UDC 621'886'2 : 669'14-144

(Reaffirmed 2003)

Indian Standard

SPECIFICATION FOR STEEL NAILS USED AS INTERNAL CHILLS IN STEEL CASTINGS

(First Revision)

1. Scope — This standard covers the requirements for steel nails used as internal chills in steel castings.

2. Supply of Material — General requirements relating to supply of steel nails used as internal chills shall be as laid down in IS : 1387-1967 'General requirements for the supply of metallurgical materials (*first revision*)'.

3. Material — Steel nails up to 12·5 mm shall be manufactured from soft steel wire conforming to IS : 280-1978 'Specification for mild steel wire for general engineering purposes (*third revision*)', and those of diameter above 12·5 mm from hot rolled round bars conforming to IS : 226-1975 'Specification for structural steel (standard quality) (*fifth revision*)'.

4. Shapes and Sizes — Some typical shapes of chill nails are given in Fig. 1.

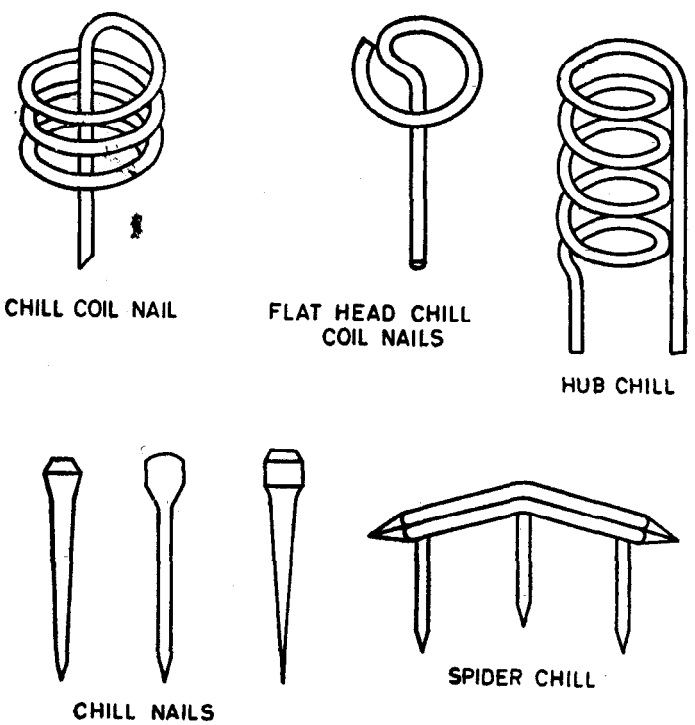

FIG. 1 SOME TYPICAL SHAPES OF CHILL NAILS

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BUREAU OF INDIAN STANDARDS
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4.1 The sizes of steel nails shall be as given in Tables 1 to 5.

4.1.1 Steel nails of dimensions other than those specified in Tables 1 to 5 may be supplied by agreement between the purchaser and the manufacturer.

5. Requirements

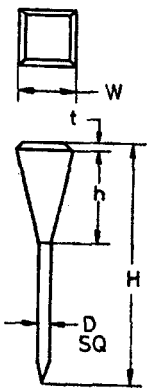
5.1 *Corrosion Protection* — The steel nails shall be given anti-corrosion coating of tin conforming to Grade Sn 99·75 of IS : 26-1979 'Specification for tin ingot (*third revision*)'.

5.1.1 *Hot dip tinning* — It shall be done in conformity with IS : 5274-1969 'Recommended practice for hot-dip tinning of plain carbon steel'.

TABLE 1 DIMENSIONS OF NAILS (TYPE 1)

(*Clauses* 4.1 *and* 4.1.1)

All dimensions in millimetres.

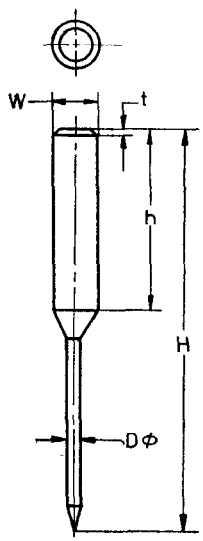


D	*t*	*W*	*h*	*H*
1·5	1·0	7	15	50
2·0	1·3	9	20	55
3·5	1·6	11	22	60
3·5	1·6	13	25	65
3·5	1·6	15	25	65

TABLE 2 DIMENSIONS OF NAILS (TYPE 2)

(*Clauses* 4.1 *and* 4.1.1)

All dimensions in millimetres.

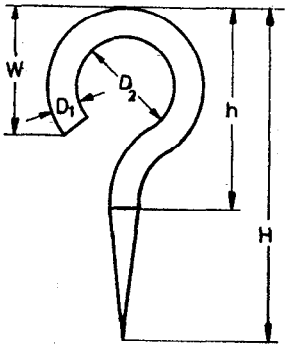


D	*t*	*W*	*h*	*H*
1·5	1·0	6	45	95
2·0	1·3	8	45	95
3·0	1·6	10	50	110
3·5	1·6	12	50	110
3·5	1·8	14	55	120

TABLE 3 DIMENSIONS OF NAILS (TYPE 3)

(Clauses 4.1 *and* 4.1.1)

All dimensions in millimetres.

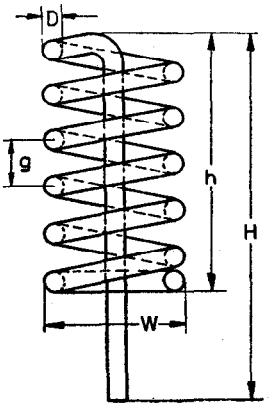


D_1	D_2	W	h	H
5	20	25	40	70
8	27	35	55	90
12	33	45	70	110
18	37	55	85	130

TABLE 4 DIMENSIONS OF NAILS (TYPE 4)

(Clauses 4.1 *and* 4.1.1)

All dimensions in millimetres.



W	g	D	h	H
25	12	5	50	75
38	12	5	70	100

5.1.2 *Cleaning of nails* — The nails shall be thoroughly cleaned before coating to ensure strong adherance of the coating to the base metal.

5.2 As far as possible, sharp corners should be omitted in chills which would rapidly melt away and also avoid flat plains which are difficult to fuse in with the casting.

6. Storage — The chills should be properly stored to keep them clean and dry.

7. Packing — Unless specified otherwise, the material shall be supplied in jute/polythene lined/ canvas bags of suitable size weighing not more than 50 kg gross.

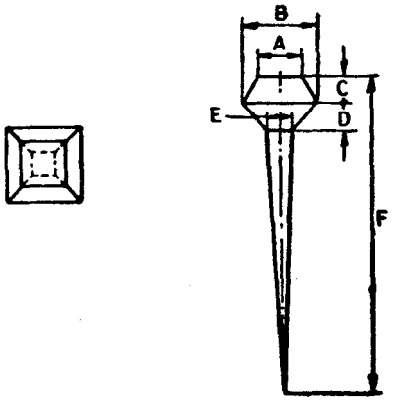
8. Sampling of Steel Nails

8.1 *Lot* — All steel nails of the same composition shape and dimensions belonging to a single batch of manufacture shall constitute a lot.

TABLE 5 DIMENSIONS OF NAILS (TYPE 5)

(Clauses 4.1 *and* 4.1.1)

All dimensions in millimetres.



A	*B*	*C*	*D*	*E*	*F*
8	13	5	5	4	50
6	9	5	3	3	40
4	7	4	2	3	30

8.2 Scale of Sampling — From each lot, sample nails shall be selected at random according to Table 6. For random selection procedure, guidance can be had from IS : 4905-1968 'Methods for random sampling'.

TABLE 6 SCALE OF SAMPLING AND PERMISSIBLE NUMBER OF DEFECTIVES

Lot Size (No. of Nails)	Sample Size	Acceptance Number
(1)	(2)	(3)
Up to 100	13	1
101 to 300	20	2
301 to 500	32	3
501 to 1 000	50	5
1 001 and above	80	7

8.2.1 If the nails are packed in boxes, at least 25 percent of the boxes shall be opened and the required number of sample nails shall be selected equally from the opened boxes.

8.3 *Criteria for Conformity* — All the sample nails selected according to **8.2** shall be examined for dimensions given in **4.1** and also to other requirements given in **5.1** and **5.2**. Any nail which fails in one or more of the requirements given above shall be deemed as defective.

The lot shall be accepted as conforming to the requirements of this specification if the number of defective nails in the sample does not exceed the corresponding acceptance number given in col 3 of Table 6.

9. Marking — Each container shall be clearly marked with the following information:

a) Name or trade-mark of the manufacturer, and

b) Weight of chills.

9.1 *Standard Marking* — Details available with the Bureau of Indian Standards.

EXPLANATORY NOTE

The function of internal chills is basically to reduce the effect of localized hot spots in castings. They, however, speed up the solidification of a section to the extent that auto feeding will occur while molten metal is still being added through the gate. But chills are a necessary and important part of the feeding system. Most castings are poured in mould rammed up of bonded silica sand which is a good insulator and transmits relatively little heat from the solidifying castings. The application of chill having higher heat transfer properties causes the metal to freeze much faster at that point and sets up steep temperature gradients. The chill aids in promoting good directional and progressive solidification as chill performs its task as long as it can extract heat from the solidifying metal faster than the sand.

Chills may be used on remote bosses or pads which cannot be reached by or where it is not economical to apply risers. Chills initiate directional feed towards riser sections and may be used to reduce the number of risers. The use of internal chills is not recommended in case of pressure tight castings, casting having a carbon content 0·1 percent as also at critical castings location, namely, bosses where threading for fitment is required. For heavy castings in the range of 12 tons and above where internal chill cage made out of mild steel rods as already mentioned above can be used.

Broaches made of mild steel rods may be used on boss having fairly large drill holes. This will reduce the size of risers used in this boss.

The composition of the chill shall be compatible with the metal being poured. Usually the chill shall have approximately the composition of the metal in which it is to be used.

This standard keeps in view the manufacturing and trade practices followed in the country in this field. This standard was first published in 1974 and as a result of experience gained during subsequent years, more detailed data has been incorporated in this this revised version of the standard.

For the purposes 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 'Rules for rounding off numerical valves (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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