

BS 8020:2011



BSI Standards Publication

Tools for live working – Specification for insulating hand tools for work on or near conductor rail systems operating at voltages up to 1 000 V a.c. or 1 500 V d.c.

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ISBN 978 0 580 71084 1

ICS 13.260; 45.120

The following BSI references relate to the work on this standard:

Committee reference PEL/78

Draft for comment 10/30218908 DC

Publication history

First published January 2002

Second (present) edition September 2011

Amendments issued since publication

Date	Text affected
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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 24, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI to come into effect on 1 January 2012. It was prepared by Technical Committee PEL/78, *Tools for live working*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 8020:2002, which is to be withdrawn on 31 December 2011.

Relationship with other publications

While BS EN 60900 provides a specification for hand-held insulated and insulating tools for live working, these are tools primarily used by electricians and other electrical personnel. That standard does not provide an appropriate specification for the larger, purpose-designed, specialist tools employed in track work. However, full account has been taken of the requirements of BS EN 60900 in drafting this standard to ensure uniformity of approach and common requirements where practicable.

Information about this document

This is a full revision of the standard and introduces the following principal changes:

- a) additional requirements concerning the design and construction of hybrid tools are included, i.e. tools that include both insulating and insulated parts;
- b) an additional mechanical test for verifying the insulation bond of hybrid tools is included;
- c) an additional mechanical test for verifying the insulation wear of hybrid tools and all other tools incorporating an insulating sleeve is included;
- d) a type and sampling wet electrical test for verifying the electrical insulation of finished hybrid tools is included in addition to the routine dry electrical test;
- e) the determination of sample sizes in Annex E has been simplified to reflect the fact that many tools are manufactured in small batch sizes.

Assessed capability. Users of this British Standard are advised to consider the desirability of quality system assessment and registration against the appropriate standard in the BS EN ISO 9000 series by an accredited third-party certification body, with particular reference to material and chemical bonding used in the manufacture of insulating hand tools.

Use of this document

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

0 Introduction

This British Standard specifies requirements for insulating hand tools and hybrid insulating hand tools, where the applied insulation for the latter is a combination of the measures used separately for insulated and insulating tools. This British Standard does not provide a specification according to the definition of an insulated tool because the size, design and construction of specialist track tools makes this method of insulation application alone impracticable.

The tools specified in this British Standard are for work on or in close proximity to ground-level, fully exposed live conductor rails providing traction supplies for electrified railways. Such traction supply systems are in wide use in certain areas of Great Britain, particularly in London and southern England. These traction systems date from the early days of railway electrification and their design and construction impose special requirements concerning tools used for track work, in order to meet modern safety requirements. These specialist tools are intended to protect the user from electric shock and minimize the risk of causing short-circuits by bridging between two conductive parts at different potentials.

NOTE BS EN 50163 specifies requirements for the supply voltages of traction systems.

1 Scope

This British Standard specifies requirements for insulating hand tools and hybrid insulating hand tools used for work on or in close proximity to conductor rails providing traction supplies, in accordance with BS EN 50163, to electrified railways and mass transit systems operating at voltages up to 1 000 V a.c. or 1 500 V d.c.

It is not applicable to hand-held insulated and insulating tools conventionally used by electricians and others for work on live electrical apparatus, which are specified in BS EN 60900.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 876:1995, *Specification for hand hammers*

BS 1421:1995, *Specification for picks, beater picks and mattocks*

BS 2589:1955, *Specification for railway track spanners*

BS 2945:1995, *Specification for axes and hatchets*

BS 3388:2004, *Forks, shovels and spades – Requirements and test methods*

BS EN 60900:2004, *Live working – Hand tools for use up to 1 000 V a.c. and 1 500 V d.c.*

BS EN ISO 2039-2:2000 (BS 2782-3: Method 365C:1992), *Plastics – Determination of hardness – Part 2: Rockwell hardness*

IEC 60417-5216:2002 (DB:2002-10), *Graphical symbols for safety-related applications – Suitable for live working: double triangle and voltage indication*

3 Terms and definitions

For the purposes of this British Standard, the following terms and definitions apply.

3.1 acceptance test

contractual test that provides the customer with evidence that the item(s) or product in question meet(s) the conditions of the customer's specification

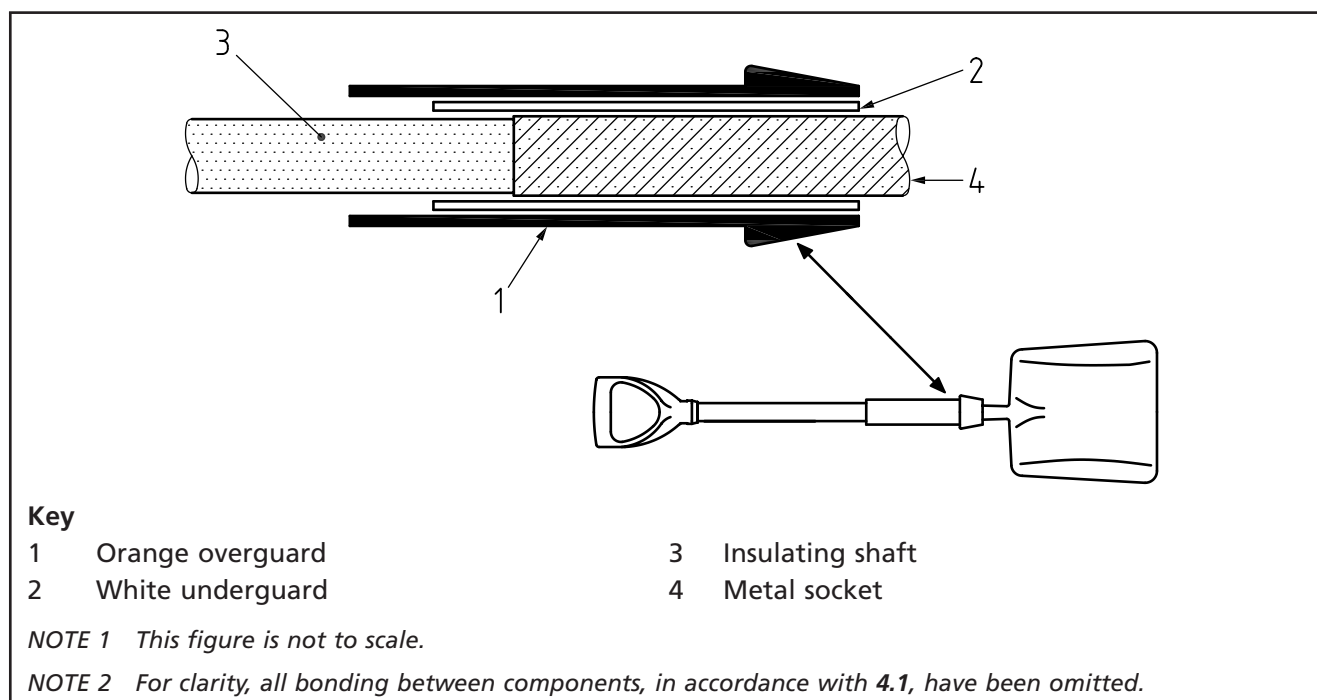
3.2 hybrid insulating hand tool

hand tool employing a combination of insulated and insulating parts

NOTE 1 An example is shown in Figure 1.

NOTE 2 Annex A categorizes tools according to their design, construction and intended use. Category 5(a) is applicable to hybrid insulating tools. The construction and method of insulation might dictate that particular tools in other categories can also be classified as hybrid insulating tools, e.g. torque wrenches.

Figure 1 Example of a hybrid insulating hand tool



3.3 insulated hand tool

hand tool made of conductive material(s), fully or partially covered by insulating material(s)

[IEC 60743, 2.3.1]

3.4 insulating hand tool

hand tool made totally or predominantly from insulated material(s)

[IEC 60743, 2.3.2]

NOTE 1 Insulating hand tools have metal working heads and might have some conductive parts used for reinforcement, which might or might not be exposed. Without any insulating material the remainder would no longer constitute a tool.

NOTE 2 Annex A categorizes tools according to their design, construction and intended use.

3.5 insulating insert

insulating material inserted between two conductive parts, e.g. in the case of a double-ended tool

3.6 material batch

purchase lot or production run of each finished length, profile and size of profile of insulating material to be used in the manufacture of insulating hand tools

3.7 routine test

test to which each individual insulating hand tool is subjected during or after manufacture to ascertain whether it conforms to certain criteria

3.8 sample test

test on a selected number of items taken at random from a batch

3.9 tool batch

production run of tools within a particular tool category

NOTE Definitions of tool categories are given in Annex A.

3.10 tool working head

part of an insulating hand tool intended to perform the function of the tool, which might be in contact with or in close proximity to conductor rails

3.11 type test

test of one or more insulating hand tools manufactured to a certain design to show that the design meets certain specifications

4 Materials

4.1 General

The insulating material(s) shall be compatible with one another and with any other materials used in the construction of the insulating hand tool.

NOTE Such compatibility ensures adequate bonding of the insulating material(s), as well as no adverse chemical inter-reaction(s).

When selecting and applying insulating materials, the materials shall be selected and applied to prevent the absorption or ingress of moisture beneath such material(s).

In the case of category 5 tools, the handle grip shall be formed from material that has a comparable di-electric performance to the tool shaft.

4.2 Fibreglass

When fibreglass insulating material is required as a structural component of the tool, fibreglass shall be used that contains a mass fraction of not less than 60% fibre, and fibres that are tensioned, continuous and parallel.

The fibreglass specification shall be obtained from the fibreglass manufacturer and shall be made available to the tester and/or the purchaser if requested.

4.3 Appearance

The colour of the insulating parts shall be predominantly orange.

In the case of hybrid tools, the outer layer (overguard) shall be orange and the under layer (underguard) shall be white.

5 Construction

5.1 General

An insulating or hybrid insulating hand tool shall be manufactured from an assembly including one or more insulating parts in conjunction with the conductive tool working head.

NOTE 1 Insulating parts can be applied over other insulating parts (multi-layer construction to which 4.3 refers). The design and construction of the tool might necessitate some overlap of insulating and conductive parts where joined at the tool working head.

All metallic parts shall be securely fixed to the insulating handle or insulating insert, as appropriate. Conformity shall be verified by means of the test specified in 8.3.3.

The final assembly shall be constructed to prevent the ingress of moisture.

Where insulating or hybrid insulating hand tools are assembled by the user from component parts, the integrity of the assembly shall be verified to be in accordance with the specification for that tool or, in the absence of such information, in accordance with BS EN 60900.

NOTE 2 An example of such a tool is a ratchet handle with detachable socket head.

5.2 Handle grip

Where the handle end incorporates a sleeve type grip, the adhesion of the sleeve shall be tested in accordance with 8.3.2.

5.3 Insulating components

Where hollow or foam-filled insulating components are used in the construction of a tool, design and/or construction measures shall be employed to prevent internal moisture accumulation or migration.

5.4 Additional requirements for particular insulating and hybrid insulating hand tools

If the intended use for a tool dictates the necessity for additional requirements particular to that use, e.g. a multifunction hand tool such as a permanent way spanner that can be used as both a hammer and a spanner, these shall be agreed between the manufacturer and the railway infrastructure controller. The additional requirements shall be fully documented and the tool shall conform to these requirements in addition to the requirements specified in this British Standard.

6 Properties

6.1 Mechanical properties

The mechanical properties of an insulating or hybrid insulating hand tool shall conform to the relevant requirements of the appropriate British Standard for an uninsulated tool having the same function:

- BS 876:1995 for hand hammers;
- BS 1421:1995 for picks, beater picks and mattocks;
- BS 2589:1955 for railway track spanners;
- BS 2945:1995 for axes and hatchets;
- BS 3388:2004 for forks, shovels and spades.