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Indian Standard

**SPECIFICATION FOR
HARD-DRAWN STEEL WIRE FABRIC FOR
CONCRETE REINFORCEMENT**

(Second Revision)

(Incorporating Amendment Nos. 1, 2 & 3)

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BUREAU OF INDIAN STANDARDS
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Indian Standard
SPECIFICATION FOR
HARD-DRAWN STEEL WIRE FABRIC FOR
CONCRETE REINFORCEMENT
(Second Revision)

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Indian Standard
SPECIFICATION FOR
HARD-DRAWN STEEL WIRE FABRIC FOR
CONCRETE REINFORCEMENT
(*Second Revision*)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 15 March 1982, after the draft finalized by the Joint Sectional Committee for Concrete Reinforcement had been approved by the Civil Engineering Division Council and the Structural and Metals Division Council.

0.2 This standard was first published in 1960 and subsequently revised in 1967. The present revision has been taken up with a view to modifying the earlier provisions in the light of experience gained during the use of this standard by both the manufacturers and the users.

0.3 This standard adopts SI units in specifying the various physical requirements. Further, certain provisions of the standard have been revised based on the latest Indian Standards on methods of physical and chemical tests for steel.

0.4 In the formulation of this standard due weightage has been given to international coordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

0.5 This edition 3.3 incorporates Amendment No. 1 (May 1988), Amendment No. 2 (February 1993) and Amendment No. 3 (February 1994). Side bar indicates modification of the text as the result of incorporation of the amendments.

0.6 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*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (*revised*).

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1. SCOPE

1.1 This standard covers the requirements for hard-drawn steel wire fabric consisting of hard-drawn steel wire with cross wires electrically welded to them for use as concrete reinforcement.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Elongation — The increase in length of a tensile test piece under stress. The elongation after fracture is conventionally expressed as a percentage of the original gauge length of a standard test piece.

2.2 Mesh Size — The pitch or centre to centre distance of main wires by the pitch or centre to centre distance of cross wires.

2.3 Proof Stress — The stress which is just sufficient to produce, under load, a permanent deformation equal to a specified percentage of the original gauge length.

2.4 Ultimate Tensile Stress — The maximum load reached in a tensile test piece divided by the original cross-sectional area of the gauge length portion of the test piece.

3. TYPES

3.1 Hard-drawn steel wire fabric shall be of the following two types:

- a) Oblong mesh, and
- b) Square mesh.

3.2 The fabric may be designated for ordering purposes by the number of this standard and the reference number given in first column of Appendix A, alternately a complete description of the fabric may be given.

When denoting the size of sheet or roll of oblong mesh fabric, the first dimension shall be the length of the main wires.

Example :

Hard-drawn steel wire fabric to IS : 1566, reference
number 5,50 sheets, 5 m × 2 m.

4. MATERIAL

4.1 Quality of Steel — The wire used in the manufacture of fabric shall be hard-drawn steel wire conforming, in all respects, to the requirements of IS : 432 (Part II)-1982* and suitable for welding. When so requested by the purchaser, the manufacturer or the supplier shall supply certificates to this effect.

5. MANUFACTURE

5.1 The fabric shall be formed by spacing the main and the cross wires, which shall be fixed at their points of intersection by electric welding, so as to be sufficiently stable to withstand normal handling in transport and during concreting, without displacement beyond the limits specified. It shall be fabricated and finished in a workmanlike manner which will assure accurate spacing and alignment of all members of the finished fabric to give substantial square or rectangular openings.

5.1.1 Butt joints in the wires of the fabric shall be electrically welded and the joints shall be staggered.

6. DIMENSIONS

6.1 Mesh sizes, weight and sizes of wires for square and oblong welded wire fabric shall be as agreed to between the purchaser and the manufacturer.

NOTE — The mesh sizes, weights and sizes of wires for square as well as oblong welded wire fabric being commonly manufactured in the country are given in Appendix A for information.

7. SIZES OF SHEETS OR ROLLS

7.1 The width of the sheet or roll shall be such as to fit in with the modular size of 10 cm module and the length of the sheet or roll shall be that which is mutually agreed to between the manufacturer and the purchaser subject to the tolerances specified in 9.

7.1.1 The width of the fabric shall be considered end to end distance between outside longitudinal wires, unless otherwise specified. Transverse wire shall project beyond the centre line of each longitudinal edge wire for a distance equal to half the pitch of the main wires, unless otherwise specified.

8. MASS

8.1 Calculation of Mass — The nominal mass of fabric shall be calculated on the basis that steel weighs 0.785 kg/cm^2 of nominal cross-sectional area per metre run.

*Specification for mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement : Part II Hard-drawn steel wire (*third revision*).

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8.2 The actual mass of the fabric shall be determined by weighing a sheet or sheets of any convenient size, and if possible at least one square metre, with the edges trimmed so that the longitudinal wires protrude by a distance equal to half the distance between the cross wires, and the cross wires produce a distance equal to half the distance between the longitudinal wires.

9. TOLERANCES

9.1 Subject to the tolerances on wire diameter specified in IS : 432 (Part II)-1982*, the tolerances shall be as in **9.2** to **9.4**.

9.2 Tolerance on Size of Mesh — The number of spaces between the external wires in a sheet or roll shall be determined by the nominal pitch. The centre distance between two adjacent wires shall not vary by more than 7½ percent from the nominal pitch. The maximum variation in the size of any mesh shall be not more than 5 percent over or under the specified size, and the average mesh size shall be such that the total number of meshes contained in a sheet or roll is not less than that determined by the nominal pitch.

9.3 Tolerance on Size of Sheet — When fabric is required to be cut to specified dimensions, the tolerance shall be as follows:

- | | |
|-------------------------------------|---|
| a) For dimensions of 5 mm and under | 25 mm under or over the specified dimension |
| b) For dimensions over 5 mm | ½ percent under or over the specified dimension |

9.4 Tolerance on Mass of Fabric — The tolerances on the mass of fabric shall be as follows:

- | | |
|--|--------------------|
| a) When the specified mass is not stated to be either a maximum or a minimum | ± 6 percent |
| b) When the specified mass is stated to be a maximum | + 0
-12 percent |
| c) When the specified mass is stated to be a minimum | +12
- 0 percent |

10. MECHANICAL PROPERTIES

10.1 All wires of the finished fabric shall meet the minimum requirements for physical properties as prescribed in IS : 432 (Part II)-1982* except elongation.

*Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement : Part II Hard-drawn steel wire (*third revision*).

11. TESTS

11.1 Selection of Test Pieces

11.1.1 All test pieces shall be selected by the purchaser, and in the event of the tests being satisfactory, he shall pay the cost of the sheets from which the test pieces have been cut, or accept delivery as though such test pieces had not been cut therefrom.

11.1.2 Test Pieces — The test pieces for tensile and bend tests shall be so cut from the fabric that each tensile test piece shall contain one or more cross welds in its length.

11.1.3 Identification of Specimens with the Materials — The manufacturer shall make appropriate arrangements for the identification of the material represented by the test pieces.

11.2 Tensile Test — The tensile test shall be made on the mesh after fabrication across one or more welds to the requirements specified in IS : 1521-1972*.

11.2.1 One tensile test shall be made from every 6 000 m² of fabric.

11.3 Bend Test — The bend test shall be made on the test pieces cut from the longitudinal wire as well as the transverse wire, between the welds. The test piece shall not be annealed or subjected to any heat treatment before testing. The test piece shall withstand one complete cycle of reverse bend around a pin of size indicated below, without showing any signs of fracture when reverse bend test is carried out in accordance with the requirements of IS : 1716-1971†:

Dia of Specimen Wire

Dia of Pin

7.5 mm and under

Equal to diameter of specimen

Over 7.5 mm

Equal to twice the diameter of specimen

11.3.1 One reverse bend test shall be made from every 6 000 m² of fabric.

11.4 Re-tests — Should a tensile test piece break outside the middle half of its gauge length, the test may, at the manufacturer's option, be discarded and another test made on a piece cut from the same length of wire. In all other cases, should any of the test pieces first selected not fulfil the required tests, two additional test pieces in respect of each failure may be taken. Should both the additional test pieces pass the test, the material represented shall be accepted. Should either of them fail to fulfil such tests, the material represented may be rejected. The

*Method for tensile testing of steel wire (*first revision*).

†Method for reverse bend testing of steel wire (*first revision*).

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additional tests shall be carried out in the same manner in all respects as the tests herein before required to be made in the first instance.

12. DELIVERY, INSPECTION AND TESTING FACILITIES

12.1 Unless otherwise specified, general requirements relating to the supply of material, inspection and testing shall conform to IS : 1387-1959*.

12.2 Delivery — All fabric reinforcement shall be delivered free from oil and grease, paint, loose mill scale, loose rust and other matter likely to adversely affect the bond with concrete. Limewash shall be permitted unless otherwise specified by the purchaser. A sheet shall not contain any broken wires, and no broken cross welds in excess of four percent of the total number of welded joints, or half of the welded joints in any wire.

12.2.1 If so required by the purchaser, the manufacturer shall give a certificate that the welded wire mesh supplied conforms in all respects to the requirements of this specification.

12.2.2 If so required by the purchaser, the manufacturer shall give a certificate that all welded intersections of the welded wire mesh supplied shall be capable of withstanding a load in shear of not less than one quarter of that necessary to develop the load, calculated from the specified proof stress in tension of the smaller of the intersecting wires. If required by the purchaser, this test shall be performed according to mutual agreement between the purchaser and the manufacturer.

12.3 The purchaser or his authorized representative shall be at liberty to inspect and verify the steel maker's certificate of cast analysis at the premises of the manufacturer or supplier; when the purchaser requires an actual analysis of finished material, this shall be made at a place agreed to between the purchaser and the manufacturer or the supplier.

12.4 The purchaser shall have all reasonable facilities for satisfying himself that the material is being or has been manufactured fully in accordance with the requirements of this specification and, for this purpose he shall be furnished with the test certificates giving the results of test specified in this specification and he shall have free access to the relevant parts of the supplier's works at all reasonable times as agreed to mutually. He shall be at liberty to inspect the manufacture without interfering in any way with the normal production of the material at any stage and to reject any material which does not conform to this specification.

12.4.1 If so required by the purchaser, he shall be informed by the supplier when the material relating to the order is under manufacture.

*General requirements for the supply of metallurgical materials (*first revision*).

12.4.2 The supplier shall supply labour and appliances required for testing at his premises. If facilities are not available at his own works, the supplier shall bear the cost of the tests carried out in a laboratory selected by the purchaser.

12.5 Independent Test

12.5.1 Should there be a dispute about the compliance of the material with this specification, the supplier and the purchaser each shall have the right to get the material tested by a mutually acceptable independent testing authority unless such disputes are within the terms of any other agreement for reference or submission to arbitration.

12.5.2 The results obtained by the independent testing authority shall be accepted as final. If the material does not comply with this specification, the cost of independent testing shall be borne by the supplier; if the material complies with this specification, the cost shall be borne by the purchaser.

12.6 Defects Revealed After Delivery — Should any material after delivery be found not to be in accordance with this specification, such material shall be deemed not to comply with this Indian Standard notwithstanding any previous acceptance, provided it has not been improperly treated.

13. IDENTIFICATION AND MARKING

13.1 The manufacturer or the supplier shall have ingots, billets, wires, fabric or bundles of fabric marked in such a way that all finished wires or fabric can be traced to the cast from which they were made. Every facility be given to the purchaser or his authorized representative for tracing the wires or fabric to the cast from which they were made.

13.2 Marking — When the material is delivered in bundles, the manufacturer shall fasten securely to every bundle a metal tag bearing a suitable identification mark.

13.3 Each bundle containing the fabric may also be marked with the ISI Certification Mark in which case the concerned test certificate shall also bear the Standard Mark.

NOTE — 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 Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

A P P E N D I X A*(Clauses 3.2 and 6.1)***DIMENSIONS AND PROPERTIES OF HARD-DRAWN STEEL
WIRE FABRIC (SQUARE AND OBLONG MESH)****SQUARE MESH**

<i>Sl No.</i>	<i>Mesh Size (Nominal Pitch of Wires)</i>	<i>Diameter of Wire Each Way</i>	<i>Nominal Mass per m²</i>
(1)	(2)	(3)	(4)
	mm	mm	kg
1	50	3.0	2.220
2	50	3.8	3.560
3	50	5.0	6.160
4	100	3.4	1.430
5	100	3.6	1.600
6	100	4.0	1.980
7	100	4.5	2.530
8	100	4.8	2.840
9	100	5.0	3.080
10	100	5.3	3.460
11	100	5.8	4.140
12	100	6.5	5.200
13	100	7.0	6.040
14	100	8.0	7.900
15	150	3.15	0.82
16	150	3.6	1.060
17	150	4.0	1.320
18	150	4.5	1.660
19	150	4.75	1.85
20	150	5.0	2.060
21	150	5.3	2.300
22	150	5.6	2.57
23	150	5.8	2.760
24	150	6.0	2.960

<i>Sl No.</i>	<i>Mesh Size (Nominal Pitch of Wires)</i>	<i>Diameter of Wire Each Way</i>	<i>Nominal Mass per m²</i>
(1)	(2)	(3)	(4)
25	150	6.3	3.27
26	150	6.5	3.480
27	150	7.1	4.14
28	150	7.5	4.62
29	150	8.0	5.260
30	150	9.0	6.660
31	150	10.0	8.220
32	200	4.0	0.980
33	200	4.5	1.260
34	200	4.8	1.420
35	200	5.3	1.740
36	200	5.8	2.080
37	200	6.5	2.600
38	200	7.0	3.020
39	200	8.0	3.940
40	200	9.0	5.300
41	200	10.0	6.160

OBLONG MESH

<i>Sl No.</i>	<i>Mesh Size (Nominal Pitch of Wires)</i>		<i>Diameter of Wire</i>		<i>Nominal Mass per m²</i>
(1)	(2)	(3)	(4)	(5)	(6)
	Main, mm	Cross, mm	Main, mm	Cross, mm	kg
42	75	250	5.0	4.2	2.490
43	75	250	4.2	4.2	1.890
44	75	250	6.0	5.0	3.580
45	75	300	3.15	2.65	0.96
46	75	300	3.55	2.65	1.18
47	75	300	4.0	2.65	1.45
48	75	300	4.0	3.0	1.510
49	75	300	4.5	3.15	1.870

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<i>Sl No.</i>	<i>Mesh Size (Nominal Pitch of Wires)</i>		<i>Diameter of Wire</i>		<i>Nominal Mass per m²</i>
(1)	(2)	(3)	(4)	(5)	(6)
	Main, mm	Cross, mm	Main, mm	Cross, mm	kg
50	75	300	4.75	3.15	2.06
51	75	300	4.8	3.6	2.160
52	75	300	5.0	4.2	2.420
53	75	300	5.0	5.0	2.600
54	75	300	5.3	3.15	2.51
55	75	300	5.3	3.6	2.580
56	75	300	5.6	3.55	2.83
57	75	300	5.8	3.6	3.040
58	75	300	6.0	5.0	3.470
59	75	300	6.5	4.0	3.80
60	75	300	6.5	6.0	4.260
61	75	300	7.0	4.0	4.360
62	75	300	8.0	4.8	5.730
63	75	300	9.0	4.8	7.130
64	75	300	10.0	5.8	8.910
65	75	400	9.0	4.75	7.00
66	75	400	9.5	5.6	7.90
67	75	400	10.0	5.6	8.71
68	75	400	8.0	4.75	5.60
69	75	400	7.5	4.75	4.97
70	75	400	7.1	4.5	4.46
71	75	400	6.3	4.0	3.50
72	100	150	4.2	3.0	1.460
73	100	150	4.5	3.0	1.620
74	100	150	4.6	3.0	1.670
75	100	150	4.8	3.6	1.950
76	100	150	5.0	3.0	1.910
77	100	150	5.3	3.6	2.260
78	100	150	5.5	3.0	2.240
79	100	150	5.8	3.6	2.600
80	100	150	6.5	4.0	3.260

<i>Sl No.</i>	<i>Mesh Size (Nominal Pitch of Wires)</i>		<i>Diameter of Wire</i>		<i>Nominal Mass per m²</i>
(1)	(2)	(3)	(4)	(5)	(6)
	Main, mm	Cross, mm	Main, mm	Cross, mm	kg
81	100	150	7.0	4.0	3.680
82	100	250	4.2	4.2	1.530
83	100	250	5.0	4.2	1.960
84	100	250	5.5	4.2	2.300
85	100	250	7.0	5.0	3.640
86	100	300	4.0	3.0	1.180
87	100	300	4.2	5.0	1.640
88	100	300	4.5	3.0	1.440
89	100	300	4.2	4.2	1.450
90	100	300	4.8	3.6	1.690
91	100	300	5.0	5.0	2.100
92	100	300	5.0	4.2	1.900
93	100	300	5.0	3.0	1.730
94	100	300	5.3	3.6	2.000
95	100	300	5.8	3.6	2.340
96	100	300	6.0	5.0	2.730
97	100	300	6.5	4.0	2.930
98	100	300	7.0	4.0	3.350
99	100	300	7.0	5.0	3.530
100	100	300	7.0	5.5	3.640
101	100	300	7.5	6.0	4.210
102	100	300	8.0	4.8	4.420
103	100	300	8.0	6.0	4.690
104	100	300	8.0	6.5	4.820
105	100	300	9.0	4.8	5.460
106	100	300	10.0	5.8	6.860
107	150	250	5.0	4.2	1.440
108	150	250	6.0	5.0	3.300
109	150	250	6.5	5.5	3.900
110	150	300	6.0	5.0	2.070
111	150	300	7.0	5.0	2.520
112	150	300	8.0	6.0	3.490

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