Piezoelectric properties of ceramic materials and components - Part 2: Methods of measurement - Low power

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 50324-2:2003 sisaldab Euroopa standardi EN 50324-2:2002 ingliskeelset teksti. Käesolev dokument on jõustatud 15.01.2003 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN 50324-2:2003 consists of the English text of the European standard EN 50324-2:2002. This document is endorsed on 15.01.2003 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: The methods of measurement described in this European Standard are for use with piezoelectric components produced from the ceramic materials described in EN 50324-1 Terms and definitions . Methods of measurement for specific dielectric, piezoelectric and elastic coefficients are generally applicable to piezoelectric ceramics.	**Scope:** The methods of measurement described in this European Standard are for use with piezoelectric components produced from the ceramic materials described in EN 50324-1 Terms and definitions . Methods of measurement for specific dielectric, piezoelectric and elastic coefficients are generally applicable to piezoelectric ceramics.

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Võtmesõnad: consistency, consistency (mechanica, dimensions, electrical engineering, electrical prope, electrical properties and phenomena, electronic equ, electronic equipment and components, materials, measuring techniques, piezoelectric devices, properties, small-signals

EUROPEAN STANDARD **EN 50324-2**

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English version

Piezoelectric properties of ceramic materials and components Part 2: Methods of measurement - Low power

Propriétés piézoélectriques des matériaux et composants en céramique
Partie 2: Méthodes de mesure - Faible puissance

Piezoelektrische Eigenschaften von keramischen Werkstoffen und Komponenten
Teil 2: Meßverfahren - Kleinsignal

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

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Foreword

This European Standard was prepared by the CENELEC BTTF 63-2, Advanced technical ceramics.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50324-2 on 2001-12-01.

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)	2002-12-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2004-12-01

This part 2 is to be used in conjunction with EN 50324-1.

Contents

1 Scope

The methods of measurement described in this European Standard are for use with piezoelectric components produced from the ceramic materials described in EN 50324-1 “Terms and definitions”. Methods of measurement for specific dielectric, piezoelectric and elastic coefficients are generally applicable to piezoelectric ceramics.

The polycrystalline nature of ceramics, statistical fluctuations in composition and the influence of the manufacturing process, result in specified material coefficients being typical mean values. These values are provided for design information only.

Piezoelectric transducers can have widely differing shapes and may be employed in a range of vibrational modes. Material parameters however, are measured on simple test-pieces (discs, rods etc. see EN 50324-1, Figure 2) using specific geometric and electrical boundary conditions. Consequently, the results of the tests provide basic material parameters only and must only be used as a guide to the actual properties of manufactured commercial components.

2 Symbols and units

All material constants and equations appearing in this standard are given according to the International System of Units (SI-units).

Table 1 lists the symbols and, where appropriate, shows the units associated with the physical quantities designated by the symbols.

Table 1 - List of symbols and their units

Symbol	Meaning	SI-unit
A	Area	m^2
c	Ageing rate	See note
c_{ij}	Elastic stiffness constant	N/m^2
C	Capacitance	F
C^T	Free capacitance	F
d	Diameter	m
d_{ij}	Piezoelectric charge (strain) constant	C/N or m/V
e_{ij}	Piezoelectric stress constant	C/m^2 or N/Vm
E_i	Component of the electric field strength	V/m
E_m	Measuring field strength	V/m
f	Frequency	Hz
f_a	Antiresonance frequency (zero reactance)	Hz
f_m	Frequency of minimum impedance	Hz
f_n	Frequency of maximum impedance	Hz
f_p	Parallel resonance frequency (maximum resistance)	Hz
f_r	Resonance frequency	Hz
f_s	Motional (series) resonance frequency (maximum conductance)	Hz
f_1	Frequency at first overtone	Hz
f_3	Frequency at third overtone	Hz
g_{ij}	Piezoelectric voltage (stress) constant	m^2/C or Vm/N