UNIVERSAL WIRE CLOTH CO.

TECHNICAL DATA SHEET

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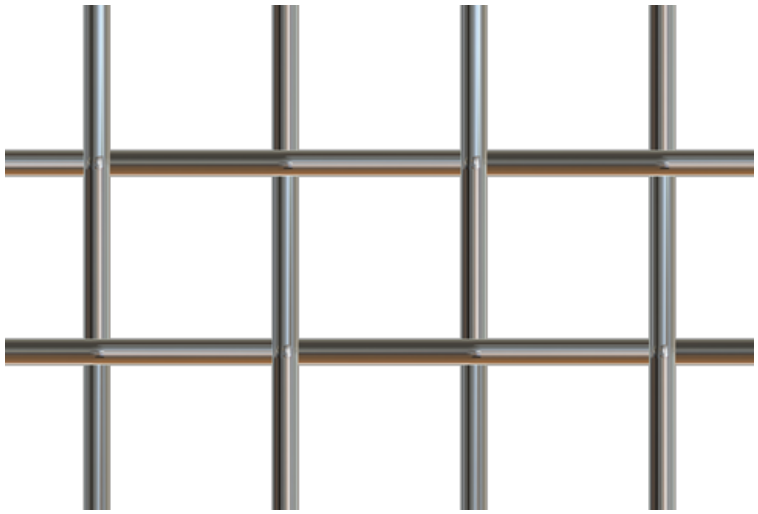
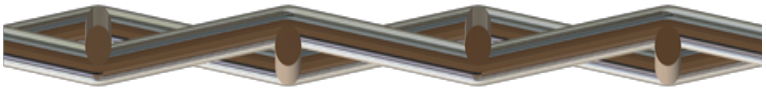
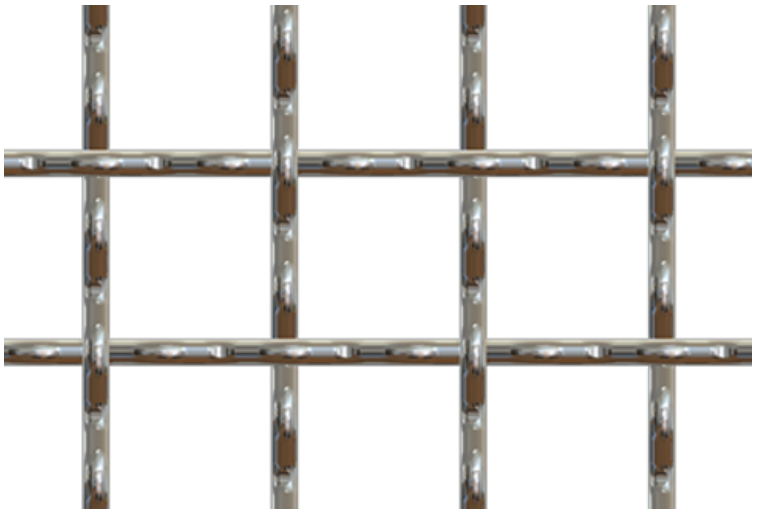
STANDARD MESH CONSTRUCTION STYLES





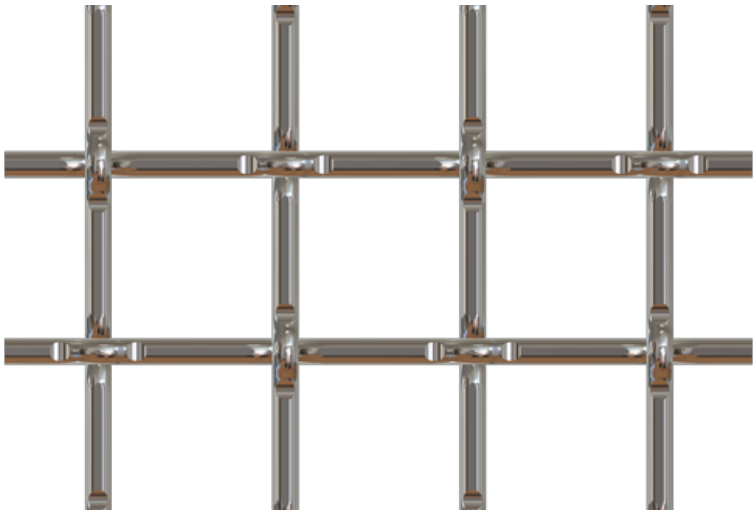
Plain Weave

Plain weave is constructed with interlacing wires at every intersection. This standard weave style is mostly common in Wire Cloth where moderate or small openings are needed for general screening applications.



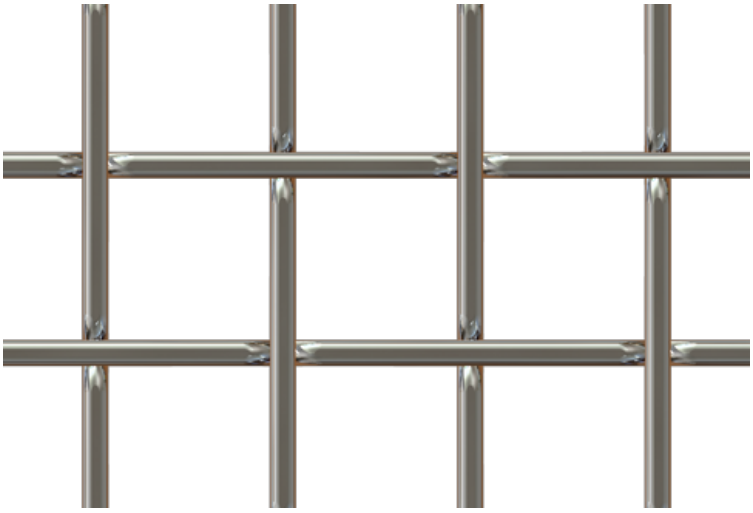
Intermediate Crimp

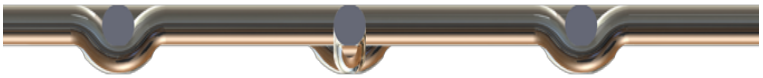
This weave style is a variation of plain weave where more defined crimps are placed on the material. Wires are placed on odd numbers crimps 3rd, 5th, 7th, etc to create a unique opening. This attractive-looking mesh is often used in architectural applications.



Lock Crimp

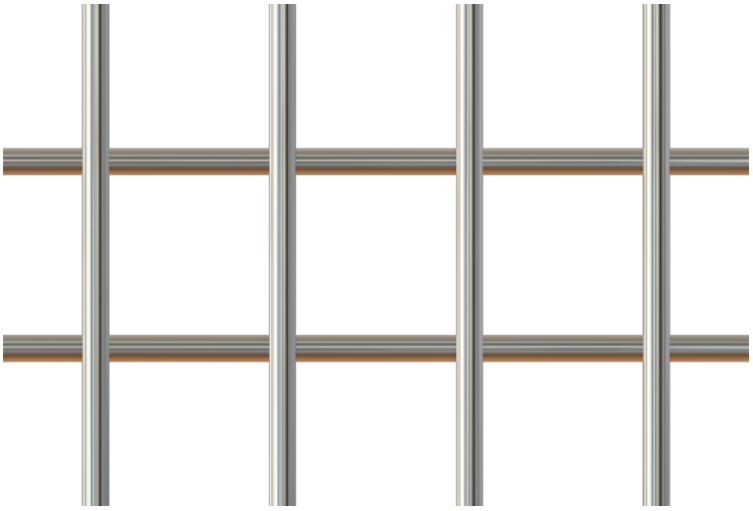
This weave style creates a tight wire joining at each intersection that resists movements know as "racking". Lock Crimp has very accurate opening dimensions and is commonly used in fencing and security applications.





Flat Top

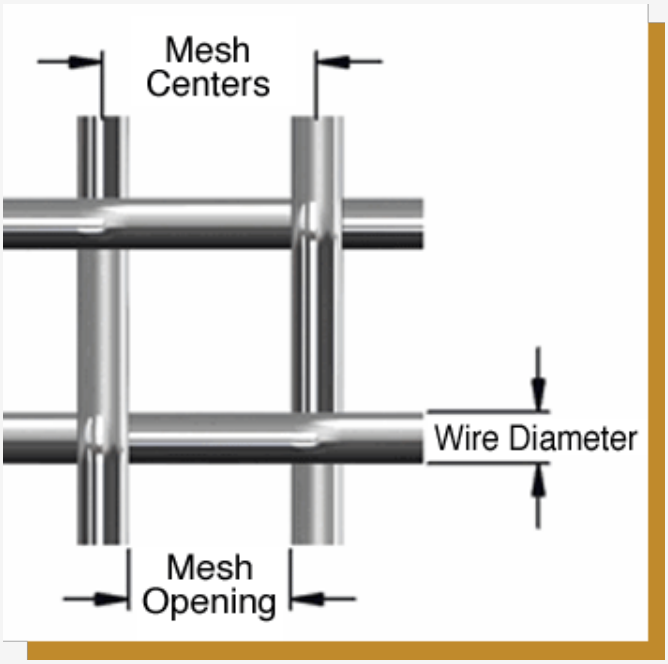
This weave style has all the crimps on one side giving the other side a smooth suface. This style also has less resistance to material flow as well as an aesthetic appeal.



Welded

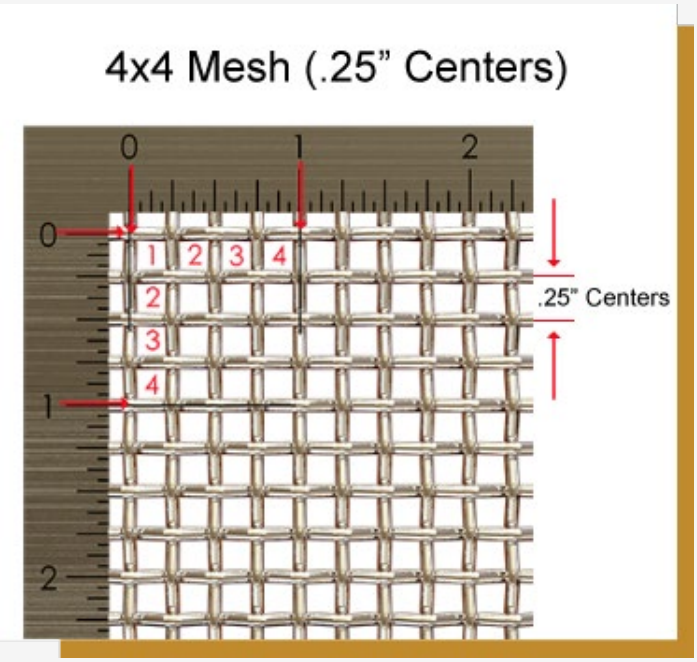
Welded wire mesh has intersecting rows and columns of wire that are resistance welded at the intersection to form a grid. Because the wires are fused together, the mesh is incredibly strong and rigid ensuring a long-lasting product.

SPECIFYING WIRE MESH



- Mesh Centers – (C) Refers to the center of one wire to the center of the next parallel wire.
- Wire Diameter – (D) Refers to the measurement of the entire wire from one side to the other. This is usually expressed as a number within three decimal places.
- Mesh Opening – (O) Refers to the measurable distance between two parallel wires.

- Lineal Inch – Refers to the measurable distance in one inch.
- Mesh Count (MC) – Refers to the number of openings that can be counted in one lineal inch.



Quick Formulas

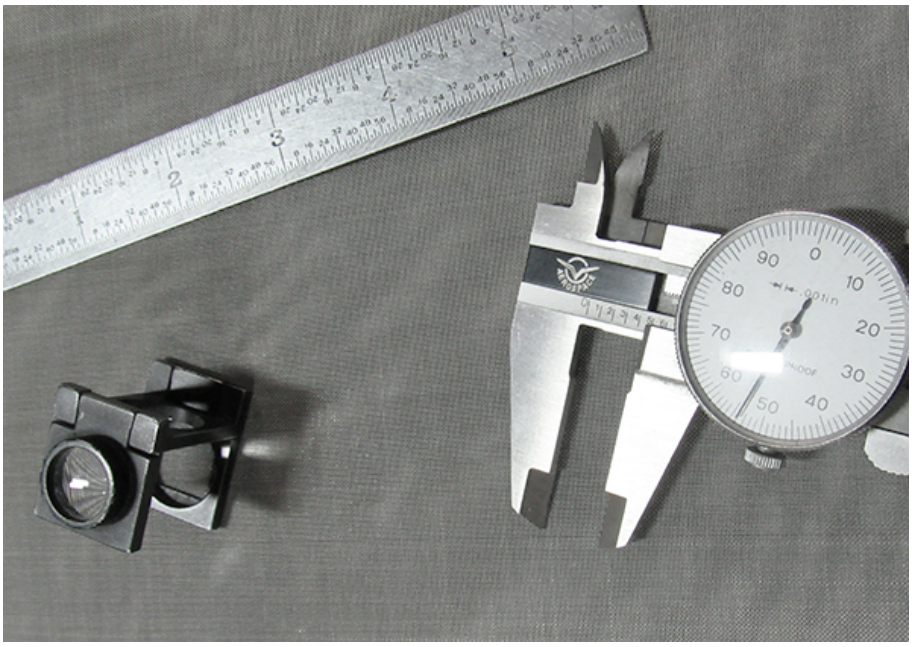
- To find the Mesh Opening if the Mesh Count and Wire Diameter are known:
  1 – (Wire Diameter • Mesh Count) / Mesh Count = Mesh Opening

- To find the Mesh Count if the Mesh Opening and Wire Diameter are known:
  1 / (Mesh Opening + Wire Diameter) = Mesh Count

- To find the Mesh Centers if the Mesh Count is known:
  1 / Mesh Count = Mesh Centers

- To find the Mesh Centers if the Mesh Opening is known:
  Mesh Opening + Wire Diameter = Mesh Centers

- To find the Mesh Opening if the Mesh Centers are known:
  Mesh Centers – Wire diameter = Mesh Opening



Percentage of Open Area

The percentage of open area in wire cloth and wire mesh is the ratio of the total open area of all of the openings combined relative to the entire screens area.

Applications that involve a required flow rate, as in material sizing, the flow of air, liquid or even the luminescence of light that passes through, the Percentage of Open Area is used to determine which specification will be best suited to a particular application.

Wire Cloth – Small & Medium Openings – Mesh Count

Method #1 – If the Mesh Opening is unknown:

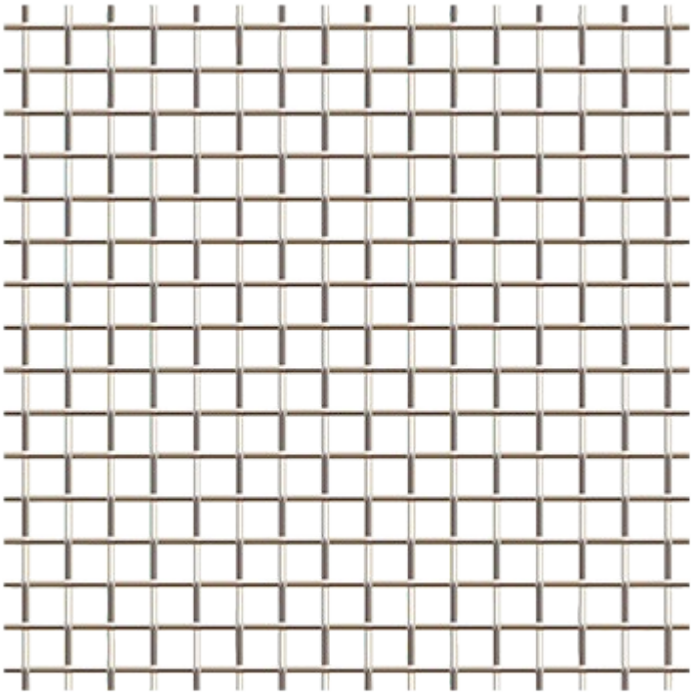
$(1 - MC \cdot D)^2 \times 100 = OA\%$

1. 4 • .047 =.188
2. 1 – 1.88 = .812
3. .812 • .812 = .6593
4. .6593 • 100 = 65.93
5. Open Area % = 65.93%

Method #2 – If the Wire Diameter is unknown:

$(O \cdot MC)^2 \times 100 = OA\%$

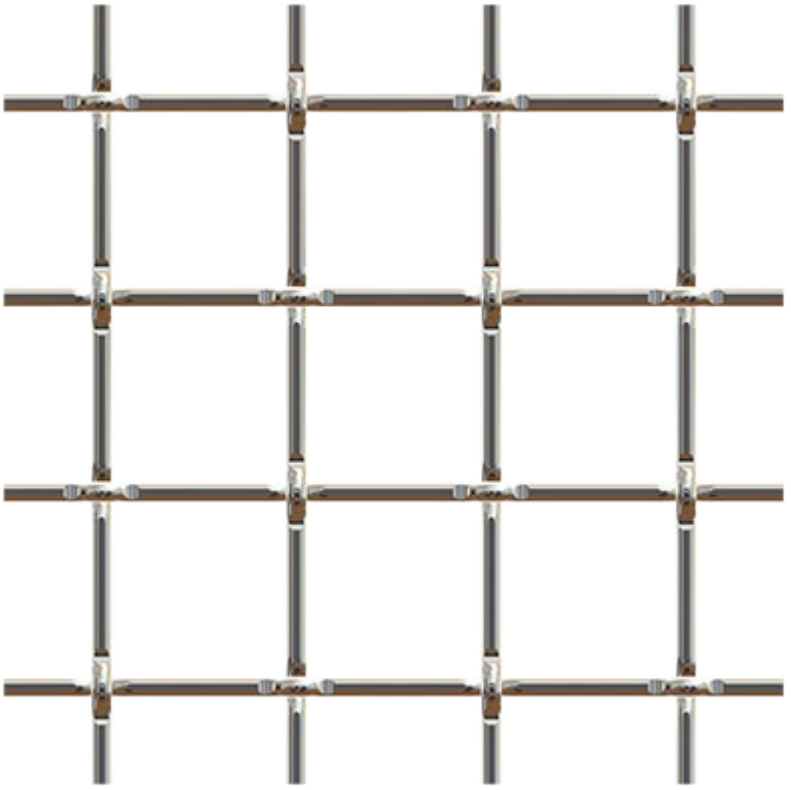
1. .203 • 4 = .812
2. .812 • .812 = .6593
3. .6593 • 100 = 65.93
4. Open Area % = 65.93%



4 x 4 Mesh .047" Wire Diameter
.203" Opening
Open Area % = 65.93%

WIRE MESH - LARGER OPENINGS

Space Formula



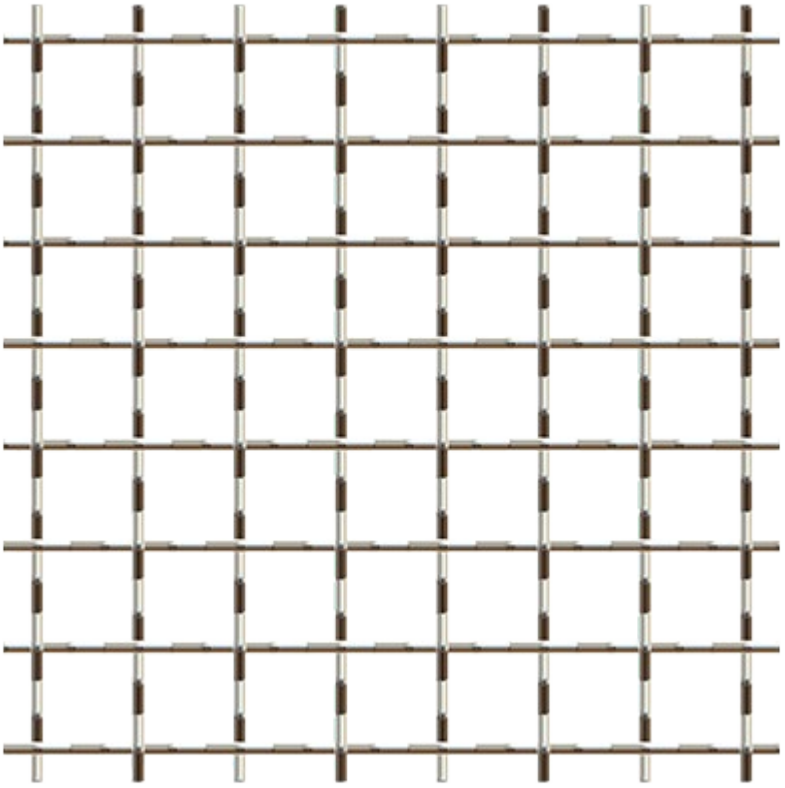
1" Opening .120" Wire Diameter – Lock Crimp
Open Area % = 79.72%

For Wire Mesh when the mesh opening and wire diameter are known:

$$(O / O + D)^2 \bullet 100 = OA\%$$

1. 1.00 + .120 = 1.120
2. 1.00 / 1.120 = 0.892
3. 0.892 • 0.892 = .797
4. .797 • 100 = 79.72
5. Open Area % = 79.72%

Square Centers



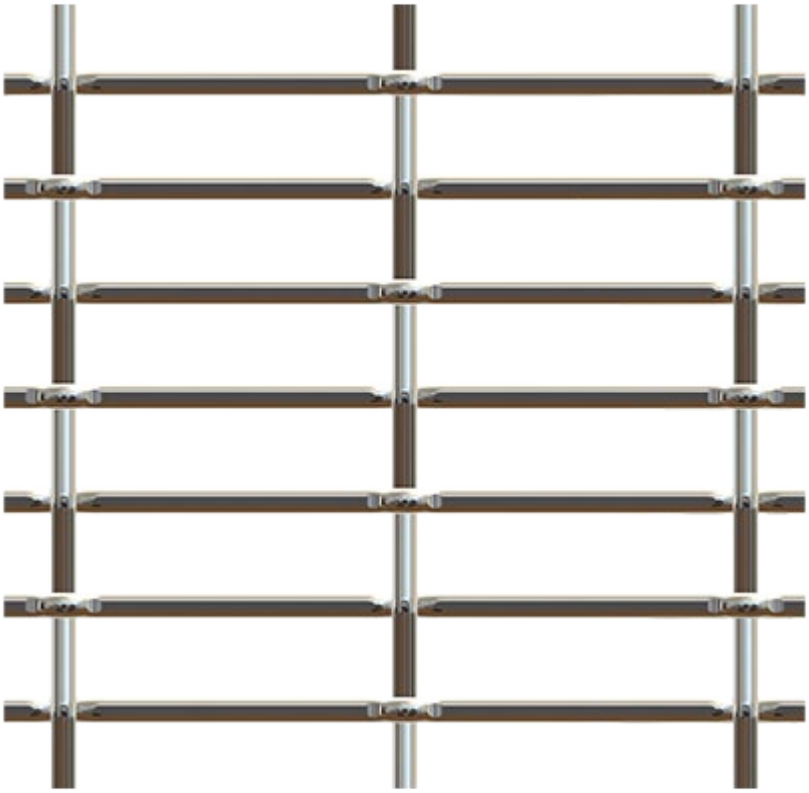
1/2" Centers .063" Wire Diameter – Intercrimp
Open Area % = 76.36%

For a square opening when the mesh centers and the wire diameter are known:

$$(C/D - 1)^2 / (C/D)^2 \bullet 100 = OA\%$$

1. .50 / .063 = 7.93 – 1
2. 6.93 • 6.93 = 48.02
3. 7.93 • 7.93 = 62.88
4. 48.02 / 62.88 = .7636
5. .7636 • 100 = 76.36
6. Open Area % = 76.36%

Rectangular Opening



2" Opening x .50" Opening
.162" Wire Diameter
Lock Crimp x Plain Weave
Open Area % = *48.84 %*

For a rectangular opening use the centers for each opening direction (large and small) as well as the wire diameter:

$(C/D - 1)^2 / (C/D)^2 \bullet (C/D - 1)^2 / (C/D)^2 \bullet 100 = OA\%$

1. Mesh Opening + Wire Diameter = Mesh Centers
2. 2.162 / .162 = 13.346 – 1 = 12.346 • 12.346 = 152.420
3. 2.162 / .162 = 13.346 • 13.346 = 178.116
4. .662 / .162 = 4.086 -1 = 3.086 • 3.086 = 9.525
5. .662 / .162 = 4.086 • 4.086 = 16.695
6. 152.420 / 178.116 = .0.856
7. 9.525 / 16.695 = .0571
8. 0.856 • .0.571 = .0.488 • 100
9. Open Area % = 48.84%

Wire Cloth – Ultra Fine & Fine Openings – Micron Retention

Though difficult to view with the naked eye, fine wire cloth have exceptionally small openings. Referred to as Micron, many applications require this single opening to be extremely accurate.

Micron Retention is calculated using the numerical equivalent of a millimetre (.03937). Note: The resulting answers may not be an exact match to a particular mesh specification, but there will be close available alternatives.

If the mesh opening is known divide the opening by the millimeter:

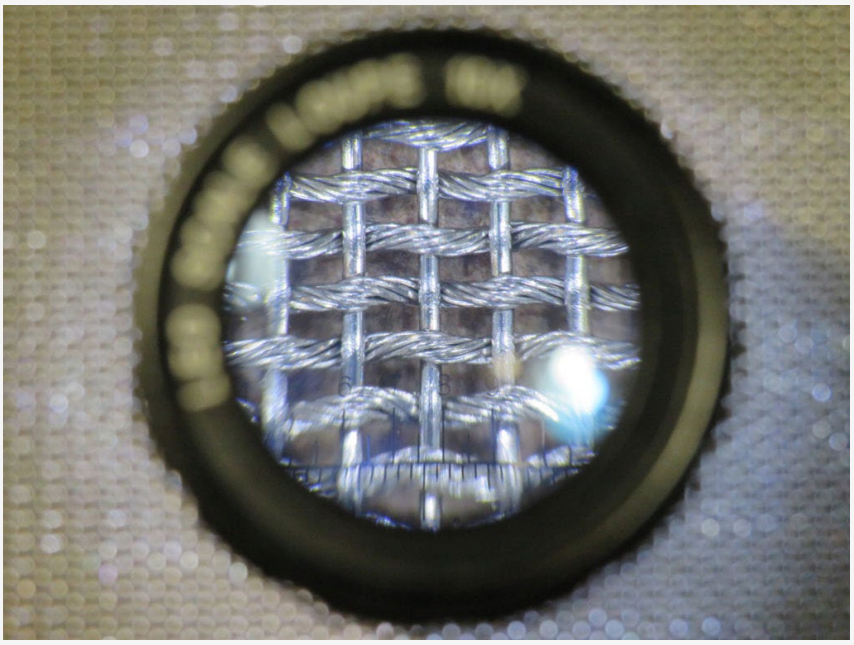
O / .03937 = Micron

1. A 200 x 200 Mesh .0021″ dia. wire has an opening of .0029″.
2. .0029 / .3937 = 73.66 Microns

If the desired Micron is known multiply the desired Micron by the millimetre:

__ * .03937 = Opening

1. Desired is a 300 Micron
2. 300 • .3937 = .0118″ opg
3. A specification near .0118″ opg is needed
4. A 50 x 50 Mesh .0085″ dia. wire with an opening of .0115″ is an option.



TYPE 304 STAINLESS STEEL is an excellent basic Stainless and is often referred to as 18-8 Stainless, meaning 18% Chromium and 8% Nickel. It is the most commonly used grade in wire cloth and operates to approx. 1500 degrees F.

TYPE 316 STAINLESS STEEL has an addition of at least 2% Molybdenum that is more corrosion resistant than TYPE 304. It has better resistance in salt water and chlorine salts. Its strength is also increased at higher temperatures.

Type 304 & Type 316 Stainless Steel are also available in a different grade with decreased carbon content for additional corrosion resistance. They are referred to as "L" as in Type 304L or 316L or sometimes ELC (extra low carbon).

CARBON STEEL is a steel alloy where carbon is the main alloying element. The higher the carbon content, the more abrasion resistant the mesh. The standard selections are C1008 (low carbon), C1045 (high carbon), and C1065 (oil tempered). See the next page for additional details.

ALUMINUM is a light malleable silvery metal that resists corrosion and oxidation which make it very popular in fencing applications. Aluminum also has good electrical and thermal conductivity and has high reflectivity as well.

BLACK EXPOXY COATED STEEL is an exterior coating compound consisting of two distinct elements: an epoxy resin and a polyamine hardener. When the epoxy coating is fully cured, the resulting product is a durable, rigid plastic coating that is typically applied to plain steel.

HARDWARE CLOTH is a flexible wire-mesh material consisting of welded wires in a simple rectangular grid with a zinc coating to prevent corrosion. It is available is various openings and wire diameters as well as a selection of woven varieties.

TYPE 321 STAINLESS is 9-12% Nickel and 17-19% Chromium that also contains Titanium. This alloy is not recommended when welding is a requirement. This alloy has superior resistance to inter granular.

TYPE 330 STAINLESS with 35% Nickel and 17% Chromium is excellent for high temperature use to approx. 1900 degrees F. This alloy is good for heat treating baskets, etc., and is much lower in cost than Inconel 600.

400 SERIES STAINLESS with the addition of approx. 11% Chromium (no nickel) to carbon steel allows the mesh to be called Stainless Steel with the added features of magnetic properties.

TYPE 410 STAINLESS has approx. 12% added Chromium (no nickel) to a carbon steel base. This gives a magnetic base to the metal with mild corrosion resistance. It can be used up to approx. 1400 degrees F. It can rust due to steel base makeup.

TYPE 430 STAINLESS has approx. 16 to 18% Chromium (no nickel) to a carbon steel base. This gives a magnetic base to the metal with mild corrosion resistance. It can rust due to its steel base.

COPPER is a base metal that is strong, easily formed and fatigue resistant. It has excellent electrical and thermal conductivity and good corrosion resistance in most alkaline solutions and organic chemicals.

HIGH BRASS is nominal 70 % Copper and 30 % Zinc. It has high strength and is ductile for severe cold working. It has mild corrosion resistance. Also known as Alloy 270.

LOW BRASS is nominal 80% Copper and 20% Zinc. This alloy has good corrosion resistance. Also known as Alloy 240.

COMMERCIAL BRONZE is a 90% Copper and 10% Zinc alloy of excellent corrosion resistance. It is some-times used in areas where salt air is present.

PHOSPHOR BRONZE is nominal 94% Copper, 4.75% Tin and .25% of Phosphorus. It has a strong alloy and offers excellent resistance to fatigue. It is resistant to corrosion from sea water but must not be used with strong oxidizing agents.

MONEL 400 is a corrosion resistant alloy of copper and nickel. It is excellent when used in sewage disposal and where toughness is also required. It stands up well in salt, alkali, food and beverages. The nominal content is 66 % Nickel and 30 % Copper.

NICHROME has a minimum of 57% Nickel and approx. 16% Chromium that resists scaling at high temperatures usually up to 1875 F. NICHROME V is good up to 2150 F. due to it's composition of 8o% Nickel and 20% Chromium.

INCOLOY 800 operates in approx. 1200 to 1600 F. This alloy contains approx. 32% Nickel and 20% Chromium and reacts similar to TYPE 330 Stainless.

ALLOY 1100 is a pure form of Aluminum where corrosion resistance is more important than strength.

HAST ALLOY A is resistant to cyanide salts even at high temperatures, making it an ideal alloy for heat treating baskets.

HAST ALLOY B is useful in Hydrochloric acid in most concentrations. This alloy is not to be used in high temperatures. This material is excellent for pickling baskets.

HAST ALLOY C - 276 is good for wet Chlorine gas as well as ferric and cupric chloride. This alloy also has higher temperature properties up to 1800 F. range. This alloy also has strong corrosion resistance to oxidizing agents.

INCONEL 600 is meant for high temperatures up to 2000 F. due to 72% min. Nickel and 15% NOMINAL Chromium content. This alloy is slow to carburize at high temperatures.

TANTALUM is comparable to glass in resisting corrosion and is inert to most acids except hydrofluoric acid and alkalis. It is compatible with body tissue and often used in implants. The physical properties compare to mild steel.

Chemical Compositions

Aluminum

Component	Al	Si	Mn	Fe	Cu	Cr	Mg	Ti
Max. %	94.4-96.8	0.25	0.1	0.4	0.1	0.15-0.35	3.1-3.9	0.2

Brass

Component	Cu	Zn						
Max. %	60.5-63.5	Balance						

Commercial Bronze

Component	Cu	Zn						
Max. %	90.00	10						

Phosphorous Bronze

Component	Cu	Sn						
Max. %	95.00	5.00						

Copper

Component	Cu	P	Ni	Si	Fe	Zn	Pb	S	Sn
Max. %	99.96	0.0007	0.0002	0.0004	0.0008	0.0009	0.00001	0.0009	0.0001

Black Epoxy Coated Steel

Component	C	Si	Mn	P	S	Cr		
Max. %	≤ 0.03	≤ 0.10	.20 - .40	≤ 0.02	≤ 0.025	.02-.06		

Galvanzied Steel & Hardware Cloth

Component	C	Si	Mn	P	S			
Max. %	0.06-0.12	0.3	0.25-0.5	0.045	0.005			

High Carbon Steel

Component	C	Fe	Mn	S				
Max. %	0.95	98.4	0.50	0.05				

Monel

Component	Ni	Cu	Fe					
Max. %	5-Mar	32	1.00					

Plain Steel

Component	C	Si	Mn	P	S			
Max. %	.056-0.85	0.15-0.35	0.5-0.7	0.035	0.035			

Chemical Compositions

Type 304 Stainless Steel

Component	C	Si	Mn	P	S	Ni	Cr	
Max. %	0.08	1.00	2.00	0.045	0.030	8.00-10.50	18.00-20.00	

Type 304L Stainless Steel

Component	C	Si	Mn	P	S	Ni	Cr	
Max. %	0.03	1.00	2.00	0.045	0.03	8.00-12.00	18.00-20.00	

Type 316 Stainless Steel

Component	C	Si	Mn	P	S	Ni	Cr	Mo
Max. %	0.08	1.00	2.00	0.045	0.03	10.00-14.00	16.00-18.00	2.00-3.00

Type 316L Stainles Steel

Component	C	Si	Mn	P	S	Ni	Cr	Mo
Max. %	0.03	1.00	2.00	0.045	0.03	10.00-14.00	16.00-18.00	2.00-3.00

Type 430 Stainless Steel

Component	Carbon (C)	Silicon (Si)	Mn	P	S	Cr		
Max. %	0.12	1.00	1.00	0.04	0.03	16.00-18.00		

Helpful Technical Data

Carbon Steel

Plain carbon steel also known as mild steel C1008 is a strong durable steel alloy often used in construction. Due to its chemical composition it can corrode and rust when exposed to moisture. High carbon steel C1045 has an increased carbon count that gives it a higher tensile strength that is both abrasion and impact resistant. Oil Tempered Carbon Steel C1065 has even a higher carbon count that incorporates a heat treatment process to increase overall toughness.

Although carbon steel may be desirable due to cost or availability, there are limitations to what mesh specs can be made using this type of material due to the presence of moisture as noted above. This is also known as Blinding or Caking where corrosion will interfere with the mesh opening. Oil temp and High carbon are most commonly made as heavier specs with openings larger than 10 mesh and wire diameters of .035" minimum.

Grades

Grades can either refer to a classification of material or a set group of specifications. In terms of material, the grade indicates the differentiating factors of that item. For example, Type 304 Stainless Steel is a grade of Stainless Steel which is different than Type 316 Stainless Steel.

On the other hand, Market Grade, Filter Grade, Bolting Cloth, Space Cloth etc. all refer to a classification of popular specifications with that Grade. Market Grade refers to popular common specs. Filter Grade refers to finer specs typically used in filtering applications. While, Bolting Cloth refers to lighter than normal wire diameters to allow for more air flow, however, also equates to a shorter material life expectancy. Finally, Space Cloth refers to larger opening and heavier wire diameters that can be also called Wire Mesh.

Raw Edges

While raw edging may not be as critical for larger opening wire mesh, that is likely not the case with finer wire cloth applications. There are a variety of options that can be completed upon request to avoid fraying and damage. These include razor shearing for a sharp edge, plasma cutting for a sealed edge or the addition of edging material such as canvas, plastic, PVC, metal etc. for extra protection.

Synthetic Mesh

As an alternative to metal, synthetic mesh is readily available in Nylon, Polyester, and Polypropylene beginning at 40" wide. These meshes start from a 6x6 mesh and go as fine as the many stainless specifications including some of the filter grades. Note: This material can be "hot knife" cut to prevent edge fraying.

Definitions

Calendered Wire Cloth - Wire cloth which has been passed through a pair of heavy rolls to reduce the thickness of the cloth or to flatten the intersections of the wires and provide a smooth surface. Also called "rolled'

Count - The number of openings in a lineal inch.

Crimp - Corrugations in wires to lock them in place.

Double Crimp - Corrugations in both warp and shute wires to lock wires into position.

Fill Wire- See "shute Wires"

Flat Top - A weave in which all crimps are on the underside of the cloth, thus providing a smooth surface.

Gauge - Measure of wire diameter. The actual wire diameter should always be specified in decimal sizes.

Intermediate (Inter) Crimp - Extra crimps in warp and fill wires between intersections. Most often used in wide mesh to assure accurate openings.

Lock Crimp - A weave in which deep crimps in wires at points of intersection lock wires securely in place. Usually specified for heavy duty screening.

Long Slot (Slotted) - A weave in which shute wires are arranged in clusters to provide slotted rectangular openings.

Market Grade - The most popular wire cloth specifications selected for general purpose work.

Mesh - When the mesh is specified as a number, it refers to the number of openings in a lineal inch measured from the center of one wire to a point 1" distant.

Oblong Mesh - Wire cloth with rectangular openings. Usually called off count in the case of finer meshes

Plain Weave - Wire cloth in which each warp wire and each shute wire passes over one and under the next adjacent complementary wire in both directions.

Plain Dutch Weave - The same as "plain weave" except that the warp wires are usually larger than shute wires, and the shute wires are closely spaced, resulting in a dense weave with tapered or wedge shaped openings.

Selvage - A finished edge to prevent unraveling of wire cloth.

Shute Wire - Wires running across the width of the cloth as woven. Also known as Weft or "fill wires"

Space Opening- The clear opening or space between adjacent parallel wires.

Square Mesh - Wire cloth with mesh count the same in both directions.

Stranded Weave - Wire cloth with a twilled weave of multiple wires in both warp and shute.

Twilled Weave - Wire cloth in which each warp wire and each shute wire passes successively over two and under the next adjacent pair of wires.

Twilled Dutch Weave - A combination of "Plain Dutch Weave" and "Twilled'; except that the warp and shute wires are usually the same size.

Twilled Dutch Double Weave - Same as "Twilled Dutch" except that the shute wires are smaller and overlap, thus increasing the number of shute wires in a lineal inch to provide greater density.

Warp Wires - Wires running the length of the cloth as woven.

Welded Wire Mesh - Has intersecting rows and columns of wire that are resistance welded at the intersection to form a grid. Because the wires are fused together, the mesh is incredibly strong and rigid ensuring a long-lasting product.

Wire Cloth – is an arrangement of woven metal wires creating very small to medium uniform openings. Many different specifications are available which are used for various applications.

Wire Mesh – is an arrangement of thicker woven metal wires creating larger uniform openings. Many different diameters and weave constructions are available which are used for various applications.

Universal Wire Cloth Quality Control Department Specifications

ASTM	A108 - 18	Steel Bar, Carbon and Alloy, Cold-Finished
ASTM	A227M - 06(2017)	Steel Wire, Cold-Drawn for Mechanical Springs
ASTM	A229M - 18	Steel Wire, Quenched and Tempered for Mechanical Springs
ASTM	A230M - 19	Steel Wire, Carbon Valve Spring Quality
ASTM	A240M - 19	Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
ASTM	E437-92(1997)	Industrial Wire Cloth and Screens (Square Opening Series) (Withdrawn 2000)
ASTM	A478 - 97(2019)	Chromium-Nickel Stainless Steel Weaving and Knitting Wire
ASTM	A480M - 19a	General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM	A555M - 16	General Requirements for Stainless Steel Wire and Wire Rods
ASTM	A641M - 19	Zinc–Coated (Galvanized) Carbon Steel Wire
ASTM	A740 - 98(2014)	Hardware Cloth (Woven or Welded Galvanized Steel Wire Fabric)
ASTM	A853 - 19	Steel Wire, Carbon, for General Use
ASTM	B1 - 13(2018)	Hard-Drawn Copper Wire
ASTM	B105 - 05(2012)	Hard-Drawn Copper Alloy Wires for Electric Conductors
ASTM	B134M - 15	Brass Wire
ASTM	B159M - 17	Phosphor Bronze Wire
ASTM	B164 - 03(2019)	Nickel-Copper Alloy Rod, Bar, and Wire
ASTM	B211M - 19	Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, Wire
ASTM	E11 - 17	Woven Wire Test Sieve Cloth and Test Sieves
ASTM	E1638 - 18	Sieves, Sieving Methods, and Screening Media
ASTM	E2016 - 15	Industrial Woven Wire Cloth
ASTM	E2814 - 18	Industrial Woven Wire Filter Cloth
ASTM	E74 - 18e1	Calibration and Verification for Force-Measuring Instruments
C.S.	A-A-1035A	Wire Fabric, Industrial
F.S.	123D	Marking for Shipment (CIVIL AGENCIES).
F.S.	368A	Quality Control System Requirements
F.S.	MIL-I-45208A	Inspection System Requirements
F.S.	MIL-Q-9858A	Quality Program Requirements
F.S.	MIL-STD-105E	Sampling Procedures/Table for Inspection by Attributes
C.S.	A-A-10377B	Replaced by: ANSI/AWCI-01 1992 Wire Fabric, Industrial
F.S.	MIL-STD-163C	Steel Mill Products, Preparation for Shipment & Storage
F.S.	QQ-A-200E	Aluminum Alloy, Bar, Rod, Structural, Tube & Wire, Extruded
F.S.	QQ-A-430C	Aluminum Alloy & Wire, Rivets & Cold Heading
F.S.	QQ-W-423B	Wire, Steel, Corrosion-Resisting
F.S.	QQ-W-461H	Wire, Steel, Carbon (Round, Bare, Coated)
F.S.	RR-W-360A	Wire Fabric, Industrial
F.S.	RR-W-365A	Wire Fabric, Insect Screening
F.S.	RR-W-370B	Wire Fabric, Steel, Hot Dipped Galvanized
F.S.	RR-W-375A	Wire Fabric, Steel, Welded (for concrete)
	ASTM = AMERICAN SOCIETY FOR TEST AND MATERIALS	
	C.S. = COMMERICAL STANDARDS	
	F.S. = FEDERAL STANDARDS	