

Sizes of Expanded Metal

A practical guide to sizes of expanded metal, covering the reader intent, the relationship to sizes of expanded metal, key evaluation criteria, common risks, and the information the intended project audience should confirm before taking the next step.



wirefilters.com

Main topic: Perforated & Expanded Metal

<https://www.kaifil.com/products/perforated-expanded-metal/>

In industrial filtration and structural engineering, the term "expanded metal" refers to a versatile material created by simultaneously slitting and stretching a metal sheet. Unlike perforated metal, which involves punching holes and generating scrap, expanded metal is produced through a pressurized expansion process that results in a diamond-shaped pattern with no material waste. For engineers and procurement specialists, understanding the specific sizes of expanded metal is critical, as these dimensions directly influence mechanical strength, flow rates, filtration efficiency, and the overall structural integrity of the final component.

Selecting the correct Perforated & Expanded Metal requires a deep dive into technical specifications that go beyond simple length and width. This guide examines the standardized measurement systems, the relationship between strand geometry and performance, and the engineering considerations necessary for industrial applications.

| Technical Terminology and Measurement Standards

To accurately specify the sizes of expanded metal, one must use the industry-standard terminology. These measurements define the geometry of the diamond openings and the thickness of the material. There are four primary dimensions used to identify the size of the mesh:

1. **SWD (Short Way of Design):** This is the distance measured from the center of one bond to the center of the next bond across the short axis of the diamond.
2. **LWD (Long Way of Design):** This is the distance from the center of one bond to the center of the next bond across the long axis of the diamond.
3. **SWO (Short Way of Opening):** This refers to the actual clear opening width of the diamond, excluding the metal strands.
4. **LWO (Long Way of Opening):** This refers to the actual clear opening length of the diamond.

When engineers evaluate the sizes of expanded metal, they must also consider the "strand width" and "strand thickness." The strand width is the amount of metal fed into the expanding machine between each stroke, while the strand thickness is the gauge of the original base metal. These two factors, combined with the SWD and LWD, determine the weight per square foot and the percentage of open area.

| Standard vs. Flattened Expanded Metal Sizes

Expanded metal is typically available in two forms: standard (raised) and flattened. Each form has a significant impact on the final dimensions and the performance of the filter or structural panel.

| Standard Expanded Metal

Standard expanded metal, also known as "raised" expanded metal, comes directly from the expanding machine. The strands and bonds are set at a uniform angle to the plane of the sheet. This creates a three-dimensional surface that provides excellent grip and strength. However, from a filtration perspective, the raised profile creates a more complex flow path. The "thickness" of a standard expanded metal sheet is significantly greater than the original gauge of the metal because of the angled orientation of the strands.

| Flattened Expanded Metal

Flattened expanded metal is produced by passing the standard expanded sheet through a cold-roll reducing mill. This process flattens the strands and bonds into a single plane, resulting in a smooth, flat surface. Flattening reduces the overall thickness of the sheet and slightly increases the LWD of the openings. For many industrial filtration applications, flattened metal is preferred because it offers a consistent surface for bonding with other filter media, such as fine wire mesh or non-woven fabrics.

| The Role of Material Gauge and Strand Geometry

The structural performance of expanded metal is largely dictated by the relationship between the material gauge and the strand width. In heavy-duty industrial environments, such as hydraulic systems or high-pressure chemical processing, thicker strands are necessary to prevent deformation under stress.

Lightweight Mesh: Often used for decorative grilles or fine filtration support, these sizes feature thin strands and small SWD/LWD dimensions. They offer high open area percentages but lower mechanical resistance.

Heavy-Duty Mesh: Used in industrial walkways, heavy machinery guards, or as robust support cores for large-scale filter cartridges. These sizes utilize thicker gauges (e.g., 10-gauge to 3/16") and wider strands to ensure the component can withstand significant pressure drops and physical impact.

When specifying sizes, it is important to remember that as the strand width increases, the open area percentage decreases. Engineers must balance the need for structural rigidity with the requirement for low resistance to fluid or gas flow.

| Calculating Open Area for Filtration Efficiency

In the context of filtration, the open area percentage is perhaps the most critical metric derived from the sizes of expanded metal. The open area determines the face velocity of the fluid and the pressure drop across the filter element. If the open area is too low, the system will experience high energy consumption and potential pump cavitation. If the open area is too high, the metal may lack the strength to support the filter media against the flow.

Calculating the open area involves a geometric ratio of the strand width to the SWD. While manufacturers provide standard tables for these values, custom requirements often necessitate bespoke calculations. For instance, in a chemical reactor where a specific flow rate is mandatory, the expanded metal must be engineered with precise strand-to-opening ratios to ensure the filter cartridge operates within its design parameters.

| Material Selection and Its Impact on Sizing

The choice of material—whether stainless steel, carbon steel, or aluminum—influences the available sizes of expanded metal. Stainless steel (specifically 304 and 316L) is the gold standard for industrial filtration due to its corrosion resistance and ability to maintain structural integrity at high temperatures.

1. **Stainless Steel:** Offers the widest range of precision sizes. Due to its strength, thinner strands can often achieve the same structural performance as thicker carbon steel strands, allowing for a higher percentage of open area.
2. **Carbon Steel:** Economical for general industrial use but requires thicker strands or protective coatings (like galvanization) to prevent corrosion, which can slightly alter the effective opening sizes.
3. **Aluminum:** Lightweight and corrosion-resistant, but with lower tensile strength. Aluminum expanded metal typically requires larger strand widths to maintain rigidity, which can limit the minimum SWD available.

| Customization and Engineering Tolerances

Standard off-the-shelf expanded metal sizes may not always meet the rigorous demands of specialized industrial equipment. OEM manufacturers like Kaifil specialize in providing customized filtration solutions where the sizes of expanded metal are tailored to specific housing dimensions and performance targets.

| Precision Cutting and Shearing

When expanded metal is integrated into a filter cartridge, the shearing process must be precise. "Bond shearing" (cutting through the center of the bond) or "random shearing" (cutting anywhere) can affect how the mesh fits into end caps or frames. For high-precision components, engineers must specify tolerances for the overall sheet size to ensure a leak-proof fit during assembly.

| Custom Tooling

For unique filtration requirements, custom tooling can be developed to produce specific diamond shapes or sizes that are not found in standard catalogs. This is particularly useful in pharmaceutical or food and beverage applications where specific aperture sizes are required to meet sanitary standards or particle retention goals.

Selection Guide: Confirming Specifications Before Procurement

To ensure the successful integration of expanded metal into an industrial project, purchasing teams and engineers should confirm the following details before finalizing an order:

Material Grade: Does the application require the high corrosion resistance of SS316L or is SS304 sufficient?

Style Designation: Is the requirement for "Standard" or "Flattened"? Note that a 1/2" #18 standard sheet has different physical properties than a 1/2" #18 flattened sheet.

Direction of the Diamond: In many applications, the orientation of the LWD (parallel or perpendicular to the length of the sheet) affects the strength and the way the material wraps around a cylindrical filter core.

Open Area Requirements: Has the minimum required open area been calculated to prevent excessive pressure drop?

Tolerances: What are the allowable variances in SWD, LWD, and overall sheet dimensions? This is vital for automated assembly processes.

Why Precision Sizing Matters for Total Cost of Ownership

Selecting the wrong sizes of expanded metal can lead to premature failure of filtration systems. If the strands are too thin, the mesh may fatigue and break under the constant stress of flow cycles. If the openings are incorrectly sized, the filter may either clog too quickly or allow bypass of contaminants.

By focusing on precision-engineered expanded metal, companies can optimize the replacement cycles of their filter cartridges. Durable, correctly sized components reduce the frequency of maintenance shutdowns and ensure that downstream equipment is protected from particulate damage. In the long run, the investment in high-quality, accurately sized metal components results in a lower total cost of ownership and higher process reliability.

| Conclusion

The sizes of expanded metal are more than just a list of dimensions; they are a fundamental aspect of industrial engineering that dictates the performance of filtration and structural systems. Whether you are designing a custom stainless steel filter cartridge for a chemical plant or a protective guard for hydraulic machinery, understanding the nuances of SWD, LWD, strand geometry, and open area is essential.

For those seeking reliable, high-performance filtration components, working with a manufacturer that understands these technical boundaries is key. By aligning material selection with precise sizing and customization, industrial professionals can achieve efficient, durable, and cost-effective results in even the most demanding environments.