INTERNATIONAL STANDARD

IEC 60900

Second edition
2004-01

Live working –
Hand tools for use up to 1 000 V a.c.
and 1 500 V d.c.

This English-language version is derived from the original bilingual publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.
Live working –
Hand tools for use up to 1 000 V a.c. and 1 500 V d.c.

© IEC 2004 Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11  Telefax: +41 22 919 03 00  E-mail: inmail@iec.ch  Web: www.iec.ch

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия
PRICE CODE X
For price, see current catalogue
CONTENTS

FOREWORD ........................................................................................................................................ 7
INTRODUCTION .................................................................................................................................. 11

1 Scope ................................................................................................................................................ 13
2 Normative references ..................................................................................................................... 13
3 Terms and definitions ..................................................................................................................... 15
4 Requirements .................................................................................................................................... 15
   4.1 General requirements .................................................................................................................. 15
   4.2 General requirements concerning insulating materials ......................................................... 19
   4.3 Additional requirements ............................................................................................................. 19
5 Type tests ........................................................................................................................................ 25
   5.1 General ......................................................................................................................................... 25
   5.2 Visual check ................................................................................................................................. 27
   5.3 Dimensional check ....................................................................................................................... 27
   5.4 Impact tests .................................................................................................................................. 27
   5.5 Dielectric tests ............................................................................................................................ 29
   5.6 Indentation test (for insulated tools) .......................................................................................... 33
   5.7 Test for adhesion of the insulating material coating (for insulated tools) ......................... 33
   5.8 Flame retardancy test ............................................................................................................... 37
   5.9 Mechanical tests ....................................................................................................................... 39
   5.10 Durability of marking .............................................................................................................. 41
6 Quality assurance plan .................................................................................................................... 41
   6.1 Routine tests ............................................................................................................................... 41
   6.2 Sampling tests ............................................................................................................................ 43
   6.3 Tools with negative test results ............................................................................................... 43
   6.4 Records ....................................................................................................................................... 43
   6.5 Acceptance tests ....................................................................................................................... 43

Annex A (informative) Mechanical strength of insulating tools ....................................................... 77
Annex B (informative) Recommendation for use and in-service care .............................................. 81
Annex C (normative) Examples of calculation of the unwinded length of coating and acceptable leakage current ......................................................................................................................... 83
Annex D (normative) Sampling procedure ......................................................................................... 85
Annex E (normative) Acceptance tests ............................................................................................... 89

Bibliography ........................................................................................................................................ 91

Figure 1 – Symbol IEC-60417-5216 (DB:2002-10) – Suitable for live working; double triangle, and voltage indication (see 4.1.4) .................................................................................................................. 45
Figure 2 – Marking symbol for tools capable of being assembled and designed to be interchangeable between different manufacturers (see 4.1.4 and 4.3.1.3.2) ............................................ 45
Figure 3 – Description of the insulating overlapping element and different assembly configurations for tools capable of being assembled with square drives (see 4.3.1.3.1) ...... 47
Figure 4 – Illustration of insulation of typical tools (see 4.3.2 and 4.3.3) .................................... 49
Figure 5 – Illustration of insulation of pliers and knives ................................................................. 51
Figure 6 – Illustration of insulation of pliers and nippers for electronics (see 4.3.4 and 5.5.4) ..........................................................................................................................................................53
Figure 7 – Example of insulation of the handles of tweezers (see 4.3.6) .................................................................55
Figure 8 – Examples of test arrangements for the impact test (see 5.4) .............................................................59
Figure 9 – Electric testing device for insulated tools (see 5.5.3) ........................................................................61
Figure 10 – Description of dummies for electrical tests for tools capable of being assembled with square drives (see 5.5.3.1) ........................................................................................................63
Figure 11 – Dielectric testing device for insulating tools (see 5.5.4) ..........................................................63
Figure 12 – Indentation test (see 5.6) .................................................................................................................65
Figure 13 – Principle of the testing device for checking adhesion of the insulating coating on conductive parts of the tools (see 5.7.2) .................................................................................................69
Figure 14 – Testing device for checking adhesion of the insulating coating of screwdrivers on conductive parts and the handle (see 5.7.3) ..........................................................................................71
Figure 15 – Example of mountings for checking stability of adhesion of the insulation of the entire tool (see 5.7.4) ...........................................................................................................................................73
Figure 16 – Example of a flame retardancy test arrangement (see 5.8) ..........................................................75

Table 1 – Dimensions and tolerances of the insulating overlapping element ........................................................21
Table 2 – Dimensions and tolerances for dummies to be used for dielectric tests ...........................................31
Table A.1 – Torque values for insulating screwdrivers .......................................................................................77
Table D.1 – Classification of defects ..................................................................................................................85
INTERNATIONAL ELECTROTECHNICAL COMMISSION

LIVE WORKING –
HAND TOOLS FOR USE UP TO 1 000 V AC
AND 1 500 V DC

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

6) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

International Standard IEC 60900 has been prepared by IEC technical committee 78: Live working. This second edition

– adds requirements concerning interchangeable tools, where the used components are from different manufacturers;
– adds requirements and test values concerning insulating tools;
– includes bit-screwdrivers;
– includes screwdrivers with screw retaining devices;
– enlarges conditioning and test possibilities of the dielectric test;
– clarifies questions concerning quality assurance and
– includes the number of the standard with the year of publication (four digits) into the marking requirements.
The text of this standard is based on the following documents:

<table>
<thead>
<tr>
<th>FDIS</th>
<th>Report on voting</th>
</tr>
</thead>
<tbody>
<tr>
<td>78/547/FDIS</td>
<td>78/554/RVD</td>
</tr>
</tbody>
</table>

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until 2008. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.
This International Standard has been prepared in accordance with the requirements of IEC 61477 where applicable.

WITHDRAWN
1 Scope

This International Standard is applicable to insulated and insulating hand tools used for working live or close to live parts at nominal voltages up to 1 000 V a.c. and 1 500 V d.c.

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.

IEC 60060-1:1989, High-voltage test techniques — Part 1: General definitions and test requirements

IEC 60212:1971, Standard conditions for use prior to and during the testing of solid electrical insulating materials

IEC 60417-DB:2002¹, Graphical symbol for use on equipment

IEC 61318:2003 Live working – Quality assurance plans applicable to tools, devices and equipments


ISO 9656:1989, Pliers and nippers for electronics – Test methods

ISO 9657:1989, Pliers and nippers for electronics – General technical requirements

¹ “DB” refers to the IEC on-line database.