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Information technology — Office equipment — Determination of chemical emission rates from electronic equipment —

Part 2: Not using-consumables

Technologies de l'information — Équipement de bureau — Détermination des taux d'émission chimique d'un équipement électronique —

Reference number
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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

ISO/IEC 28360-2 was prepared by Ecma International (as ECMA-328 Part 2) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1, Information technology, in parallel with its approval by national bodies of ISO and IEC.

This first edition of ISO/IEC 28360-2, together with ISO/IEC 28360-1, cancels and replaces ISO/IEC 28360: 2015, which has been technically revised. It also incorporates the Technical Corrigendum ISO/IEC 28360: 2015/Cor.1:2016. The main changes compared to the previous edition are as follows:

— This edition was divided into a part for electronic equipment using consumables and a part for electronic equipment not using consumables as follows:

  — Determination of Chemical Emission Rates from Electronic Equipment — Part 1 (using-consumables);

  — Determination of Chemical Emission Rates from Electronic Equipment — Part 2 (not using-consumables).

  The purpose of the split was to make the description of test procedures simpler (they included considerable differences between the two equipment categories) and to facilitate users' understanding.

— This edition is fully aligned with "Test method for the determination of emission from Hard Copy Devices" (RAL-UZ 205).

A list of all parts in the ISO/IEC 28360 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Globally, governmental agencies, academic institutions, environmental organizations and manufacturers have started to develop methods to determine chemical emissions from electronic equipment. These attempts however, initially resulted in a range of tests from which the results were not necessarily comparable, either qualitatively or quantitatively.

Following the publications of the 1st edition of ECMA-328 in 2001 and the "Test method for the determination of emissions from Hard Copy Devices" (RAL-UZ 122), experts from the BAM and Ecma have collaborated to harmonise methods to determine the chemical emission rates from ICT & CE equipment in the 2nd edition.

In addition to stricter test procedures, the 2nd edition used uses generalised emission formulae, and their derivations developed in Annex C, to calculate emission rates from concentrations of analytes that are measured in Emission Test Chambers.

The 3rd edition was fully aligned with the 1st edition of ISO/IEC 28360:2007 adopted under ISO/IEC JTC 1 fast track procedure and published in September 2007.

In addition, the 4th edition fixed a number of errata on ISO/IEC 28360:2007 that JTC 1/SC 28 identified.

Following the publications of the 4th edition of ECMA-328 and the "Test method for the determination of emissions from Hard Copy Devices" (RAL-UZ 122), experts from the BAM, WKI, JBMIA and Ecma have collaborated to harmonise methods to determine the Fine Particle (FP) and Ultrafine Particle (UFP) emissions from hard copy devices in the 5th edition.

The 6th edition was aligned with the 2nd edition of ISO/IEC 28360:2012, and it added a new ozone calculation method. "Test method for the determination of emission from Hard Copy Devices" (RAL-UZ 122) has been replaced by "Test method for the determination of emission from Hard Copy Devices" (RAL-UZ 171) published in January 2013. Therefore, "RAL-UZ 122 option" is replaced with "RAL-UZ 171 option" in the 6th edition.

The 7th edition of ECMA-328 is fully aligned with ISO/IEC 28360:2015.

The 8th edition was divided into a part for electronic equipment using consumables and a part for electronic equipment not using consumables as follows:

— Determination of Chemical Emission Rates from Electronic Equipment — Part 1 (using-consumables);

— Determination of Chemical Emission Rates from Electronic Equipment — Part 2 (not using-consumables).

The purpose of the split was to make the description of test procedures simpler (they included considerable differences between the two equipment categories) and to facilitate users' understanding.

This 8th edition is fully aligned with "Test method for the determination of emission from Hard Copy Devices" (RAL-UZ 205).

This part of the Standard is Part 2.

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Information technology — Office equipment — Determination of chemical emission rates from electronic equipment —

Part 2:
Not using-consumables

1 Scope

This Standard (all parts) specifies methods to determine chemical emission rates of analyte from ICT & CE equipment during intended operation in an Emission Test Chamber (ETC).

This Standard (all parts) includes specific methods for equipment using consumables, such as printers, and equipment not using consumables, such as monitors and PC's.

Part 2 specifies the methods to determine chemical emission rates of analyte from electronic equipment not using consumables.

The methods comprise preparation, sampling (or monitoring) in a controlled ETC, storage and analysis, calculation and reporting of emission rates.

Examples of EUT that do not use consumables are:

— Monitors and TV sets (CRT, Plasma, LCD, Rear projector, Beamer).

— Video (VCR, DVD Player/Recorder, Camcorder).

— SAT Receiver (Set-Top Box).

— Audio units (CD Player/Recorder, Home theatre Systems, Audio Home Systems, Micro-/Mini, Midi Systems, Amplifier, Receiver).

— Portable Audio (CD Player, MP 3 Player, Radio recorder, Clock radio, etc.).

— Computer (desktop, tower, server), portable computers (Notebooks).

The emission rates determined with this method may be used to compare equipment in the same class.

Predictions of "real indoor" *concentrations* from the determined *emission rates* are outside the scope of this Standard.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 554:1976, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 16000-3:2011, *Indoor air — Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air — Active sampling method*

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ISO 16000-6:2011, *Indoor air — Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA sorbent, thermal desorption and gas chromatography using MS or MS-FID*

ISO 16000-9:2006, *Indoor air — Part 9: Determination of the emission of volatile organic compounds from building products and furnishing — Emission test chamber method*

ISO 16017-1:2000, *Indoor, ambient and workplace air — Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography — Part 1: Pumped sampling*

ECMA-74, *Measurement of Airborne Noise emitted by Information Technology and Telecommunications Equipment*

EN 55013:2013, *Sound and Television Broadcast Receivers and associated equipment — Radio disturbance characteristics — Limits and methods for measurement*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 https://www.iso.org/obp

3.1
averaged ozone concentration time series
simple moving average of ozone concentration (Co_3) over 80 ± 5 seconds

3.2
air exchange rate
n
ratio (n) of the volume of clean air brought into the ETC per hour [m^3/h] to the unloaded ETC volume [m^3]

3.3
air velocity
air speed [m/s] measured in the unloaded ETC

3.4
analyte
volatile organic compounds (VOC), carbonyl compounds and ozone

3.5
emission test chamber
ETC
enclosure with controlled operational parameters for testing analyte mass emitted from EUT

3.6
equipment under test
EUT
functional and complete ICT or CE equipment from which chemical emission rates are determined

3.7
loading factor
ratio of the EUT volume to the volume of the unloaded ETC

3.8
operating phase
phase in which the EUT is performing its intended functions in the ETC

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3.9
total volatile organic compounds
TVOC
the sum of the concentrations of identified VOC and the concentrations of the converted areas of unidentified peaks using the toluene response factor

Note 1 to entry: This definition of "total volatile organic compounds" differs from the definition in ISO 16000-6:2011.

3.10
unit specific emission rate
SER
mass, in micrograms, of a specific analyte emitted per hour

Note 1 to entry: If more than one EUT is placed in the ETC, the determined SER is divided by the number of EUTs to obtain the unit specific emission rate SER_u.

3.11
volatile organic compounds
VOC
compounds that elute between n-hexane and n-hexadecane on a nonpolar GC-column

4 Symbols and abbreviated terms

4.1 Abbreviated terms

CE	Consumer Electronics
DNPH	2,4-Dinitrophenylhydrazine
ETC	Emission Test Chamber
EUT	Equipment Under Test
FID	Flame Ionisation Detector
GC/MS	Gas chromatography/Mass spectrometry
ICT	Information and Communication Technology
PTFE	Polytetrafluoroethene
PVC	Polyvinylchloride
RH	Relative humidity
SER	Unit Specific Emission Rate
TVOC	Total Volatile Organic Compounds
VOC	Volatile Organic Compounds

4.2 Symbols

C_{bg}	Background mass concentration [µg m^{-3}]
C_s	Average mass concentration [µg m^{-3}]
C_{ope}	Average mass concentration during operating phase [µg m^{-3}]

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