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सिरा काटने के संयुक्त प्लास —विशिष्टि

(IS 3650 *का तीसरा पुनरीक्षण*)

Draft Indian Standard

Combination Side Cutting Pliers — Specification

(*Third Revision of* IS 3650)

ICS 25.140.30

Hand Tools Sectional Committee, PGD 34	Last Date for Comments: **One month from the date of circulation**

FOREWORD

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

This standard was first published in 1966 and was subsequently revised in 1973 and 1981. This third revision has been brought out to align it with the latest technological developments and industry practices.

In this revision, the following major changes have been made:

a) Clause 3.1 of Table 1 has been modified with respect to the dimensions b, e, h, and T;

b) Clause 5 has been modified regarding the material of the plier's head and handle, as well as the rivet used in the plier;

c) Clause 7 has been modified to include changes in the hardness of pliers near the cutting edges, the hardness at the nose and body, and the addition of hardness requirements for the rivet head;

d) Cutting test, torsion test and handle load test have been added.

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 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

Combination Side Cutting Pliers — Specification

(Third Revision)

1 SCOPE

This standard specifies the dimensions and other requirements for combination side cutting pliers.

2 REFERENCES

The standards given below 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 these standards:

IS No.	*Title*
IS 2 : 2022	Rules for rounding off numerical values (*second revision*)
IS 1501 (Part 1) : 2025	Metallic Materials — Vickers Hardness Test Part 1 Test Method (*sixth revision*)
IS 1586 (Part 1) : 2025	Metallic materials — Rockwell hardness test: Part 1 test method (*sixth revision*)
IS 2615 (Part 1): 2023	Pliers and nippers: Part 1 General technical requirements

3 NOMENCLATURE

The nomenclature for the pliers shall be as shown in Fig 1.

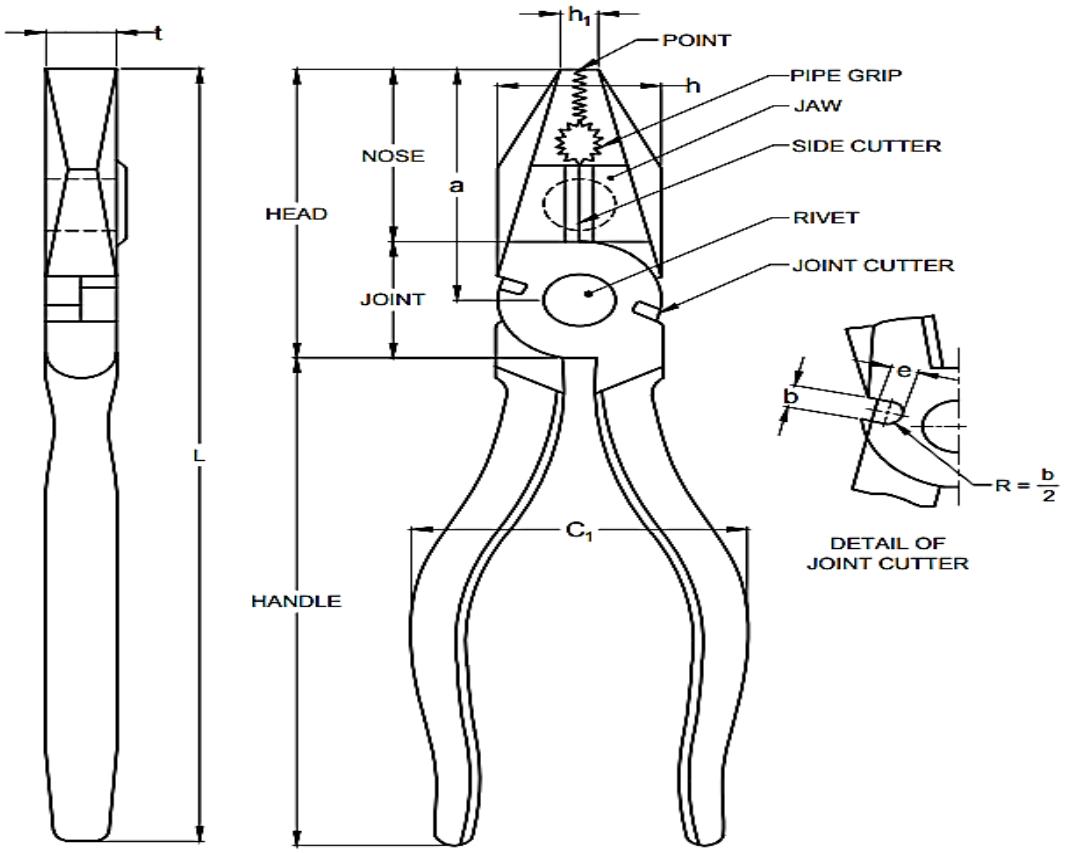


FIG. 1 COMBINATION SIDE CUTTING PLIERS

4 DIMENSIONS

4.1 The dimensions of the pliers shall be as given in Table 1.

Table 1 Dimensions of Combination Side Cutting Pliers
(*Clause* 4)
All dimensions are in millimeters.

Sl No	Nominal Size $(L)^{+10}_{-10}$	***a*** ±5	***b*** *Min*	C_1[1)] ±5	***e*** *Min*	***h*** ±3	h_1 *Max*	***t*** *Min*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	160	48	2	48	2.5	23	7	8
ii)	180	50	2	50	2.5	26	7.5	9
iii)	200	55	2	50	2.5	29	10	10
iv)	250	65	2	50	2.5	36	12	11

[1)] L & C_1 shall be mentioned without a sleeve.

4.2 The pliers shall have either flat or raised surface for side cutter and the cutting angle shall be from 90˚ to 120˚.

5 MATERIAL

5.1 The head and handle of combination side cutting pliers shall be made from suitable materials as given in Table 2.
5.2 The rivets used in the combination side cutting pliers shall be made from suitable materials as given in Table 3.

Table 2 Chemical Composition of Steel Grade
(*Clause* 5.1)

Sl No	Material	C (*Min*)	Si	Mn	S (*Max*)	P (*Max*)	Cr (*Min*)	V (*Min*)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Chrome Vanadium	0.28	0.40*Max*	0.40*Min*	0.040	0.040	0.30	0.07
ii)	Chrome steel	0.37	0.40*Max*	0.50-0.70	0.040	0.040	0.80	-
iii)	Carbon steel	0.35	0.10-0.40	0.50*Min*	0.040	0.040	-	-

Table 3 Chemical Composition of Steel Grade
(*Clause* 5.2)

Sl No	Material	C (*Min*)	Si	Mn	S (*Max*)	P (*Max*)	Cr (*Min*)	V (*Min*)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Chrome steel	0.37	0.10-0.40	0.50-0.70	0.040	0.040	0.80	-
ii)	Carbon steel	0.20	0.10 *Min*	0.50 *Min*	0.050	0.050	-	-

6 INSULATION

The pliers having insulated handles shall be supplied as agreed to between the supplier and the purchaser. The insulating material shall be PVC or any other suitable material as agreed between the supplier and the purchaser. The insulation shall cover the whole of the handle including the outer ends and may be shoulder at the head end. The insulating material shall adhere firmly to the handles and shall be such that it does not easily splinter or get damaged. The insulation shall successfully withstand the test laid down in **8.7**. The test voltage shall not be marked on the tool or insulation.

7 HARDNESS

7.1 The hardness of pliers when tested on any three locations on different parts of the Combination Pliers as below-

a)	Head & Handle including gripping surfaces	(≈ 35 HRC to 50) (350 HV to 510 HV
b)	Cutting Edges (anywhere up to 2 mm from tip)	(≈ 50 HRC to 65) 510 HV to 770 HV
c)	Rivet Head any side	(*Min* 30 HRC) (*Min* 300 HV)

7.2 The hardness of pliers shall be determined in accordance with IS 1586 (Part 1) or IS 1501 (Part 1) as applicable.

8 TEST

The combination side cutting pliers shall pass the following tests:

8.1 Cutting Test

8.1.1 *Hard Wire Cutting Test*

A piece of steel wire of suitable diameter and physical characteristics as recommended in Table 4 'having a minimum 140 kPa (140 kg/mm^2) tensile strength shall be used. The plier shall be placed in a test equipment. Insert the test wire in the cutting edge of the tool Combination side cutting plier and apply a force F_1 to the handles at a point L_1 from the center of rivet and test wire shall be placed in the center of the cutting edges at L_2 distance from rivet center. (For details of F_1, L_1 and L_2, *see* Fig 2, Hard wire test). If the wire cutting test cannot conveniently be carried out at the points defined by L_1 and L_2, then more suitable positions may be chosen defined by L_1 and L_2. The cutting force F_1, shall then be calculated as:

$$F_1 \times L_1 = F_2 \times 2 \times L_2$$

$$F_1 = \frac{F_2 \times 2 \times L_2}{L_1}$$

where,

F_1 is the maximum cutting force

F_2 is the cutting force as specified in Table 5

2 is the Correction factor for Hard test wire

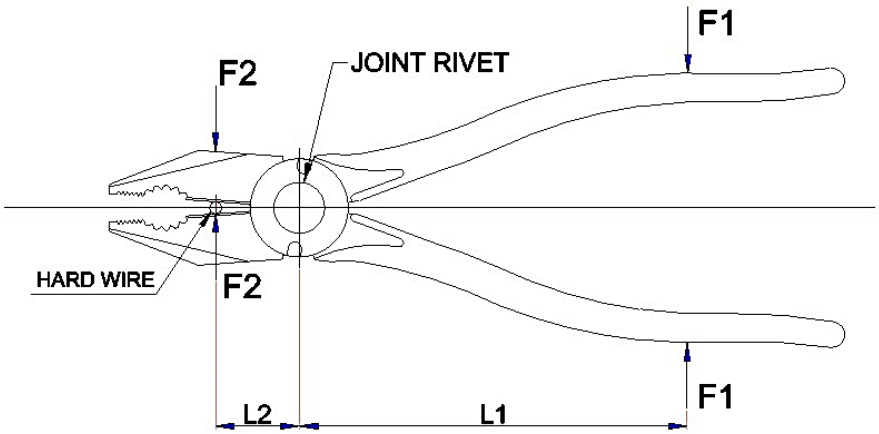


FIG. 2 HARD WIRE CUTTING TEST

After completion of test, the cutting edges shall show neither visible indentation nor distortion which would affect the cutting performance of the tool. The tool shall also not show any damage which may affect its use.

Table 4 Hard Test Wire Characteristics

(*Clause* 8.1.1)

Sl No. (1)	**Size of Plier** mm (2)	**Test Wire Diameter (D)** mm (3)	**Max Cutting Force (F_2)** N (4)
i)	160	1.75	3575
ii)	180		
iii)	200	2.0	4200
iv)	250		

NOTE — Cutting force F_2 is meant for calculating F_1 only.

8.1.2 *Soft Wire Cutting Test*

After completion of hard wire cutting test, combination side cutting pliers shall be capable of cutting soft wires of characteristic specified in Table 5. The test wire shall be held by hand and placed between the cutting edges. Test wire shall be cut off completely without being exposed by the stress caused by bending or pulling which may facilitate the cutting operation.

Table 5 Soft Test Wire Characteristics

(*Clause* 8.1.2)

Sr No. (1)	**Tool** (2)	**Type** (3)	**Wire Material** (4)	**Test Wire Dia** mm (5)	**Tensile Strength** MPa (6)
i)	Combination Side cutting Pliers	Engineer's and line man's pliers	Bronze	1.0	560-670

NOTE — In case of bronze wire specified above, any alternative materials may also be used. provided that they have same diameter and ultimate tensile strength.

8.2 Tube Gripping Test

A piece of mild steel pipe of 15 mm nominal diameter shall be held in a vice securely and then gripped with the plier at the pipe grip. The plier shall then be rotated as though attempting to turn the pipe in the vice. The pipe shall not rotate but shall get marked fairly uniformly by the jaw serrations and it shall not be damaged.

8.3 Shock Test

The combination side cutting pliers shall be capable of withstanding, without any sign of damage, the test of having the nose struck with normal manual force against a mild steel block while being held manually by the handles.

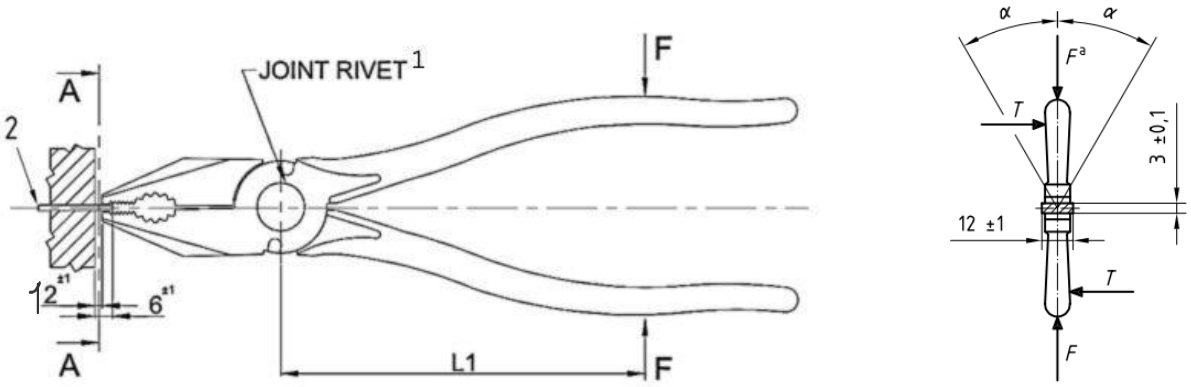
8.4 Torsion Test

8.4.1 The Combination side cutting plier to be tested shall be placed in equipment. Depending on type and size of the tool, the test piece shall be inserted between the two jaws as specified at **8.4.2.** Apply the handle load F of 50 N at distance L_1 from the rivet and clamp the handles to resist the turning moment (*see* Fig. 3). Apply the torque *T* as specified in Table 6, in both directions. The angular moment α^o shall not exceed the values given Table 6. After loosening of

the joint or, permanent set of the jaws resulting from the test, the plier shall not impair the efficient functioning of the tool combination side cutting plier.

8.4.2 *Test Piece for Torsion Test*

For a combination side cutting plier, the test piece shall be 3 mm ± 0.1 mm thick, 12 mm ± 1 mm wide and shall have a hardness of 45 HRC to 50 HRC. The test piece shall be inserted between the jaws of the pliers to a depth of 6 mm ± 1 mm. For illustration, *see* Fig.3 and Fig.4.



Key
1. Joint rivet
2. test piece

All dimensions are in millimeters.

FIG. 3 TORSION TEST ILLUSTRATION FOR COMBINATION SIDE CUTTING PLIER

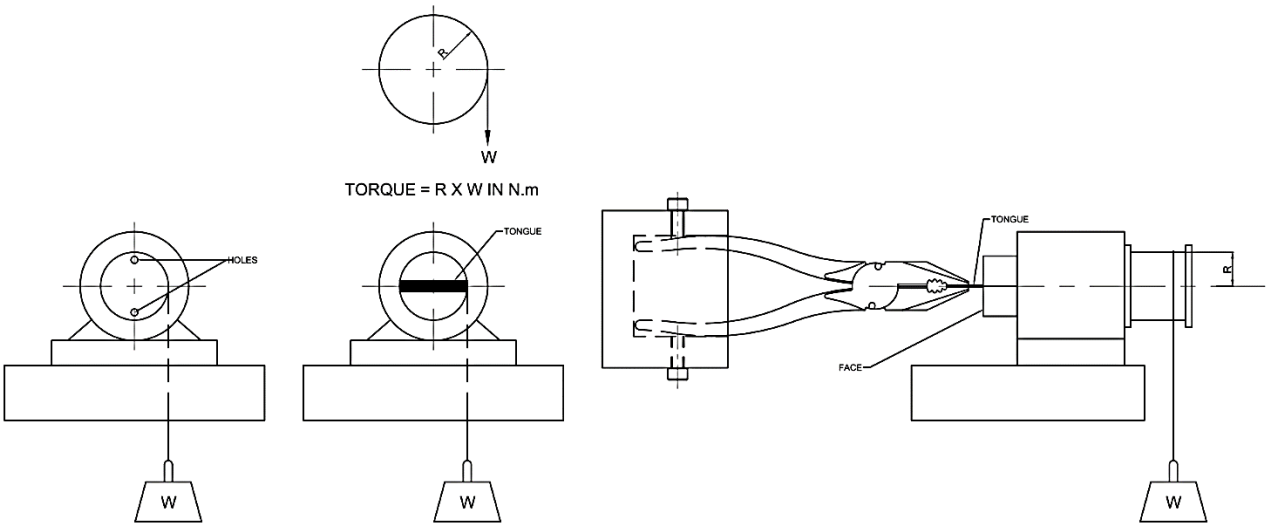


FIG. 4 TORSION TEST

8.5 Handle Load Test

The combination side cutting pliers shall be mounted in a suitable test fixture based on the principles illustrated in Fig.5, for the handle load test. An initial load of 50 N (5 kg-f. approx.) shall be applied at a distance L_1 from the rivet, keeping a suitable test piece as given at 8.5.1 in the jaws. The distance between open ends of the handles (w_1) shall be measured. The initial Load shall then be increased to the specified test load appropriate to the tool size as specified in Table 6. Then reduce the load to the initial load of 50 N. The load shall be applied four times and then the width, w_2 of the handles shall again be measured at the same distance L_1. The difference

between the first and second reading shall not exceed the maximum value of permanent set ($s = w_1 - w_2$), appropriate to the size of tool specified in Table 6. After this test the tool shall show no deformation that may affect its use.

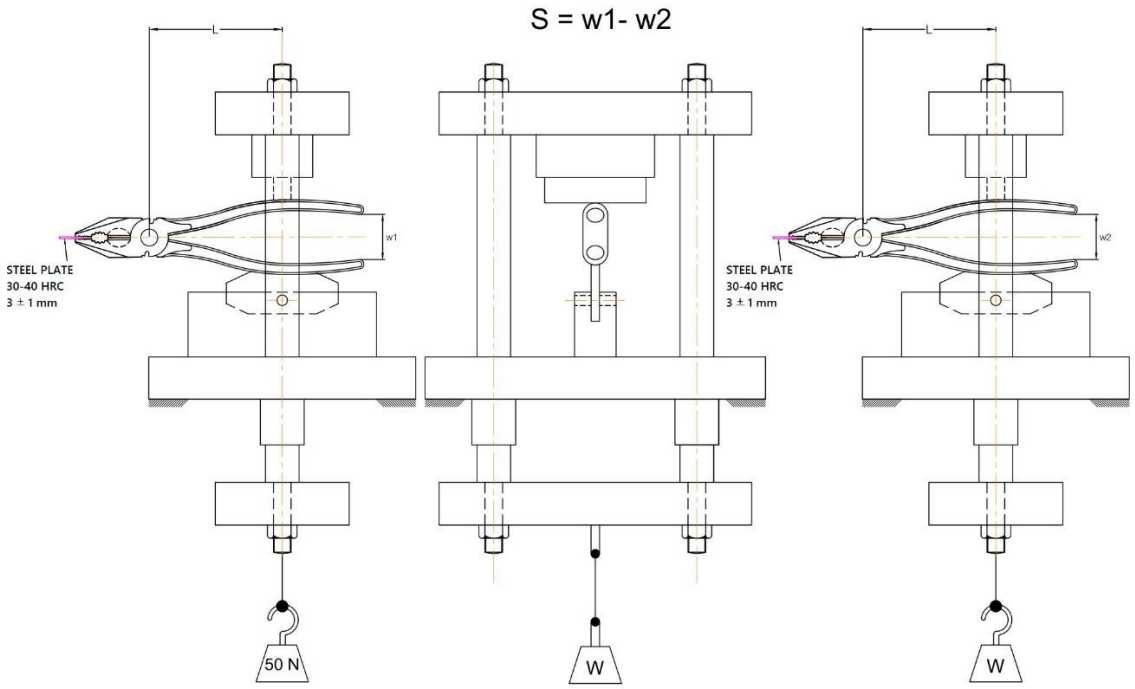


FIG. 5 TEST ARRANGEMENT FOR HANDLE LOAD TEST FOR COMBINATION SIDE CUTTING PLIER

8.5.1 *Test Piece for Handle Load Test*

The test piece shall have a hardness value of 30 HRC – 40 HRC and shall be of such a size and profile as to make contact over a length of 8 ±1 mm from the point of the jaws. With the piece inserted, the gap between the points of the jaws shall be 3 ±1 mm.

Table 6 Test Requirements for Combination Side Cutting Pliers for Torsion Load or Handle Load

(*Clauses* 8.4 and 8.5)

Sl No.	**Nominal Size L** *mm*	**TORSION TEST**		**HANDLE LOAD TEST**		
		Torsion Load *Nm*	**Angular Moment** α_{max}	**Handle Load** *N*	**Combined Deflection,** *(Max)* *mm*	**Combined Permanent Set(S),** *(Max)* *mm*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	160	9.4	15°	94	9.60	0.76
ii)	180	11.7	15°	117	12.50	0.76
iii)	200	13.5	15°	135	15.24	0.76
iv)	250	15.8	15°	158	19.00	0.76

8.6 Bend Test

The Combination side cutting pliers, when tested by bending hard drawn 1.25 mm diameter steel wire with the help of its gripping portion shall work satisfactorily and shall not show any sign of damage, distortion or indentation on the jaw on completion of the test.

8.7 Insulation Test

The insulated handles shall be immersed in a conducting fluid such as a solution of washing soda in water. Immersion shall be up to a distance from the end of the insulant, sufficient to obviate any arcing between the solution and the head of the tool. The solution shall form one pole of an electric circuit; the opposite pole being formed by the jaws of the tool. The insulation shall then withstand a pressure of 2800 V(rms) ac or 4000 V dc. The pressure shall be maintained continuously for two minutes during which time; there shall be no breakdown of the insulation.

9 DESIGNATION

The combination side cutting pliers shall be designated as:

Combination Plier, Nominal Size, IS 3650

10 MANUFACTURE, WORKMANSHIP AND FINISH, PRESERVATION, PACKING AND SAMPLING

The manufacture, workmanship and finish, preservation, packing and sampling shall conform to IS: 2615 (Part 1).

11 MARKING

11.1 The pliers shall be clearly and legibly stamped or marked with the manufacturers, brand name or initials and recognized trade-mark.

11.2 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 product(s) may be marked with the standard mark.