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IS 2405-2 (1980): Industrial Sieves, Part II: Perforated Plates [CED 55: Sieves, Sieving and other Sizing Methods]



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# Indian Standard SPECIFICATION FOR INDUSTRIAL SIEVES PART II PERFORATED PLATES (First Revision)

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BUREAU OF INDIAN STANDARDS MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG NEW DELHI 110002

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IS : 2405 ( Part II ) - 1980

# Indian Standard

## SPECIFICATION FOR INDUSTRIAL SIEVES

#### PART II PERFORATED PLATES

# (First Revision)

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## AMENDMENT NO. 1 JUNE 1985

### T0

# IS:2405(Part 2)-1980 SPECIFICATION FOR INDUSTRIAL SIEVES

## PART 2 PERFORATED PLATES

(First Revision)

(Page 7, clause 5.2) - Add the following after clause 5.2:

'5.2.1 The maximum value of the corner radius of any square hole  $\binom{r}{\max}$  is given in millimetres, by the following formula:

 $r_{\rm max} = 0.05 \, \text{A} + 0.30$ 

where A is the aperture size, in

millimetres,'

(BDC 19)

## Indian Standard

## SPECIFICATION FOR INDUSTRIAL SIEVES

#### PART II PERFORATED PLATES

# (First Revision)

## **0.** FOREWORD

**0.1** This Indian Standard (Part II) (First Revision) was adopted by the Indian Standards Institution on 30 January 1980, after the draft finalized by the Sieves, Sieving and Other Sizing Methods Sectional Committee had been approved by the Civil Engineering Division Council.

**0.2** Industrial sieves made of wire cloth as well as of perforated plates are widely used for grading of stones, in the manufacture of cement and sugar and for a variety of other industrial purposes. These are produced in a number of combinations of size and shape of aperture, wire diameter or plate thickness, and metal. Such variety is most confusing and to the vast majority of users, unnecessary; since each usually requires only a very few of these.

**0.3** This standard was first issued in 1963, with a view to cover the requirements of wire cloth and perforated plates having round and square apertures, in the sizes most commonly used in a number of industries. This revision of the standard has been prepared in two parts; Part I dealing with wire cloth sieves and Part II dealing with perforated plates.

0.3.1 In this part ( Part II ), R 20 preferred number series for aperture sizes and pitches of holes as recommended by International Organization for Standardization ( ISO 2194 Wire screens and plate screens for industrial purposes — Nominal sizes of apertures and ISO Document ISO/ TC 24/SC 7 N24 ), has been followed. To suit different industrial uses, five classes each of round hole and square hole perforated plates have been specified which give nominal open areas ranging from 64 percent to 23 percent.

**0.4** In the formulation of this standard assistance has been drawn from BS 1669: 1972 Specification for industrial perforated plates, issued by the British Standards Institution.

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**0.5** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS: 2-1960<sup>\*</sup>. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

#### 1. SCOPE

1.1 This standard (Part II) specifies requirements for flat metal industrial perforated plates with round or square hole perforations, staggered pitch.

1.1.1 The ranges of aperture sizes are 125 mm to 3.15 mm for round perforations and 125 mm to 4 mm for square perforations.

#### 2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shalla pply.

2.1 Aperture Size (A) — The diameter of a round hole or the distance between opposite sides of a square hole, measured on the punch side (see Fig. 1, 2 and 3).

2.2 Bridge Width -- The distance between the nearest edges of two adjacent holes in a perforated plate, measured on the punch side (see Fig. 1, 2 and 3).

2.3 Margin — The minimum distance between the outside edges of the outside rows of holes and the edges of a perforated plate.

2.4 Percentage Open Area (Screening Area) — The ratio of the total area of the apertures to the area of the perforated plate, excluding the unperforated margins, expressed as a percentage.

2.5 Perforated Plate — A plate with uniform holes in symmetrical arrangement, usually formed by punching.

**2.6 Pitch** (P) — The distance between the centres of adjacent round holes in a perforated plate, or between the lines of centres of square holes (see Fig. 1, 2 and 3).

2.7 Plate Thickness — The thickness of the plate before perforation.

2.8 Punch Side — The surface of the perforated plate which the punch entered during the perforating operation.

<sup>\*</sup>Rules for rounding off numerical values (revised).



FIG. 1 ROUND HOLE PERFORATIONS 60° STAGGERED PITCH





### **3. DESIGNATION OF PERFORATED PLATES**

3.1 Industrial perforated plates shall be designated by:

- a) aperture size and shape,
- b) pitch and arrangement of apertures,
- c) plate thickness, and
- d) material of the plate.

#### 4. MATERIAL AND PLATE THICKNESS

4.1 Industrial perforated plates shall be made of mild steel conforming to IS: 226-1975\* or any other suitable metal.

**4.2** The ranges of thickness for mild steel industrial perforated plates are given in Table 1. The thickness for plates of metal other than mild steel may vary from those given in Table 1.

<sup>\*</sup>Specification for structural steel (standard quality) (fifth revision).



FIG. 3 SQUARE HOLE PERFORATIONS: IN-LINE ARRANGEMENT

#### 5. APERTURES AND PITCHES

5.1 Shape and Arrangement of Apertures — Shape and arrangement of apertures shall be as shown in Fig. 1 to 3. Figure 1 shows the usual round hole arrangement of 60° staggered apertures with respect to the long edge of the plate. Figure 2 shows square hole apertures staggered at half the pitch. Figure 3 shows the square hole apertures placed 'in-line arrangement'.

5.2 Aperture Size — The nominal sizes of round or square holes in industrial plate screens shall be as given in Table 2.

5.3 Pitch — The ratio of the nominal pitch to the nominal aperture size should be taken from the five options:

The five pitch/aperture ratios give five open areas for round as well as square holes as indicated in Table 2. The nominal pitches to give the five open areas for each aperture size are also listed in Table 2.

| Armaruan<br>Armaruan<br>Sista<br>Rianoa<br>125 down i<br>Below 100<br>Below 100<br>125 down i<br>125 | TABLE<br>Precal<br>Armeruna<br>RATIO<br>RATIO<br>RATIO<br>RATIO<br>0 0 0 0 63<br>0 0 0 0 63<br>0 0 0 0 63<br>2 5 0 0 8 | I RANGES OF PLA<br>RANGES<br>BANGES<br>A<br>3 125<br>2 125<br>1 25<br>2 20<br>1 6<br>1 6<br>1 6<br>1 6<br>1 6<br>1 6<br>1 6<br>1 25<br>2 5<br>2 5<br>2 5<br>2 5<br>2 5<br>2 5<br>2 5<br>2 5<br>2 5 | AND FITCH/APE<br>(Clause 4.5<br>(Clause 4.5<br>(Clause 4.5<br>(Clause 4.5<br>1:4<br>1:4<br>1:4<br>3:15 to 25<br>2:5 ,, 20<br>1:6 ,, 11:2<br>1:6 ,, 11:2<br>1:6 ,, 7:1<br>1:25 ,, 5 | <b>POR VARIOUS A</b><br>RTURE RATIOS<br>2)<br>1-6<br>3-15 to 25<br>2-5 ,, 20<br>1-6 ,, 12-5<br>1-6 ,, 2-5<br>1-6 ,, 2-5<br>1-6 ,, 2-5<br>1-6 ,, 2-5<br>1-6 , 12-5 | PERTURE SIZE<br>1-8<br>3-15 to 25<br>2-5 ,, 20<br>1-6 ,, 16<br>1-6 ,, 10<br>1-25 ,, 71 | 2<br>3-15 to 25<br>2-5 ,, 20<br>1-6 ,, 16<br>1-6 ,, 10<br>1-25 ,, 8 |
|--|--|--|--|---|--|---|
|  | 8 5<br>5 <sup>3</sup> · <sup>11</sup>  | 1 1  | 1·25 ,, 3<br>—   | 1.25 " 3.6  | 1·25 " <b>4</b><br>1·25 " <b>3</b>   | 1·25 " <b>4</b><br>1·25 " <b>3</b>                                  |
|  |  |  |  |   |  |   |

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5.4 Tolerance — The tolerances on measured average aperture and measured average pitch from nominal aperture size and nominal pitch respectively are given in Table 2.

5.4.1 The tolerances on measured size of any individual aperture or pitch are also given in Table 2.

#### 6. MARKING

6.1 The perforated plates shall have a permanently attached label on which the following information shall be marked:

- a) Aperture size;
- b) Aperture shape;
- c) Pitch;
- d) Aperture arrangement (see Fig. 1, 2 and 3);
- e) Plate thickness;
- f) Material of plate;
- g) Overall dimensions of plate;
- h) Particulars of margin, if required;
- j) Fixing arrangements for plate; and
- k) Any special requirements.

NOTE — This standard refers to flat perforated plates. Requirements for curved plates should be agreed between the purchaser and the manufacturer.

#### 6.1.1 The product may also be marked with Standard mark.

**6.1.2** The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

#### 7. METHOD OF EXAMINATION OF PERFORATED PLATES

7.1 Measurement of pitch and aperture size shall be made at the punch side of the plate.

| -                                | TABLE 2 PI           | REFERRED P<br>AT 60° STAG | TTCH-APE<br>GER AND<br>PERF | ERTURE<br>SQUARE<br>ORATED | COMBINA<br>HOLES II<br>PLATES | TIONS FC     | RIAL | D HOLES     |             |
|----------------------------------|----------------------|---------------------------|-----------------------------|----------------------------|-------------------------------|--------------|------|-------------|-------------|
|                                  |                      |                           | ( Clau<br>All dime          | ses 5.2, 5.5<br>ensions in | 3 and 5.4 )<br>millimetres    |              |      |             |             |
|                                  |                      |                           | 20-1                        | Рітсн/А<br>1-4             | APERTURE R                    | (ATIO<br>1.8 | 2-0  |             |             |
|                                  |                      |                           | •                           | APPRO                      | IX OPEN AI                    | RA           |      |             |             |
|                                  |                      |                           |                             | æ                          | oumd Holes                    |              |      |             |             |
|                                  |                      |                           | 58%                         | 46%                        | 35%                           | 28%          | 23%  |             |             |
|                                  |                      |                           | 64%                         | 51%                        | quare Holes<br>39%            | 31%          | 25%  |             |             |
|                                  | AFERTURE             |                           |                             |                            | Ритсн                         |              |      | TOLERANCI   | S ON PITCH  |
| Nominal<br>Size<br>(R 10 Series) | Average<br>Tolerance | Ind ividual<br>Tolerance  |                             |                            |                               |              | ſ    | Average     | Individual  |
| (1)                              | (2)                  | (3)                       | (+)                         | (2)                        | (9)                           | 6            | (8)  | (6)         | (01)        |
| 125                              | 3-0                  | 6-0                       | 155                         | I                          | ı                             | I            | ł    | <b>4</b> -8 | 9-6         |
| 112                              | 2.7                  | 5-4                       | 140                         | I                          | 1                             | I            | I    | 4-4         | 8-8         |
| 100                              | 2.5                  | 5-0                       | 125                         | I                          | I                             | I            | I    | <b>4</b> -0 | 8-0         |
| 8                                | 2-3                  | 4.6                       | 110                         | ١                          | 1                             | ۱            | I    | 3-7         | 7-4         |
| 8                                | 2.1                  | 4:2                       | 100                         | 1                          | 1                             | I            | I    | 3-4         | <b>6</b> ·8 |
| 11                               | 6-1                  | 3.8<br>2                  | 88                          | 100                        | I                             | I            | I    | 3.1         | 6-2         |
| 8                                | 1-7                  | <b>3-4</b>                | 78                          | 88                         | 100                           | I            | 1    | 2-8         | 5.6         |
| 8                                | 1-5                  | <b>3-</b> 0               | 70                          | 78                         | 8                             | I            | I    | 2-5         | 5-0         |
| 8                                | 1                    | 2-8                       | 63                          | 20                         | 8                             | I            | 1    | 2.3         | <b>4</b> -6 |
| <del>.</del> 5                   | 1-3                  | 2.6                       | 35                          | 8                          | 72                            | I            | I    | 2.1         | <b>4</b> ·2 |
| <b>\$</b>                        | 1-2                  | 2.4                       | 8                           | 8                          | 5                             | 1            | 1    | 1-9         | 3.8         |

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| <b>3.4</b> | 3.2  | 2.8        | 2-6     | 2-4        | 2-2 | 2-0  | 1-8  | 1.6         | 1.5           | 1-3         | 1-2        | ŀI     | 1-0   | 6-0   | 0.8    | 0-72        | 99-0    | 0.00     | 0-54       | 0-50   | 0-44    |  |
|------------|------|------------|---------|------------|-----|------|------|-------------|---------------|-------------|------------|--------|-------|-------|--------|-------------|---------|----------|------------|--------|---------|--|
| 1-7        | 1.6  | 1-4        | 1-3     | 1-2        | 1.1 | 1-0  | 6-0  | <b>8</b> .0 | 0-75          | 0-65        | 9-0        | 0-55   | 0-5   | 0-45  | 0-4    | 0-36        | 0-33    | 0-30     | 0-27       | 0-25   | 0-22    |  |
| I          | 1    | I          | 1       | I          | ł   | I    | ł    | i           | 1             | I           | 1          | I      | •16   | +14   | *12·5  | 11-25       | 10      | <b>0</b> | 7-5        | 7      | 6-25    |  |
| I          | I    | ł          | ł       | ł          | 1   | 1    | 1    | ۱           | <b>*</b> 22-5 | 20          | 18         | 16-5   | 14    | 12-5  | 11-25  | 10          | 6       | 7-5      | 7          | *6·25  | +5-25   |  |
| 57         | 22   | 45         | <b></b> | 36         | 32  | 28   | 26   | 22-5        | 20            | 18          | <b>J</b> 6 | 14     | 12-5  | 11-25 | 10     | 0<br>•      | 80<br>• | • 7      | 9 <b>•</b> | • 5-25 | ະວ<br>+ |  |
| 50         | 44   | 39         | 35      | 32         | 28  | 52   | 22-5 | 19-5        | 17-5          | 15-75       | 14         | 12-5   | 11-25 | 10    | † 8·75 | 1           | I       | I        | I          | I      | ł       |  |
| 4          | 7    | 35         | 32      | 28         | 25  | 22-5 | 20   | 17-5        | 15-75         | 14          | *12-5      | •11-25 | •10   | 8.75  | ł      | 1           | 1       | 1        | I          | 1      | 1       |  |
| 2.2        | 2.0  | 1.8        | 1-6     | <b>1-4</b> | 1-2 | 1-2  | 1-0  | 6.0         | 0-8           | 0-8         | 0-7        | 0.6    | 9.0   | 0.5   | 0.5    | <b>4</b> -0 | 0-4     | 0.3      | 0-3        | 0.3    | 0.3     |  |
| 1.1        | 1-0  | 6.0        | 0-8     | 0-7        | 9.0 | 0-6  | 0-5  | <b>0.4</b>  | <b>*</b> .0   | <b>†</b> .0 | 0-35       | 0-3    | 0-3   | 0-25  | 0-25   | 0-2         | 0-2     | 0-15     | 0-15       | 0-15   | 0-15    |  |
| 35-5       | 31-5 | <b>5</b> 8 | 52      | 23.4       | 20  | 18   | 16   | 14          | 12-5          | 11-2        | 10         | 6      | 8     | 1.7   | 6.3    | 5.6         | 5       | 4-5      | 4          | 3.55   | 3.15    |  |

\*For round perforations only.
\*For square perforations only.

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7.2 The number of apertures or pitches measured in order to arrive at an average may vary according to the number of perforations in the plate. A minimum sample  $\mathcal{N}$  of apertures or pitches may be chosen using the expression:

$$\mathcal{N}=2+(100/A)$$

where

A = aperture size in millimetres, a proper fraction being taken as an integer.

#### 8. SAMPLING

8.1 Lot — All the perforated plates of the same class, same nominal aperture, manufactured from plates of same thickness and same cast, under identical conditions of manufacture, shall be grouped together to constitute a lot.

8.2 Each lot shall be taken up separately for determining conformity to the requirements of this specification. For this purpose samples shall be taken depending upon the size of the lot in accordance with 8.2.1.

8.2.1 The number of sample perforated plates from a lot shall be in accordance with Level IV of Table 1 of 1S: 2500 (Part I)-1973\* and Table 2 of 1S: 2500 (Part I)-1973\*.

8.3 All the sample perforated plates selected in 8.2.1 shall be inspected for all the requirements of this specification. Any sample perforated plate failing in any one or more of the requirements shall be termed as defective. Based on the number of defective sample perforated plates the criterion to determine the conformity or otherwise of the lot to the requirements of this specification shall be in accordance with AQL of 2.5 percent in Table 2 of IS : 2500 (Part I)-1973\*.

<sup>•</sup>Sampling inspection tables: Part I Inspection by attributes and by count of defects (first revision).

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