

Wire Cloth as an Industrial Filter Media

Wire cloth has the strength to perform in industrial settings. It is also a safe, exceedingly adaptable manufactured product that can be produced in multiple specifications. Woven wire cloth is used in many fields, including architectural, oil and gas, chemical, food handling, aerospace, automotive, medical, paper production, waste water, hygiene and sanitation, ore and mineral, even radio and microwave screening, and in many other areas. The possibilities are endless.

The most common applications for wire cloth screens and wire cloth filter products are used in industrial and manufacturing work, particularly filtration and separation. It is lightweight and easy to cut to size and handle during manufacture in primarily cartridge form. Wire cloth screens are manufactured of multiple material types, including aluminum, brass, carbon steel, copper, and stainless steel, among other materials. Primarily for industrial applications, various grades of stainless steel are used depending on the application and process fluid being used. Wire cloth products are made in varying mesh and size openings, as well as, wire diameters and patterns.

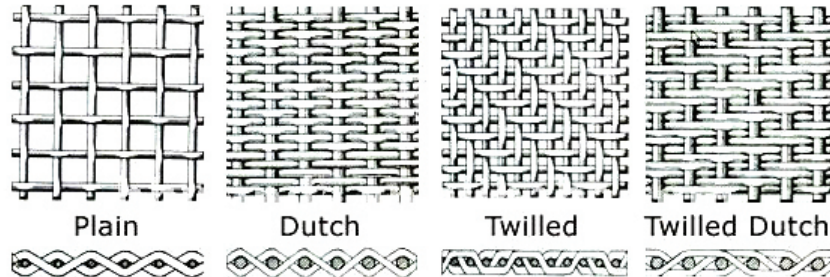
This paper will aid in the understanding of varying mesh sizes and weaves that are used in filtration applications. Wire cloth is known for high strength, resistance to wear and distortion, has an ability to withstand high temperatures, and has a long service life. It is also very efficient where high pressure drops are common and where cleanable filters are recommended or required.

Bulk wire cloth is received from weavers in rolls, much like bolts of fabric used to make clothing. It is then slit into the sizes required to manufacture filter devices. Wire cloth is nominally rated and is a surface filter. Before we look into the various mesh sizes, let's look at the most common weaves used.



There are a few terms to understand before taking a look at the varying weaves.

- **FILL WIRES OR SHUTE WIRES** – the wires running the short way of the cloth as they are woven. In other words, the wires running the width of the roll.
- **WARP WIRES** – the wires running the long way of the cloth as they are woven. In other words, the wires running the length of the roll.
- **MESH COUNT** – the number of openings per linear inch in wire cloth. For example, 100 mesh would, in reality, be 100 x 100 mesh. There are 100 openings per inch going in both directions.
- **RECTANGULAR MESH** – wire cloth with a different mesh count in the fill than in the warp. Also referred to as “oblong mesh” or, “off count.” Rectangular meshes are used for finer levels of filtration.



There are primarily four common weaves that are used in manufacturing industrial filters; Plain weave, Plain Dutch weave, Twilled weave, and Twilled Dutch weave. Please compare the weave descriptions against the image above.

PLAIN WEAVE – Plain weave is the most popular wire cloth pattern, offering general purpose functionality and strength, and a uniform look. Plain weave is formed by running a set of warp wires over and under a set of fill wires perpendicular to it. Plain woven wire mesh features the same mesh count in both dimensions. For example, 30 mesh would have 30 openings per inch in both directions. By the way, generally speaking, 30 mesh also happens to be the mesh size of the window screens in the home.

PLAIN DUTCH WEAVE – Plain Dutch weave has the same pattern as plain weave but the warp wires have a larger diameter than the fill wires. The fill wires are driven close to each other, making a tapered or wedge shaped opening instead of square ones. The warp remains straight and the fill has all the crimps. This allows for a tighter, denser, and firmer weave. Double or triple warp Plain Dutch weave is sometimes used for a higher strength. It is the same pattern except there are two or three warp wires in place of just one.

TWILLED WEAVE – A Twilled weave is similar to a plain weave, except the fill (or shute) wires cross two warp wires at a time, creating a staggered arrangement with a distinct front and back pattern. Twilled weave is popular due to its increased pliability. This pattern allows for the use of larger diameter wires, which create a finished product with greater strength.

TWILLED DUTCH WEAVE – As the name implies, this weave is a variant of the traditional Dutch weave. In it, a single fill or shute wire crosses two warp wires, creating a staggered pattern and tighter weave. The warp wires are straight and the fill wires, driven up tight, have all the crimps, both up and down and sideways. Twilled Dutch weave is popular for its ability to be used to make a filter that can remove particles from the fluid as small as 2 microns.

Wire cloth is always considered nominally rated, as mentioned above. However, if any reference is needed to approximate the nominal mesh rating to an absolute rating, the chart below can be used for reference only.

MICRON SIZE	MESH SIZE (OPENINGS / INCH)	TYPE WEAVE	APPROX. ABSOLUTE RATING
595	30 X 30	Square	730-738
238	60 x 60	Square	288-296
149	100 x 100	Square	178-186
74	200 x 200	Square	84-88
63	50 x 250	Plain Dutch	58-63
40	50 x 246	Plain Dutch Twin Warp	42-46
25	165 x 800	Twilled Dutch	24-26
10	165 x 1400	Twilled Dutch	18-21
5	200 x 1400	Twilled Dutch	12-13

One thing to notice is the column labeled “MESH SIZE (Openings Per Inch)”. It means exactly that. If a piece of wire cloth has 1400 openings per inch, the wire diameter must be very small. For example, the diameter of the wire used in the weaving of 1400 mesh is as small as .0016”. With that in mind, wire cloth with this tight of a weave must be handled more carefully than that of a 30 mesh, for example, where the wire diameter is .0065” and is stronger. To carefully protect the level of filtration in extreme low micron ranges using wire cloth, a back-up of usually 30 mesh is used for strength so the filter doesn’t lose its integrity.

TIP: If the moment occurs in which you are looking at a piece of wire cloth and do not know what mesh it is, there is a way to determine what the mesh size is rather easily on some of the coarser meshes. Using a sharp eye and a ruler along with a magnifying glass, view how many openings there are in ¼ of an inch. Multiply that by 4 and that is the mesh size.

With real fine mesh this will be virtually impossible, however. There are more weave patterns and mesh size combinations but the examples in this paper are the more common ones.

For more information on wire cloth, what is available, or if a custom filter is needed for your system, give OFCO a call. OFCO personnel are wire cloth specialists and are always ready to assist you with your filtration needs.