

STN

**Práce pod napäťím. Ochranné odevy na ochranu
pred tepelným ohrozením elektrickým oblúkom.
Časť 1-2: Skúšobné metódy. Metóda 2: Určenie
ochrannej triedy materiálu a odevu použitím
riadeného a usmerneného oblúka (box-test).**

**STN
EN 61482-1-2**

35 9714

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)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 05/15

Obsahuje: EN 61482-1-2:2014, IEC 61482-1-2:2014

Oznámením tejto normy sa od 13.11.2017 ruší
STN EN 61482-1-2 (35 9714) zo septembra 2007

120761

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61482-1-2

December 2014

ICS 13.220.40; 29.260; 29.260.99

Supersedes EN 61482-1-2:2007

English Version

**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)
(IEC 61482-1-2:2014)**

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)
(CEI 61482-1-2:2014)

Arbeiten unter Spannung - Schutzkleidung gegen die thermischen Gefahren eines elektrischen Lichtbogens - Teil 1-2: Prüfverfahren - Verfahren 2: Bestimmung der Lichtbogen-Schutzklasse des Materials und der Kleidung unter Verwendung eines gerichteten Prüflichtbogens (Box-Test)
(IEC 61482-1-2:2014)

This European Standard was approved by CENELEC on 2014-11-13. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

The text of document 78/1053/FDIS, future edition 2 of IEC 61482-1-2, prepared by IEC/TC 78 "Live working" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61482-1-2:2014.

The following dates are fixed:

- latest date by which the document has to be implemented at (dop) 2015-08-13 national level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-11-13

This document supersedes EN 61482-1-2:2007.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61482-1-2:2014 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61482-1-1	NOTE	Harmonized as EN 61482-1-1.
ISO 3175-2	NOTE	Harmonized as EN ISO 3175-2.
ISO 6330	NOTE	Harmonized as EN ISO 6330.
ISO 13688:2013	NOTE	Harmonized as EN ISO 13688:2013 (not modified).
ISO 15797	NOTE	Harmonized as EN ISO 15797.

Annex ZA
(normative)**Normative references to international publications
with their corresponding European publications**

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 9151	1995	Protective clothing against heat and flame - Determination of heat transmission on exposure to flame	-	-



INTERNATIONAL STANDARD

NORME INTERNATIONALE

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)

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)





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2014 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, 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 either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 14 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

More than 55 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 14 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

Plus de 55 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.



INTERNATIONAL STANDARD

NORME INTERNATIONALE

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)

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)

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX



ICS 13.220.40, 29.260, 29.260.99

ISBN 978-2-8322-1881-5

Warning! Make sure that you obtained this publication from an authorized distributor. Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

CONTENTS

FOREWORD	4
1 Scope	6
2 Normative references	6
3 Terms, definitions and symbols.....	6
3.1 Terms and definitions.....	6
3.2 Symbols and units used in this document.....	11
4 Principle of the test method	11
4.1 Material box test procedure.....	11
4.2 Garment box test procedure.....	11
5 Significance and use of the test method	12
6 Test apparatus	12
6.1 Test apparatus and test box.....	12
6.2 Material box test procedure.....	15
6.2.1 Arrangement of the material box test procedure.....	15
6.2.2 Test plate (panel) construction.....	16
6.2.3 Sensor construction.....	17
6.2.4 Sensor response	17
6.3 Garment box test procedure.....	17
6.3.1 Arrangement of the garment box test procedure	17
6.3.2 Mannequin construction.....	17
6.4 Electric supply and electrodes	18
6.4.1 Test circuit.....	18
6.4.2 Test circuit control	18
6.4.3 Electrodes	18
6.4.4 Fuse wire.....	18
6.5 Electric test arc characteristics	19
6.6 Measurement and data acquisition system	19
7 Operator safety.....	19
8 Specimen preparation.....	20
8.1 Description of the test specimens	20
8.1.1 Test specimens for material box test procedure	20
8.1.2 Test specimens for garment box test procedure	20
8.2 Pre-treatment by cleaning	20
8.3 Pre-conditioning of the test specimens.....	20
9 Calibration	20
9.1 Data acquisition system pre-calibration	20
9.2 Calorimeter calibration check	20
9.3 Arc exposure calibration	21
9.4 Calibration of the electric test circuit and testing	21
9.5 Confirmation of test apparatus setting	22
9.6 Preparing and conditioning of the box	22
10 Apparatus care and maintenance	22
10.1 Surface reconditioning of the sensors	22
10.2 Care of test plate and mannequin	23
10.3 Care of electrodes	23

11 Test procedures	23
11.1 Test parameters.....	23
11.2 Number of tests	23
11.3 Test conditions and initial temperature.....	24
11.4 Specimen mounting	24
11.4.1 Material box test procedure	24
11.4.2 Garment box test procedure	24
11.5 Specimen description.....	24
12 Interpretation of results.....	25
12.1 Heat transfer.....	25
12.1.1 Determining time zero.....	25
12.1.2 Plotting sensor response	25
12.1.3 Incident energy E_i	25
12.1.4 Sensor response versus Stoll curve	25
12.2 Visual inspection.....	25
12.3 Test result.....	26
12.3.1 Acceptance criteria of material box test procedure.....	26
12.3.2 Acceptance criteria of garment box test procedure	26
13 Test report.....	27
Annex A (informative) Precision of the test method	28
Bibliography.....	29
 Figure 1 – Test box.....	14
Figure 2 – Test set-up.....	15
Figure 3 – Test plate with sensors (calorimeters in mounting boards)	16
 Table 1 – Test validity check range of direct exposure incident energy (permissible direct exposure incident energy range)	21
Table 2 – Test validity check range of arc energy (permissible arc energy range)	22
Table 3 – Test parameters for Classes 1 and 2	23
Table 4 – Acceptance criteria for tests on materials	26
Table 5 – Acceptance criteria for tests on garments	26
Table A.1 – Repeatability and reproducibility values of test procedure	28

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**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)****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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees 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.
- 8) 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.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61482-1-2 has been prepared by IEC technical committee 78: Live working.

This second edition cancels and replaces the first edition, published in 2007. This edition constitutes a technical revision.

It includes the following significant technical changes with regard to the previous edition:

- new mean values of main control parameters *arc energy* and *incident energy* based on an extended statistical database consisting of parameter values measured in four laboratories;
- reduction of validity check ranges of main control parameters;

- determination of the *incident energy* by averaging the two *sensor* values of a test (instead of considering each single *sensor* value);
- determination of the heat curves of transmitted *incident energy* and an amendment to the *heat flux* acceptance criterion;
- information on precision (repeatability and reproducibility) of the test method;
- clarification of the scope;
- selection of the *arc protection classes* (test classes) by the amount of the *arc energy* and *incident energy* instead of the short-circuit current;
- permitting electrode design without bores;
- recommendations of the heat resistance *materials* to be used for the box and for the test plate;
- clarification of the conditions for cleaning and replacing the box;
- requirement for including in the test report the differences ΔE_i of the *transmitted energy* values to the Stoll limit value at t_{max} and the information if the heat curves of transmitted *incident energy* exceed the *Stoll curve* during the *exposure time*;
- preconditioning of the samples according to manufacturer's instruction.

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

FDIS	Report on voting
78/1053/FDIS	78/1089/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.

In this standard terms defined in Clause 3 appear in *italics*.

A list of all parts in 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 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.

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)

1 Scope

This part of IEC 61482 specifies procedures to test *material* and *garments* intended for use in heat and flame-resistant *clothing* for workers if there is an electric arc hazard. A directed and constrained *electric arc* in a test circuit is used to classify *material* and *clothing* in two defined *arc protection classes*.

This International Standard is not dedicated toward measuring the arc rating values (ATPV¹, ELIM² or EBT³). Procedures determining these arc rating values are prescribed in IEC 61482-1-1, using an open arc for testing.

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 standard.

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9151:1995, *Protective clothing against heat and flame – Determination of heat transmission on exposure to flame*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN