

Insulating foam-filled tubes and solid rods for live working

Insulating foam-filled tubes and solid rods for live working

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 60855:2006 sisaldab Euroopa standardi EN 60855:1996 ingliskeelset teksti. Käesolev dokument on jõustatud 14.02.2006 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN 60855:2006 consists of the English text of the European standard EN 60855:1996. This document is endorsed on 14.02.2006 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.
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Käsitlusala: Applies to insulating foam-filled tubes and solid rods made of synthetic materials and intended for tools and equipment for live work on systems operating at voltages above 1 kV.	Scope: Applies to insulating foam-filled tubes and solid rods made of synthetic materials and intended for tools and equipment for live work on systems operating at voltages above 1 kV.
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ICS 13.340.20

Võtmesõnad:

Descriptors: Live working, insulating foam-filled tube, insulating solid rod, making, characteristic, test

English version

Insulating foam-filled tubes and solid rods for live working
(IEC 855:1985, modified)

Tubes isolants remplis de mousse et
tiges isolantes pleines pour travaux sous
tension
(CEI 855:1985, modifiée)

Isolierende schaumgefüllte Rohre und
massive Stäbe zum Arbeiten an unter
Spannung stehenden Teilen
(IEC 855:1985, modifiziert)

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 855:1985, prepared by IEC TC 78, Tools for live working, was approved by CENELEC as HD 496 S1 on 1987-12-02.

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 60855 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 496 S1 S1:1988 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 D and annex ZA and ZC are normative, annex ZB is informative.

Annexes ZA, ZB and ZC have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 855:1985 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS

CONTENTS

Replace "16 Acceptance" by "16 Acceptance tests"

Replace "appendix" by "annex" and add "(normative)" for the four annexes.

Add:

17 Quality assurance plan

Annex ZA (normative) - Sampling procedure

Annex ZB (informative) - Acceptance tests

Annex ZC (normative) - Normative references to international publications with their corresponding European publications

SECTION THREE - TYPE TESTS

5 General

Add in the second paragraph "(according to clause 6)" after "dimensional check".

7 Dye penetration test

Delete "(about 50 Torr)".

8 Dielectrical tests

8.1.3 Replace the second paragraph by:

"At the end of this period, the test pieces shall remain in an atmosphere of 93 % relative humidity until the moment of the dielectric test. Then they are to be tested upon return to the ambient temperature of the areas, without intentional prolongation, and after the test pieces have been lightly wiped with a dry cloth, the current I_2 and phase angle Φ_2 are measured under the same conditions as I_1 and Φ_1 ."

8.2.3 Add "(5 °C)" at the end of the last dash.

9 Mechanical tests

9.2 Replace in the fourth paragraph "1 %" by "10 %".

SECTION FOUR - ROUTINE TEST AND SAMPLING TESTS

12 Sampling tests

Add "(see annex ZA)" at the end of the clause.

SECTION FIVE - SPECIAL CLAUSES

16 Acceptance

Replace the text of the clause by:

16 Acceptance tests

If the customer requests from the manufacturer additional requirements and tests, the manufacturer shall keep all additional test results for inspection by the customer (see annex ZB).

Add the following new clause 17:

17 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 this standard shall be carried out (see annex ZA).

Annexes

Replace the title "Appendix A" by:

Annex A
(normative)

Add in figure A1, "Measuring equipment impedance" to " $\leq 10\,000\,\Omega$ ".

Replace the headings of the appendices by:

Annex B
(normative)

Annex C
(normative)

Annex D
(normative)

Add the following new annexes:

Annex ZA
(normative)

Sampling procedure

ZA.1 General

The sampling procedure does not follow in its entirety the sampling procedure developed in IEC 410:1973. The products covered by this standard do not lend themselves to the application of the above mentioned standard, due to their nature.

ZA.2 Classification of defects

Defects are classified as major or minor (see definition in IEC 410).

The defects are classified according to table ZA.1.

Table ZA.1 - Classification of defects

Name of test	Subclause	Major	Minor
Dimensional test	6.2	X	
Bending test	9.1	X	
Torsion test	9.2	X	
Crushing test	9.3	X	
Dielectric on material	8.1	X	
Dielectric wet test	8.2	X	

ZA.3 General sampling plan

ZA.3.1 Plans for major defects

Table ZA.2 - Major defects

Batch or lot size	Sample size	Acceptance number	Rejection number
2 to 90 (300 to 13 500 m)	5	1	2
91 to 500 (13 500 to 75 000 m)	8	2	3
NOTE 1: For a given batch, the sampling elementary unit is defined as equal to 150 m of tube with a well-defined type, diameter and category. NOTE 2: The tests are to be carried on parts of tubes taken at random among the batch.			

Annex ZB
(informative)

Acceptance tests

As defined in IEC 151-04-20, an acceptance test is a contractual test to prove to the customer that the device meets certain conditions of its specification. These tests may be carried out on every unit (routine tests) or on a sampling of the units (sampling tests).

If a customer indicates in this specification that the device must meet this standard only, the acceptance tests are those (both routine and sampling) which are specified in this document.

The customer may wish to witness the tests, have someone witness them, or simply accept the results of the tests as carried out by the manufacturer. He may also specify that the tests be carried out in an independent laboratory of his choosing or even in his own laboratory.

Further, the customer may specify additional tests or larger sampling sizes, when he is purchasing from a new manufacturer, because he has experienced problems with a particular manufacturer, or he is purchasing a new product or a new design.

Annex ZC (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 60-1	1973 ¹⁾	High-voltage test techniques Part 1: General definitions and test requirements	-	-
IEC 212	1971	Standard conditions for use prior to and during the testing of solid electrical insulating materials	HD 437 S1	1984
IEC 743	1983	Terminology for tools and equipment to be used in live working	EN 60743 ²⁾	1996

1) IEC 60-1:1989 is harmonized as HD 588 S1:1991.

2) EN 60743 includes A1:1995 to IEC 743.

**NORME
INTERNATIONALE
INTERNATIONAL
STANDARD**

**CEI
IEC**

60855

Première édition
First edition
1985-01

**Tubes isolants remplis de mousse et tiges
isolantes pleines pour travaux sous tension**

**Insulating foam-filled tubes and solid rods
for live working**



Numéro de référence
Reference number
CEI/IEC 60855: 1985

Numéros des publications

Depuis le 1^{er} janvier 1997, les publications de la CEI sont numérotées à partir de 60000.

Publications consolidées

Les versions consolidées de certaines publications de la CEI incorporant les amendements sont disponibles. Par exemple, les numéros d'édition 1.0, 1.1 et 1.2 indiquent respectivement la publication de base, la publication de base incorporant l'amendement 1, et la publication de base incorporant les amendements 1 et 2.

Validité de la présente publication

Le contenu technique des publications de la CEI est constamment revu par la CEI afin qu'il reflète l'état actuel de la technique.

Des renseignements relatifs à la date de reconfirmation de la publication sont disponibles dans le Catalogue de la CEI.

Les renseignements relatifs à des questions à l'étude et des travaux en cours entrepris par le comité technique qui a établi cette publication, ainsi que la liste des publications établies, se trouvent dans les documents ci-dessous:

- «Site web» de la CEI*
- **Catalogue des publications de la CEI**
Publié annuellement et mis à jour régulièrement (Catalogue en ligne)*
- **Bulletin de la CEI**
Disponible à la fois au «site web» de la CEI* et comme périodique imprimé

Terminologie, symboles graphiques et littéraux

En ce qui concerne la terminologie générale, le lecteur se reportera à la CEI 60050: *Vocabulaire Electrotechnique International* (VEI).

Pour les symboles graphiques, les symboles littéraux et les signes d'usage général approuvés par la CEI, le lecteur consultera la CEI 60027: *Symboles littéraux à utiliser en électrotechnique*, la CEI 60417: *Symboles graphiques utilisables sur le matériel. Index, relevé et compilation des feuilles individuelles*, et la CEI 60617: *Symboles graphiques pour schémas*.

* Voir adresse «site web» sur la page de titre.

Numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series.

Consolidated publications

Consolidated versions of some IEC publications including amendments are available. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Validity of this publication

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology.

Information relating to the date of the reconfirmation of the publication is available in the IEC catalogue.

Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is to be found at the following IEC sources:

- **IEC web site***
- **Catalogue of IEC publications**
Published yearly with regular updates (On-line catalogue)*
- **IEC Bulletin**
Available both at the IEC web site* and as a printed periodical

Terminology, graphical and letter symbols

For general terminology, readers are referred to IEC 60050: *International Electrotechnical Vocabulary* (IEV).

For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to publications IEC 60027: *Letter symbols to be used in electrical technology*, IEC 60417: *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets* and IEC 60617: *Graphical symbols for diagrams*.

* See web site address on title page.

**NORME
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**Tubes isolants remplis de mousse et tiges
isolantes pleines pour travaux sous tension**

**Insulating foam-filled tubes and solid rods
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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE

R

*Pour prix, voir catalogue en vigueur
For price, see current catalogue*

**Tubes isolants remplis de mousse
et tiges isolantes pleines pour
travaux sous tension**

**Insulating foam-filled tubes
and solid rods for live working**

CORRIGENDUM 1

Le comité technique 78 est toujours attentif à l'emploi en travaux sous tension de matériaux et de produits chimiques qui, tout en étant adéquats, assurent la santé et la sécurité au travail ainsi que la protection de l'environnement. En conséquence, un solvant adéquat a été identifié pour remplacer le trichloro-1,1,2 trifluoro-1,2,2 éthane (aussi connu sous les appellations trifluorotrichloroéthane, Fréon et Réfrigérant 113), utilisé au préalable.

Technical committee 78 continues to monitor the use of chemicals and materials in live working that are suitable and provide for safety, occupational health and environmental protection. As a result, a suitable solvent has been found to replace the previously used trichloro-1,1,2 trifluoro-1,2,2 ethane (also known as trifluorotrichloroethane, Freon and Refrigerant 113).

Page 12

Page 13

8.1.1 Conditions générales d'essai

8.1.1 General test conditions

Premier alinéa, deuxième ligne

First paragraph, first line

Au lieu de:

Instead of:

avec du trifluorotrichloroéthane
(CF₂ClCFCl₂)

with a trifluorotrichloroethane solution
(CF₂ClCFCl₂)

lire:

read:

avec de l'isopropanol (CH₃-CH(OH)-CH₃)

with isopropanol (CH₃-CH(OH)-CH₃).

Ajouter, à la fin de cet alinéa, la note suivante:

Add, at the end of this paragraph, the following note:

NOTE Il est du devoir d'un employeur de s'assurer que la législation applicable ainsi que les prescriptions de sécurité propres à l'usage de ce produit chimique sont respectées intégralement.

NOTE It is the duty of an employer to ensure that the relevant legislation and safety requirements for the use of this chemical are complied with in their entirety.

Page 16

Page 17

8.2.1 Conditions générales d'essai

8.2.1 General test conditions

Premier alinéa, deuxième ligne

First paragraph, second line

Au lieu de:

Instead of:

avec du trifluorotrichloroéthane
(CF₂ClCFCl₂)

with a trifluorotrichloroethane solution
(CF₂ClCFCl₂)

lire:

read:

avec de l'isopropanol (CH₃-CH(OH)-CH₃)

with isopropanol (CH₃-CH(OH)-CH₃)

SOMMAIRE

	Pages
PRÉAMBULE	4
PRÉFACE	4
INTRODUCTION	6
SECTION UN – GÉNÉRALITÉS	
Articles	
1. Domaine d'application	6
2. Définitions	6
SECTION DEUX – CARACTÉRISTIQUES TECHNIQUES	
3. Matériaux	8
3.1 Tubes isolants ou tiges isolantes	8
3.2 Remplissage du tube isolant avec de la mousse	8
4. Diamètres des tubes et des tiges	8
SECTION TROIS – ESSAIS DE TYPE	
5. Généralités	10
6. Contrôles visuel et dimensionnel	12
6.1 Contrôle visuel	12
6.2 Contrôle dimensionnel	12
7. Essai à la fuchsine	12
8. Essais diélectriques	12
8.1 Essais diélectriques avant et après conditionnement humide	12
8.2 Essai diélectrique sous pluie	16
9. Essais mécaniques	16
9.1 Essai de flexion	16
9.2 Essai de torsion	18
9.3 Essai d'écrasement du tube	20
10. Essais de vieillissement mécanique	20
10.1 Essai de flexion	20
10.2 Essais diélectriques	22
SECTION QUATRE – ESSAI DE SÉRIE ET ESSAIS SUR PRÉLÈVEMENT	
11. Essai individuel de série	22
12. Essais sur prélèvement	24
13. Essais complémentaires non précisés	24
SECTION CINQ – CLAUSES PARTICULIÈRES	
14. Marquage	24
15. Modification	24
16. Acceptation	24
ANNEXE A – Essais diélectriques avant et après conditionnement humide	26
ANNEXE B – Essai diélectrique sous pluie	32
ANNEXE C – Essais mécaniques	33
ANNEXE D – Essais individuels de série	36

CONTENTS

	Page
FOREWORD	5
PREFACE	5
INTRODUCTION	7
SECTION ONE – GENERAL	
Clause	
1. Scope	7
2. Definitions	7
SECTION TWO – TECHNICAL CHARACTERISTICS	
3. Materials	9
3.1 Insulating tubes or insulating rods	9
3.2 Interior of insulating foam-filled tube	9
4. Diameters of tubes and rods	9
SECTION THREE – TYPE TESTS	
5. General	11
6. Visual inspection and dimensional check	13
6.1 Visual inspection	13
6.2 Dimensional check	13
7. Dye penetration test	13
8. Dielectrical tests	13
8.1 Dielectrical tests before and after exposure to humidity	13
8.2 Dielectrical wet test	17
9. Mechanical tests	17
9.1 Bending test	17
9.2 Torsion test	19
9.3 Crushing test on tube	21
10. Mechanical ageing tests	21
10.1 Bending test	21
10.2 Dielectrical tests	23
SECTION FOUR – ROUTINE TEST AND SAMPLING TESTS	
11. Routine test	23
12. Sampling tests	25
13. Additional tests not indicated	25
SECTION FIVE – SPECIAL CLAUSES	
14. Marking	25
15. Modification	25
16. Acceptance	25
APPENDIX A – Dielectrical tests before and after exposure to humidity	26
APPENDIX B – Dielectrical wet test	32
APPENDIX C – Mechanical tests	33
APPENDIX D – Routine tests	36

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

TUBES ISOLANTS REMPLIS DE MOUSSE ET TIGES ISOLANTES PLEINES POUR TRAVAUX SOUS TENSION

PRÉAMBULE

- 1) Les décisions ou accords officiels de la CEI en ce qui concerne les questions techniques, préparés par des Comités d'Etudes où sont représentés tous les Comités nationaux s'intéressant à ces questions, expriment dans la plus grande mesure possible un accord international sur les sujets examinés.
- 2) Ces décisions constituent des recommandations internationales et sont agréées comme telles par les Comités nationaux.
- 3) Dans le but d'encourager l'unification internationale, la CEI exprime le vœu que tous les Comités nationaux adoptent dans leurs règles nationales le texte de la recommandation de la CEI, dans la mesure où les conditions nationales le permettent. Toute divergence entre la recommandation de la CEI et la règle nationale correspondante doit, dans la mesure du possible, être indiquée en termes clairs dans cette dernière.

PRÉFACE

La présente norme a été établie par le Comité d'Etudes n° 78 de la CEI: Outils pour travaux sous tension.

Le texte de cette norme est issu des documents suivants:

Règle des Six Mois	Rapport de vote
78 (BC) 10	78 (BC) 13

Pour de plus amples renseignements, consulter le rapport de vote mentionné dans le tableau ci-dessus.

Les publications suivantes de la CEI sont citées dans la présente norme:

Publications n°s 50 (151) (1978): Vocabulaire Electrotechnique International (VEI), Chapitre 151: Dispositifs électriques et magnétiques.

60: Techniques des essais à haute tension.

60-1 (1973): Première partie: Définitions et prescriptions générales relatives aux essais.

212 (1971): Conditions normales à observer avant et pendant les essais de matériaux isolants électriques solides.

743 (1983): Terminologie pour l'outillage et le matériel à utiliser dans les travaux sous tension.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INSULATING FOAM-FILLED TUBES AND SOLID RODS
FOR LIVE WORKING**

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.

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) 10	78 (CO) 13

Further information can be found in the Report on Voting 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.
60: High-voltage Test Techniques.
60-1 (1973): Part 1: General Definitions and Test Requirements.
212 (1971): Standard Conditions for Use Prior to and during the Testing of Solid Electrical Insulating Materials.
743 (1983): Terminology for Tools and Equipment to be Used in Live Working.

TUBES ISOLANTS REMPLIS DE MOUSSE ET TIGES ISOLANTES PLEINES POUR TRAVAUX SOUS TENSION

INTRODUCTION

La spécification des essais permettant de vérifier les caractéristiques électriques et mécaniques dépend en partie du mode de fabrication des tubes et des tiges. La présente norme s'applique aux tubes remplis de mousse et aux tiges pleines qui existent sur le marché, sans exclure la possibilité de développement futur de tubes protégés intérieurement d'une autre manière et de tubes ou de tiges pleines protégés extérieurement. Toute proposition de matériel de conception différente pourra faire l'objet d'une mise au point des essais, afin que ceux-ci puissent être adaptés à la fabrication proposée.

SECTION UN - GÉNÉRALITÉS

1. Domaine d'application

La présente norme est applicable aux tubes isolants remplis de mousse et aux tiges isolantes pleines fabriqués en matériaux synthétiques et destinés aux outils et matériels pour travaux sous tension utilisés sur des réseaux de tension nominale supérieure à 1 kV.

Des normes techniques particulières donnent le détail des essais correspondant aux embouts, aux outils adaptables et aux outils entiers.

2. Définitions

Les termes suivants sont définis conformément à la Publication 50(151) de la CEI: Vocabulaire Electrotechnique International (VEI), Chapitre 151: Dispositifs électriques et magnétiques.

2.1 Essai de type

Essai effectué sur un ou plusieurs dispositifs réalisés selon une conception donnée, pour vérifier que cette conception répond à certaines spécifications (VEI 151-04-15).

2.2 Essai individuel de série

Essai auquel est soumis chaque dispositif en cours ou en fin de fabrication pour vérifier qu'il satisfait à des critères définis (VEI 151-04-16).

2.3 Essai (de série) sur prélèvement

Essai effectué sur un certain nombre de dispositifs prélevés au hasard dans un lot (VEI 151-04-17).

2.4 Essai de réception - Essai d'acceptation

Essai contractuel ayant pour objet de prouver au client que le dispositif répond à certaines conditions de sa spécification (VEI 151-04-20).

2.5 Autres définitions

Pour les définitions des termes généraux utilisés dans la présente norme, se reporter au Vocabulaire Electrotechnique International (Publication 50 de la CEI) ou, pour des termes particuliers, aux définitions données dans la Publication 743 de la CEI: Terminologie pour l'outillage et le matériel à utiliser dans les travaux sous tension.

INSULATING FOAM-FILLED TUBES AND SOLID RODS FOR LIVE WORKING

INTRODUCTION

A specification of tests to verify the electrical and mechanical performance of insulating tubes and rods is dependent in part on their construction. This standard covers foam-filled tubes and solid rods such as those currently available without excluding possible future developments of tubes protected internally in other ways and tubes and solid rods protected externally. Any proposed equipment of different design may call for re-examination of the tests, so that they may be adapted to the construction proposed.

SECTION ONE – GENERAL

1. Scope

This standard is applicable to insulating foam-filled tubes and solid rods made of synthetic materials and intended for tools and equipment for live work on systems operating at voltages above 1 kV.

Separate special technical standards give details of tests for fittings and attachments to these poles and rods, adaptable tools and complete tools.

2. Definitions

The following terms are defined in accordance with IEC Publication 50(151): International Electrotechnical Vocabulary (IEV), Chapter 151: Electrical and Magnetic Devices.

2.1 *Type test*

A test of one or more devices made to a certain design to show that the design meets certain specifications (IEV 151-04-15).

2.2 *Routine test*

A test to which each individual device is subjected during or after manufacture to ascertain whether it complies with certain criteria (IEV 151-04-16).

2.3 *Sampling test*

A test on a number of devices taken at random from a batch (IEV 151-04-17).

2.4 *Acceptance test*

A contractual test to prove to the customer that the device meets certain conditions of its specification (IEV 151-04-20).

2.5 *Other definitions*

For the definitions of general terms used in this standard, reference should be made to the International Electrotechnical Vocabulary (IEC Publication 50) or to special definitions laid down in IEC Publication 743: Terminology for Tools and Equipment to be Used in Live Working.