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REDLINE VERSION

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Live working – Protective clothing against the thermal hazards of an electric arc –
Part 2: Requirements

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ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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LIVE WORKING – PROTECTIVE CLOTHING AGAINST THE THERMAL HAZARDS OF AN ELECTRIC ARC –

Part 2: Requirements

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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This Redline version provides you with a quick and easy way to compare all the changes between this standard and its previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 61482-2 has been prepared by IEC technical committee 78: Live working.

This second edition cancels and replaces the first edition published in 2009. This edition constitutes a technical revision.

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

a) new definition for $ELIM$, $ATPV$ and EBT as used in accordance with IEC 61482-1-1:–;
b) new requirements for the thermal stability of the intermediate layers;
c) additional material requirement for volume resistance;
d) new test procedure for the thermal resistance of sewing threads;
e) new symbol for marking.

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

FDIS	Report on voting
78/1205/FDIS	78/1228/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 document 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.

A list of all parts of the IEC 61482 series, published under the general title *Live working – Protective clothing against the thermal hazards of an electric arc,* 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 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 publication using a colour printer.

INTRODUCTION

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

The products designed and manufactured according to this document 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 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 – PROTECTIVE CLOTHING AGAINST THE THERMAL HAZARDS OF AN ELECTRIC ARC –

Part 2: Requirements

1 Scope

This part of IEC 61482 is applicable to *protective clothing* used in work where there is the risk of exposure to an *electric arc hazard*.

This document specifies requirements and test methods applicable to *materials* and *garments* for *protective clothing* for electrical workers against the thermal hazards of an *electric arc* ~~based on~~.

~~– relevant general properties of the textiles, tested with selected textile test methods, and~~

~~– arc thermal resistance properties, such as~~

- ~~the arc rating of materials (ATPV or E_{BT50}), when tested with an open electric arc under defined laboratory conditions according to IEC 61482-1-1, or~~
- ~~the arc protection class of materials and garments (Class 1 or Class 2), when tested with a directed and constrained electric arc under defined laboratory conditions according to IEC 61482-1-2.~~

~~Requirements of this standard do not address electric shock hazards. The present standard is applicable in combination with standards covering such hazards.~~

~~NOTE 1 If conductive fibres are used in the construction of the garments the risk for electric shock hazard should be considered.~~

~~This standard does not contain requirements for the protection of head, hands and feet.~~

~~NOTE 2 Requirements and tests to cover these hazards are under development.~~

~~Requirements of this standard do not cover the electric arc hazards of electric shock, noise, UV emissions, pressure shrapnel, hot oil, the consequences of physical and mental shock and the toxic influences.~~

~~NOTE 3 The standard is applicable in combination with standards covering such hazards.~~

Electric shock hazard is not covered by this document, which is applicable in combination with standards covering such hazards.

Other effects than the thermal effects of an *electric arc* like noise, light emissions, pressure rise, hot oil, electric shock, the consequences of physical and mental shock or toxic influences are not covered by this document.

Protection of eyes, face, head, hands and feet against *electric arc hazard* is not covered by this document.

NOTE Requirements and tests to cover *electric arc hazards* to these parts of the body are under development.

Protective clothing for work intentionally using an *electric arc*, e.g. arc welding, plasma torch, is not covered by this document.

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

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

IEC 61340-2-3:2016, *Electrostatics – Part 2-3: Methods of test for determining the resistance and resistivity of solid materials used to avoid electrostatic charge accumulation*

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

IEC 61482-1-1:–[1], *Live working – Protective clothing against the thermal hazards of an electric arc – Part 1-1: Test methods – Method 1: Determination of the arc rating (ELIM, ATPV and/or ~~E_{BT50}~~ EBT) of ~~flame resistant materials for~~ clothing materials and of protective clothing using an open arc*

IEC 61482-1-2~~:2007~~, *Live working – Protective clothing against the thermal hazards of an electric arc – Part 1-2: Test methods – Method 2: Determination of arc protection class of material and clothing by using a constrained and directed arc (box test)*

~~ISO 3175-2, *Textiles – Professional care, drycleaning and wetcleaning of fabrics and garments – Part 2: Procedure for testing performance when cleaning and finishing using tetrachloroethene*~~

ISO 3146, *Plastics – Determination of melting behaviour (melting temperature or melting range) of semi-crystalline polymers by capillary tube and polarizing-microscope methods*

ISO 3758, *Textiles – Care labelling code using symbols*

ISO 5077, *Textiles – Determination of dimensional change in washing and drying*

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

ISO 13688:~~1998~~ 2013, *Protective clothing – General requirements*

ISO 13934-1, *Textiles – Tensile properties of fabrics – Part 1: Determination of maximum force and elongation at maximum force using the strip method*

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

ISO 13938-1, *Textiles – Bursting properties of fabrics – Part 1: Hydraulic method for determination of bursting strength and bursting distension*

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[1] Under preparation. Stage at time of publication: IEC CDV 61482-1-1:2017.

ISO 13938-2, *Textiles – Bursting properties of fabrics – Part 2: Pneumatic method for determination of bursting strength and bursting distension*

~~ISO 14116:2007, *Protective clothing – Protection against heat and flame – Limited flame spread materials, material assemblies and clothing*~~

ISO 15025~~:2000~~, *Protective clothing – Protection against ~~heat and~~ flame – Method of test for limited flame spread*

ISO 17493:2016, *Clothing and equipment for protection against heat – Test method for convective heat resistance using a hot air circulating oven*

ISO 30023, *Textiles – Qualification symbols for labelling workwear to be industrially laundered*

IEC 61482-2

Edition 2.0 2018-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Live working – Protective clothing against the thermal hazards of an electric arc –
Part 2: Requirements

Travaux sous tension – Vêtements de protection contre les dangers thermiques d'un arc électrique –
Partie 2: Exigences

IEC 61482-2:2018-05(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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1 Under preparation. Stage at time of publication: IEC CDV 61482-1-1:2017.

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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TRAVAUX SOUS TENSION – VÊTEMENTS DE PROTECTION CONTRE LES DANGERS THERMIQUES D'UN ARC ÉLECTRIQUE –

Partie 2: Exigences

AVANT-PROPOS

1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
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La Norme internationale IEC 61482-2 a été établie par le comité d'études 78 de l'IEC: Travaux sous tension.

Cette deuxième édition annule et remplace la première édition parue en 2009. La présente édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) nouvelle définition des valeurs d'*ELIM*, d'*ATPV* et d'*EBT*, telles qu'utilisées conformément à l'IEC 61482-1-1:–;
b) nouvelles exigences relatives à la stabilité thermique des couches intermédiaires;

c) exigence supplémentaire du matériau concernant la résistance électrique;

d) nouvelle procédure d'essai pour la résistance thermique des fils de couture;

e) nouveau symbole de marquage

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
78/1205/FDIS	78/1228/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Les termes définis à l'Article 3 sont imprimés en *caractères italiques* dans la présente norme.

Une liste de toutes les parties de la série IEC 61482, publiées sous le titre général *Travaux sous tension – Vêtements de protection contre les dangers thermiques d'un arc électrique*, peut être consultée sur le site web de l'IEC.

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INTRODUCTION

Le présent document a été rédigé en conformité avec les exigences de l'IEC 61477.

Les produits conçus et fabriqués conformément au présent document contribuent à la sécurité des utilisateurs, pourvu qu'ils soient utilisés par des personnes qualifiées, conformément à des méthodes de travail sûres et aux instructions d'emploi.

Le produit couvert par le présent document peut avoir un impact sur l'environnement pendant certaines étapes de son cycle de vie ou tout au long de celui-ci. La gravité de ces impacts peut s'échelonner de faible à forte, ils peuvent être de courte ou de longue durée, et se produire à un niveau local, régional ou global.

Le présent document ne contient pas d'exigences ni de dispositions d'essai s'adressant au fabricant, ou de recommandations aux utilisateurs du produit ayant pour but d'améliorer l'environnement. Cependant, toutes les parties qui interviennent dans sa conception, sa fabrication, son emballage, sa distribution, son utilisation, son entretien, sa réparation, sa réutilisation, sa récupération et sa mise au rebut sont invitées à prendre en compte les éléments environnementaux.

TRAVAUX SOUS TENSION – VÊTEMENTS DE PROTECTION CONTRE LES DANGERS THERMIQUES D'UN ARC ÉLECTRIQUE –

Partie 2: Exigences

1 Domaine d'application

La présente partie de l'IEC 61482 est applicable aux *vêtements de protection* utilisés pour réaliser des travaux lorsqu'il y a un risque d'exposition à un *danger d'arc électrique.*

Le présent document spécifie les exigences et les méthodes d'essai applicables aux *matériaux et aux articles d'habillement* utilisés pour les *vêtements de protection* des travailleurs du domaine électrique contre les dangers thermiques d'un *arc électrique*.

Les dangers de chocs électriques ne sont pas couverts par le présent document, qui est applicable en combinaison avec les normes couvrant ce type de dangers.

Le présent document ne couvre que les effets thermiques d'un *arc électrique,* et ne couvre pas les effets comme le bruit, les émissions lumineuses, l'augmentation de la pression, l'huile chaude, le choc électrique, les conséquences d'un choc physique ou mental ou des effets toxiques lors d'un arc électrique.

Le présent document ne couvre pas la protection des yeux, du visage, de la tête, des mains et des pieds contre le *danger d'arc électrique*.

NOTE Les exigences et les essais applicables aux dangers d'arc électrique concernant ces parties du corps sont en cours d'élaboration.

Le présent document ne couvre pas les *vêtements de protection* portés pour réaliser des travaux utilisant intentionnellement un *arc électrique*, par exemple le soudage à l'arc, l'usage d'une torche à plasma.

2 Références normatives

Les documents suivants cités dans le texte constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60417, *Symboles graphiques utilisables sur le matériel* (disponible à l'adresse http://www.graphical-symbols.info/equipment)

IEC 61318, *Travaux sous tension – Evaluation de la conformité applicable à l'outillage, au matériel et aux dispositifs*

IEC 61340-2-3:2016, *Électrostatique – Partie 2-3: Méthodes d'essais pour la détermination de la résistance et de la résistivité des matériaux solides destinés à éviter les charges électrostatiques*

IEC 61477, *Travaux sous tension – Exigences minimales pour l'utilisation des outils, dispositifs et équipements*

IEC 61482-1-1:–[1], *Travaux sous tension – Vêtements de protection contre les dangers thermiques d'un arc électrique – Partie 1-1: Méthodes d'essai – Méthode 1: Détermination de la valeur assignée d'arc (ELIM, ATPV et/ou EBT) des matériaux pour vêtements et des vêtements de protection utilisant un arc ouvert*

IEC 61482-1-2*, Travaux sous tension – Vêtements de protection contre les dangers thermiques d'un arc électrique – Partie 1-2: Méthodes d'essai – Méthode 2: Détermination de la classe de protection contre l'arc de matériaux et de vêtements au moyen d'un arc dirigé et contraint (enceinte d'essai)*

ISO 3146, *Plastiques – Détermination du comportement à la fusion (température de fusion ou plage de températures de fusion) des polymères semi-cristallins par méthodes du tube capillaire et du microscope polarisant*

ISO 3758, *Textiles – Code d'étiquetage d'entretien au moyen de symboles*

ISO 5077, *Textiles – Détermination des variations dimensionnelles au lavage et au séchage domestiques*

ISO 13688:2013, *Vêtements de protection – Exigences générales*

ISO 13934-1, *Textiles – Propriétés des étoffes en traction – Partie 1: Détermination de la force maximale et de l'allongement à la force maximale par la méthode sur bande*

ISO 13937-2, *Textiles – Propriétés de déchirement des étoffes – Partie 2: Détermination de la force de déchirure des éprouvettes pantalons (Méthode de la déchirure unique)*

ISO 13938-1, *Textiles – Propriétés de résistance à l'éclatement des étoffes – Partie 1: Méthode hydraulique pour la détermination de la résistance et de la déformation à l'éclatement*

ISO 13938-2, *Textiles – Propriétés de résistance à l'éclatement des étoffes – Partie 2: Méthode pneumatique pour la détermination de la résistance et de la déformation à l'éclatement*

ISO 15025, *Vêtements de protection – Protection contre les flammes – Méthode pour la propagation de flamme limitée*

ISO 17493:2016, *Vêtements et équipement de protection contre la chaleur – Méthode d'essai de la résistance à la chaleur de convection au moyen d'un four à circulation d'air chaud*

ISO 30023, *Textiles – Symboles de qualification pour l'étiquetage des vêtements de travail destinés à être lavés de manière industrielle*

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[1] En cours d'élaboration. Stade au moment de la publication: IEC CDV 61482-1-1:2017.