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.

Designation: E11 – 22

Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves[1]

This standard is issued under the fixed designation E11; 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 document specifies the technical requirements for; the woven wire test sieve cloth (sieve cloth) used in test sieves, the construction of test sieves, standard and non-standard test sieve frame sizes, and test procedures used to inspect sieve cloth and the test sieves. This specification applies to test sieves manufactured with sieve cloth having a nominal aperture size ranging from 125 millimetres (mm) down to 20 micrometres (µm).

1.2 Additional reference information can be found in Specifications E161, E323, E2016, and in Test Methods C430 and E2427.

1.3 The values stated in SI units shall be considered standard for the dimensions of the sieve cloth openings and the wire diameters used in the sieve cloth. The values stated in inch-pound units shall be considered standard with regard to the sieve frames, pans, and covers.

1.4 *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.*

1.5 *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-µm (No. 325) Sieve

E161 Specification for Electroformed Material and Test Sieves

E323 Specification for Perforated-Plate Sieves for Testing Purposes

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

E2016 Specification for Industrial Woven Wire Cloth

E2427 Test Method for Acceptance by Performance Testing for Sieves

2.2 *ASTM Manual:*[2]

Manual 32 Test Sieving Methods: Guidelines for Establishing Sieve Analysis Procedures; 5th Edition

2.3 *Federal Standard:*[3]

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

2.4 *Military Standard:*[3]

MIL-STD-129 Marking for Shipment and Storage

2.5 *ISO Standard:*[4]

ISO 3310-1 Test Sieves—Technical Requirements and Testing – Part 1: Test Sieves of Metal Wire Cloth

3. Terminology

3.1 *Definitions*—Additional terms can be found in Terminology E1638.

3.1.1 *aperture, n*—the dimension defining an opening in a screening surface.

3.1.2 *backing cloth, n*—a wire mesh support layer used directly under the sieve cloth with an opening coarser than the sieve designation.

[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.

Current edition approved Feb. 1, 2022. Published May 2022. Originally approved in 1925. Last previous edition approved in 2020 as E11 – 20. DOI: 10.1520/E0011-22.

[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://www.dodssp.daps.mil.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

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

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TABLE 1 Nominal Dimensions and Permissible Variations for Sieve Cloth and Compliance, Inspection and Calibration Test Sieves

(1)	(2a)	(2b)	(3)[A]	(4)	(5)	(6)	(7)	(8)	(9)[B, C]	(10)	(11)[B, C]	(12)	(13)	(14)	(15)
Sieve Designation			Nominal Sieve Opening	±Y Variation for Average Opening	+X Maximum Variation for Opening	Resulting Maximum Individual Opening	Compliance Sieves		Inspection Sieves		Calibration Sieves		Typical Wire Diameter	Permissible Average Wire Diameter	
Standard	U.S. Alternative	Supplementary Size					Sample Openings per 100 ft^2	Maximum Standard Deviation	Sample Openings per Sieve	Maximum Standard Deviation	Sample Openings per Sieve	Maximum Standard Deviation		Min	Max
mm		mm	in.	mm	mm	mm							mm		
125	5 in.		5.00	3.30	4.06	129.06	20	–	all	–	all	–	8.00	6.8	9.2
		112	4.41	2.96	3.74	115.74	20	–	all	–	all	–	8.00	6.8	9.2
106	4.24 in.		4.24	2.80	3.59	109.59	20	–	all	–	all	–	6.30	5.4	7.2
100	4 in.		4.00	2.65	3.44	103.44	20	–	all	–	all	–	6.30	5.4	7.2
90	3½ in.		3.50	2.39	3.18	93.18	20	–	all	–	all	–	6.30	5.4	7.2
		80	3.15	2.13	2.91	82.91	20	–	all	–	all	–	6.30	5.4	7.2
75	3 in.		3.00	2.00	2.78	77.78	20	–	all	–	all	–	6.30	5.4	7.2
		71	2.80	1.89	2.67	73.67	20	–	all	–	all	–	5.60	4.8	6.4
63	2½ in.		2.50	1.69	2.44	65.44	20	–	all	–	all	–	5.60	4.8	6.4
		56	2.20	1.50	2.24	58.24	20	–	all	–	all	–	5.00	4.3	5.8
53	2.12 in.		2.12	1.42	2.15	55.15	20	–	all	–	all	–	5.00	4.3	5.8
50	2 in.		2.00	1.34	2.06	52.06	20	–	all	–	all	–	5.00	4.3	5.8
45	1¾ in.		1.75	1.21	1.91	46.91	20	–	all	–	all	–	4.50	3.8	5.2
		40	1.57	1.08	1.75	41.75	20	–	all	–	all	–	4.50	3.8	5.2
37.5	1½ in.		1.50	1.01	1.67	39.17	20	1.103	all	–	all	–	4.50	3.8	5.2
		35.5	1.40	0.961	1.60	37.10	20	1.035	all	–	all	–	4.00	3.4	4.6
31.5	1¼ in.		1.25	0.855	1.47	32.97	20	0.907	all	–	all	–	4.00	3.4	4.6
		28	1.10	0.762	1.35	29.35	20	0.802	all	–	all	–	3.55	3.0	4.1
26.5	1.06 in.		1.06	0.722	1.29	27.79	20	0.758	all	–	all	–	3.55	3.0	4.1
25	1.00 in.		1.00	0.682	1.24	26.24	20	0.715	all	–	all	–	3.55	3.0	4.1
22.4	⅞ in.		0.875	0.613	1.14	23.54	150	0.641	15	0.431	30	0.460	3.55	3.0	4.1
		20	0.787	0.548	1.05	21.05	150	0.575	15	0.387	30	0.413	3.15	2.7	3.6
19	¾ in.		0.750	0.522	1.01	20.01	150	0.548	15	0.368	30	0.393	3.15	2.7	3.6
		18	0.709	0.495	0.97	18.97	150	0.521	15	0.350	30	0.374	3.15	2.7	3.6
16	⅝ in.		0.625	0.441	0.89	16.89	150	0.467	15	0.314	30	0.335	3.15	2.7	3.6
		14	0.551	0.387	0.81	14.81	150	0.414	15	0.278	30	0.297	2.80	2.4	3.2
13.2	0.530 in.		0.530	0.365	0.78	13.98	150	0.393	15	0.264	30	0.282	2.80	2.4	3.2
12.5	½ in.		0.500	0.346	0.75	13.25	150	0.374	15	0.251	30	0.268	2.50	2.1	2.9
11.2	7⁄16 in.		0.438	0.311	0.69	11.89	150	0.340	15	0.229	30	0.244	2.50	2.1	2.9
		10	0.394	0.279	0.64	10.64	150	0.308	15	0.207	30	0.221	2.50	2.1	2.9
9.5	⅜ in.		0.375	0.265	0.61	10.11	150	0.294	15	0.198	30	0.211	2.24	1.9	2.6
		9	0.354	0.251	0.59	9.59	150	0.281	15	0.189	30	0.202	2.24	1.9	2.6
8	5⁄16 in.		0.312	0.224	0.54	8.54	150	0.254	15	0.171	30	0.182	2.00	1.7	2.3
		7.1	0.280	0.200	0.50	7.60	150	0.230	15	0.155	30	0.165	1.80	1.5	2.1
6.7	0.265 in.		0.265	0.189	0.48	7.18	150	0.219	15	0.147	30	0.157	1.80	1.5	2.1
6.3	¼ in.		0.250	0.178	0.46	6.76	150	0.208	15	0.140	30	0.149	1.80	1.5	2.1
5.6	No. 3½		0.223	0.159	0.42	6.02	150	0.189	15	0.127	30	0.136	1.60	1.3	1.9
		5	0.197	0.142	0.39	5.39	150	0.172	15	0.116	30	0.123	1.60	1.3	1.9
4.75	No. 4		0.187	0.135	0.37	5.12	150	0.165	15	0.111	30	0.118	1.60	1.3	1.9
		4.5	0.177	0.128	0.36	4.86	150	0.158	15	0.106	30	0.113	1.40	1.2	1.7
4	No. 5		0.157	0.114	0.33	4.33	150	0.143	15	0.096	30	0.103	1.40	1.2	1.7
		3.55	0.140	0.102	0.30	3.85	200	0.130	20	0.092	40	0.097	1.25	1.06	1.50
3.35	No. 6		0.132	0.096	0.29	3.64	200	0.125	20	0.088	40	0.093	1.25	1.06	1.50
		3.15	0.124	0.091	0.28	3.43	200	0.119	20	0.084	40	0.089	1.25	1.06	1.50
2.8	No. 7		0.110	0.081	0.26	3.06	200	0.108	20	0.076	40	0.081	1.12	0.95	1.30
		2.5	0.0984	0.073	0.24	2.74	200	0.099	20	0.070	40	0.074	1.00	0.85	1.15
2.36	No. 8		0.0937	0.069	0.23	2.59	200	0.095	20	0.067	40	0.071	1.00	0.85	1.15
		2.24	0.0882	0.065	0.22	2.46	200	0.091	20	0.064	40	0.068	0.90	0.77	1.04
2	No. 10		0.0787	0.059	0.20	2.20	250	0.083	25	0.060	50	0.064	0.90	0.77	1.04
		1.8	0.0709	0.053	0.19	1.99	250	0.077	25	0.056	50	0.059	0.80	0.68	0.92
1.7	No. 12		0.0661	0.050	0.18	1.88	250	0.074	25	0.054	50	0.057	0.80	0.68	0.92

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TABLE 1 *Continued*

(1)	(2a)	(2b)	(3)[A]	(4)	(5)	(6)	(7)	(8)	(9)[B, C]	(10)	(11)[B, C]	(12)	(13)	(14)	(15)
Sieve Designation			Nominal Sieve Opening	±Y Variation for Average Opening	+X Maximum Variation for Opening	Resulting Maximum Individual Opening	Compliance Sieves		Inspection Sieves		Calibration Sieves		Typical Wire Diameter	Permissible Average Wire Diameter	
Standard	U.S. Alternative	Supplementary Size					Sample Openings per 100 ft^2	Maximum Standard Deviation	Sample Openings per Sieve	Maximum Standard Deviation	Sample Openings per Sieve	Maximum Standard Deviation		Min	Max
		1.6	0.0630	0.047	0.17	1.77	250	0.070	25	0.051	50	0.054	0.80	0.68	0.92
1.4	No. 14		0.0555	0.042	0.16	1.56	400	0.064	40	0.050	80	0.052	0.71	0.60	0.82
		1.25	0.0492	0.038	0.15	1.40	400	0.058	40	0.045	80	0.047	0.63	0.54	0.72
1.18	No. 16		0.0469	0.036	0.14	1.32	400	0.056	40	0.043	80	0.045	0.63	0.54	0.72
		1.12	0.0441	0.034	0.14	1.26	400	0.054	40	0.042	80	0.044	0.56	0.48	0.64
1	No. 18		0.0394	0.030	0.13	1.13	400	0.050	40	0.039	80	0.040	0.56	0.48	0.64
µm		µm	in.	µm	µm	µm							mm		
		900	0.0354	27.6	118	1018	400	45.51	40	35.22	80	36.74	0.500	0.43	0.58
850	No. 20		0.0331	26.2	114	964	400	43.66	40	33.79	80	35.25	0.500	0.43	0.58
		800	0.0315	24.8	109	909	400	41.79	40	32.34	80	33.74	0.450	0.38	0.52
710	No. 25		0.0278	22.2	101	811	500	38.36	50	30.43	100	31.62	0.450	0.38	0.52
		630	0.0248	19.9	93	723	500	35.23	50	27.95	100	29.04	0.400	0.34	0.46
600	No. 30		0.0234	19.0	91	691	500	34.04	50	27.00	100	28.06	0.400	0.34	0.46
		560	0.0220	17.9	87	647	500	32.43	50	25.73	100	26.73	0.355	0.30	0.41
500	No. 35		0.0197	16.2	80	580	600	29.96	60	24.21	120	25.09	0.315	0.27	0.36
		450	0.0177	14.7	75	525	600	27.86	60	22.51	120	23.32	0.280	0.24	0.32
425	No. 40		0.0165	14.0	73	498	600	26.79	60	21.65	120	22.43	0.280	0.24	0.32
		400	0.0157	13.3	70	470	600	25.71	60	20.78	120	21.52	0.250	0.21	0.29
355	No. 45		0.0139	12.0	65	420	800	23.72	80	19.68	160	20.30	0.224	0.19	0.26
		315	0.0124	10.8	60	375	800	21.90	80	18.17	160	18.75	0.200	0.17	0.23
300	No. 50		0.0117	10.4	58	358	800	21.20	80	17.59	160	18.15	0.200	0.17	0.23
		280	0.0110	9.8	56	336	800	20.26	80	16.81	160	17.34	0.180	0.15	0.21
250	No. 60		0.0098	8.9	52	302	800	18.82	80	15.61	160	16.11	0.160	0.13	0.19
		224	0.0088	8.1	49	273	800	17.53	80	14.54	160	15.01	0.160	0.13	0.19
212	No. 70		0.0083	7.8	47	259	800	16.93	80	14.05	160	14.49	0.140	0.12	0.17
		200	0.0079	7.4	45	245	800	16.32	80	13.54	160	13.97	0.140	0.12	0.17
180	No. 80		0.0070	6.8	43	223	1000	15.27	100	12.91	200	13.28	0.125	0.106	0.150
		160	0.0063	6.3	40	200	1000	14.20	100	12.00	200	12.34	0.112	0.095	0.130
150	No. 100		0.0059	6.0	38	188	1000	13.65	100	11.53	200	11.86	0.100	0.085	0.115
		140	0.0055	5.7	37	177	1000	13.09	100	11.06	200	11.38	0.100	0.085	0.115
125	No. 120		0.0049	5.2	34	159	1000	12.23	100	10.33	200	10.63	0.090	0.077	0.104
		112	0.0044	4.8	32	144	1000	11.46	100	9.68	200	9.96	0.080	0.068	0.092
106	No. 140		0.0041	4.7	31	137	1000	11.10	100	9.38	200	9.65	0.071	0.060	0.082
		100	0.0039	4.5	30	130	1000	10.73	100	9.07	200	9.33	0.071	0.060	0.082
90	No. 170		0.0035	4.2	29	119	1000	10.10	100	8.53	200	8.78	0.063	0.054	0.072
		80	0.0031	3.9	27	107	1000	9.45	100	7.99	250	8.33	0.056	0.048	0.064
75	No. 200		0.0029	3.7	26	101	1000	9.12	100	7.70	250	8.04	0.050	0.043	0.058
		71	0.0028	3.6	25	96	1000	8.85	100	7.48	250	7.80	0.050	0.043	0.058
63	No. 230		0.0025	3.4	24	87	1000	8.29	100	7.01	250	7.31	0.045	0.038	0.052
		56	0.0022	3.2	22	78	1000	7.79	100	6.58	250	6.87	0.040	0.034	0.046
53	No. 270		0.0021	3.1	21	74	1000	7.56	100	6.39	250	6.67	0.036	0.031	0.041
		50	0.0020	3.0	21	71	1000	7.34	100	6.20	250	6.47	0.036	0.031	0.041
45	No. 325		0.0017	2.8	20	65	1000	6.95	100	5.87	250	6.13	0.032	0.027	0.037
		40	0.0016	2.7	19	59	1000	6.55	100	5.54	300	5.83	0.032	0.027	0.037
38	No. 400		0.0015	2.6	18	56	1000	6.38	100	5.39	300	5.69	0.030	0.024	0.035
		36	0.0014	2.6	18	54	1000	6.22	100	5.26	300	5.54	0.030	0.024	0.035
32	No. 450		0.0012	2.4	17	49	1000	5.87	100	4.96	300	5.23	0.028	0.023	0.033
25	No. 500		0.0010	2.2	15	40	1000	5.23	100	4.42	300	4.66	0.025	0.021	0.029
20	No. 635		0.0008	2.1	13	33	1000	4.73	100	4.00	300	4.22	0.020	0.017	0.023

Column 3—These numbers are only approximate but are in use for reference; the sieve shall be identified by the standard designation in millimetres or micrometres.
Columns 9 and 11—See Annex A1, which specifies that all openings will be inspected for test sieves having 15 openings or less.
Columns 9 and 11—These number of sample openings are based on an 8-in. diameter test sieve.

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3.1.3 *crimp, n*—the corrugation in the warp and 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 sieve cloth.

3.1.4 *firmness, n*—a subjective term referring to the planar rigidity of sieve cloth (as a roll good, not mounted in a test sieve frame), 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 sieve cloth is termed *sleaziness*.

3.1.5 *matched test sieve, n*—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 this specification).

3.1.6 *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.

3.1.7 *plain weave, n*—sieve cloth in which the warp wires and shute wires pass over one and under one in both directions.

3.1.8 *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).

3.1.9 *sieve cloth, n*—woven wire cloth conforming to this specification.

3.1.10 *test sieve (sieve cloth), n*—an apparatus manufactured by mounting E11 sieve cloth in a frame, designed for use in particle size analysis by sieving.

3.1.10.1 *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 of 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).

3.1.10.2 *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 of 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).

3.1.10.3 *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 of Table 1 in part based on the standard deviation of the required number of sample openings in the test sieve (Column 11) not exceeding the maximum allowable for a confidence level of 99.73 % (Column 12).

3.1.11.3.1 *Discussion*—Calibration sieves have had at least twice as many openings measured as Inspection sieves.

3.1.11 *twill weave, n*—sieve cloth in which the warp wires and shute wires pass over two and under two wires in both directions.

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

4. Ordering Information

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

4.1.1 Description of item(s) (Test Sieve or Sieve Cloth),

4.1.2 ASTM E11 designation and year of issue,

4.1.3 Quantity of each item, and

4.1.4 Sieve designation (Table 1, Standard Column 1, Alternate Column 2).

4.1.4.1 Test sieves can be supplied based on different levels of confidence as Compliance Sieves, Inspection Sieves, and Calibration Sieves.

4.2 Test sieves in standard circular or nonstandard frame:

4.2.1 Nominal sieve frame diameter (see Table 2) or dimensional description of nonstandard test sieve frame, and

4.2.2 Nominal sieve frame height (see Table 2).

5. Sieve Cloth Requirements

5.1 The sieve cloth used in test sieves shall meet the requirements of Table 1 and shall be designated Specification E11 Sieve Cloth. The number of inspected apertures shall be in accordance with Table 1 (Column 7). Sieve cloth conforming to this specification shall be woven from stainless steel, brass, or bronze. Sieve cloth with openings greater than or equal to 75 micrometres shall be woven using a plain weave. For sieve cloth with openings equal to or less than 71 micrometres the sieve cloth may be supplied using a twill weave. The sieve cloth shall not be coated or plated.

5.2 All measurements of openings and wire diameters shall be made along the midpoints of the openings as shown in Fig. 1.

TABLE 2 Dimensions of Standard Frames

Nominal Diameter, in.	Diameter Tolerance, in. (mm)	Typical Frame[A]
	Inside at Top[B]	Nominal Height, in. (mm)
3	3.000 + 0.030/–0.000 (76.2 + 0.76/–0.00)	1¼ (31.8) FH[C] ⅝ (15.9) HH
6	6.000 + 0.030/–0.000 (152.4 + 0.76/–0.00)	1¾ (44.5) FH 1 (25.4) HH
8	8.000 + 0.030/–0.000 (203.2 + 0.76/–0.00)	2 (50.8) FH 1 (25.4) HH
10	10.000 + 0.030/–0.000 (254 + 0.76/–0.00)	3 (76.2) FH 1½ (38.1) HH
12	12.000 + 0.030/–0.000 (304.8 + 0.76/–0.00)	3¼ (82.6) FH 2 (50.8) IH 1⅝ (41.3) HH

[A] Frame height measured from top of frame to top of sieve cloth.
[B] Measured 0.2 in. (5 mm) below the top of the frame.
[C] FH = full height; HH = half height; IH = intermediate height.

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