



Designation: ~~E1638-10~~ Designation: E1638 – 11

Standard Terminology Relating to Sieves, Sieving Methods, and Screening Media¹

This standard is issued under the fixed designation E1638; 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

Particle size analysis through the use of standard test sieves, and particle separation through the use of screening media, are commonly adopted methods of achieving desired process specifications related to particles. To ensure a better understanding of sizing and separation systems and processes and to ensure appropriate comparison of data, terminology common to the processes must be documented and defined.

For Subcommittee E29.01 on Sieves, Sieving Methods, and Screening Media, this is an ongoing process of developing new related terms. Every effort has been made to ensure accuracy, precision, and clarity for the terms included. Suggestions and comments for additions, corrections, and revisions are welcomed.

1. Scope

1.1 This terminology includes all those terms used in all of the standards under the jurisdiction of Subcommittee E29.01. Terms are defined that are related to the manufacture of standard test sieves and screening media, as well as terms related to the methods, analysis, procedures, and equipment for sizing and separating particles.

1.2 Committee E29 on Particle and Spray Characterization feels that it is essential to include terms and definitions explicit to the scope, regardless of whether the terms appear in existing ASTM standards. Terms that are in common usage and appear in common-language dictionaries are generally not included.

2. Referenced Documents

2.1 *ASTM Standards:*² *ASTMSTP447B Manual on Testing Sieving Methods*

E11 *Specification for Woven Wire Test Sieve Cloth and Test Sieves*

[ASTM E1638-11](#)

<https://standards.iteh.ai/catalog/standards/sist/9b825b1b-41bb-4749-9f57-49e1652d3980/astm-e1638-11>

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

Current edition approved Dec. 1, 2010. Published January 2011. Originally approved in 1994. Last previous edition approved in 2009 as E1638 – 10. DOI: 10.1520/E1638-10.

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.

Specification for Woven Wire Test Sieve Cloth and Test Sieves

E161 [Specification for Precision Electroformed Sieves](#)

E454 [Specification for Industrial Perforated Plate and Screens \(Square Opening Series\)](#)

E674 [Specification for Industrial Perforated Plate and Screens \(Round Opening Series\)](#)

E2016 [Specification for Industrial Woven Wire Cloth](#)

E2427 [Test Method for Acceptance by Performance Testing of U.S. Standard Test Sieves](#)

E2589 [Terminology Relating to Nonsieving Methods of Powder Characterization](#)

2.2 *ISO Standard:*

ISO 2395 Test Sieves and Test Sieving—Vocabulary. [ASTM Manuals](#):²

[ASTM STP 447B Manual on Testing Sieving Methods](#)

3. Significance and Use

3.1 This terminology contains terms used in the description and procedure of analysis of the size of particulate materials through sieve analysis with standard testing sieves and is applicable to the work of many ASTM technical committees. For a composite listing of published ASTM standards using standard testing sieves, refer to [ASTM STP 447B/ASTM STP 447B](#).

3.2 While some of the terms appearing in this terminology may also be used in the description, procedure, and end products of production screening (either on a batch-fed or continuous basis), it is the intent of this terminology to present the definitions and usage of terms strictly in the context of sieve analysis using standard testing sieves.

4. Terminology

4.1 *Definitions:*

agglomerate, *n*—two or more particles adhering together. **E1638**

aperture, *n*—the opening in a screening or sieving medium. **E11**

aperture size, *n*—the dimension defining an opening in a screening or sieving medium. **E11**

bar, *n*—the metal between perforations. **E454, E674**

blank, *n*—an unperforated area located other than along the perimeter of a plate. **E454, E674**

bolting grade wire 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, manufactured based on using a limited number of wire diameters for a large group of mesh designations. **E2016**

DISCUSSION—“Bolting Grade” designations are often misused; and should not be specified without a wire diameter, as the designations have become non-standard.

break-out, *v*—a term applied to the action that occurs ahead of the punch in its going through the plate. **E454, E674**

DISCUSSION—The fracturing of the material results in a tapered hole with the small dimensions on the punch side.

bulk density, *n*—the mass per unit volume of a material, including voids inherent in the material as tested. **E1638**

calibration test sieve, *n*—a test sieve manufactured using sieve cloth which has been inspected after being mounted in the sieve frame, and that meets the requirements in accordance with Specification E11, Table 1, in part based on the standard deviation of the number of sample openings in the test sieve (column 11) not exceeding the maximum allowable for a confidence level of 99.73 % (column 12). **E11**

centers, *n*—the dimensional sum of one perforation and one bar, or the dimensional distance from the center of one perforation to the center of an adjacent perforation. **E454, E674**

compliance test sieve, *n*—a test sieve manufactured using sieve cloth which has been inspected prior to being mounted in the sieve frame, and that meets the requirements in accordance with Specification E11, Table 1, in part based on the standard deviation of the required number of sample openings per 100 square feet of sieve cloth (column 7) not exceeding the maximum allowable for a confidence level of 66 % (column 8). **E11**

crimp, *n*—the corrugation in the warp or shute wire, or both. **E11, E2016**

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 the shute wires fundamentally determines the respective amount of depth of crimp, which locks the wires in place and in part establishes the firmness of the sieve cloth.

cumulative oversize distribution graph, *n*—a graph obtained by plotting the total (cumulative) percentage by the mass retained on each of a set of sieves versus the corresponding aperture sizes. **E1638**

cumulative undersize distribution graph, *n*—a graph obtained by plotting the total (cumulative) percentage by the mass passing each of a set of sieves versus the corresponding aperture sizes. **E1638**

die side, *n*—the surface of the plate that was against the die during the punching operation. **E454, E674**

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. **E11, E2016**

endpoint, *n*—point at which no more material falls through the sieve concluding the sieving, taking into account sample degradation. **E2427**

finished end pattern, *n*—the condition that occurs with some specifications of staggered pattern perforations as a result of tool design where the pattern is completed on both ends of the plate. **E454, E674**

firmness, *n*—a subjective term referring to the planar rigidity of wire cloth (as a roll good, not mounted in a frame). **E11, E2016**

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*.

flat top wire cloth, *n*—wire cloth with deep crimps, as in lock crimp, except that all crimps are on the under side of the cloth, leaving the top surface all in one plane. **E2016**

DISCUSSION—Sometimes designated *smooth top*.

inspection test sieve, *n*—a test sieve manufactured using sieve cloth which has been inspected after being mounted in the sieve frame, and that meets the requirements in accordance with Specification E11, Table 1, in part based on the standard deviation of the required number of sample openings in the test sieve (column 9) not exceeding the maximum allowable for a confidence level of 99 % (column 10). **E11**

intermediate crimp wire cloth, *n*—precrimped wire cloth with extra crimps or corrugations between the points of intersection. **E2016**

DISCUSSION—Sometimes designated *intercrimp* or *multiple crimp*.

lock crimp wire cloth, *n*—precrimped wire cloth with deep crimps at the points of intersection to lock the wires securely in place. **E2016**

margin or border, *n*—an unperforated area located along the perimeter of a plate. **E454, E674**

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. **E2016**

DISCUSSION—“Market Grade” designations are often misused; and should not be specified without a wire diameter, as the designations have become non-standard.

matched test sieve, *n*—~~a test sieve that reproduces the performance results of a calibration sieve within defined limits for a designated material.~~ —a test sieve that reproduces the performance results of another test sieve within user defined limits for a designated material (for information only and may not be in compliance with Specification E11). **E11**

median particle size, *n*—the particle size at which half the distribution (by mass, volume, number, etc.) is larger than and half smaller than the stated size. **E1638, E2589**

mesh, *n*—the number of wires or openings per linear inch or 25.4 millimetres (25.4 mm), counted from the center of any wire to a point exactly one inch or 25.4 millimetres (25.4 mm) distant, including the fractional distance between either thereof. **E11, E2016**

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. **E2016**

DISCUSSION—“Mill Grade” designations are often misused; and should not be specified without a wire diameter, as the designations have become non-standard.

near size particle, *n*—a particle of a size approximately equal to the aperture size of the sieve that may block an opening. **ISO2395- E1638**

particle size distribution, *n*—*in sieve analysis*, the percentages, by mass or number, of all fractions into which various sizes of particles are classified. **E1638**

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 for wire cloth: **E2016**

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

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.

percent retained, *n*—mass fraction percentage of material that is left upon or retained by the sieve after the test has been performed. **E2427**

plain weave, *n*—see **types of weaves**, *plain*.

precrimp, *n*—wire cloth woven with both the warp and shute wires crimped before weaving. **E11**