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Emission safety of combustible air fresheners — Methodology for the assessment of test results and application of recommended emission limits

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Emission safety of combustible air fresheners - Methodology for the assessment of test results and application of recommended emission limits

Sécurité des émissions des désodorisants à combustion - Méthodologie de l'évaluation des résultats d'essais et application des limites d'émission recommandées

Emissionssicherheit brennbarer Lufterfrischer - Methodik für die Bewertung von Prüfergebnissen und Anwendung empfohlener Emissionsgrenzen

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European foreword

This document (EN 16739:2015) has been prepared by Technical Committee CEN/TC 421 “Project Committee - Emission safety of combustible air fresheners”, the secretariat of which is held by UNI.

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1 Scope

This European standard specifies the methodology for the assessment of test results from the emissions of a combustible air freshener, when tested according to EN 16738 and follows REACH Guidance and consumer habits and practices to produce a consumer exposure assessment. It provides reference to published emission limit or guidance values.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 16738:2015, *Emission safety of combustible air fresheners — Test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16738:2015 and the following apply.

3.1
exposure assessment
process of measuring or estimating the concentrations, frequency and duration of consumer exposure to a chemical compound released in the environment, or estimating future exposures for a chemical compound that has not yet been released

3.2
Time Weighted Average Concentration
TWA
average concentration to which the consumer is exposed during a week

3.3
unit specific emission rate
***SER*$_u$**
product specific rate describing the mass of a volatile organic compound emitted per unit of product per unit of time at a given time from the start of the test

4 Requirements

4.1 Assessment of consumer exposure

4.1.1 Consumer exposure based on habits and practices

The approach and default values described under the European Chemicals Regulation “REACH“ (EC) N° 1907/2006 have been used to estimate potential human inhalation exposures to chemicals released from consumer products.

The following models can be used to estimate human indoor exposures to combustible air freshener emissions on the basis of their emission rates:

— ConsExpo 1-Box Model, RIVM [2];

— 2-Box Indoor Air Dispersion Model developed by the RIFM [3];

— CONTAM Building Model [4].

These models can be used to determine peak and time-weighted average consumer exposure concentrations at maximum emission rates resulting from the use of the combustible air fresheners using the default room size and air exchange rate stated in Table 1.

Table 1 — Default values [a] for room size and air exchange rate

Room size (*RV*)	30 m^3
Air exchange rate (*VR*)	0,5 h^{-1}
[a] Values to be used in absence of reliable specific data.	

4.1.2 Consumer habits

4.1.2.1 Scented candles

The consumer use pattern was based on a use behaviour study commissioned by the Belgium Ministry of Health and completed by the market research organization IPSOS [1]. This study reported that the daily average use of scented candles is 2,4 h in the living room, 2 h in the adults room and 1,9 h in the kitchen and dining area. This study also reported that between 7 and 10 candles are used by consumers over a monthly period. To assume a reasonable worst case, an exposure for 4 h per day in an average sized living room of 30 m^3 and a weekly usage of 4 is suggested.

Therefore the following values are default values.

Table 2 — Default values [a] for scented candles

Frequency of use	4 days per week
Exposure time	4 h per day
[a] Values to be used in absence of reliable specific data.	

4.1.2.2 Other Combustible Air Fresheners

For other combustible air fresheners, the frequency of use and the exposure time should be determined on a case by case basis.

4.1.3 Exposure levels

The models listed above serve to translate a measured emission rate of the substance of interest to:

1) Short term peak (consumer exposure) concentration [STPC] over the measurement period (µg/m^3) is given by the formula:

$$STPC\left(\mu g/m^3\right) = \frac{SER_u\left(\mu g/h\right)}{\left[RV\left(m^3\right) * VR\left(h^{-1}\right)\right]}$$

2) Worst case time weighted average (TWA) consumer exposure concentration (µg/m^3) according to the following formula:

$$TWA\left(\mu g/m^3\right) = \frac{SER_u\left(\mu g/h\right)}{\left[RV\left(m^3\right) * VR\left(h^{-1}\right)\right]} * AUF$$

where

SER_u = emission rate (µg/h),

RV = room volume (m^3),

VR = ventilation rate (h^{-1}),

AUF (Average Use Factor) = [Exposure time h per day/24 (h)] x [Frequency of use (day)/7 (day)]

Comparison of test results with relevant published indoor air limits:

$$CF = CONC / SLV < 1$$

where

CF = Compliance Factor

$CONC$ = concentration (STPC or TWA) (µg/m^3)

SLV = Selected Limit Value (µg/m^3)

NOTE Indoor air concentration of a specific substance is usually attributed to more than one source. The contribution part of the product assessed is integrated in the process of defining the 'Selected Limit Value'. It can be based for example on the published guideline values in Annex A, using a contribution factor which attributes a proportion of this maximum value to the product assessed.

Annex A
(informative)

Published guideline values

Table A.1 — Published guideline values

Compound	Cas N.	CLP classification [5]	INDEX [6] (µg/m³)	WHO [7] (µg/m³)
BENZENE	71–43–2	Flammable Liquid: Category 2 Aspiration Toxicity: Category 1 Skin Irritation: Category 2 Eye Irritation: Category 2 Mutagenicity: Category1B Carcinogenicity: Category 1A STOT RE [a]: Category 1	None set	0,17 (air concentration for excess lifetime risk of leukaemia = 1/1 000 000)
FORMALDEHYDE	50–00–0	Acute Toxicity: Category 3 [if swallowed, in contact with skin and if inhaled] Skin Corrosion: Category 1B Skin Sensitization: Category 1 Carcinogenicity: Category 1B from 1st January 2016	30	100 (30-min average concentration).
NAPTHALENE	91–20–3	Acute Toxicity: Category 4 [if swallowed] Carcinogenicity: Category 2 Aquatic Acute Toxicity: Category 1 Aquatic Chronic Toxicity: Category 1	10	10 (yearly average)
SO_2	7446–09–5	Skin Corrosion: category 1B Acute Toxicity: Category 3 [if inhaled]	None set	20 (24-h-mean) 500 (10-min mean)
NO_2	10102–44–0	Ox. Gas 1 Skin Corr. 1B Acute Tox. 2 [if inhaled]	40 (yearly average)	40 (yearly average) 200 (1-h mean)
NO	10102–43–9	Oxidizing Gas: Category 1 Skin Corrosion: Category 1B Eye Damage: Category 1 Acute Toxicity: Category 1 [if inhaled] STOT RE [a]: Category 2	None set	None set
CO	630–08–0	Reprotoxicity 1A, Acute Toxicity: 3, STOT 1	None set	100 000 (15 min), 35 000 (1 h), 10 000 (8 h), 7000 (24 h)
[a] : STOT RE = Specific target organ toxicity — repeated exposure				

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[2] RIVM. *ConsExpo 5.0 beta version, Consumer exposure model, Dutch National Institute for Public Health and the Environment*. RIVM, 2012

[3] RIFM. Estimating inhalation exposure to fragrance materials in air freshening products using a two-zone residential indoor air dispersion model; 2011, Poster presented by the Research Institute of Fragrance Materials (RIFM) at the annual Society of Toxicology (SOT) Meeting in Salt Lake City, 7–11 March 2010

[4] NIST. *CONTAM multizone building modelling program*. National Institute of Standards and Technology, Gaithersburg, MD, 2010

[5] REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

[6] The INDEX project Critical Appraisal of the Setting and Implementation of Indoor Exposure Limits in the EU [European Commission, Joint Research Centre, Institute for Health and Consumer Protection,Physical and Chemical Exposure Unit, Ispra, Italy (JRC/IHCP/PCE)]

[7] WHO guidelines for indoor air quality:selected pollutants

[8] Guidance on information requirements and chemical safety assessment, Chapter R.15: Consumer exposure estimation (ECHA – 10- G-03-EN- October 2012)

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