~~Designation:E2016–06~~ Designation: E2016 – 11

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.

~~1.2The values stated in inch-pound units shall be regarded as the standard. The values given in parentheses are for information only.~~

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 and health practices and determine the applicability of regulatory limitations prior to use.*

[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.

~~Current edition approved Nov. 1, 2006. Published December 2006. Originally approved in 1999. Last previous edition approved in 2004 as E2016–99(2004)ε1. DOI: 10.1520/E2016-06.~~

Current edition approved Nov. 15, 2011. Published December 2011. Originally approved in 1999. Last previous edition approved in 2006 as E2016 – 06. DOI: 10.1520/E2016-11.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A510 Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon 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~~ Specification for Woven Wire Test Sieve Cloth and Test Sieves

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

E2814 Guide for Industrial Woven Wire Filter Cloth

3. Terminology

~~3.1~~

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

3.2 *Definitions of Terms Specific to This Standard:*

~~3.1.1~~

3.2.1 *aperture*, *n*—~~the dimensions defining an opening in a screening surface (see also~~ *—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*).

~~3.1.2~~

3.2.3 *bolting cloth*, *n*—~~a specific group of commonly used mesh and wire diameter combinations. They are covered within this specification.~~

~~3.1.3*coatings*~~—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, 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*—~~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. Consult with a supplier as to the applicability of this specification. Examples of possible coatings include, but are not limited to, metallic plated, such as, copper, nickel, tin, and so forth, painted, or epoxy-coated or galvanized-steel wire cloth that has been coated with zinc either before or after weaving.~~

~~3.1.4*Types of Crimps*:~~

~~3.1.4.1*crimp, n*—the corrugation in the warp or shute wire, or both. 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.~~

~~3.1.4.2*double crimp, adj*—wire cloth woven with approximately equal corrugations in both the warp and shute wires to lock the wires in position (see Fig. 1).~~

~~3.1.4.3*flat top, adj*—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. Sometimes designated smooth top (see Fig. 2).~~

~~3.1.4.4*intermediate crimp, adj*—precrimped wire cloth with extra crimps or corrugations between the points or intersection; sometimes designated intercrimp or multiple crimp. The warp, or shute wires, or both, may be intermediate crimped (see Fig. 3).~~

~~3.1.4.5*lock crimp, adj*—precrimped wire cloth with deep crimps at points of intersection to lock the wires securely in place (see Fig. 4).~~

~~3.1.4.6*precrimp, adj*—wire cloth woven with both the warp and shute wires crimped before weaving.~~

~~3.1.4.7*triple shute, adj*—wire cloth woven with three shute wires inserted adjacent to each other, often constructed in conformance with precrimp rectangular.~~

~~3.1.5*market grade*~~—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*—~~a specific group of commonly used mesh and wire diameter combinations. They are covered within this specification.~~

~~3.1.6~~*—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.

[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.

FIG. ~~1~~ 5 Double Crimp

~~3.1.7*mill grade*~~

3.2.7 *mill grade wire cloth*, *n*~~—a specific group of commonly used mesh and wire diameter combinations. They are covered within this specification.~~

~~3.1.8~~*—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. The theoretical percent open area~~percentage, that theoretically can be calculated as follows:

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

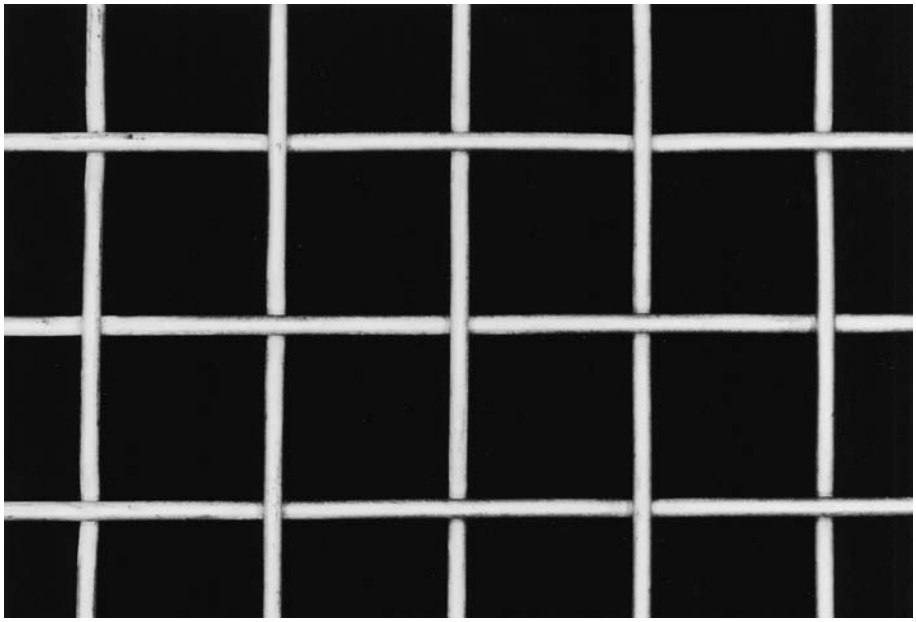


FIG. ~~2~~ 6 Smooth Top

where:

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

~~3.1.9~~

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~~openings; the diameter of the warp and shute wires may be the same or different.

~~3.1.10~~3.2.10 *screen*, *n*—~~a surface provided with apertures of uniform size and shape; another term used interchangeably for woven wire cloth.~~

~~3.1.11~~ *—(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.*

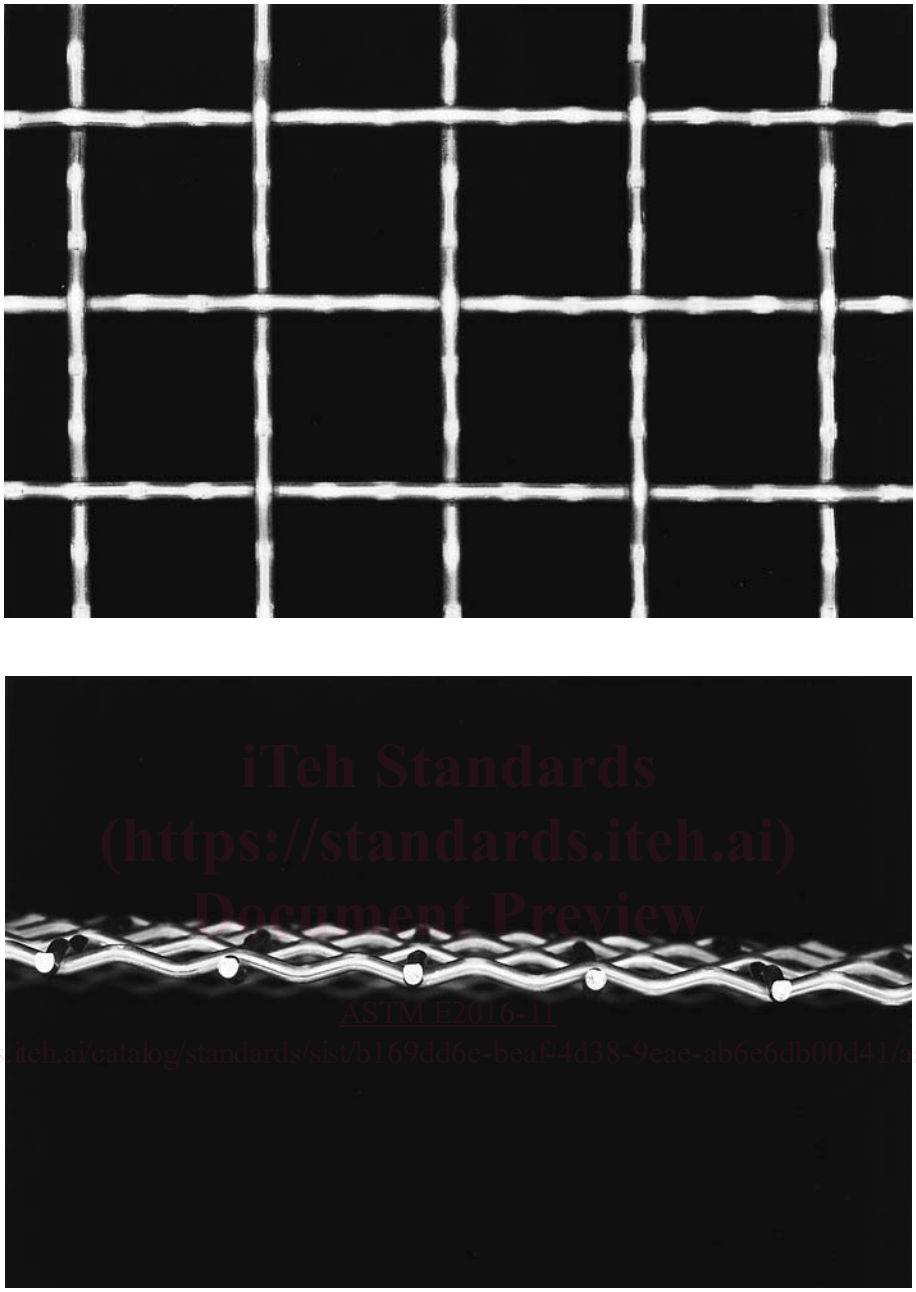


FIG. ~~3~~ 7 Intermediate Crimp

3.2.11 *selvage*, *n*—the edge or border of wire cloth finished off so as to prevent unraveling. ~~E;~~ examples of finished edges include looped selvage (see Fig. ~~5~~1), folded selvage (see ~~Fig. 6~~Fig. 2), cut and tucked (see ~~Fig. 7~~Fig. 3), welded, plastic bonded, and bent-back picket, as opposed to a raw or cut edge (see ~~Fig. 8~~Fig. 4).

~~3.1.12~~

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).

~~3.1.13~~

3.2.13 *sieve cloth*, *n*—~~wire cloth specified by width of opening based approximately on the fourth root of 2 Series. Sieve cloth is used generally for the determination of particle size as opposed to the separation of particles. This specification excludes sieve cloth from the scope, because it is covered under Specification~~ —woven wire cloth conforming to Specification E11.

~~3.1.14~~

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

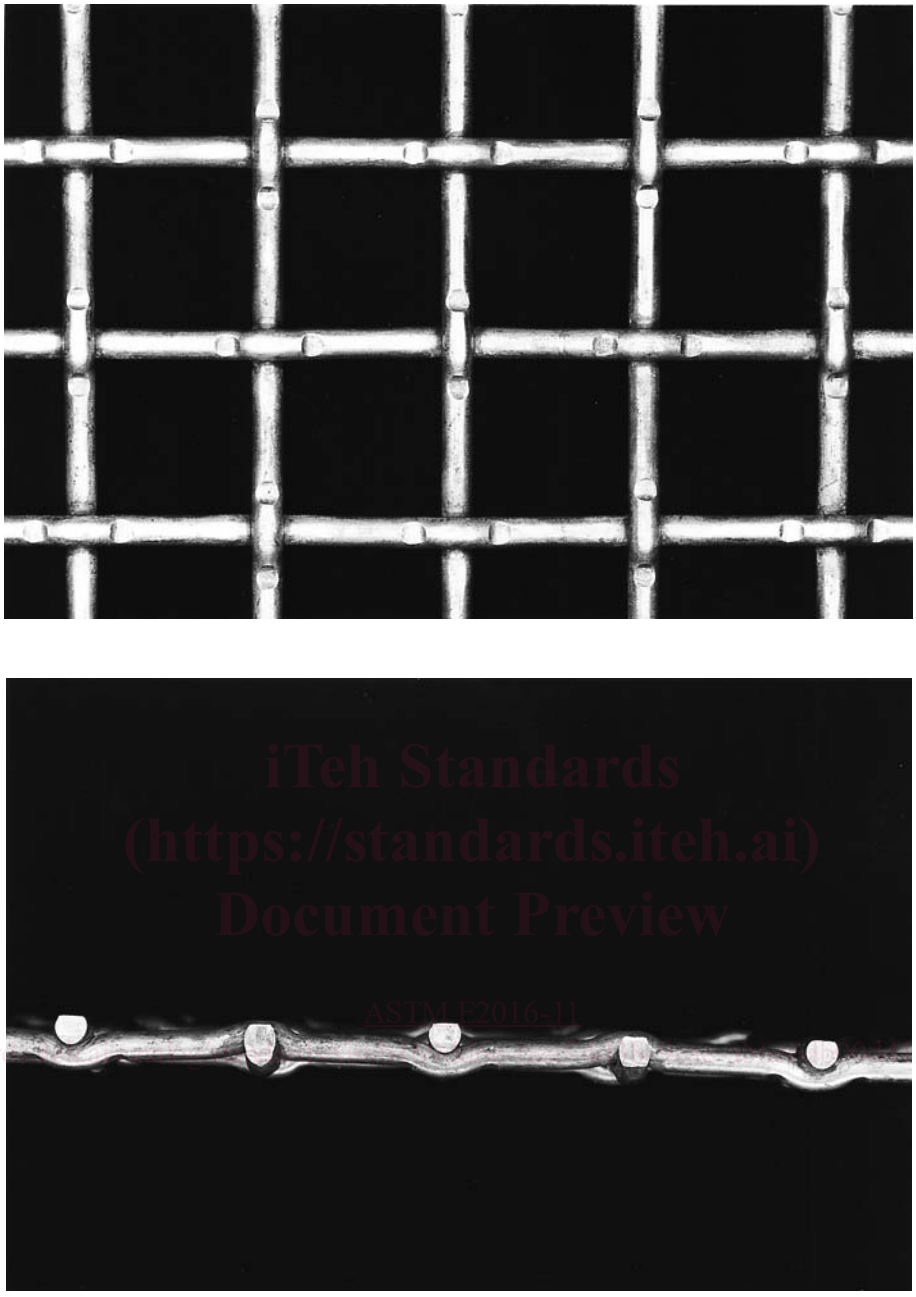


FIG. 4 8 Lock Crimp

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).

~~3.1.15~~

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

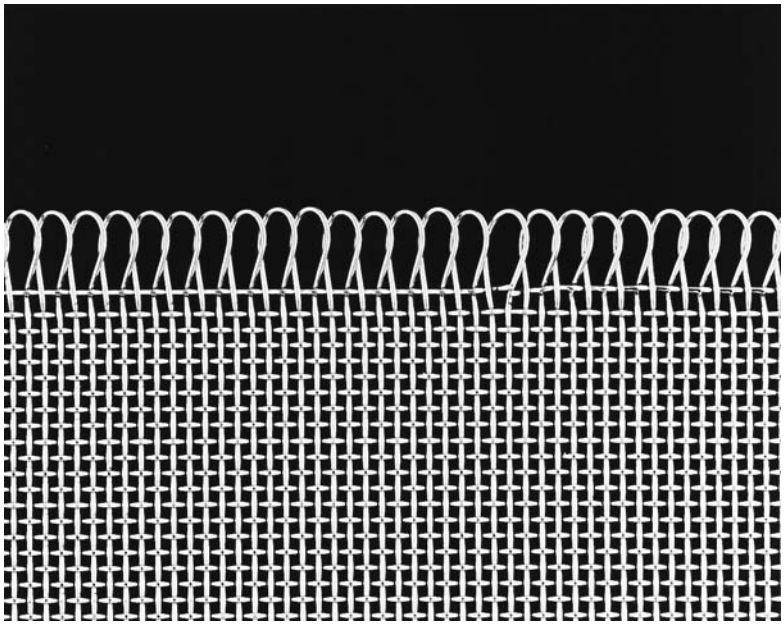
~~3.1.16 *Types of Weaves*:~~

~~3.1.16.1 *herringbone twill, adj*~~

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.



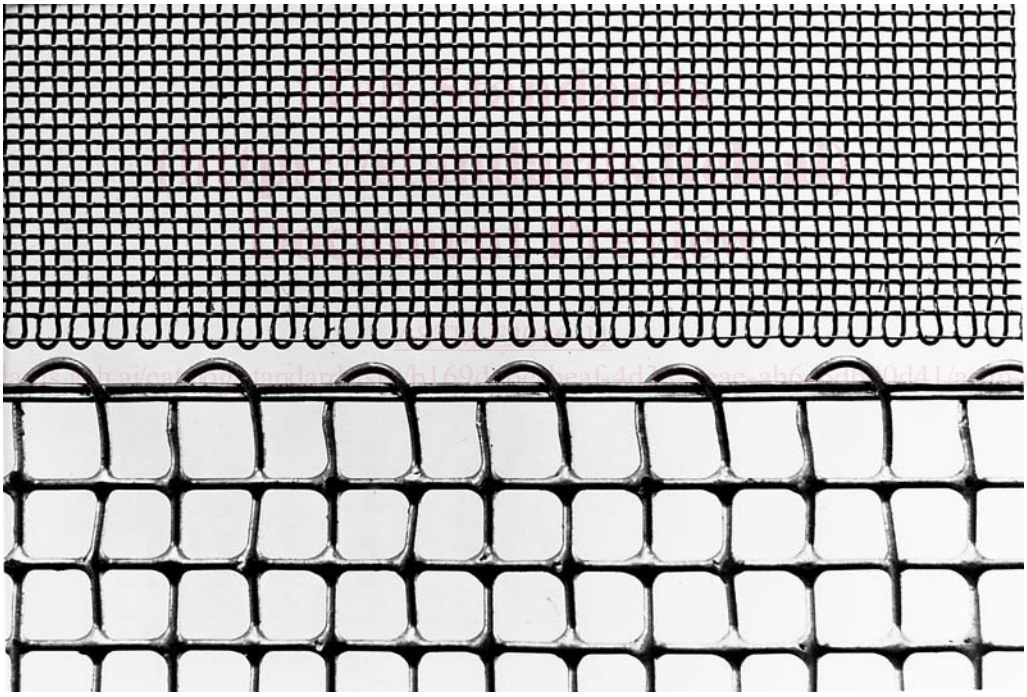


FIG. 5 1 Looped Edge

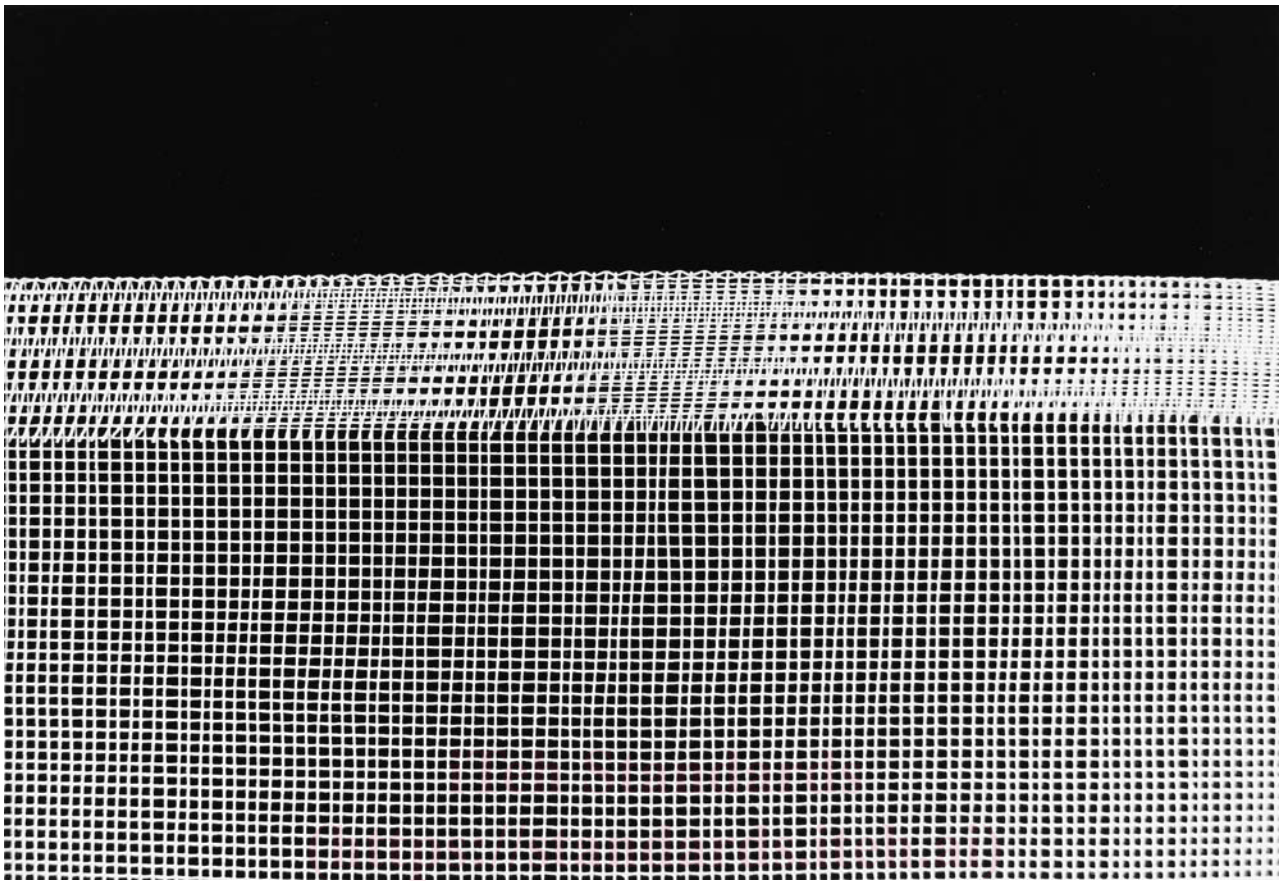


FIG. 6 2 Folded Edge

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.

~~3.1.16.2*plain, adj*~~

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).

~~3.1.16.3*twill, adj*~~

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).

~~3.1.17~~

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

~~3.1.18~~

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:

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

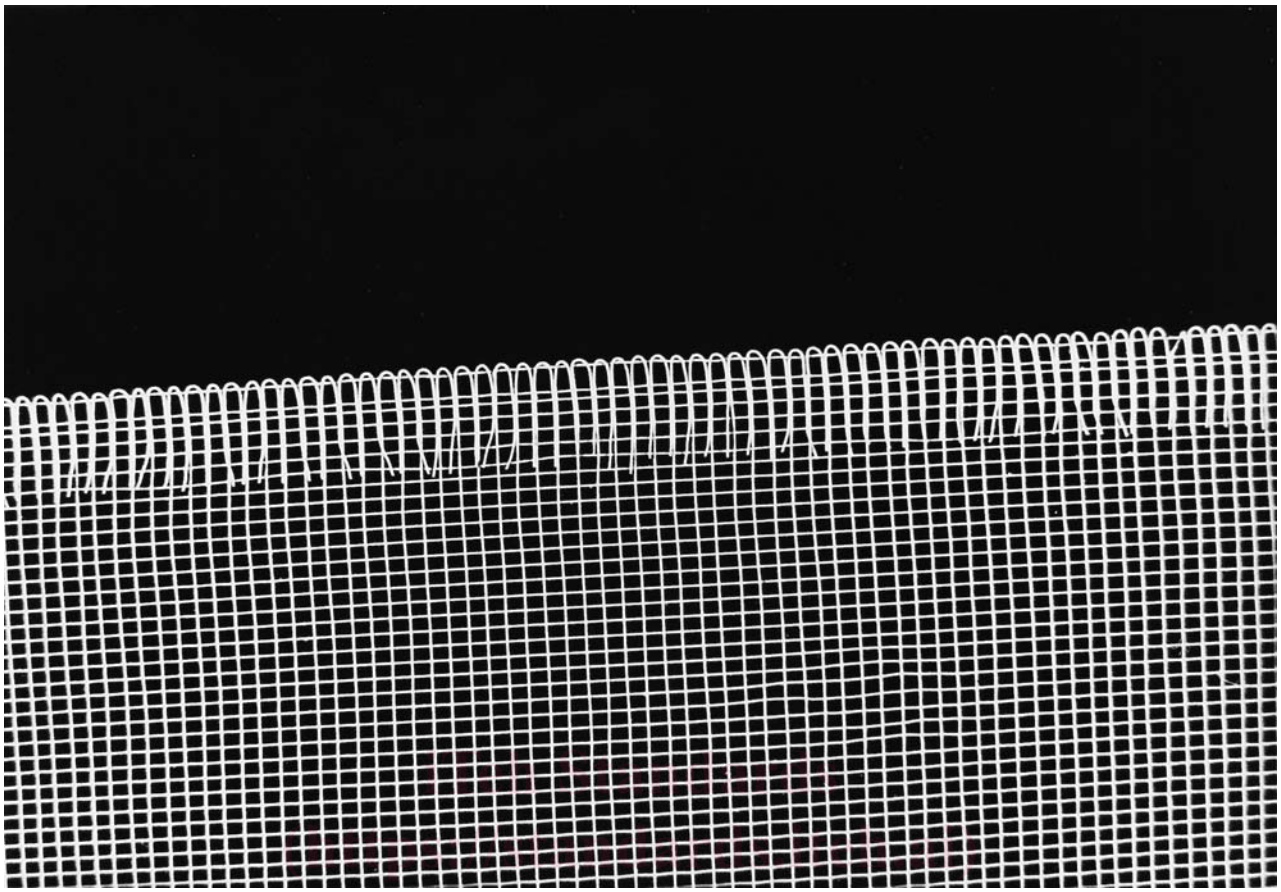


FIG. ~~7~~ 3 Cut and Tucked Edge

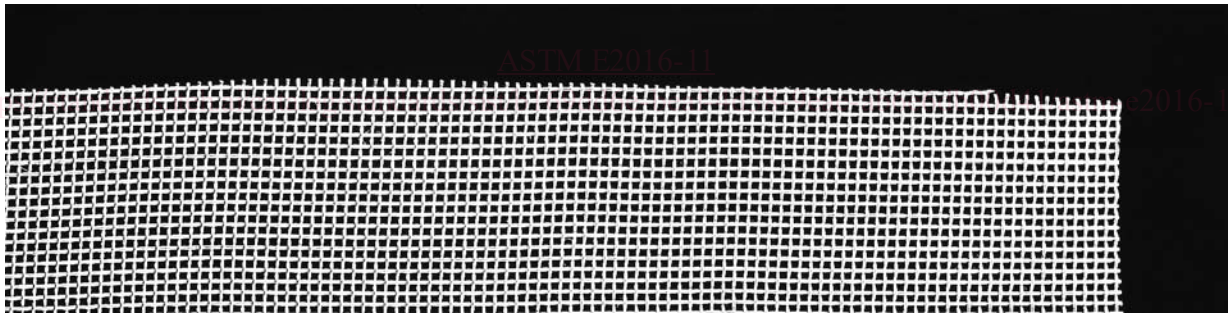


FIG. ~~8~~ 4 Raw or Cut Edge

where:

Wt/ft^2 = the weight (lb/ft^2~~);~~),
M_w = the mesh warp (number of wires per ~~inch);~~ inch),
M_s = the mesh shute (number of wires per ~~inch);~~ inch),
D_w = the diameter warp wire (decimal parts of an ~~inch);~~ inch),
D_s = the diameter shute wire (decimal parts of an ~~inch);~~ inch),
ρ = the density of material (lb/in.^{3}) (0.2836 for plain or carbon ~~steel); and,~~ 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:

$$\text{Wt/ft}^2 = 72\pi\rho MD^2$$

~~which further reduces for plain steel to:~~

~~Wt/ft^2 = 64.15 MD^2~~ 2

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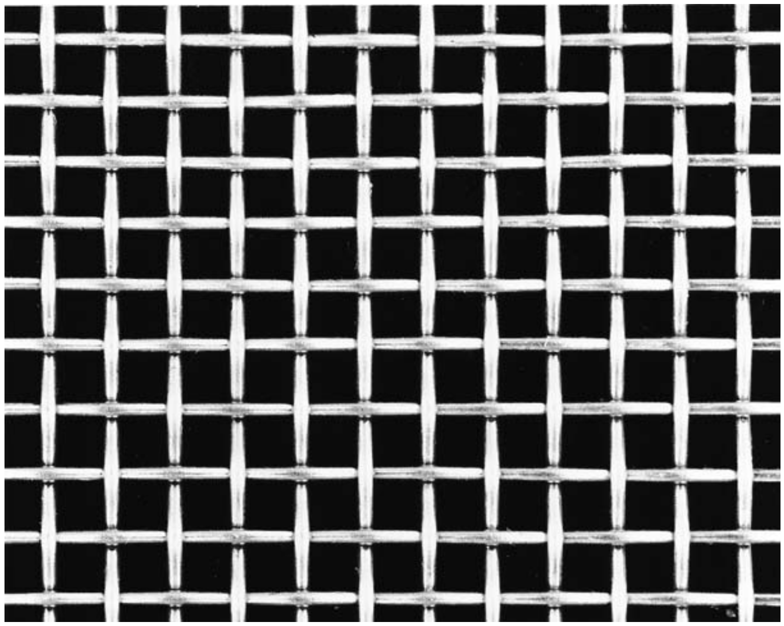

FIG. 9 Plain Square Weave

where:

Wt/ft^2	=	the weight (lb/ft^2) per square ~~foot;~~ foot,
M	=	the mesh (number of wires per ~~inch); and,~~ inch), and
D	=	the diameter wire (decimal parts of an inch).

~~See~~

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.

~~3.1.19~~*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:

$$Opn = (1/M) - D \quad (3)$$

TABLE 10

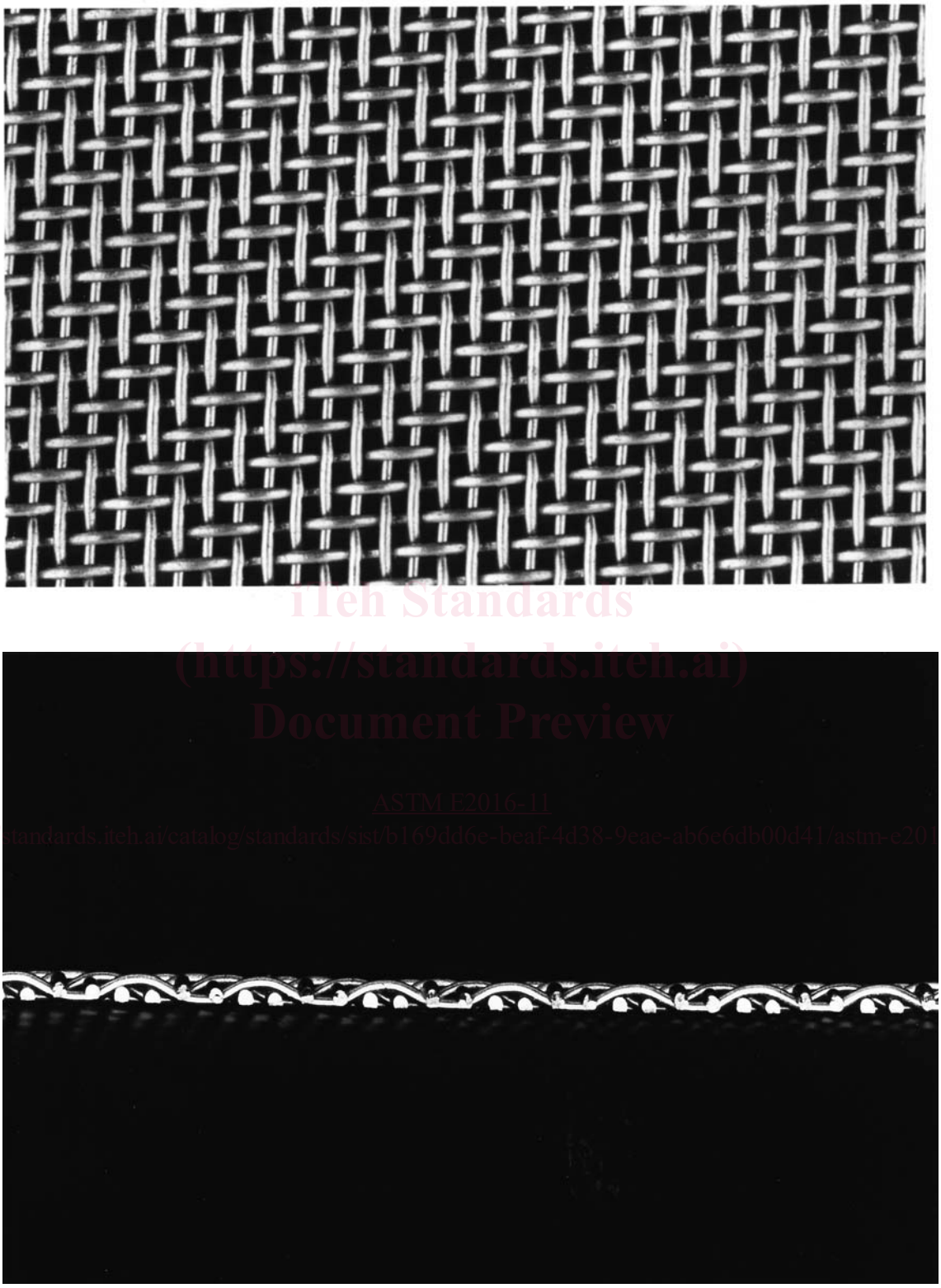

FIG. 10 Twilled Square Weave