

Hand crimping tools for the termination of electrical cables and wires for low frequency and radio frequency applications —

Part 3A: Specification for hand crimping tools for contacts of electrical connectors

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- Electronic Engineering Association
- Ministry of Defence
- National Supervising Inspectorate
- Society of British Aerospace Companies Limited
- Telecommunication Engineering and Manufacturing Association (TEMA)

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- Association of Manufacturers Allied to the Electrical and Electronic Industry (BEAMA Ltd)
- Business Equipment Trade Association

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Foreword

This Part of BS 5310 has been prepared under the direction of the Electronic Components Standards Committee.

BS 5310-1 specifies general requirements for hand crimping tools for the termination of electrical cables and wires for low frequency and radio frequency applications which can be invoked as necessary in the preparation of detailed tool specifications. This Part of BS 5310 is a detailed tool specification and covers hand operated indent crimping tools for removable male and female contacts complying with BS 9521, electrical connectors complying with BS 9210 and components that meet the requirements of these two standards.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 5310 specifies detail requirements for hand crimping tools incorporating a system of multiple indentors for use with removable male and female contacts of electrical connectors and similar components.

Two sizes of tool are covered, as follows:

- a) a tool for contacts with crimp barrel size 12 to 20 inclusive [tool reference BS 5310-3A-100 (see clause 5)];
- b) a tool for contacts with crimp barrel size 20 and smaller [tool reference BS 5310-3A-300 (see clause 5)].

It includes requirements for crimped joints made with the tools.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 5310, the definitions given in BS 5310-1 apply.

3 Design requirements

3.1 General

Crimping tools shall comply with the requirements of 3.1 to 3.8 and 3.10 to 3.14 of BS 5310-1:1976.

3.2 Indentor operation

The design of the crimping tool shall be such that all indentors travel with nearly equal and simultaneous movement when the tool is operated through distances typical of those shown in Figure 1 or Figure 4, as appropriate (see Appendix A).

NOTE Dimensions of indentors and gauges are given in Figure 2 or Figure 5, as appropriate.

3.3 Crimping operation

Positioners or turrets shall be provided for the proper holding and location of the contacts during the crimping operation during which, except for elongation, there shall be no movement of the contact.

NOTE Typical turrets and positioners shown in Figure 3 and Figure 6, as appropriate, are described in Appendix B.

3.4 Outline dimensions

The tool designated BS 5310-3A-100 shall have the outline dimensions shown in Figure 1. The tool designated BS 5310-3A-300 shall have the outline dimensions shown in Figure 4.

3.5 Mass

The maximum mass of the tool designated BS 5310-3A-100 without positioner or turret shall be 0.7 kg. The maximum mass of the tool designated BS 5310-3A-300 without positioner shall be 0.45 kg.

3.6 Operating force (crimping cycle)

When the tool is tested as described in 5.7 of BS 5310-1:1976, using the largest combination of contact and wire for which the tool is designed, the force applied shall be not greater than 400 N for the tool designated BS 5310-3A-100 or 200 N for the tool designated BS 5310-3A-300 when applied to the handles at a point 30 mm to 35 mm from their ends.

3.7 Overload force

When tested as described in 5.8 of BS 5310-1:1976, except for the magnitude of the applied force, the tool shall comply with the requirements of that clause. The force shall be applied to the handles at a point 30 mm to 35 mm from their ends and shall increase at a rate of not more than 25 N/s until it reaches 670 N, this maximum force being maintained for 30 s.

3.8 Indentors

The dimensions, and arrangement of the indentors shall be in accordance with Figure 2 and Figure 5 when tested using the gauges given in those figures.

When visually examined, without the aid of magnification, the surface texture of the indentors shall be smooth and free from cracks.

3.9 Marking

Data plates shall be permanently affixed to turrets and positioners and the information on them shall be legible. Positioners and turrets shall be marked in accordance with 3.14 of BS 5310-1:1976. Where colour codes are used to indicate the contact size for test contacts, the colours used for each size of positioner shall be in accordance with Appendix C.

3.10 Crimped joints

3.10.1 General. The tool shall be designed such that it will produce crimped joints complying with the requirements given in 3.10.2 to 3.10.5, when tested as described in Appendix D.

3.10.2 General examination. There shall be no evidence of cracks in the material of the crimp barrel or its plated surface finish when examined with a magnification of $\times 10$.

3.10.3 Deformation of crimp barrel. The out-of-roundness of the barrel after crimping shall not exceed the maximum diameter before crimping by more than the following:

- crimp barrel size 20 and larger: 0.15 mm
- smaller crimp barrel sizes : 0.05 mm

3.10.4 Run-out (axial concentricity). The run-out of crimped contacts shall not exceed 0.31 mm total indicator reading (TIR) for sizes 12 and 16 contacts and 0.28 mm TIR for size 20 and smaller.

NOTE This includes a tolerance for the manufacture of the contact.

3.10.5 Tensile strength. The pull-off load for crimped joints made with solid or stranded copper and high strength copper alloy conductors of the sizes and characteristics given in Table 1 shall be not less than the relevant minimum value given in that table.

Table 1 — Requirement for tensile strength of crimped joints

Conductor size number (see note 1)	Number/nominal diameter of strands in millimetres	Minimum tensile pull-off load
28*	7/0.125	N 12.5
26	19/0.10	25
24	19/0.12	40
24*	19/0.118 (see note 2)	53
23*	1/0.60	53
22	19/0.15	50
20	19/0.20	85
18	19/0.25	140
16	19/0.30	170
14	37/0.25	250
12	37/0.315	450
NOTE 1 The minimum tensile pull-off load figures are as in BS 4G 178-1:1984, except for the conductor sizes marked with an asterisk (*) which are not included in BS 4G 178-1.		
NOTE 2 High strength copper alloy conductor only.		

3.11 Gauging

When the space between opposing closed indentors is tested using the appropriate GO gauge from Figure 2 or Figure 5, as appropriate, the gauge shall pass cleanly through. The appropriate NOT GO gauge from the appropriate figure shall not pass through the space between the closed indentors.

The gauges used shall be made from hardened and tempered tool steel.

3.12 Mechanical endurance

When tested as described in 5.9 of BS 5310-1:1976, under the conditions specified in Appendix E, the tool shall:

- form test joints after 50 000, 100 000, 150 000 and 200 000 cycles that shall comply with 3.10.2 to 3.10.5;
- comply, after 200 000 cycles, with the requirements of 5.9 of BS 5310-1:1976.

3.13 Corrosive atmosphere (salt mist)

When tested as described in 5.10 of BS 5310-1:1976, the tool shall comply with the requirements of that clause.

3.14 Low temperature crimping

When tested as described in 5.11 of BS 5310-1:1976, the tool shall comply with the requirements of that clause.

4 Type tests and production tests

With the following exceptions, type testing and production testing of tools shall be in accordance with clauses 4 to 7 of BS 5310-1:1976.

- The modified test methods given in Appendix D and Appendix E of this Part of BS 5310 shall be used.
- For the purposes of type testing, the methods of test described in Appendix D for crimped joints shall be carried out after the overload force test of 5.8 of BS 5310-1:1976, using crimped joints made with the crimping tools under test.

5 Designations

5.1 Tools

The tools shall be designated by individual references which shall consist of three elements as follows:

- the number of this British Standard followed by a hyphen, i.e. BS 5310-;
- the number of this Part of BS 5310 followed by a hyphen, i.e. 3A-;
- the number of the tool, i.e. 100 or 300.

Example: Reference BS 5310-3A-100 designates the tool shown in Figure 1. Reference BS 5310-3A-300 designates the tool shown in Figure 4.

5.2 Positioners and turrets

Positioners and turrets shall be designated by individual references which shall consist of three elements as follows:

- the number of this British Standard followed by a hyphen, i.e. BS 5310-;
- the number of this Part of BS 5310 followed by a hyphen, i.e. 3A-;
- for turrets:
 - A three digit number consisting of the numeral one followed by two digits.
- for positioners:
 - A three digit number consisting of the numeral three followed by two digits.

Example: Reference BS 5310-3A-104 designates a turret, as described in B.1. Reference BS 5310-3A-307 designates a positioner, as described in B.2.

NOTE Reference numbers refer to individual tools, or turrets or positioners, and not to assemblies of tools with either turrets or positioners.

6 User information

User information in accordance with clause 8 of BS 5310-1:1976 shall be provided.

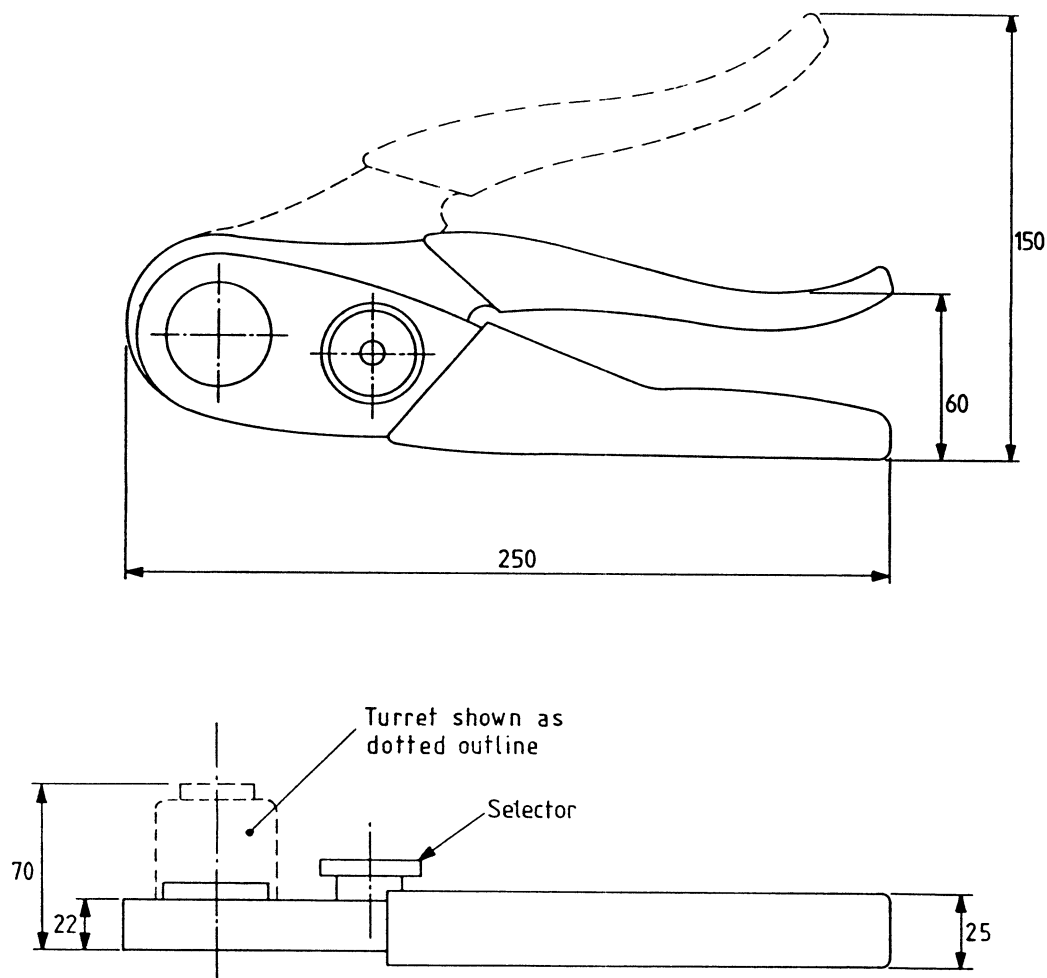
NOTE Details of user control gauge tools are given in Table 7 and Table 8 and Figure 14.

Appendix A Crimping tool description

A.1 Crimping tool type BS 5310-3A-100

A.1.1 Tool BS 5310-3A-100

Figure 1 gives the maximum outline dimensions of the tool and turret.



NOTE 1 Dimensions are in millimetres and are derived from original inch dimensions.

NOTE 2 The outline configuration is optional within the maximum dimensions shown.

NOTE 3 The mass of tool without positioner or turret is 0.7 kg maximum (see 3.5).

NOTE 4 The operating force (crimping cycle) is 400 N maximum (see 3.6).

Figure 1 — Hand crimping tool type BS 5310-3A-100