Designation: E2016 – 22

Standard Specification for Industrial Woven Wire Cloth[1]

This standard is issued under the fixed designation E2016; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

Industrial wire cloth can be produced in many thousands of combinations of size and shape of opening, wire diameter, type of weave, and metal. This specification covers woven wire cloth for industrial use, including the separation of particles. Its purpose is to introduce standard terms and definitions, to note the normal range of specifications woven, and to establish tolerances and requirements. This specification excludes sieve cloth from its scope, since this is covered under Specification E11. If a user has a specific application for industrial wire cloth that is not within the scope of this specification, it is recommended that the wire cloth supplier be consulted.

1. Scope*

1.1 This specification covers industrial woven wire fabric, referred to as wire cloth, for general use including the separation of particles. Wire cloth can be made of any primary metal or metal alloy wire that is suitable for weaving. This specification does not apply to the following special types of wire cloth: filter cloth or dutch weave (see Appendix X1), fourdrinier and cylinder cloth, galvanized hardware cloth, insect wire screening, spiral weave wire cloth, testing sieve cloth, or welded wire cloth.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A510/A510M Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel

A555/A555M Specification for General Requirements for Stainless Steel Wire and Wire Rods

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

E1638 Terminology Relating to Sieves, Sieving Methods, and Screening Media

E2814 Specification for Industrial Woven Wire Filter Cloth

E3278 Test Method for Bubble Point Pressure of Woven Wire Filter Cloth

E3315 Specification for Certification of Metallic Materials

3. Terminology

3.1 *Definitions*—For definitions of related terms, refer to Terminology E1638.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *aperture, n*—the opening in a screening or sieving medium.

3.2.2 *aperture size, n*—the dimension defining an opening in a screening or sieving medium (see also *width opening*).

3.2.3 *bolting cloth, n*—wire cloth meeting a group of specifications that are typical for higher sifting capacities and which can speed the bolting action of vibratory screening machines,

[1] This specification is under the jurisdiction of ASTM Committee E29 on Particle and Spray Characterization and is the direct responsibility of E29.01 on Sieves, Sieving Methods, and Screening Media.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard**

manufactured based on using a limited number of wire diameters for a large group of mesh designations.

3.2.3.1 *Discussion*—"Bolting Grade" designations are often misused; and should not be specified without a wire diameter, as the designations have become non-standard.

3.2.4 *firmness, n*—a subjective term referring to the planar rigidity of wire cloth (as a roll good, not mounted in a frame).

3.2.4.1 *Discussion*—Firmness is established by the tensile strength of the material, the relationship of the mesh to wire diameters, the type of weave, and amount of crimp in the wires. The absence of firmness in wire cloth is termed *sleaziness*.

3.2.5 *market grade wire cloth, n*—wire cloth meeting a group of specifications that are typical for use in the general industrial market, manufactured based on using a different wire diameter for each of the common mesh designations.

3.2.5.1 *Discussion*—"Market Grade" designations are often misused; and should not be specified without a wire diameter, as the designations have become non-standard.

3.2.6 *mesh, n*—the number of wires or openings per linear inch (25.4 mm), counted from the center of any wire to a point exactly 1 in. (25.4 mm) distant, including the fractional distance between either thereof.

3.2.7 *mill grade wire cloth, n*—wire cloth meeting a group of specifications that are typical for milling grain and other light screening, manufactured based on using a different wire diameter for each of the common mesh designations.

3.2.7.1 *Discussion*—"Mill Grade" designations are often misused; and should not be specified without a wire diameter, as the designations have become non-standard.

3.2.8 *percent open area, n*—the ratio of the area of the openings to the total area expressed as a percentage, that theoretically can be calculated as follows:

$$OA = (1 - M_w\ D_w)(1 - M_s\ D_s)(100) \quad (1)$$

where:

OA = the percent open area,
M_w = the mesh warp,
M_s = the mesh shute,
D_w = the diameter warp wire, and
D_s = the diameter shute wire.

3.2.9 *rectangular (off-count) mesh, n*—either precrimp or double crimp wire cloth having a different number of wires in the warp and shute, producing rectangular openings; the diameter of the warp and shute wires may be the same or different.

3.2.10 *screen, n*—(*1*) a surface provided with apertures of uniform size and shape; (*2*) another term used interchangeably for woven wire cloth; and (*3*) a machine provided with one or more screen surfaces.

3.2.11 *selvage, n*—the edge or border of wire cloth finished off so as to prevent unraveling; examples of finished edges include looped selvage (see Fig. 1), folded selvage (see Fig. 2), cut and tucked (see Fig. 3), welded, plastic bonded, and bent-back picket, as opposed to a raw or cut edge (see Fig. 4).

3.2.12 *shute wires, n*—the wires running the short way of, or across the cloth as woven (also referred to as the shoot, fill, or weft wires).

3.2.13 *sieve cloth, n*—woven wire cloth conforming to Specification E11.

3.2.13.1 *Discussion*—Sieve cloth is generally used for the determination of particle size as opposed to the separation of particles.

3.2.14 *sleaziness, n*—wire cloth that does not exhibit firmness.

3.2.15 *space cloth, n*—wire cloth that is designated by the width of the open spaces between the inside faces of adjacent parallel wires, expressed in inches or the metric equivalent (see 4.2 for the normal range of space cloth specifications).

3.2.16 *square mesh, n*—wire cloth having the same number of wires in both the warp and shute.

3.2.17 *Types of Crimps:*

3.2.17.1 *crimp, n*—the corrugation in the warp or shute wire, or both.

3.2.17.2 *Discussion*—The crimp in the wires is formed either during the weaving process, or with a crimping machine prior to weaving. If formed during the weaving process, the tension existing between the warp and shute wires fundamentally determines the respective amount or depth of crimp, which locks the wires in place and in part establishes the firmness of the wire cloth.

3.2.17.3 *double crimp wire cloth, n*—wire cloth woven with approximately equal corrugations in both the warp and shute wires to lock the wires in position (see Fig. 5).

3.2.17.4 *flat top wire cloth, n*—wire cloth with deep crimps, as in lock crimp, except that all crimps are on the underside of the cloth, leaving the top surface all in one plane.

3.2.17.5 *Discussion*—Sometimes designated smooth top (see Fig. 6).

3.2.17.6 *intermediate crimp wire cloth, n*—precrimped wire cloth with extra crimps or corrugations between the points or intersection.

3.2.17.7 *Discussion*—Sometimes designated intercrimp or multiple crimp (see Fig. 7).

3.2.17.8 *lock crimp wire cloth, n*—precrimped wire cloth with deep crimps at points of intersection to lock the wires securely in place (see Fig. 8).

3.2.17.9 *precrimp wire cloth, n*—wire cloth woven with both the warp and shute wires crimped before weaving.

3.2.17.10 *triple shute wire cloth, n*—wire cloth woven with three shute wires inserted adjacent to each other, often constructed in conformance with precrimp rectangular.

3.2.18 *Types of Weaves:*

3.2.18.1 *herringbone twill, n*—wire cloth in which the direction of a twilled weave is reversed at regular intervals to produce a striped or herringbone effect.

3.2.18.2 *plain, n*—wire cloth in which the warp wires and shute wires pass over one and under one wire in both directions (see Fig. 9).

3.2.18.3 *twill, n*—wire cloth in which the warp wires and shute wires pass over two and under two wires in both directions (see Fig. 10).

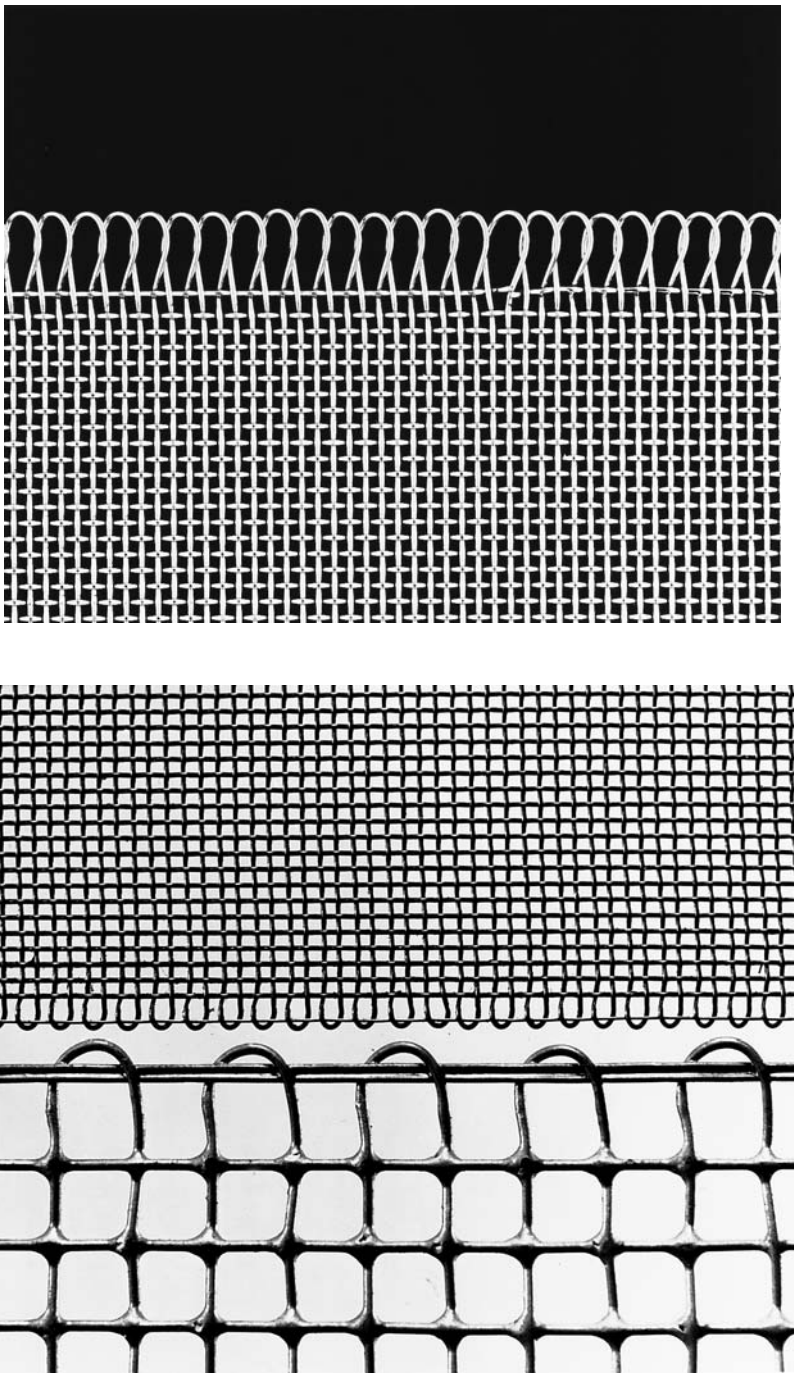


FIG. 1 Looped Edge

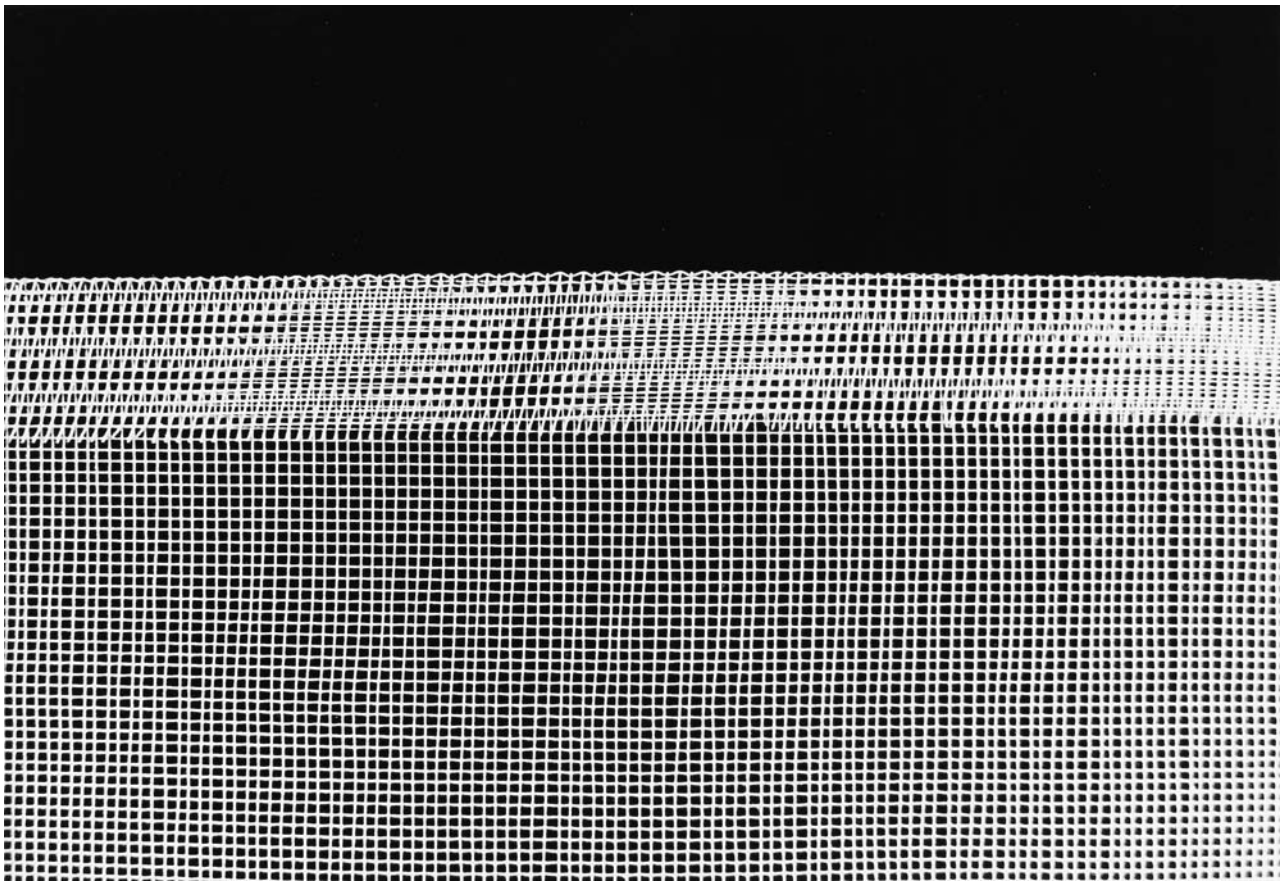


FIG. 2 Folded Edge

3.2.19 *warp wires, n*—the wires running the long way of the cloth as woven.

3.2.20 *weight per unit area, n*—the weight per square foot for wire cloth can be approximated (without consideration for crimp) by the following equation:

$$Wt/SqFt = (12 \quad M_w\ (12\ \pi\ (D_w^2/4)\rho)) = (12 \quad M_s\ (12\ \pi\ (D_s^2/4)\rho)) \tag{2}$$

where:

Wt/ft^2 = the weight (lb) per square foot,
M_w = the mesh warp (number of wires per inch),
M_s = the mesh shute (number of wires per inch),
D_w = the diameter warp wire (decimal parts of an inch),
D_s = the diameter shute wire (decimal parts of an inch),
ρ = the density of material ($lb/in.^3$) (0.2836 for plain or carbon steel), and
π = the constant 3.1416,

which for square mesh wire cloth with the same wire diameter in both the warp and shute reduces to:

$$Wt/SqFt = 72\pi\rho MD^2$$

where:

Wt/SqFt = the weight (lb) per square foot,
M = the mesh (number of wires per inch), and
D = the diameter wire (decimal parts of an inch).

3.2.20.1 *Discussion*—See Table 1 for a listing of conversion factors from plain steel for various other metals and alloys. The theoretical mass/unit area can be similarly calculated with SI units or an approximate multiplier factor of 4.8824 can be used to obtain kg/m^2.

3.2.21 *width opening, n*—distance between two parallel adjacent warp or shute wires, measured in the projected plane.

3.2.21.1 *Discussion*—The theoretical width of an opening in the direction of interest can be calculated by subtracting the nominal wire diameter from the reciprocal of the mesh in that direction as follows:

$$Opn = (1/M) - D \tag{3}$$

where:

Opn = the width opening (in decimal parts of an inch),
M = the mesh, and
D = the diameter wire (in decimal parts of an inch).

The theoretical width of an opening can be calculated similarly with SI units converting the pitch (1/*M*) to millimetres by the multiplier factor 25.4 and subtracting the wire diameter in millimetres.

4. Wire Cloth Specifications

4.1 *Normal Range of Double-Crimp, Square Mesh Wire Cloth (Expressed By Mesh):*

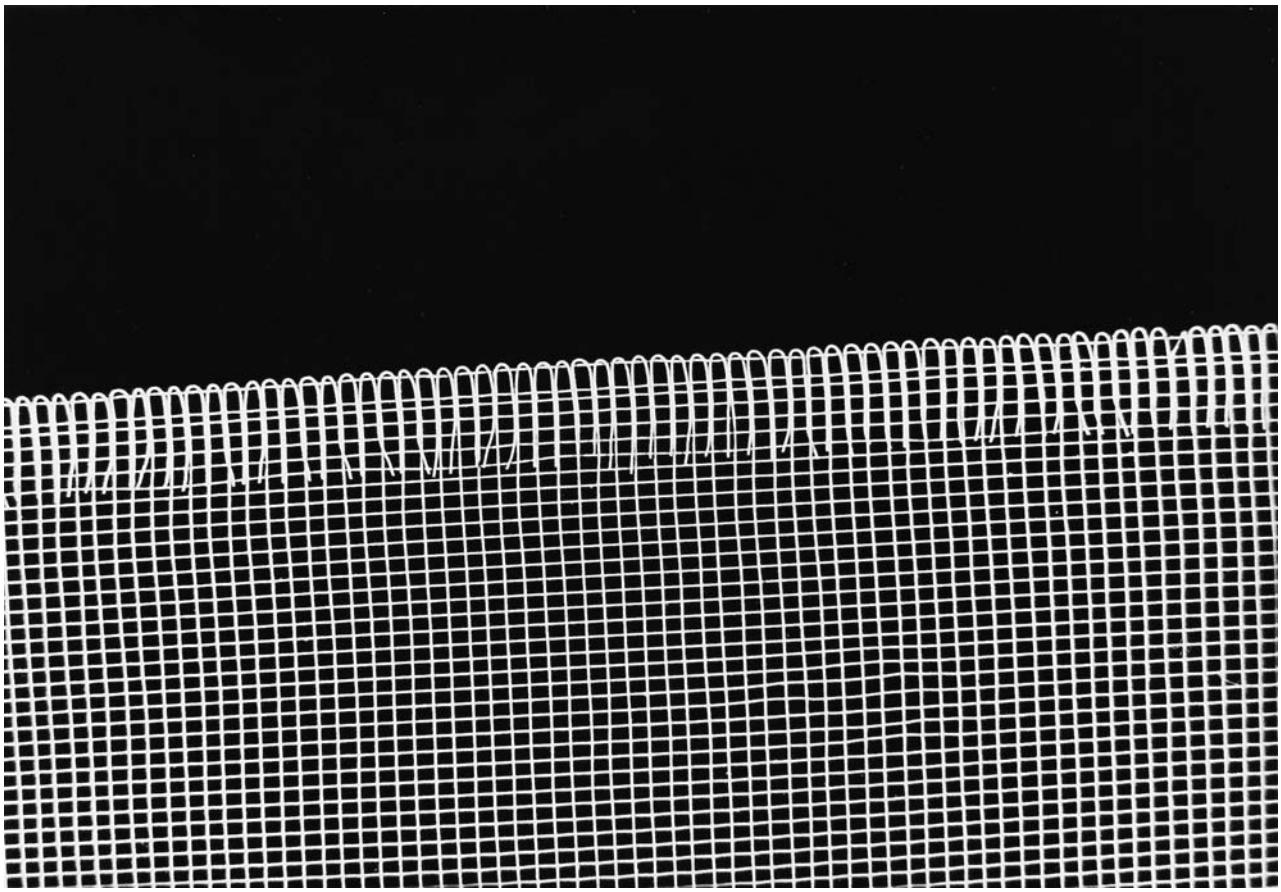


FIG. 3 Cut and Tucked Edge

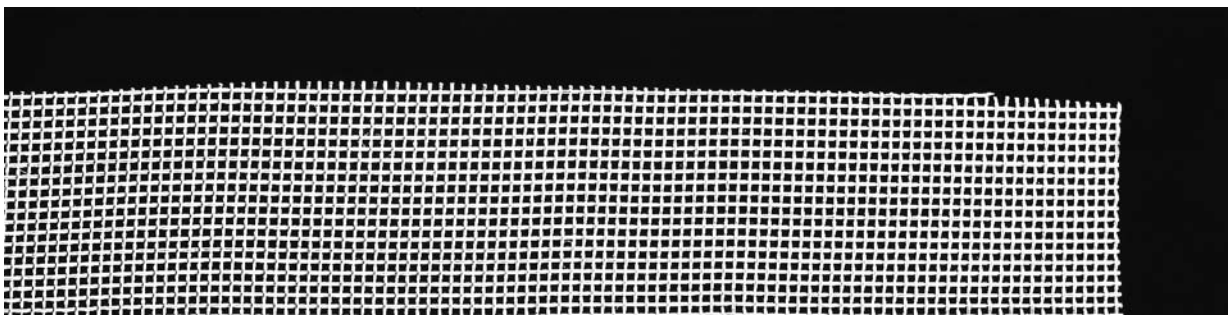


FIG. 4 Raw or Cut Edge

4.1.1 *Carbon Steel*—For the normal range of woven wire cloth specifications for double-crimp, square mesh carbon steel, see Table 2.

4.1.2 *Stainless Steel*—For the normal range of woven wire cloth specifications for double-crimp, square mesh stainless steel, see Table 3.

4.2 *Normal Range of Space Cloth (Expressed By Width Opening):*

4.2.1 *Carbon Steel*—For the normal range of space cloth specifications for carbon steel, see Table 4.

4.2.2 *Stainless Steel*—For the normal range of space cloth specifications for stainless steel, see Table 5.

5. Technical Requirements

5.1 *Wire Tolerances*—The wire diameter shall be expressed in decimal parts of an inch or the metric equivalent, and the tolerance for wire before weaving shall be in accordance with Table 6. It is recognized that mechanical deformation of the wire occurs during weaving, and therefore, the diameter measured after weaving only can be used as a guide of the original nominal diameter.

5.2 *Wire Cloth Tolerances:*

5.2.1 Industrial wire cloth can be woven from a great variety of metals and alloys. For the purposes of tolerances as woven, the following metals are applicable:

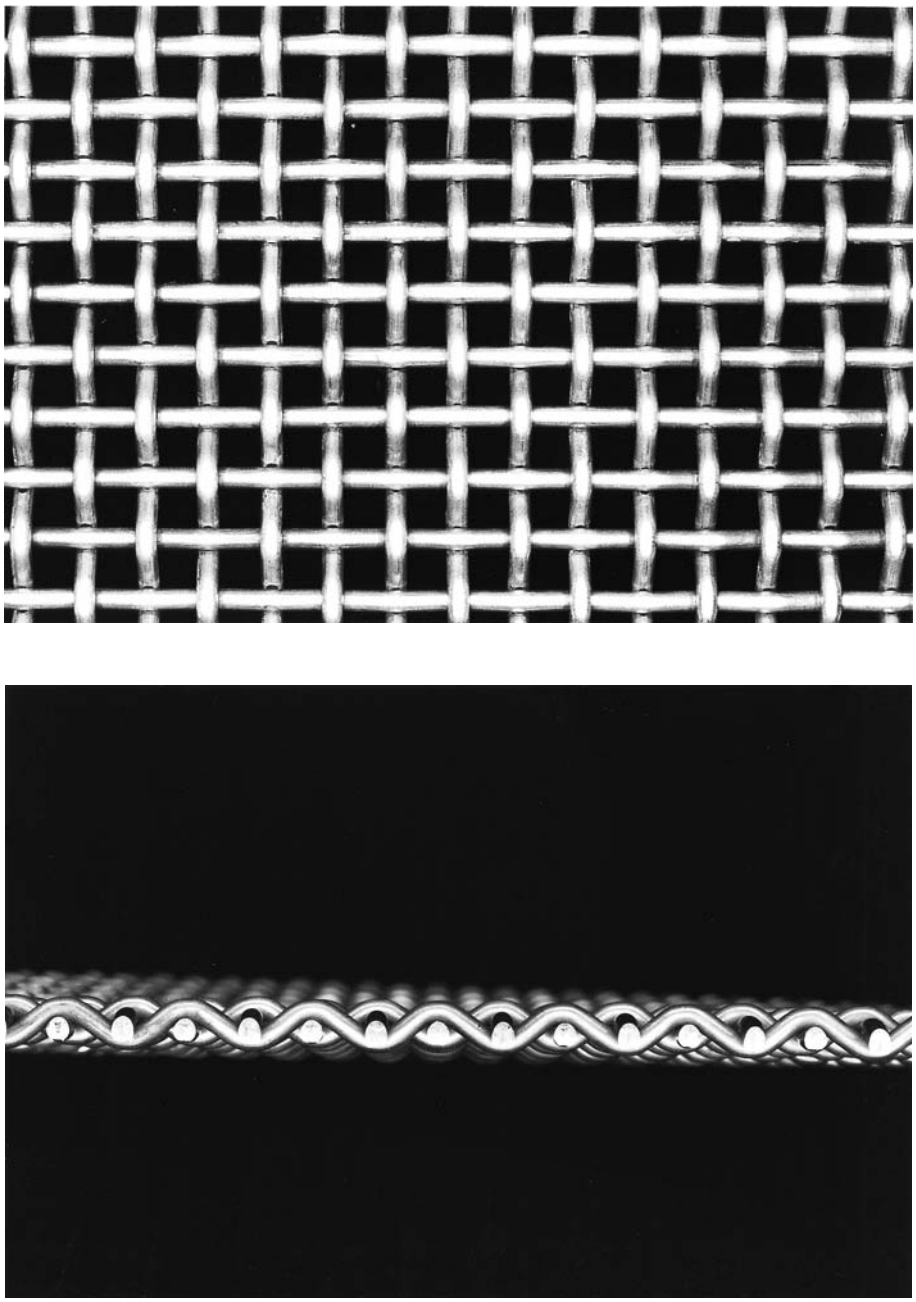


FIG. 5 Double Crimp

5.2.1.1 Aluminum (5000 series),
5.2.1.2 Brass,
5.2.1.3 Carbon steel,
5.2.1.4 Copper,
5.2.1.5 Monel metal,[3]
5.2.1.6 Nickel;
5.2.1.7 Phosphor bronze, and
5.2.1.8 Stainless steel (300 and 400 series).

5.2.2 Wire cloth tolerances for other metals may or may not be applicable depending on the particular specification and should be discussed with the supplier.

5.2.3 *Tolerances on Mesh*—Tolerances in mesh count shall be applied separately for warp and shute and in accordance with Table 7.

5.2.4 Tolerances on opening for space cloth The tolerance in opening of space cloth shall be in accordance with Table 8.

[3] Monel metal is a trademark of Special Metals Corporation.

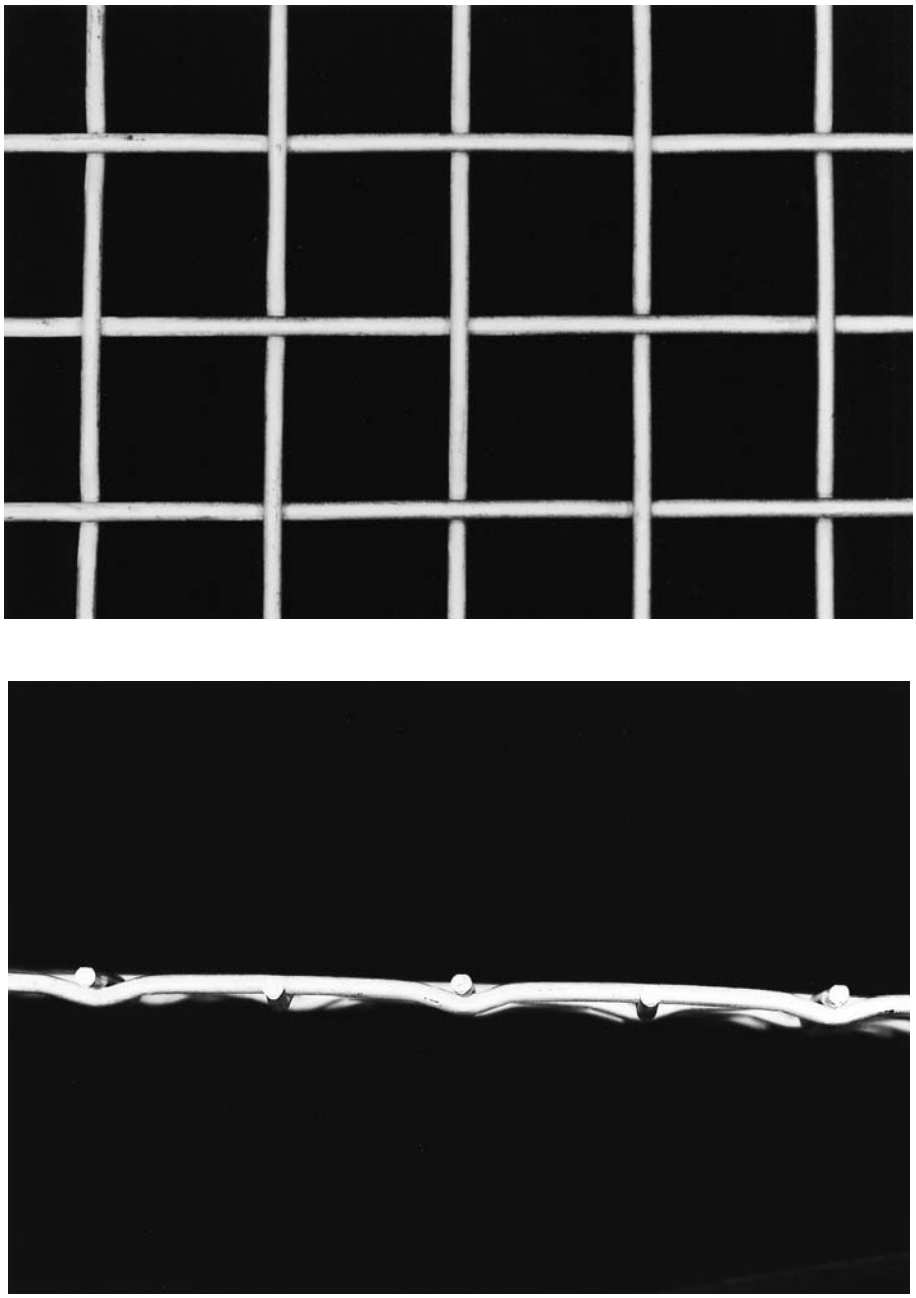


FIG. 6 Smooth Top

5.3 *Wire Cloth Blemishes:*

5.3.1 Wire cloth shall be woven with first-class workmanship, although some blemishes or defects are inherent in the weaving process.

5.3.2 *Permissible Number of Major Blemishes*—Unless otherwise agreed upon, the permissible number of major blemishes or defects as defined in Annex A1 shall be as shown in Table 9. The shute count shall determine the mesh category.

5.3.3 *Variation in Mesh*—An area of wire cloth with mesh count out of the tolerances shown in 5.2.3 shall be considered a defective area.

5.3.4 *Defective Opening*—An irregular opening in an area of wire cloth shall be considered a defect if the measured opening is out of tolerance as shown in Table 10 or Table 8 for space cloth. For heavy double crimp meshes (less than 50 % open area), a negative tolerance is not applicable as (*1*) the

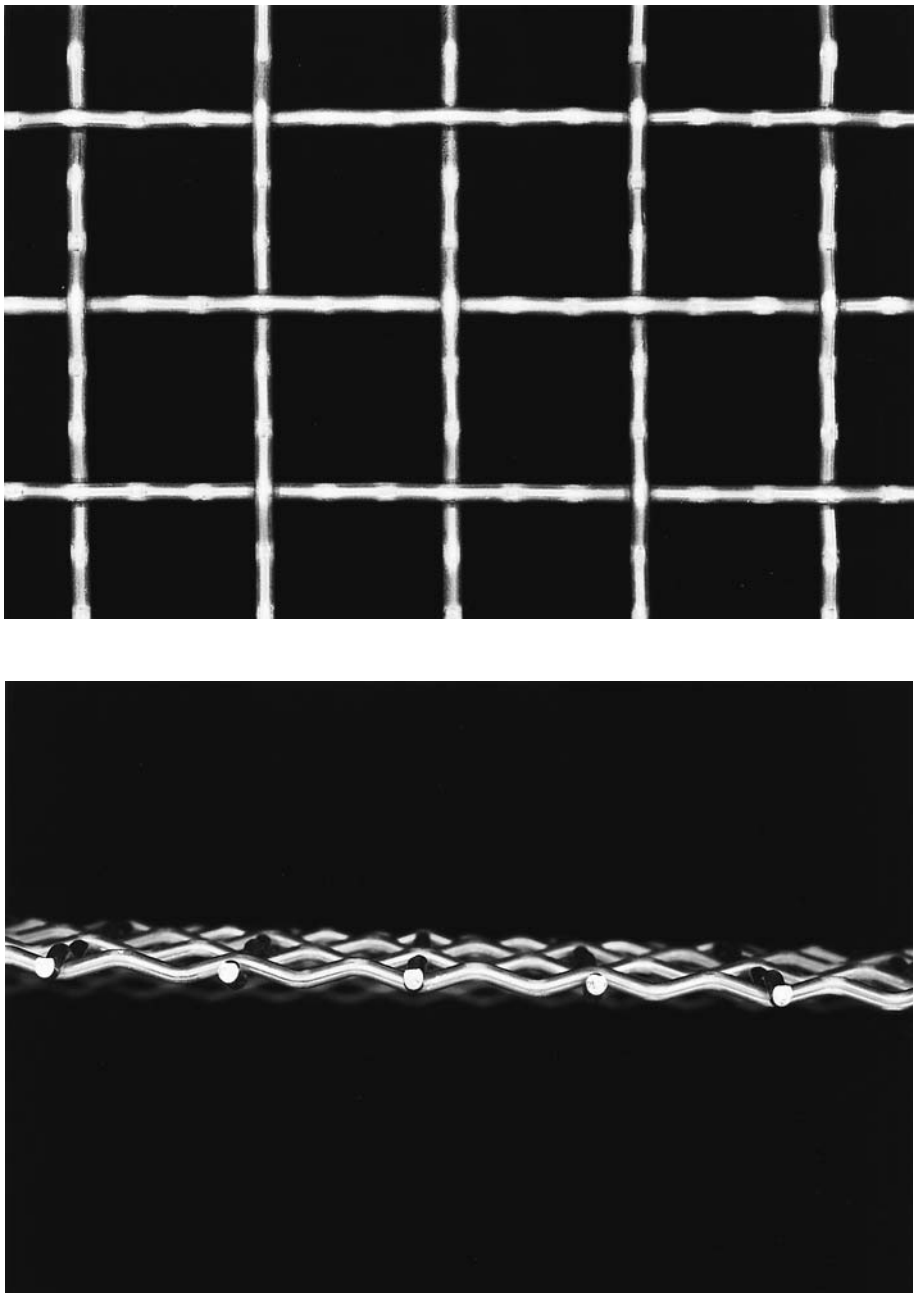


FIG. 7 Intermediate Crimp

physical possibility of severe undersize openings is less likely during weaving, and (*2*) minor undersize openings do not typically affect screening processes.

5.4 *Delivery Requirements*—Except when specifically agreed to otherwise, the total quantity of wire cloth furnished shall be within ± 10 % of the quantity ordered. The invoice shall be based on the actual quantity furnished. Any finishing or fabrication specified to wire cloth may or may not affect its delivered quality and should be discussed with the supplier.

5.4.1 *Roll*—A standard roll shall be 100 linear feet (30.5 m) ± 10 linear feet (3 m), and may consist of up to three pieces, no piece less than 10 linear feet (3 m).

5.4.2 *Width*—Permissible tolerance in the width of standard wire cloth rolls, except when cut to specific dimension, shall be in accordance with Table 11. Unless otherwise specified, rolls of wire cloth may be delivered with or without selvage edges. The width tolerance of selvage edge cloth should be defined explicitly.

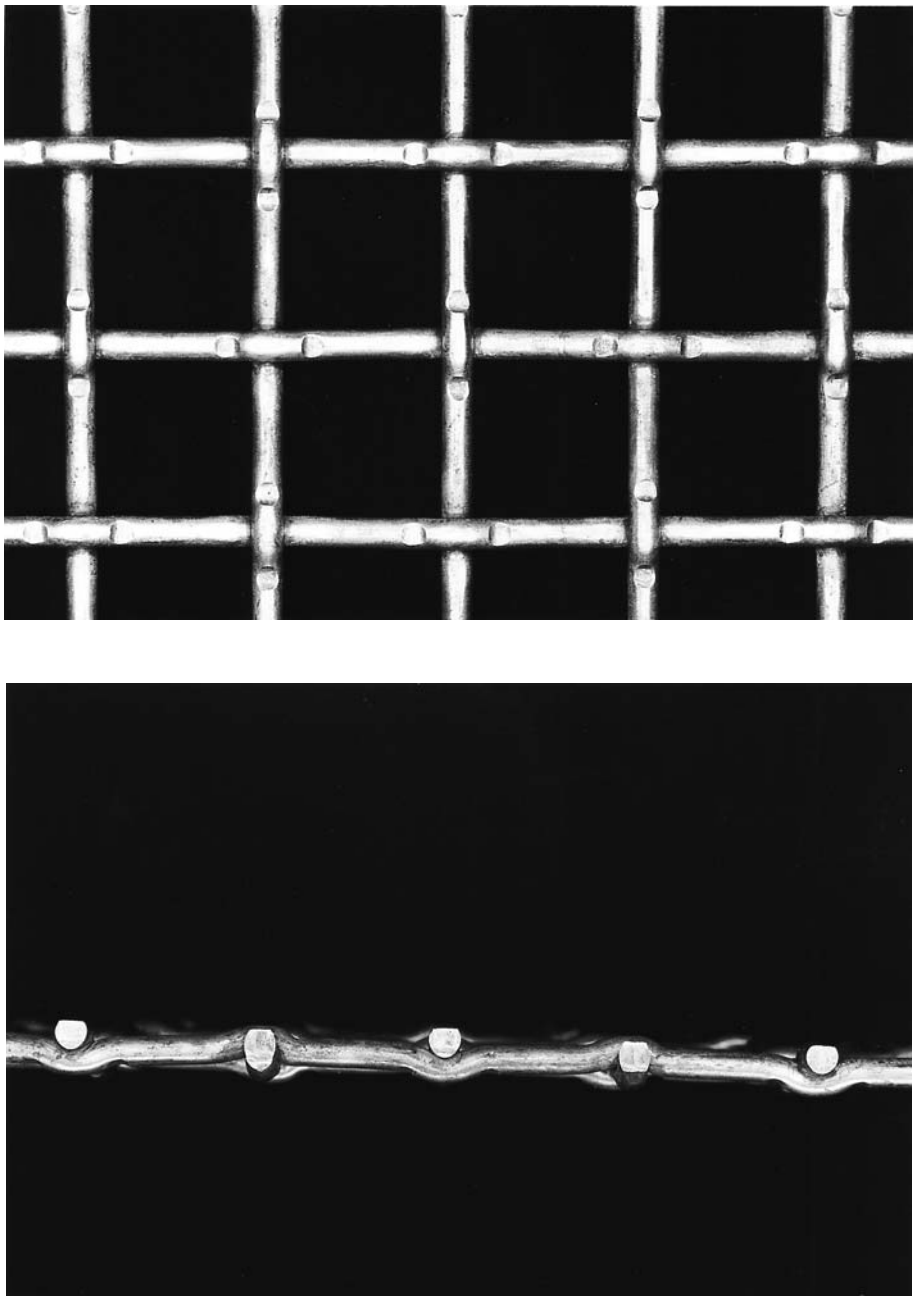


FIG. 8 Lock Crimp

5.4.3 *Flatness*—Woven wire cloth may be curled in either or both the warp or shute direction, unless specifically agreed to otherwise.

5.4.4 *Firmness*—Woven wire cloth should normally exhibit firmness.

5.4.5 *Squareness*—The warp and shute wires of woven wire cloth normally should be aligned such that they are perpendicular; however, ultralight or lighter grades may not always exhibit squareness due to their sleaziness.

5.4.6 *Surface Condition*—Woven wire cloth may be covered with a film of oil or other lubricant as a result of the manufacturing process. The wire may show traces of products used in the drawing process. Depending on the material, there may be traces of surface rust and corrosion, which should not affect functionality. The surface may show markings caused by the drawing or weaving processes. The depth of crimp generally differs between the warp and shute wires.

5.4.7 *Cut-to-Size Pieces*—The tolerances that can be held on cut pieces of wire cloth can be dependent on the piece size, the mesh and wire diameters, and the type of weave. These factors should be considered in the discussion of tolerances with the supplier.

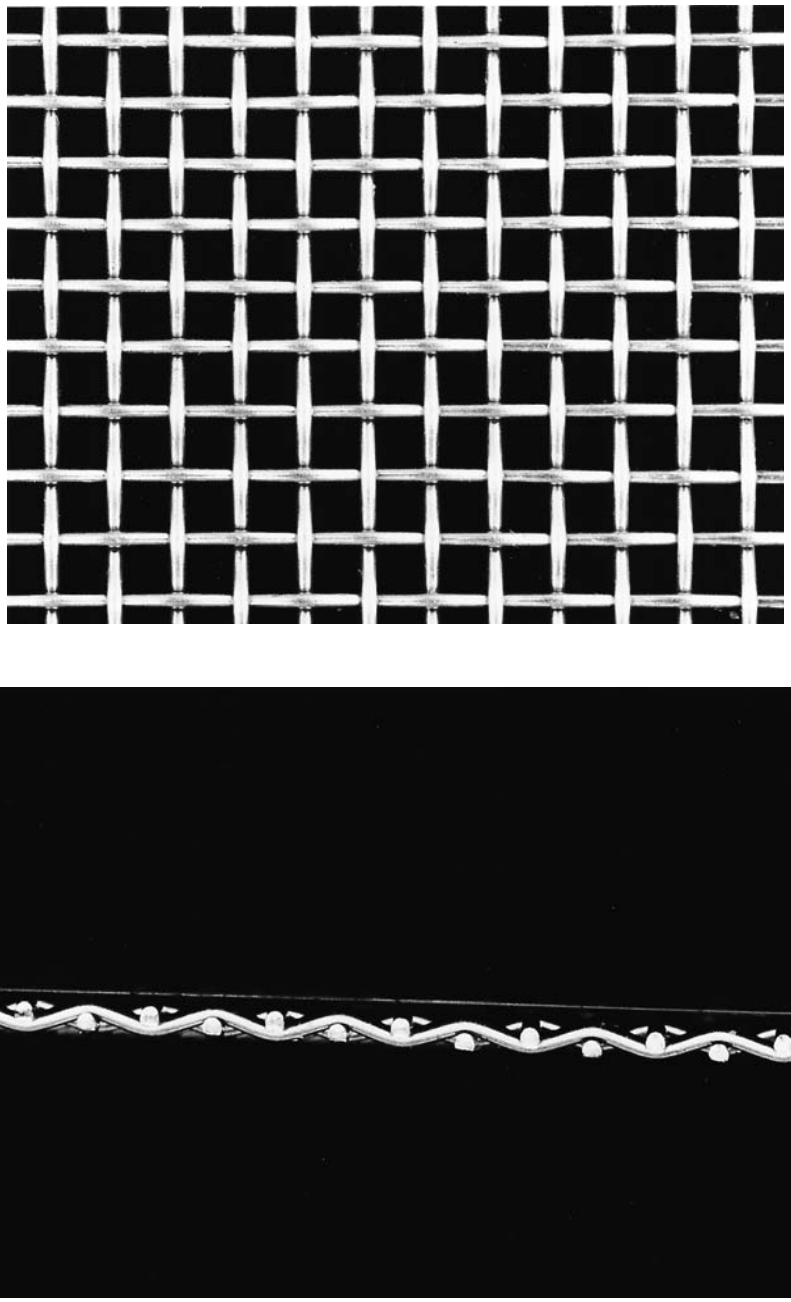


FIG. 9 Plain Square Weave

5.4.8 *Slit Widths*—Slitting tolerances should be discussed with the supplier in accordance with 5.4.7, and it should be further noted that wires may or may not be jumped or crossed.

5.4.9 *Coatings*—The wire used for weaving wire cloth can be coated, plated, or in some other way finished prior to weaving, or wire cloth can be specified coated after weaving. Coatings applied to wire before weaving or coatings applied to wire cloth after weaving can impact the delivered condition of the wire cloth. Consult with a supplier as to the applicability of this specification. Depending on the specifications, the uniformity of coatings applied before weaving can be affected by the weaving process. Coatings applied after weaving may fill or partially fill some number of the openings of the wire cloth. Coatings also can significantly affect the firmness of the cloth. Additionally, tolerances on the width of opening cannot be applied since, after woven, coatings will effectively increase the wire diameter and decrease the opening. Examples of possible coatings include, but are not limited to, metallic

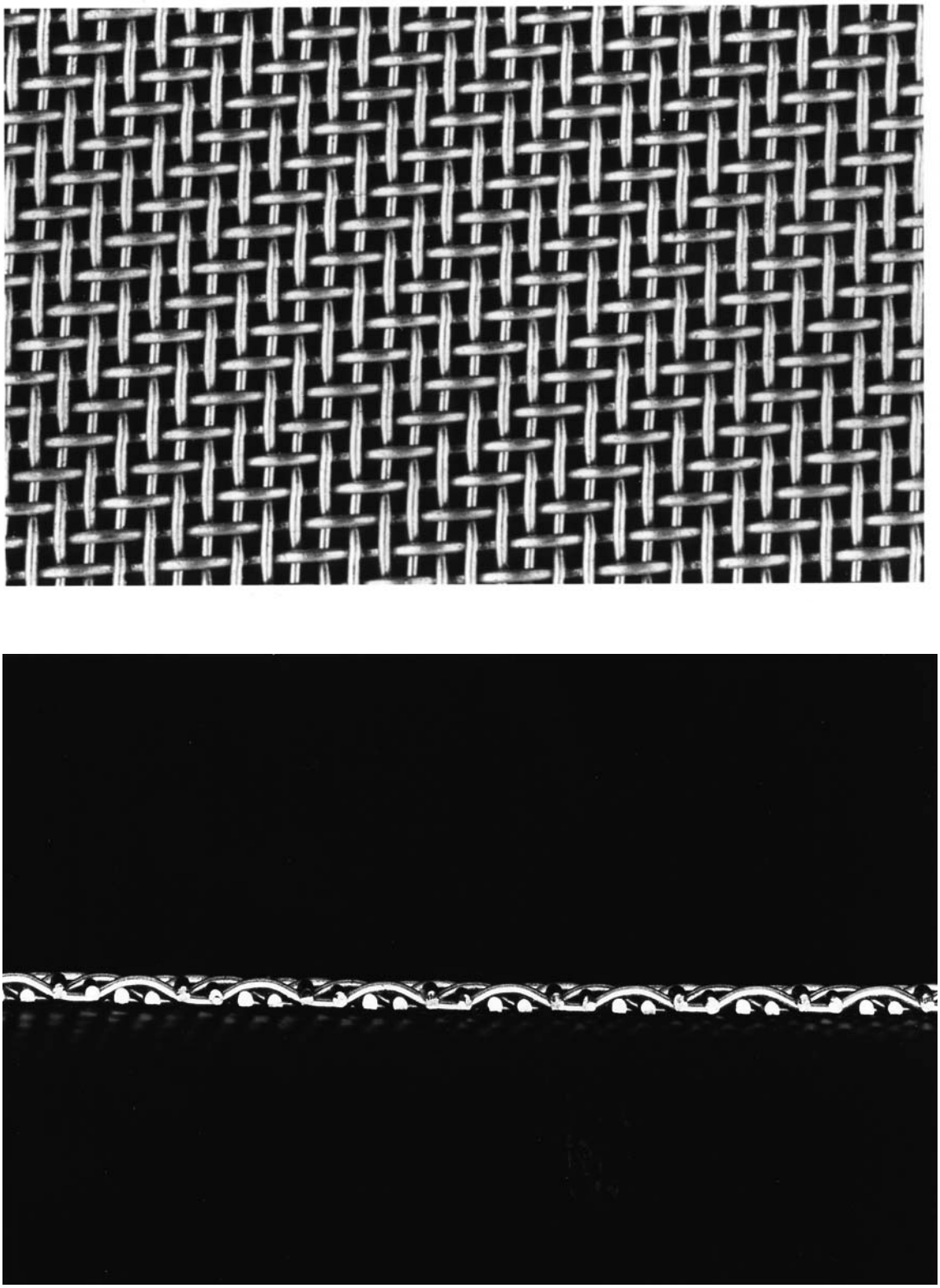


FIG. 10 Twilled Square Weave

TABLE 1 Approximate Weight/ft²—Multiplier Conversion Factors

Metal or Alloy	Multiplier Conversion Factor	Metal or Alloy	Multiplier Conversion Factor
Aluminum (EC) and 1100	0.346	Nichrome[A]	1.052
Aluminum (5056)	0.335	Nichrome[A] I	1.017
Brass, cartridge (70/30)	1.087	Nichrome[A] V	1.073
Brass, low (80/20)	1.105	Nickel 200	1.133
Bronze, comm. (90/10)	1.122	Platinum	2.736
Bronze, phosphor (A)	1.130	Silver	1.338
Copper	1.137	Stainless steel	1.024
Gold	2.464	(302,304,316,347)	
Haynes[B] 25 (L605)	1.165	Stainless steel (410,430)	0.988
Hastelloy[B] B	1.179	Steel (1008)	1.004
Hastelloy[B] C	1.140	Steel (1042)	1.000
Hoskins 502	1.013	Tantalum	2.114
Inconel[C] 600	1.073	Titanium	0.572
Molybdenum	1.303	Tungsten	2.450
Monel metal[C] 400	1.126		

[A] Nichrome is a trademark of Driver-Harris Company.
[B] Haynes and Hastelloy are trademarks of Haynes International Inc.
[C] Inconel and Monel metal are trademarks of Special Metals Corporation.

plated, such as, copper, nickel, tin, etc., painted, or epoxy-coated or galvanized-steel wire cloth that has been coated with zinc either before or after weaving.

5.4.10 *General*—The percentage of yield of the cloth shall be agreed on with the customer and will vary according to the specification and size of the product. If the quality or conformance to tolerances is disputed, the wire cloth may be returned to the supplier in delivered condition, that is, unprocessed and unused, and suitably packaged to avoid damage in transit, if allowed by the supplier in writing.

6. Testing Procedure

6.1 *Test Apparatus*—Test apparatus for either counting mesh or measuring irregular openings shall be compatible with the value of the tolerances. Examples of test apparatus to count mesh include a counting glass (see Fig. 11) and a standard metal rule (see Fig. 12). Examples of test apparatus to measure openings include a graduated magnifying device, a vernier inside caliper (see Fig. 13), and a standard metal rule. Computerized optical image analysis equipment may be used for either determining mesh count or the width of openings. All test apparatus shall be calibrated against standards traceable to the National Institute of Standards and Technology.

6.2 *Width Opening*—The measurement of an opening shall be made along the midpoint of the opening (see Fig. 14).

6.3 *Sampling:*

6.3.1 *Mesh Count*—The mesh of each 100-ft roll of wire cloth shall be counted and averaged in accordance with Table 11.

6.3.2 *Defective Openings*—The width of an opening shall be measured for conformance upon the visual location of an irregular opening in the wire cloth.

7. Packaging, Labeling, and Certification

7.1 *Packaging:*

7.1.1 Depending on the exact specification, woven wire cloth with wire diameters of about 0.011 in. (0.28 mm) or less, shall be rolled on a wooden or cardboard roll having a diameter of about 2 in. (50 mm). Woven wire cloth with a wire diameter greater than about 0.011 in. (0.28 mm) may be rolled up without a center roll. The heavier the wire diameter, the larger the inside diameter or the roll should be.

7.1.2 The method of packaging shall take into account the likelihood of the wire cloth corroding or being damaged mechanically. Any special packaging should be specified and agreed to with the supplier.

7.2 *Labeling:*

7.2.1 Wire cloth shall be labeled with the following information:

7.2.1.1 The name of the manufacturer;

7.2.1.2 The material of the wire;

7.2.1.3 The mesh or opening designation depending on the specification;

7.2.1.4 The nominal wire diameters;

7.2.1.5 The type of weave; and

7.2.1.6 The quantity, that is, length and width, or the size and number of pieces.

7.2.2 Other labeling requirements shall be subject to agreement between the customer and the supplier.

7.3 *Certification:*

7.3.1 At the time of ordering, customers may request a test certificate containing the following information:

7.3.1.1 Mesh or opening designation depending on the specification, and the diameters of the wire used for weaving (see Specification E3315, subsection 5.1.1).

7.3.1.2 Chemical analysis of the weaving wires and for traceability the original melt mill heat number shall be included (see Specification E3315, subsection 5.1.2).

7.3.1.3 For other requirements, additional tests shall be subject to agreement between the customer and the supplier (see Specification E3315, subsections 5.1.3 and 5.1.4).

8. Keywords

8.1 aperture; gauze; mesh; particle separation; screens; space cloth; width opening; wire cloth; wire diameter; woven wire

TABLE 2 Normal Range of Woven Wire Cloth Specifications for Carbon Steel—Double-Crimp, Square-Mesh

NOTE 1—Specifications other than those listed and off-count mesh may be woven. Check with your weaver.

	Carbon Steel–Light						Carbon Steel–Heavy				
	Wire Diameter		Width Opening		Percent of		Wire Diameter		Width Opening		Percent of
Mesh	in.	mm	in.	mm	Open Area, (%)	Mesh	in.	mm	in.	mm	Open Area, (%)
1 × 1	0.041	1.04	0.959	24.36	92	1 × 1	0.375	9.53	0.625	15.88	39
2 × 2	0.039	0.99	0.461	11.71	85	2 × 2	0.250	6.35	0.250	6.35	25
2.5 × 2.5	0.035	0.89	0.365	9.27	83	2.5 × 2.5	0.207	5.26	0.193	4.90	23
3 × 3	0.030	0.76	0.303	7.70	83	3 × 3	0.162	4.11	0.171	4.35	26
4 × 4	0.018	0.46	0.232	5.89	86	4 × 4	0.135	3.43	0.115	2.92	21
5 × 5	0.018	0.46	0.182	4.62	83	5 × 5	0.105	2.67	0.095	2.41	23
6 × 6	0.016	0.41	0.151	3.83	82	6 × 6	0.092	2.34	0.075	1.90	20
8 × 8	0.011	0.28	0.114	2.90	83	8 × 8	0.072	1.83	0.053	1.35	18
10 × 10	0.010	0.25	0.090	2.29	81	10 × 10	0.063	1.60	0.037	0.94	14
12 × 12	0.0090	0.229	0.074	1.89	80	12 × 12	0.047	1.19	0.036	0.92	19
14 × 14	0.0080	0.203	0.063	1.61	79	14 × 14	0.047	1.19	0.024	0.62	12
16 × 16	0.0070	0.178	0.056	1.41	79	16 × 16	0.035	0.89	0.028	0.70	19
18 × 18	0.0060	0.152	0.050	1.26	80	18 × 18	0.032	0.81	0.024	0.60	18
20 × 20	0.0050	0.127	0.045	1.14	81	20 × 20	0.028	0.71	0.022	0.56	19
24 × 24	0.0050	0.127	0.037	0.93	77	24 × 24	0.025	0.64	0.017	0.42	16
30 × 30	0.0050	0.127	0.028	0.72	72	30 × 30	0.017	0.43	0.016	0.41	24
35 × 35	0.0050	0.127	0.024	0.60	68	35 × 35	0.015	0.38	0.014	0.34	23
40 × 40	0.0050	0.127	0.020	0.51	64	40 × 40	0.013	0.33	0.012	0.30	23
50 × 50	0.0050	0.127	0.015	0.38	56	50 × 50	0.011	0.28	0.0090	0.229	20
60 × 60	0.0050	0.127	0.012	0.30	49	60 × 60	0.011	0.28	0.0057	0.144	12
80 × 80	0.0045	0.114	0.0080	0.203	41	80 × 80	0.0070	0.178	0.0055	0.140	19
100 × 100	0.0035	0.089	0.0065	0.165	42	100 × 100	0.0050	0.127	0.0050	0.127	25

TABLE 3 Normal Range of Woven Wire Cloth Specifications for Stainless Steel—Double-Crimp, Square-Mesh

NOTE 1—Specifications other than those listed and off-count mesh may be woven. Check with your weaver.

	Stainless Steel–Light						Stainless Steel–Heavy				
	Wire Diameter		Width Opening		Percent of		Wire Diameter		Width Opening		Percent of
Mesh	in.	mm	in.	mm	Open Area, (%)	Mesh	in.	mm	in.	mm	Open Area, (%)
1 × 1	0.041	1.04	0.959	24.36	92	1 × 1	0.375	9.53	0.625	15.88	39
2 × 2	0.039	0.99	0.461	11.71	85	2 × 2	0.250	6.35	0.250	6.35	25
2.5 × 2.5	0.035	0.89	0.365	9.27	83	2.5 × 2.5	0.207	5.26	0.193	4.90	23
3 × 3	0.018	0.46	0.315	8.01	89	3 × 3	0.162	4.11	0.171	4.35	26
4 × 4	0.018	0.46	0.232	5.89	86	4 × 4	0.120	3.05	0.130	3.30	27
5 × 5	0.018	0.46	0.182	4.62	83	5 × 5	0.105	2.67	0.095	2.41	23
6 × 6	0.011	0.28	0.156	3.95	87	6 × 6	0.092	2.34	0.075	1.90	20
8 × 8	0.0050	0.127	0.120	3.05	92	8 × 8	0.072	1.83	0.053	1.35	18
10 × 10	0.0050	0.127	0.095	2.41	90	10 × 10	0.063	1.60	0.037	0.94	14
12 × 12	0.0050	0.127	0.078	1.99	88	12 × 12	0.047	1.19	0.036	0.92	19
14 × 14	0.0045	0.114	0.067	1.70	88	14 × 14	0.047	1.19	0.024	0.62	12
16 × 16	0.0045	0.114	0.058	1.47	86	16 × 16	0.035	0.89	0.028	0.70	19
18 × 18	0.0040	0.102	0.052	1.31	86	18 × 18	0.035	0.89	0.021	0.52	14
20 × 20	0.0030	0.076	0.047	1.19	88	20 × 20	0.028	0.71	0.022	0.56	19
24 × 24	0.0025	0.064	0.039	0.99	88	24 × 24	0.025	0.64	0.017	0.42	16
30 × 30	0.0020	0.051	0.031	0.80	88	30 × 30	0.017	0.43	0.016	0.41	24
35 × 35	0.0020	0.051	0.027	0.67	86	35 × 35	0.016	0.41	0.013	0.32	19
40 × 40	0.0018	0.046	0.023	0.59	86	40 × 40	0.014	0.34	0.012	0.29	21
50 × 50	0.0010	0.025	0.019	0.48	90	50 × 50	0.012	0.30	0.0080	0.203	16
60 × 60	0.0010	0.025	0.016	0.40	88	60 × 60	0.011	0.28	0.0057	0.144	12
80 × 80	0.0010	0.025	0.012	0.292	85	80 × 80	0.0070	0.178	0.0055	0.140	19
100 × 100	0.0010	0.025	0.0090	0.229	81	100 × 100	0.0050	0.127	0.0050	0.127	25
120 × 120	0.0010	0.025	0.0073	0.186	77	120 × 120	0.0042	0.107	0.0041	0.105	25
150 × 150	0.0010	0.025	0.0057	0.144	72	150 × 150	0.0030	0.076	0.0037	0.093	30
180 × 180	0.0010	0.025	0.0046	0.116	67	180 × 180	0.0025	0.064	0.0031	0.078	30
200 × 200	0.0010	0.025	0.0040	0.102	64	200 × 200	0.0025	0.064	0.0025	0.064	25
250 × 250	0.0010	0.025	0.0030	0.076	56	250 × 250	0.0016	0.041	0.0024	0.061	36
270 × 270	0.0010	0.025	0.0027	0.069	53	270 × 270	0.0016	0.041	0.0021	0.053	32
325 × 325	0.0010	0.025	0.0021	0.053	46	325 × 325	0.0014	0.036	0.0017	0.043	30

TABLE 4 Normal Range of Space Cloth Specifications for Carbon Steel

NOTE 1—Specifications other than those listed and off-count mesh may be woven. Check with your weaver.

Carbon Steel (Light)					Carbon Steel (Heavy)				
Width Opening		Wire Diameter		Percent of Open	Width Opening		Wire Diameter		Percent of Open
in.	mm	in.	mm	Area, (%)	in.	mm	in.	mm	Area, (%)
4	101.6	0.120	3.05	94	4	101.6	1.000	25.40	64
3-½	88.9	0.120	3.05	93	3-½	88.9	0.750	19.05	68
3	76.2	0.120	3.05	92	3	76.2	0.750	19.05	64
2-¾	69.9	0.120	3.05	92	2-¾	69.9	0.750	19.05	62
2-½	63.5	0.120	3.05	91	2-½	63.5	0.750	19.05	59
2-¼	57.2	0.120	3.05	90	2-¼	57.2	0.625	15.88	61
2	50.8	0.120	3.05	89	2	50.8	0.625	15.88	58
1-¾	44.5	0.120	3.05	88	1-¾	44.5	0.625	15.88	54
1-½	38.1	0.105	2.67	87	1-½	38.1	0.625	15.88	50
1-⅜	34.9	0.105	2.67	86	1-⅜	34.9	0.500	12.70	54
1-¼	31.8	0.080	2.03	88	1-¼	31.8	0.500	12.70	51
1-⅛	28.6	0.080	2.03	87	1-⅛	28.6	0.500	12.70	48
1	25.4	0.063	1.60	88	1	25.4	0.500	12.70	44
⅞	22.2	0.063	1.60	87	⅞	22.2	0.500	12.70	40
¾	19.1	0.063	1.60	85	¾	19.1	0.500	12.70	36
⅝	15.9	0.063	1.60	83	⅝	15.9	0.500	12.70	31
9/16	14.3	0.063	1.60	81	9/16	14.3	0.437	11.10	32
½	12.7	0.063	1.60	79	½	12.7	0.437	11.10	28
7/16	11.1	0.063	1.60	76	7/16	11.1	0.375	9.53	29
⅜	9.5	0.047	1.19	79	⅜	9.5	0.375	9.53	25
5/16	7.9	0.047	1.19	76	5/16	7.9	0.250	6.35	31
¼	6.4	0.047	1.19	71	¼	6.4	0.250	6.35	25
3/16	4.8	0.047	1.19	64	3/16	4.8	0.225	5.72	21
5/32	4.0	0.047	1.19	59	5/32	4.0	0.192	4.88	20
⅛	3.2	0.032	0.81	63	⅛	3.2	0.135	3.43	23
3/32	2.4	0.032	0.81	56	3/32	2.4	0.120	3.05	19
1/16	1.6	0.020	0.51	57	1/16	1.6	0.092	2.34	16

TABLE 5 Normal Range of Space Cloth Specifications for Stainless Steel

NOTE 1—Specifications other than those listed and off-count mesh may be woven. Check with your weaver.

Stainless Steel (Light)					Stainless Steel (Heavy)				
Width Opening		Wire Diameter		Percent of Open	Width Opening		Wire Diameter		Percent of Open
in.	mm	in.	mm	Area, (%)	in.	mm	in.	mm	Area, (%)
4	101.6	0.120	3.05	94	4	101.6	1.000	25.40	64
3-½	88.9	0.120	3.05	93	3-½	88.9	0.750	19.05	68
3	76.2	0.120	3.05	92	3	76.2	0.750	19.05	64
2-¾	69.9	0.120	3.05	92	2-¾	69.9	0.625	15.88	66
2-½	63.5	0.120	3.05	91	2-½	63.5	0.625	15.88	64
2-¼	57.2	0.120	3.05	90	2-¼	57.2	0.625	15.88	61
2	50.8	0.120	3.05	89	2	50.8	0.625	15.88	58
1-¾	44.5	0.120	3.05	88	1-¾	44.5	0.500	12.70	60
1-½	38.1	0.080	2.03	90	1-½	38.1	0.500	12.70	56
1-⅜	34.9	0.080	2.03	89	1-⅜	34.9	0.500	12.70	54
1-¼	31.8	0.080	2.03	88	1-¼	31.8	0.500	12.70	51
1-⅛	28.6	0.080	2.03	87	1-⅛	28.6	0.500	12.70	48
1	25.4	0.063	1.60	88	1	25.4	0.500	12.70	44
⅞	22.2	0.063	1.60	87	⅞	22.2	0.437	11.10	44
¾	19.1	0.063	1.60	85	¾	19.1	0.375	9.53	44
⅝	15.9	0.063	1.60	83	⅝	15.9	0.375	9.53	39
9/16	14.3	0.063	1.60	81	9/16	14.3	0.313	7.95	41
½	12.7	0.063	1.60	79	½	12.7	0.313	7.95	38
7/16	11.1	0.063	1.60	76	7/16	11.1	0.313	7.95	34
⅜	9.5	0.047	1.19	79	⅜	9.5	0.250	6.35	36
5/16	7.9	0.047	1.19	76	5/16	7.9	0.250	6.35	31
¼	6.4	0.041	1.04	74	¼	6.4	0.250	6.35	25
3/16	4.8	0.041	1.04	67	3/16	4.8	0.225	5.72	21
5/32	4.0	0.041	1.04	63	5/32	4.0	0.192	4.88	20
⅛	3.2	0.032	0.81	63	⅛	3.2	0.120	3.05	26
3/32	2.4	0.032	0.81	56	3/32	2.4	0.120	3.05	19
1/16	1.6	0.020	0.51	57	1/16	1.6	0.092	2.34	16

TABLE 6 Tolerances for Wire Diameters

Wire[A]	Wire Diameter		Tolerance	
	in.	mm	in.	mm
Stainless Steels[B]	0.5000 and larger	12.70 and larger	±0.002	±0.05
	Under 0.5000 to 0.3125, incl	Under 12.70 to 7.94, incl	±0.0015	±0.04
	Under 0.3125 to 0.0440, incl	Under 7.94 to 1.12, incl	±0.001	±0.03
	Under 0.0440 to 0.0330, incl	Under 1.12 to 0.84, incl	±0.0008	±0.02
	Under 0.0330 to 0.0240, incl	Under 0.84 to 0.61, incl	±0.0005	±0.013
	Under 0.0240 to 0.0120, incl	Under 0.61 to 0.30, incl	±0.0004	±0.010
	Under 0.0120 to 0.0080, incl	Under 0.30 to 0.20, incl	±0.0003	±0.008
	Under 0.0080 to 0.0048, incl	Under 0.20 to 0.12, incl	±0.0002	±0.005
	Under 0.0048	Under 0.12	±0.0001	±0.003
Carbon Steels[C]	0.5000 and larger	12.70 and larger	±0.003	±0.08
	Under 0.5000 to 0.0800, incl	Under 12.70 to 2.03, incl	±0.002	±0.05
	Under 0.0800 to 0.0350, incl	Under 2.03 to 0.89, incl	±0.001	±0.03
	Under 0.0350 to 0.0280, incl	Under 0.89 to 0.71, incl	±0.0008	±0.02
	Under 0.0280 to 0.0200, incl	Under 0.71 to 0.51, incl	±0.0006	±0.015
	Under 0.0200 to 0.0160, incl	Under 0.51 to 0.41, incl	±0.0005	±0.013
	Under 0.0160 to 0.0110, incl	Under 0.41 to 0.28, incl	±0.0004	±0.010
	Under 0.0110 to 0.0060, incl	Under 0.28 to 0.15, incl	±0.0003	±0.008
	Under 0.0060 to 0.0045, incl	Under 0.15 to 0.11, incl	±0.0002	±0.005

[A] Refer to the appropriate wire industry standard for other metals.
[B] Refer to Specification A555/A555M.
[C] Refer to Specification A510/A510M.

TABLE 7 Tolerance in Mesh Count

Mesh	Warp	Shute
Coarser than 30 mesh, incl	±2 %	±5 %
Over 30 to 200 mesh, incl	±2 %	±4 %
Finer than 200 mesh	±3 %	±4 %

TABLE 8 Tolerances on Openings for Space Cloth

Opening		Tolerance	
in.	mm	in.	mm
1/16 to 1/8, incl	1.6 to 3.2, incl	±0.007	±0.18
Over 1/8 to 3/16, incl	Over 3.2 to 4.8, incl	±0.010	±0.25
Over 3/16 to 1/4, incl	Over 4.8 to 6.4, incl	±0.012	±0.30
Over 1/4 to 3/8, incl	Over 6.4 to 9.5, incl	±0.015	±0.38
Over 3/8 to 1/2, incl	Over 9.5 to 12.7, incl	±0.017	±0.43
Over 1/2 to 3/4, incl	Over 12.7 to 19.1, incl	±0.020	±0.51
Over 3/4 to 1, incl	Over 19.1 to 25.4, incl	±0.030	±0.76
Over 1 to 1-1/2, incl	Over 25.4 to 38.1, incl	±0.045	±1.14
Over 1-1/2 to 3, incl	Over 38.1 to 76.2, incl	±0.075	±1.90
Over 3 to 5, incl	Over 76.2 to 127.0, incl	±0.100	±2.54
Over 5 to 7, incl	Over 127.0 to 177.8, incl	±0.125	±3.18
Over 7	Over 177.8	±0.188	±4.78

TABLE 9 Permissible Number of Major Blemishes

NOTE 1—Maximum number per 100 ft^2 or 10 m^2.

Mesh	Number
Coarser than 15 mesh, incl	3
Over 15 to 30 mesh, incl	4
Over 30 to 100 mesh, incl	5
Over 100 to 200 mesh, incl	6
Finer than 200 mesh	7

TABLE 10 Tolerance for Defective Opening

NOTE 1—Deviation from nominal opening in accordance with 3.2.21.

Mesh	Tolerance[A]
Coarser than 6 mesh incl	±20 %
Over 6 to 15 mesh incl	±25 %
Over 15 to 30 mesh incl	±30 %
Over 30 to 100 mesh incl	±40 %
Over 100 to 250 mesh incl	±60 %
Finer than 250 mesh	±80 %

[A] Minus tolerance only applies if >50 % open area in accordance with 3.2.8.

TABLE 11 Mesh Count Sampling/100-ft Roll

Mesh	Number of Random Samples		Count Length	
	Warp	Shute	in.	mm
Coarser than 10 mesh, incl	1	5	2	50.8
Over 10 to 30 mesh, incl	1	6	1	25.4
Over 30 to 100 mesh, incl	1	8	1/2	12.7
Finer than 100 mesh	1	10	1/4	6.35

TABLE 12 Width Tolerance of Standard Wire Cloth Rolls

Mesh	Tolerance			
	in.		mm	
Coarser than 6 mesh, incl	+1/2	–0	+12.8	–0
Over 6 to 50 mesh, incl	+1/4	–0	+6.4	–0
Finer than 50 mesh	+1/8	–0	+3.2	–0

FIG. 11 Counting Glass

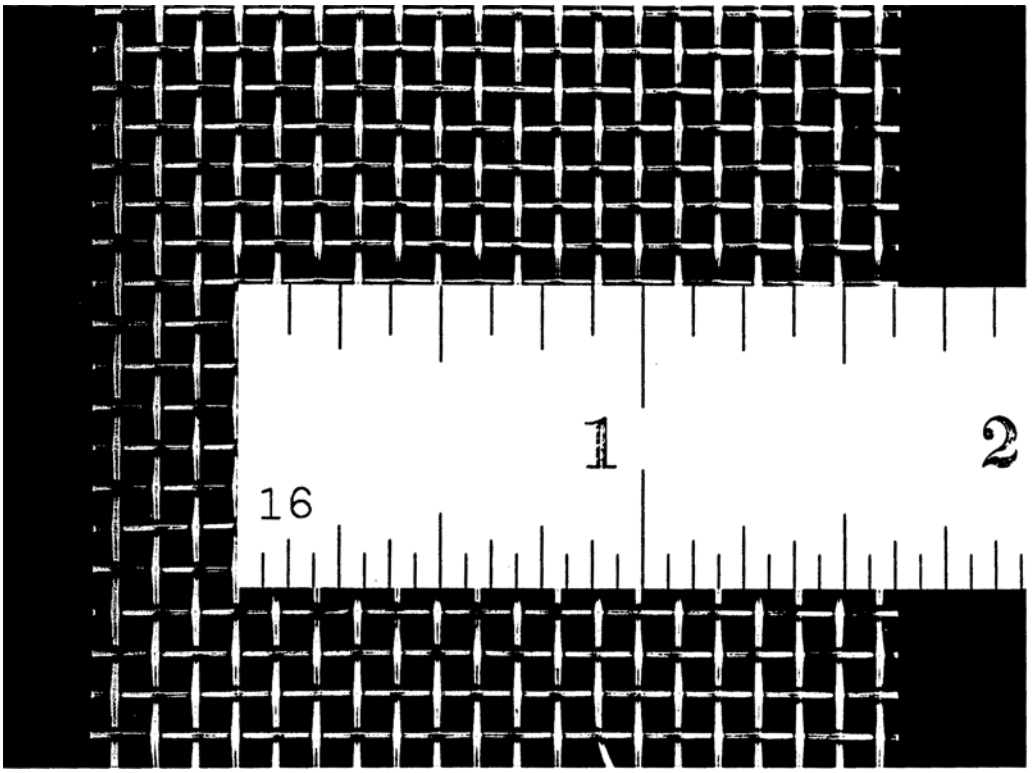


FIG. 12 Standard Metal Rule

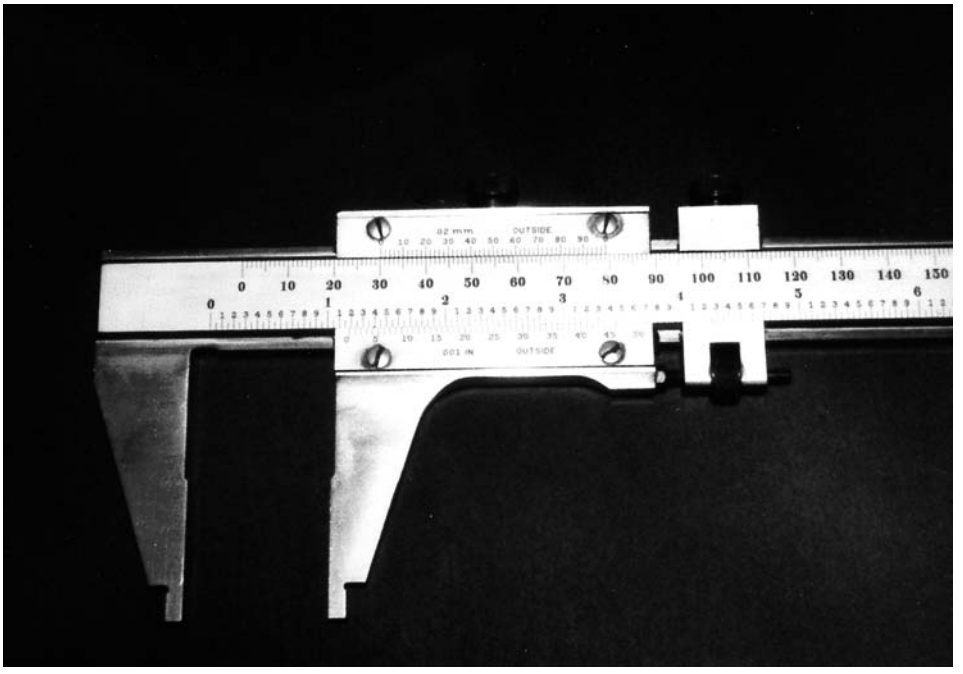


FIG. 13 Vernier Caliper

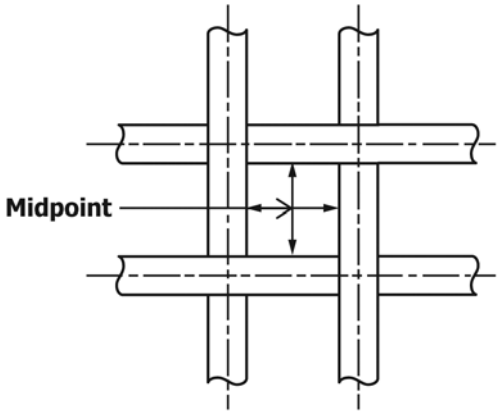


FIG. 14 Midpoint of the Opening

ANNEX

(Mandatory Information)

A1. TERMS

A1.1 *smash, n*—a smash is any complex break-up of the weaving pattern through mechanical damage during the weaving process (see Fig. A1.1).

A1.2 *broken shot, n*—a broken shot is a line of wide openings resulting from a broken shute wire that was not removed and replaced before the next shot was completed (see Fig. A1.2).

A1.3 *draw-over, n*—a draw-over is a length of cloth containing no shute wires, extending up to the full width of the cloth (see Fig. A1.3).

A1.4 *double, n*—a double is a shot in which two shute wires have been inserted instead of one, extending up to the full width of the cloth (see Fig. A1.4).

A1.5 *slack shot, n*—a slack shot is a shute wire that is longer than the neighboring shute wires, extending up to the full width of the cloth (see Fig. A1.5).

A1.6 *pinhole, n*—a pinhole is a single hole in the cloth as a result of a broken wire or slack shot (see Fig. A1.6).

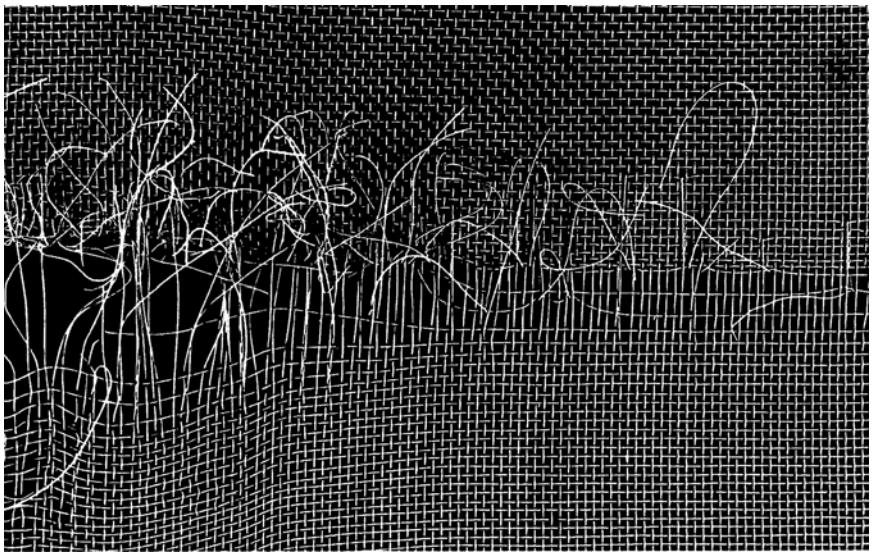


FIG. A1.1 Smash

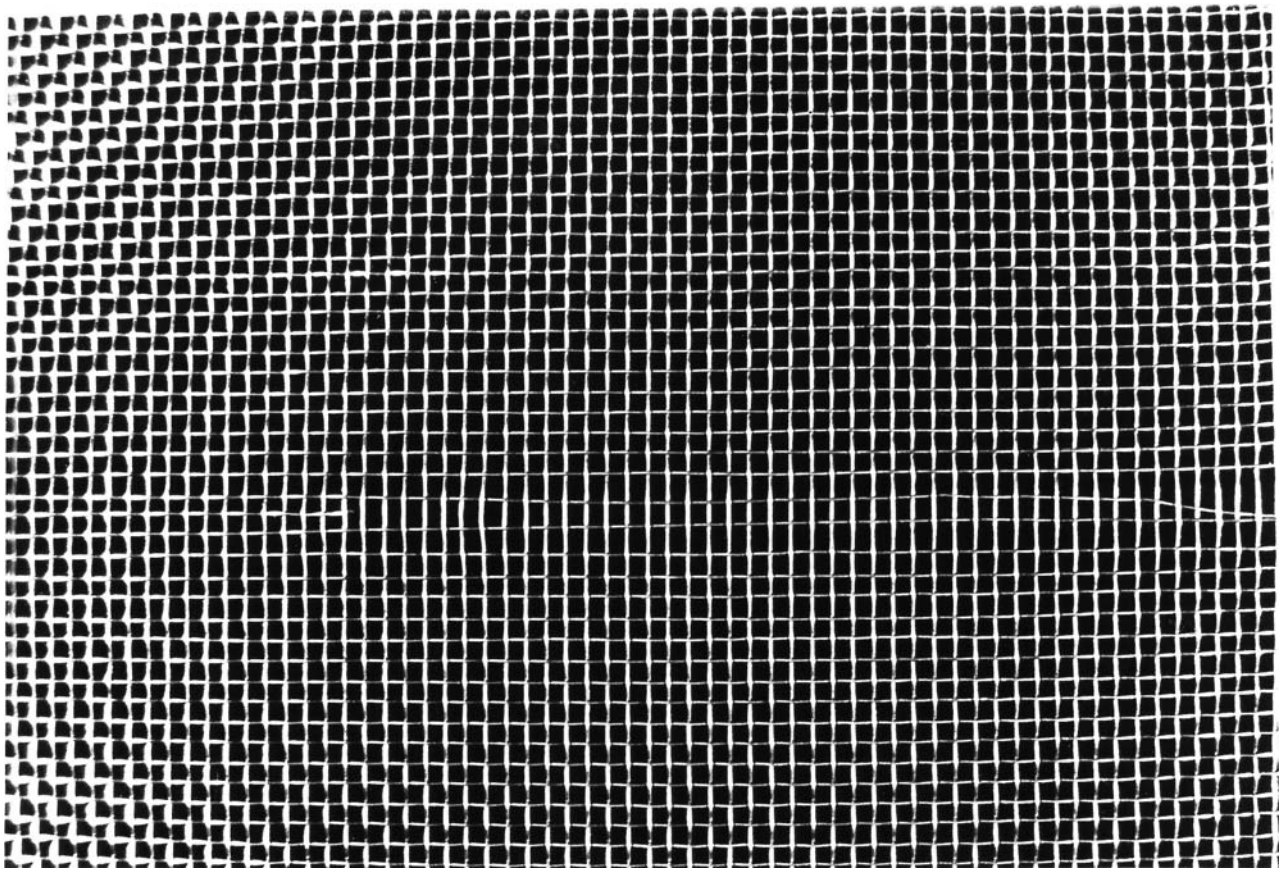


FIG. A1.2 Broken Shot

A1.7 *hard shot, n*—a hard shot is a shute wire that is shorter than the neighboring shute wires causing a ridge above the plane of the cloth, extending up to the full width of the cloth (see Fig. A1.7).

A1.8 *snick or kink, n*—a snick (or kink) is a shute wire that has twisted over (see Fig. A1.8).

A1.9 *creeper, n*—a creeper is a warp wire that is longer than the neighboring warp wires (see Fig. A1.9).

A1.10 *reed mark, n*—a reed mark is a line of irregular width openings along a warp wire, also called tramlines (see Fig. A1.10).

A1.11 *burst, n*—a burst is a tear of variable length in the cloth.

A1.11.1 *Discussion*—Bursts normally occur near the edges (see Fig. A1.11).

A1.12 *edge defect, n*—an edge defect is any type of damage or distortion at the edge of the cloth, for example, rip, patch, or stretch exceeding 1 in. (25.4 mm) in length and ½ in. (12.7 mm) in width from the edge (see Fig. A1.12).

A1.13 *wrinkle, n*—a wrinkle is a ridge or crease in the wire cloth (see Fig. A1.13).

A1.14 *debris in cloth, n*—this refers to any foreign object that has been woven into the cloth.

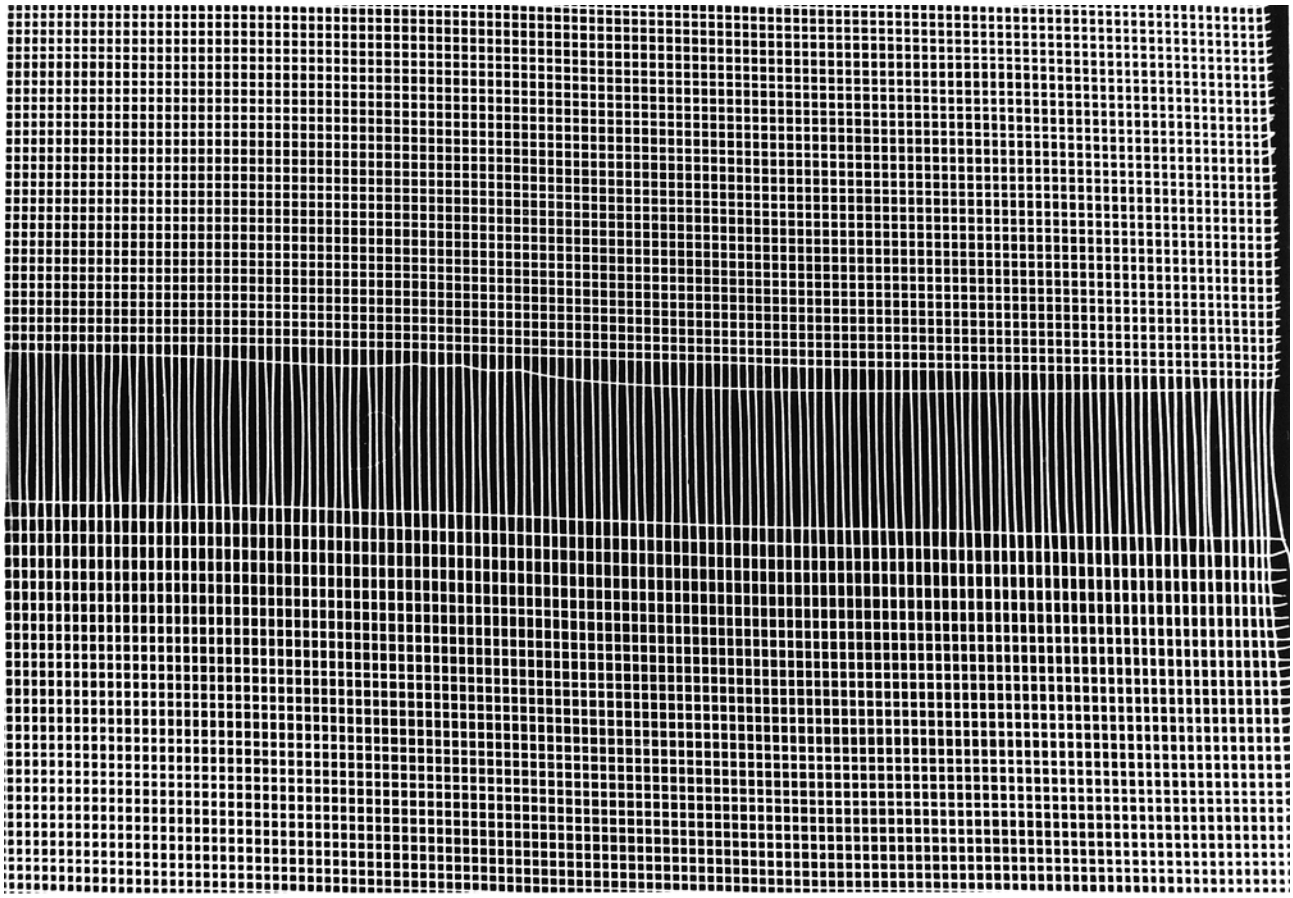


FIG. A1.3 Draw Over

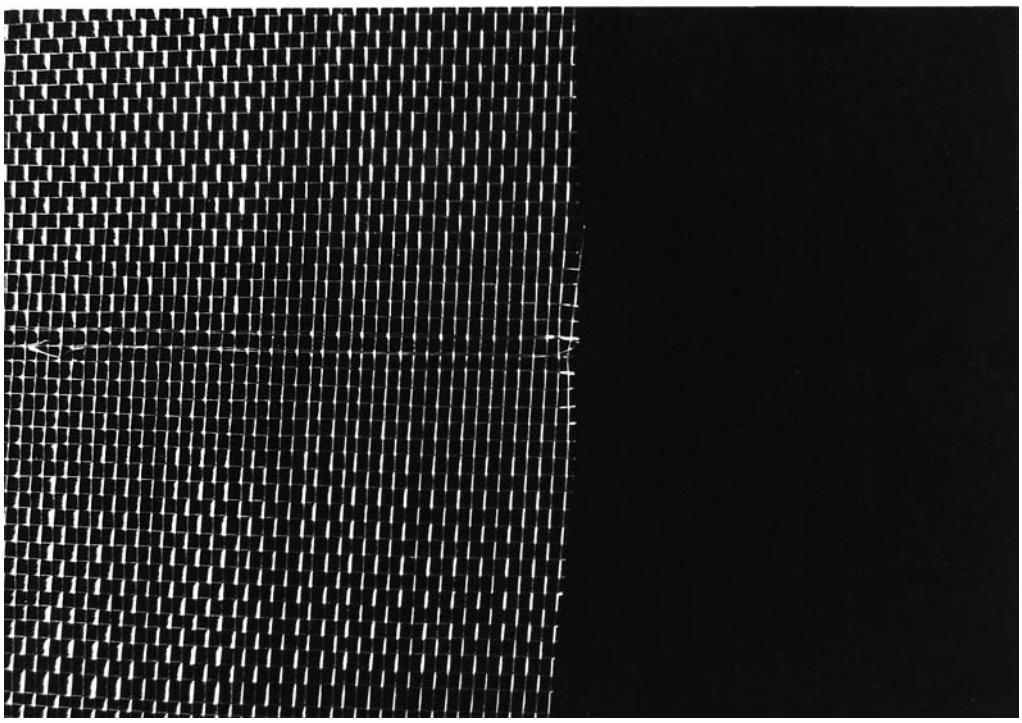


FIG. A1.4 Double

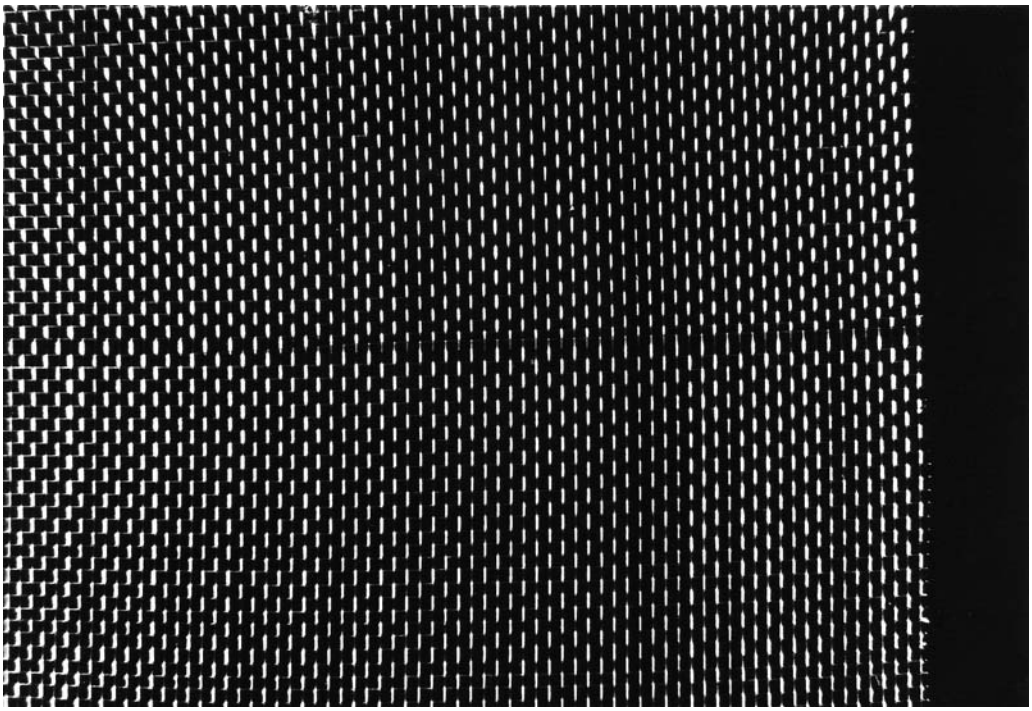


FIG. A1.5 Slack Shot

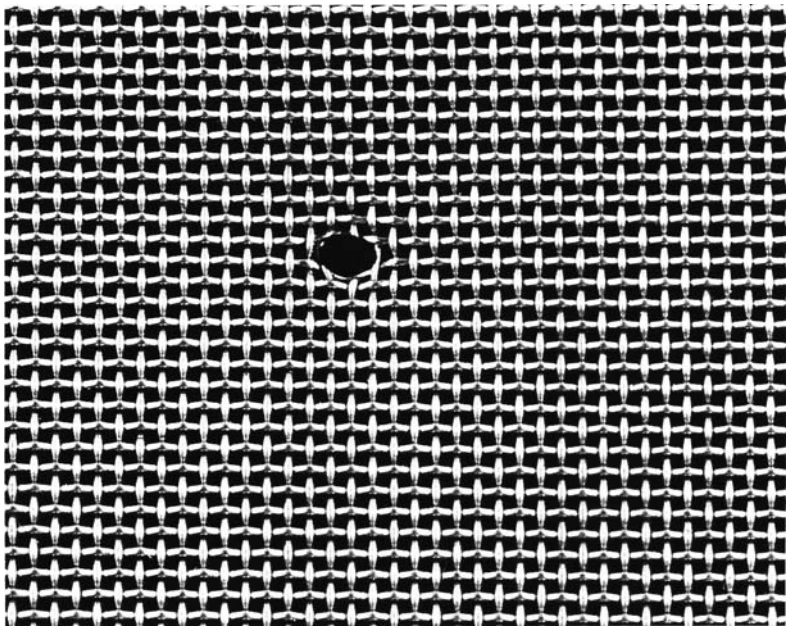


FIG. A1.6 Pinhole

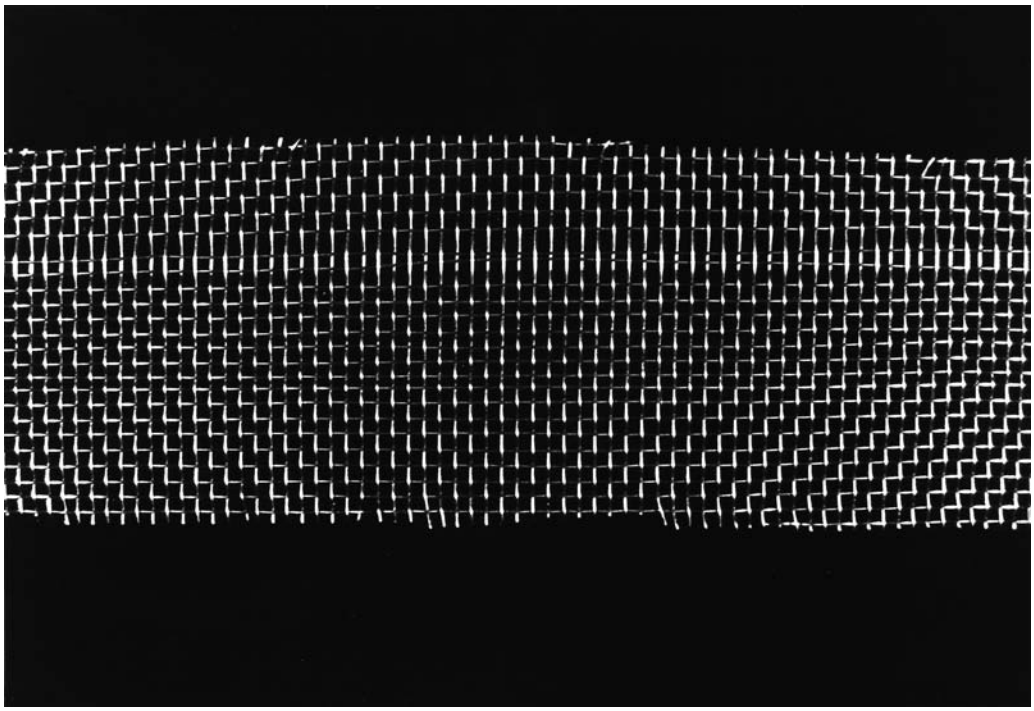


FIG. A1.7 Hard Shot

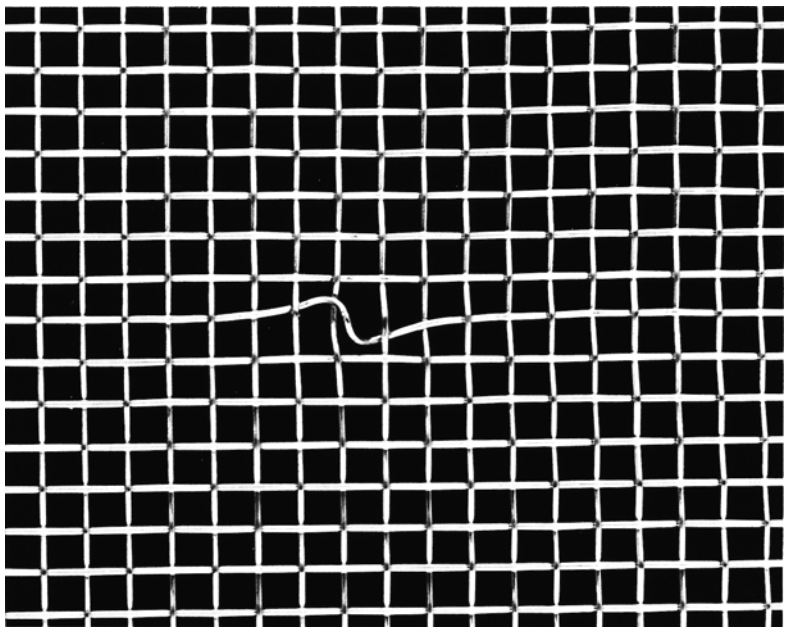


FIG. A1.8 Snick or Kink

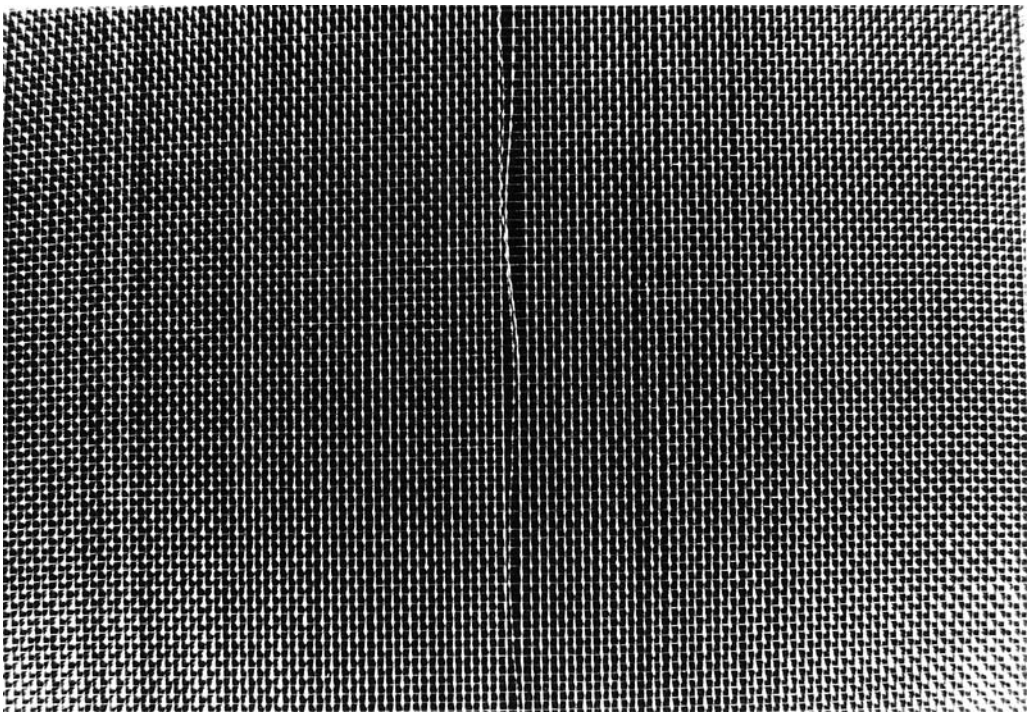


FIG. A1.9 Creeper

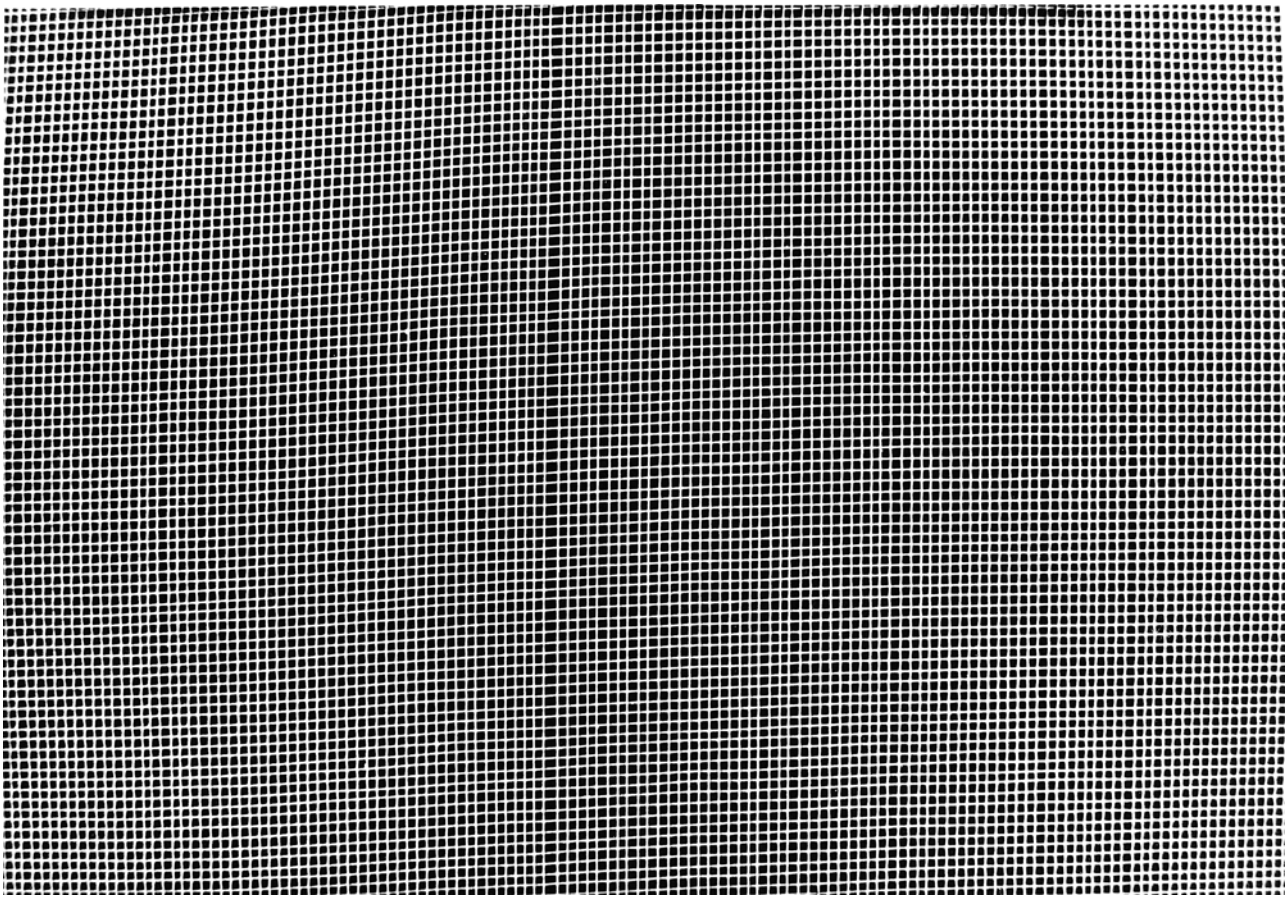


FIG. A1.10 Reed Mark

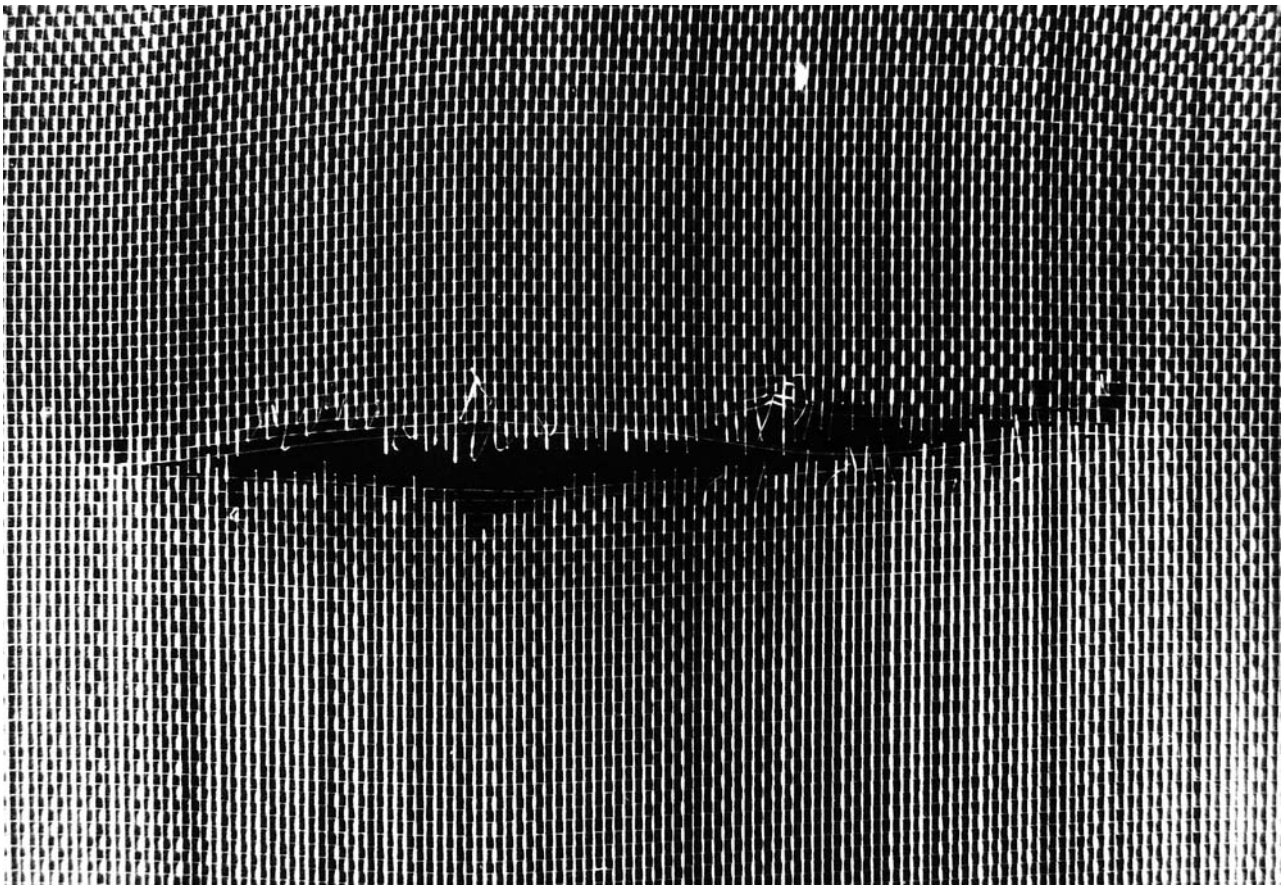
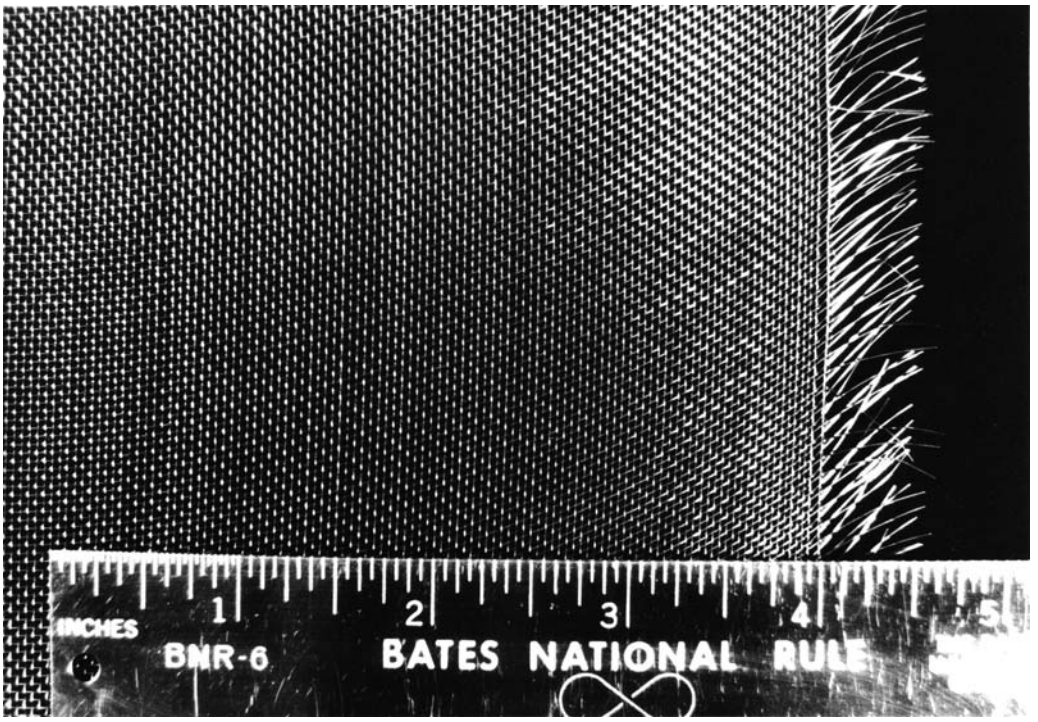


FIG. A1.11 Burst



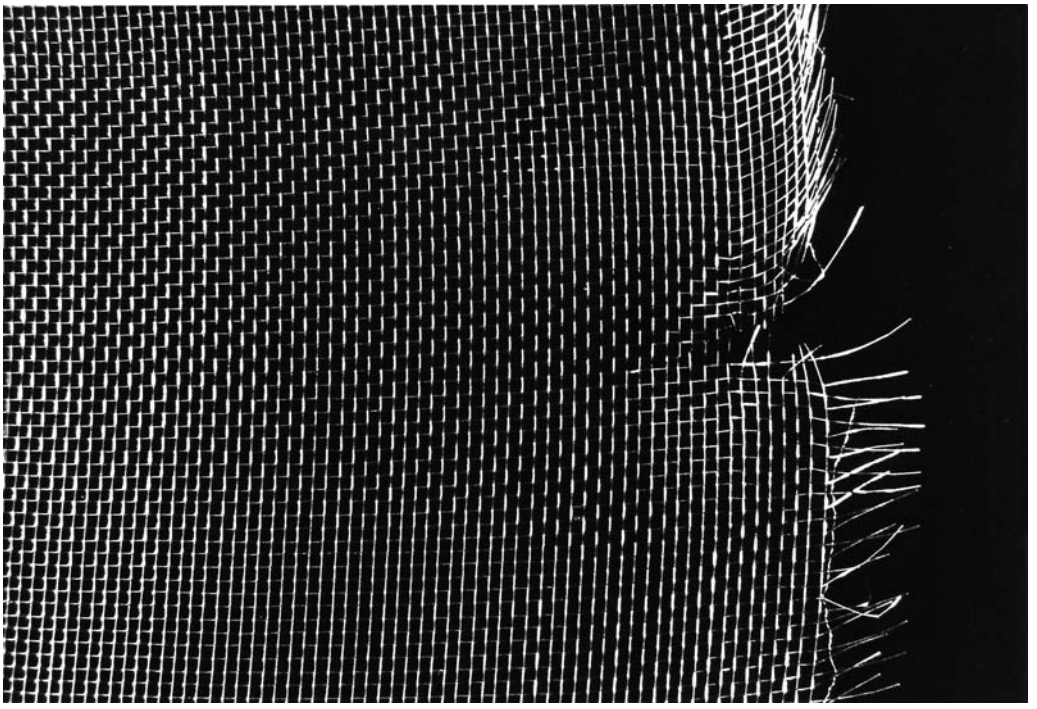


FIG. A1.12 Edge Defects

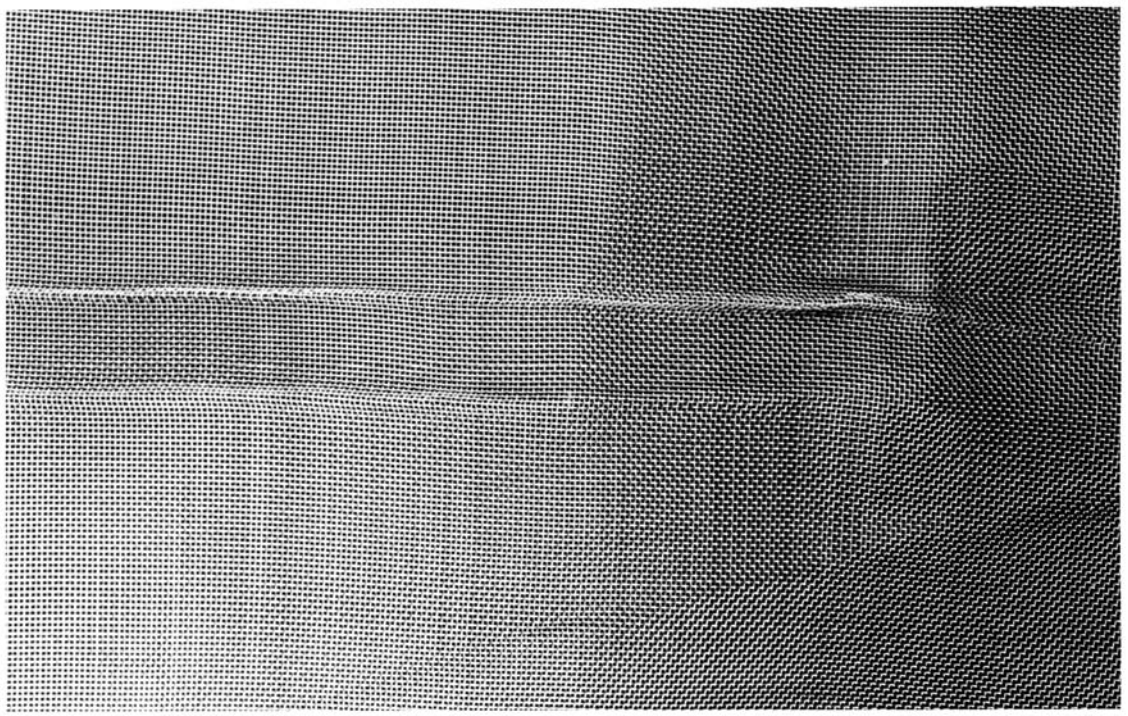


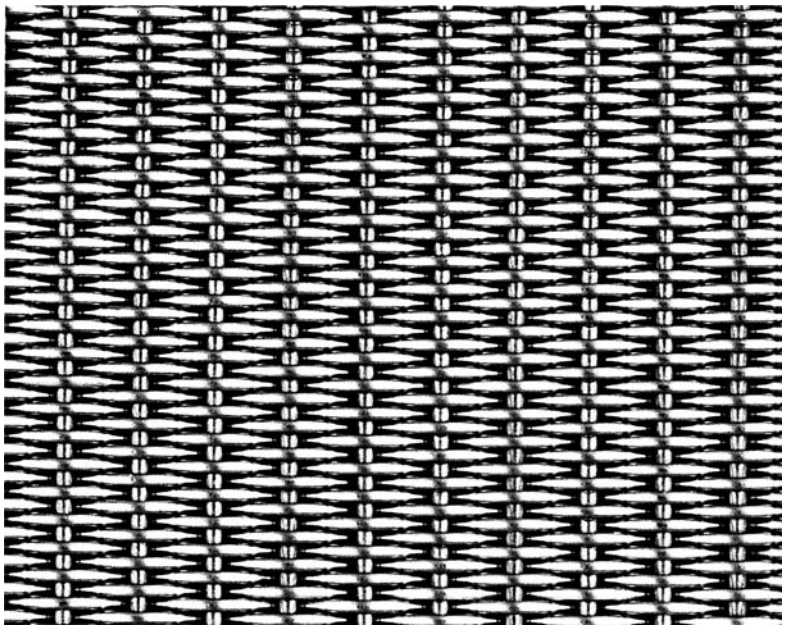
FIG. A1.13 Wrinkle

APPENDIX

(Nonmandatory Information)

X1. DUTCH WEAVE

X1.1 Filter cloth, also referred to as Dutch weave, is a special type of wire cloth woven with a greater number of wires in one direction than the other, and utilizing two different wire diameters. Filter cloth is woven in both plain and twill weave patterns (see Figs. X1.1 and X1.2). Filter cloth is not included within the scope of this specification (see Specification E2814). The pore size of a filter cloth specification may be determined by applying a conversion factor to a bubble point pressure test result (see Test Method E3278).



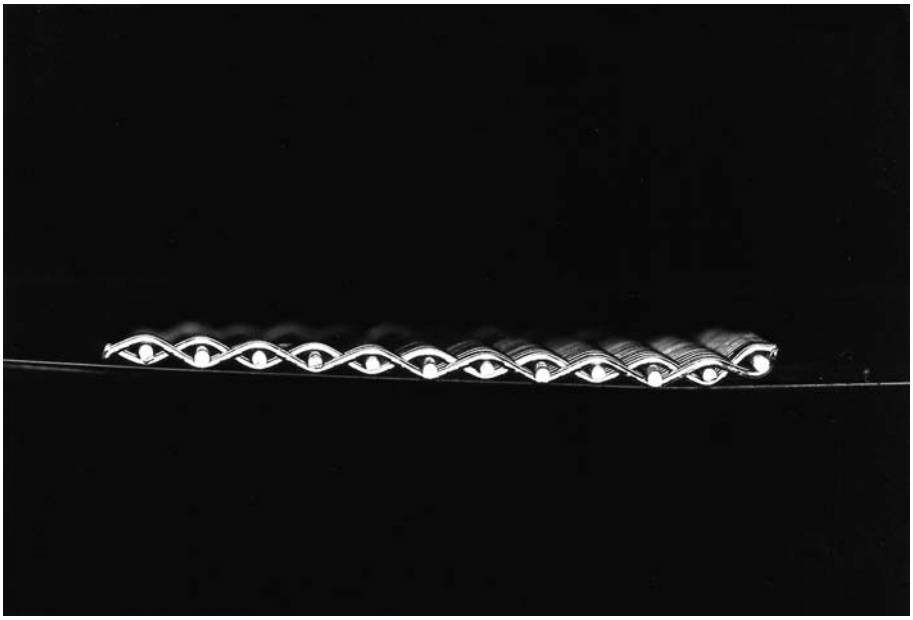
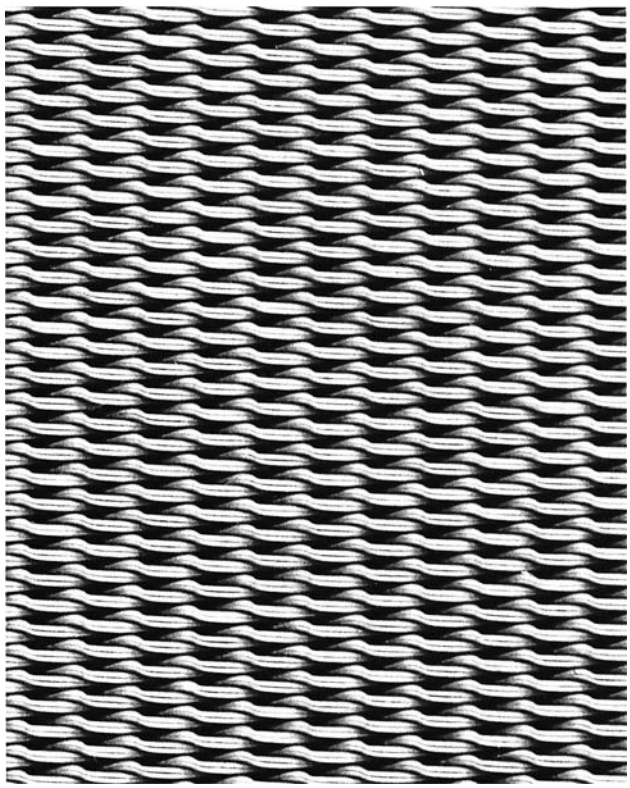


FIG. X1.1 Plain Dutch Weave



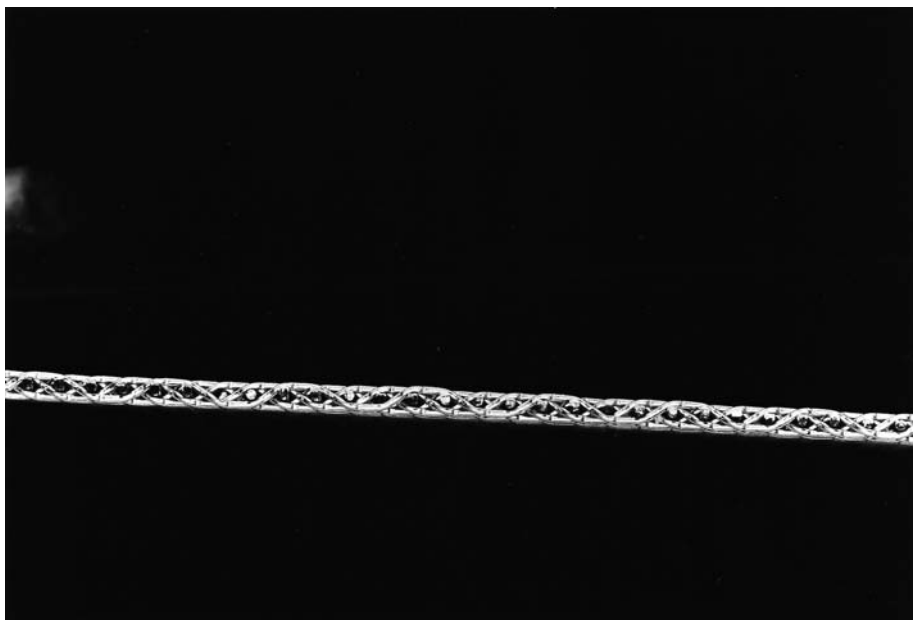


FIG. X1.2 Twilled Dutch Weave

SUMMARY OF CHANGES

Committee E29 has identified the location of selected changes to this standard since the last issue (E2016 – 20) that may impact the use of this standard. (Approved Feb. 1, 2022.)

(1) Corrected physical impossibilities created by large negative tolerances defining defective openings (see 5.3.4).
(2) Provided standard reference for certifications (see 7.3) per new E3315.
(3) Provided standard reference for bubble point pressure test method (see Appendix X1) per new E3278.