
Electrical insulating materials - Thermal endurance properties - Part 4-3: Ageing ovens - Multi-chamber ovens (IEC 60216-4-3:2000)

Electrical insulating materials - Thermal endurance properties -- Part 4-3: Ageing ovens - Multi-chamber ovens

Elektroisolierstoffe - Thermische Langzeiteigenschaften -- Teil 4-3:
Alterungswärmeschränke - Mehrkammerwärmeschränke

Matériaux isolants électriques - Propriétés d'endurance thermique -- Partie 4-3: Etuves de vieillissement - Etuves à chambres multiples

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**Electrical insulating materials - Thermal endurance properties
Part 4-3: Ageing ovens - Multi-chamber ovens
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Matériaux isolants électriques -
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(CEI 60216-4-3:2000)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 15E/132/FDIS, future edition 1 of IEC 60216-4-3, prepared by SC 15E, Methods of test, of IEC TC 15, Insulating materials, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60216-4-3 on 2000-06-01.

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) 2001-03-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2003-06-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA is normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60216-4-3:2000 was approved by CENELEC as a European Standard without any modification.

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INTRODUCTION

IEC 60216, which deals with the determination of thermal endurance properties of electrical insulating materials, is composed of several parts:

Part 1: General guidelines for ageing procedures and evaluation of test results;

Part 2: Choice of test criteria;

Part 3: Instructions for calculating thermal endurance characteristics – Section 1: Calculations using mean values of normally distributed complete data;

Part 3: Instructions for calculating thermal endurance characteristics – Section 2: Calculations for incomplete data: proof test results up to and including the median time to end-point (equal test groups);

Part 4: Ageing ovens – Section 1: Single chamber ovens;

Part 4-2: Ageing ovens – Precision ovens for use up to 300 °C (in preparation);

Part 5: Guidelines for application of thermal endurance characteristics.

NOTE This series may be extended. For revisions and new parts, see the current catalogue of IEC publications for an up-to-date list.

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ELECTRICAL INSULATING MATERIALS – THERMAL ENDURANCE PROPERTIES –

Part 4-3: Ageing ovens – Multi-chamber ovens

1 Scope

This part of IEC 60216 covers the minimum requirements for ventilated and heated multi-chamber ovens used for thermal endurance evaluation of electrical insulation and of any other appropriate thermal conditioning application where the use of single-chamber ovens is inappropriate.

It covers ovens designed to operate over all or part of the temperature range from 20 K above ambient to 500 °C.

It gives acceptance tests and in-service monitoring tests for both unloaded and loaded multi-chamber ovens and conditions of use.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60216. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60216 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

<https://standards.iteh.ai/catalog/standards/sist/15cb3929-106a-4ac9-86c0-71b8d6e1e100/iec-60216-4-3-1990>

IEC 60216-1:1990, *Guide for the determination of thermal endurance properties of electrical insulating materials – Part 1: General guidelines for ageing procedures and evaluation of test results* (under revision)

IEC 60216-3-1:1990, *Guide for the determination of thermal endurance properties of electrical insulating materials – Part 3: Instructions for calculating thermal endurance characteristics – Section 1: Calculations using mean values of normally distributed complete data*

IEC 60216-3-2:1993, *Guide for the determination of thermal endurance properties of electrical insulating materials – Part 3: Instructions for calculating thermal endurance characteristics – Section 2: Calculations for incomplete data: proof test results up to and including the median time to end-point (equal test groups)*

IEC 60216-4-1:1990, *Guide for the determination of thermal endurance properties of electrical insulating materials – Part 4: Ageing ovens – Section 1: Single-chamber ovens*

3 Definitions

For the purposes of this part of IEC 60216, the following definitions apply:

3.1

rate of ventilation

number of air changes per hour in the exposure chamber at room temperature. Any calculation of the velocity of the air is based on the cross-sectional area of the chamber measured in a plane that intersects the working volume and is made assuming plug flow

3.2

exposure volume

that central part of each chamber that meets the requirements for temperature variation

3.3

exposure temperature (see also global exposure temperature)

temperature selected for ageing test specimens to obtain data for the determination of effects of temperature on standardized test specimens

3.4

temperature fluctuation

maximum change in temperature at one point in the exposure volume over a period of 3 h

3.5

temperature difference

maximum difference of temperature between any two points in the exposure volume at any one time

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3.6

temperature variation

difference between the highest temperature and the lowest temperature measured over a period of 3 h

3.7

global average temperature

an average temperature, calculated from the results of determinations made over a period of approximately 3 h using nine sensors spaced throughout the exposure volume of a chamber

NOTE The global average temperature is considered to be the initial effective global exposure temperature.

3.8

time constant

measure of the time taken for the temperature of a standard specimen to approach the cell temperature

3.9

temperature deviation

deviation of the exposure temperature from the nominal value due to the combination of temperature variation and the error of temperature measurement

4 Constructional requirements

4.1 General

The oven shall be soundly constructed using suitable materials. All electrical and other ancillary fittings shall be readily accessible for maintenance purposes.

The construction shall be fitted with equipment to switch off the oven and preferably sound an alarm when the temperature of the thermostatically controlled medium deviates from the allowable temperature range or if the supply of ventilating air fails.

4.2 Specimen chambers

The ovens shall consist of at least two open-topped, approximately cylindrical chambers with appropriate lids, mounted with their axis approximately vertical. Each lid shall form an effective seal with the chamber: the leakage of ventilating gas from the lid seal shall be no more than 5 % of the flow rate of ventilating gas to the specimen chamber.

NOTE 1 Some types of 'O' ring seals have been found to be satisfactory.

Unless otherwise specified, the individual chambers shall have a minimum diameter of 35 mm and a minimum length of 200 mm.

The materials of construction of the chambers, their lids and their internal parts shall not contain any copper, copper alloy or any material that may give off interfering volatiles over the temperature range of the oven, for example some silicone resins.

The design shall be such as to permit the chambers to be easily cleaned after each test.

The chambers shall be mounted in a thermostatically controlled heat transfer medium: for example in a metal block, a liquid or 'sand' bath, a saturated vapour bath or in an air circulating oven. Examples of typical designs are given in figures 1 and 2.

NOTE 2 The performance of air circulating ovens in this context is usually poorer than the alternative systems.

4.3 Ventilation

Each chamber shall be provided with a supply of continuously metered, filtered, pre-heated ventilating air, entering the chamber at one end and being exhausted through the other.

When specified in the purchase contract, provision shall be made for the use of ventilating gases other than air.

Ventilation rates in the range 5 to 20 changes per hour shall be available.