BRITISH STANDARD

BS 410-2:2000
ISO 3310-2:1999

# Test sieves — Technical requirements and testing —

## Part 2: Test sieves of perforated metal plate

ICS 19.120

# National foreword

This British Standard reproduces verbatim ISO 3310-2:1999 and implements it as the UK national standard. Together with BS 410-1:2000, it supersedes BS 410:1986 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee LBI/37, Sieves, screens and particle sizing, to Subcommittee LBI/37/1, Test sieves and sieving, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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**Summary of pages**

This document comprises a front cover, an inside front cover, the ISO title page, pages ii and iii, a blank page, pages 1 to 10, an inside back cover and a back cover.

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INTERNATIONAL STANDARD

**ISO 3310-2**

Fourth edition
1999-08-15

# 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 3310-2:1999(E)

## 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.

International Standard ISO 3310-2 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 3310-2:1990), 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*

Annex A of this part of ISO 3310 is 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 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 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

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 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 |

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) |
| 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 |
| 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 |

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) |
| | | 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

$$r_{max} = 0{,}15w$$

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 the 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 25 | All (max. 25 in larger sieves with diameter more than 200 mm) | All (max. 50 in larger sieves with diameter more than 200 mm) |
| 22,4 to 4 | $2 \times 15$ | $2 \times 30$ |
| 3,55 to 2,24 | $2 \times 20$ | $2 \times 40$ |
| 2 to 1,6 | $2 \times 25$ | $2 \times 50$ |
| 1,4 to 1 | $2 \times 40$ | $2 \times 80$ |

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.

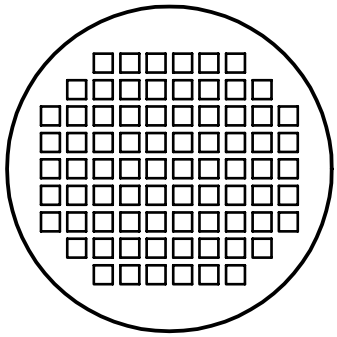


**Figure 2 — Example of hole configuration for measurement of up to 20 holes**

## 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.

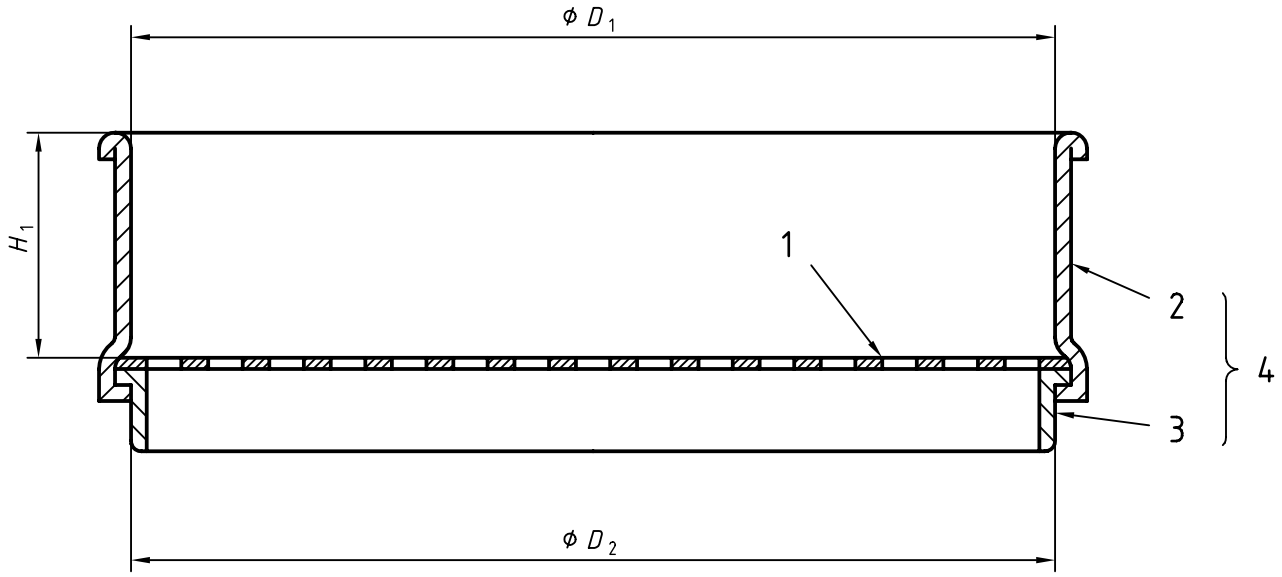
The shape and size of the test sieve frame have little effect on the results of the sieving operation, see ISO 2591-1.

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:<br>ISO 3310-2</td><td colspan="2">TEST SIEVE RECORD CARD</td><td>Date: 1999-05-05<br>Signed:</td></tr>
<tr><td colspan="3">Sieve serial No.:<br>987654</td><td colspan="2">Nominal size of holes</td><td rowspan="2">Certificate 5.3.2<br>Compliance 1 ☒<br>Inspection 2 ☐<br>Calibration 3 ☐<br>(mark 1, 2 or 3)</td></tr>
<tr><td colspan="3">Certificate No.:</td><td>mm<br>100</td><td>Round ○<br>Square ☒</td></tr>
<tr><td>Date</td><td>Times used</td><td>Visual survey</td><td colspan="2">Tolerance on individual size of holes</td><td></td></tr>
<tr><td>1998-05-05</td><td>New</td><td>Yes</td><td colspan="2">Within tolerance</td><td>Yes</td></tr>
<tr><td colspan="6">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, subclause 6.2.

# Bibliography

[1] EN 10204:1991, *Metallic products — Types of inspection documents.*

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