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Fine Wire Mesh for Filter Elements

1. SCOPE:

1.1 This SAE Aerospace Information Report (AIR) discusses the terminology, types, method of manufacture and chemistry of the fine wire meshes used for filtration of hydraulic, lubrication fuel systems, and similar applications. Information contained herein may be used for quality assurance testing to insure that a high performance filter grade wire mesh is acceptable for use in an aerospace application.

1.2 This document pertains to meshes as coarse as 4 x 4 wires/cm (10 x 10 wires/in) or coarser, as well as to meshes as fine as 155 x 1100 wires/cm (400 x 2800 wires/in) or finer. Fine wire meshes refer to all wire meshes used in the manufacturing of filters for the aerospace industry. This includes not only the very fine meshes used for filtration, but also the coarser meshes used as a backup or supporting material.

2. REFERENCES:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of all publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

ARP598 The Determination of Particulate Contamination in Liquids by the Particle Count Method
AIR844 Sensitization and Corrosion in Stainless Steel Filters
AIR887 Liquid Filter Ratings, Parameters and Tests
ARP901 Bubble Point Test Method

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM A 262 Detecting Susceptibility to Intergranular Attack in Stainless Steels

3. TERMINOLOGY:

3.1 Wire Mesh:

Wire mesh is similar to other cloth materials that are woven on a loom. This is accomplished by taking a set of wires, called warp wires, and winding them on a drum in a loom. Once these wires are tensioned in the loom, weaving commences by feeding the other wires, known as the shute (also called weft or fill wires), into the warp wires. Different types of weaving are obtained by varying the pattern in which the shute wires are fed into the warp wires.

3.2 Depth Filter:

A filter medium that retains contaminant, primarily within tortuous passages, at different levels within the filtration media. Other materials are frequently used in combination with wire to improve filtration.

3.3 Surface Filter:

Porous materials that retain contaminants, primarily on the influent face. The filtration holes for particle retention are on the same plane within the filtration media.

3.4 Service Life:

The time in service up until a predetermined point is reached. This point is usually expressed as a maximum differential pressure across the filter element at rated flow and pressure. Service life usually does not include additional life that may be obtained by cleaning a cleanable-type filter.

3.5 Warp:

The wires running the long way of the cloth as woven.

3.6 Shute:

Sometimes called filler or "weft" wires. Run across the short way of the cloth as woven.

3.7 Plain Binding:

A weave in which each warp wire and each shute wire passes over one and under the next adjacent wire in each direction. Also square weave.

3.8 Twilled Binding:

A weave in which each shute wire passes successively over two and under two warp wires and each warp wire passes successively over two and under two shute wires.

3.9 Single Compression:

A weave in which the shute wires are compressed tightly by the comb of the loom so that they are deformed in the machine direction. The shute wires are in contact with each other.

3.10 Double Compression:

A weave in which the shute wires are compressed even more tightly by the comb of the loom. The shute wires are deformed in the machine direction so the mesh count equals twice the sum of the wire diameters plus approximately 4%.

3.11 Dutch Weave:

A weave in which the warp wires are straight and heavier than the shute wires.

3.12 Mesh Number:

Manufacturers' standards for wire meshes are usually distinguished by mesh numbers. These numbers refer to the number of wires per inch [for example, a 10 x 10 (4 x 4 wires/cm) mesh has 10 wires per inch running in each direction; a 400 x 2800 (155 x 1100 wires/cm) mesh has 400 wires per inch running in one direction and 2800 wires per inch running in the other direction]. Usually, the first number describes the warp count and the second number describes the shute count. Since this document is written using the metric system of measurement all further references to mesh counts will be in wires per centimeter.

3.13 Wire Diameters:

In order to fully describe a mesh, it is necessary to state the wire diameters as well as the method of weaving and the mesh numbers. These diameters are usually expressed in inches. For a square or twill weave, where both wire diameters are usually the same, the mesh is described by the mesh number followed by the wire's diameter. For example, 4 x 4 wires/cm (10 x 10 wires/in) x 0.64 mm (0.026 in). This signifies 4 wires/cm in each direction and a 0.64 mm wire diameter. Another example would be 24 x 24 wires/cm (60 x 60 wires/in) x 0.19 mm (0.0075 in). This has 24 wires per centimeter in each direction, each wire consisting of a 0.19 mm diameter. For a dutch weave, both wire diameters are listed after the mesh number, with the warp wire diameter listed first. For example, 65 x 550 wires/cm (165 x 1400 wires/in) by 0.07 x 0.04 mm (0.0028 x 0.0016 in). This represents a twilled dutch double weave with 65 warp wires per centimeter, with a diameter of 0.07 and 550 shute wires per centimeter, with a diameter of 0.04 mm. For twilled dutch double weave, please note that the product of the shute wire multiplied by the shute wire's diameter usually exceeds

3.13 (Continued):

2 cm (for example, 550 wires/cm x 0.004 cm = 2.2 cm). This occurs because the tightness of the weave in the double layer of shute wires encroaches on the space between adjacent shute wires (see Figure 1). The filter manufacturer should include wire diameter tolerances in its specification.

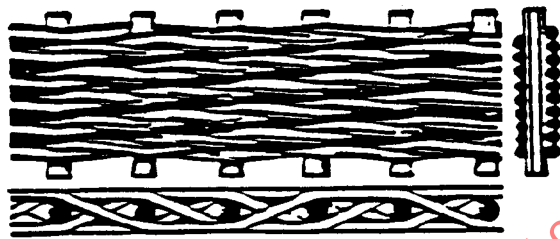

FIGURE 1 - Twilled Dutch Double Weave

4. WIRE MESH DESCRIPTION:

4.1 Types of Weave:

Virtually all wire meshes in use in the Aerospace Industry fall into one of six basic weaves. They are as follows:

a. Plain Square Weaves (PSW): (See Figure 2) This weave has each warp and shute wire passing over one and under the next adjacent complementary wire in both directions. In its most common form, the number of shute wires and the number of warp wires per cm (in) are the same. In a weave of this type, usually both wire diameters are also the same. It is necessary to indicate wire diameter as well as mesh count when ordering.

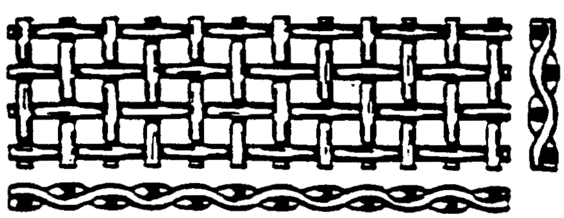

FIGURE 2 - Plain Square Weave

b. Twilled Square Weaves (TSW): (See Figure 3) Twilled weaves are the same as square weaves except each wire in each direction will go over two wires and under two wires in the other direction. For any given wire count, there is a maximum wire diameter beyond which it is not possible to weave a plain weave because of geometric or physical limitations. The twilled weave is then used to produce the same wire count using heavier wire diameters.

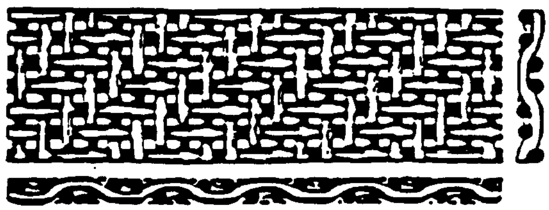

FIGURE 3 - Twilled Square Weave

4.1 (Continued):

c. Plain Dutch Weaves (PDW): (See Figure 4) In the dutch weaves, the warp wire is usually straight and heavier (larger in diameter) than the shute wire. The shute wires are tightly woven one against the other. This results in a high density weave with triangular openings. Unlike a square mesh with straight-through holes, a dutch weave is opaque to normal incident light. There is a special plain dutch weave called high flow or betamesh in which the rectangular surface slots are smaller than the inner triangular openings. Therefore, the particles are retained on the medium surface before they get to the inner passage. This high flow type of weave has the additional benefits of an increased dirt holding capacity, easier cleaning and a lower pressure drop at higher flow rates.

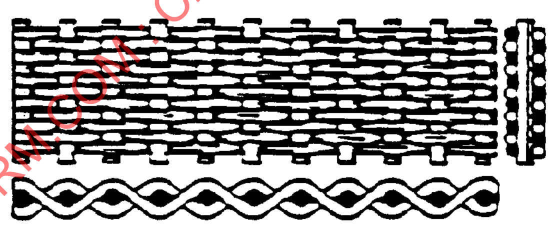

FIGURE 4 - Plain Dutch Weave

d. Twilled Dutch Double Weaves (TDDW): (See Figure 1) This is another weave in which the warp wire is usually straight and heavier than the shute wires. The shute wire is driven up over the preceding shute wire creating a double layer of shute wires. By placing two shute wires on top of one another the mesh count is increased, thus, creating a finer cloth. The commonly used specification of 65 x 550 wires/cm (165 x 1400 wires/in) mesh, 80 x 550 wires/cm (200 x 1400 wires/in) mesh, 130x 905 wires/cm (325 X 2300 wires/in) mesh are twilled dutch double weaves. No warp wires are visible. This weave (sometimes called the "dutch twill" weave) is more dense than a plain dutch weave and can produce a finer micron cloth with greater particle retention ability. This material is also opaque to normal light.

4.2 Twilled Dutch Single Weaves (TDSW):

(See Figure 5) This weave is similar to the TDDW described in 4.1d except that each shute wire is driven up next to the preceding shute wire. The shute wires are in a single layer. The warp wires are partly visible in a twilled dutch single weave, but they are not visible in a twilled dutch double weave. The specification 65 x 315 wires/cm (165 x 800 wires/in)mesh, 0.01 x 0.0028 x 0.0020 mm wire is an example of a twilled dutch single weave. This material also is opaque to normal incident light.

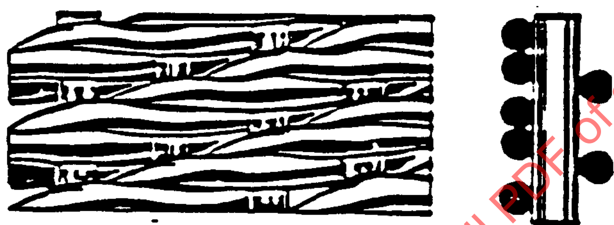

FIGURE 5 - Twilled Dutch Single Weave

4.3 Reverse Plain Dutch Weaves:

(See Figure 6) In the reverse plain dutch weaves the shute wire is of a larger diameter than the warp wire and it remains straight in the weave. The warp wires, which are of a smaller diameter, are almost touching, and as the word "plain" indicates, they go over and under each shute wire. Like all dutch weaves, this material is opaque to normal incident light.

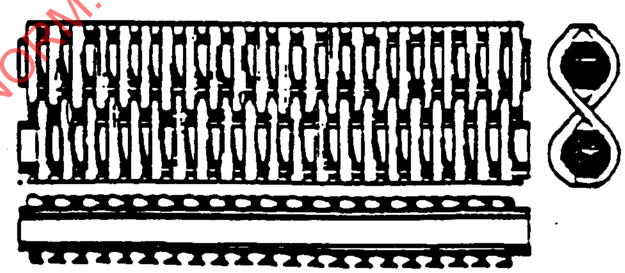

FIGURE 6 - Reverse Plain Dutch Weave

5. DESIGN FACTORS:

5.1 Tortuosity:

One factor that is of extreme importance to the design of a filter made from the woven filter cloth is the tortuosity factor of the cloth. Figures 7, 8 and 9 illustrate various tortuous flow paths through different woven filter cloths.

The more tortuous the flow path becomes is an important factor in the wire cloth's ability to retain particulate. The more tortuous the path, the better the cloth's ability to retain particulate as long slender particles have more difficulty passing through a tortuous route. As the flow path becomes more tortuous, however, there is a negative effect of increased pressure drop.

The tortuosity factor represents the thickness of the cloth versus the distance a particle would have to travel to get through the cloth. With plain square weave a particle can go straight through like an arrow so the cloth thickness and the distance to get through are the same. With twilled double dutch weave, the path through the cloth follows a skewed "S" path so a particle that gets through this weave has to travel approximately 2.7 times the thickness of the cloth before it emerges on the other side.

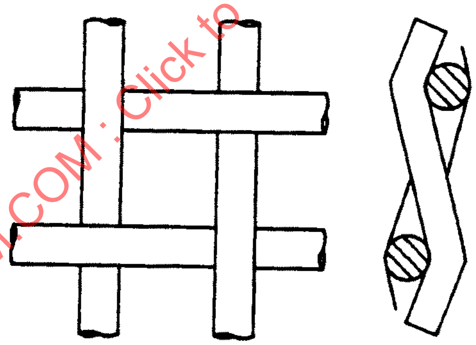

FIGURE 7 - Plain Square Weave Tortuosity Factor - 1.0

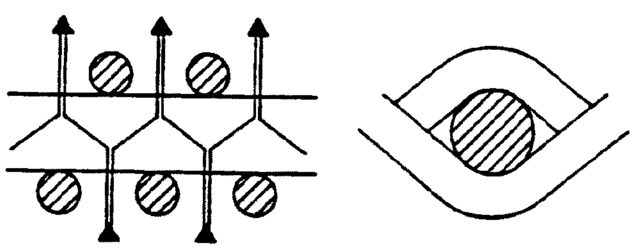

FIGURE 8 - Plain Dutch Single Weave Tortuosity Factor - 1.9

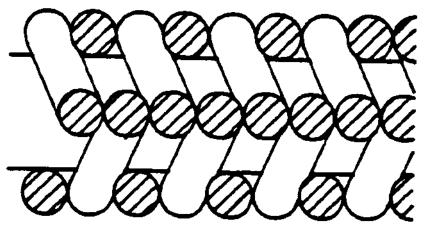

FIGURE 9 - Twilled Dutch Double Weave Tortuosity Factor - 2.7

5.2 Sintering:

Sintering, also known as "diffusion bonding", is a high-temperature process which fuses tangent metal surfaces without the addition of filler metals or bonding agents. The sintering process is performed on wire mesh to bond all wire together at their points of contact. This treatment makes permanent the geometry of the original weave, and therefore the pore sizes and absolute filter rating of the medium. The sintering process is also used to laminate multiple layers of wire mesh into an integral structure with physical properties superior to the component layers. The following is a list of the basic benefits achieved during the sintering process:

5.2.1 Strength: The primary difference between sintered and unsintered material is that sintering bonds the wires at all points of contact. In unsintered material, the interlocking of the weave is the only strength factor which prevents wire movement. In sintered material, the fixed structure exhibits greatly improved strength, while at the same time the modulus of elasticity is increased at least four fold in flexure. A great benefit of sintering is the ability to laminate otherwise fine and flimsy meshes to one or more layers of stronger meshes to provide support and rigidity. Laminated multilayer filtration media increases the modulus by factors of several hundred. This is particularly useful in the construction of elements with high collapse pressure requirements.

5.2.2 Puncture Resistance: The sintering process affects the ability of the filtration media to resist puncture by foreign objects. In unsintered media, the contaminant must simply overcome the friction of the weave to move wires aside. In sintered media, a bond must be broken in addition to overcoming the friction of the weave. This puncture resistance is most obvious in a square weave but it also applies to other weaves.

5.2.3 Resistance to Media Migration: The woven wire mesh is composed of long wires and it is naturally highly resistant to media migration. The one area of susceptibility to media migration is the edges of the screen. The sintering process and the proper installation of the mesh will reduce media migration.

5.2.4 Resistance to Fatigue: The weaving process reduces the fatigue strength of the wires and residual stress levels are high. Sintering acts as an annealing process and removes all residual stress to restore the fatigue strength of the material.

5.2.5 Cleanliness: Mesh, as woven is contaminated and must be cleaned prior to use. During sintering, the material is subjected to the most efficient of all cleaning methods to remove the contaminants. The method used is the vacuum atmosphere of a sintering furnace combined with a controlled temperature that is within a few degrees of the melting point of stainless steel. This allows most contaminants to be vaporized, and any stainless steel contaminants are sintered into place. The only contaminants remaining after sintering are those with melting or vaporizing temperatures that exceed the sintering temperature. These contaminants may be removed by ultrasonic cleaning of the mesh. Ultrasonic cleaning should be done throughout fabrication of the filter.

5.2.6 Dirt Capacity Limitations: The dirt holding capacity for a given filtration rating is a direct function of the number of holes per square inch. One method to increase the dirt holding capacity is by reducing the diameter of the wire and increasing the number of holes per square inch. The finer mesh, however, produces a weaker filtration media that is too flimsy for use. To overcome this problem, the finer mesh can be sintered to a coarser support mesh. This combination provides strength and a greater number of holes per inch for a greater dirt holding capacity.

6. PRODUCEABILITY METHODS:

Weaving, is the method of manufacture of wire mesh. This consists of passing a wire known as the “Shute” or “Fill” wire perpendicularly between “Warp” wires which run parallel with the length of the roll.

6.1 Warping:

Separate wires are spaced at intervals and wound on to a beam. Some beams can accommodate over 20,000 wires at 1,000 meters long each. The warping stage occurs when the wires are guided to the appropriate width for the Shute wire to pass between them.

6.2 Weaving:

The weaving commences by the introduction of the shute wire (cross wire) into the warp wires. Traditionally, shuttle looms have been used to weave the fine grades of wire cloth. On a shuttle loom, the shute wire is wound on a small spool or pin known as a prin. The prin is placed in a shuttle that travels back and forth across the warp wires. The wire on the prin will weave several inches of material, depending on the number of wires per cm (inch) that are being woven. The newer looms do not use a shuttle. The shute wire is wound on a large diameter spool which minimizes the problems of having kinks in the wire, and a large quantity of material can be woven from a single spool.

The number of different wire spools used in the warp and shute are very important in considering the quality in any wire mesh. One of the areas where failure in a product can take place is the introduction of the wrong wire at some point in the weaving operation. The wrong wire may be composed of an alloy which will not stand up in the manufacturing process or in the fluid being filtered.

7. PRODUCEABILITY ISSUES:

7.1 Chemistry of Material:

This document refers to stainless steel mesh and specifically to the AISI (American Iron and Steel Institute) 300 series stainless steels. Most filter media for aerospace applications in contact with fuels or hydraulic systems are made of stainless steel type AISI 304L.

a. Intergranular Corrosion (Attack): All AISI 300 series stainless steels are of an austenitic structure which, when improperly heat treated, become subject to intergranular corrosion, also know as Intergranular Attack (IGA). Refer to AIR844. Stainless steels contain, by definition, more than 12% chromium and some carbon. When heated above 1150 °C (2100 °F), the stainless steel goes into a complete solution. If it is rapidly cooled, the steel remains in a solid solution. This rapid cooling results in a highly corrosion resistant product. If the steel is cooled slowly, the carbon tends to migrate to the grain boundaries where it will precipitate as a chromium carbide. The chromium carbide is more corrodable than chromium so it will leave the grain boundary susceptible to a corrosive attack. The chromium carbide leaves the material in a sensitized state. Sensitized materials are subject to corrosion even when they are subjected to mild corrosive environments. Severe intergranular attack may cause a total failure of stainless steel meshes even in the presence of ordinary tap water.

   The cause for sensitization is related to both the carbon content of the material and prolonged exposure to temperatures of 425 to 815 °C (800 to 1500 °F). When 300 series stainless steel is heated between 425 and 815 °C (800 and 1500 °F), the carbon will start to migrate to the grain boundaries. It requires heat ranging from 1065 to 1175 °C (1950 to 2150 °F) to cause the carbon or chromium carbide to go back into solution. This type of heat, with rapid cooling through the temperature range of 425 and 815 °C (800 and 1500 °F), is called solution annealing.

7.2 Cause of Intergranular Attack (IGA):

The consequences of IGA are serious. IGA can result in filter failure and, even worse, can result in the generation of small stainless particles which may cause system failure to aircraft or missiles. The cause of IGA is materials becoming sensitized. This sensitization may occur during sintering, furnace brazing or other heat treatments. However, any phase of manufacturing where the temperature can reach the critical range of 425 to 815 °C (800 to 1500 °F) should be considered a probable cause of sensitization and it should be avoided. Resistance welding, deburring and cutting operations are examples of processes that may be of some concern. This is true of the filter manufacturing phase but not of the wire cloth itself. Before wire cloth can be woven, wire must be produced. A rod of material has to be drawn to wire form. This multiple drawing operation is interspersed with many annealing steps. If heat treatment or annealing is not properly performed at this stage, the material could be sensitized. This is highly unlikely to occur in fine stainless wires which are normally strand annealed, with very rapid cooling. Normally the chemical composition of stainless steel type AISI 304 calls for a maximum carbon content of 0.08%.

7.2 (Continued):

The rate at which chromium carbide precipitates at grain boundaries is a function of time and temperature, as well as a function of chemical composition. In this context, chemical composition refers to the carbon context. With increased carbon content, the tendency for precipitation at the grain boundaries increases while a lower carbon content decreases this tendency. It is possible to obtain a severe precipitation of chromium containing a maximum of 0.08% of carbon. It has, therefore, been found advisable to make all of the fine stainless steel meshes out of low carbon or 0.03% maximum carbon stainless steel. Even with this low carbon concentration, a very slow cooling through the critical range from 425 to 815 °C (1500 to 800 °F) will result in sufficient precipitation at the grain boundary to permit intergranular attack. So even with the low carbon concentration, it is still necessary to obtain rapid cooling through this critical range. When the critical temperature range cannot be avoided, solution annealing will return sensitized material back to its unsensitized state.

7.3 Physical Criteria:

Aside from the chemical considerations, it is necessary to carefully examine the physical characteristics of any wire mesh. The filtration characteristics of a given mesh are a function of wire diameter, wire count in the warp and shute, and the type of weave. The maximum pore opening in a given piece of mesh will determine the maximum particle size passed by this material. The pore size distribution in a given mesh will determine the filtration efficiency of that mesh.

The weaving operation can introduce physical flaws in the mesh. The most obvious are missing wires, resulting either from wire breakage or omission by the weaver. More predominant are pinholes which occur every time a warp wire breaks in the weaving process.

Many of the tests performed are checks upon one another. A poor bubble point or low dirt holding capacity generally indicates improper wire count or diameter.

7.4 Quality Control Considerations:

In order to insure that wire mesh is suitable for use, the characteristics listed in Table 1 should be checked by the filter manufacturer. The point at which these properties are tested should be consistent with the filter manufacturing procedure. For example, it will not do much good to check the "as woven" mesh for sensitization (IGA) when the material will be subjected to subsequent steps that could cause sensitization such as sintering, annealing or other manufacturing operations in the critical temperature range. Likewise, the determination of maximum pore opening on "as woven" mesh will not guarantee this same opening in a finished filter element.

TABLE 1 - Characteristic of Woven Cloth

Characteristic	Checking Procedure
Chemical Composition	7.4.1
Type of Weave	7.4.2
Shute Wire Diameter	7.4.2a
Warp Wire Diameter	7.4.2b
Wire Count	7.5
Overall Thickness	7.6
Weaving Flaws	7.7
Filtration Media Performance Tests	7.8
Maximum Pore Opening	7.9
Intergranular Corrosion Test (IGA)	7.10

7.4.1 Chemical Composition: Chemical composition may be checked by a complete wet chemical analysis, a semiquantitative analysis or spectrographic analysis. A number of standard acceptable methods exist for each form of analysis. This type of analysis can easily be obtained from any qualified laboratory. If the carbon content is critical, as in stainless steels, this should be checked separately.

a. Carbon Content: This test is readily performed by available modern equipment. In order to obtain reliable results, it is necessary to check the carbon content against standard samples. The latter are readily available from the National Institute of Standards and Technology in Gaithersburg, MD, and can be obtained to cover the low carbon range of 0.03% maximum carbon. Standard samples are also available for a higher carbon content if it is desired to check out equipment for accuracy in other ranges. The most important factor in performing the carbon analysis is to make sure that the material is clean when tested. It must be remembered at this point that some of the very fine weaves have very large exposed surface areas and carbon contained in even minute oil films or dust films on such areas can result in an apparently high carbon content even though the steel may be within specification. This surface contamination, while undesirable in the final product, will not affect the metallurgical properties of the stainless steel. It is, therefore, essential that all surface contamination be removed before performing carbon analysis. This can be achieved in a number of different ways. It has been found that ordinary degreasing is not always successful in removing surface contamination since dust particles and lint can be locked into the wire mesh during the weaving operation. Special techniques to assure complete removal of surface contamination such as ultrasonic cleaning etc., must be used.

7.4.2 Type of Weave: This is usually readily observed by eye or with a very low power magnifying glass. The various types of weaves are described in 4.1 and Figures 1 through 6 and are readily distinguished from these descriptions.

a. Shute Wire Diameters: Wire diameters are readily measured using a magnifying device such as a microscope equipped with a calibrated scale in the eyepiece. This usually is a small scale with graduated divisions that will permit the measuring of a wire diameter with much greater accuracy than can normally be obtained with a mechanical measuring tool. This is particularly true when measuring wire diameters that are less than 0.01 cm (0.004 in). Even with slightly larger diameters, the wire is usually deformed because of the weaving operation and it may be difficult to obtain a straight section that can be measured with a micrometer. Furthermore, optical examination will permit the measuring of wire diameters anywhere on a roll of material, whereas micrometer measurements are limited to edge wires, which can be removed.

b. Warp Wire Diameter: Measurement of the warp wire diameter is performed in a similar manner to that for the shute wires. In the case of a plain weave, the test will be identical. In the case of the twilled dutch double weave where the material is of high density, it is not possible to see warp wires in the middle of the material, and this test must be performed at an edge. This is, of course, acceptable keeping in mind that the warp wires run continuously through the mesh. In the case of the twilled dutch single weaves, the warp wire is visible enabling measurement in a similar manner to that of the shute wire.

7.5 Wire Count:

7.5.1 Shute Wire Count: There is no substitute for an actual physical wire count, again using a magnifying device such as described in 7.4.2a. There are a number of devices available that will permit the wire counts to be checked by using diffraction techniques. In fine meshes, the ability to count is usually limited to the microscope field and the length of the scale on the microscope eyepiece. If the scale covers a major portion of the eyepiece, counting the number of wires in the length of the scale is usually adequate.

7.5.2 Warp Wire Count: The warp wires should be counted in the same manner as the shute wires of 7.5.1 with the exception that, in a high twilled dutch double weave, it is not possible to see the warp wires except at the edge of the cloth.

7.6 Overall Thickness:

This is measured using an accurate micrometer, graduated in 0.0003 cm (0.0001 in) increments. This is also usually a good check against wire diameters and it should work out as follows:

a. In the case of a plain square weave, the overall thickness should be equal to the sum of the shute and warp wire diameters, however, the actual measurement might exceed this slightly, depending on the amount of crimp in the wire.

b. In the case of a twilled square weave, the overall thickness should be equal to the sum of the shute and warp wires. The actual measurement, however, might exceed this slightly depending on the amount of crimp in the wire. In very heavy weaves, the thickness can be greater. An example of this is a 150 x 150 x 0.028 wires/cm (60 x 60 x 0.011 wires/in) inch mesh which has an overall thickness of 0.071 cm (0.028 in).

c. In the case of either a plain dutch weave or a twilled dutch weave, the overall thickness should be equal to the sum of the warp wire diameter plus two times the shute wire diameter.

7.7 Weaving Flaws:

These are usually tested on a light box. The mesh is placed on the glass cover of the light box. By masking the edges and dimming the lights in the room, one may observe any missing strands or weaving flaws such as pinholes with the naked eye. If a wire is broken and the two wires are still in line, this defect might not be noticeable until pressure is applied to the cloth causing the wires to shift.

7.8 Filtration Media Performance Tests:

Filtration performance is best measured by the combination of the clean flow pressure drop and the filter efficiency ratio test. The contamination capacity test is also a good indicator of relative service life. It is important to note that the performance test on finished filters do not produce the same results as tests on flat sheets. Thus, these performance tests are only for the purpose of verifying that a lot of material is equal to previous lots. Filter performance qualification tests must be performed on finished filters to check specific requirements and not on flat mesh sheets.

7.8.1 Clean Flow Pressure Drop: The pressure drop at rated flow across the filter media.

7.8.2 Filtration Efficiency Ratio: The ratio of the number of particles greater than a specific size in the influent fluid to the number of particles greater than the same size in the effluent fluid. See AIR887 for a more detailed discussion of filtration efficiency ratio.

7.8.3 Contamination Capacity: The weight of a specified artificial contaminant that must be added to the influent fluid to produce a given differential pressure across a filter at specified conditions. See AIR887 for a more detailed discussion of contamination capacity.