

# WHITE PAPER

Engineered for  
Strength and Safety:

Providing Fall and Impact Protection  
for Skylights with Expanded Metal

## OVERVIEW

As new homes and businesses are constructed, skylights are a common rooftop addition. Industry experts say that skylights can lower electric lighting bills by one-third or more, and evolving building energy codes— such as the California Title 24 standard— are expected to favor, or even mandate the use of skylights in large flat-roof commercial buildings.

When deciding to use skylights, consideration must be taken for safety, protection, and aesthetics. Rooftop workers must be protected from falls through skylights, and the skylight should be protected from impacts. This paper will discuss the consequences of unprotected skylights, and how expanded metal is an excellent choice to safeguard, protect, and enhance and in some cases, comply with local regulations.

## SAFETY FOR ROOFTOP WORKERS

Skylights provide an economical source of light, but also pose a serious hazard for rooftop workers. A skylight without a safety barrier can easily allow a worker to fall through causing severe injuries or even loss of life. Two recent examples:

In June 2016, a rooftop fall severely injured a 29-year-old worker in Southern California, say state regulators who have filed five safety citations against an electrical firm. The victim fell 29 feet through a skylight, suffering head injuries, cognitive impairment, pelvic fractures, broken ribs and a collapsed lung, regulators said in a written statement.

In November 2016, a worker fell through a skylight and died of multiple traumatic injuries while working on a warehouse roof. This was the second worker to fall through a skylight at the same warehouse in one week.

Under the Occupational Safety and Health Act of 1970, employers are responsible for providing safe and healthful workplaces for their employees:

- ◆ 29 CFR §1910.23(a)(4) requires that skylights in the roof of buildings through which persons may fall while walking or working shall be guarded by a standard skylight screen or a fixed standard railing on all exposed sides.
- ◆ 29 CFR §1910.23 (e)(8) 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.

Cal/OSHA screen requirements are more stringent:

- ◆ §3212 (5) (b) Floor and roof opening covers shall be designed by a qualified person and be capable of safely supporting the greater of 400 pounds or twice the weight of the employees, equipment and materials that may be imposed on any one square foot area of the cover at any time.

Skylight screens provide excellent protection from falls. As opposed to railing, screens don't typically require any mounting to the roof. Commonly constructed from welded wire, they usually require a special mount to be attached to the frame. These screens easily meet both OSHA and Cal/OSHA safety requirements and allow ample light to pass.

## DAMAGE FROM IMPACTS

All regions of the country are susceptible to hailstorms and wind-borne damage. According to the National Storm Center, hail causes approximately \$1 billion in damage annually in the United States to houses, buildings, cars and crops, with over two million hail damage claims being processed from Jan. 1, 2010, to Dec. 31, 2012.

Damage for homeowners can result in the cost and inconvenience of having to file an insurance claim, have the damage repaired, and pay any deductibles. Research indicates that the cost to replace a fixed 22.5" x 22.5" skylight will range from \$901 – \$1,304. For businesses, the costs will be significantly greater. Not only will there most likely be multiple replacements, but operations may have to be dramatically reduced or cease while the repairs are being made.

## EXPANDED METAL TO SAFEGUARD, PROTECT, AND ENHANCE

As welded wire is the predominant choice for skylight screens, expanded metal is often overlooked as a legitimate alternative. Its inherent architecture makes it a top-notch replacement to achieve the same goals of safeguarding worktop roofers, protecting from impacts, and enhancing architectural elements.

### SAFEGUARD WITH EXPANDED METAL

Safety is not an option, and the fines for failing to protect rooftop workers are extremely punitive. Cal/OSHA is proposing penalties of \$130,125 against the electrical firm that didn't protect its worker from accidentally falling through a skylight.

Skylight screens incorporating expanded metal can meet OSHA and Cal/OSHA rooftop safety mandates. Expanded metal is formed from one sheet using a Shear-Form<sup>SM</sup> process: As the sheet of metal is fed under the knives, it is slit and stretched producing a diamond-patterned mesh that has a very high strength-to-weight ratio. Unlike welded wire, there are no points at which the material can separate. The openings of the diamonds can be customized to allow maximum light to pass while still meeting safety requirements.

### PROTECT AND ENHANCE WITH EXPANDED METAL

Although some skylights may be rated to repel impacts, wind-borne debris, or even forced entry, a metal screen offers the best protection. Screens made from welded wire allow a flood of sunlight to enter the room, yet its inherent open architecture does not offer the best defense from impacts. A better choice is to use expanded metal for impact

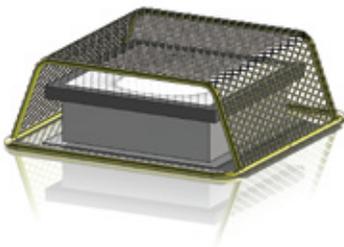
protection. Welded or woven wire is limited to either a square or rectangle pattern; expanded metal features a diamond-shaped pattern which can be enlarged or reduced to both defend against impacts and allow ample light to pass.

Another reason to use expanded metal is the availability of metals, patterns, and colors to complement and enhance existing architectural elements. Not limited to a diamond-shaped pattern, expanded metal can be formed into many designs that go well with gutter guards, chimney caps, solar panel skirting, building facades, and more. It can be made from galvanized steel, stainless steel, copper, or other corrosion-resistant metal to withstand the elements. Due to its inherent single-piece architecture, it is extremely strong and can be painted— or even powder coated during the manufacturing process.

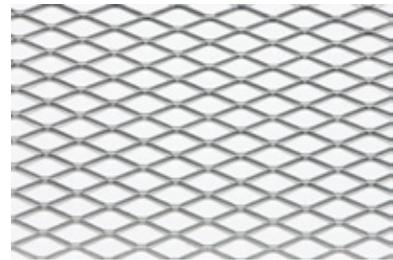
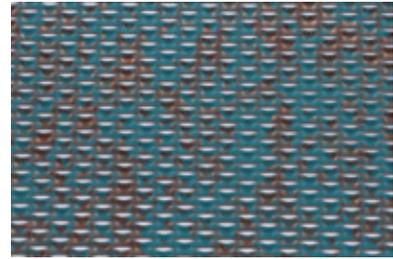
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## FINAL THOUGHTS

Skylights will continue to be an important and beneficial element for new construction. Rooftop worker must be safeguarded from falls through skylights, and the skylight must be protected from impacts. A protective screen can serve both these requirements; however, not all screens are created equal. A screen using expanded metal is the best choice to safeguard, protect, and even enhance.



Examples of skylight screens made with expanded metal



Expanded metal can be formed into different patterns with various finishes



## ABOUT WALLNER EXPAC

Wallner Expac is an employee-owned company and North America's largest manufacturer of light gauge expanded metals for filtration- and also manufacturers expanded metal for many industries and uses. Since 1959, it has evolved from a simple shop to a state-of-the-art, world class manufacturing entity with facilities in Georgia, El Paso, and headquarters in Ontario, California.

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<sup>®</sup>, the industry standard in filter media backing. Awarded U.S. Patent No. 8,696,781 for X-Mesh<sup>®</sup>, 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](http://www.expac.com).

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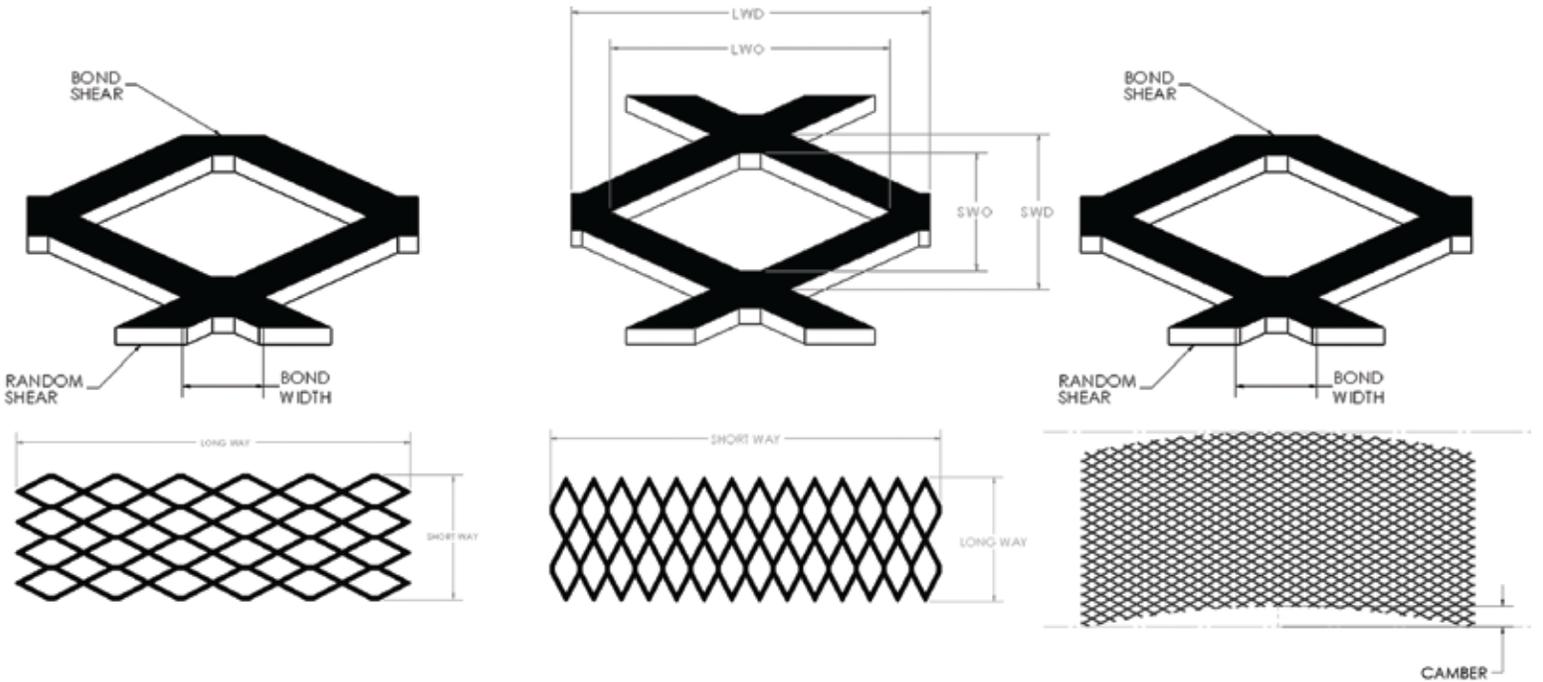
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# EXPANDED METAL TERMINOLOGY



## LWD

"Long Way of Diamond/Design" dimension

## LWO

"Long Way of Opening" dimension  
Used to indicate clear opening in the long direction

## STRAND THICKNESS

Equal to the thickness of the sheet metal being used

## BOND SHEARED

Where two strands intersect  
Eliminates prongs or jagged edges

## RANDOM SHEAR

Shearing that leaves prongs or jagged edges

## SWD

"Short Way of Diamond/Design" dimension

## SWO

"Short Way of Opening" dimension  
Used to indicate clear opening in the short direction

## STRAND WIDTH

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

## BOND WIDTH

The width of two intersecting strands

## CAMBER

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

