इंटरनेट मानक

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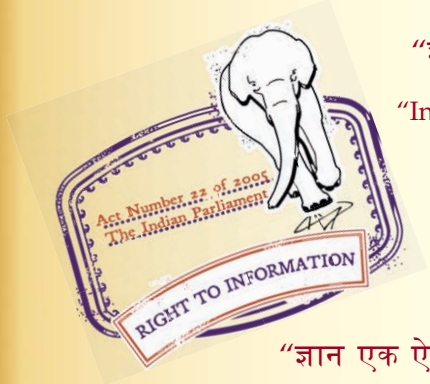
IS 1931 (2000): Engineer's Files [PGD 5: Assembly Hand Tools]



"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 1931 : 2000
(Reaffirmed 2006)

भारतीय मानक

इंजीनियर्स फाइल्स — विशिष्टि

(तीसरा पुनरीक्षण)

Indian Standard

ENGINEER'S FILES — SPECIFICATION

(Third Revision)

ICS 25.100.60

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

August 2000

Price Group 10

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Assembly Hand Tools Sectional Committee had been approved by the Production Engineering Division Council.

This standard was first published in 1962 and its first revision was taken up in 1972 after incorporating following changes:

a) Minimum values of hardness were specified,

b) Tolerance limits were modified, and

c) Sampling plans were also modified.

While second revision was taken up in 1985, this standard was split up as:

IS 1931 Specification for files:

Part 1 Technical supply conditions
Part 2 Engineer's files
Part 3 Saw files
Part 4 Mill files
Part 5 Special purpose files

In this revision, the following changes have been made:

a) The endurance test requirements have been limited to bastard cut of engineer's files only. The number of strokes for stock removal has been reduced to minimize the time taken for testing the files for endurance test,

b) Dimensions of hand prover have been incorporated for guidance only,

c) Figure showing the use of hand prover has also been included, and

d) Micro hardness testing has been made as a type test.

While revising this standard, all the five parts have been combined into a single comprehensive standard. The files which are indicated in the Tables 1, 2, 4, 9, 10 and 14 are widely used for forestry work.

The needle files have been covered in IS 3152 : 1980 'Specification for needle files (*first revision*)' and the rasps have been covered in IS 3587 : 1985 'Specification for rasps (*second revision*)'. The files used by instrument makers, jewellers and die sinkers, as well as high speed steel files have not been covered in the above specification.

While preparing this standard, considerable assistance has been derived from the following standards:

ISO 234/1	: 1983	Files and rasps — Part 1 : Dimensions
ISO 234/2	: 1982	Files and rasps — Part 2 : Characteristics of cut issued by the International Organization for Standardization (ISO)
BS 498	: 1990	Specification for rasps and engineers' files issued by the British Standards Institution (UK)

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, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*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.

AMENDMENT NO. 1 JANUARY 2012
TO
IS 1931 : 2000 ENGINEER'S FILES — SPECIFICATION

(Third Revision)

(*Page* 3, *clause* **6**, *Title*) — Substitute the following for the existing:

'**MATERIAL, HARDNESS AND MICROSTRUCTURE**'

(*Page* 3, *clause* **6.2**) — Insert the following new clause **6.3** below clause **6.2**:

'**6.3 Microstructure**

The microstructure on the cutting portion of the file shall be uniformly distributed fine nodular carbides in martensitic matrix with no surface decarburization.'

(*Page* 3, *clause* **7.1.9**) — Renumber clauses '7.1.9, 7.1.9.1, 7.1.9.2' as '7.2.1, 7.2.1.1, 7.2.1.2' and insert below clause **7.2** on page 12 of the standard and renumber the subsequent clauses.

[*Page* 10, *Table* 7, *col* 7, *Sl. No.* (ii)] — Substitute '17.5' *for* '18.5'.

(*Page* 24, *clause* **8.1**) — Substitute the following for the existing clause:

'**8.1** The tolerances on nominal length (*L*) shall be:

a) Up to and including 300 mm ±3.0 mm
b) Over 300 mm ±4.0 mm'

(*Page* 26, *clause* **13.3.1**) — Substitute the following for the existing clause:

'**13.3.1** The hardness of hand prover for testing different files shall be as below:

a) For saw files 635 to 675 HV or 57 to 59 HRC
b) For engineers and mill files 580 to 615 HV *Min* or 54 to 56 HRC *Min*
c) For other files 545 HV *Min* or 52 HRC *Min*'

(PGD 34)

Reprography Unit, BIS, New Delhi, India

Indian Standard

ENGINEER'S FILES — SPECIFICATION

(Third Revision)

1 SCOPE

This standard covers dimensional and test requirements, general requirements and methods of tests for engineer's files.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
620 : 1985	Wooden tool handles, general requirements (*fourth revision*)
1501 (Part 1) : 1984	Method for Vicker hardness test for metallic materials : Part 1 HV 5 to HV 100 (*second revision*)
2500 (Part 1) : 1992	Sampling inspection procedures: Part 1 Attribute sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection (*second revision*)
2895 : 1990	Specification for wooden handles for engineers' file and engineers' scrapers (*second revision*)
3748 : 1990	Tool and die steels (*second revision*)

3 NOMENCLATURE

3.1 For the purpose of this standard, the nomenclature given in Fig. 1 shall apply.

L = length (excluding the tang),
b = width,
t = thickness,
d = diameter,
L_1 = length of taper,
b_1 = point width,
t_1 = point thickness,
d_1 = point diameter; and
a = length of tang.

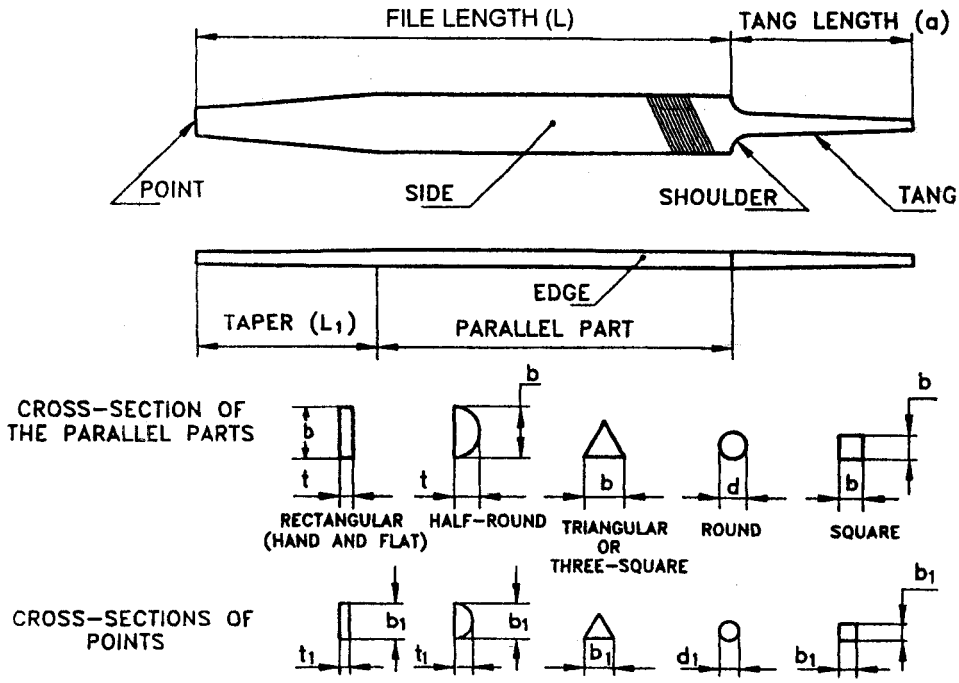


FIG. 1 NOMENCLATURE OF FILES

A file or rasp is considered tapered when L_1 is between 25 and 50 percent of length L and the dimensions of the point b_1 and d_1 do not exceed 80 percent of the dimensions of b and d respectively.

On tapered files and rasps the taper length L_1 is measured from the point to the parallel part of the file or rasp.

4 CUTS

4.1 There shall be four grades of cuts, namely, bastard, second cut, smooth and dead smooth. The number of cuts shall be measured along the centre line of the file.

4.2 There shall be two types of cuts for the files:

a) Single cut, and

b) Double cut.

4.2.1 *Single Cut*

Single cut shall mean a set of parallel cuts on the surface, except where otherwise specified (*see* Fig. 2).

4.2.2 *Double Cut*

Double cut shall mean two sets of parallel cuts on the surface, one of which shall cross the other. The first cut and the second cut are called over cut and up cut respectively (*see* Fig. 2). Where the files are double cut, the number of cuts per centimetre shall relate to the number of up cuts per centimetre.

4.3 Other types of cuts, like wavy cut, curved cut, which are also in use, shall be permitted as special requirement subject to agreement between the purchaser and the supplier.

4.4 Details of the cut, such as single or double cut, and number of cuts per centimetre applicable to files of different types shall be as given in the relevant Tables.

4.5 Safe Edges

Those edges of the files which are not cut and are left smooth, shall be called safe edges.

5 TYPES

5.1 The engineer's files shall be of the following types:

a) Flat files,

b) Hand files,

c) Half round files,

d) Round files,

e) Square files,

f) Three square files,

g) Warding files,

h) Knife files, and

j) Feather edge files.

5.2 The saw files shall be of the following types:

a) Taper saw files,

b) Band saw taper regular files,

c) Blunt hand saw files,

d) Double ended saw files,

e) Pit saw files,

f) Cant saw files, and

g) Cross cut saw files.

5.3 The mill files shall be of the following types:

a) Taper mill files,

b) Parallel mill files, and

c) Blunt heavy mill files.

5.4 The special purpose files shall be of the following types:

a) Hand finishing files,

b) Cabinet files,

c) Reaper files, and

d) Block files.

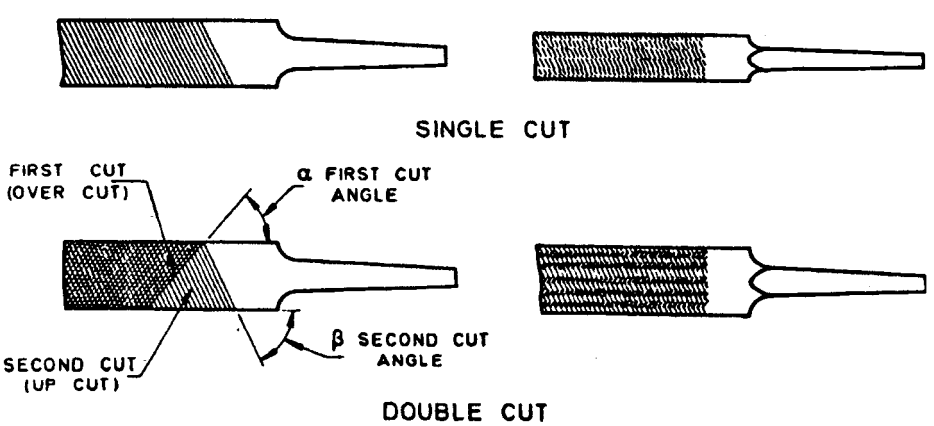


FIG. 2 ANGLE AND PATTERN OF CUT

6 MATERIAL AND HARDNESS

6.1 Material

The material for the manufacture of files and hand-prover shall be normally of designation 118 T3 or 133 T3 according to IS 3748 or any suitable alloy steel.

6.2 Hardness

The hardness of the cutting portion of the files shall be 745 HV (≈62 HRC), *Min* on the tip of the teeth as measured by the micro hardness tester.

7 DIMENSIONS AND SHAPES

7.1 Engineer's Files

7.1.1 *Flat Files*

7.1.1.1 The dimensions of the flat files shall be as given in Table 1.

7.1.1.2 Flat files shall be of rectangular cross-section, parallel for approximately two-thirds file length and then tapering towards the point in width and parallel or slightly tapering in thickness. Both edges may be either square or round. The sides shall have double cut, whereas the edges shall have single cut.

7.1.2 *Hand Files*

7.1.2.1 The dimensions of the hand files shall be as given in Table 2.

7.1.2.2 Hand files shall be of rectangular cross-section, and parallel in width throughout. These shall be parallel in thickness for approximately two-thirds file length and rest tapering towards the point. Both edges may be either square or round. The sides shall have double cut. One edge shall be of single cut, whereas the other shall be the safe edge.

7.1.3 *Half Round Files*

7.1.3.1 The dimensions of the half round files shall be as given in Table 3.

7.1.3.2 Half round files shall be of one side flat and other convex cross-section, parallel for approximately two-thirds file length towards the point in width and then parallel or slightly tapering in thickness. Flat side for files of all grades of cut, shall have double cut. The convex side shall have double cut for bastard files, single cut or double cut for second cut files and single cut or double cut for smooth files. Files shall have cuts up to the point.

7.1.4 *Round Files*

7.1.4.1 The dimensions of the round files shall be as given in Table 4.

7.1.4.2 Round files shall be of circular cross-section, parallel for approximately two-thirds file length and then tapering towards the point. Bastard files less than 150 mm in length shall have single cut (preferably of spiral form) or double cut. For files of length 150 mm and above, these shall have double cut. Second cut and smooth files of all sizes, shall have single cut or double cut (preferably of spiral form). Files shall have cuts up to the point.

7.1.5 *Square Files*

7.1.5.1 The dimensions of the square files shall be as given in Table 5.

7.1.5.2 Square files shall be of square cross-section, parallel for approximately two-thirds file length and then tapering towards the point. All sides shall have double cut. Files shall have cuts up to the point.

7.1.6 *Three Square Files*

7.1.6.1 The dimensions of the three square files shall be as given in Table 6.

7.1.6.2 Three square files shall be of equilateral triangular cross-section, parallel for approximately two-thirds file length and then tapering towards the point. All sides shall have double cut. The edges shall be uncut or cut. Files shall have cuts up to the point.

7.1.7 *Warding Files*

7.1.7.1 The dimensions of the warding files shall be as given in Table 7.

7.1.7.2 Warding files shall be of rectangular cross-section, parallel in thickness throughout, parallel in width for approximately two-thirds file length and then tapering towards the point. The sides shall have double cut, whereas the edges shall have single cut. Files shall have cuts up to the point.

7.1.8 *Knife Files*

7.1.8.1 The dimensions of the knife files shall be as given in Table 8.

7.1.8.2 Knife files shall be of uniform wedge cross-section, having the thinner edge straight, thicker edge parallel to the thinner edge for approximately two-thirds file length and then tapering towards the point. The sides shall have double cut. The thinner edge shall have single cut, whereas the thicker edge shall be left uncut. Files shall have cuts up to the point.

7.1.9 *Feather Edge Files*

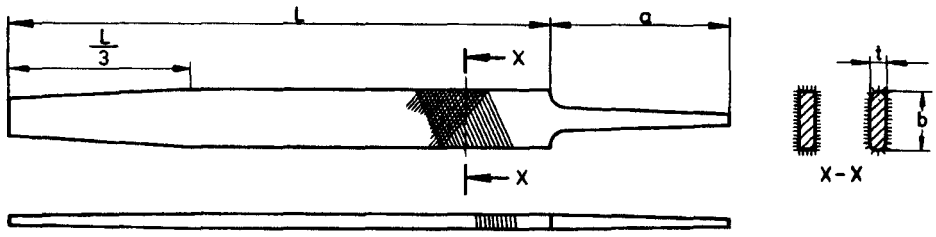
7.1.9.1 The dimensions of the feather edge files shall be as given in Table 9.

7.1.9.2 Feather edge files shall be of elongated diamond cross-section, parallel in width and thickness throughout. All sides shall have single cut. Files shall have cuts up to the point.

Table 1 Dimensions and Test Requirements for Flat Files

(*Clause* 7.1.1.1)

All dimensions in millimetres.

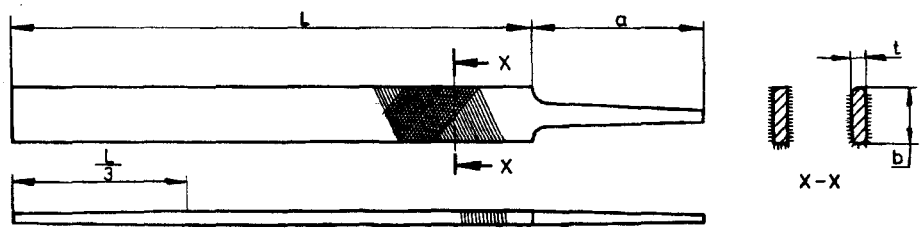


Sl No.	Nominal File Length	Dimensions			No. of Up Cuts per Centimetre for			Test Requirements		
	L	*b*	*t*	*a*	Bastard	Second Cut	Smooth	Warpage, *Max*	Distortion	Minimum Length of Test Bar to be Filed Away Within 30 000 Strokes for Bastard Cut
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
i)	100	12	2.5	40	16	16.5	23.5	2°	0.20	–
ii)	150	16	4	50	12.5	15	20	2°	0.20	–
iii)	200	20.5	5	60	10	12.5	17	2°	0.25	–
iv)	250	25	6	70	8	11	16.5	2°	0.65	150
v)	300	30	6.5	80	7	10	16	2°	0.65	200
vi)	350	35	7.5	90	6.5	9.5	15	2°	1.3	250
vii)	400	39	9	100	6	9	14	2°	1.5	280
viii)	450	43.5	9	110	6	8	13.5	2°	1.5	300

Table 2 Dimensions and Test Requirements for Hand Files

(*Clause* 7.1.2.1)

All dimensions in millimetres.

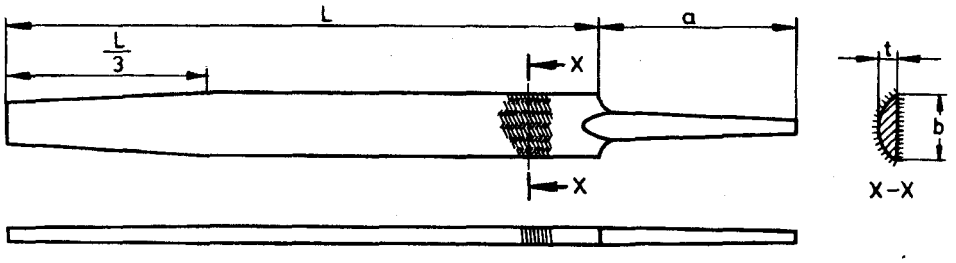


Sl No.	Nominal File Length	Dimensions			No. of Up Cuts per Centimetre for				Test Requirements		
	L	*b*	*t*	*a*	Bastard	Second Cut	Smooth	Dead Smooth	Warpage, *Max*	Distortion	Minimum Length of Test Bar to be Filed Away Within 30 000 Strokes for Bastard Cut
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	100	12	2.5	40	16	16.5	23.5	34.5	2°	0.20	–
ii)	150	16	4	50	12.5	15	20	33	2°	0.20	–
iii)	200	20.5	5	60	10	12.5	17	31.5	2°	0.25	–
iv)	250	25	6.0	70	9.5	11	16.5	30	2°	0.65	150
v)	300	30	6.5	80	8	10	16	28	2°	0.65	200
vi)	350	35	7.5	90	7.5	9.5	15	–	2°	1.03	250
vii)	400	39	9	100	7	9	14	–	2°	1.03	280
viii)	450	43.5	9	110	7	8	13.5	–	2°	1.03	300

Table 3 Dimensions and Test Requirements for Half Round Files

(*Clause* 7.1.3.1)

All dimensions in millimetres.

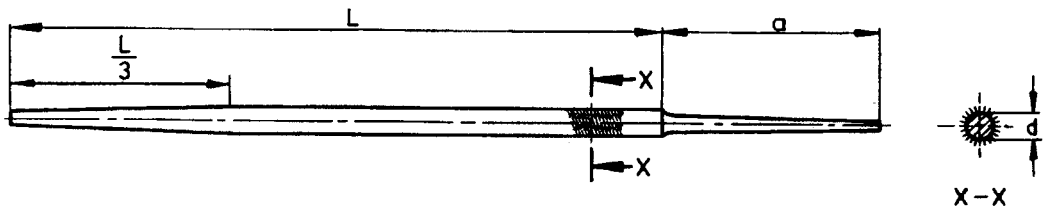


Sl No.	Nominal File Length	Dimensions			No. of Up Cuts per Centimetre for						Test Requirements	
					Bastard		Second Cuts		Smooth			
	L	*b*	*t*	*a*	Flat side	Convex side	Flat side	Convex side	Flat side	Convex side	War-page, *Max*	Minimum Length of Test Bar to be Filed Away Within 30 000 Strokes for Bastard Cut
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	100	11	3.5	40	16	15	16.5	17	23.5	21	3°	–
ii)	150	16	4	50	12.5	12	15	14	20	19	3°	–
iii)	200	20	5.5	60	10	9.5	12.5	11	17	16.5	3°	–
iv)	250	24	7	70	9.5	9	11	10	16.5	16	3°	150
v)	300	29	8.5	80	8	8	10	9.5	16	15	3°	200
vi)	350	34	10	90	7.5	7	9.5	9	15	14	3°	250
vii)	400	38	11	100	6	6	9	8	14	13.5	3°	280
viii)	450	44	13	110	6	6	8	7	13.5	12.5	3°	300

Table 4 Dimensions and Test Requirements for Round Files

(*Clause* 7.1.4.1)

All dimensions in millimetres.

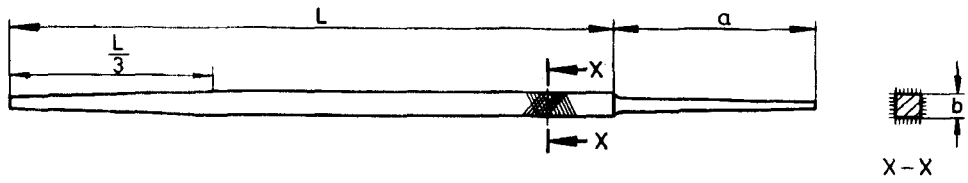


Sl No.	Nominal File Length	Dimensions		No. of Up Cuts per Centimetre for			Test Requirements, Distortion
	L	*d*	*a*	Bastard	Second Cut	Smooth	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	100	4	40	15	17	21	0.25
ii)	125	5	45	13.5	16	20.5	0.50
iii)	150	6	50	12	14	19	0.50
iv)	200	7.5	60	10	12	16.5	0.50
v)	250	9.5	70	9	10	16	0.65
vi)	300	12	80	8	9.5	15	0.65
vii)	350	15	90	7	9	14	0.75
viii)	400	18	100	7	8	13.5	0.75

Table 5 Dimensions and Test Requirements for Square Files

(*Clause* 7.1.5.1)

All dimensions in millimetres.

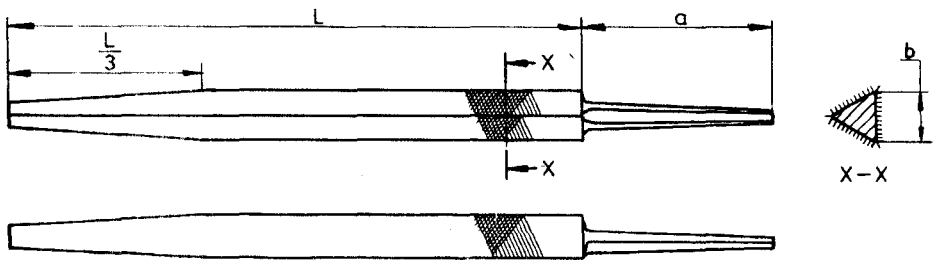


Sl No.	Nominal File Length	Dimensions		No. of Up Cuts per Centimetre for			Test Requirements		
	L	*b*	*a*	Bastard	Second Cut	Smooth	Warpage, *Max*	Distortion	Minimum Length of Test Bar to be Filed Away Within 30 000 Strokes for Bastard Cut
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	100	4	40	16.5	18	23.5	2°	0.13	–
ii)	125	5	45	15	17	22	2°	0.25	–
iii)	150	6	50	13.5	16	20.5	2°	0.38	–
iv)	200	7.5	60	11	13.5	18	2°	0.50	–
v)	250	10	70	10	12	17	2°	0.50	–
vi)	300	12	80	9.5	11	16.5	2°	0.50	–
vii)	350	15	90	9	10	16	2°	0.65	140
viii)	400	18	100	8	9.5	15	2°	0.65	150

Table 6 Dimensions and Test Requirements for Three Square Files

(*Clause* 7.1.6.1)

All dimensions in millimetres.

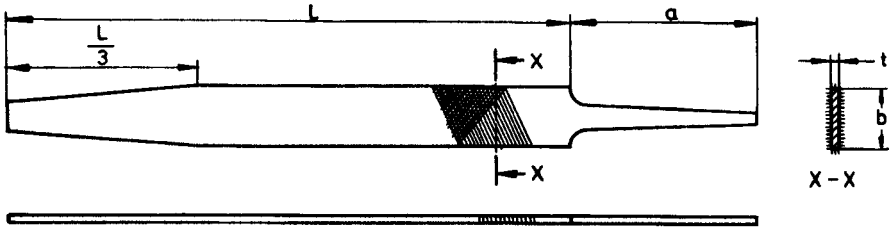


Sl No.	Nominal File Length	Dimensions		No. of Up Cuts per Centimetre for			Test Requirements	
	L	*b*	*a*	Bastard	Second Cut	Smooth	Warpage, *Max*	Minimum Length of Test Bar to be Filed Away Within 30 000 Strokes for Bastard Cut
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	100	8	40	16	16.5	23.5	2°	–
ii)	125	10	45	14	16	21	2°	–
iii)	150	11	50	12.5	14	20	2°	–
iv)	200	15	60	10	12.5	17	2°	–
v)	250	18	70	9.5	11	16.5	2°	150
vi)	300	20	80	8	10	16	2°	200
vii)	350	24	90	7.5	9.5	15	2°	250
viii)	400	27	100	7	9	14	2°	280

Table 7 Dimensions and Test Requirements for Warding Files

(*Clause* 7.1.7.1)

All dimensions in millimetres.

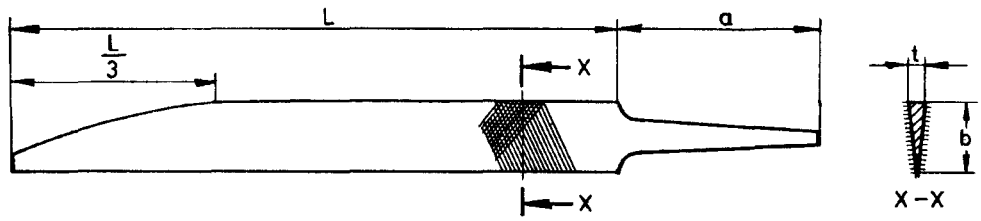


Sl No.	Nominal File Length	Dimensions			No. of Up Cuts per Centimetre for			Test Requirements	
	L	*b*	*t*	*a*	Bastard	Second Cut	Smooth	War-page, *Max*	Distortion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	100	12	1.5	40	16.5	18	23.5	2°	0.13
ii)	125	14	1.75	45	15	18.5	22	2°	0.16
iii)	150	16	2.0	50	13.5	16	20.5	2°	0.20
iv)	200	20	2.5	60	11	13.5	18	2°	0.25

Table 8 Dimensions and Test Requirements for Knife Files

(*Clause* 7.1.8.1)

All dimensions in millimetres.

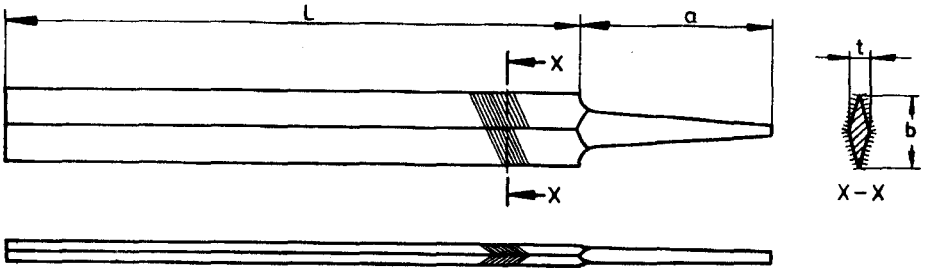


Sl No.	Nominal File Length	Dimensions			No. of Up Cuts per Centimetre for			Test Requirements, Warpage *Max*
	L	*b*	*t*	*a*	Bastard	Second Cut	Smooth	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	100	13	3	40	16.5	18	23.5	3°
ii)	150	18	4	50	13.5	16	20.5	5°
iii)	200	22	5	60	11	13.5	18	6°
iv)	250	27	6.5	70	10	12	17	7°
v)	300	33	7.5	80	9.5	11	16.5	7°

Table 9 Dimensions and Test Requirements for Feather Edge Files

(*Clause* 7.1.9.1)

All dimensions in millimetres.



Sl No.	Nominal File Length	Dimensions			No. of Up Cuts per Centimetre for			Test Requirements, Warpage *Max*
	L	*b*	*t*	*a*	Second Cut	Smooth	Dead Smooth	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	100	12.5	3.25	40	24	30	37	2°
ii)	150	19.0	5.0	50	20	27	35	2°
iii)	200	25.0	6.5	60	16	23	34	2°
iv)	250	32.0	8.0	70	14	20	33	2°

7.2 Saw Files

7.2.1 *Taper Saw Files*

7.2.1.1 The dimensions of the taper saw files shall be as given in Table 10.

7.2.1.2 Taper saw files shall be of equilateral triangular cross-section, parallel for approximately two-thirds file length and then tapering towards the point. Depending on the proportions of length and cross-section, the files shall be of *Regular*, *Slim*, *Extra Slim* or *Double Extra Slim* types. The sides and edges for all types of files unlike the three square files [*see* Table 6] shall have single cut. Point shall be left uncut.

7.2.2 *Band Saw Taper Regular Files*

7.2.2.1 The dimensions of the band saw taper regular files shall be as given in Table 11.

7.2.2.2 Band saw taper regular files shall be of equilateral triangular cross-section, parallel for approximately two-thirds file length and the rest tapering towards the point. Corners of the triangular cross-section shall be rounded with large radius for sharpening saws with rounded gullets. The sides and edges shall have single cut. Point shall be left uncut.

7.2.3 *Blunt Hand Saw Files*

7.2.3.1 The dimensions of the blunt hand saw files shall be as given in Table 12.

7.2.3.2 Blunt hand saw files shall be of equilateral triangular cross-section, parallel in width and thickness throughout. The sides and edges shall have single cut. Files shall have cuts up to the point.

7.2.4 *Double Ended Saw Files*

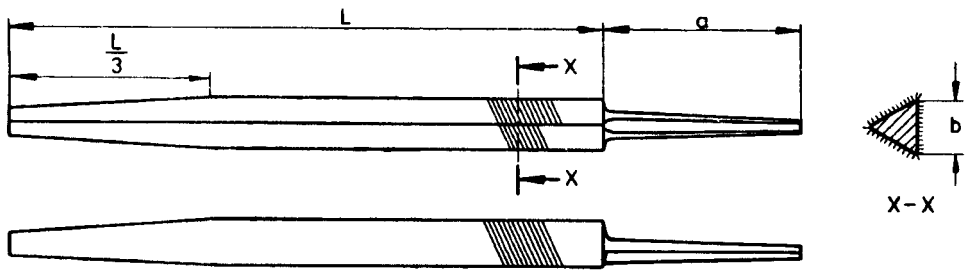
7.2.4.1 The dimensions of the double ended saw files shall be as given in Table 13.

7.2.4.2 The double ended saw file shall be of equilateral triangular cross-section having no tang, parallel in the centre and tapering towards both ends for approximately one-sixth of the file length. The file is reversible and its length is measured from end-to-end. The sides and edges shall have single cut. Point shall be left uncut.

Table 10 Dimensions and Test Requirements for Taper Saw Files

(*Clause* 7.2.1.1)

All dimensions in millimetres.

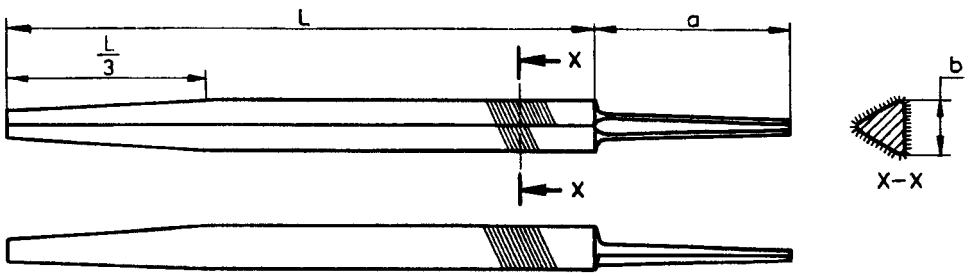


Sl No.	Nominal File Length *L*	Tang *a*	Regular		Slim		Extra Slim		Double Extra Slim		Test Requirements, Warpage *Max*
			b	No. of Cuts for Second Cut	*b*	No. of Cuts for Second Cut	*b*	No. of Cuts for Second Cut	*b*	No. of Cuts for Second Cut	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	75	35	7	23.5	–	–	–	–	–	–	2°
ii)	90	40	7.5	23	–	–	–	–	–	–	2°
iii)	100	40	8	21	6	23.5	5	24	4	26	2°
iv)	110	40	10	20.5	7	23.5	6	23.5	–	–	2°
v)	125	45	11	20	7	23	6	23	5	25	2°
vi)	150	50	12	17	8.5	21	7	23	6	24	2°
vii)	175	55	13.5	16.5	10	20	8.5	21	7	23	2°
viii)	200	60	15	16	12	17	10	19	–	–	2°
ix)	225	65	16.5	15	13.5	16.5	–	–	–	–	2°
x)	250	70	18	14	15	16	–	–	–	–	2°

Table 11 Dimensions and Test Requirements for Band Saw Taper Regular Files

(*Clause* 7.2.2.1)

All dimensions in millimetres.

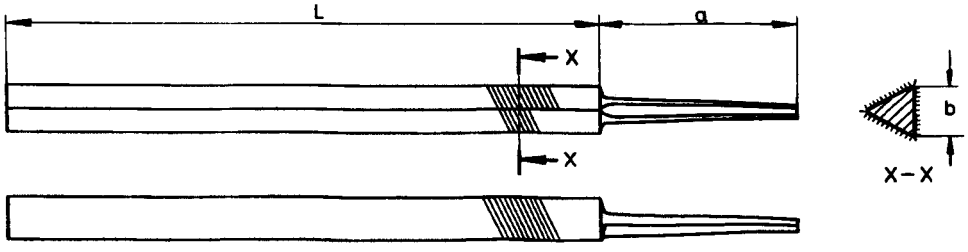


Sl No.	Nominal File Length *L*	Dimensions		No. of Cuts per Centimetre for Second Cut	Test Requirements, Warpage *Max*
		b	*a*		
(1)	(2)	(3)	(4)	(5)	(6)
i)	125	11	40	20	2°
ii)	150	12	50	17	2°
iii)	175	13.5	55	16.5	2°
iv)	200	15	60	16	2°

Table 12 Dimensions and Test Requirements for Blunt Hand Saw Files

(*Clause* 7.2.3.1)

All dimensions in millimetres.

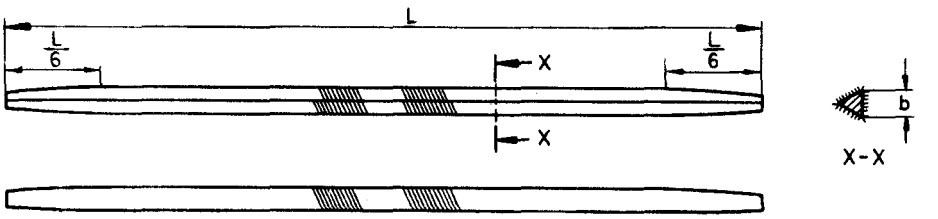


Sl No.	Nominal File Length *L*	Dimensions		No. of Cuts per Centimetre for Second Cut	Test Requirements, Warpage *Max*
		b	*a*		
(1)	(2)	(3)	(4)	(5)	(6)
i)	110	10	40	20	2°
ii)	125	11	45	20	2°
iii)	150	12	50	17	2°
iv)	175	13.5	55	16.5	2°
v)	200	15	60	16	2°

Table 13 Dimensions and Test Requirements for Double Ended Saw Files

(*Clause* 7.2.4.1)

All dimensions in millimetres.



Sl No.	Nominal File Length *L*	*b*	No. of Cuts per Centimetre for Second Cut	Test Requirements, Warpage *Max*
(1)	(2)	(3)	(4)	(5)
i)	150	5.5	23.5	2°
ii)	175	7.0	23.5	2°
iii)	200	7.0	23	2°
iv)	225	9.0	21	2°
v)	250	9.5	20.5	2°

7.2.5 *Pit Saw Files*

7.2.5.1 The dimensions of the pit saw files shall be as given in Table 14.

7.2.5.2 Pit saw files shall be of one side flat and other convex cross-section, parallel in width and thickness throughout. Both flat and convex sides shall have single cut. Point shall be left uncut.

7.2.6 *Cant Saw Files*

7.2.6.1 The dimensions of the cant saw files shall be as given in Table 15.

7.2.6.2 Cant saw files shall be of isosceles triangular cross-section having an obtuse apex angle, parallel in width and thickness throughout. The base angles shall be flattened and cut. The sides and edges shall have single cut. Files shall have cuts up to the point.

7.2.7 *Cross Cut Saw Files*

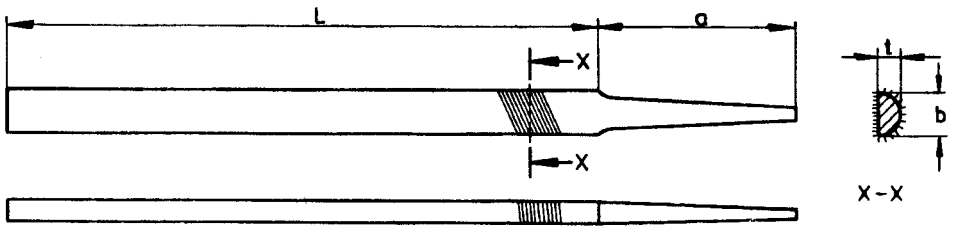
7.2.7.1 The dimensions of the cross cut saw files shall be as given in Table 16.

7.2.7.2 Cross cut saw files shall be of uniform wedge cross-section, with the thicker edge having convex shape. The sides and the edges shall have single cut. Files shall have cuts up to the point.

Table 14 Dimensions and Test Requirements for Pit Saw Files

(*Clause* 7.2.5.1)

All dimensions in millimetres.

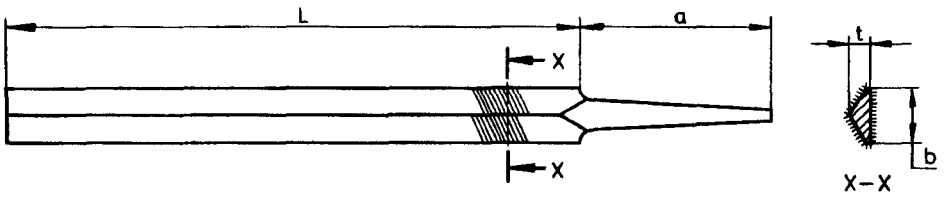


Sl No.	Nominal File Length *L*	Dimensions			No. of Cuts per Centimetre for Second Cut Flat/Convex Side	Test Requirements, Warpage *Max*
		b	*t*	*a*		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	100	8	4.0	40	21	2°
ii)	110	9	4.5	40	20.5	2°
iii)	125	10	5.0	45	20	2°
iv)	150	11	5.5	50	19	2°
v)	175	13	6.5	55	19	2°
vi)	200	14	7.0	60	18	2°

Table 15 Dimensions and Test Requirements for Cant Saw Files

(*Clause* 7.2.6.1)

All dimensions in millimetres.

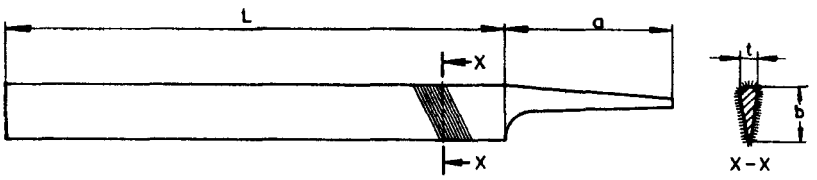


Sl No.	Nominal File Length *L*	Dimensions			No. of Cuts per Centimetre for Second Cut	Test Requirements, Warpage *Max*
		b	*t*	*a*		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	100	10	3.25	40	24	2°
ii)	150	13.5	5.5	50	20.5	2°
iii)	200	17.5	6.5	60	19	2°
iv)	250	20.5	7	70	16.5	2°

Table 16 Dimensions and Test Requirements for Cross Cut Saw Files

(*Clause* 7.2.7.1)

All dimensions in millimetres.



Sl No.	Nominal File Length L	Dimensions			No. of Cuts per Centimetre for Second Cut	Test Requirements, Warpage Max
		b	t	a		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	150	14.0	5.0	50	20.5	3°
ii)	250	17.5	6.5	60	19	3°
iii)	300	21.5	8.0	70	16.5	3°

7.3 Mill Files

7.3.1 *Taper Mill Files*

7.3.1.1 The dimensions of the taper mill files shall be as given in Table 17.

7.3.1.2 Taper mill files shall be of rectangular cross-section, parallel for approximately two-thirds file length and then tapering towards the point in width and thickness. The edges may be either two square edges, one round edge and other square or two round edges. Sides and edges shall have single cut. Point shall be left uncut.

7.3.2 *Parallel Mill Files*

7.3.2.1 The dimensions of the parallel mill files shall be as given in Table 18.

7.3.2.2 Parallel mill files shall be of rectangular cross-section, parallel in width and thickness throughout. The edges may be either two square edges, one round edge and other square, or two round edges. Sides and edges shall have single cut. Point shall be left uncut.

7.3.3 *Blunt Heavy Mill Files*

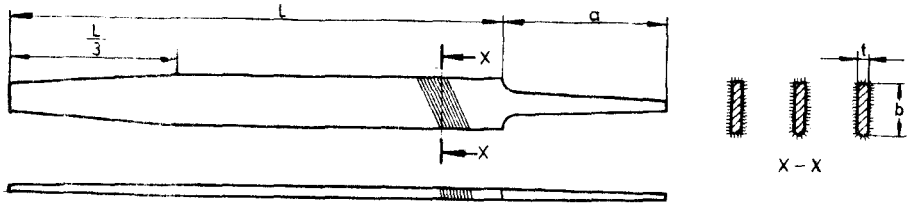
7.3.3.1 The dimensions of the blunt heavy mill files shall be as given in Table 19.

7.3.3.2 Blunt heavy mill files shall be of rectangular cross-section, parallel in width and thickness throughout. The edges may be either one round edge and other square or two round edges. Sides and edges shall have single cut. Point shall be left uncut.

Table 17 Dimensions and Test Requirements for Taper Mill Files

(*Clause* 7.3.1.1)

All dimensions in millimetres.

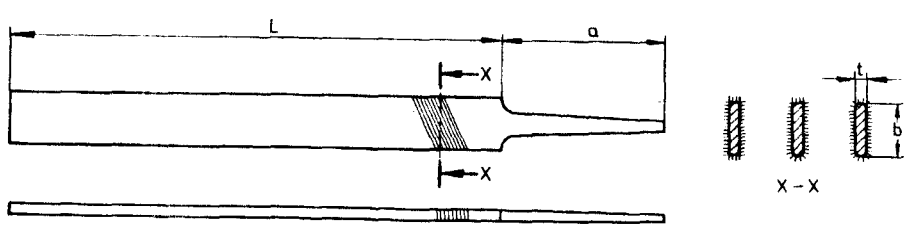


Sl No.	Nominal File Length	Dimensions			No. of Cuts per Centimetre for			Test Requirements	
	L	*b*	*t*	*a*	Bastard	Second Cut	Smooth	Warpage, *Max*	Distortion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	150	16	3.0	50	19	20.5	24.5	2°	0.20
ii)	175	17.5	3.5	55	17	20	23	2°	0.20
iii)	200	20	3.5	60	16.5	19	22	2°	0.25
iv)	225	23	4.5	65	16	17	20.5	2°	0.25
v)	250	25	4.5	70	15	16.5	19	2°	0.38
vi)	300	30	5.0	80	13.5	15	17	2°	0.38
vii)	350	34	6.0	90	12	13.5	16	2°	0.50

Table 18 Dimensions and Test Requirements for Parallel Mill Files

(*Clause* 7.3.2.1)

All dimensions in millimetres.

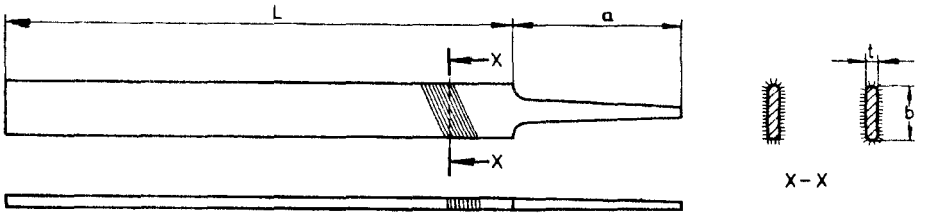


Sl No.	Nominal File Length	Dimensions			No. of Cuts per Centimetre for			Test Requirements	
	L	*b*	*t*	*a*	Bastard	Second Cut	Smooth	Warpage, *Max*	Distortion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	150	16	3.0	50	19	20	24	2°	0.20
ii)	175	17.5	3.5	55	17	20	23	2°	0.20
iii)	200	20	3.5	60	17	19	22	2°	0.25
iv)	225	23	4.5	65	16	17	20	2°	0.25
v)	250	25	4.5	70	15	17	19	2°	0.38
vi)	300	30	5.0	80	13	15	17	2°	0.38
vii)	350	34	6.0	90	12	13	16	2°	0.50

Table 19 Dimensions and Test Requirements for Blunt Heavy Mill Files

(*Clause* 7.3.3.1)

All dimensions in millimetres.



Sl No.	Nominal File Length	Dimensions			No. of Cuts per Centimetre for		Test Requirements	
	L	*b*	*t*	*a*	Second Cut	Smooth	War-page, *Max*	Distortion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	150	21	4	50	18	20.5	2°	0.20
ii)	200	24	5	60	16.5	19	2°	0.25
iii)	250	27	6	70	16	18	2°	0.38
iv)	300	30	6	80	14	16.5	2°	0.38

7.4 Special Purpose Files

7.4.1 *Hand Finishing Files*

7.4.1.1 The dimensions of the hand finishing files shall be as given in Table 20.

7.4.1.2 Hand finishing files shall be of rectangular cross-section, parallel in width and thickness throughout. The sides shall have double cut. One edge shall have single cut and other shall be kept smooth (safe edge). Files shall have cuts up to the point.

7.4.2 *Cabinet Files*

7.4.2.1 The dimensions of the cabinet files shall be as given in Table 21.

7.4.2.2 Cabinet files shall be of one side flat and other convex cross-section, parallel for approximately two-thirds file length and then tapering towards the point in width and thickness. Both flat and convex sides shall have double cut. Point shall have cuts up to the point.

7.4.3 *Reaper Files*

7.4.3.1 The dimensions of the reaper files shall be as given in Table 22.

7.4.3.2 Reaper files shall be of rectangular cross-section, parallel in width and thickness throughout. These files shall be provided with integral handle. The sides shall have single cut. Both edges shall be left safe.

7.4.4 *Block Files*

7.4.4.1 The dimensions of the block files shall be as given in Table 23.

7.4.4.2 The block file shall be of rectangular cross-section having no tang, parallel in width and thickness throughout. The sides shall have single cut and both edges shall be left safe. Both ends may have uncut of 10 mm.

7.5 Length of uncut portion from the shoulder end to longer side of the cut may be approximately 1.5 times the width or diameter of the file (*see* Fig. 3).

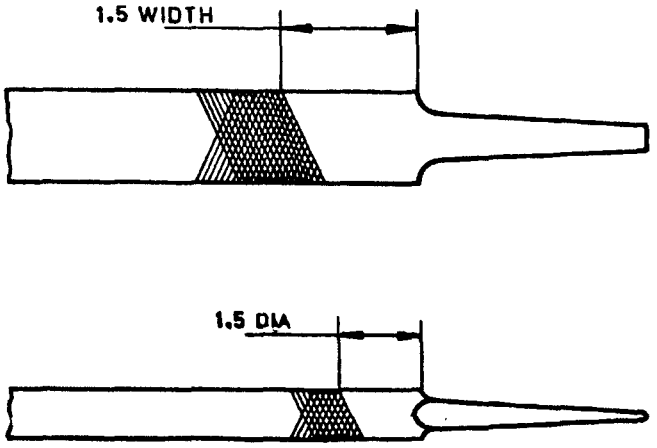
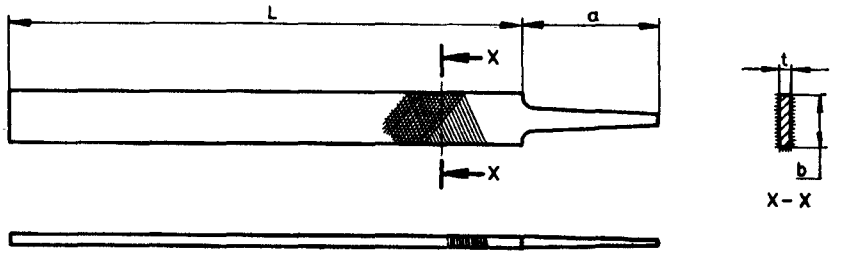


FIG. 3 LENGTH OF UNCUT PORTION

Table 20 Dimensions and Test Requirements for Hand Finishing Files
(*Clause* 7.4.1.1)

All dimensions in millimetres.

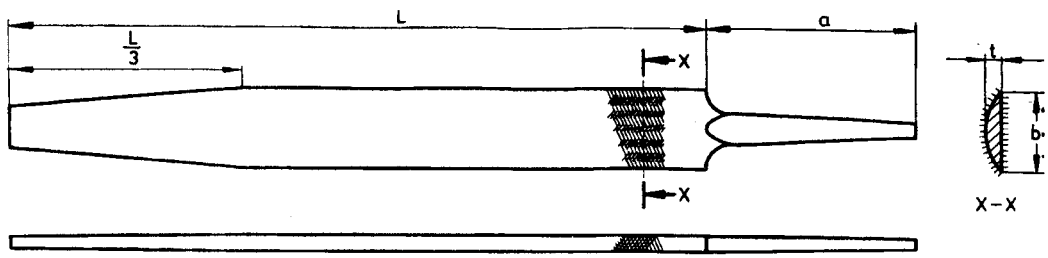


Sl No.	Nominal File Length *L*	Dimensions			No. of Cuts per Centimetre for Smooth Cut	Test Requirements	
		b	*t*	*a*		Warpage, *Max*	Distortion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	250	25	6.0	70	16	2°	0.75
ii)	300	30	7.0	80	15	2°	0.75
iii)	350	35	7.5	90	14	2°	1.3

Table 21 Dimensions and Test Requirements for Cabinet Files

(*Clause* 7.4.2.1)

All dimensions in millimetres.

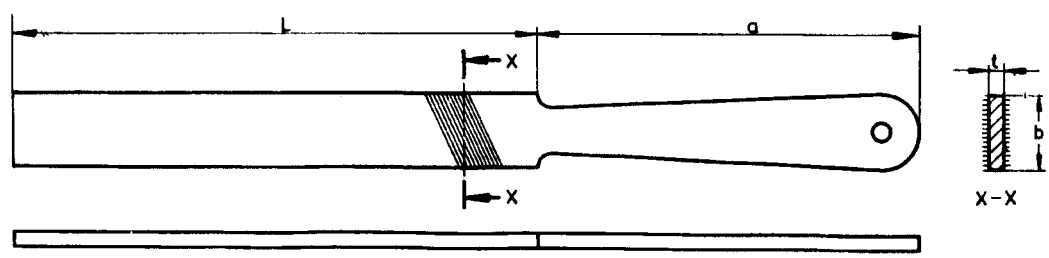


Sl No.	Nominal File Length	Dimensions			No. of Cuts per Centimetre for		Test Requirements, Warpage
	L	*b*	*t*	*a*	Flat Side	Convex Side	*Max*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	200	23	4.5	60	10	9.5	2°
ii)	250	28	5.5	70	9.5	9	2°
iii)	300	34	6.5	80	8	8	2°

Table 22 Dimensions and Test Requirements for Reaper Files

(*Clause* 7.4.3.1)

All dimensions in millimetres.

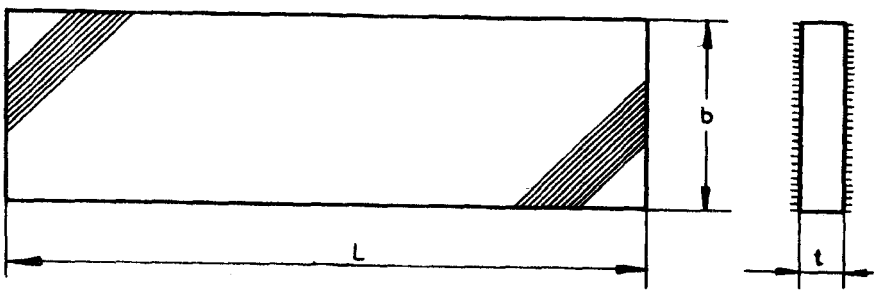


Sl No.	Nominal File Length	Dimensions			No. of Cuts per Centimetre for Second Cut	Test Requirements	
	L	*b*	*t*	*a*		War-page *Max*	Distortion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	150	21.0	4.0	110	16	2°	0.50
ii)	200	23.0	4.5	110	15	2°	0.50

Table 23 Dimensions and Test Requirements for Block Files

(*Clause* 7.4.4.1)

All dimensions in millimetres.



Sl No.	Nominal File Length *L*	Dimensions *b*	Dimensions *t*	No. of Cuts per Centimetre	Test Requirements: Warpage *Max*	Test Requirements: Distortion
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	100	30	6.5	13.25	2°	0.50

8 TOLERANCES

8.1 The tolerances on nominal length (*L*) shall be :

a) Up to and including 150 mm $+6\ 0$ mm

b) Over 150 mm up to and including 250 mm $+8\ 0$ mm

c) Over 250 mm $+10\ 0$ mm

8.2 The tolerances on diameter, width or side (*b*) shall be:

a) For warding files ± 0.8 mm

b) For all other files ± 1.6 mm

8.3 The tolerances on thickness (*t*) shall be:

a) For warding files of all sizes ± 0.4 mm

b) For all other files of

i) Length up to and including 150 mm ± 0.8 mm

ii) Length over 150 mm ± 1.6 mm

8.4 The tolerance on length of tang (*a*) for files of all sizes shall be –20 percent.

8.5 The tolerance on number of cuts per centimetre shall be ±10 percent.

9 GENERAL REQUIREMENTS

9.1 The files shall generally conform to the shapes and dimensions given in the relevant Tables.

9.2 The teeth on the surfaces and sides shall be uniform.

9.3 Safe edges shall be smooth and free from burrs.

9.4 When held near the middle of file length and struck by a piece of steel, the files shall give a clear metallic ring.

10 WORKMANSHIP AND FINISH

The file shall be well shaped and shall be reasonably straight. They shall be properly cleaned and shall not show cracks, scales, rust or other manufacturing defects.

11 HANDLES

In case, the handles are required to be supplied with files, these shall conform to IS 2895.

12 SAMPLING

For ascertaining the conformity of the lot, the procedure for sampling and inspection as given in IS 2500 (Part 1) shall be followed. The sampling plan, inspection level and AQL to be followed for various characteristics shall be as given in **12.1** and relevant Tables.

12.1 For dimensions and visual inspection, a single sampling plan with inspection level III and AQL of 2.5 percent as given in Tables I and IIA of IS 2500 (Part 1) shall be followed.

12.2 For warpage test, distortion test and hand prover test, a single sampling plan with inspection level I and AQL of 2.5 percent as given in Tables I and II A of IS 2500 (Part 1) shall be followed.

12.3 For endurance test, one sample from a lot of 3 000 or part thereof shall be selected. After the test, it shall meet the requirements laid down in relevant Tables.

13 TESTS

13.1 Warpage Test

Warpage is the angular displacement between the plane of the side at shoulder and at the point. Warpage shall be measured by means of an instrument consisting of one horizontal surface and one pivoted surface to which an indicating pointer is attached, supported on a master flat surface. A typical instrument used for warpage testing is given in Fig. 4. The horizontal surface shall be adjustable so as to accommodate the length of the file under test. The shoulder shall be pressed against the horizontal surface, the pivoted surface shall then be rotated in its pivot to bear on the side of the point. The warpage shall be indicated by a pointer on a scale graduated in degrees. The files shall meet the requirements of warpage specified in the relevant Tables.

13.2 Distortion Test

The distortion shall be considered as the deviation of the centre line of file from a straight line. It is half the difference between maximum and minimum gauge readings taken on opposite sides. The distortion shall be measured by means of a dial gauge and two steel blocks supported on a master flat surface. A typical instrument for measuring distortion is given in Fig. 5. Flat blocks shall be employed for flat surface files and V-blocks for round and curved surface files. The flat or V-blocks shall be placed under the point and the shoulder of the file under test. The dial gauge readings shall be taken in the middle of nominal length at opposite sides by rotating the files through 180° around the centre line of the file. The files shall meet the requirements of distortion specified in relevant Tables.

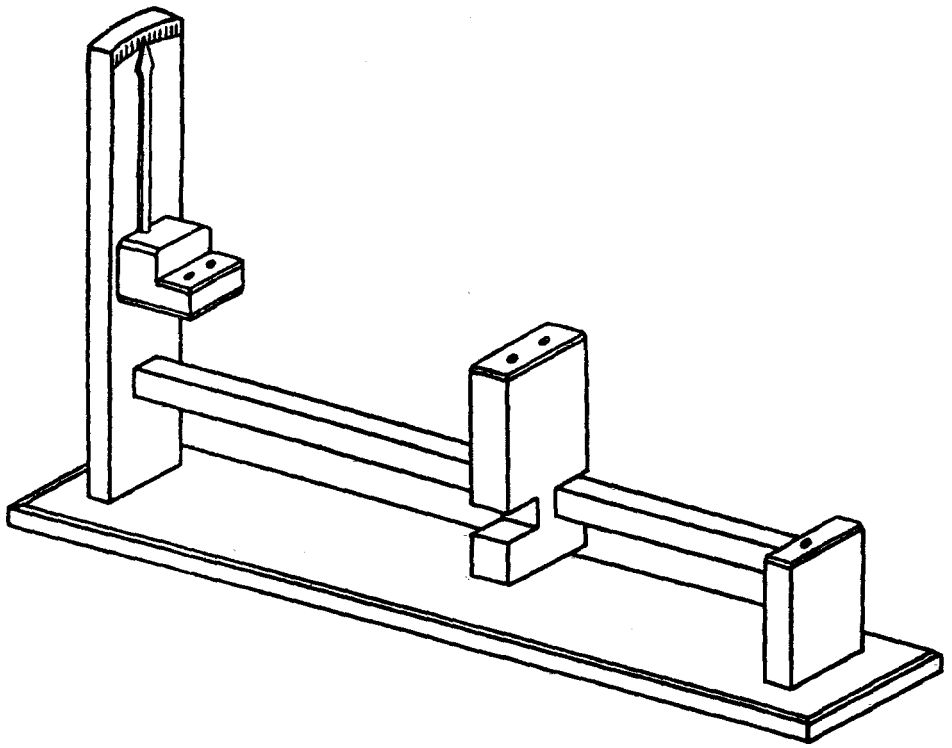


FIG. 4 INSTRUMENT FOR MEASURING WARPAGE

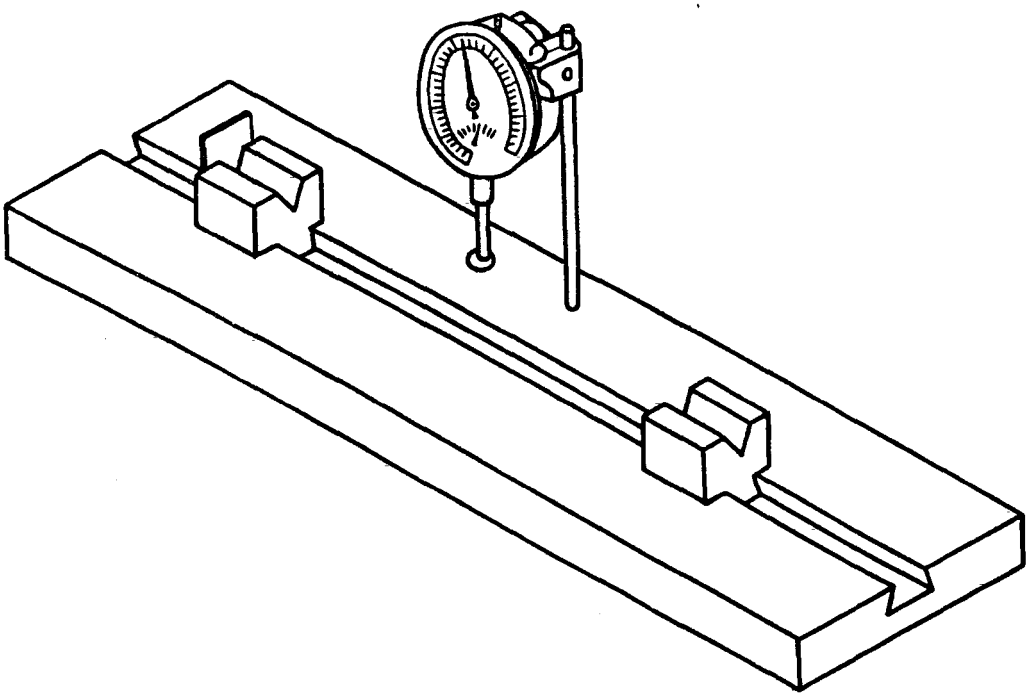


FIG. 5 INSTRUMENT FOR MEASURING DISTORTION

13.3 Hand Prover Test (Routine Test)

13.3.1 The hardness of hand prover for testing different files shall be as given below:

a) For saw files 615 HV *Min* or 56 HRC *Min*, and

b) For other files 545 HV *Min* or 52 HRC *Min*.

13.3.2 The prover may be of cross-section 25 mm × 5 mm and having length approximately 250 mm for the convenience of proper grip. The prover shall be applied to the file at an angle of approximately 30° (*see* Fig. 6) and firmly over the file from point to shoulder using only pressure sufficient to make it bite. The files shall cut without any signs of slip, blunting or stripping of teeth. Any file that allows the prover to slip over any portion of its surface shall be considered unsatisfactory and shall be rejected.

NOTE — The word 'slip' in the above requirement means absence of noticeable abrading, cutting or filing action on the prover and absence of bite.

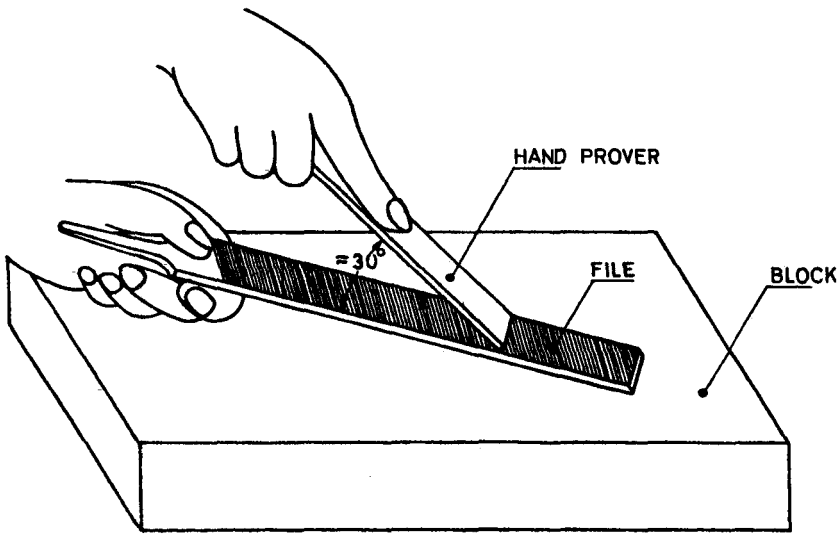


FIG. 6 HAND PROVER TEST

13.4 Micro Hardness Test (Type Test)

Files shall be checked for hardness requirements specified in 6, by mirco hardness tester. Two numbers of files of each type shall be checked every quarter of the year to evaluate the quality control at the manufacturing process.

13.5 Endurance Test

This test shall be applicable only to the engineer's files which are of double cut types and have bastard grade of cut. This test shall apply only to the flat sides of file. This test shall not be conducted on files of second cut, smooth and dead smooth grades of cut. This will also not be applicable to single cut type of files. The endurance test requirements as laid down in relevant Tables shall be met.

13.5.1 The test bar on which the file is to be tested shall be of 25 mm × 25 mm or 12 mm × 25 mm in cross-section depending upon the width of file under test. The test bars shall be of 60T6 steel with the sulphur and phosphorous content not exceeding 0.06 percent each (*see* IS 3748). The test bar shall have a hardness value between 220 to 230 HV.

13.5.2 The file testing machine shall be operated at a frequency of 50 to 55 strokes per minute. The length of stroke shall be adjusted to 150 mm. The file shall exert a constant pressure of about 20 N/cm^2 (2 kgf/cm^2 approx) on the test bar during the entire test. It shall be so arranged that the file works flat and relieves the test bar during the return stroke.

13.5.3 The minimum length of test bar filed away by a flat side of the file, at 30 000 strokes, shall be not less than the limits specified in the relevant Tables.

13.5.3.1 During the endurance test of files, the following conditions shall be kept in view:

a) The test bar and the file under test shall be kept free from oil; and

b) During the test, files shall be cleaned once during 1 000 strokes.

14 DESIGNATION

The files shall be designated by commonly used names, grade of cut, nominal file length (excluding the tang), details of edges (wherever applicable) and number of Indian Standards.

Example:

A half round file with grade of cut smooth, having nominal length L = 350 mm, shall be designated as:

Half Round File S 350 — IS 1931

A taper saw extra slim file with grade of cut as second cut (SC) having nominal length L = 125 mm shall be designated as:

Taper Saw Extra Slim File SC 125 — IS 1931

A blunt heavy mill file with grade of cut bastard having nominal length L = 200 mm and with two round edges shall be designated as:

Blunt Heavy Mill File — B — Two Round Edges 200 — IS 1931

A cabinet file with grade of cut bastard, having nominal length L = 250 mm, shall be designated as:

Cabinet File B 250 — IS 1931

15 PRESERVATIVE TREATMENT AND PACKING

15.1 The files may be given a suitable rust preventive treatment before packing.

15.2 Unless otherwise agreed upon by the manufacturer and the purchaser, files shall be individually wrapped in wax paper to avoid damage to the teeth and to protect them against corrosion. They shall be then packed in cardboard boxes. Each box shall contain files of similar type, cut and length.

16 MARKING

16.1 Each file shall be stamped legibly with nominal size, the grade of cut and the manufacturer's name/ initials or trade-mark on the uncut portion of the file but in case where the space is limited, the tang may also be used for the purpose.

16.1.1 When the space does not permit the marking of grade of cut in full, the following abbreviations may be used:

Bastard (B), Second Cut (SC), Smooth (S), Dead Smooth (DS)

16.2 Boxes in which files are packed shall also be labelled or marked to show the description of size and quantity, in accordance with the best trade practices.

16.3 BIS Certification Mark

Each file may also be marked with the Standard Mark.

16.3.1 The use of the Standard Mark is governed by the provision of *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.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act,* 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc : No. BP/PE 05 (0171).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones : 323 01 31, 323 33 75, 323 94 02

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Printed at : Prabhat Offset Press, New Delhi-2