EESTI STANDARD EVS-EN 50324-3:2003

Piezoelectric properties of ceramic materials and components - Part 3: Methods of measurement - High power

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EESTI STANDARDIKESKUS

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NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 50324-3:2003 sisaldab Euroopa standardi EN 50324-3:2002 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 50324-3:2003 consists of the English text of the European standard EN 50324-3:2002. 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: This European Standard relates to piezoelectric transducer ceramics for power application over a wide frequency range both as electromechanical or mechanoelectrical converters.	**Scope:** This European Standard relates to piezoelectric transducer ceramics for power application over a wide frequency range both as electromechanical or mechanoelectrical converters.

ICS 31.140

Võtmesõnad: ceramics, classification, components, 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 50324-3**

NORME EUROPÉENNE

EUROPÄISCHE NORM May 2002

ICS 31.140

English version

Piezoelectric properties of ceramic materials and components Part 3: Methods of measurement - High power

Propriétés piézo-électriques des matériaux et composants céramiques Partie 3: Méthodes de mesure - Grande puissance

Piezoelektrische Eigenschaften von keramischen Werkstoffen und Komponenten Teil 3: Meßverfahren - Großsignal

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CENELEC

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

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Ref. No. EN 50324-3:2002 E

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 50324-3 on 2001-01-12.

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 3 is to be read in conjunction with EN 50324-1 and EN 50324-2.

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1 Scope

This European Standard relates to piezoelectric transducer ceramics for power application over a wide frequency range both as electromechanical or mechanoelectrical converters.

This standard covers the large signal characterization of piezoelectric ceramics material only, and not the characterization of a complete assembled transducer.

The selection of a material for a given power application is difficult and the advice given in clause 2 is mainly indicative.

2 Specification of material

2.1 Power applications criteria

Most mechanical, electrical and piezoelectric coefficients defined in EN 50324-2 exhibit a non-linear behaviour when the piezoelectric material is subjected to large electrical and/or mechanical signals.

However, the difference in non-linear behaviour of the various ceramic compositions is not the only criterion to decide which is the most suited for a given power application. In general, the material factors which limit the available acoustic power capacity of a piezoceramic based transducer are mainly

- the dynamic mechanical strength of the ceramic,
- the reduction in efficiency due to dielectric and mechanical ceramic internal losses,
- depolarization due to temperature rise.

2.2 Materials for electromechanical conversion

2.2.1 *Figure of Merit M*

The figure of Merit characterizes the ability of the material to convert the electrical energy into mechanical energy. It may be represented by the appropriate electromechanical coupling factor measured under high power conditions. A more suited figure of Merit for power applications is M_{ij}, derived from the electromechanical transformer ratio N of the Mason equivalent electric circuit (see Figure 1). This figure of Merit is measured at low signal level and it is assumed that it is constant at high level.