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Industrial woven wire cloth — Technical requirements and tests

Tissus métalliques industriels — Exigences techniques et vérifications

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Foreword

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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 ISO/TC 24, *Particle characterization including sieving*, Subcommittee SC 8, *Test sieves, sieving and industrial screens*.

Annex A of this International Standard is for information only.

Industrial woven wire cloth — Technical requirements and testing

1 Scope

This International Standard defines terms regarding industrial woven wire cloth for screening purposes and specifies maximum permissible error, requirements and test methods.

It applies to industrial woven wire cloth with square apertures, made of steel, stainless steel or non-ferrous metals, (see ISO 4783-2). It does not apply to woven wire cloth coated after weaving nor does it apply to pre-crimped and welded wire screens which are covered in ISO 4783-3 and ISO 14315.

It is of limited application to woven wire cloth used for purposes other than screening which may necessitate other requirements. The alternative requirements may be agreed between the purchaser and the supplier at the time of placing the order.

2 Normative references

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

ISO 2194:1991, *Industrial screens — Woven wire cloth, perforated plate and electroformed sheet — Designation and nominal sizes of openings*

ISO 4782:1987, *Metal wire for industrial wire screens and woven wire cloth*

ISO 4783-1:1989, *Industrial wire screens and woven wire cloth — Guide to the choice of aperture size and wire diameter combinations — Part 1: Generalities*

ISO 4783-2:1989, *Industrial wire screens and woven wire cloth — Guide to the choice of aperture size and wire diameter combinations — Part 2: Preferred combinations for woven wire cloth*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
aperture width
w
distance between two adjacent warp or weft wires, measured in the projected plane at the mid-positions

Note 1 to entry: See Figure 1

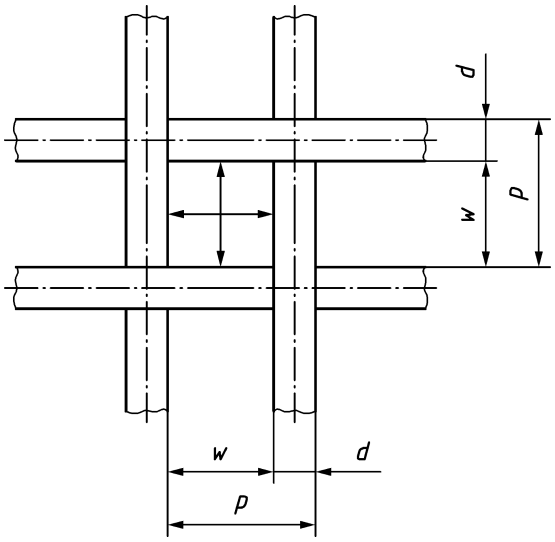


Figure 1 — Aperture width, wire diameter and pitch

3.2
wire diameter
d
diameter of the wire in the wire screen

Note 1 to entry: The wire diameter may be altered slightly during the weaving process. See Figure 1.

3.3
pitch
p
distance between the mid-points of two adjacent wires

Note 1 to entry: The pitch is the sum of the aperture width w and the wire diameter d. See Figure 1.

3.4
warp
all wires running lengthwise in the cloth as woven

3.5
weft
all wires running crosswise in the cloth as woven

3.6
number of apertures per unit length
n
number of measurements taken

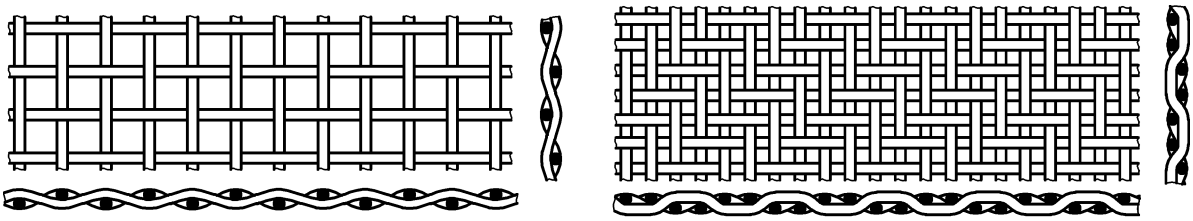
3.7
open screening area
A_0
percentage of the surface of all the apertures in the total screening surface

Note 1 to entry: The open screening area is calculated as the ratio of the square of the nominal aperture width w and the square of the nominal pitch $p = w + d$, rounded to a full percentage value:

$$A_0 = \frac{w^2}{(w+d)^2} \cdot 100\% \quad (1)$$

3.8
type of weave
way in which the warp and weft wires cross each other

Note 1 to entry: Industrial woven wire cloth is manufactured with square apertures in plain or twilled weave (see Figure 2).



a) **Plain weave**

b) **Twilled weave**

Figure 2 — Types of weave

3.9
firmness of woven wire cloth
tension existing between the crossing warp and weft wires and which determines the firmness of the wire cloth

Note 1 to entry: it is affected by the relationship of w to d and by the type of weave.

3.10
mass per unit area
ρ_A
quantity calculated using the following equation:

$$\rho_A = \frac{d^2 \cdot \rho}{618{,}1 \cdot (w + d)} \tag{2}$$

where

d is the wire diameter, in mm;

w is the aperture width, in mm;

ρ is the material density, in kg/m^3;

ρ_A is the mass per unit area, in kg/m^2.

Equation (2) gives the calculated mass per unit area.

Note 1 to entry: The value 618,1 is based on the crimped wire.

Note 2 to entry: Typical values of ρ for various materials are given in ISO 4783-2:1989, Table 2. For example, the mass per unit area for plain or carbon steel with a density of 7 850 kg/m^3 can be calculated using equation (2) as follows:

$$\rho_A = \frac{d^2 \cdot 7\,850}{618{,}1 \cdot (w + d)} = \frac{12{,}7 \cdot d^2}{w + d}$$

Equation (2) can also be used to calculate the wire diameter d when the pitch p, or $(w + d)$, and the mass per unit area ρ_A are known. In the case of plain or carbon steel (ρ = 7.850 kg/m^3), see equation (3).

$$d = \sqrt{\frac{\rho_A \cdot p}{12{,}7}} \quad (3)$$

3.11
major blemishes
production defects which significantly affect the aperture width or surface quality of the wire cloth

Note 1 to entry: See annex A for information.

4 Requirements

4.1 Aperture width and wire diameter combination

Unless otherwise agreed between the supplier and the purchaser, the aperture width and wire diameter combination shall be selected from ISO 2194, ISO 4782, ISO 4783-1 or ISO 4783-2, as appropriate.

4.2 Maximum permissible errors on aperture width

The maximum permissible errors on aperture width are given in Table 1.

In Table 1 and equations (4) to (10), the suffix "i", used with the symbols denotes "industrial wire cloth". In equations (4) to (11), X_i, Y_i, s_0 and w are expressed in micrometers.

NOTE Nominal apertures in Table 1 lower than 1 mm are in µm, higher or equal in mm.

Table 1 — Maximum permissible error of aperture width

Nominal aperture width, w	Maximum permissible error on aperture width, w for woven wire cloth made of…					
	austenite stainless steel			steel, copper, brass, bronze, aluminium, non-ferrous steels and other stainless steels without austenite stainless steel		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm	$\pm Y_i$	s_0	$+X_i$	$\pm Y_i$	s_0	$+X_i$
16	0,69	0,913	1,89	0,78	1,026	2,09
12,5	0,54	0,741	1,58	0,62	0,831	1,74
10	0,43	0,616	1,34	0,50	0,690	1,48
8	0,35	0,513	1,14	0,40	0,574	1,26
6,3	0,28	0,423	0,96	0,32	0,473	1,06
5	0,22	0,352	0,82	0,25	0,393	0,90
4	0,18	0,295	0,70	0,20	0,330	0,77
3,15	0,14	0,245	0,59	0,16	0,274	0,65
2,5	0,11	0,205	0,50	0,13	0,229	0,55
2	0,09	0,174	0,43	0,10	0,193	0,47
1,6	0,07	0,147	0,37	0,08	0,164	0,41
1,25	0,06	0,122	0,31	0,07	0,136	0,34
1	0,05	0,104	0,27	0,05	0,116	0,30
µm	$\pm Y_i$	s_0	$+X_i$	$\pm Y_i$	s_0	$+X_i$
800	39	88,8	231	44	98,8	255
630	31	75,1	197	35	83,5	218
500	25	64,1	170	29	71,2	188
400	21	55,1	147	24	61,2	163
315	17	47,0	127	19	52,2	140
250	13,8	40,5	110	15,8	45,0	121
200	11,6	35,2	96	13,2	39,0	106
160	9,7	30,6	84	11,1	34,0	93
125	8,1	26,4	73	9,3	29,3	80
100	7,0	23,2	64	8,0	25,7	71
80	6,0	20,5	57	6,9	22,7	63
63	5,2	17,9	50	6,0	19,9	55
50	4,6	15,9	44	5,3	17,6	49
40	4,2	14,2	39	4,8	15,7	43
32	3,8	12,7	35	4,3	14,1	39
25	3,5	9,3	25	3,9	9,5	25
20	3,2	7,6	20	3,7	7,8	20

4.2.1 Y_i is the maximum permissible error of the arithmetical mean value of the aperture widths measured and calculated separately in both warp and weft directions. The arithmetical average aperture width shall not deviate from the nominal size by more than ± Y; where

$$Y_i = \left[\frac{w^{0,98}}{27} + 1,6\right] \cdot 1,4 \text{ for column 2 in Table 1 and} \quad (4)$$

$$Y_i = \left[\frac{w^{0,98}}{27} + 1,6\right] \cdot 1,6 \text{ for column 5 in Table 1} \quad (5)$$

4.2.2 The maximum Standard deviation s of the aperture widths measured and calculated separately in both warp and weft directions.

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}\left(w_i - \overline{w}\right)^2} \text{ with} \quad (6)$$

$$\overline{w} = \frac{1}{n}\sum_{n=1}^{n} w_i \quad (7)$$

4.2.3 No aperture width shall exceed the nominal size by more than the value +X. It is the maximum permissible deviation of a single aperture measured in one direction (warp or weft) and is calculated using the formula:

$$X_i = \left[\frac{2w^{0,75}}{3} + 4w^{0,25}\right] \cdot 1,9 \text{ for Column 4 in Table 1 and} \quad (8)$$

$$X_i = \left[\frac{2w^{0,75}}{3} + 4w^{0,25}\right] \cdot 2,1 \text{ for Column 7 in Table 1} \quad (9)$$

but with a maximum value of $X_i = w$.

A line of apertures exceeding the value X_i is deemed to be a major blemish (see annex A).

As, on the basis of experience, negative deviations of single aperture widths do not affect the screening process, values for X_i have only positive deviations.

4.2.4 Calculation of s_0

The maximum standard deviation of the aperture sizes in warp and weft directions taken separately shall not exceed the values of s_0 in Tables 1 Column 3 and 6.

The standard deviation s_0 is calculated normal distribution $p(w)$ based of not more than 6 % of a total number of aperture size between +X and +Z.

$$p(w) = \Phi\left(\frac{w_X}{s_0}\right) - \Phi\left(\frac{w_Z}{s_0}\right);\ Z = \frac{X + |Y|}{2} \quad (10)$$

4.2.5 Calculation of sub-values aperture width for s_0 column 3 and 6 in Table 1: