INTERNATIONAL STANDARD

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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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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 3310 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 3310-1 was prepared by Technical Committee ISO/TC 24, *Sieves, sieving and other sizing methods*, Subcommittee SC 1, *Test sieves, test sieving*.

This fourth edition cancels and replaces the third edition (ISO 3310-1:1990), of which it constitutes a technical revision.

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*

Annexes A and B of this part of ISO 3310 are for information only.

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 tolerances on the apertures in metal wire cloth as close as possible.

Requirements other than tolerances 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.

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 normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 3310. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 3310 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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

ISO 2395:1990, *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 part of ISO 3310, the terms and definitions given in ISO 2395 apply.

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 millimetres (mm); nominal aperture sizes below 1 mm shall be expressed in micrometres (μm).

5 Metal wire cloth

5.1 Requirements

Aperture tolerances and wire diameters shall be as specified in Tables 1 and 2.

Table 1 — Aperture tolerances and wire diameters

Values in millimetres

Nominal aperture sizes, w [a]			Tolerances 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	4,51	3,66	b	8	9,2	6,8
	112		4,15	3,29		8	9,2	6,8
		106	3,99	3,12		6,3	7,2	5,4
	100		3,82	2,94		6,3	7,2	5,4
90	90	90	3,53	2,66		6,3	7,2	5,4
	80		3,24	2,37		6,3	7,2	5,4
		75	3,09	2,22		6,3	7,2	5,4
	71		2,97	2,1		5,6	6,4	4,8
63	63	63	2,71	1,87		5,6	6,4	4,8
	56		2,49	1,67		5	5,8	4,3
		53	2,39	1,58		5	5,8	4,3
	50		2,29	1,49		5	5,8	4,3
45	45	45	2,12	1,35	1,000	4,5	5,2	3,8
	40		1,94	1,2	1,000	4,5	5,2	3,8
		37,5	1,85	1,13	1,000	4,5	5,2	3,8
	35,5		1,78	1,07	1,000	4	4,6	3,4
31,5	31,5	31,5	1,63	0,95	1,000	4	4,6	3,4
	28		1,5	0,85	1,000	3,55	4,1	3
		26,5	1,44	0,8	1,000	3,55	4,1	3
	25		1,38	0,76	1,000	3,55	4,1	3
22,4	22,4	22,4	1,27	0,68	0,920	3,55	4,1	3
	20		1,17	0,61	0,780	3,15	3,6	2,7
		19	1,13	0,58	0,729	3,15	3,6	2,7
	18		1,08	0,55	0,690	3,15	3,6	2,7
16	16	16	0,99	0,49	0,610	3,15	3,6	2,7
	14		0,9	0,43	0,530	2,8	3,2	2,4
		13,2	0,86	0,41	0,506	2,8	3,2	2,4
	12,5		0,83	0,39	0,480	2,5	2,9	2,1
11,2	11,2	11,2	0,77	0,35	0,430	2,5	2,9	2,1
	10		0,71	0,31	0,385	2,5	2,9	2,1
		9,5	0,68	0,3	0,372	2,24	2,6	1,9
	9		0,65	0,28	0,350	2,24	2,6	1,9

Table 1 (*continued*)

Values in millimetres

Nominal aperture sizes, w [a]			Tolerances 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	0,6	0,25	0,315	2	2,3	1,7
	7,1		0,55	0,22	0,280	1,8	2,1	1,5
		6,7	0,53	0,21	0,269	1,8	2,1	1,5
	6,3		0,51	0,2	0,255	1,8	2,1	1,5
5,6	5,6	5,6	0,47	0,18	0,235	1,6	1,9	1,3
	5		0,43	0,16	0,210	1,6	1,9	1,3
		4,75	0,41	0,15	0,199	1,6	1,9	1,3
	4,5		0,4	0,14	0,190	1,4	1,7	1,2
4	4	4	0,37	0,13	0,175	1,4	1,7	1,2
	3,55		0,34	0,11	0,155	1,25	1,5	1,06
		3,35	0,32	0,11	0,151	1,25	1,5	1,06
	3,15		0,31	0,1	0,145	1,25	1,5	1,06
2,8	2,8	2,8	0,29	0,09	0,130	1,12	1,3	0,95
	2,5		0,26	0,08	0,117	1	1,15	0,85
		2,36	0,25	0,08	0,114	1	1,15	0,85
	2,24		0,24	0,07	0,110	0,9	1,04	0,77
2	2	2	0,23	0,07	0,105	0,9	1,04	0,77
	1,8		0,21	0,06	0,092	0,8	0,92	0,68
		1,7	0,2	0,06	0,087	0,8	0,92	0,68
	1,6		0,19	0,05	0,082	0,8	0,92	0,68
1,4	1,4	1,4	0,18	0,05	0,076	0,71	0,82	0,6
	1,25		0,16	0,04	0,069	0,63	0,72	0,54
		1,18	0,16	0,04	0,067	0,63	0,72	0,54
	1,12		0,15	0,04	0,064	0,56	0,64	0,48
1	1	1	0,14	0,03	0,059	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 — Aperture tolerances and wire diameters

Values in micrometres

Nominal aperture sizes, w [a]			Tolerances 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		131	31	54,2	500	580	430
		850	127	29	52,2	500	580	430
	800		122	28	50,2	450	520	380
710	710	710	112	25	45,8	450	520	380
	630		104	22	42	400	460	340
		600	101	21	40,5	400	460	340
	560		96	20	38,7	355	410	300
500	500	500	89	18	35,9	315	360	270
	450		84	16	33,2	280	320	240
		425	81	16	32,2	280	320	240
	400		78	15	30,9	250	290	210
355	355	355	72	13	28,2	224	260	190
	315		67	12	26,1	200	230	170
		300	65	12	25,4	200	230	170
	280		62	11	24,2	180	210	150
250	250	250	58	9,9	22,4	160	190	130
	224		54	9	20,8	160	190	130
		212	52	8,7	20	140	170	120
	200		50	8,3	19,4	140	170	120
180	180	180	47	7,6	18	125	150	106
	160		44	6,9	16,8	112	130	95
		150	43	6,6	16,3	100	115	85
	140		41	6,3	15,6	100	115	85
125	125	125	38	5,8	14,4	90	104	77
	112		36	5,4	13,6	80	92	68
		106	35	5,2	13,2	71	82	60
	100		34	5	12,8	71	82	60
90	90	90	32	4,6	12	63	72	54
	80		30	4,3	11,3	56	64	48
		75	29	4,1	10,9	50	58	43
	71		28	4	10,5	50	58	43

Table 2 (*continued*)

Values in micrometres

Nominal aperture sizes, w [a]			Tolerances 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	26	3,7	9,9	45	52	38
	56		25	3,5	9,3	40	46	34
		53	24	3,4	9	36	41	31
	50		23	3,3	8,7	36	41	31
45	45	45	22	3,1	8,3	32	37	27
	40		21	3	7,9	32	37	27
		38	20	2,9	7,7	30	35	24
R'10	36		20	2,8	7,5	30	35	24
32			19	2,7	6,8	28	33	23
25			16	2,5	6,1	25	29	21
20			14	2,3	5,7	20	23	17

NOTE All aperture sizes apply for plain weave. Aperture 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 Aperture tolerances and standard deviations

5.1.1.1 The aperture tolerances 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 centre-lines 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.

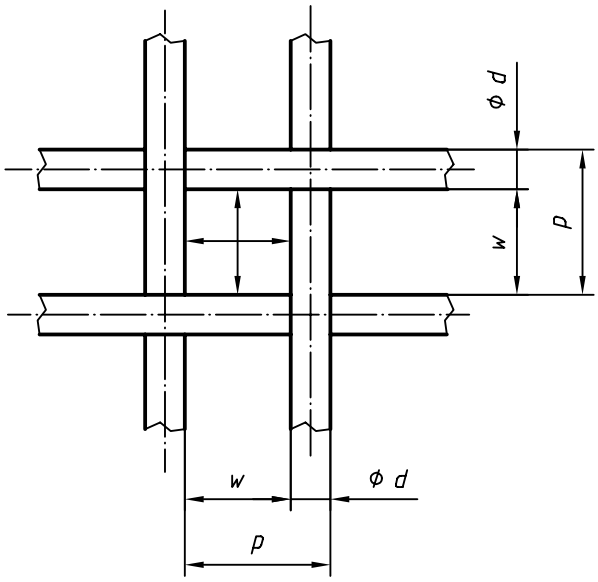
$$X = \frac{2w^{0,75}}{3} + 4w^{0,25} \quad (1)$$

where X and w are expressed in micrometres.

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

$$Y = \frac{w^{0,98}}{27} + 1,6 \quad (2)$$

where Y and w are expressed in micrometres.



Key

w is the aperture size

d is the wire diameter

p is the 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 standard deviation σ is obtained by measurement of all full apertures, N, in the test sieve and is calculated from equation (3):

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(w_i - \overline{w})^2} \tag{3}$$

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

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

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

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

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

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

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

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

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

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 tolerance 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 (tolerance 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.

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

If any aperture is found to be oversize by more than tolerance X, the sieve is unacceptable.

Test 3 — Measurement of average aperture size $\overline{w}$ for tolerance Y, standard deviation for tolerance σ_0 and wire diameter d

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