

Expanded Metal Numbers

A practical guide to expanded metal numbers, covering the reader intent, the relationship to expanded metal numbers, 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

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In industrial manufacturing and filtration engineering, precision is the foundation of performance. When specifying materials for structural support, filtration media, or protective guarding, understanding "expanded metal numbers" is essential for ensuring the final component meets the rigorous demands of the application. These numbers are not merely arbitrary codes; they represent a standardized nomenclature system that defines the geometry, weight, and structural integrity of the material.

For engineers and procurement professionals working with Perforated & Expanded Metal, decoding these designations is the first step in optimizing a filtration system or industrial assembly. This guide provides a technical breakdown of how expanded metal is measured, the meaning behind standard industry numbers, and how these specifications impact performance in B2B industrial environments.

| The Fundamentals of Expanded Metal Designation

Expanded metal is produced by a process of simultaneously slitting and stretching a metal sheet. Unlike perforated metal, which involves punching holes and creating scrap, expanded metal is formed without any material loss, resulting in a unique diamond-shaped pattern. Because the manufacturing process involves stretching, the original gauge of the metal sheet and the final dimensions of the diamond openings must be precisely documented.

When professionals refer to expanded metal numbers, they are typically referencing a style designation that follows a specific format, such as "1/2#13" or "3/4#9." These numbers provide a shorthand for the two most critical variables in the material's specification:

1. **The Nominal Diamond Size:** The first number (e.g., 1/2" or 3/4") refers to the nominal width of the diamond opening, usually measured as the Short Way of the Diamond (SWD).
2. **The Material Gauge:** The second number (e.g., #13 or #9) refers to the thickness of the metal used, often corresponding to standard manufacturer's gauges, though it is important to note that the final strand thickness may vary slightly from the raw sheet gauge.

| Decoding the Standard Numbering System

To accurately interpret expanded metal numbers, one must distinguish between the two primary forms of the product: Raised (Standard) and Flattened. The numbering system applies to both, but the physical properties change significantly during the flattening process.

| Raised Expanded Metal

In its "as-manufactured" state, expanded metal is referred to as "raised" or "standard." The strands and bonds are set at a uniform angle to the plane of the sheet. This provides maximum strength and rigidity, as well as a slip-resistant surface. When specifying raised expanded metal numbers, the thickness mentioned refers to the gauge of the original sheet. However, the "overall thickness" of the finished sheet will be much greater than the gauge because of the angle 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, creating a smooth, flat surface. While this makes the material thinner and slightly wider, the original expanded metal numbers (the style designation) usually remain the same to indicate the starting material. For filtration applications requiring a low profile or a smooth surface to prevent bypass, flattened expanded metal is often preferred.

| Physical Characteristics and Measurement Units

Beyond the shorthand style numbers, a complete technical specification requires an understanding of four primary measurements. These dimensions are critical when integrating expanded metal into filtration housings or industrial frames.

SWD (Short Way of Diamond): The distance from a point on a bond to a corresponding point on the next bond measured across the short axis of the diamond.

LWD (Long Way of Diamond): The distance from a point on a bond to a corresponding point on the next bond measured across the long axis of the diamond.

SWO (Short Way of Opening): The actual clear opening width between the strands.

LWO (Long Way of Opening): The actual clear opening length between the strands.

In filtration, the SWO and LWO are often more important than the SWD and LWD because they define the size of the particles that can pass through the mesh and influence the total open area of the filter component.

Expanded Metal vs. Perforated Metal in Industrial Filtration

Choosing between expanded metal and perforated metal often comes down to the specific requirements of the filtration cycle. While both fall under the category of Perforated & Expanded Metal, their mechanical behaviors differ.

Expanded metal is generally more cost-effective because the manufacturing process produces no waste. Furthermore, the interconnected diamond structure provides an excellent strength-to-weight ratio. In high-pressure hydraulic or chemical processing environments, expanded metal numbers with thicker strands are frequently used as "support cages" or "pleat supports" for finer wire mesh layers. The expanded metal provides the structural skeleton, preventing the finer filter media from collapsing under differential pressure.

Perforated metal, by contrast, offers more variety in hole shapes (round, square, hexagonal) and can provide a more precise "cut-off" for particle filtration. However, for coarse filtration, pre-filtration, or structural reinforcement, expanded metal is often the superior engineering choice due to its rigidity and three-dimensional flow characteristics.

| Calculations for Engineering and Flow Performance

For engineers, the most critical aspect of expanded metal numbers is how they translate into "Percent Open Area." This value determines the pressure drop (ΔP) across the filter and the velocity of the fluid or gas passing through the system.

To calculate the open area of expanded metal, the strand width and the diamond dimensions must be known. In a standard raised configuration, the angular orientation of the strands can create a "louvre effect," which can be used to deflect flow or trap larger debris more effectively than a flat perforated sheet. However, this also makes the calculation of effective open area more complex than simply measuring the two-dimensional holes.

When reviewing expanded metal numbers for a new project, engineers should confirm:

Strand Width: The amount of metal between the openings.

Strand Thickness: The gauge of the metal.

Weight per Square Foot: A critical number for calculating the total load on the filtration assembly.

| Material Selection for Demanding Environments

While the style numbers define the geometry, the material composition defines the longevity. In the industries Kaifil serves—such as chemical processing, pharmaceutical, and food and beverage—the choice of alloy is paramount.

Stainless Steel (304 and 316L): These are the most common materials for industrial filtration. Stainless steel expanded metal numbers are often specified for their corrosion resistance and ability to withstand high-temperature sterilization processes. 316L is specifically chosen for environments involving high chloride concentrations or acidic solutions.

Carbon Steel: Frequently used in hydraulic oil filtration where corrosion is less of a concern, or where the component is protected by the fluid itself.

Aluminum: Chosen for lightweight applications or where non-magnetic properties are required.

It is important to note that expanded metal numbers for stainless steel may sometimes use decimal thicknesses rather than standard gauges to ensure higher precision in specialized filtration applications.

| Specifying Requirements for Custom Fabrication

When partnering with a manufacturer like Kaifil for custom filtration solutions, providing the correct expanded metal numbers is only the beginning. To ensure the component performs as expected in a demanding industrial environment, several additional factors should be confirmed during the procurement process:

1. **Direction of the Diamond:** In many filtration applications, the orientation of the LWD relative to the flow or the length of the filter cartridge is critical for structural integrity.
2. **Edge Conditions:** Specify whether the sheet should have "random sheared" edges (where diamonds are cut through) or "bond sheared" edges (where the cut happens at the intersection, providing a smoother edge).
3. **Tolerances:** Standard industrial tolerances for expanded metal are generally broader than those for machined parts. If the expanded metal must fit into a precision-machined housing, tighter tolerances must be specified.
4. **Surface Treatment:** Depending on the application, the metal may require electropolishing (common in pharma and food) or specialized coatings to enhance chemical resistance.

| Conclusion

Understanding expanded metal numbers is a vital skill for any engineer or purchasing agent involved in industrial filtration. By mastering the relationship between style designations, diamond dimensions, and material gauges, technical professionals can select components that offer the perfect balance of flow efficiency and structural durability.

Whether you are designing a high-pressure hydraulic filter or a large-scale chemical strainer, the precision of your specifications ensures the reliability of the entire system. For those seeking high-performance, customized solutions, utilizing the right Perforated & Expanded Metal is the key to achieving optimal filtration results and long-term cost-efficiency.