# IEC 60895

Edition 3.0 2020-04

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside

## Live working – Conductive clothing

## Travaux sous tension – Vêtements conducteurs

IEC 60895:2020-04(en-fr)

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# LIVE WORKING – CONDUCTIVE CLOTHING

## 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.
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International Standard IEC 60895 has been prepared by IEC technical committee 78: Live working.

This third edition cancels and replaces the second edition, published in 2002. This edition constitutes a technical revision.

This 3edition includes the following significant technical changes with respect to the previous edition:

a) increase of the use up to 1 000 kV AC and ±800 kV DC;
b) introduction of two classes of conductive clothing with different electrical requirements;
c) revision of the electrical requirements of conductive clothing;
d) definition of specific resistance values for each component part of the conductive clothing;
e) introduction of conductive helmet and conductive scarf as *component parts* of conductive clothing;
f) introduction of mechanical requirements and new tests for fabrics;
g) update of the cleaning test procedures;

h) revision of the efficiency test of the conductive clothing to improve the feasibility and repeatability;

i) preparation of the elements of classification of defects, and general application of IEC 61318:2007;

j) the normative Annex B for the classification of tests has been replaced by normative Annex C for the general type tests procedure, the normative Annex D for the classification of defects and the informative Annex E providing the justification for the classification of defects;

k) the normative Annex C on sampling procedure has been deleted (not applicable according to IEC 61318:2007);

l) modification of the recommended frequency of the periodic tests.

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

| FDIS | Report on voting |
|---|---|
| 78/1309/FDIS | 78/1312/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.

Terms defined in Clause 3 are given in *italic* print throughout this standard.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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 document using a colour printer.**

# INTRODUCTION

This document provides specifications for protective *conductive clothing* currently being used without incident in live work by qualified electrical workers throughout the world. The adequacy of this clothing is established by its *screening efficiency* and the electrical resistance of material and *component parts* of the *conductive clothing*. Based on resistance measurements carried out by manufacturers and utilities of used clothing being successfully worn in the field, differences of up to 1 000 fold have been reported.

The whole set-up and preparation work in very high voltage is made to limit the power of electric arcs during work activities.

When, in the preparation phase of the work, the risk assessment leads to a high probability that there may be electric arcs, due to the short distances or unsuitable equipment insulation, the work is not done.

This approach is dictated by the fact that the electric arcs produced by high-voltage installations have very significant thermal and electrical effects, which are hardly attenuated by protective clothing worn by operators.

If protection against electric arc value is required by agreements between customer and manufacturer, it is possible to perform tests on the fabric and/or on the *garment* complete with accessories using the reference standards already published on this topic by IEC TC 78.

This document has been prepared according to the requirements of IEC 61477, where applicable.

The bibliography provides a list of papers of international level that were used during the development of this edition of IEC 60895.

The product covered by this document 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 duration, and occur at the global, regional or local level.

This document 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 – CONDUCTIVE CLOTHING

## 1 Scope

This document is applicable to *conductive clothing*, worn during live working (especially bare-hand working) on AC and DC electrical installations, to provide electrical continuity between all parts of the clothing and a reduction of electric field inside the clothing.

This document is applicable to *conductive clothing* assembled from a conductive *garment* (jackets and trousers or coveralls forming a one-piece *garment*) and from conductive *component parts* (gloves, hoods or helmets, shoes or boots, overshoe socks and socks) in electrical systems with nominal voltage up to 1 000 kV AC and up to ±800 kV DC.

This document does not indicate values of protection from the effects of the electric arc, because any value indicated would not guarantee the necessary protection from the effects of electric arcs, or the operator would need to wear very heavy and rigid conductive clothing, which would not allow the execution of the work in safety.

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

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60212:2010, *Standard conditions for use prior to and during the testing of solid electrical insulating materials*

IEC 60417, *Graphical symbols for use on equipment* (available at: http://www.graphical-symbols.info/equipment)

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

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

ISO 3175 (all parts), *Textiles – Professional care, drycleaning and wetcleaning of fabrics and garments*

ISO 6330, *Textiles – Domestic washing and drying procedures for textile testing*

ISO 12947-1, *Textiles – Determination of the abrasion resistance of fabrics by the Martindale method – Part 1: Martindale abrasion testing apparatus*

ISO 12947-2, *Textiles – Determination of the abrasion resistance of fabrics by the Martindale method – Part 2: Determination of specimen breakdown*

ISO 13937-2, *Textiles – Tear properties of fabrics – Part 2: Determination of tear force of trouser-shaped test specimens (Single tear method)*