

International Standard



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Pliers and nippers — Methods of test

Pinces et tenailles — Méthodes d'essai

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Foreword

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International Standard ISO 5744 was developed by Technical Committee ISO/TC 29, *Small tools*, and was circulated to the member bodies in April 1982.

It has been approved by the member bodies of the following countries :

Australia	Germany, F.R.	Romania
Austria	Hungary	South Africa, Rep. of
Belgium	India	Spain
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The member body of the following country expressed disapproval of the document on technical grounds :

United Kingdom

Pliers and nippers — Methods of test

1 Scope and field of application

This International Standard specifies methods of test for checking the correct functions of pliers and nippers.

The test parameters have been specified on the basis of the functional uses of the tools.

2 Load test

2.1 General

The test shall be carried out using suitable equipment which can be checked by comparison with a standard.

2.2 Pliers and nippers

For the type and size of tool, given in the dimensional standards, define a point for the application of the load on the handles at the distance L_1 from the rivet, and insert a suitable test piece into the jaws (see 2.4).

Apply a load of 50 N and measure the width, w_1 , of the handles. Increase the load to that specified F , and then reduce to 50 N. The load F shall be applied four times for pliers, nippers and lever-assisted pliers.

The width, w_2 , of the handles shall again be measured at the same distance L_1 ; the difference between the first and second readings shall not exceed the value of permanent set ($s = w_1 - w_2$), see figures 1, 2 and 3.

After the test, the tool shall show no deformation that can affect its use.

If the load test cannot conveniently be carried out at the distance L_1 from the rivet, then a more suitable position for the load may be chosen at the distance L'_1 from the rivet. The load F' at distance L'_1 from the rivet shall then be calculated from the formula

$$F' = \frac{F \times L_1}{L'_1}$$

where F is the load at distance L_1 (see figures 1, 2 and 3).

2.3 Lever-assisted pliers

For the type and size of tool, given in the dimensional standards, define a point for the application of the load on the handles at the distance L_1 from the rivet, and insert a suitable test piece into the jaws (see 2.4).

Apply a load of $0,5 \times F$; reduce to 50 N and measure the width, w_1 , of the handles. Increase the load to that specified, F , and then reduce to 50 N. The width, w_2 , of the handles shall again be measured at the same distance L_1 ; the difference between the first and second readings shall not exceed the value of permanent set ($s = w_1 - w_2$), see figures 1, 2 and 3.

After the test, the tool shall show no deformation that can affect its use.

2.4 Test piece

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

3 Wire cutting test

3.1 Calibration of test wire

The wire to be used for cutting tests shall first be calibrated in equipment which can be checked by comparison with a standard.

Assemble in the test equipment two tungsten carbide cutters, with edges ground to an inclusive angle of $60 \pm 1^\circ$ having a radius of 0,3 mm, with the cutting edges parallel to each other and at right angles to the test wire (see figure 4).

Record the force required to cut the wire. The mean of three readings shall correspond to the values given in 3.2.

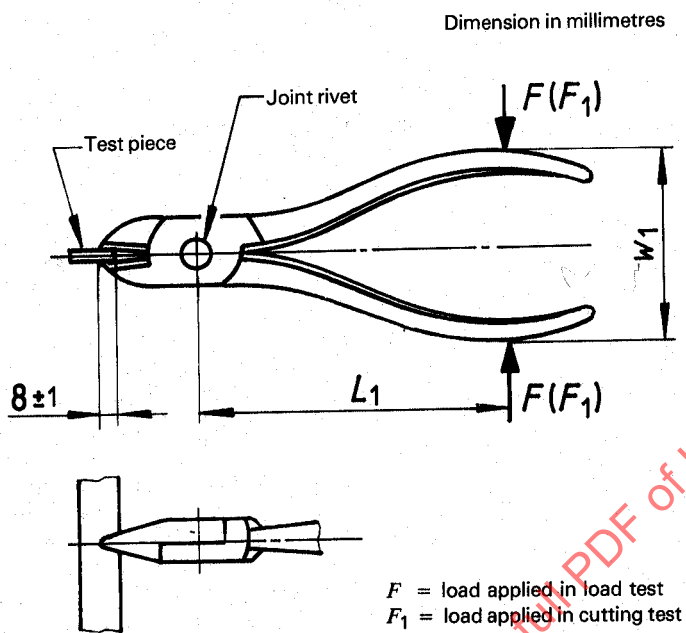


Figure 1 — Diagonal cutting nipper

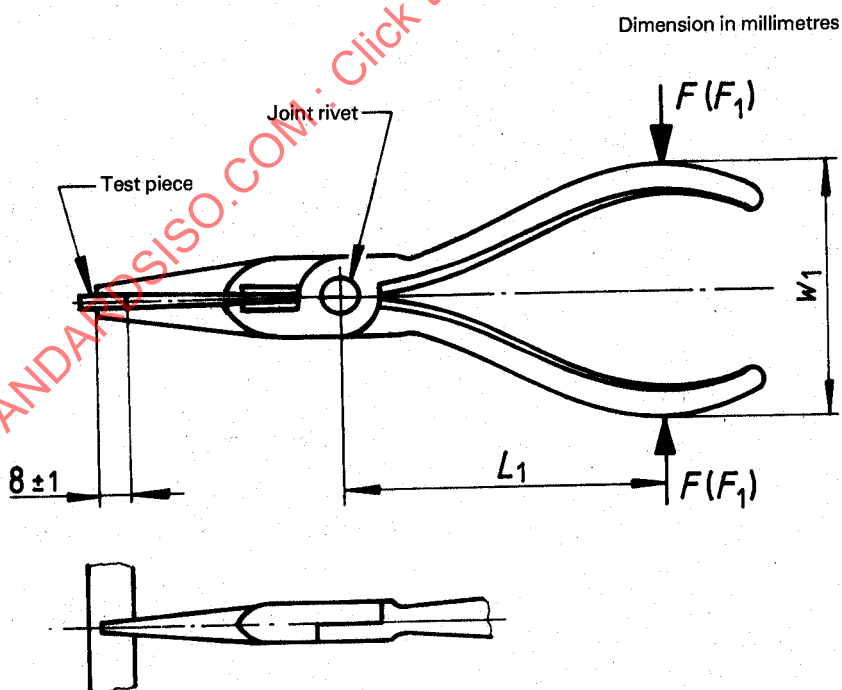


Figure 2 — Snipe nose, flat nose and round nose plier

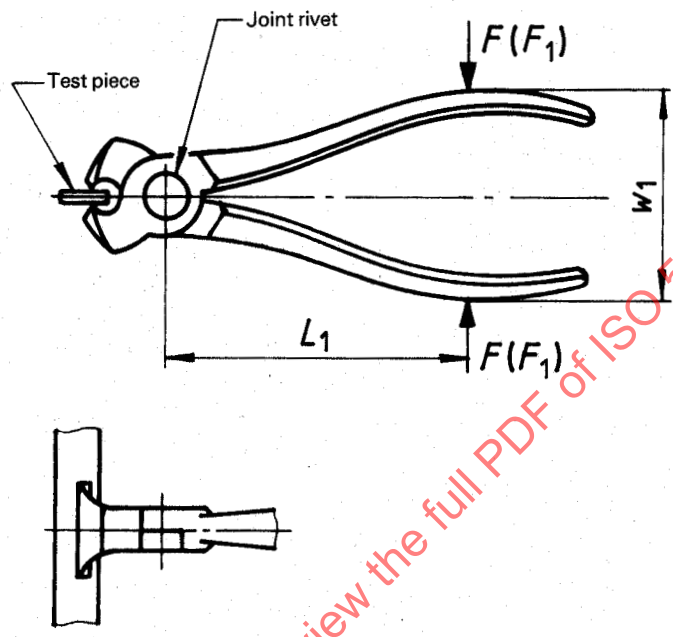


Figure 3 — End cutting nipper

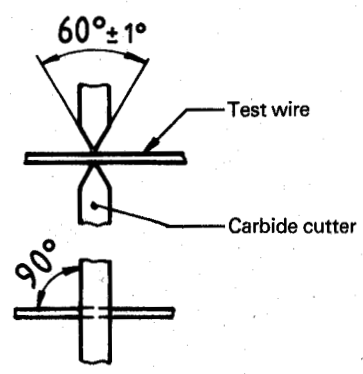


Figure 4 — Test equipment

3.2 Cutting force

Table 1 — Medium hard test wire

Wire diameter <i>D</i>	Tensile strength ¹⁾	Cutting force <i>F</i> ₂
mm	MPa	N
1,6	1 600	1 800 ± 90

1) The tensile strength is approximate, for guidance only.

Table 2 — Hard test wire

Wire diameter <i>D</i>	Tensile strength ¹⁾	Cutting force <i>F</i> ₂
mm	MPa	N
1,25	2 300	2 000 ± 100
1,4	2 250	2 350 ± 125
1,6	2 200	2 800 ± 150
1,8	2 150	3 400 ± 175
2	2 100	4 000 ± 200
2,5	2 000	5 700 ± 300

1) The tensile strength is approximate, for guidance only.

3.3 Cutting test

Calibrated test wire shall be used and the tool shall be placed in test equipment which can be checked by comparison with a standard.

Insert the test wire into the jaws of the tool, and apply the force, *F*₁, to the handles at the points defined by *L*₁ and *L*₂ for the size and type of tool. For end cutting nippers, the test wire shall be placed in the centre of the cutting edges.

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 using the formula

$$F_1' = \frac{F_2 \times A \times L_2'}{L_1'}$$

where

*F*₁' is the maximum cutting force which is not given in the dimensional standards;

*F*₂ is the cutting force according to tables 1 and 2;

A is the correction factor : 1,6 for medium hard test wire and 2,0 for hard test wire.

Measure the force *F*₁ necessary to cut the test wire, which shall not exceed the value of maximum cutting force given for the type and size of tool.

Upon completion of the test, the cutting edges shall show neither visible indentation nor distortion which would affect the cutting performance of the tool. Nor shall the tool show any damage that can affect its use.

After this test, a paper cutting test shall be completed in accordance with clause 5.

4 Torsion test

4.1 General

The tool to be tested shall be placed in equipment that can be checked by comparison with a standard.

Depending on the type and size of tool, insert the point of the jaws into a suitable test piece in accordance with 4.2. Apply the handle load, *F*, at a distance *L*₁ from the rivet and clamp the handles to resist the turning moment.

Apply the torque, *T*, in both directions. The angular movement, *α*, shall not exceed the value given for the type and size of tool.

Any loosening of the joint or permanent set of the jaws resulting from the test shall not impair the efficient functioning of the tool.

4.2 Test piece

For flat nose pliers the test piece shall be 3 mm thick, 12 mm wide and shall have a hardness of 45 to 50 HRC. The test piece shall be inserted between the jaws of the plier to a depth of 6 ± 1 mm (see figure 5).

For round nose pliers, the points of the jaws shall be supported in a test piece with two holes. The holes shall be 3,6 mm in diameter, 3 mm deep with flat bottoms, spaced on the centre line to give a dimension of 4 mm between the inner edges. The test piece shall have a hardness of 45 to 50 HRC (see figure 6).

5 Paper cutting test

On completion of the wire cutting test, pliers and nippers (dual purpose pliers excepted) shall be capable of cutting into sections a length of art paper of grammage 150 g/m² and width 2 mm less than the cutting edges of the tool. The paper shall be positioned centrally within the length of the cutting edges.

6 Hardness test of jaw

The hardness shall be measured on the gripping surface or not more than 1 mm distant on an adjacent face.