Designation: E323 – 11 (Reapproved 2016)

Standard Specification for Perforated-Plate Sieves for Testing Purposes[1]

This standard is issued under the fixed designation E323; 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 perforated plate with either round or square apertures, normally mounted in a frame for use as sieves in precision testing in the classification of materials according to designated nominal particle size. A method for checking the accuracy of perforated sieve plates is included as information in Appendix X1.

NOTE 1—The perforated-plate sieves covered by this specification are intended for general precision testing. Some industries may require more restricted specifications for sieves for special testing purposes.

NOTE 2—For other types of sieves see Specifications E11 and E161.

NOTE 3—Complete instructions and procedures on the use of test sieves are contained in *ASTM STP 447, Manual on Test Sieving Methods.* This manual also contains a list of all ASTM published standards on sieve analysis procedures for specific materials or industries.

1.2 The values stated in inch-pound units are to be regarded as the 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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

E161 Specification for Precision Electroformed Sieves

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

2.2 *Other Documents:*[3]

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)

MIL-STD-129 Marking for Shipment and Storage

3. Terminology

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

4. Perforated Sieve Plates

4.1 Materials used in the manufacture of perforated sieve plates shall be steel, stainless steel, brass, bronze, or other rigid material and shall not be painted, plated, or otherwise coated. The thickness of materials used for perforated sieves plates shall conform to the requirements of column (7) in Table 1, but may vary within the limits shown in column (10).

4.2 Round apertures shall be arranged with their centers nominally at the vertices of equilateral triangles as shown in Fig. 1. The diameter of any aperture shall not vary from the nominal diameter given in columns (1) and (2) of Table 1 by more than the maximum variation given in column (3). The preferred centers for round apertures shall be as given in column (4) of Table 1 but may vary within the range given in column (6).

4.3 Square apertures shall be arranged in a staggered pattern with their midpoints nominally at the vertices of isosceles triangles whose bases shall equal their heights or shall be arranged in line with their midpoints nominally at the vertices of squares as shown in Fig. 2. The midsection of any aperture shall not vary from the nominal midsection dimension given in columns (1) and (2) of Table 1 by more than the maximum variation given in column (3). The preferred centers for square apertures shall be as given in column (4) of Table 1, but may vary within the range given in column (6).

NOTE 4—The percentage of open area for square apertures is identical for both staggered and straight-line patterns.

5. Sieve Plate Frames

5.1 Standard frames for perforated-plate sieves with apertures 0.16 in. (4.00 mm) and larger shall be made of hardwood

[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.

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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] Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, http://dodssp.daps.dla.mil.

TABLE 1 Nominal Dimensions, Permissible Variations, and Ranges for Perforated Plate in Standard Sieves

Sieve Designation and Aperture Size[A]		Maximum Variation of Aperture Size[B]	Centers			Plate Thickness			
			Preferred		Permissible Range[C]	Preferred			Permissible Range
Standard[D]	Alternative		Standard	Alternative		Standard	Alternative		
mm	in.[E]	mm	mm	in.[E]	mm	mm	in.[E]	gage[F]	mm
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
125	5	±1.0	160	6¼	144 to 184	3.4	0.1345	10	2.5 to 4.0
106	4¼	±0.9	135	5¼	122 to 155	3.4	0.1345	10	2.5 to 4.0
100[G]	4	±0.9	128	5	115 to 147	3.4	0.1345	10	2.5 to 4.0
90	3½	±0.8	111	4⅜	100 to 128	2.7	0.1046	12	2.5 to 4.0
75	3	±0.7	95	3¾	86 to 109	2.7	0.1046	12	2.5 to 4.0
63	2½	±0.6	80	3⅛	72 to 92	2.7	0.1046	12	2.5 to 4.0
53	2⅛	±0.6	68	2⅝	61 to 78	2.7	0.1046	12	2.5 to 4.0
50[G]	2	±0.5	64	2½	58 to 73	2.7	0.1046	12	2.5 to 4.0
45	1¾	±0.5	57	2¼	51 to 65	1.9	0.0747	14	1.5 to 2.5
37.5	1½	±0.4	48	1⅞	43 to 55	1.9	0.0747	14	1.5 to 2.5
31.5	1¼	±0.4	41	1⅝	37 to 47	1.9	0.0747	14	1.5 to 2.5
26.5	1 1/16	±0.4	35	1 5/16	31 to 40	1.9	0.0747	14	1.5 to 2.5
25.0[G]	1	±0.4	32	1¼	29 to 37	1.9	0.0747	14	1.5 to 2.5
22.4	⅞	±0.3	29	1⅛	26 to 33	1.9	0.0747	14	1.5 to 2.5
19.0	¾	±0.3	25	1	22 to 29	1.9	0.0747	14	1.5 to 2.5
16.0	⅝	±0.27	21	13/16	19 to 24	1.9	0.0747	14	1.5 to 2.5
13.2	17/32	±0.25	18	¾	16 to 20	1.9	0.0747	14	1.0 to 2.0
12.5[G]	½	±0.24	17	11/16	15 to 20	1.9	0.0747	14	1.0 to 2.0
11.2	7/16	±0.23	15	⅝	13 to 17	1.9	0.0747	14	1.0 to 2.0
9.5	⅜	±0.20	13.0	½	11.3 to 14.9	1.9	0.0747	14	1.0 to 2.0
8.0	5/16	±0.19	11.0	7/16	9.5 to 12.6	1.9	0.0747	14	1.0 to 2.0
6.7	17/64	±0.17	9.9	25/64	8.3 to 11.4	1.5	0.0598	16	0.8 to 1.5
6.3[G]	¼	±0.16	9.5	⅜	8.0 to 10.9	1.5	0.0598	16	0.8 to 1.5
5.6	7/32	±0.15	8.7	11/32	7.2 to 10.0	1.5	0.0598	16	0.8 to 1.5
4.75	3/16	±0.14	6.8	¼	5.8 to 7.8	1.5	0.0598	16	0.8 to 1.5
4.00	5/32	±0.13	5.9	7/32	5.0 to 6.8	1.5	0.0598	16	0.8 to 1.5
3.35	0.127 (⅛)	±0.12	4.9	3/16	4.2 to 5.7	1.5	0.0598	16	0.8 to 1.5
2.80	7/64	±0.11	4.4	11/64	3.7 to 5.1	1.5	0.0598	16	0.8 to 1.5
2.36	3/62	±0.10	3.8	5/32	3.2 to 4.4	1.5	0.0598	16	0.8 to 1.5
2.00	0.078	±0.09	3.3	⅛	2.8 to 3.8	1.5	0.0598	16	0.8 to 1.5
1.70	0.066	±0.08	2.9	7/64	2.5 to 3.3	0.8	0.0299	22	0.4 to 0.8
1.40	0.055	±0.08	2.6	0.100	2.2 to 3.0	0.8	0.0299	22	0.4 to 0.8
1.18	0.045	±0.07	2.2	0.090	1.9 to 2.5	0.8	0.0299	22	0.4 to 0.8
1.00	0.039	±0.07	2.0	0.077	1.7 to 2.3	0.8	0.0299	22	0.4 to 0.8

[A] The values shown in this table refer to both round and square apertures. In general, square-aperture perforated-sieve plates are available only in 3.35 mm and larger.
[B] This permissible variation applies to both the standard aperture sizes and the alternative aperture sizes.
[C] A range of ±15 % is allowed except that in no case shall the minimum bridge (bar between apertures) be less than one half of the difference between the nominal aperture and the preferred center.
[D] These standard designations, progressing from a base of 1 mm in the ratio of approximately $\sqrt[4]{2}$ to 1, correspond to the values for test sieve apertures recommended by the International Organization for Standardization, Geneva, Switzerland.
[E] Only approximately equivalent to the standard values.
[F] The gage values are for carbon steel. For other materials, the gage used should be the nearest decimal equivalent of the U.S. standard gage for steel.
[G] These sieves are not in the standard series but they have been included because they are in common usage.

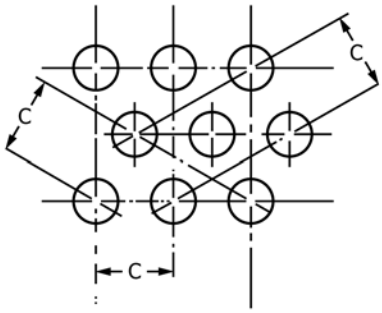

FIG. 1 Arrangement of Round Apertures

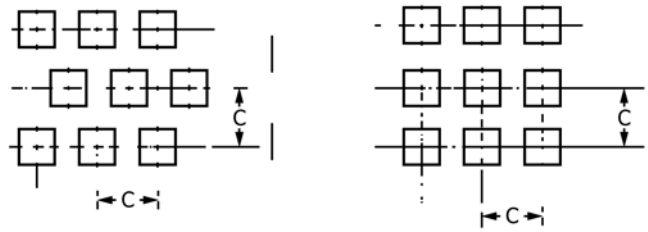

FIG. 2 Arrangement of Square Apertures

or steel and shall be designed to hold 12.0-in. (304.8-mm), 16.0-in. (406.4-mm), or 18.0-in. (457.2-mm) square sieve plates. The use of rectangular, circular, or other shaped frames

of other dimensions is not precluded for special purposes. Frames shall have a maximum of a 0.5-in. (12.7-mm) flange on the inside of all four sides for sealing the joint and for mounting the sieve plates. Perforated sieve plates that are square or rectangular in shape shall have a maximum of 0.5-in. (12.7-mm) solid border on all four sides. Perforated sieve plates that are circular in shape may be furnished without solid borders. The sides of the frame shall be a minimum of 2.0 in. (50.8 mm) and not over 4.0 in. (101.6 mm) in height.

NOTE 5—The frame may be designed to nest with compatible frames if so specified, but in general, perforated sieve plates are removable from the frame and one frame is used with a series of perforated sieve plates.

5.2 Standard frames for perforated-plate sieves with apertures smaller than 0.16 in. (4.00 mm) may be designed as in 5.1 or may be the standard 8.0-in. (203.2-mm) circular sieve frame as described in Specification E11 for wire-cloth sieve frames.

NOTE 6—Care should be taken to install the sieve plate in the frame with the side on which the manufacturer has indicated the aperture size uppermost.

6. Label Marking

6.1 Each perforated sieve plate shall bear a label or be stamped with the aperture size expressed both in millimetres and inches. The manufacturer shall ensure that the marking is done on the punch side of the sieve plate.

6.2 Each perforated-plate sieve with apertures smaller than 0.16 in. (4.00 mm) that has the sieve plate permanently affixed in the frame may carry the size markings, expressed in millimetres and inches, on the frame instead of on the sieve plate itself.

7. Keywords

7.1 opening; particle size; perforated plate sieves; precision testing; seive analysis; sieve perforated plate; test sieve

SUPPLEMENTARY REQUIREMENTS

The following sections shall be applicable when U.S. contractual matters are involved.

S1. Responsibility for Inspection

S1.1 Unless otherwise specified in the contract or purchase order, the producer is responsible for the performance of all inspection and test requirements specified herein. Except as otherwise specified in the contract or order, the producer may use his own or any other suitable facilities for the performance of the inspection and test requirements specified herein unless disapproved by the purchaser. The purchaser shall have the right to perform any of the inspections and tests set forth in this specification where such inspections are deemed necessary to ensure that material conforms to prescribed requirements.

S2. Government Procurement

S2.1 Unless otherwise specified in the contract, the material shall be packaged in accordance with the suppliers' standard practice which will be acceptable to the carrier at lowest rates. Containers and packing shall comply with the Uniform Freight Classification rules or National Motor Freight Classification rules. Marking for shipment of such material shall be in accordance with Fed. Std. No. 123 for civil agencies and MIL-STD-129 for military agencies.

APPENDIXES

(Nonmandatory Information)

X1. METHOD OF CHECKING PERFORATED SIEVE PLATES

X1.1 In principle, every aperture in a perforated sieve plate is eligible for inspection, so that the first test is a careful and methodical visual examination applied to each aperture and center. If obvious faults are found, the sieve plate is unacceptable.

X1.2 Check the dimensions of the apertures using an accurate steel rule or other suitable means. The use of calibrated flat-plug gages or calibrated tapered-pin gages is also permitted. Since any perforated aperture has an inherent taper, take care to make all measurements from the side of the sieve plate on which the manufacturer has indicated the aperture size. The apertures selected for measurements may be over any area of the sieve plate, but shall be those lying along two straight lines at least 4 in. (100 mm) in length and shall include at least ten apertures. In the case of round apertures, one of the straight lines selected shall follow a straight line of apertures and the included angle between the two straight lines shall be 60°. In the case of square apertures, one of the straight lines selected shall follow a straight line of apertures and the included angle shall be 90° if the apertures are arranged with their midpoints at the vertices of squares, but shall be 63° 26 min if their midpoints are at the vertices of isosceles triangles. If the minimum number of apertures prescribed for checking is not available along the two straight lines prescribed, check all apertures in the sieve plate.

X1.3 At the same time that the aperture dimensions are checked, also examine the center between each of the selected apertures.

X1.4 Check the thickness of the sieve plate using any reliable procedure.

X2. PRESENTATION OF DATA

X2.1 Sieve tests should be presented in tabular or graphical form in terms of the nominal aperture dimension and the percentage by weight. For purposes of comparison, the cumulate percentage undersize will be accepted as standard. This does not preclude the representation of percentages on individual sieves provided the sieve interval is clearly specified as plus one sieve aperture and minus another or as between two sieve apertures. Graphical representation may include the use of logarithmic scales, probability paper, and so forth, to emphasize specific characteristics of shape.