# IEC 62836

Edition 1.0 2024-02

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside

## Measurement of internal electric field in insulating materials – Pressure wave propagation method

**Mesurage du champ électrique interne dans les matériaux isolants – Méthode de l'onde de pression**



IEC 62836:2024-02(en-fr)



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## Measurement of internal electric field in insulating materials – Pressure wave propagation method

## Mesurage du champ électrique interne dans les matériaux isolants – Méthode de l'onde de pression

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 17.220.99, 29.035.01

ISBN 978-2-8322-8338-7

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# CONTENTS

FOREWORD ..... 5
INTRODUCTION ..... 7
1 Scope ..... 8
2 Normative references ..... 8
3 Terms, definitions and abbreviated terms ..... 8
3.1 Terms and definitions ..... 8
3.2 Abbreviated terms ..... 8
4 Principle of the method ..... 9
5 Samples ..... 12
6 Electrode materials ..... 12
7 Pressure pulse wave generation ..... 12
8 Set-up of the measurement ..... 13
9 Calibrating the electric field ..... 14
10 Measurement procedure ..... 14
11 Data processing for experimental measurement ..... 15
12 Space charge distribution measurement ..... 16
13 Impact of coaxial geometry ..... 16
13.1 Measuring set-up of pressure wave propagation method for the coaxial geometry sample ..... 16
13.2 Physical model in coaxial geometry ..... 17
13.3 Measuring conditions ..... 18
13.4 Calibration of electric field for a coaxial sample ..... 19
13.4.1 Summary ..... 19
13.4.2 Linearity verification ..... 19
13.4.3 Validity verification of the ratio between two current peaks ..... 19
13.4.4 Method for retrieving internal electric field from the measured current signal ..... 20
Annex A (informative) Preconditional method of the original signal for the PWP method on a planar sample ..... 22
A.1 Simple integration limitation ..... 22
A.2 Analysis of the resiliency effect and correction procedure ..... 23
A.3 Example of the correction procedure on a PE sample ..... 24
A.4 Estimation of the correction coefficients ..... 25
A.5 MATLAB® code ..... 27
Annex B (informative) Linearity verification of the measuring system ..... 29
B.1 Linearity verification ..... 29
B.2 Sample conditions ..... 29
B.3 Linearity verification procedure ..... 29
B.4 Example of linearity verification ..... 29
Annex C (informative) Measurement examples for planar plaque samples ..... 32
C.1 Samples ..... 32
C.2 Pressure pulse generation ..... 32
C.3 Calibration of sample and signal ..... 32
C.4 Testing sample and experimental results ..... 33
C.4.1 Measurement results ..... 33

C.4.2 Internal electric field distribution in the testing sample ..... 34
C.4.3 Distribution of space charge density in the testing sample ..... 36
Annex D (informative) Measurement examples for coaxial geometry samples ..... 38
D.1 Example of linearity verification of coaxial geometry ..... 38
D.1.1 Sample conditions ..... 38
D.1.2 Linearity verification procedure ..... 38
D.1.3 Example of linearity verification ..... 38
D.2 Verification of the current peak area ratio between the outer and inner electrodes ..... 39
D.2.1 Verification principle ..... 39
D.2.2 Example of verification of the current peak area ratio ..... 40
D.3 Testing sample and experimental results ..... 40
D.3.1 Raw results of measurements ..... 40
D.3.2 Electric field distribution in the coaxial sample ..... 42
D.3.3 Space charge distribution in the coaxial sample ..... 44
Bibliography ..... 46

Figure 1 – Principle of the PWP method ..... 11
Figure 2 – Measurement set-up for the PWP method ..... 13
Figure 3 – Sample of circuit to protect the amplifier from damage by a small discharge on the sample ..... 13
Figure 4 – Diagram of the pressure wave propagation method set-up for a coaxial sample ..... 17
Figure 5 – Diagram of wave propagation of PWP for a coaxial geometry sample ..... 17
Figure 6 – Diagram of the propagation of pressure wave on the section of a cylinder ..... 19
Figure 7 – Flowchart for the computation of the electric field in a coaxial sample from PWP measured currents ..... 21
Figure A.1 – Comparison between practical and ideal pressure pulses ..... 22
Figure A.2 – Original signal of the sample free of charge under moderate voltage ..... 23
Figure A.3 – Comparison between original and corrected reference signals with a sample free of charge under moderate voltage ..... 24
Figure A.4 – Electric field in a sample under voltage with space charge calculated from original and corrected signals ..... 25
Figure A.5 – Geometrical characteristics of the reference signal for the correction coefficient estimation ..... 26
Figure A.6 – Reference signal corrected with coefficients graphically obtained and adjusted ..... 26
Figure A.7 – Electric field in a sample under voltage with space charge calculated with graphically obtained coefficient and adjusted coefficient ..... 27
Figure B.1 – Voltage signals obtained from the oscilloscope by the amplifier with different amplifications ..... 30
Figure B.2 – Current signals induced by the sample, considering the input impedance and the amplification of the amplifier ..... 30
Figure B.3 – Relationship between the measured current peak of the first electrode and applied voltage ..... 31
Figure C.1 – Measured current signal under −5,8 kV ..... 32
Figure C.2 – First measured current signal (< 1 min) ..... 33
Figure C.3 – Measured current signal after 1,5 h under −46,4 kV ..... 33

Figure C.4 – Measured current signal without applied voltage after 1,5 h under −46,4 kV ..... 34
Figure C.5 – Internal electric field distribution under −5,8 kV ..... 34
Figure C.6 – Internal electric field distribution under −46,4 kV, at the initial state ..... 35
Figure C.7 – Internal electric field distribution after 1,5 h under −46,4 kV ..... 35
Figure C.8 – Internal electric field distribution without applied voltage after 1,5 h under −46,4 kV ..... 36
Figure C.9 – Space charge distribution after 1,5 h under –46,4 kV ..... 37
Figure C.10 – Space charge distribution without applied voltage after 1,5 h under −46,4 kV ..... 37
Figure D.1 – Measured currents from the LDPE coaxial sample under different applied voltages in a few minutes ..... 39
Figure D.2 – Relationships between the peak amplitude of the measured current at outer and inner electrodes and applied voltage ..... 39
Figure D.3 – First measured current signal (< 1 min) for the coaxial sample ..... 40
Figure D.4 – Measured current signals for the coaxial sample at beginning and after 2 h under −90,0 kV ..... 41
Figure D.5 – Measured current signals for the coaxial sample after 2 h under −90,0 kV, and without applied voltage after 2 h under high voltage ..... 41
Figure D.6 – Internal electric field distribution under –22,5 kV for the coaxial sample ..... 42
Figure D.7 – Internal electric field distribution under –90,0 kV for the coaxial sample, at the initial state ..... 43
Figure D.8 – Internal electric field distribution after 2 h under –90,0 kV ..... 43
Figure D.9 – Internal electric field distribution without applied voltage after 2 h under −90,0 kV ..... 44
Figure D.10 – Space charge distribution with and without applied voltage after 2 h under −90,0 kV ..... 45

Table A.1 – Variants of symbols used in the text ..... 27
Table D.2 – Analysis of ratio between theoretical and measured peak area for measured current signal ..... 40

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# MEASUREMENT OF INTERNAL ELECTRIC FIELD IN INSULATING MATERIALS – PRESSURE WAVE PROPAGATION METHOD

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IEC 62836 has been prepared by IEC technical committee 112: Evaluation and qualification of electrical insulating materials and systems. It is an International Standard.

This first edition cancels and replaces IEC TS 62836 published in 2020.

This edition includes the following significant technical changes with respect to IEC TS 62836:

a) addition of Clause 12 for the measurement of space charge distribution in a planar sample;
b) addition of Clause 13 for coaxial geometry samples;
c) addition of Annex D with measurement examples for coaxial geometry samples;
d) addition of a Bibliography;
e) measurement examples for a planar sample have been moved from Clause 12 in IEC TS 62836 to Annex C.

The text of this International Standard is based on the following documents:

| Draft | Report on voting |
|---|---|
| 112/627/FDIS | 112/632/RVD |

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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- withdrawn, or
- revised.

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# INTRODUCTION

High-voltage insulating structures, especially high-voltage DC cables and capacitors etc., are subjected to charge accumulation and this can lead to electrical breakdown if the electric field produced by the charges exceeds the electrical breakdown threshold. With the trend to multiply power plants, especially green power plants such as wind or solar generators, more cables will be used for connecting these power plants to the grid and share the electric energy between countries. Therefore, a standardized procedure for testing how the internal electric field can be characterized has become essential for the materials used for the cables, and even the structure of these cables when considering electrodes or the junction between cables. The measurement of the internal electric field provides a tool for comparing materials and helps to establish thresholds on the internal electric field for high-voltage applications in order to avoid risks of breakdown as much as possible. The pressure wave propagation (PWP) method has been used by many researchers to measure the space charge distribution and the internal electric field distribution in insulators. However, since experimental equipment, with slight differences, is developed independently by researchers throughout the world, it is difficult to compare the measurement results between the different equipment.

The procedure outlined in this document provides a reliable point of comparison between different test results carried out by different laboratories in order to avoid interpretation errors. The method is suitable for a planar plaque sample as well as for a coaxial sample, with homogeneous insulating materials of thickness from 0,5 mm to 5 mm.

# MEASUREMENT OF INTERNAL ELECTRIC FIELD IN INSULATING MATERIALS – PRESSURE WAVE PROPAGATION METHOD

## 1 Scope

This document provides an efficient and reliable procedure to test the internal electric field in the insulating materials used for high-voltage applications, by using the pressure wave propagation (PWP) method. It is suitable for a planar and coaxial geometry sample with homogeneous insulating materials of thickness larger or equal to 0,5 mm and an electric field higher than 1 kV/mm, but it is also dependent on the thickness of the sample and the pressure wave generator.

## 2 Normative references

There are no normative references in this document.

## 3 Terms, definitions and abbreviated terms

### 3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

**3.1.1**
**pressure wave propagation**
procedure where a pressure wave is propagated in a material containing electric charges and the induced electric signal from electrodes is measured.

**3.1.2**
**interface charge**
net layer of charges between two different materials, either two different insulators or a conductor and an insulator

**3.1.3**
**space charge**
net charge inside an insulating dielectric material

### 3.2 Abbreviated terms

| | |
|---|---|
| CB | carbon black |
| EVA | ethylene vinyl acetate |
| LDPE | low density polyethylene |
| LIPP | laser induced pressure pulse |
| PE | polyethylene |
| PIPP | piezoelectric induced pressure pulse |
| PMMA | poly methyl methacrylate |
| PWP | pressure wave propagation |
| S/N | signal to noise ratio |