
Conductive clothing for live working at a nominal voltage up to 800 kV a.c. (IEC 60895:1987, modified)

Conductive clothing for live working at a nominal voltage up to 800 kV a.c.

Schirmende Schutzbekleidung zum Arbeiten an unter Spannung stehenden Teilen für eine Nennspannung bis a.c. 800 kV

Vêtements conducteurs pour travaux sous tension jusqu'à 800 kV de tension nominale en courant alternatif

iTeh STANDARD PREVIEW
 (standards.iteh.ai)

[SIST EN 60895:2000](https://standards.iteh.ai/catalog/standards/sist/f75c4d89-6b83-4112-b9c1-c7aad0c02c910/sist-en-60895-2000)

Ta slovenski standard je istoveten z: EN 60895:1996

ICS:

13.260	Xæ•ç[Å!^åÅ ^\ d ā } ā	Protection against electric shock. Live working
13.340.10	Varovalna obleka	Protective clothing

SIST EN 60895:2000

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 60895:2000

<https://standards.iteh.ai/catalog/standards/sist/f75c4d89-6b83-4112-b9c1-e7aa0c62c910/sist-en-60895-2000>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 60895

June 1996

ICS 13.340.10

Supersedes HD 547 S1:1990

Descriptors: Live working, electrical equipment, conductive clothing, characteristic, test

English version

**Conductive clothing for live working at a nominal voltage
up to 800 kV a.c.
(IEC 895:1987, modified)**

Vêtements conducteurs pour travaux
sous tension jusqu'à 800 kV de tension
nominale en courant alternatif
(CEI 895:1987, modifiée)

Schirmende Schutzbekleidung zum
Arbeiten an unter Spannung stehenden
Teilen für eine Nennspannung bis a.c.
800 kV
(IEC 895:1987, modifiziert)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 60895:2000

<https://standards.iteh.ai/catalog/standards/sist/f75c4d89-6b83-4112-b9c1-e7aa0c62c910/sist-en-60895-2000>

This European Standard was approved by CENELEC on 1996-03-05. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 895:1987, prepared by IEC TC 78, Tools for live working, was approved by CENELEC as HD 547 S1 on 1989-12-05.

This Harmonization Document, together with common modifications prepared by the Technical Committee CENELEC TC 78, was submitted to the formal vote and was approved by CENELEC as EN 60895 on 1996-03-05.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 1997-03-01
- latest date by which national standards
conflicting with the EN have to be withdrawn (dow) 1997-03-01

For products which have complied with HD 547 S1:1990 before 1997-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2002-03-01.

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given only for information.
In this standard, annexes A to E and annex ZA are normative.
Annex ZA has been added by CENELEC.

SIST EN 60895:2000

<https://standards.iteh.ai/catalog/standards/sist/f75c4d89-6b83-4112-b9c1-e7aa0c62c910/sist-en-60895-2000>

Endorsement notice

The text of the International Standard IEC 895:1987 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS**CONTENTS**

Add: 10 Quality assurance plan

Replace "Appendix" by "Annex"

Add "(normative)" for all annexes.

Add the title "Test arrangements" for annex C.

Add: Annex ZA (normative) - Normative references to international publications with their corresponding European publications

Add the following new clause 10:

10 Quality assurance plan

In order to assure the delivery of products that meet this standard, the manufacturer shall employ an approved quality assurance plan that complies with the provisions of the ISO 9000 series

The quality assurance plan shall ascertain that the products meet the requirements contained in this standard.

In the absence of an accepted quality assurance plan as specified above the sampling tests contained in clause 6 shall be carried out.

Annexes

Replace the headings of the appendices by:

Annex A
(normative)

Annex B
(normative)

Annex C
(normative)

Tests arrangements

Annex D
(normative)

Annex E
(normative)

Add the following new annex:

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

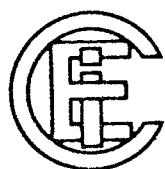
<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 50(151)	1978	International Electrotechnical Vocabulary (IEV) Chapter 151: Electrical and magnetic devices	-	-
IEC 212	1971	Standard conditions for use prior to and during the testing of solid electrical insulating materials	HD 437 S1	1984
IEC 456 (mod)	1974	Methods to be used for measuring energy consumption of automatic electric washing machines for cold water supply only, for household use, and for the purpose of informing the consumer of it		
+ A1 (mod)	1980		HD 377 S1 ¹⁾	1978
ISO 479	1975	Paper - Untrimmed sizes - Designation and tolerances	-	-
ISO 3290	1975	Rolling bearings - Bearing parts - Balls for rolling bearings	-	-

1) HD 377 S1 is superseded by EN 60456:1994, which is based on IEC 456:1994.

NORME INTERNATIONALE INTERNATIONAL STANDARD

CEI
IEC
895

Première édition
First edition
1987



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

**Vêtements conducteurs pour travaux sous tension
jusqu'à 800 kV de tension nominale en courant alternatif**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 60895:2000](https://standards.iteh.ai/catalog/standards/sist/f75c4d89-6b83-4112-b9c1-e7aa0c62c910/sist-en-60895-2000)

<https://standards.iteh.ai/catalog/standards/sist/f75c4d89-6b83-4112-b9c1-e7aa0c62c910/sist-en-60895-2000>

**Conductive clothing for live working at a nominal voltage
up to 800 kV a.c.**

Publication
895: 1987

CONTENTS

	Page
FOREWORD	5
PREFACE	5
INTRODUCTION	7
 SECTION ONE — GENERAL	
Clause	
1. Scope	7
2. Terminology	7
 SECTION TWO — TECHNICAL REQUIREMENTS	
3. Technical requirements on components	9
 SECTION THREE — TYPE TESTS	
4. Knitted or woven fabric used for the suit, hood, socks and gloves, and basic shielding fabric used for face shield	13
5. Conductive clothing (complete assembly)	31
 SECTION FOUR — SPECIAL CLAUSES	
6. Sampling tests	37
7. Routine tests	37
8. Acceptance checks and tests	39
9. Modification	39
Appendix A — Determination of electrical resistance properties of fabric intended for conductive clothing for live working. Evaluation of conductive paint	41
Appendix B — Example of general arrangement of suit	43
Appendix C —	44
Appendix D — Conductive suit measurement points (typical suit construction)	52
Appendix E — Measurement of the efficiency of the electrostatic screen. Complete suit ...	53

INTERNATIONAL ELECTROTECHNICAL COMMISSION

CONDUCTIVE CLOTHING FOR LIVE WORKING AT A NOMINAL VOLTAGE UP TO 800 kV a.c.

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

iTeh STANDARD PREVIEW

PREFACE

This standard has been prepared by IEC Technical Committee No. 78: Tools for Live Working.

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

Six Months' Rule	Report on Voting
78(CO)15	78(CO)21

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

The following IEC publications are quoted in this standard:

- Publications Nos. 50 (151) (1978): International Electrotechnical Vocabulary (IEV). Chapter 151: Electrical and Magnetic Devices.
- 212 (1971): Standard Conditions for Use Prior to and during the Testing of Solid Electrical Insulating Materials.
- 456 (1974): Methods for Measuring the Performance of Electric Clothes Washing Machines for Household Use, Amendment No. 1 (1980).

Other publications quoted:

- ISO Standards 479 (1975): Paper — Untrimmed Sizes — Designation and Tolerances.
- 3290 (1975): Rolling Bearings — Bearing Parts — Balls for Rolling Bearings.

CONDUCTIVE CLOTHING FOR LIVE WORKING AT A NOMINAL VOLTAGE UP TO 800 kV a.c.

INTRODUCTION

The conductive clothing by the assembly of its different components should constitute an electrically continuous coverall, surrounding the worker with the possible exception of his face. However the worker can be protected by a face shield electrically connected to the suit itself.

If press studs, zip fasteners, hooks and eyes or any other method of fastening are used in the assembly of the complete suit, care should be taken to ensure that the electrical conductivity of the suit is not impaired.

The conductive clothing (complete assembly) should be electrically connected to the conductor or the conductive part on which the live working has to be carried out. This connection shall be made by a conductive braid fixed at one of its extremities to the conductive suit and at the other by a special clamp.

SECTION ONE — GENERAL

1. Scope

This standard is applicable to conductive clothing worn by electrical workers during live working (especially bare-hand working) at a nominal voltage level up to 800 kV a.c.

It is applicable to suit, gloves or mitts, hoods, shoes and socks.

The corresponding d.c. values are under consideration.

2. Terminology (see Appendix B)

Conductive material

Material composed of metallic threads or non-metallic conductive substances and natural or synthetic threads closely woven or knitted.

Connecting braid

Special conductive braid to connect the conductive suit to the live metal working point.

The connecting braid is equipped at one of its extremities with a connection system to the suit; the other extremity of the braid is equipped with a special clamp.

Hood

Part of the clothing covering the head.

Face shield

Part covering the worker's face. It can be a synthetic and metallized shield having good optical and anti-U.V. qualities, or consisting of a conductive net.

SECTION TWO — TECHNICAL REQUIREMENTS

3. Technical requirements on components

The material used shall have the following properties:

3.1 *Flame retardancy*

Placed in contact with a flame or a fire (e.g. an electric arc), the material shall be constituted to prevent the fire from spreading. This quality shall be checked as indicated in Sub-clause 4.1.

3.2 *Wear resistance*

The conductive clothing shall be resistant to abrasion and to tearing.

As special tests to check these qualities are difficult to set up and to perform, the satisfaction of the wearer and the life duration of the cloth will be the only elements to consider.

3.3 *Electrical resistance*

This quality can be considered as a basic element which determines the current carrying capability and the spark discharge properties.

The only direct consequence for a worker of the correct value of electrical resistance, is the low potential difference between two points of the cloth in contact with the skin and is consequently an element of comfort.

<https://standards.iteh.ai/catalog/standards/sist/f75c4d89-6b83-4112-b9c1-e7aa0c62c910/sist-en-60895-2000>

3.4 *Current-carrying capability*

During the worker's travel to his working position (from the metallic structure of the tower or from the ground in an aerial device) and at the moment of his connection to the live conductor, capacitive currents flow through his clothing. These can be significant and it is necessary for the suit to be able to conduct them without damage (heating, smoke...).

This capability will be checked as indicated in Sub-clause 4.3.

3.5 *Screening efficiency*

Material must have a screening efficiency better than 40 dB.

Screening efficiency of a conductive fabric is defined by the ratio of energy that would be received by a body without a screen to energy received by the same body screened by the conductive fabric. A ratio of two voltages measured in these conditions is used to calculate screening efficiency of the conductive fabric.

3.6 *Cleaning requirements*

To ensure that the screening efficiency and flame retardant properties of the clothing do not deteriorate excessively after repeated cleaning, the clothing shall be subjected to 10 wash-dry cycles and/or 10 dry-cleaning cycles. The screening effect and flame retardant properties shall still meet the specified requirements after the tests.

3.7 Spark discharge protection

To provide protection from spark discharges directly to the worker, the spacing between any individual adjacent conducting components in the fabric (except for face shield) shall not exceed 5 mm under all normal wearing conditions including stretching (such as at the elbows or knees).

3.8 Requirements on:

3.8.1. Gloves and socks

The resistance of gloves and socks shall be low enough for the maximum expected current flow through them not to be perceptible to the worker. This resistance shall have a maximum value of 100 Ω for gloves and 10 Ω for socks, when measured using the specified electrodes.

3.8.2 Footwear

The footwear resistance shall be low enough so that if the footwear is used alone, without conductive clothing, the voltage drop across the footwear, due to the induced current in a person in the highest expected field strength, will not result in an annoying discharge. The resistance shall have a maximum value of 500 Ω , when measured using the specified electrodes. If conductive socks are used, the shoes may be of a normal type without special conducting properties.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.8.3 Hood and face shield

A conductive hood is necessary to provide screening effect.

It may be completed especially for very high voltages by a facial conductive shield. If no face shield is provided, protective flaps, conductive visor and the shape of the hood, shall ensure face protection. A bond between hood, facial shield and suit shall be provided.

3.8.4 Clothing (complete assembly)

Additional tests (Sub-clause 5.6) shall be carried out on the complete assembly to prove the actual values of screening efficiency and resistance in order to detect manufacturing faults.

3.8.5 Marking

Each conductive suit shall carry at least the following permanent information:

- name or trade mark of the manufacturer,
- type reference and size (in accordance with ISO standards),
- year of manufacture.

Each conductive item shall carry a blue triangle firmly attached, by sewing, adhesion or other suitable means. This triangle will be:

- dark blue 3 mm border on light blue background,
- side dimension shall be 50 mm or smaller if the conductive item is too small for such a triangle.