



PLIERS, CUTTERS, NIPPERS AND CROPPERS

**Farnell
Technical
Data
Service**

Order Code 107-994 TO ~~108-045~~

ESI STANDARD 26-3, ISSUE 2 1984



PW138

ENGINEERS PLIERS with curved finger grips on 200mm size for positive control of the tool. Sidecutting with pipe grip. Ultra Tensile quality.

Size mm 150

Weight g 200

107-997



PW58

LONG CHAIN NOSE PLIERS

Size mm 140 165

Weight g 112 150

PW106

LONG CHAIN NOSE PLIERS

Size mm 200

Weight g 200

Sidecutting with serrated jaws.
Ultra tensile quality.

107-996



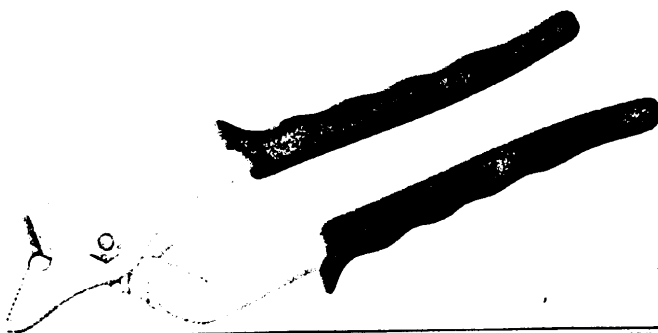
PW56 107-994

Heavy duty diagonal cutting with curved finger grips for positive control of the tool.

Size mm 190

Weight g 275

Ultra Tensile Quality



IT/HL112

GROOVE JOINT PLIERS 'DIAMALLOY'

Size mm 300

Weight g 600

tools have curved finger grips for positive tool control

108-044



IT/CC10

CABLE CROPPERS

Size mm 250

Weight g 595

Cutting capacity 19/064 in. 440V cable

High tensile quality

107-995



TOTALLY INSULATED SPANNERS

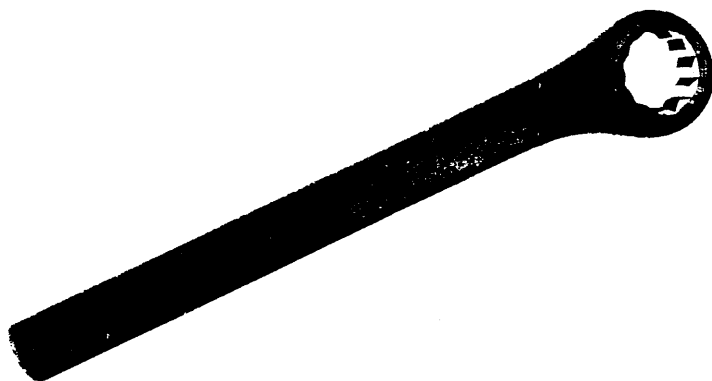
i.e. Head and Handle Insulated

Sizes available

Whitworth	Weight g		Metric	Weight g
3/16"	50	108-027	10	47 108-016
1/4"	78	108-028	11	48 108-017
5/16"	87	108-029	13	78 108-018
*3/8"	120	108-030	14	93 108-019
*7/16"	170	108-031	15	94 108-020
*1/2"	215	108-032	*17	120 108-021
9/16"	275	108-033	*19	170 108-022
5/8"	305	108-034	*22	205 108-023
11/16"	335	108-035	*23	215 108-024
3/4"	397	108-036	*24	215 108-025
			30	310 108-026

Single Ended, Slim Series, incorporating 'Warning' Thumb stops.

*These spanners have reduced head width for clearance purposes in link boxes etc.



TOTALLY INSULATED RING SPANNERS

i.e. Head and Handle insulated

Sizes available

Metric	Weight g	
8	42	108-037
10	50	108-038
13	85	108-039
17	150	108-040
19	195	108-041
22	245	108-042
24	290	108-043

Single Ended with 60° offset head

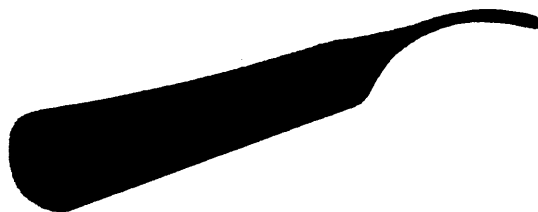


TOTALLY INSULATED HACKSAW FRAMES

Cat. No.	Description	Weight g
IT/HSFJ	Junior to take 150mm blade overall length 270mm	145

All hacksaw frames are supplied complete with blades.

108-045



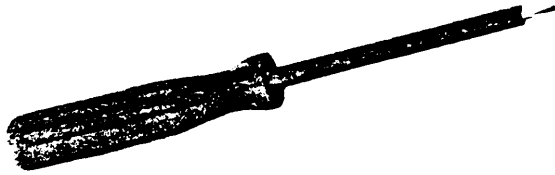
CABLE JOINTERS CORING KNIFE

Cat. No.	Length	Weight g
IT/CCK	175mm	120

Insulation covers handle and top of curved blade.
Protective case available.

107-999

ELECTRICIANS TERMINAL SCREWDRIVERS



	Cat. No.	Handle Size MM	Basic Blade Size MM	Dia. Over Insulation MM	Total Length MM	Weight
108-000	IT18/3	75x13	75x3	5	150	19
108-001	IT18/4	75x13	100x3	5	175	20

Both fluted handle - parallel blade

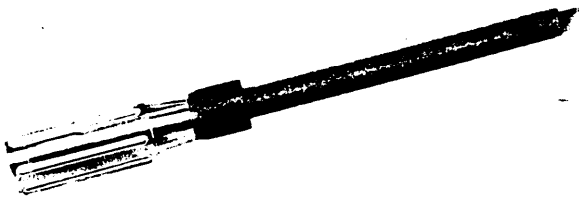
ELECTRICIANS SCREWDRIVERS



	108-002	P500/3	75x19	75x5	8	140	40
	108-003	P500/6	75x19	152x5	8	227	55
	108-004	P500/8	75x19	203x5	8	279	65

All fluted handle - parallel blade

ENGINEERS SCREWDRIVERS



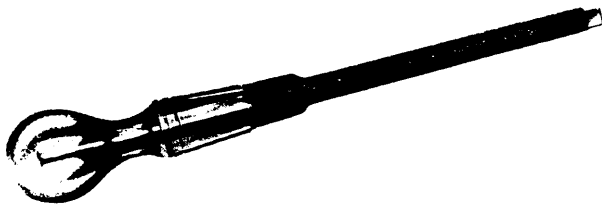
	108-005	IT501/4	90x25	102x6	11	190	87
	108-006	IT502/6	102x25	152x8	13	254	143
	108-007	IT503/8	114x32	203x10	14	317	260
	108-008	IT503/10	114x32	254x10	14	368	300

All fluted handle B.S. Pattern

IMPORTANT NOTE

All engineers screwdrivers are available with completely parallel blades when

ENGINEERS CABINET HANDLE SCREWDRIVERS



	108-009	IT14/5	100x38	125x6	8	225	97
	108-010	IT516/4	127x44	102x8	13	229	165
	108-011	IT 516/6	127x44	152x8	13	279	195
	108-012	IT 38/8	152x51	203x10	14	356	335

Parallel blades allow the best sight line for locating recessed or countersunk screw heads

POZIDRIV SCREWDRIVERS



	108-013	IT/PX1/3	75x19	75x5	No 1 point	6	150	40
	108-014	IT/PX2/4	90x25	100x6	No 2 point	8	190	85
	108-015	IT/PX3/6	100x25	150x8	No 3 point	12	250	137

THE NEED FOR NYLON 11 INSULATION

INSULATED HAND TOOLS:

On modern Medium Voltage Distribution Networks, fault levels have risen to very high values and accidental short circuits have caused serious burns injuries to operatives using unreliable and badly insulated hand tools, also damage to costly equipment.

INSULATION MATERIALS:

The need for permanent safe insulation was recognised as far back as 1963 and an ad hoc Tools Committee formed from a consortium of four Area Electricity Boards began investigations with Insulated Tools Ltd. whose collaboration was sought by the ad hoc Tools Committee. After full laboratory investigations of all available insulation materials, and extensive field trials over approximately three years, i.e. 1964/67. NYLON 11 was selected because of its unique Electrical and Mechanical properties which were outstanding in comparison with other insulation materials evaluated - i.e. 'dipped' P.V.C., Polythene, Epoxy/Glass Fibre, Cellulose Acetate, Butyrate etc.

'Dipped' P.V.C. and Polythene which were type tested satisfactorily in the laboratory whilst in pristine condition were rejected because of their severe limitations in mechanical strength. These materials, especially, P.V.C., which is soft, were found to be too easily damaged by abrasion and cutting which is almost an everyday experience in the rough usage of hand tools. These conclusions were drawn by the ad hoc Tools Committee representing the Electricity Supply Industry in South East England, and were published in the Electrical Times in March 1967 by the then Chairman of the Committee. (A copy will be provided upon request). As the insulation materials investigated and evaluated are exactly the same now as they were then, the conclusions drawn are equally valid.

Because of the paramount importance of safety to operatives carrying out 'live' working, a proper and serious distinction should be drawn between insulated hand tools type tested in a laboratory and their ability to withstand rough usage under arduous working conditions, and maintain the integrity of the insulation.

Some published Standards covering Insulated Hand Held Tools for 'live' working state that the preferred insulation is Nylon 11, but allow any other insulation material which satisfies the Type Test specified. This leaves the Purchaser/User to make the decision as to which material may be suitable as an alternative to Nylon 11 and to accept full responsibility in the case of injury or fatality, for their choice.

The grade of NYLON selected - i.e. NYLON 11 GPE was considered to be superior to other grades for the following reasons:-

1. Lower moisture absorption and hence greater dimensional stability
2. Lower processing temperatures thus reducing the potential risk of thermal degradation, oxidation, and embrittlement
3. Lower melting viscosity (at the processing temperature) which facilitates mould filling, especially with complex flow patterns and thus leading to a very minimal level of moulded in strain.
4. The impact strength of NYLON 11 is superior to any other grade
5. NYLON 11 features the lowest relative density - i.e. 1.04

APPLICATION OF NYLON 11 INSULATION:

This is carried out by means of single impression direct injection moulding which is the only method which guarantees uniformity of insulation wall thickness to ensure permanent safe insulation. Soft insulation materials applied by a 'dipping' process frequently have thickness variations due to material flow in the 'dipping' process which may lead to premature mechanical breakdown.

TESTING:

Including type testing, sampling, routine and production testing. In accordance with E.S.I. Standard 26-3 Issue 2 1984, our products also conform with the requirements of International and other National Standards.

B.S. SPECIFICATION:

The products of the British Manufacturers listed in the brochure all comply with the relevant British Standards Specifications where applicable and NYLON insulated screwdrivers fully comply with BS 2559 Part 3 1973.



ELECTRICITY SUPPLY INDUSTRY

STANDARD 26—3

ISSUE 2 APRIL 1984

HAND HELD INSULATED TOOLS FOR LIVE WORKING UP TO 1000 VOLTS

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Price Code 3

This Standard is issued by the Electricity Supply Industry in conjunction with the Trade Associations or other bodies acknowledged in the document.

ESI Standards are revised when necessary by the issue either of revised pages or complete new editions. It is important that users of ESI Standards should ascertain that they are in possession of the latest issue.

HAND HELD INSULATED TOOLS FOR LIVE WORKING UP TO 1000 VOLTS

FOREWORD

This Standard has been revised by a Standing Panel established by the Safety Liaison Consultancy Group of the Chief Engineers' Conference. The revision takes account of a proposed new international Standard and incorporates higher testing and working voltages than the previous issue of this Standard.

In addition, the revision permits the use of insulating materials other than nylon 11 GPE (General Purpose Electrical), including multilayer application, and adopts a standard insulation colour.

1. SCOPE

This Standard sets out the insulation requirements and materials and specifies tests to verify the electrical and mechanical performance of partially, fully, or all insulated hand held tools for live working on power systems up to 1000 V.

This Standard applies to three categories of insulated tools, as follows:

- (i) Partially Insulated Tools: tools in which comparatively large areas of bare metal are left exposed, e.g., pliers and other scissor action tools in which the handles are insulated but the remainder is not.
- (ii) Fully Insulated Tools: tools in which the exposed uninsulated metal is very limited, e.g., interior jaws of ring or open ended spanners, tips of screwdrivers, etc.
- (iii) All insulated Tools: tools made entirely of insulating materials.

2. REFERENCES

This Standard makes reference to the following documents:

- BS 381C, 'Specification for Colours for Identification, Coding and Special Purposes'.
BS 2559, 'Screwdrivers'
Part 3 (1973), 'Insulated Screwdrivers'.
Ministry of Defence Standard 93—7, Issue 1 (1972), 'Nylon Moulding and Extrusion Materials for Electrical Purposes'.

3. DEFINITIONS

For the purpose of this Standard, the following definitions shall apply:

Routine Test:

A test to which each individual tool is subjected, during or after manufacture, to ascertain whether it complies with certain requirements of the Standard.

Sampling Test:

A test on a number of tools taken at random from a batch.

Type Test:

A test of one or more tools manufactured to a particular design to demonstrate that the design meets the requirements of the Standard.

4. GENERAL REQUIREMENTS

Tools shall be of good construction, sound material, adequate strength, free from patent defects and suitable for the application intended.

All metal parts of tools shall be free from burrs and deleterious defects and all sharp edges shall be removed from those parts of the tools which are to be covered with insulating materials.

Where applicable, the tool shall comply with the requirements of the appropriate British Standards, or equivalent.

Double or multiple ended tools with electrical continuity between the ends are not permitted in the Partially or Fully Insulated Categories.

5. MARKING

Each tool shall be clearly and indelibly marked before testing to indicate:

- (i) Its maximum safe working voltage (1000 V).
- (ii) The month and year of manufacture.
- (iii) In respect of spanners, their size and thread description.
- (iv) If requested by the purchaser, the appropriate Board's initials or other identification marks.

6. INSULATION

- 6.1 All metal tools shall be insulated with Nylon 11 GPE or other material with physical and electrical characteristics which satisfy the requirements of this Standard. Nylon 11 GPE shall meet all the requirements of the Ministry of Defence Standard 93—7, Issue 1, except those relating to electrical strength which shall meet the requirements specified in 7, 'Type Test'.
- 6.2 The insulation applied to all tools should be coloured 'International Orange' (see ref. 592, Table 1, BS 381C, 1980). Where more than one layer of insulation is applied, the finish layer shall be orange and inside layers must be of a contrasting colour.
- 6.3 The insulation must cover the maximum surface area of the tool that is practicable, having regard to the manufacturing process and the intended application of the tool.
- 6.4 The insulation covering metallic surfaces shall, as far as possible, be uniform in thickness although this may be varied to meet operational requirements and the contour of the tool. The minimum thickness of insulation shall be in accordance with BS 2559, Part 3, 1973, for screwdrivers or 3 mm for other tools, except that this may be reduced to meet operational requirements at the request of the purchaser.
- 6.5 The insulation must be securely bonded to the tool and retain its mechanical and electrical properties and adhesion to the metal through the temperature range -20°C to $+70^{\circ}\text{C}$.
- 6.6 Where more than one layer of insulation is applied, the electrical tests specified in 7.2 shall be undertaken after the application of the final underlayer, in addition to the tests on the finished tool.

7. TYPE TEST

Insulated tools manufactured to this Standard shall be type tested in the following manner.

7.1 Mechanical Test

- 7.1.1 At least three samples or 5 per cent (whichever is the greater) of the finished tools in the first production batch of each new design, shall be tested for mechanical strength by dropping each tool on to a smooth concrete floor from a height of not less than 1.5 m, the test being arranged so that the insulation strikes the concrete. The insulation shall then be examined visually to ensure there are no signs of damage.
- 7.1.2 Separate tests shall be carried out at ambient temperature ($21^{\circ}\text{C} \pm 5^{\circ}\text{C}$) after preconditioning the tools for a minimum of 2 h at the limits of the temperature range specified in 6.5 above. There is no requirement for both tests to be carried out on one and the same tool.

7.2 Electrical Test

- 7.2.1 As soon as practicable after the mechanical tests specified in 7.1 above, the tools shall be subjected to a voltage withstand test in which 10 kV, 50 Hz is applied for 3 min. between the insulation and the exposed metalwork.
- 7.2.2 In the case of multilayer tools, the voltage test shall also be carried out after the application of the final underlayer and after preconditioning the tool as described in 7.1.2 of this Standard.
- 7.2.3 The test shall be conducted by immersing the tool in water of conductivity not less than 250 microsiemens per centimetre and at ambient temperature to within $24\text{ mm} \pm 2\text{ mm}$ of the exposed metal or working surface, the test voltage being applied between the exposed metal or working surface and the water. Where double or multiple ended tools are to be tested, a centrally placed metal foil or conducting tape electrode shall be employed in place of the water tank.
- 7.2.4 The test is successful if:
 - (i) no electrical breakdown occurs, and
 - (ii) the leakage current does not exceed the value calculated in accordance with the following formula when rounded up to the next nearest milliamp. Leakage current in mA = $5 \times L$ where L is the total length of immersed insulation measured in metres.

7.3 Flame Test

The insulating material used shall be shown to be flame retardant by applying the tip of a pure propane flame of 20 mm height at right angles for a period of 10 s. On removal, the insulation shall be self-extinguishing within 20 s.

8. SAMPLING TEST

8.1 Mechanical Test

Of each production batch, 5 per cent of the tools shall be subjected to the mechanical test at ambient temperature ($21^{\circ}\text{C} \pm 5^{\circ}\text{C}$) as specified in 7.1 above. Each tool shall then be examined visually for mechanical damage to the insulation.

8.2 Electrical Test

As soon as practicable after the mechanical test specified in 8.1, each tool shall be subjected to the routine electrical test specified in 9, 'Routine Test'.

9. ROUTINE TEST

9.1 Electrical Test

Every tool shall be subjected to a voltage withstand test at ambient temperature ($21^{\circ}\text{C} \pm 5^{\circ}\text{C}$) by the manufacturer as specified in 7.2 above, except that the leakage current need not be measured.

10. CONDITIONS FOR APPROVAL

Approval to this Standard shall be granted, in respect of a particular type of insulated tool, by successful completion of all type tests specified in 7, 'Type Test', and witnessed by two authorized representatives of the Electricity Supply Industry. A copy of the certified results of these tests must be submitted to the Electricity Council, and a further copy retained by the manufacturer.