



Designation: ~~E161 – 12~~ E161 – 17

Standard Specification for ~~Precision Electroformed~~ Electroformed Material and Test Sieves¹

This standard is issued under the fixed designation E161; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers the ~~technical requirements~~ for design and construction of electroformed ~~sieves, sieves and sieve material~~. These sieves are used to perform particle-size ~~distribution analysis~~ and in preparing narrowly designated ~~particle-size particle -size~~ fractions. They may also be used as reference standards when suitably ~~calibrated~~. Acertified. The method of ~~calibrating/certifying~~ these sieves is included in Annex A1.

~~NOTE 1—Complete instructions and procedures on the use and calibration of testing sieves are contained in ASTM Manual 32.² This publication also contains a list of all published ASTM Standards on sieve analysis procedures for specific materials or industries.~~

1.2 The sieve analysis results from two testing sieves of the same sieve designation may not be the same because of the ~~variances in sieve opening permitted by this specification~~. To minimize the differences in sieve analysis results, the use of testing sieves ~~matched on a performance basis is suggested~~.

~~NOTE 2—For other types of sieves, see Specifications E11 and E323.~~

1.2 The values stated in SI units shall be considered standard for the dimensions of the electroformed mesh openings and the size of the ~~wires—line width in the electroformed mesh~~. The values stated in inch-pound units shall be considered standard with regard to the sieve ~~frames—frames~~ and to lines per unit length, as in Table 1. The values given in parentheses are mathematical conversions that are provided for informational purposes 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—safety, health, and health~~ 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

C430 Test Method for Fineness of Hydraulic Cement by the 45- μ m (No. 325) Sieve

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

E323 Specification for Perforated-Plate Sieves for Testing Purposes

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

2.2 *ISO Standard:*⁴

~~ISO 565 Test sieves—Metal Wire Cloth, Perforated Plate and Electroformed Sheet—Nominal Aperture Sizes~~

3. Terminology

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

3.2 *Definitions of Terms Specific to This Standard:*

¹ This specification 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 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.

3.2.1 *electroformed material, n*—electrodeposited grid material consisting of precision openings used as the base material separation media for electroformed sieves.

3.2.2 *electroformed sieves, n*—see *test sieve (electroformed)*.

3.2.3 *non-standard frames (electroformed), n*—sieve frames other than as specified in accordance with **Table 2** of Specification E161 that may be circular, square, rectangular, or non-metal.

3.2.3.1 *Discussion*—

The frame may shall have the electroformed sheet permanently attached, or it may be designed so the electroformed sheet is replaceable. material permanently attached.

TABLE 1 Nominal Dimensions, Permissible Variations and Limits for Precision Electroformed Sieves

Nominal Opening Size, μm^A	Tolerance on Sieve Openings, $\pm\mu\text{m}$	Limits, Openings per Linear cm^B			
		Limits, Openings per Linear in.		Min	Max
		Min	Max		
500	2.0	15.35	16.14	39	41
425	2.0	17.32	18.11	44	46
355	2.0	19.29	20.07	49	53
300	2.0	22.83	24.41	58	62
250	2.0	25.20	26.77	64	68
212	2.0	31.89	33.46	81	85
180	2.0	35.04	36.61	89	93
150	2.0	41.34	46.06	105	117
125	2.0	46.06	51.18	117	130
106	2.0	47.24	59.06	120	150
90	2.0	55.12	78.74	140	200
75	2.0	59.06	78.74	150	200
63	2.0	66.93	98.43	170	250
53	2.0	78.74	110.24	200	280
45	2.0	90.55	118.11	230	300
38	2.0	98.43	137.80	250	350
32	2.0	110.24	157.48	280	400
25	2.0	118.11 ^C	196.85 ^C	300 ^C	500 ^C
20	2.0	157.48 ^C	295.28 ^C	400 ^C	750 ^C
15	2.0	157.48 ^C	295.28 ^C	400 ^C	750 ^C
10	2.0	196.85 ^C	393.70 ^C	500 ^C	1000 ^C
5	2.0	196.85 ^C	590.55 ^C	500 ^C	1500 ^C

TABLE 1 Sample Dimensions, Permissible Variations and Limits for Precision Electroformed Sieves

Nominal Opening Size, μm^A	Tolerance on Sieve Openings, $\pm\mu\text{m}$	Limits, Lines per Linear in.	
		Min	Max
		300–500	2.0
15.0–299	2.0	58	117
90–149	2.0	105	200
50–89	2.0	140	280
30–49	2.0	200	400
20–29	2.0	280 ^B	750 ^B
15–19	2.0	400 ^B	750 ^B
3–14	2.0	500 ^B	1500 ^B

^A These nominal size openings are from the preferred number series R40/3 and R10. (Openings on apertures 32 μm and less are series R10.) These standard designations correspond to the values for test sieve apertures recommended by the International Standards Organization, Geneva, Switzerland, in ISO 565. Other Organization for Standardization (ISO). These sizes are typical, other opening sizes are not precluded available.

^B These limits permit at least two adjacent sieves to be formed with the same number of openings per cm. The percent open area must in no case be so great that the width of metal between openings is less than 13 μm .

^C Because of their greater durability in routine testing, sieves made close to the minimum limit are normally supplied. Sieves made close to the maximum limit may be obtained only on special order but are preferable from the standpoint of logical progression and better test completion time.

TABLE 2 Dimensions of Standard Circular Frames

Current-Nominal Diameter, in.	Proposed Revision Mean Diameter		Comments-Typical Frame ^A Nominal Height ^B
	Inside at Top ^C		Outside on Skirt
3	3.000 in. + 0.030/-0.000 (76.20 mm + 0.76/-0.00)		3.000 in. + 0.000/-0.030 (76.20 mm + 0.00/-0.76)
8	8.000 in. + 0.030/-0.000 (203.20 mm + 0.76/-0.00)		8.000 in. + 0.000/-0.030 (203.20 mm + 0.00/-0.76)
12	12.000 in. + 0.030/-0.000 (304.80 mm + 0.76/-0.00)		12.000 in. + 0.000/-0.030 (304.80 mm + 0.00/-0.76)

TABLE 2 Dimensions of Standard Circular Frames

Nominal Diameter, in.	Proposed Revision Mean Diameter		Typical Frame ^A Nominal Height ^B
	Inside at Top ^C		
3	3.000 in. + 0.030/-0.000 (76.20 mm + 0.76/-0.00)		1 in. (25.4 mm)
8	8.000 in. + 0.030/-0.000 (203.20 mm + 0.76/-0.00)		2 in. (50.8 mm) FH ^D 1 in. (25.4 mm) HH ^E
12	12.000 in. + 0.030/-0.000 (304.80 mm + 0.76/-0.00)		2 in. (50.8 mm) FH

^A Other frame heights are not precluded.

^B Distance from the top of the frame to the sieve cloth surface.

^C Measured 0.2 in. (5 mm) below the top of the frame.

^D FH = Full height.

^E HH = Half height.

3.2.4 *support grid, n*—conductive metal grid mounted screen fused to the sieve sheet material.

3.2.5 *test sieve (electroformed), n*—a sieve manufactured by mounting electroformed material consisting of high precision openings in a frame, designed for use in particle size analysis by sieving.

4. Ordering Information

4.1 Orders for items under this specification include the following information as necessary:

4.1.1 Name of material (~~Electroformed Sieve~~); (electroformed sieve or electroformed sieve material),

4.1.2 ASTM designation and year of issue (Specification E161—XX);,

4.1.3 Quantity of each item, and <http://www.astm.org/standards/sist/d50782ac-dal-f-41ad-bd30-ba6e1171eccc8/astm-e161-17>

4.1.4 Standard sieve designation (designation, Table 1, Column 1);

4.1.4.1 Nominal opening size in micrometres (Table 1, Column 1), and

4.1.4.2 Aperture geometry.

4.1.5 For testing sieves in standard circular frames:

4.1.5.1 Nominal sieve frame diameter, and

4.1.5.2 Nominal sieve frame height.

4.1.6 For sieve cloth not in frames or in non-standard frames:

4.1.6.1 Lateral dimension of sieve mesh, and/or

4.1.6.2 Description of non-standard frame, frame, or both.

4.1.7 For sieves requiring supporting grid:

4.1.7.1 Support grid desired, and

4.1.7.2 Support grid mounted up or down, and as assembled in frame.

4.1.8 Compatible sieve pans and covers.

5. Sieve Sheet Electroformed Material Requirements

5.1 The material used in the manufacture of the sieve material shall be nickel or a metal suitable for electrodeposition with a firm crystalline structure.

5.2 The material shall have square, round, or slotted openings with straight uniform sides and smooth, flat surfaces except for a slight bevel along the edges of the openings. The nominal dimension of these openings establishes the designated size of the sieve.

5.3 The material used in the manufacture of the sieve sheet shall be nickel or a metal suitable for electrodeposition in a firm crystalline structure. The sheet shall have square or round openings with straight uniform sides and smooth, flat surfaces except for a slight bevel along the edges of the openings. The thickness of the sheet material (exclusive of the supporting support grid, see