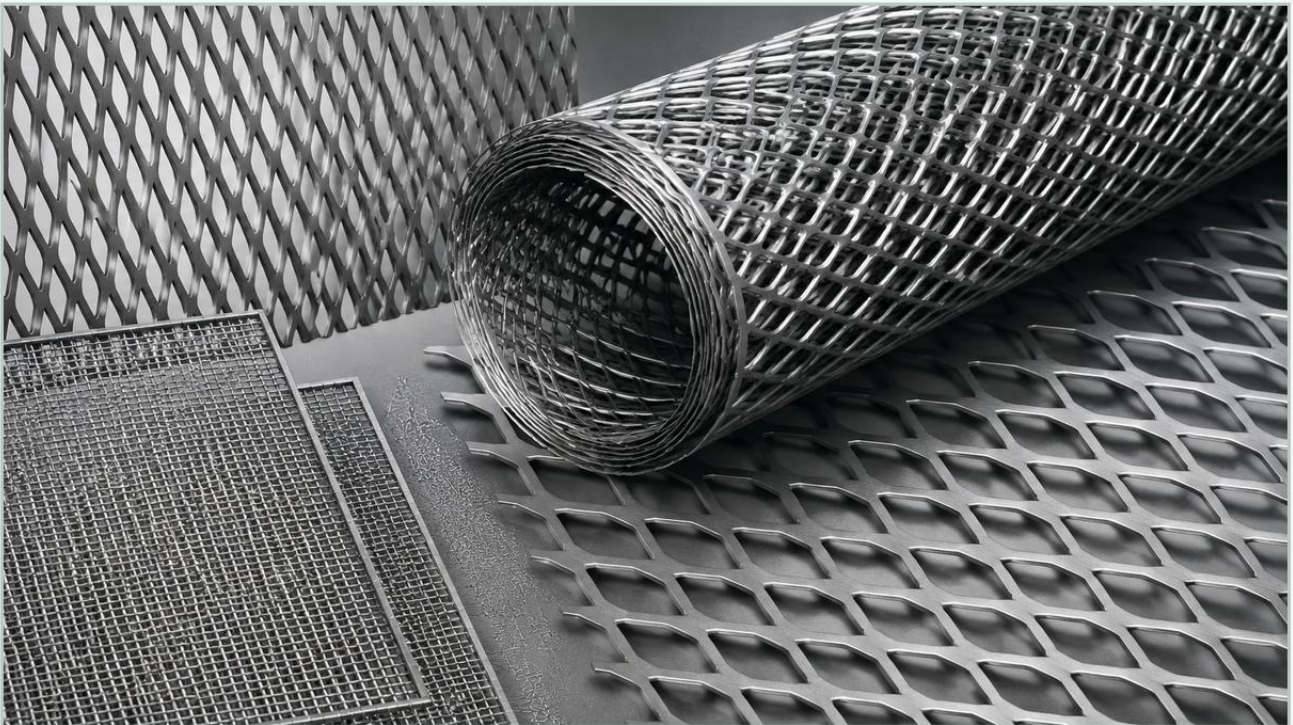


Expanded Metal Nomenclature

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



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Main topic: Perforated & Expanded Metal

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

In the realm of industrial filtration and structural engineering, precision is not merely a preference but a requirement. When specifying components for high-performance systems, understanding the specific terminology used by manufacturers is critical to ensuring mechanical integrity and filtration efficiency. Expanded metal, a versatile material produced by simultaneously slitting and stretching metal sheets, is a staple in industrial environments. However, the technical language—the expanded metal nomenclature—can be complex for those not intimately familiar with the manufacturing process.

For engineers and procurement professionals working with Perforated & Expanded Metal, a clear grasp of these terms prevents costly errors in design and ordering. This guide provides a technical breakdown of the nomenclature used to define expanded metal characteristics, focusing on the metrics that impact industrial performance.

| The Fundamental Geometry: SWD and LWD

The most basic elements of expanded metal nomenclature relate to the dimensions of the diamond-shaped openings. Unlike woven wire mesh, which is often defined by mesh count per inch, expanded metal is defined by the pitch of the diamonds.

| SWD (Short Way of Design)

The Short Way of Design refers to the distance from the center of one bond to the center of the next bond, measured across the short axis of the diamond. It is important to distinguish this from the "opening" size; the SWD includes the width of the strands and the bond itself. In engineering specifications, the SWD is typically the first dimension listed.

| LWD (Long Way of Design)

The Long Way of Design is the distance from the center of one bond to the center of the next bond measured across the long axis of the diamond. The relationship between SWD and LWD determines the overall shape and orientation of the pattern. For most industrial filtration applications, the orientation of these axes relative to the flow of fluid or gas can influence pressure drop and structural support.

| SWO and LWO (Short/Long Way of Opening)

While SWD and LWD measure from center-to-center, the SWO and LWO measure the actual clear space within the diamond.

SWO: The shortest distance between the inside edges of the diamond opening.

LWO: The longest distance between the inside edges of the diamond opening.

These measurements are vital for filtration applications where the size of the particles to be retained or the passage of specific media is the primary concern.

| Strands and Bonds: The Structural Anatomy

The strength and weight of the expanded metal are determined by the dimensions of the strands and the bonds created during the expansion process.

| The Strand

A strand is the single metal strip that forms the border of the diamond opening. Its dimensions are defined by two metrics:

1. Strand Width: The amount of metal fed into the machine between the upper and lower dies to produce one strand. This is essentially the "width" of the metal strip that makes up the diamond.

2. **Strand Thickness:** This is the thickness of the original base material (the sheet or coil) before expansion. In the case of stainless steel filtration components, maintaining consistent strand thickness is essential for ensuring the longevity of the filter under high-pressure conditions.

| The Bond

The bond is the intersection where two strands meet. It is the solid portion of the mesh that remains un-slitted. The bond is typically twice the width of a single strand, as it consists of two overlapping or adjacent strands joined together. The integrity of the bond is a key quality indicator; a well-manufactured bond ensures that the expanded metal maintains its shape even when cut or subjected to mechanical stress.

| Standard vs. Flattened Expanded Metal

One of the most important distinctions in expanded metal nomenclature is the difference between "Standard" and "Flattened" varieties. Choosing between these depends heavily on the intended industrial application.

| Standard (Raised) Expanded Metal

Standard expanded metal, also known as "raised" or "regular," is the product as it comes directly off the expanding press. The strands and bonds are set at a uniform angle to the plane of the sheet. This creates a three-dimensional surface that offers several advantages:

High Strength-to-Weight Ratio: The angled strands provide significant structural rigidity.

Grip and Deflection: The raised surface is excellent for applications requiring anti-skid properties or for deflecting airflow.

Maximum Open Area: Because the strands are angled, the perceived open area may change depending on the viewing angle, but the physical passage for media remains high.

| Flattened Expanded Metal

Flattened expanded metal is produced by passing standard expanded metal through a cold-rolling reducing mill. This process flattens the strands and bonds into a single plane, resulting in a smooth, flat surface.

Reduced Thickness: The overall thickness of the sheet is reduced, often to roughly the thickness of the original base material.

Smoothness: This is preferred for filtration support cores where a smooth surface is required to prevent damage to delicate outer filter media (such as fine wire cloth or membranes).

Dimensional Stability: Flattened metal is easier to weld and incorporate into tight-tolerance assemblies.

| Decoding Industry Spec Sheets

When reviewing a quote or a technical data sheet, the expanded metal nomenclature often follows a shorthand format. For example, you might see a specification such as "1/2 #13 Stainless Steel."

The First Number (e.g., 1/2): This typically refers to the nominal SWD dimension. In this case, the center-to-center distance across the short way of the diamond is 0.5 inches.

The Second Number (e.g., #13): This traditionally referred to the gauge of the metal. However, in modern industrial procurement—especially with stainless steel—this number often correlates to a specific weight per square foot or a decimal thickness. It is always advisable to confirm the exact decimal thickness (e.g., 0.072") rather than relying solely on gauge numbers, which can vary between carbon steel and stainless steel standards.

| Shearing and Tolerances

In B2B procurement, how the expanded metal is finished is just as important as the diamond size. The nomenclature for shearing defines how the edges of the sheet are treated.

| Random Shearing (Side and End)

Random shearing occurs when the cut is made without regard to the placement of the diamonds. This often results in "open" diamonds or jagged edges where strands are cut mid-span. While cost-effective, random shearing may require additional framing or finishing if the edges are exposed.

| Bond Shearing

Bond shearing involves cutting the sheet exactly through the center of the bonds. This results in a "closed" diamond edge, which is safer to handle and provides a more stable perimeter for welding into filter housings or frames. This requires higher precision during manufacturing and is often specified for custom filtration components.

| Tolerances

Standard industry tolerances for expanded metal include variations in SWD, LWD, and thickness. For high-precision industrial filters, engineers must specify tighter-than-standard tolerances to ensure the component fits perfectly within a hydraulic or chemical processing assembly. Common tolerances to monitor include camber (the bow in a sheet) and out-of-squareness.

| Material Selection and Performance

The choice of material is an integral part of the nomenclature and specification process. While expanded metal can be made from various alloys, stainless steel (Grades 304, 316, and 316L) is the standard for industrial filtration due to its corrosion resistance and thermal stability.

304 Stainless Steel: Suitable for general industrial use and food processing.

316L Stainless Steel: Preferred for pharmaceutical and marine applications where resistance to pitting and chloride corrosion is essential.

When specifying Perforated & Expanded Metal, the material grade must be paired with the correct expansion ratio. The expansion ratio determines the percentage of open area, which directly impacts the flow rate and pressure drop across the filter.

| Calculating Open Area for Engineers

For engineers designing filtration systems, the percentage of open area is perhaps the most critical metric. While manufacturers provide these figures, understanding the relationship is key. The open area is calculated based on the strand width and the SWD.

As the strand width increases for a given SWD, the open area decreases, and the structural strength increases. Conversely, a narrower strand width increases the open area, allowing for higher flow rates but reducing the mechanical load the mesh can support. In high-pressure hydraulic applications, a balance must be struck between these two competing requirements.

| Conclusion: Confirming Specs Before Procurement

Navigating expanded metal nomenclature requires attention to detail. Before moving forward with a purchase or a custom design, engineering teams should confirm the following with their manufacturer:

1. **Exact Dimensions:** Confirm SWD and LWD, and clarify if measurements are center-to-center or inside-to-inside (SWO/LWO).

2. Surface Finish: Specify whether the application requires the structural rigidity of "Standard" (raised) metal or the smooth profile of "Flattened" metal.

3. Edge Treatment: Determine if bond shearing is necessary for the assembly process or if random shearing is acceptable.

4. Material Grade and Thickness: Ensure the decimal thickness is clearly defined to avoid gauge-related confusion.

By mastering this nomenclature, procurement professionals and engineers can ensure they receive filtration components that are perfectly suited to their demanding industrial environments, optimizing both performance and total cost of ownership.