

ICS 17.220.99, 29.035.01
CCS K 15



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 47965-2026

**Measurement of internal electric field in insulating materials -
Pressure wave propagation method**

绝缘材料中内部电场的测量 压力波传播法

(English Translation)

Issued on: July 30, 2026

Implemented on: February 1, 2027

Issued by: State Administration for Market Regulation

Table of Contents

Preface	
Introduction	
1 Scope	
2 Normative References	
3 Terms, Definitions, and Abbreviations	
4 Method Principles	
5 Samples	
6 Electrode materials	
8 Measuring device	
9 Electric field verification	
10 Measurement Steps	
11 Measurement Data Processing	
12 Measurement of space charge distribution	
13 Coaxial Structure Specimens	
Appendix A (Informative) Raw Signal Preprocessing Method for PWP Method of Plate Specimens	
Appendix B (Informative) Linearity Verification of the Measurement System	
Appendix C (Informative) Measurement Examples of Flat Plate Specimens	
Appendix D (Informative) Measurement Examples of Coaxial Structure Specimens	
References	

1 Scope 1

2 Normative References	1
3 Terms, Definitions, and Abbreviations	1
4 Method Principles	2

5 Samples

6 Electrode materials	5
8 Measuring device	5
9 Electric field verification	6

10 Measurement Steps 6

11 Measurement Data Processing 7

12 Measurement of space charge distribution 8

13 Coaxial Structure Specimens 8

Appendix A (Informative) Raw Signal Preprocessing Method for PWP Method of Plate Specimens 13

Appendix B (Informative) Linearity Verification of the Measurement System 18

Appendix C (Informative) Measurement Examples of Flat Plate Specimens 20

Appendix D (Informative) Measurement Examples of Coaxial Structure Specimens 25

References 32

Figure 1.Principle of pressure wave propagation method 3

Figure 2.Schematic diagram of the actual measuring device for the pressure wave propagation method.

Figure 3.Schematic diagram of the protection circuit.

Figure 4.Schematic diagram of the pressure wave propagation method measurement device for coaxial structure specimens. 9

Figure 5.Schematic diagram of pressure wave propagation in a coaxial structure specimen.

Figure 6.Schematic diagram of pressure wave propagation in a cylindrical cross-section.

Figure 7.Flowchart for calculating the internal electric field distribution of a coaxial structure specimen by measuring current using the PWP method.

Figure A.1 Comparison of actual pressure wave pulse waveform and ideal pulse waveform 13

Figure A.3 Comparison between the original reference signal and the corrected reference signal when the sample is under moderate voltage and without charge.14

Figure A.4 Electric field distribution of the space charge sample calculated from the original signal and the correction signal.15

Figure A.5 Geometric features of the reference signal used for coefficient estimation 15

Figure A.6 Comparison of direct integration results of the reference signal before and after correction 16

Figure A.7 Comparison of the internal electric field distribution of a space-charged sample under an applied voltage using reference signals before and after correction.16

Figure B.1 shows the measured voltage signals acquired by the oscilloscope under different applied voltages and amplification ratios after amplification.

Figure B.2 shows the current signal generated in the sample considering the input impedance and amplifier amplification factor.

Figure B.3 Relationship between the peak measured current at the first electrode and the applied voltage.¹⁹

Figure C.1 Measurement current signal at -5.8kV voltage 20

Figure C.2 Initial measured current signal (Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document adopts IEC 62836:2024 "Measurement of internal electric fields in insulating materials - pressure wave propagation method".

The following minimal editorial changes have been made to this document.

---An errata has been made, changing the R^2 value in Figure D.2 from 0.997 to 0.9972 and 0.9965 respectively;

---An errata has been made, and Table D.2 in Appendix D has been changed to Table D.1.

This document was proposed by the China Electrical Equipment Industry Association.

This document is under the jurisdiction of the National Technical Committee on Standardization of Electrical Insulation Materials and Insulation Systems (SAC/TC301).

Introduction

In high-voltage insulation systems, especially in equipment such as high-voltage DC cables and capacitors, charge accumulation is prone to occur. If this charge accumulation generates...

If the electric field exceeds the electrical breakdown threshold, electrical breakdown will occur. With the increasing number of power plants, especially green power generation such as wind or solar power...

The increase in the number of power stations will require more cables to connect these stations to the power grid and share electricity among countries. Therefore, when considering electrodes...

When connecting cables, standardized test procedures are needed to characterize the internal electric field, taking into account the materials used in the cables and even their structure.

Both are crucial. Furthermore, comparing the internal electric fields of materials provides a method for comparing material properties, which helps in establishing [the framework for high-voltage applications].

The internal electric field threshold is determined to minimize the risk of breakdown. Many researchers have used the pressure wave propagation (PWP) method to measure the internal electric field threshold of insulating materials.

Therefore, it is difficult to compare measurement results between different devices.

The test procedures described in this document provide a reliable point of comparison for different test results performed in different laboratories, thus avoiding the interpretation of discrepancies.

Misunderstanding.

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

1 Scope

This document describes the principle of pressure wave propagation (PWP) method for testing the internal electric field distribution and spatial electric field in insulating materials under applied voltage.

Methods for load distribution.

This document applies to insulating material specimens with uniform flat or coaxial structures, and whose insulation thickness is not less than 0.5 mm. The external...

The applied electric field strength is greater than 1kV/mm, but it is also related to the specific sample thickness and pressure wave source.

2 Normative references this document has no normative references.

3.Terms, Definitions and Abbreviations

3.1 Terms and Definitions the following terms and definitions apply to this document.

The URLs for the terminology databases maintained by ISO and IEC for standardization are as follows.

3.1.1

The phenomenon of pressure waves propagating inside an insulating material containing a charge and inducing a measurable electrical signal on its electrodes.

interface charge

The net charge at the interface between two different materials, or two different insulators, or between a conductor and an insulator.