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BSI Standards Publication

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

# National foreword

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The UK participation in its preparation was entrusted to Technical Committee GEL/112, Evaluation and qualification of electrical insulating materials and systems.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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# TECHNICAL SPECIFICATION

colour inside

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



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

## FOREWORD

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IEC TS 62836 has been prepared by IEC technical committee 112: Evaluation and qualification of electrical insulating materials and systems. It is a Technical Specification

The text of this Technical Specification is based on the following documents:

| Draft | Report on voting |
|---|---|
| 112/472/DTS | 112/499/RVDTS |

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 Technical Specification 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/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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# INTRODUCTION

High voltage insulating cables, especially high voltage DC cables, are subject to charge accumulation and this may 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, the materials for the cables, and even the structure of these cables, when considering electrodes or the junction between cables, need a standardized procedure for testing how the internal electric field can be characterized. The measurement of the internal electric field would give a tool for comparing materials and help to establish thresholds on the internal electric field for high voltage applications in order to limit breakdown risks 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 Technical Specification provides a reliable point of comparison between different test results carried out by different laboratories in order to avoid interpretation errors. The IEC has established a project team to develop a procedure for the measurement of PWP.

# 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, using the pressure wave propagation (PWP) method. It is suitable for a sample with homogeneous insulating materials 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

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

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

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

### 3.1 Terms and definitions

**3.1.1**
**pressure wave propagation**
PWP
pressure wave that is propagated in a material containing electric charges and measurement of the induced electric signal from electrodes

### 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 |