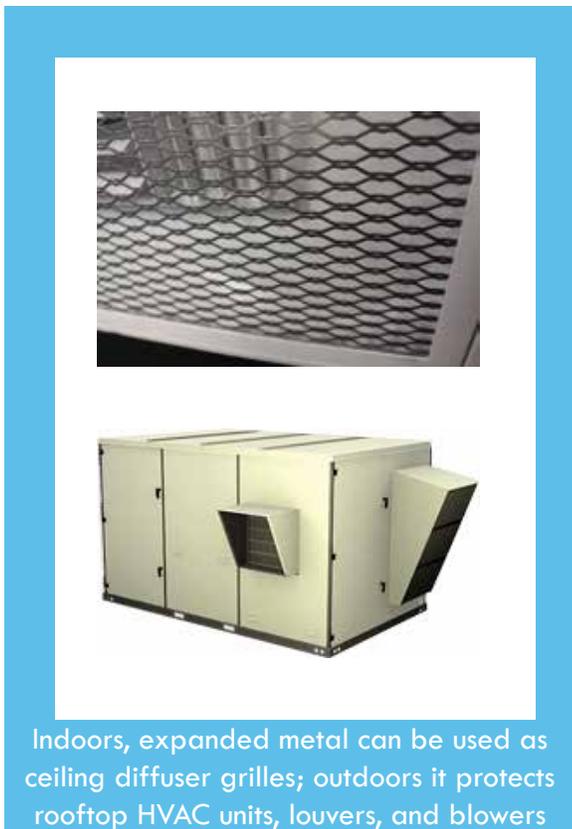
design to match existing décor, decorative patterns and colors are available.

Walls. Ceilings. Masonry. Decoration.

Lightweight, flexible, and strong, expanded metal is ideal for stone veneers, masonry, tiles, and ceilings. Featuring a raised pattern to allow the keying of plaster or cement for secure adhesion, it can also be used to support and reinforce areas prone to cracking such as around doors, windows, or ceilings. All are available in coils for jobsite portability, or sheets for larger jobs.

Once the plaster is dry, it can be smoothed using a drywall rasp that has a flattened expanded metal surface.

Not limited to a diamond-shaped pattern, expanded metal can be formed into attractive designs to comple-



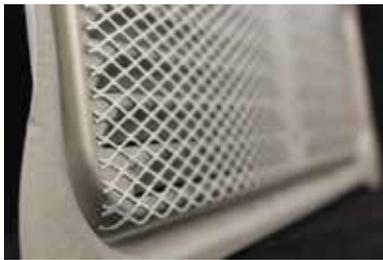
ment existing architectural elements including gutter guards, chimney caps, and building façades. For landscaping, expanded metal support can be used to form pools, ponds, decking, and even intricate shapes for topiaries. Additional uses include outdoor furniture, trellises, fire screens, and sun shades. Paint or powder coat can be applied to maximize longevity.

THE ENVIRONMENTAL ADVANTAGES OF EXPANDED METAL

Many are unaware that using expanded metal has environmental advantages— primarily, its sustainability. It is 100% recyclable. From a supplier standpoint, expanded metal is routinely sourced from metal suppliers that typi-

cally include 20-35% recycled metal, with some suppliers using up to 40%. In accordance with the USGBC LEED 2009 recycled content requirements, “high-recycled content” steel contains 40-57.5% recycled content that can be utilized in calculating LEED MR Credit 4 - Recycled Content.

The manufacturing process is also environmentally friendly and relatively inexpensive. Instead of creating openings by punching the metal which produces a waste disc, the metal is slit and stretched resulting in little to no waste or the need to incorporate additional post-manufacturing products or processes. This in turn reduces the materials costs while yielding more finished product than raw.

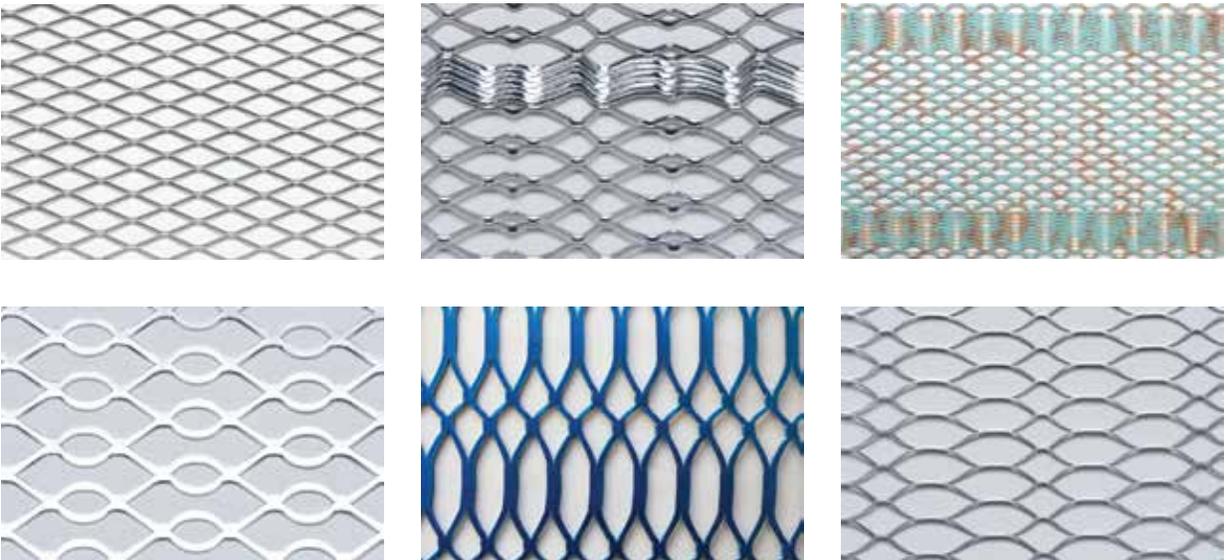


Construction uses for expanded metal:
Vent mesh, drywall rasp, stairs and balconies, chimney caps, heavy filtration, and gutter guards

FINAL THOUGHTS

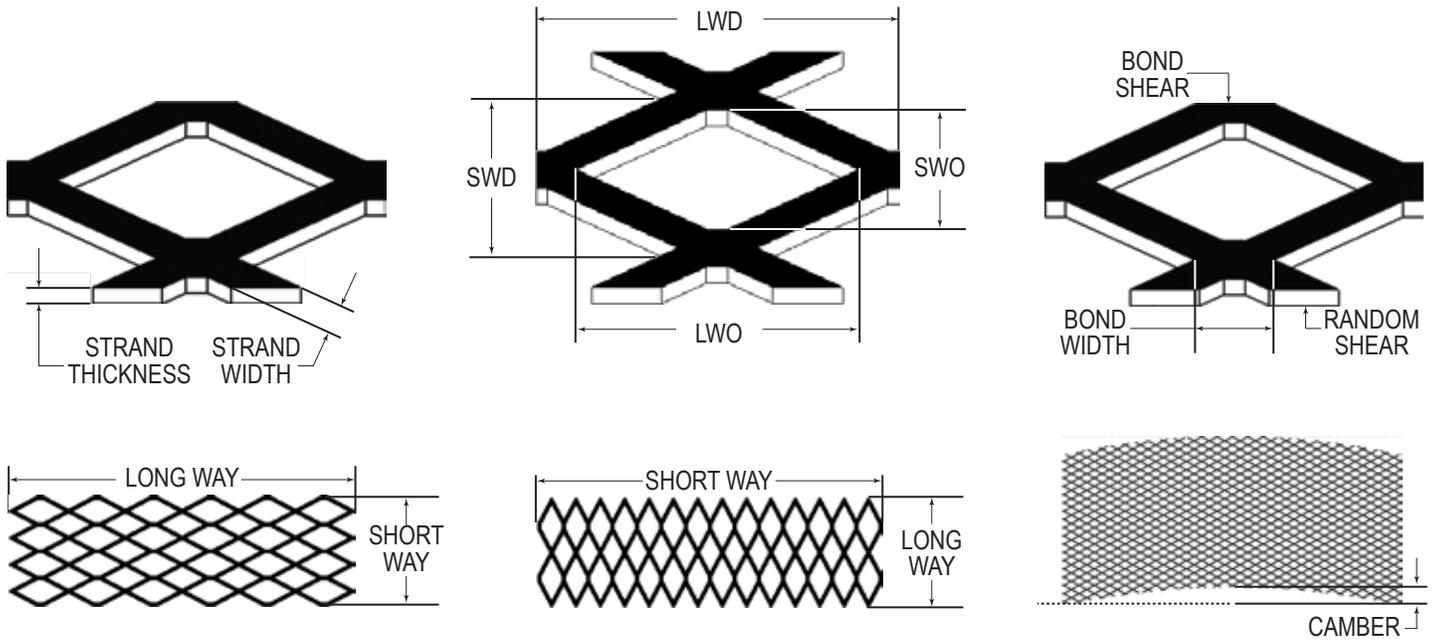
The Versatility of Expanded Metal

In the end, the design of a structure must be functional and sound. Strong and versatile, expanded metal is a distinctive material that has for many construction-related uses. Although a few examples have been presented, there are many more uses. Engineered for strength and safety, it is a leading material to be considered for your jobsite and construction needs.



Examples of standard and decorative expanded metal patterns and finishes

EXPANDED METAL TERMINOLOGY



LWD

“Long Way of Diamond/Design” dimension

SWD

“Short Way of Diamond/Design” dimension

LWO

“Long Way of Opening” dimension

Used to indicate clear opening in the long direction

SWO

“Short Way of Opening” dimension

Used to indicate clear opening in the short direction

STRAND THICKNESS

Equal to the thickness of the sheet metal being used

STRAND WIDTH

The amount of metal fed under the dies to produce one strand

BOND SHEARED

Where two strands intersect

Eliminates prongs or jagged edges

BOND WIDTH

The width of two intersecting strands

RANDOM SHEAR

Shearing that leaves prongs or jagged edges

CAMBER

The maximum distance between the edge of the expanded metal and the straight edge





ABOUT WALLNER EXPAC

Wallner Expac is the leading manufacturer of expanded metal. Since 1959, it has evolved from a simple shop to a state-of-the-art, world class manufacturing entity with facilities in Georgia (2), Texas, South Korea, and headquarters in Ontario, Calif.

Wallner Expac is the founder and leader in the manufacturing of expanded metal used in pleated filters. Since its introduction in 1976, these applications replaced the need for welded wire and distinguished Wallner Expac as an industry leader and innovator. Continuing to bring innovative products to market, Wallner Expac introduced X-Mesh[®], the industry standard in filter media backing. Awarded U.S. Patent No. 8,696,781 for X-Mesh[®], it is available in various specifications to meet individual needs. For more information on Wallner Expac, contact (909) 481-8800 or visit www.expac.com.

REFERENCES

"9 Quotes on Construction to Inspire You." iSqFt, a ConstruConnect™ Company. <http://www.isqft.com/start/blog-9-quotes-construction-inspire>. January 14, 2015.

"Construction's 'Fatal Four.'" United States Department of Labor- Occupational Safety and Health Administration. <https://www.osha.gov/oshstats/commonstats.html>. 2016.

"Occupational Safety and Health Act of 1970." Occupational Safety and Health Administration. https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=OSHACT&p_id=2743. December 29, 1970.

"Recycled Content Requirements & Specifications." Steelscape. http://www.steelscape.com/Files/sustainability/recycled_content/2017%20Recycled%20Content%20-%20LEED%20SUMMARY%20SHEET.pdf August 2017

"The High Cost of Construction Equipment Theft." ConstructConnect. <https://www.constructconnect.com/blog/operating-insights/high-cost-construction-equipment-theft>. August 30, 2017.

"Welcome to OSHA's Fall Prevention Program." United States Department of Labor- Occupational Safety and Health Administration. <https://www.osha.gov/stopfalls/index.html>. 2015.