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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Pliers and nippers — Methods of test

Pinces et tenailles — Méthodes d'essai

Reference number
ISO 5744 : 1988 (E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 5744 was prepared by Technical Committee ISO/TC 29, *Small tools*.

This second edition cancels and replaces the first edition (ISO 5744 : 1983), clause 5 of which has been technically revised.

Printed in Switzerland

Pliers and nippers — Methods of test

1 Scope

This International Standard specifies methods of test for checking the correct functioning 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 centre of the joint 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 the specified value F, and then reduce it to 50 N. The load F 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 readings shall not exceed the maximum value of permanent set ($s = w_1 - w_2$), see figures 1, 2 and 3, appropriate to the type and size of tool.

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 centre of the joint rivet, then a more suitable position for the load may be chosen at the distance L'_1 from the centre of the joint rivet. The load F' at distance L'_1 from the centre of the joint 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 centre of the joint rivet, and insert a suitable test piece into the jaws (see 2.4).

Apply a load of $0,5 \times F$; reduce it to 50 N and measure the width, w_1, of the handles. Increase the load to the specified value F, and then reduce it to 50 N. The load F 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 readings shall not exceed the maximum value of permanent set ($s = w_1 - w_2$), see figures 1, 2 and 3, appropriate to the type and size of tool.

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 HRC to 40 HRC and be of such a size and profile as to make contact with the jaws over a length of 8 mm ± 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 mm ± 1 mm.

3 Wire cutting test

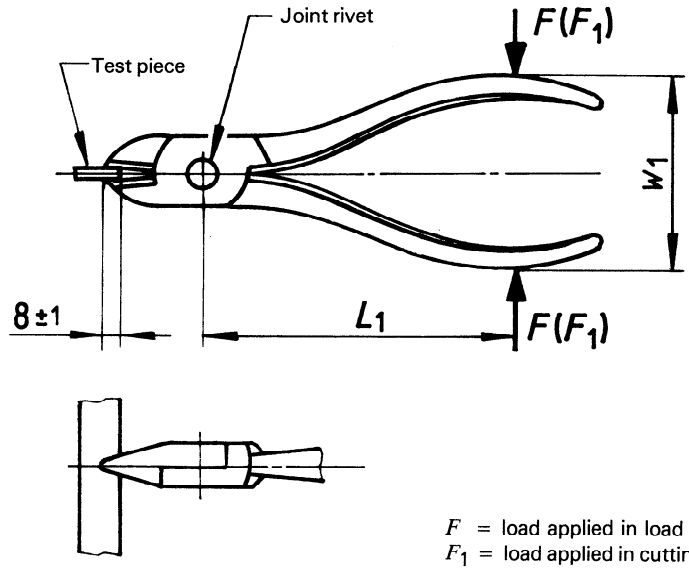
3.1 Calibration of test wire

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° ± 1° 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.

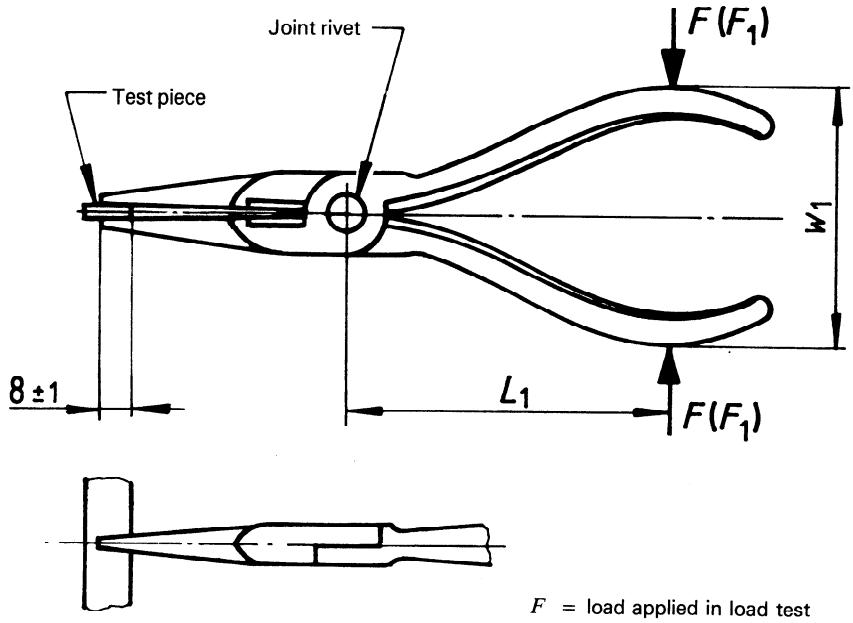
Dimension in millimetres



F = load applied in load test
F_1 = load applied in cutting test

Figure 1 — Diagonal cutting nipper

Dimension in millimetres



F = load applied in load test
F_1 = load applied in cutting test

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

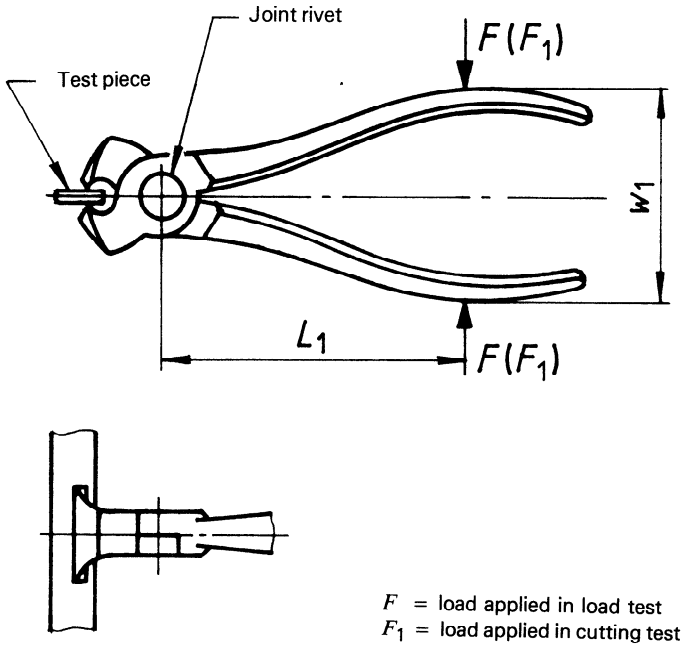


Figure 3 — End cutting nipper

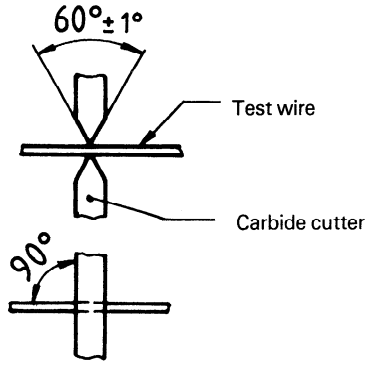


Figure 4 — Test equipment

3.2 Cutting force

Table 1 — Medium hard test wire

Wire diameter D	Approximate tensile strength 1)	Cutting force F_2
mm	MPa	N
1,6	1 600	1 800 ± 90

1) The tensile strength is given for guidance only.

Table 2 — Hard test wire

Wire diameter D	Approximate tensile strength 1)	Cutting force F_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 given 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 according to 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.

In this case the cutting force F'_1 shall 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 for hard test wire.

Measure the force F_1 necessary to cut the test wire, which shall not exceed the value of the maximum cutting force $F_{1,\ max}$ 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 soft wire 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 a handle load of 50 N at a distance L_1 from the centre of the joint 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 HRC to 50 HRC. The test piece shall be inserted between the jaws of the plier to a depth of 6 mm ± 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 HRC to 50 HRC (see figure 6).

5 Soft wire cutting test

On completion of the hard wire or the medium hard wire cutting test, pliers and nippers shall be capable of cutting soft wires as follows.

The test wire shall be positioned between the jaws of the pliers according to the examples shown in figure 7.

Test wires, as specified in table 3, shall be cut off completely without being exposed to stress, caused by bending or pulling, which could facilitate the cutting operation.

Place a piece of the test wire of maximum length 25 mm between the cutting edges of the plier. This piece of wire shall be supported only by the jaws of the plier and shall be cut only by manual pressure on the handles.

6 Hardness of gripping surfaces

The hardness shall be measured on the gripping surface or on an adjacent face at a distance of not more than 1 mm from the gripping surface.

Dimensions in millimetres

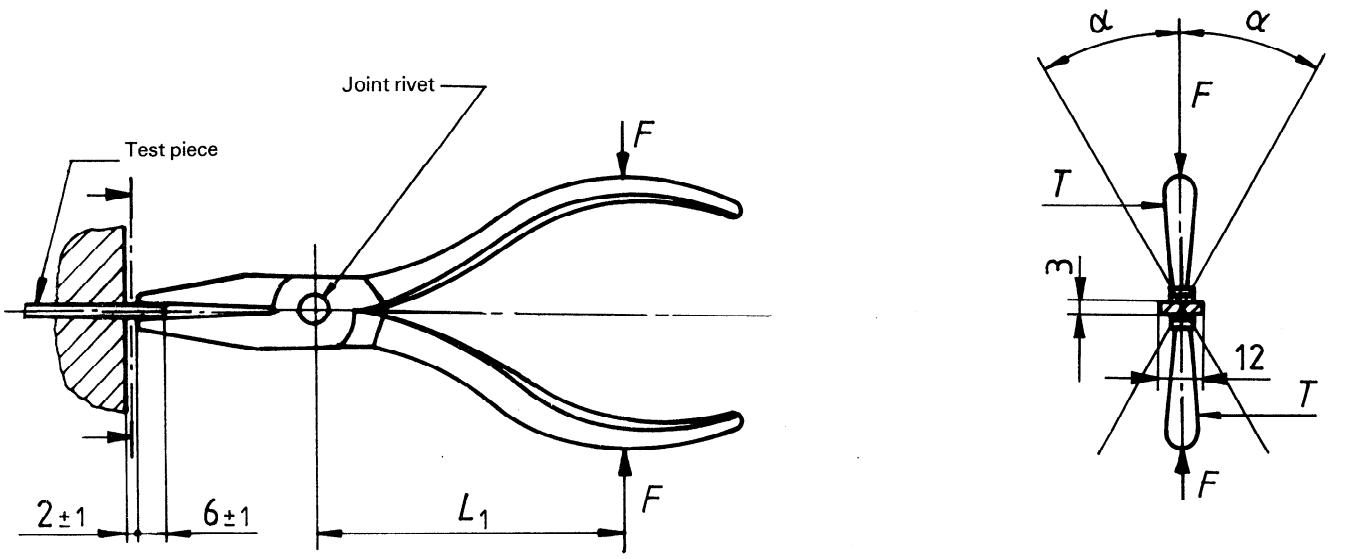


Figure 5 — Flat nose plier

Dimensions in millimetres

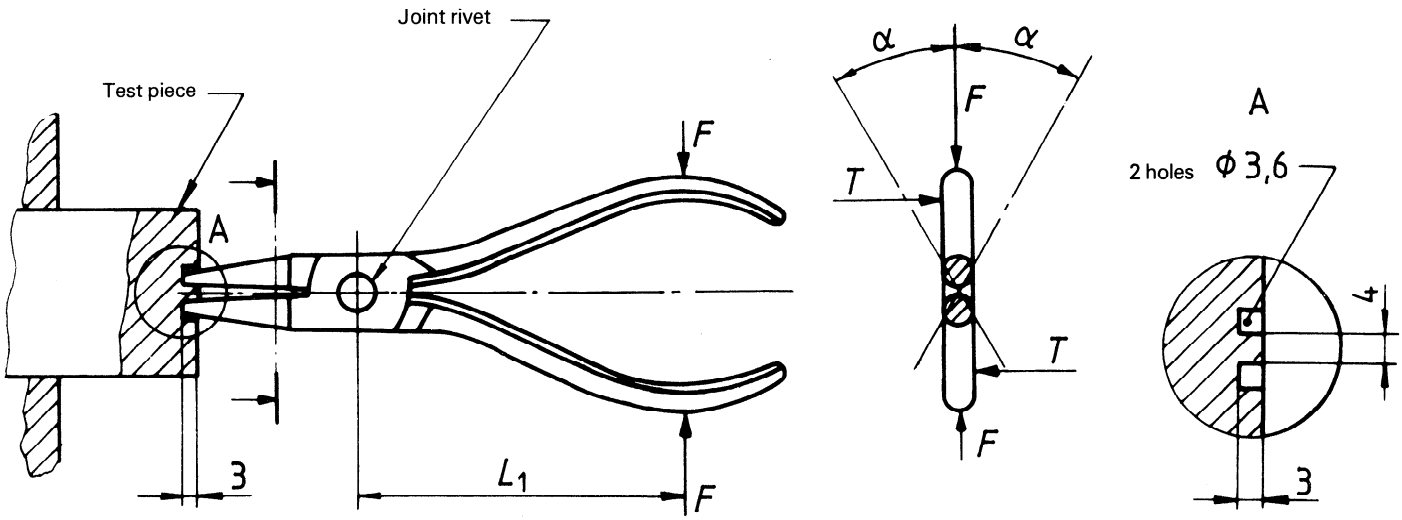
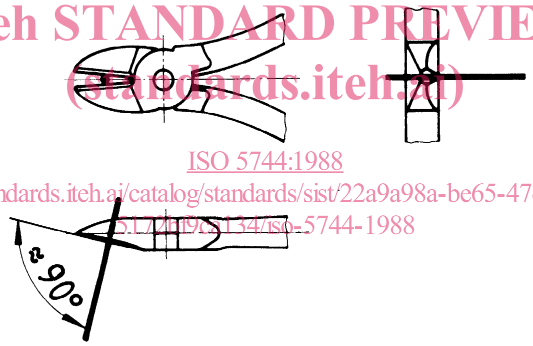


Figure 6 — Round nose plier

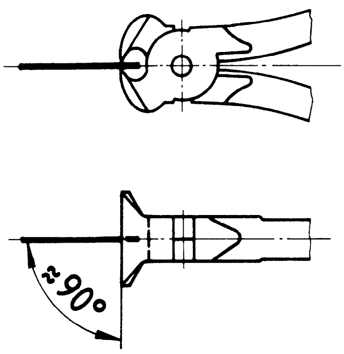
Table 3 — Materials and diameters of soft test wires

Type of plier and nipper, and corresponding International Standard	Wire material and corresponding International Standard	Approximate tensile strength MPa	Wire diameter *D* mm
Diagonal cutting nippers for hard wire ISO 5749	Bronze CuSn6 ISO 427	740 to 830	1,5
Diagonal cutting nippers for medium hard wire ISO 5749	Copper Cu-ETP ISO 1337	210 to 250	0,5
End cutting nippers for hard wire ISO 5748	Bronze CuSn6 ISO 427	740 to 830	1,5
End cutting nippers for medium hard wire ISO 5748	Copper Cu-ETP ISO 1337	210 to 250	0,5
Snipe nose pliers with side cutter for medium hard wire ISO 5745	Bronze CuSn6 ISO 427	740 to 830	1
Engineer's and lineman's pliers ISO 5746	Bronze CuSn6 ISO 427	740 to 830	1

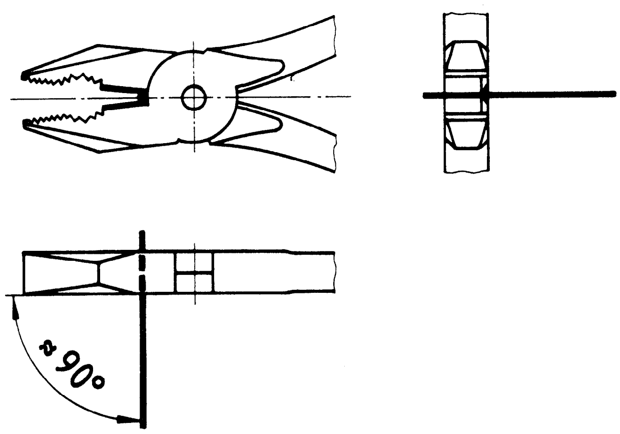


a) Diagonal cutting nipper

The diagonal cutting nippers shall cut the test wire over a length of at least two-thirds of the total cutting edge as measured from the point of the jaw.



b) End cutting nipper



c) Engineer's plier (combination plier)

The end cutting nippers and the engineer's pliers (combination pliers) shall cut the test wire over the whole length of the cutting edge.

Figure 7 — Examples of the position of the test wire

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