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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Live working – Insulating sticks and attachable devices – Part 2: Attachable devices

Travaux sous tension – Perches isolantes et outils adaptables – Partie 2: Outils adaptables

IEC 60832-2:2010

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FOREWORD

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International Standard IEC 60832-2 has been prepared by IEC technical committee 78: Live working.

The first edition of IEC 60832-1 and that of IEC 60832-2 cancel and replace the first edition of IEC 60832 published in 1988. The two parts have been created to clearly separate the requirements and testing of insulating sticks from those of attachable universal devices.

Compared to IEC 60832, the major changes included in IEC 60832-2 are:

- updating of the list of devices;
- clarifying the applicability of the document to other attachment system than splined end-fitting;
- application of conformity assessment for products having completed the production phase, according to IEC 61318:2007 (Edition 3), focusing on the classification of defects and the introduction of alternative testing in case of production follow-up.

The text of this standard is based on the following document:

FDIS	Voting report
78/839/FDIS	78/845/RVD

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.

A list of all parts of the IEC 60832 series, published under the general title *Live working – Insulating sticks and attachable devices,* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The "colour inside" logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

INTRODUCTION

The purpose of this standard is to provide essential requirements. Each user of this standard may supplement it with their own requirements. For example, the user may add requirements regarding the use of attachable devices on d.c. electrical installations or the mechanical performance or compatibility and interchangeability with tools already in service. In such cases, caution should be taken to maintain or improve the performance of the products.

This publication has been prepared in accordance with the requirements of IEC 61477.

The products designed and manufactured according to this standard contribute to the safety of the users provided they are used by skilled persons, in accordance with safe methods of work and the instructions for use.

The product covered by this standard may have an impact on the environment during some or all stages of its life cycle. These impacts can range from slight to significant, be of short-term or long-term, and occur at the global, regional or local level.

Except for a disposal statement in the instructions for use, this standard does not include requirements and test provisions for the manufacturers of the product, or recommendations to the users of the product for environmental improvement. However, all parties intervening in its design, manufacture, packaging, distribution, use, maintenance, repair, reuse, recovery and disposal are invited to take account of environmental considerations.

LIVE WORKING – INSULATING STICKS AND ATTACHABLE DEVICES –

Part 2: Attachable devices

1 Scope

This part of IEC 60832 gives the essential requirements for devices that can be attached onto and removed from the fitting of the insulating sticks for live working, for use on a.c. electrical installations.

Part 1 of IEC 60832 covers insulating sticks.

In this part of the standard, the term “device” is used for “attachable device”, unless otherwise specified.

Products designed and manufactured according to this standard contribute to the safety of the users provided they are used by skilled persons, in accordance with safe methods of work and the instructions for use.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this international standard. 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, *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, *Graphical symbols for use on equipment*

IEC 61318:2007, *Live working – Conformity assessment applicable to tools, devices and equipment*

IEC 61477, *Live working – Minimum requirements for the utilization of tools, devices and equipment*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61318 and the following apply.

3.1.1
rated value
value of a quantity used for specification purposes, established for a specified set of operating conditions of a component, device, equipment or system

[IEV 151-16-08]

3.1.2
type of device
family of devices which are of the same design and application and are of similar dimensions

3.2 Symbols

T_N rated torque given by the manufacturer for a given device and for testing purposes

F_{TN} rated tensile force given by the manufacturer for a given device and for testing purposes

F_{CN} rated compression force given by the manufacturer for a given device and for testing purposes

F_{BN} rated bending force given by the manufacturer for a given device and for testing purposes

4 Requirements

4.1 General

The following requirements have been prepared in order that the products covered by this standard are designed and manufactured to contribute to the safety of the users, provided they are used by persons skilled for live working, in accordance with safe methods of work and the instructions for use.

All bolts used to join two parts together shall be of suitable and sufficient mechanical strength both in tension and shear for that purpose.

Devices subjected to tensile or compressive forces when in use shall be designed in such a way that the force shall be exerted along the axis of the stick.

The method for fixing the device shall ensure that it cannot become accidentally detached when in use.

The method for fixing the device shall be designed and constructed to allow the angle formed by the axis of the stick and the device fitted to it to be adjusted in steps of 30°. Two examples of such a system are shown in Annex A.

4.2 Dimensional and mechanical requirements

4.2.1 Dimensional requirements

For each type of device complying with this part of the standard, the manufacturer shall provide in writing the rated dimensions and parameters relating directly to its specific functions.

NOTE Conducting devices should be designed to be as small as possible consistent with their proper functioning to reduce the risk of short-circuits.

4.2.2 Mechanical requirements

For each type of device complying with this part of the standard, the manufacturer shall provide in writing the rated values corresponding to the characteristics specified in Tables 1 and 2.

Conductor cleaning brushes shall resist uses under low and high temperature conditions.

NOTE 1 A cold crushing test and a hot crushing test of the brush are included in 5.6.4.3.

NOTE 2 In general, for other devices intended to be used in unusual atmospheric conditions (very high or very low temperature or relative humidity), the client should discuss with the manufacturer the interest of performing more restricting mechanical tests in appropriate conditions.

Only visual inspection (see 5.2), dimensional check (see 5.3) and compatibility check (see 5.4) are required for the following devices:

- Positive grip clamp stick head
- Shepherd's hook
- Ball-socket adjuster
- Fixed double-prong head
- Retaining device installer (cotter key installer)
- Insulator ball guide
- Hammer
- Self-aligning fuse puller
- Screw clamp
- Spiral disconnect
- Pruning saw
- Screwdriver
- Conductor polisher

Table 1 – Mechanical characteristics of splined end devices (to be supplied by the manufacturer)

Characteristics	Type of devices					
	Hook stick adaptor and universal adaptor	Formed-wire ring	Locating drift	Conductor cleaning brush	Holding fork	Spanner (wrench)
T_N	X					X
F_{TN}	X					
F_{BN}			X		X	
Specific characteristics		Tension strength of the spigot		Resistance to crushing F_{CN}		

Characteristics	Type of devices										
	Retaining pin remover				Retaining device installer or retaining device installer/ remover	Binding wire cutter blade (tie wire cutter)	Rotary blade	Rotary prong	Adjustable pliers	Vice-grip pliers	Adjustable insulator fork
	Spiral type	Fine point type	Cam type (pry type)	Snap-out type							
T_N	X	X									X
F_{TN}				X			X	X			
F_{BN}			X Rated distance for the bending		X	X			X	X	X
Specific characteristics				Rated return force F_R					Tightening capability	Tightening capability	Strength of the articulation

Characteristics	Type of devices							
	All-angle pliers	Pin holder	Flexible spanner head (flexible wrench head)	Ammeter holder	Anti-interference braid applicator	Hack saw	Conductor gauge	Gap gauge
T_N			X	X				
F_{TN}								X
F_{BN}	X	X			X	X		
Specific characteristics	Tightening strength						Resistance to distortion	

Table 2 – Mechanical characteristics of clevis and tongue stick devices (to be supplied by the manufacturer)

Characteristics	Type of devices					
	Clevis eye attachment	Tension link tongue attachment	Clevis-tongue adaptor	Clevis-tongue extension	Roller tongue attachment	Clevis screw adaptor
F_{TN}	X	X	X	X	X	X

4.3 Mechanical protection

When necessary, the ends of each device shall have adequate means for mechanical protection, such as an end-cap. Metal devices shall be carefully designed to ensure that all edges are rounded where this does not impair the function of the device.

4.4 Protection against corrosion

Metal parts shall be protected against corrosion either by their composition or by the use of a suitable surface treatment.

4.5 Marking

Each device shall be marked with the following permanent items of marking:

- manufacturer's name or trademark;
- type reference;
- year and (if possible) month of manufacture;
- symbol IEC 60417-5216 (2002-10) – Suitable for live working; double triangle (see Annex B);

  NOTE The exact ratio of the height of the figure to the base of the triangle is 1,43. For the purpose of convenience, this ratio can be between the values of 1,4 and 1,5.

- number of the relevant IEC standard immediately adjacent to the symbol (IEC 60832-2).

The marking shall be durable, clearly visible and legible to a person with normal or corrected vision without additional magnification.

Other characteristics or information not needed at the work location, like the year of publication of the standard, shall be associated to the product item by other means, such as coded information (bar codes, microchips, etc.), or shall be associated to its packaging.

4.6 Instructions for use

Each device shall be supplied with the manufacturer's written instructions for use and care.

These instructions shall be prepared in accordance with the general provisions given in IEC 61477.

These instructions shall include as a minimum, recommendations for maximum mechanical load (see 4.2.2), cleaning, storage and transportation, periodic testing, possible repair and disposal of the device.

5 Tests

5.1 General

The present standard provides testing provisions to demonstrate compliance of the product to the requirements of Clause 4. These testing provisions are primarily intended to be used as type tests for validation of the design input. Where relevant, alternative means (calculation, examination, tests, etc.), are specified within the test subclauses for the purpose of devices having completed the production phase.

To show compliance with this part of the standard, the manufacturer shall prove that the type tests referred to in Tables C.1 and C.2 have been successfully carried out on at least three devices of each type.

However, when differences between various types of devices are limited in number, tests that are unaffected by the differing characteristics of the device can be carried out on a single type of device and the results can be used for the other types of device.

The tests referred to in Tables C.1 and C.2 shall be performed in the specified numbered order.

The required values of mechanical forces specified in Clause 5 shall be reached using a rate of increase between 1 % and 10 % of the rated force per second. The forces shall be applied with an accuracy of ±5 %.

NOTE For example, if the rated tensile force stated by the manufacturer for a given tool is F_{TN} = 100 N, the rate of increase will be between 1 N/s and 10 N/s and the applied force to the device will be between 95 N and 105 N.

The dimensions specified in mm in Clause 5 shall be verified with an accuracy of ±2 %.

Unless otherwise specified, room temperature shall be (25 ± 10) °C.

When visual inspection is specified, it shall be understood to be visual inspection by a person with normal or corrected vision without additional magnification.

5.2 Visual inspection

Each device shall be visually inspected to detect manufacturing defaults and to check proper functioning and compliance with requirements included in 4.3, 4.4 and 4.5 where applicable.

5.3 Dimensional check

Each device shall be measured to ensure that its dimensions match the manufacturer's rated dimensions.

5.4 Compatibility check

It shall be verified by attaching each attachment system that each type fits properly and securely on the stick for which it has been designed for.

5.5 Durability of marking

The durability of the marking shall be verified by thoroughly cleaning the marking for at least 1 min with a piece of lint-free cloth dampened with water and then rubbing it vigorously for a further minimum of 1 min with a piece of lint-free cloth dampened with isopropanol (CH_3-CH(OH)-CH_3).

NOTE 1 It is the employer's duty to ensure that any relevant legislation and any specific safety instructions regarding the use of isopropanol are fully observed.