INTERNATIONAL STANDARD

ISO 3310-2

Fifth edition
2013-09-01

Test sieves — Technical requirements and testing —

Part 2: Test sieves of perforated metal plate

Tamis de contrôle — Exigences techniques et vérifications —

Partie 2: Tamis de contrôle en tôles métalliques perforées

Reference number
ISO 3310-2:2013(E)

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Published in Switzerland

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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. www.iso.org/directives.

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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 3310-2:1999), which has been technically revised.

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 tolerances on the holes in perforated metal plate as close as possible as the manufacturing process allows.

Requirements other than tolerances on the holes, such as requirements for the pitch of holes, any corner radii, and plate thickness, 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 2:
Test sieves of perforated metal plate

1 Scope

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

It applies to test sieves having

— round holes, with sizes from 125 mm down to 1 mm, or

— square holes, with sizes from 125 mm down to 4 mm,

in accordance with ISO 565.

2 Normative references

The following 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 dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

3 Terms and definitions

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

4 Designation

Test sieves of perforated metal plate shall be designated by the nominal size of the holes, expressed in millimetres, and by the shape of the holes.

5 Perforated metal plate

5.1 Requirements

The tolerances on the individual size of holes and the selection of pitches shall be as specified in Table 1.

5.1.1 Tolerances on individual size of holes

The tolerances on the individual size of holes as given in Table 1, Column 4, apply to the widths of the mid-sections of square holes and to the diameters of round holes.

5.1.2 Pitch, p

5.1.2.1 The pitches given in Table 1 apply to both round and square holes.

5.1.2.2 The nominal pitches given in Table 1, Column 5, are preferred.

The nominal pitches should be within the limits of p_{max} and p_{min} as given in Table 1, Columns 6 and 7. These are defined by a permissible range of choice of approximately ± 15 % of the value calculated from the nominal size of holes and the preferred pitch.

Table 1 — Tolerances on individual size of holes and selection of pitches

Dimensions in millimetres

Nominal sizes of holes, w [a]			Tolerances on individual size of hole ±	Pitch, p		
Principal sizes	Supplementary sizes			Preferred sizes	Permissible range of choice	
R 20/3	R 20	R 40/3		p_{nom}	p_{max}	p_{min}
(1)	(2)	(3)	(4)	(5)	(6)	(7)
125	125	125	1	160	184	143
	112		0,95	140	161	126
		106	0,9	132	152	119
	100		0,85	125	144	113
90	90	90	0,8	112	129	101
	80		0,7	100	115	90
		75	0,7	95	109	85
	71		0,65	90	103	81
63	63	63	0,6	80	92	72
	56		0,55	71	82	63,5
		53	0,55	67	77	60
	50		0,55	63	72,5	56,5
45	45	45	0,5	56	64,5	50,5
	40		0,45	50	57,5	45
		37,5	0,45	47,5	54,6	42,5
	35,5		0,4	45	51,7	40,5
31,5	31,5	31,5	0,4	40	46	36
	28		0,35	35,5	40,8	31,8
		26,5	0,35	33,5	38,5	30
	25		0,35	31,5	36	28,5
22,4	22,4	22,4	0,3	28	32,2	25,5
	20		0,3	25	29	22,5
		19	0,29	23,6	27,1	21,3
	18		0,28	22,4	25,8	20,2
16	16	16	0,27	20	23	18
	14		0,26	18	20,7	16
		13,2	0,25	17	19,5	15,1
	12,5		0,24	16	18,4	14,3

[a] In accordance with ISO 565, the lower limit of the nominal size of square holes is 4 mm.

Table 1 *(continued)*

Nominal sizes of holes, w [a]			Tolerances on individual size of hole	Pitch, p		
Principal sizes	Supplementary sizes			Preferred sizes	Permissible range of choice	
R 20/3	R 20	R 40/3	±	p_{nom}	p_{max}	p_{min}
(1)	(2)	(3)	(4)	(5)	(6)	(7)
11,2	11,2	11,2	0,23	14	16,1	12,6
	10		0,21	12,6	14,5	11,3
		9,5	0,21	12,1	13,8	10,2
	9		0,2	11,6	13,3	9,8
8	8	8	0,19	10,4	12	9,2
	7,1		0,18	9,4	10,8	8
		6,7	0,17	8,9	10,2	7,5
	6,3		0,17	8,5	9,8	7,2
5,6	5,6	5,6	0,15	7,7	8,9	6,6
	5		0,14	6,9	7,9	5,9
		4,75	0,14	6,6	7,6	5,6
	4,5		0,14	6,3	7,2	5,3
4	4	4	0,13	5,8	6,7	4,9
	3,55		0,12	5,2	6	4,4
		3,35	0,11	5	5,7	4,2
	3,15		0,11	4,7	5,3	3,9
2,8	2,8	2,8	0,11	4,35	5	3,6
	2,5		0,11	3,9	4,5	3,3
		2,36	0,11	3,75	4,3	3,2
	2,24		0,1	3,6	4,1	3,1
2	2	2	0,09	3,3	3,8	2,8
	1,8		0,08	3,1	3,6	2,7
		1,7	0,08	3	3,4	2,5
	1,6		0,08	2,75	3,2	2,3
1,4	1,4	1,4	0,08	2,6	3	2,2
	1,25		0,08	2,45	2,9	2,1
		1,18	0,07	2,4	2,7	2
	1,12		0,07	2,22	2,5	1,8
1	1	1	0,07	2	2,3	1,7

[a] In accordance with ISO 565, the lower limit of the nominal size of square holes is 4 mm.

5.1.3 Plate thickness

The nominal thicknesses given in Table 2, Column 2, are preferred. The nominal thickness may, however, depart from these values within the permissible range of choice given in Table 2, Columns 3 and 4.

Table 2 — Plate thicknesses

Dimensions in millimetres

Nominal sizes of holes w	Plate thickness		
	Preferred thickness	Permissible range of choice	
		max.	min.
(1)	(2)	(3)	(4)
125 to 50	3	3,5	2
45 to 16	2	2,5	1,5
14 to 8	1,5	2	1
7,1 to 1,7	1	1,5	0,8
1,6 to 1,0	0,6	1	0,5

5.1.4 Arrangement of holes

Round and square holes in perforated metal plates in test sieves (see Figure 1) shall be arranged in straight or staggered rows.

Sieves with hole sizes 4 mm and above shall have an unperforated margin. Partial holes are not permitted (see Figure 2). The unperforated margin is influenced by the hole size, pitch, and manufacturing method, resulting in different margin widths.

The corners of square holes may be rounded with a maximum permissible radius of rounding given by the formula

$$r_{max} = 0{,}15w \quad (1)$$

where

r_{max} is the maximum radius of rounding, in millimetres;

w is the nominal size of the hole, in millimetres.

a) Round holes **b) Square holes**

Figure 1 — Arrangement of square and round holes in test sieves

5.1.5 Material of plate

Plated steel is usually supplied. At the lower end of the aperture range, brass may be used. The purchaser should state specific requirements in the enquiry, such as stainless steel.

5.2 Test methods

Every hole in the perforated metal plate in a test sieve shall have the same probability of being inspected for compliance with the requirements listed in 5.1, Table 1, Column 4.

Measure the hole sizes using appropriate equipment with a precision of reading of 20 µm or 1/4 of the tolerance concerned (Table 1, Column 4), whichever is greater.

Test 1 — Visual examination of general condition

View the perforated metal plate against a uniformly illuminated background. If obvious deviations from uniformity of appearance are found, for example partial holes (4 mm and larger), the sieve is unacceptable.

Test 2 — Measurement of size of hole and pitch

Measure the hole size on the centre lines of square holes and on the diameter of round holes according to Table 3.

Table 3 — Minimum number of holes to be measured in a 200 mm diameter test sieve

Nominal sizes of holes *w* mm	Process for compliance and inspection	Process for calibration
(1)	(2)	(3)
125 to 22,4	All (max. 25 in larger sieves with diameter more than 200 mm)	All (max. 50 in larger sieves with diameter more than 200 mm)
20 to 4	2 × 15	2 × 30
3,55 to 2,24	2 × 20	2 × 40
2 to 1,6	2 × 25	2 × 50
1,4 to 1	2 × 40	2 × 80

Measure the dimensions of the holes and the pitches, *p*, over any selected area of the plate, along two straight lines and different directions, each line being at least 150 mm in length and including at least eight holes in each direction.

If the dimension of any hole exceeds the tolerance, the sieve is unacceptable.

If the minimum number of holes prescribed for examination is not available in the plate, check all the holes in the sieve.

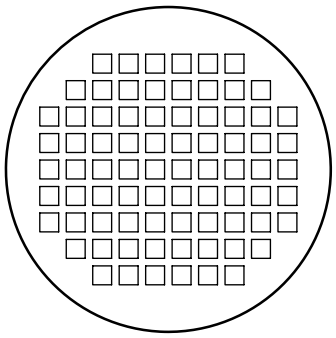


Figure 2 — Example of hole configuration for measurement of up to 20 holes

5.3 Documentation for sieve conformity

5.3.1 Test sieve record card

The manufacturer may provide a record card (see Annex A) 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 A).

5.3.2.2 Inspection certificate

The manufacturer may provide, at the specific request of the purchaser, a test sieve inspection certificate stating the test results for the average hole size. See Table 3, 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 holes measured, the average hole size, the plate thickness, and pitch. See Table 3, Column 3.

6 Test sieve frames

It is recommended that the 200 mm round metal frame be used as far as possible.

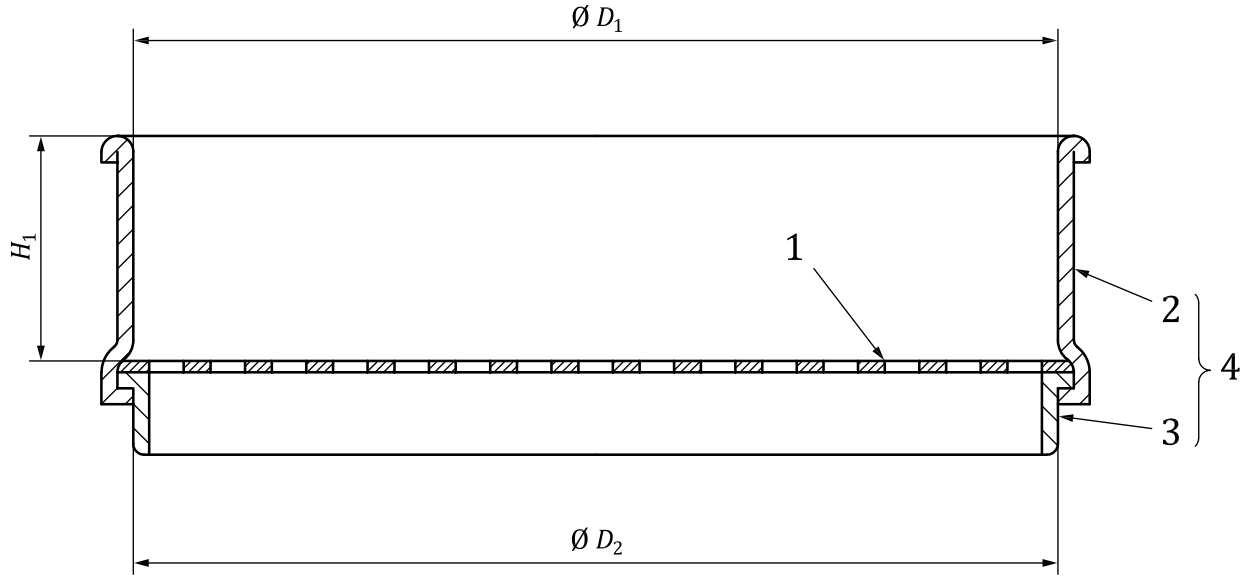
Larger frames may be appropriate for larger quantities of material to be sieved and for hole sizes larger than 25 mm.

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 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 perforated metal plate with the frame shall be so constructed as to prevent lodging of material to be sieved (see Figure 3).

The tolerances on test sieves of diameter 200 mm shall comply with Table 4.



Key

1 perforated metal plate
2 main part
3 base
4 frame

Figure 3 — Cross section of test sieve (diagrammatic)

Table 4 — Tolerances on 200 mm diameter test sieves

Dimensions in millimetres

Test sieve nominal frame size		Diameter or length of effective sieving surface		Approximate depth
D_1	D_2	min.	max.	H_1
$200\,^{0}_{+0,6}$	$200^{-0,1}_{-0,7}$	185	200	50
NOTE The tolerances 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

A metal label permanently attached to the frame shall give the following information:

a) the nominal size and shape of holes;

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

c) the material of the perforated metal plate and of 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)

Test sieve record card

Table A.1 — Example of a test sieve record card for a perforated metal plate sieve

<table>
<tr><td colspan="3">Standard:
ISO 3310-2</td><td colspan="3">TEST SIEVE RECORD CARD</td><td colspan="2">Date: 1999-05-05
Signed:</td></tr>
<tr><td colspan="3" rowspan="2">Sieve serial No.:
987654</td><td colspan="3" rowspan="2">Nominal size of holes</td><td colspan="2">Certificate 5.3.2</td></tr>
<tr><td>Compliance 1</td><td>☒</td></tr>
<tr><td colspan="3" rowspan="2">Certificate No.:</td><td rowspan="2">mm
100</td><td>Round</td><td>O</td><td>Inspection 2</td><td>☐</td></tr>
<tr><td>Square</td><td>☒</td><td rowspan="2">Calibration 3
(Mark 1, 2, or 3)</td><td rowspan="2">☐</td></tr>
<tr><td>Date</td><td>Times used</td><td>Visual survey</td><td colspan="3">Tolerance on individual size of holes</td></tr>
<tr><td>1998-05-05</td><td>New</td><td>Yes</td><td colspan="3">Within tolerance</td><td colspan="2">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 tolerances 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) reference material with an agreed particle size distribution, or

b) 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,[1] 6.2.

Bibliography

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

[2] EN 10204:2004, *Metallic materials — Types of inspection documents*

ICS 19.120

Price based on 9 pages