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Standard ECMA-328-1

10th Edition / December 2020

Corrigendum (October 2022)

Determination of Chemical Emission Rates from Electronic Equipment– Part 1 (using consumables)

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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 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 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 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 “Test method for the determination of emission from Hard Copy Devices” (RAL-UZ 122) has been replaced by “Test method for the determination of emission from Hard Copy Devices” (RAL-UZ 171) published in January 2013.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 two parts, a part for electronic equipment using consumables and a part for electronic equipment not using consumables:

- 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).

The 9th edition is fully aligned with the third edition of ISO/IEC 28360:2018.

The 10th edition has been re-organised to incorporate RAL-UZ Options into the main text as one of the two methods for determining emission rates of VOC and carbonyl compounds.

One method (QEM), which is in harmony with DE-UZ 205[1], Test Method for the Determination of Emissions from Hardcopy Devices (Appendix S-M), originates from the former RAL-UZ 205 Options. The other method (CEM) employs the generalised constant emission model in the former editions. The two methods may yield

slightly different emission rates, so the user is encouraged to select the one that satisfies their technical application.

Different elements of the two methods are described alongside each other in the main text. The models used to calculate emission rates in each method are explained in the informative Annexes C and D. Some requirements in the former RAL-UZ Options which appear too detailed and stringent as an international standard are now listed in the informative Annex E so that users can fully meet the requirements of DE-UZ 205[1] (Appendix S-M).

In this edition, it is deduced in the CEM that emission rates of VOC and carbonyl compounds during the operating phase (SER_{ope}) originate from the pre-operating phase (SER_{pre}) and printing (SER_{prp}) operations as well as in the QEM and the former RAL-UZ Options.

This document is an editorial corrigendum to ECMA-328 Part 1.

[1] The German Blue Angel Environmental Label changed the naming convention of its award criteria from RAL-UZ 205 to DE-UZ 205 in 2019.

Part 1

Determination of Chemical Emission Rates from Electronic Equipment (using consumables)

1 Introduction

This document corrects several editorial or typographical errors in ECMA-328, Determination of chemical emission rates from electronic equipment - Part 1, Using consumables - 10th edition, December 2020.

A line was missing in the first box of Figure 1.

The informative annexes C and D had several typographical or cross-reference errors in the text explaining some of the equations.

Correction 1
Clause 6 Method overview
Figure 1
Section 8.2.2 is missing in the second box of Figure 1.
“Loading factor (8.2.2)” should be added below “Ensure Test conditions (8.1)”.

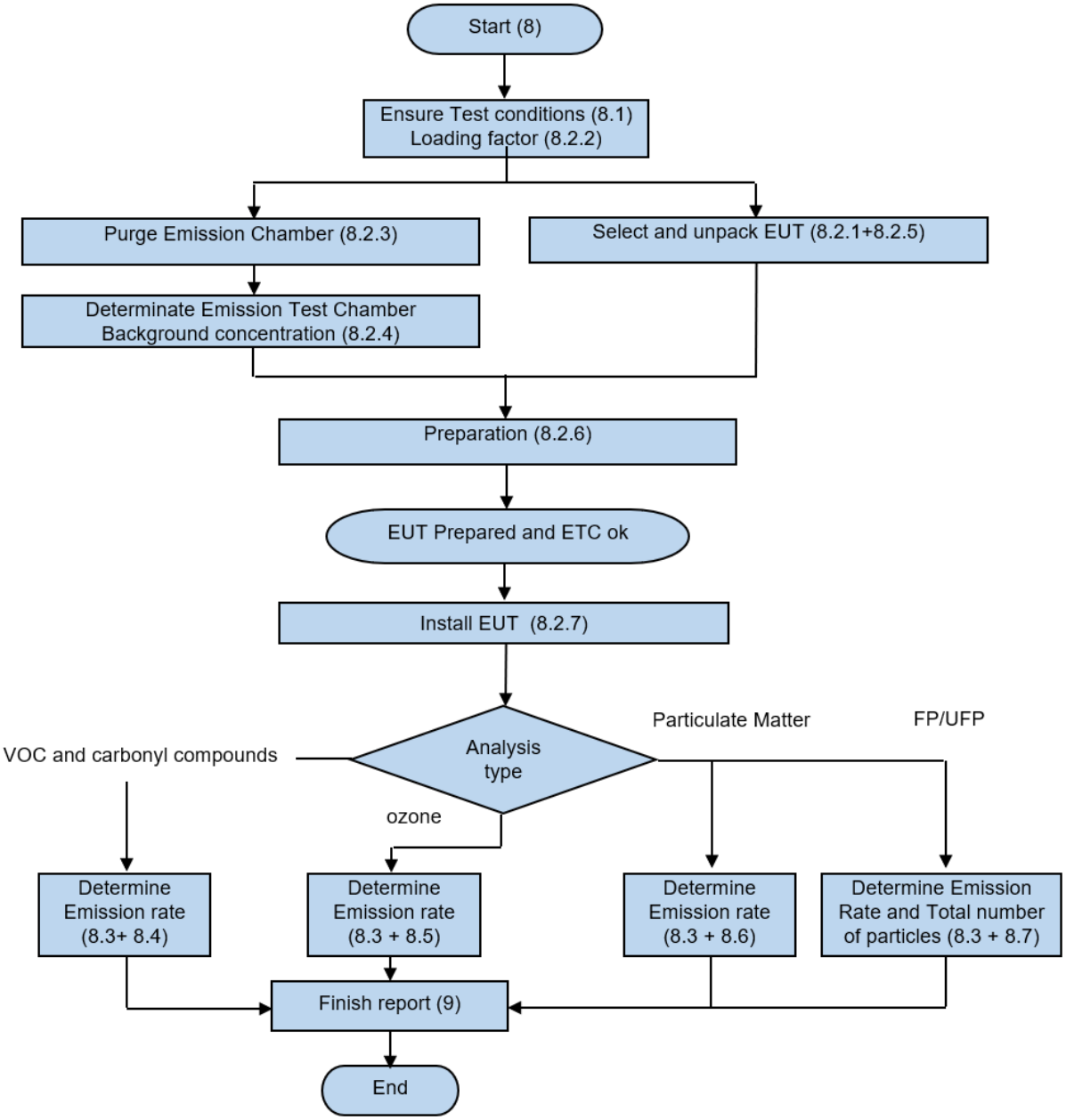

Figure 1 — Determination method overview

Correction 2
Annex C.5.2 Emission during operating phase
The explanation of Equation.(C.26) is wrong.

"Insert C_{pre} in (C.4) in (C.26):"
should be replaced by:
"Insert C_{pre} in (C.4) in (C.25):"

Correction 3
Annex C.5.2 Emission during operating phase
The explanation of Equation.(C.27) is wrong:

Insert C_0 in (C.27) in (C.22) and rearrange for SER_{prp}:
should be replaced by:
Insert C_0 in (C.26) in (C.24) and rearrange for SER_{prp}:

Correction 4
Annex D.2 Approach
Figure C.1 is a typo, correct reference is to Figure D.1

"The areas of concentration regions during the operating and post-operating phases in Figure C.1 (a) and (b) must be calculated to determine the emission rate during the operating-phase (SER_{ope})."
should be corrected as:
"The areas of concentration regions during the operating and post-operating phases in Figure D.1 (a) and (b) must be calculated to determine the emission rate during the operating-phase (SER_{ope})."

Correction 5
Annex D.5.2 Emission during operating and post-operating phase
In the explanation leading to Equation (D13), Figure C.1 is a typo, correct reference is to Figure D.1

In Figure C.1, the terms from m1 to m4 denote the regions and their areas shaped between the build-up and decaying concentration curves which stem from each source, and the time periods of the phases under consideration.
should be corrected as:
In Figure D.1, the terms from m1 to m4 denote the regions and their areas shaped between the build-up and decaying concentration curves which stem from each source, and the time periods of the phases under consideration.

Correction 6
Annex D.5.2 Emission during operating and post-operating phase
Correction of symbols in the explanation leading to Equation (D26)

In such cases, C_0 is obtained as the sum of the two concentrations, one of which decays from the concentration at the end of the pre-operating phase with air exchange while the other builds up with the continuing emission during that period of time (ts):
should be corrected as:
In such cases, C_0 is obtained as the sum of the two concentrations, one of which decays from the concentration at the end of the pre-operating phase with air exchange while the other builds up with the continuing emission during that period of time (t_s):

Correction 7
Annex D.5.2 Emission during operating and post-operating phase
Correction of symbols. (Subscript) in the explanation of "Equation.(D.24) reshown":

"If the stabilizing period (t_s) is relatively long (n*ts≥3), (D.26) is reduced to:"
should be replaced by:
"If the stabilizing period (t_s) is relatively long (n*t_s≥3), (D. 26) is reduced to:"