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PGD 34 (18943) WC
February 2022

भारतीय मानक मसौदा
धातु काटने की कतरनी— विशिष्टि
(IS 6087 का पहला पुनरीक्षण)

Draft Indian Standard
METAL CUTTING SHEARS — SPECIFICATION
(*First Revision of IS 6087*)

ICS 25.140.30

Hand Tools Sectional Committee, PGD 34

FOREWORD

This Indian Standard (First revision) will be adopted by the Bureau of Indian Standards, after the draft is finalized by the Hand Tools Sectional Committee and approval by the Production and General Engineering Division Council (PGDC).

Metal cutting shears are used for cutting scrap metal to a suitable size for handling and transport to a metal recovery operation, it is usually used for cutting rough shapes out of medium-sized pieces of sheet metal. This standard has been formulated with a view to ensuring the minimum standard of quality of the tools so that they will have a longer useful life. It specifies the certain basic overall dimensions of functional importance only without imposing any limitation on details of design.

This standard was first published in 1971. The first revision has been taken up to keep pace with the latest technological developments and international practices.

In this revision, the following changes have been made:

- a) Clause on references has been added;
- b) Material designations have been updated as per latest Indian Standard;

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

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Indian Standard

METAL CUTTING SHEARS — SPECIFICATION

(First Revision)

1 SCOPE

This standard prescribes requirements for straight cut and circular cut hand metal cutting shears for general purposes.

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 listed below:

<i>IS No.</i>	<i>Title</i>
513 (Part 1) : 2016	Cold reduced carbon steel sheet and strip: Part 1 cold forming and drawing purpose (<i>sixth revision</i>)
1364 (Part 1) : 2018	Hexagon head bolts, screws and nuts of product grades A and B: Part 1 hexagon head bolts (Size Range M 1.6 To M 64) (<i>Fifth Revision</i>)
1501 (Part 1) : 2020	Metallic Materials — Vickers hardness test: Part 1 Test Method (<i>fifth revision</i>)
1570 (Part 2) : 1979	Schedules for wrought steels: Part 2 carbon steels (Unalloyed Steels) (<i>first revision</i>)
1570 (Part 6) : 1996	Schedules for wrought steels: Part 6 Carbon and Alloy Tool Steels (<i>first revision</i>)
1586 (Part 1) : 2018	Metallic materials — Rockwell hardness test: Part 1 Test method (<i>fifth revision</i>)
1848 (Part 1) : 2018	Writing and printing papers — Specification: Part 1 account book, azure lead, bond, cream laid and cream wove/printing white/printing coloured/printing offset, printing maplitho, printing white super calendered and typewriting types (<i>fifth revision</i>)
4905 : 2015	Random sampling and randomization procedures (<i>first revision</i>)

3 MATERIAL

Shears shall be manufactured from a suitable high carbon steel or tool steel meeting with the requirements laid down in **4** and **11**. Some of the suitable steels for this purpose are 80C6 of IS 1570 (Part 2) and TC 4 of 1570 (Part 6) with a maximum sulphur and phosphorus content of 0.05 percent each.

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4 HARDNESS

The hardness of the blades shall be within the range of 545 to 655 HV or 52 to 58 HRC when determined in accordance with IS 1586 (Part 1) or IS 1501 (Part 1) as applicable.

5 DIMENSIONS

The dimensions for the metal cutting shears shall be as given in Table 1 to 5.

6 MANUFACTURE

6.1 Shears shall consist essentially of two cutting blades, two handles and a bolt.

6.2 Blades shall be of either one-piece or two-piece construction at the option of the supplier. One-piece blades shall be forged in a single piece integral with the handle. Blades of two pieces shall be forged in a single piece integral with the handle. Blades of two pieces shall be joined to handles by forge welding into a single integral unit. In case of two-piece blade construction, the cutting edges shall be at least 2 mm in depth for the grindings which may be required during the life of the tool.

6.3 Blade cutting edge shall be suitably beveled and properly hardened and tempered. Cutting edges shall be slightly crowned so that the proper cutting angle shall be maintained throughout the full length of cut.

6.4 Blade bearing and mating surfaces shall be ground true, shall be smooth and of ample width to prevent the blades from twisting or springing open under ordinary cutting loads likely to be encountered in service.

6.5 The centre bolt and nut shall serve as a pivot joint holding the blades together and shall provide a means for blade adjustment. The centre bolt shall be prevented from rotating in one blade and permitted to rotate in the other. The tensioning nut shall be of self-locking type. See IS 1364 (Part 1) for bolt designation.

6.6 The handles of shears shall be shaped to provide a smooth and comfortable grip for the hand. Handles shall be free from flash and irregular or sharp projections and edges. Shears shall be provided with handle stops so arranged as to preclude the possibility of the handles being closed beyond the effective blade-cutting point.

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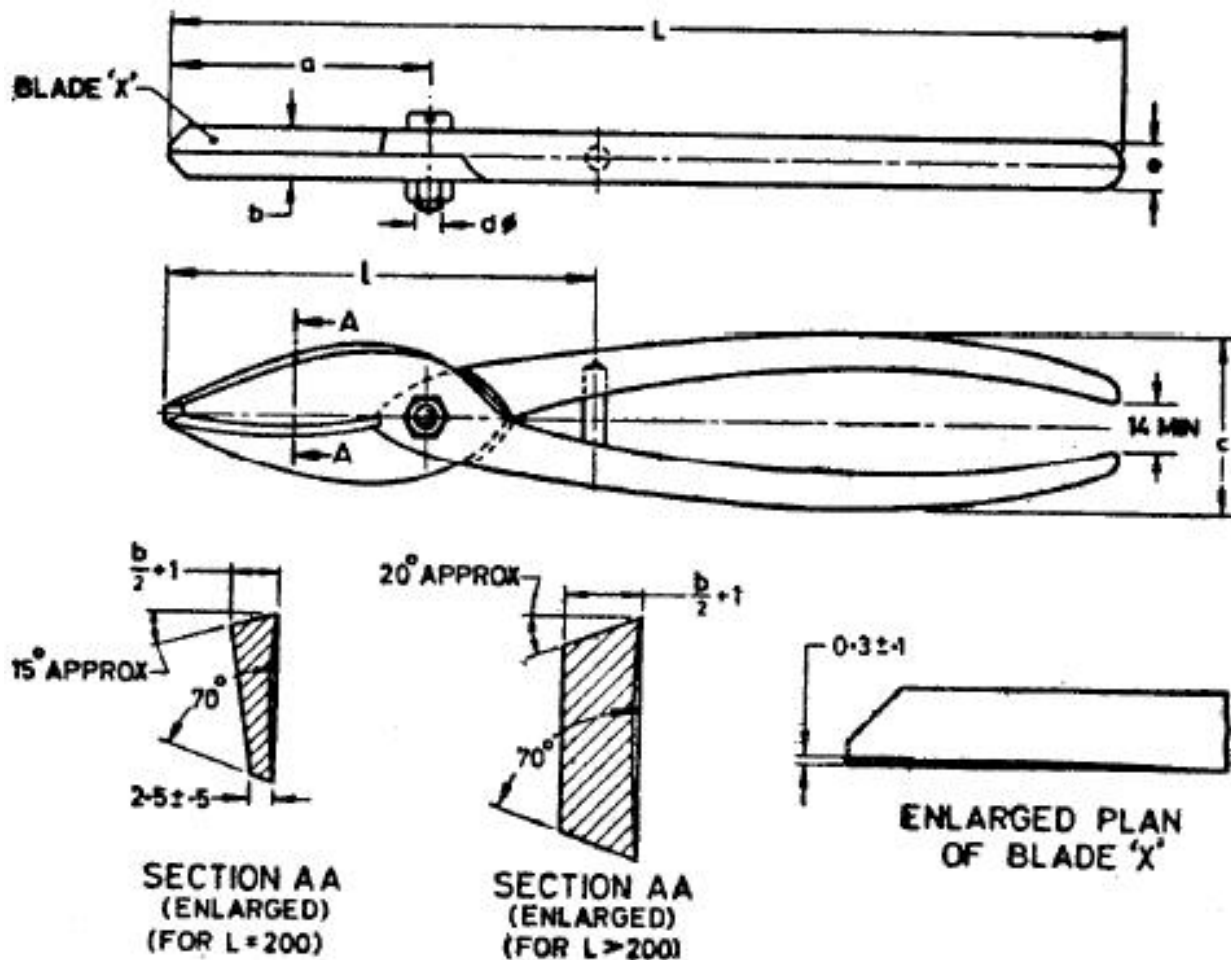
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6.7 The metal cutting shears of Types A, B and C shall be of straight cut and Types D and E shall be of circular cut. The shears shall be manufactured either in right hand cut (lower blade on right hand side) or left hand cut (lower blade on left hand side).

Table 1 Dimensions for Metal Cutting Shears, Type A

(Clause 5)

All dimension in millimeters.



Nominal Size	L ±5	a ±2	b ±2	c ±5	d	e <i>Min</i>	I <i>Max</i>
200	200	65	10	45	M6	8	105
250	250	70	14	50	M6	12	125
300	300	82	16	56	M8	14	135

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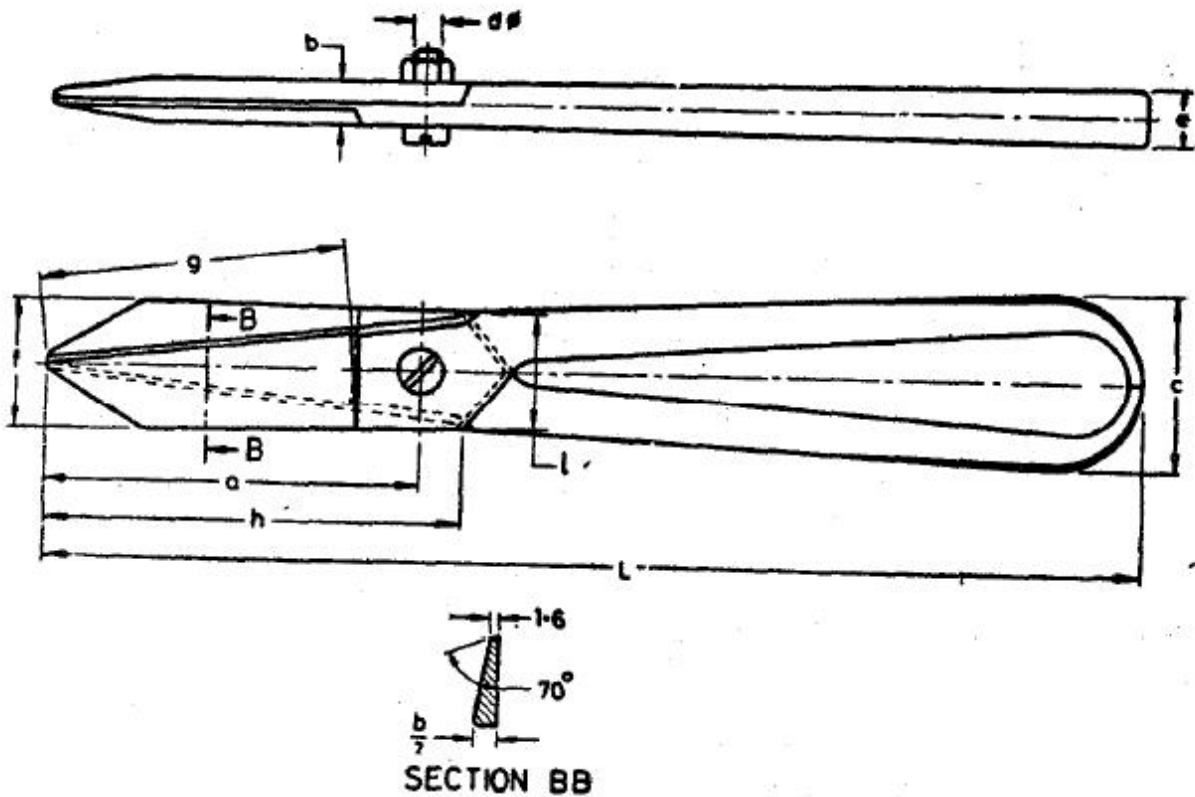
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350	350	114	20	58	M8	20	190
400	400	122	21	62	M10	20	210

Table 2 Dimensions for Metal Cutting Shears, Type B
(Clause 5)

All dimensions in millimeters



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Nominal Size	L ±5	a ±2	b ±2	c ±5	d	e <i>Min</i>	f <i>Approx</i>	g ±2	h ±2	I <i>Approx</i>
160	160	55	10	40	M6	12	30	43	65	24
250	250	85	10	40	M6	12	30	70	95	27
300	300	105	14	50	M8	14	45	85	110	42
350	350	105	16	50	M8	14	45	90	125	42
400	400	122	20	60	M10	20	50	100	130	42

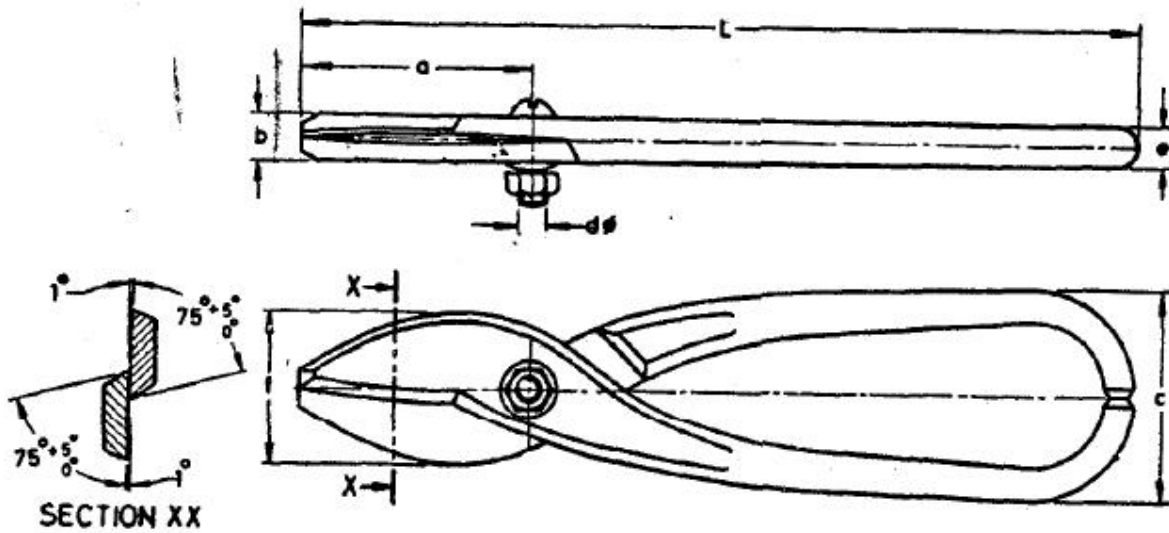
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Table 3 Dimensions for Metal Cutting Shears, Type C
(Clause 5)

All dimension in millimeters.



Nominal Size	L ±5	a ±2	b ±5	c ±5	d	e <i>Min</i>	f <i>Approx</i>
160	160	45	8	50	M6	6	30
200	200	55	11	50	M6	9	36
250	250	70	12	50	M6	10	38
300	300	85	14	50	M8	12	44

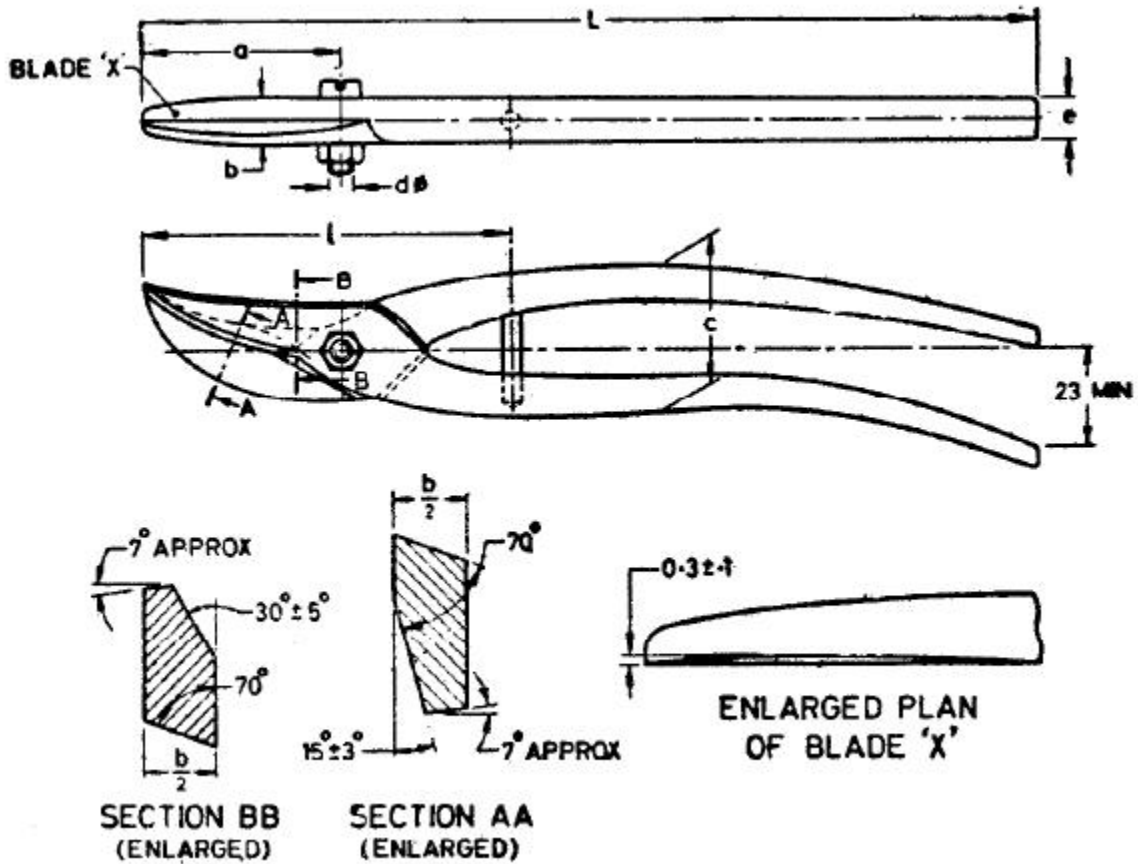
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Table 4 Dimensions for Metal Cutting Shears, Type D
 (Clause 5)

All dimension in millimeters.



Nominal Size	L	a	b	c	d	e	I
	±5	±2	±2	±5		<i>Min</i>	<i>Max</i>
250	250	55	14	40	M6	12	110
300	300	65	16	50	M8	14	125

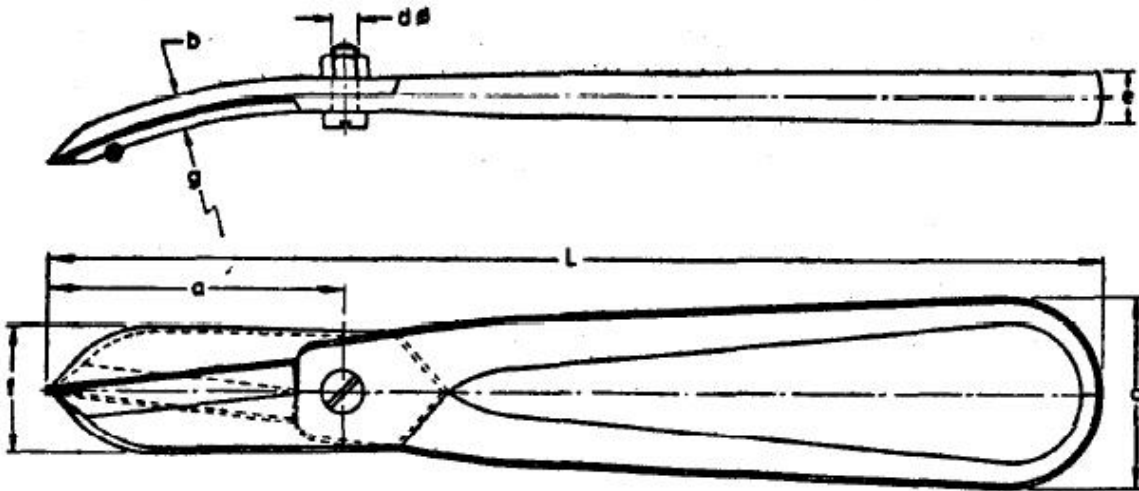
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Table 5 Dimensions for Metal Cutting Shears, Type E
(Clause 5)

All dimension in millimeters.



Nominal Size	L ± 5	a ± 2	b ± 2	c ± 5	d	e <i>Min</i>	f <i>Approx</i>	g <i>Approx</i>
250	250	70	8	45	M6	12	30	140

7 WORKMANSHIP AND FINISH

7.1 Shears shall be free from rust, burrs, fins, blisters and other defects that may impair serviceability and durability of the tool.

7.2 Blades shall have all edges rounded except the cutting edges. The bearing side of the blades and beveled portions adjacent to the cutting edges shall be smoothly ground and shall have a natural finish. The outer side of each blade and handle shall have a painted, lacquered, enameled or natural finish at the option of the customer. The cutting edges shall be given a suitable rust preventive treatment.

8 DESIGNATION

The shears shall be designated by:

- a) Commonly used name,
- b) Type,
- c) Nominal size, and
- d) Number of this standard.

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Example:

A metal cutting shear of Type A and of nominal size 200 mm shall be designated as follows:

Shears, A 200, IS 6087

9 MARKING

9.1 The shears shall be clearly and legibly stamped with the manufacturer's name, initials or recognized trade-mark or both. Year of manufacture shall also be marked if required by the purchaser.

9.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

10 SAMPLING

Unless otherwise agreed to between the purchaser and the supplier, the sampling plan and criteria for conformity as given in Annex A shall be followed.

11 TESTS

11.1 Paper Cutting Test

Each sample shear, both before and after being tested as specified in **11.2**, shall be made to cut one sheet of bond (white or coloured) paper conforming to 1848 (Part 1). At least 300 mm of the paper shall be cut clearly without leaving torn or rugged edges using shear's full length of cut.

11.2 Metal Cutting Test

The shears shall be subjected to the following tests:

11.2.1 Load Cutting Test

Each sample shear shall make 10 cuts in steel strip as specified in Table 6. The test sheets shall be 75 mm wide by 300 mm long, having a minimum thickness as specified in Table 6. The test load shall be applied by a testing machine or other suitable device or method. The first cut shall be made parallel to the 75 mm side 10 mm from the end. Each succeeding cut shall be spaced 10

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mm from the proceeding cut until 10 cuts have been made. The entire length of cutting edges cuts shall not exceed the values specified in Table 6.

Table 6 Test Requirements for Metal Cutting Shears
(Clauses 11.2.1 and 11.2.3)

Nominal Size	Strip-Cutting Capacity, Cold Rolled Steel ⁽¹⁾ Thickness <i>Min</i>	Load Cutting Test			Wire Nail Cutting Test, Diameter of Nail
		Point of Application of Load on Handle ⁽²⁾	Test Load		
mm	mm	mm	N	(kgf)	mm
160	0.50	80	176.5	(18)	1.60
200	0.50	110	196.1	(20)	1.80
250	0.63	150	194.2	(30)	1.80
300	1.00	190	392.3	(40)	2.80
350	1.25	230	539.4	(55)	3.15
400	1.60	270	637.4	(85)	4.00

⁽¹⁾ Conforming to temper No. 2 half hard of IS 513 (Part 1).

⁽²⁾ From the centre of bolt (see Tables 1 to 5).

11.2.2 Strip Cutting Test

Following the load cutting test, each shear shall be operated by hand to make at least five cuts across strips 10 mm wide of the same material as used in the above test; the cutting being done within 25 mm of the outer and of the blades. The shear may be rested on a bench and the strip supported or held for this test.

11.2.3 Wire Nail Cutting Test

After the strip cutting test, each sample shear operated by hand shall then be required to cut (at approximately the mid-point of the blade length) a common steel nail of diameter specified in Table 6. The test as specified in 11.1 shall again be carried out.

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Annex A

(Clause 10)

SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

A-1 SCALE OF SAMPLING

A-1.1 Lot

In any consignment all the metal cutting shears of the same type and size manufactured under essentially similar conditions shall be grouped to constitute a lot.

A-1.2 For ascertaining the conformity of the lot to the requirements of the specification, tests shall be carried out on each lot separately. The number of shears to be selected at random shall be in accordance with col 1 and 2 of Table 7. In order to ensure the randomness of selection IS 4905 shall be followed.

A-2 CRITERIA FOR CONFORMITY

A-2.1 The shears selected according to **A-1.2** shall be examined for dimensions and workmanship and finish. Any shear failing to meet the requirements for any one of the characteristics shall considered as defective.

A-2.1.1 If the number of defective shears found in the sample is less than or equal to the corresponding number given in col 3 of Table 7, the lot shall be declared as conforming to the requirements for dimensions, and workmanship and finish.

Table 7 Scale of Sampling and Permissible No. of Defectives

(Clauses A-1.2, A-2.1.1, A-2.2 and A-2.2.1)

Lot Size	For Dimensions, and Workmanship and Finish		For Hardness and Cutting Tests	
	Sample Size	Permissible No. of Defectives	Sample Size	Permissible No. of Defectives
(1)	(2)	(3)	(4)	(5)
Up to 25	5	0	2	0
26 to 50	8	0	3	0
51 to 100	13	1	5	0
101 to 150	20	2	5	0

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151 to 300	32	3	8	0
301 and above	50	5	8	0

A-2.2 From those lots found satisfactory according to **A-2.1.1** the number of shears corresponding to col 4 of Table 7 shall be selected and tested for hardness and cutting tests.

A-2.2.1 If the number of defective shears found in the sample is less than or equal to the corresponding number given in col 5 of Table 7, the lot shall be declared as conforming to the requirements of this standard.