BS ISO 3310-1:2016

BSI Standards Publication

Test sieves — Technical requirements and testing

Part 1: Test sieves of metal wire cloth

bsi.

National foreword

This British Standard is the UK implementation of ISO 3310-1:2016. It supersedes BS 410-1:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee LBI/37, Particle characterization including sieving.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Test sieves — Technical requirements and testing —

Part 1: Test sieves of metal wire cloth

Tamis de contrôle — Exigences techniques et vérifications —

Partie 1: Tamis de contrôle en tissus métalliques

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 24, *Particle characterization including sieving*, Subcommittee SC 8, *Test sieves, sieving and industrial screens*.

This fifth edition cancels and replaces the fourth edition (ISO 3310-1:2000), which has been technically revised. It also incorporates the Technical Corrigendum ISO 3310-1:2000/Cor 1:2004.

ISO 3310 consists of the following parts, under the general title *Test sieves — Technical requirements and testing*:

— *Part 1: Test sieves of metal wire cloth*

— *Part 2: Test sieves of perforated metal plate*

— *Part 3: Test sieves of electroformed sheets*

Introduction

As the accuracy of test sieving depends on the dimensional accuracy of the test sieve openings, it is considered necessary in this part of ISO 3310 to keep the maximum permissible error on the apertures in metal wire cloth as close as possible.

Requirements other than maximum permissible errors on the apertures, such as requirements for the wire diameter, have not been limited more closely than necessary, since the influence of these criteria on test sieving is of minor importance, and excessively strict requirements may make manufacturing unnecessarily difficult.

INTERNATIONAL STANDARD ISO 3310-1:2016(E)

Test sieves — Technical requirements and testing —

Part 1: Test sieves of metal wire cloth

1 Scope

This part of ISO 3310 specifies the technical requirements and corresponding test methods for test sieves of metal wire cloth.

It applies to test sieves having aperture sizes from 125 mm down to 20 µm, in accordance with ISO 565.

2 Normative references

The following referenced documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 565:1990, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*

ISO 2395, *Test sieves and test sieving — Vocabulary*

ISO 2591-1:1988, *Test sieving — Part 1: Methods using test sieves of woven wire cloth and perforated metal plate*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2395 and the following apply.

3.1
test sieve
<particle size analysis> measuring instrument used for sieving

Note 1 to entry: ISO/IEC Guide 99:2007 defines a "measuring instrument" as a device used for making measurements, alone or in conjunction with one or more supplementary devices.

4 Designation

4.1 Test sieves of metal wire cloth shall be designated by the nominal size of the apertures of the metal wire cloth.

4.2 Nominal aperture sizes of 1 mm and above shall be expressed in mm; nominal aperture sizes below 1 mm shall be expressed in µm.

5 Metal wire cloth

5.1 Requirements

Aperture maximum permissible errors and wire diameters shall be as specified in Tables 1 and 2.

Table 1 — Maximum permissible errors of apertures and wire diameters

Values in mm

Nominal aperture sizes, w[a]			**Maximum permissible errors on aperture size**			**Nominal sizes of wire diameters**, d		
Principal sizes	**Supplementary sizes**		**For any aperture size**	**For average aperture size**	**Maximum standard deviation**	**Preferred sizes**	**Permissible range of choice**	
R 20/3	R 20	R 40/3	$+X$	$\pm Y$	σ_0	d_{nom}	d_{max}	d_{min}
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
125	125	125	4,056	3,296		8	9,2	6,8
	112		3,739	2,960		8	9,2	6,8
		106	3,590	2,805		6,3	7,2	5,4
	100		3,438	2,649		6,3	7,2	5,4
90	90	90	3,180	2,389		6,3	7,2	5,4
	80		2,915	2,129	b	6,3	7,2	5,4
		75	2,779	1,999		6,3	7,2	5,4
	71		2,668	1,894		5,6	6,4	4,8
63	63	63	2,443	1,685		5,6	6,4	4,8
	56		2,240	1,501		5	5,8	4,3
		53	2,150	1,423		5	5,8	4,3
	50		2,060	1,344		5	5,8	4,3
45	45	45	1,906	1,212	1,000	4,5	5,2	3,8
	40		1,748	1,080	1,000	4,5	5,2	3,8
		37,5	1,667	1,014	1,000	4,5	5,2	3,8
	35,5		1,601	0,961	1,000	4	4,6	3,4
31,5	31,5	31,5	1,467	0,855	0,907	4	4,6	3,4
	28		1,345	0,762	0,801	3,55	4,1	3
		26,5	1,292	0,722	0,757	3,55	4,1	3
	25		1,238	0,682	0,714	3,55	4,1	3
22,4	22,4	22,4	1,143	0,613	0,641	3,55	4,1	3
	20		1,052	0,548	0,575	3,15	3,6	2,7
		19	1,013	0,522	0,547	3,15	3,6	2,7
	18		0,974	0,495	0,520	3,15	3,6	2,7
16	16	16	0,894	0,441	0,467	3,15	3,6	2,7
	14		0,811	0,387	0,413	2,8	3,2	2,4
		13,2	0,777	0,365	0,392	2,8	3,2	2,4
	12,5		0,747	0,346	0,374	2,5	2,9	2,1
11,2	11,2	11,2	0,690	0,311	0,339	2,5	2,9	2,1
	10		0,636	0,279	0,307	2,5	2,9	2,1
		9,5	0,613	0,265	0,294	2,24	2,6	1,9
	9		0,589	0,251	0,281	2,24	2,6	1,9

NOTE All aperture sizes apply for plain weave.

[a] In accordance with ISO 565:1990, Table 1.

[b] On account of the small number of apertures to be measured, the calculation of the parameter σ_0 has no physical reality.

Table 1 *(continued)*

Nominal aperture sizes, w[a]			**Maximum permissible errors on aperture size**			**Nominal sizes of wire diameters**, d		
Principal sizes	**Supplementary sizes**		**For any aperture size**	**For average aperture size**	**Maximum standard deviation**	**Preferred sizes**	**Permissible range of choice**	
R 20/3	R 20	R 40/3	$+X$	$\pm Y$	σ_0	d_{nom}	d_{max}	d_{min}
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
8	8	8	0,542	0,224	0,254	2	2,3	1,7
	7,1		0,497	0,200	0,229	1,8	2,1	1,5
		6,7	0,477	0,189	0,218	1,8	2,1	1,5
	6,3		0,456	0,178	0,207	1,8	2,1	1,5
5,6	5,6	5,6	0,420	0,159	0,188	1,6	1,9	1,3
	5		0,387	0,142	0,171	1,6	1,9	1,3
		4,75	0,373	0,135	0,164	1,6	1,9	1,3
	4,5		0,359	0,128	0,157	1,4	1,7	1,2
4	4	4	0,330	0,114	0,143	1,4	1,7	1,2
	3,55		0,304	0,102	0,130	1,25	1,5	1,06
		3,35	0,292	0,096	0,124	1,25	1,5	1,06
	3,15		0,279	0,091	0,118	1,25	1,5	1,06
2,8	2,8	2,8	0,257	0,081	0,108	1,12	1,3	0,95
	2,5		0,238	0,073	0,098	1	1,15	0,85
		2,36	0,228	0,069	0,094	1	1,15	0,85
	2,24		0,220	0,065	0,090	0,9	1,04	0,77
2	2	2	0,204	0,059	0,083	0,9	1,04	0,77
	1,8		0,189	0,053	0,076	0,8	0,92	0,68
		1,7	0,182	0,050	0,073	0,8	0,92	0,68
	1,6		0,175	0,047	0,070	0,8	0,92	0,68
1,4	1,4	1,4	0,159	0,042	0,063	0,71	0,82	0,6
	1,25		0,148	0,038	0,058	0,63	0,72	0,54
		1,18	0,142	0,036	0,056	0,63	0,72	0,54
	1,12		0,137	0,034	0,053	0,56	0,64	0,48
1	1	1	0,127	0,030	0,049	0,56	0,64	0,48

NOTE All aperture sizes apply for plain weave.

[a] In accordance with ISO 565:1990, Table 1.

[b] On account of the small number of apertures to be measured, the calculation of the parameter σ_0 has no physical reality.

Table 2 — Maximum permissible errors of apertures and wire diameters

Values in µm

Nominal aperture sizes, w[a]			**Maximum permissible errors on aperture size**			**Nominal sizes of wire diameters**, d		
Principal sizes	**Supplementary sizes**		**For any aperture size**	**For average aperture size**	**Maximum standard deviation**	**Preferred sizes**	**Permissible range of choice**	
R 20/3	R 20	R 40/3	$+X$	$\pm Y$	σ_0	d_{nom}	d_{max}	d_{min}
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	900		118,3	27,6	45,5	500	580	430
		850	113,9	26,2	43,6	500	580	430
	800		109,4	24,8	41,8	450	520	380
710	710	710	101,1	22,2	38,4	450	520	380
	630		93,5	19,9	35,2	400	460	340
		600	90,6	19,0	34,0	400	460	340
	560		86,6	17,9	32,4	355	410	300
500	500	500	80,5	16,2	30,0	315	360	270
	450		75,2	14,7	27,9	280	320	240
		425	72,5	14,0	26,8	280	320	240
	400		69,8	13,3	25,7	250	290	210
355	355	355	64,7	12,0	23,7	224	260	190
	315		60,0	10,8	21,9	200	230	170
		300	58,2	10,4	21,2	200	230	170
	280		55,8	9,8	20,3	180	210	150
250	250	250	52,0	8,9	18,8	160	190	130
	224		48,7	8,1	17,5	160	190	130
		212	47,1	7,8	16,9	140	170	120
	200		45,4	7,4	16,3	140	170	120
180	180	180	42,7	6,8	15,3	125	150	106
	160		39,8	6,3	14,2	112	130	95
		150	38,3	6,0	13,7	100	115	85
	140		36,8	5,7	13,1	100	115	85
125	125	125	34,5	5,2	12,2	90	104	77
	112		32,4	4,8	11,5	80	92	68
		106	31,4	4,7	11,1	71	82	60
	100		30,4	4,5	10,8	71	82	60
90	90	90	28,6	4,2	10,1	63	72	54
	80		26,8	3,9	9,5	56	64	48
		75	25,9	3,7	9,1	50	58	43
	71		25,1	3,6	8,9	50	58	43

NOTE All aperture sizes apply for plain weave. Apertures sizes of 45 µm and smaller apply also for twilled weave. It should be noted, however, that plain and twilled weave sieves can have different sieving characteristics.

[a] In accordance with ISO 565:1990, Table 2.

Table 2 *(continued)*

Nominal aperture sizes, w^a			**Maximum permissible errors on aperture size**			**Nominal sizes of wire diameters**, d		
Principal sizes	**Supplementary sizes**		**For any aperture size**	**For average aperture size**	**Maximum standard deviation**	**Preferred sizes**	**Permissible range of choice**	
R 20/3	R 20	R 40/3	$+X$	$\pm Y$	σ_0	d_{nom}	d_{max}	d_{min}
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
63	63	63	23,6	3,4	8,3	45	52	38
	56		22,1	3,2	7,8	40	46	34
		53	21,5	3,1	7,6	36	41	31
	50		20,9	3,0	7,3	36	41	31
45	45	45	19,7	2,8	6,9	32	37	27
	40		18,6	2,7	6,5	32	37	27
		38	18,1	2,6	6,4	30	35	24
R'10	36		17,6	2,6	6,2	30	35	24
32			16,6	2,4	5,9	28	33	23
25			14,8	2,2	5,2	25	29	21
20			13,3	2,1	4,7	20	23	17

NOTE All aperture sizes apply for plain weave. Apertures sizes of 45 µm and smaller apply also for twilled weave. It should be noted, however, that plain and twilled weave sieves can have different sieving characteristics.

[a] In accordance with ISO 565:1990, Table 2.

5.1.1 Maximum permissible errors on aperture size and standard deviations

5.1.1.1 The maximum permissible error of aperture size X, Y and σ_0, as given in Tables 1 and 2, Columns 4, 5 and 6, apply to the aperture sizes as measured on the centrelines of the aperture (see Figure 1) separately in warp and weft directions.

5.1.1.2 No aperture size shall exceed the nominal size, w, by more than X.

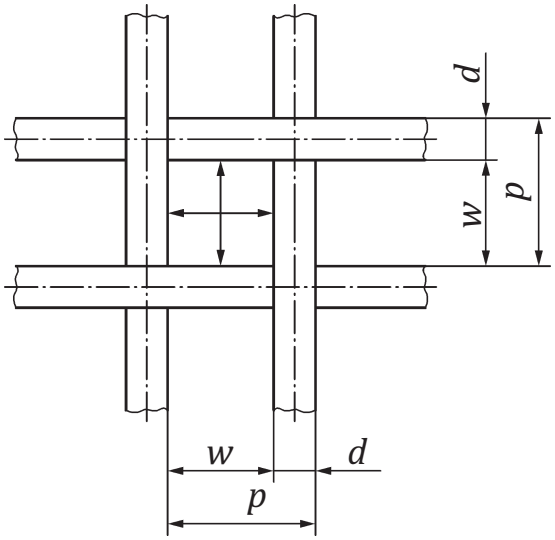
$$X = \left(\frac{2w^{0,75}}{3} + 4w^{0,25} \right) \times 0,9 \tag{1}$$

where X and w are expressed in µm.

5.1.1.3 The average aperture size, $\bar{w}$, shall not depart from the nominal size w by more than $\pm Y$.

$$Y = \left(\frac{w^{0,98}}{27} + 1,6 \right) \times 0,9 \tag{2}$$

where Y and w are expressed in µm.



Key

w aperture size
d wire diameter
p pitch (*w* + *d*)

Figure 1 — Aperture size

5.1.1.4 The maximum standard deviation of the aperture sizes in warp and weft directions taken separately shall not exceed the values of σ_0 in Tables 1 and 2, Column 6.

The maximum standard deviation, σ_0, is calculated based on a truncated normal distribution $\Phi(w)$ where not more than 5 % of all aperture size shall be between $w + Z$ and $w + X$:

$$F\left(X+\bar{w}\right)-F(Z+\bar{w})=\frac{\Phi\left(\frac{X}{\sigma_0}\right)-\Phi\left(\frac{Z}{\sigma_0}\right)}{\Phi\left(\frac{X}{\sigma_0}\right)-\Phi\left(\frac{-\bar{w}}{\sigma_0}\right)}=5\% \qquad Z=\frac{+X+\left|+Y\right|}{2} \tag{3}$$

See Tables 1 and 2.

where $\Phi\left(\frac{w-\bar{w}}{\sigma_0}\right)$ represents the normal distribution in cumulative form.

NOTE The rounded values given in Tables 1 and 2, Column 6 are binding.

The standard deviation *s* is calculated from the measurement of the number of apertures, *n*, listed in Table 4, using Formula (4):

$$s=\sqrt{\frac{1}{n-1}\sum_{i=1}^{n}\left(w_i-\bar{w}\right)^2} \tag{4}$$

The predicted value, σ_S, of the standard deviation may be calculated from Formula (5):

$$\sigma_S = K \cdot s \tag{5}$$

where values of *K* are obtained from Table 4, Columns 3 or 5.

Values of K for compliance and inspection may also be calculated from Formula (6):

$$K = 1,2 + \frac{2,5}{\sqrt{2n}} \tag{6}$$

Values of K for calibration may also be calculated from Formula (7):

$$K = 1,2 + \frac{3,0}{\sqrt{2n}} \tag{7}$$

NOTE An example of the evaluation of the standard deviation is given in Annex A.

5.1.2 Wire diameter

5.1.2.1 The wire diameters given in Tables 1 and 2 apply to metal wire cloth mounted in a frame.

5.1.2.2 The nominal wire diameters given in Tables 1 and 2, Column 7, are preferred.

The nominal wire diameters may, however, depart from these values within the limits d_{max} and d_{min} in Tables 1 and 2, Columns 8 and 9. These limits define the permissible range of choice, approximately ±15 % of the preferred sizes, d_{nom}, given in Tables 1 and 2, Column 7.

5.1.2.3 The wires in a test sieve shall have a similar diameter in the warp and weft directions.

5.2 Test methods

Every aperture in the metal wire cloth in a test sieve shall have the same probability of being inspected for compliance with the requirements listed in 5.1.

For sieves having 20 apertures or less, measure all full apertures (see Figure 2). For sieves having more than 20 apertures, carry out the examination by the following three tests.

In tests 2 and 3 below, measure the aperture sizes using appropriate equipment having a precision of reading of 1 µm or 1/4 of the maximum permissible error for the average aperture size, Y, whichever is the greater.

Test 1 — Visual examination of general condition of the wire cloth

View the wire cloth against a uniformly illuminated background. If obvious deviations from uniformity of appearance are found, for example, weaving defects, creases and wrinkles, the sieve is unacceptable.

Test 2 — Inspection for oversize apertures (maximum permissible error, X)

Carefully and methodically, examine the appearance of all the apertures in order to detect oversize apertures for subsequent measurement. Apertures in fine sieves are best viewed when magnified optically. In the optical method, the magnifications listed in Table 3 may be used.

If any aperture is found to be oversize by more than maximum permissible error of $+X$, the sieve is unacceptable.

Table 3 — Magnifying power in optical method

Nominal aperture size	5 mm to 500 µm	500 µm to 250 µm	250 µm to 20 µm
Magnification	5 to 20	20 to 50	50 to 500

Test 3 — Measurement of average aperture size, w, for maximum permissible error of Y, standard deviation for maximum permissible error of σ and wire diameter, d

Figures 2 to 4 show where to measure the individual apertures in a 200 mm test sieve.

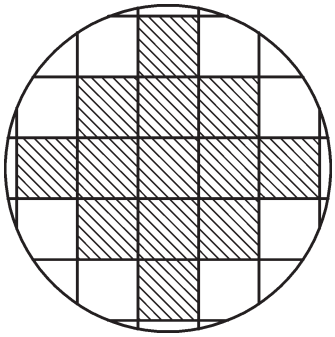
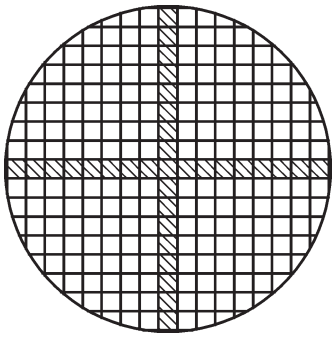
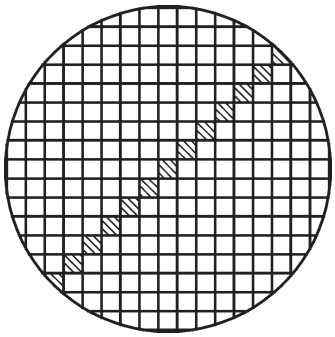


Figure 2 — All full apertures, measure up to 20 apertures



NOTE Apertures randomly spaced over the full diameter irregular intervals; measurements for warp (horizontal) and weft (vertical) dimension. Only one measurement per aperture.

Figure 3 — Example for crosswise spot check



NOTE Apertures randomly spaced over the full diameter irregular intervals; measurements for both warp and weft dimensions may be made in any one aperture.

Figure 4 — Example for diagonal spot check

After a sieve has been found to be acceptable in accordance with tests 1 and 2, carry out measurements of the average aperture size as follows.

The minimum number of apertures to be measured in both warp and weft directions in a 200 mm diameter test sieve shall be as listed in Table 4, separately for compliance, certification or calibration. For test sieves of sizes other than 200 mm diameter, the values in Table 4 should be modified in proportion to the sieving area.

Measure the average aperture size along the centerline of the metal wire cloth separately in two directions, parallel to the warp and weft wires respectively. The measured apertures shall be spaced over the full diameter of the sieve (see Figures 3 and 4). If the metal wire cloth is woven in twilled

weave (apertures ≤45 µm), the configuration shall be as shown in Figure 5 and the measurements shall be made vertically to the wire.

If the wire diameter is measured separately and not together with the aperture size, measure at least 10 wire diameters, if available, in each direction.

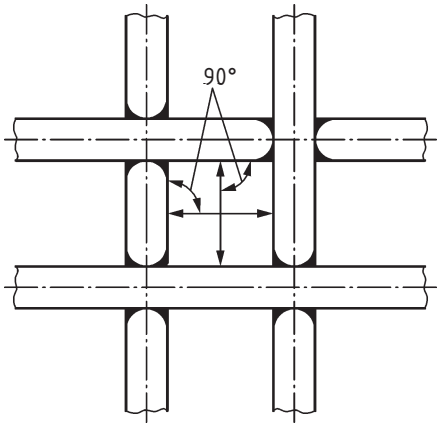


Figure 5 — Configuration of twilled weave

For compliance (5.3.2.1) and inspection (5.3.2.2), compare s with σ_0 if all full apertures have been measured or σ_s with σ_0 if a smaller number of full apertures has been measured.

For calibration (5.3.2.3), compare s with σ_0 if all full apertures have been measured or σ_s with σ_0 if a smaller number of full apertures have been measured.

If the average aperture size, w, the standard deviation, σ_s, or the wire diameter, d, are not in accordance with the appropriate values given in Tables 1 and 2, Columns 5, 6, 8 and 9, the sieve is unacceptable.

5.3 Documentation for sieve conformity

5.3.1 Test sieve record card

The manufacturer may provide a record card (see Annex B) with each new sieve, confirming that it has been inspected by the procedures described in 5.2. This card can be used subsequently to record the results of periodic tests and performance checks.

5.3.2 Certificates

All certificates shall mention the manufacturer's sieve serial number, date and name or signature.

5.3.2.1 Compliance certificate

If no specific request has been made, the manufacturer shall provide a certificate of compliance stating that the test sieve has been inspected in accordance with 5.2 and found to be in compliance with this part of ISO 3310. This certificate may be combined with the test sieve record card (see 5.3.1 and Annex B).

5.3.2.2 Inspection certificate

The manufacturer may provide, at the specific request of the purchaser, a test sieve inspection certificate stating the values for the average aperture size, separately in both the warp and weft direction of the wire cloth, see Table 4, Column 2.

5.3.2.3 Calibration certificate

The manufacturer may provide, at the specific request of the purchaser, a test sieve calibration certificate stating the results of their assessment. Results shall be stated for the number of apertures and wire diameters measured (see Table 4, Column 4), the average aperture size, standard deviation and average wire diameter, separately for the warp and weft directions. The type of weave, plain or twilled, should also be stated.

6 Test sieve frames

It is recommended that the 200 mm round metal frame be used as far as possible, especially for metal wire cloth of nominal aperture size up to 4 mm.

Smaller or larger frames may be appropriate for smaller or larger quantities of material to be sieved.

The shape and size of the test sieve frame have little effect on the results of the sieving operation (see ISO 2591-1). Sieves complete with a lid and receiver in a set shall be assembled so that escape of sample material during a test sieving operation is prevented.

The frames shall be smoothly finished and they shall nest easily with other sieves, lids and receivers of the same nominal frame size.

The seal of the metal wire cloth with the frame shall be so constructed as to prevent lodging of material to be sieved (see Figure 6).

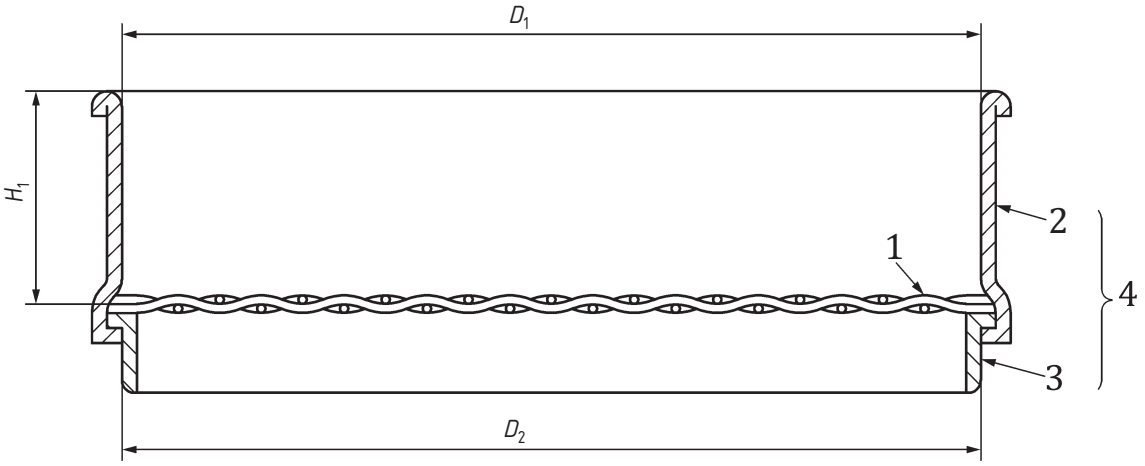
Table 4 — Minimum number of apertures in a 200 mm diameter test sieve, to be measured separately in warp and weft directions, randomly spaced over the full diameter

Nominal aperture size w[a]	Process for compliance and inspection	*K* Factor	Process for calibration	*K* Factor
(1)	(2)	(3)	(4)	(5)
				mm size
125 to 25	All in both directions (max 25 in larger sieves with diameter more than 200 mm)		All in both directions (max 50 in larger sieves with diameter more than 200 mm)	
22,4 to 4	2 × 15	1,66	2 × 30	1,59
3,55 to 2,24	2 × 20	1,60	2 × 40	1,54
2 to 1,6	2 × 25	1,55	2 × 50	1,50
1,4 to 1	2 × 40	1,48	2 × 80	1,44
				µm size
900 to 800	2 × 40	1,48	2 × 80	1,44
710 to 560	2 × 50	1,45	2 × 100	1,41
500 to 400	2 × 60	1,43	2 × 120	1,39
355 to 200	2 × 80	1,40	2 × 160	1,37
180 to 90	2 × 100	1,38	2 × 200	1,35
80 to 45	2 × 100	1,38	2 × 250	1,33
40 to 20	2 × 100	1,38	2 × 300	1,32

NOTE *K* factors are used in Formula (5) for the calculation of the predicted value of the standard deviation, σ_s, to enhance the confidence level of the standard deviation to 99 % for the process of compliance and inspection or 99,73 % for the process of calibration (see Annex A).

[a] In accordance with ISO 565:1990, Tables 1 and 2.

The maximum permissible error on test sieves of diameter 200 mm shall comply with Table 5.



Key

1 metal wire cloth
2 main part
3 base
4 frame

Figure 6 — Cross-section of test sieve (diagrammatic)

Table 5 — Maximum permissible error on test sieves of diameter 200 mm

Dimensions in mm

Test sieve nominal frame size		Diameter or length of effective sieving surface		Approximate depth
D_1	D_2	min	max	H_1
$200_{0}^{+0,6}$	$200_{-0,7}^{-0,1}$	185	200	50 or 25
NOTE The maximum permissible errors on D_1 and D_2 should also apply to other nominal frame sizes, such as 100 mm, 300 mm and 400 mm.				

7 Marking of test sieves

Each test sieve supplied shall be *permanently* marked with following information:

a) the nominal aperture size;

b) a reference to the standard(s) with which the test sieve is claimed to comply;

c) the material of the metal wire cloth and the frame;

d) the name of the party (manufacturer or vendor) that is responsible for the sieve;

e) the manufacturer's test sieve serial number.

Annex A
(informative)

Determination of the standard deviation on average aperture size

The standard deviation is calculated using Formulae (3) to (7), as illustrated by the following two examples.

Table A.1 — Test for compliance and inspection (5.3.2.1 and 5.3.2.2) — Example 1 with n = 25 (nominal aperture w = 2,0 mm)

w_i	n_i	$n_i \times w_i$	$\left(w_i - \bar{w}\right)$	$\left(w_i - \bar{w}\right)^2$	$n_i \left(w_i - \bar{w}\right)^2$
1,812	0	0,000	−0,132	0,017	0,000
1,859	3	5,577	−0,085	0,007	0,021
1,906	5	9,530	−0,038	0,001	0,007
1,953	11	21,483	0,009	0,000	0,001
2,000	6	12,000	0,056	0,003	0,019
2,047	0	0,000	0,103	0,011	0,000
2,094	0	0,000	0,150	0,023	0,000
2,141	0	0,000	0,197	0,039	0,000
2,188	0	0,000	0,244	0,060	0,000
n =	25	48,590			0,049

$$\bar{w} = \frac{1}{n}\sum_{i=1}^{n} w_i$$

$$\bar{w} = \frac{48,59}{25} = 1,944 \text{ mm}$$

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}\left(w_i - \bar{w}\right)^2}$$

$$s = \sqrt{\frac{1}{25-1} \times 0,049} = 0,045 \text{ mm}$$

For the compliance and inspection tests, this value of s is multiplied by the factor K [Formula (6)] to enhance the confidence level of the standard deviation to 99 %.

$$\sigma_s = K \cdot s$$

$$\sigma_s = 1,55 \times 0,045 = 0,070 \text{ mm}$$

Standard deviation, σ_s = 0,070, is compared with the value of σ_0 = 0,083 given in Table 1, Column 6. If $\sigma_s \leq \sigma_0$, the test sieve fulfils the requirements of a compliance and an inspection certificate.

Table A.2 — Test for calibration (see 5.3.2.3) — Example 2 with n = 50 (nominal aperture size w = 2,0 mm)

w_i	n_i	$n_i \times w_i$	$\left(w_i - \overline{w}\right)$	$\left(w_i - \overline{w}\right)^2$	$n_i \left(w_i - \overline{w}\right)^2$
1,812	0	0,000	−0,187	0,035	0,000
1,859	1	1,859	−0,140	0,020	0,020
1,906	3	5,718	−0,093	0,009	0,026
1,953	10	19,530	−0,046	0,002	0,021
2	22	44,000	0,001	0,000	0,000
2,047	11	22,517	0,048	0,002	0,025
2,094	2	4,188	0,095	0,009	0,018
2,141	1	2,141	0,142	0,020	0,020
2,188	0	0,000	0,189	0,036	0,000
n =	50	99,953			0,130

$$\overline{w} = \frac{1}{n}\sum_{i=1}^{n} w_i$$

$$\overline{w} = \frac{99,953}{50} = 1,999 \text{ mm}$$

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}\left(w_i - \overline{w}\right)^2}$$

$$s = \sqrt{\frac{1}{50-1} \times 0,130} = 0,052 \text{ mm}$$

For the calibration test, this value of s shall be multiplied by the K factor [Formula (7)] to enhance the confidence level of the standard deviation to 99,73 %.

$$\sigma_s = K \cdot s$$

$$\sigma_s = 1,50 \times 0,052 = 0,077 \text{ mm}$$

The standard deviation, σ_s = 0,077, is compared with the value of σ_0 = 0,083 given in Table 1, Column 6.

As $\sigma_s \leq \sigma_0$, the test sieve fulfils the requirements of a calibration certificate.

Annex B
(informative)

Test sieve record card

Table B.1 — Example of a test sieve record card for metal wire cloth sieve

<table>
<tr><td colspan="3">Standard:
ISO 3310-1</td><td colspan="4">TEST SIEVE RECORD CARD</td><td>Date: 1998–05–05
Signed:</td></tr>
<tr><td colspan="3">Sieve serial no.:
1234567</td><td colspan="4">Nominal aperture size, w</td><td rowspan="3">Certificate 5.3.2
Compliance 1 ☐
Inspection 2 ☐
Calibration 3 ☐
(mark 1, 2 or 3)</td></tr>
<tr><td colspan="3">Certificate no.:</td><td colspan="2">mm</td><td colspan="2">µm: 250</td></tr>
<tr><td rowspan="2">Date</td><td rowspan="2">Time used</td><td rowspan="2">Visual survey</td><td colspan="2">Maximum permissible error on average aperture size, ±Y</td><td colspan="2">Max. standard deviation, σ_0</td></tr>
<tr><td>Warp (lengthwise)</td><td>Weft (crosswise)</td><td>Warp (lengthwise)</td><td>Weft (crosswise)</td></tr>
<tr><td>1998–05–05</td><td>New</td><td>Yes</td><td>Within ± Y</td><td>Within ± Y</td><td>≤ σ</td><td>≤ σ</td><td>Yes</td></tr>
<tr><td colspan="8">NOTE It is the user's responsibility to ensure that a used sieve is re-examined according to the circumstances and with a frequency appropriate to the degree of use that the sieve has undergone.</td></tr>
</table>

The sizes and maximum permissible errors in this part of ISO 3310 apply to new test sieves. With continued use, however, sieves will wear and it is necessary that all sieves should be examined visually for damage or blinding before each use. Sieves should also be checked periodically, depending on the frequency of use.

One method for checking consists of remeasuring the sieve apertures using the procedures described in 5.2. If the user is not prepared to make such periodic reinspections, recourse may be made by the sieve manufacturer/vendor or by specialists in testing.

Alternatively, sieves can be checked for performance by sieving a known material and comparing the amount of residue on the sieve with that expected.

Known material can be either

a) a reference material with an agreed particle size distribution, or

b) a material that has also been sieved on a set of master test sieves reserved solely for this checking operation. Further guidance on checking procedures is provided in ISO 2591-1:1988, 6.2.

Bibliography

[1] EN 10204, *Metallic products — Types of inspection documents*

[2] ISO/IEC Guide 99:2007, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

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