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EN16516 REQUIREMENTS AND CONSEQUENCES

Your industry, our focus

WOOD AND HEALTH

28.11.2018 CHRISTIANA

QVARTALET MØTESENTER OSLO

DR. HELENA JÄRNSTRÖM

PRODUCT MANAGER

Outline

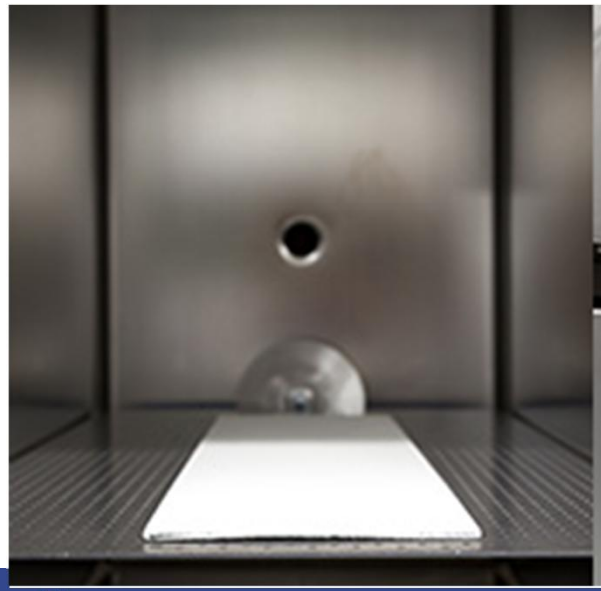
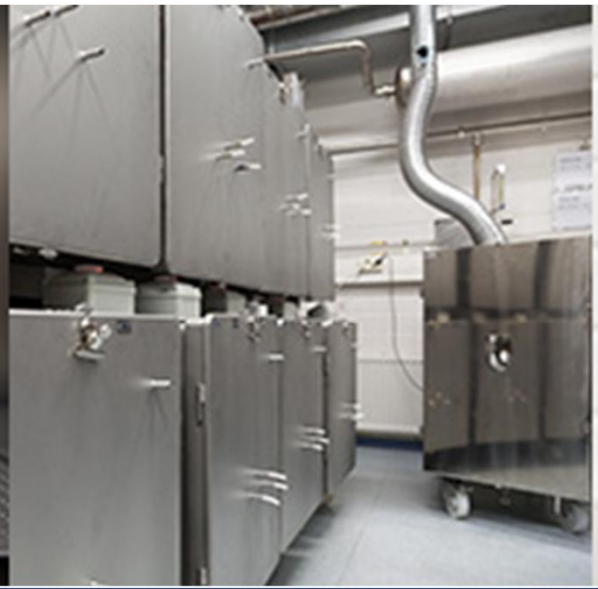
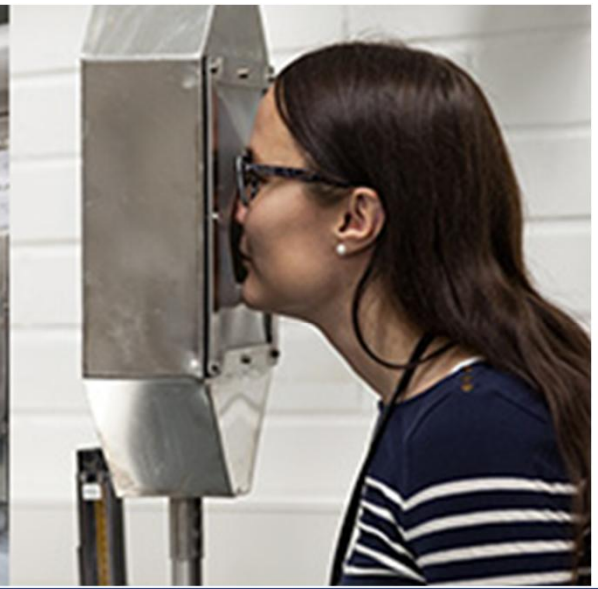
- **Background: Emission test methods and classification systems**
- **CE marking- technical specification EN16516**
- **Emission classes- status in November 2018**
- **Consequences- wood products**
- **Conclusion**

Emissions from a single material

- **Emission test chamber method ISO 16 000-9**
- **Measurements at standard conditions**

T= 23°C,
RH 50%,
ACR 0.5 h^{-1}

SER = Specific Emission Rate, mg/m^2h

Testing vs. reality

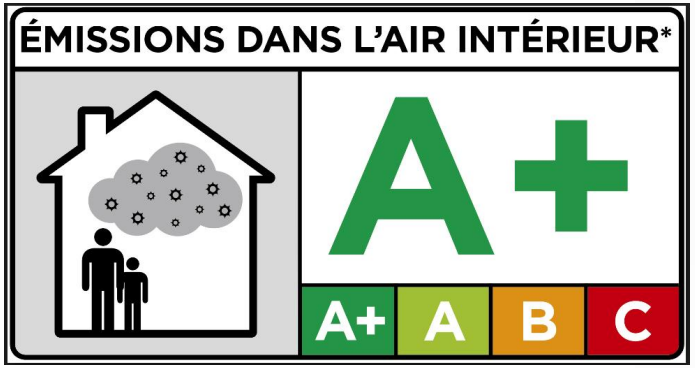
- **Testing in laboratory: the emission from materials are compared at standard conditions at a certain time point.**
- **Reality: emissions are affected by the outer conditions (temperature, humidity, air exchange rate) that can vary much between sites and time points of measurement.**

Correlation but no interconnection

Emission classification labels

European emission labels are based on the ISO 16 000 standards but differ in

- **Evaluation time point**
- **Compounds/ parameters**
- **Limit values**
- **Sensory assessment**
- **Voluntary/ mandatory**
- **Material tested**



CE marking -EN 16516

- **Construction Product Regulation, Essential Requirement nr 3 "Hygiene, health and environment" => requirements for emissions of dangerous substances into indoor air.**
- **Horizontal approach: all products are tested with the same test method.**
- **EN16516: The intended conditions of use describe the purpose, place and circumstances of typical application(s) of a construction product as defined in a product standard. This includes the intended use, (e.g. for what purpose, how the product typically is installed, etc.), and an emission scenario.**

Sample preparation

- **ISO 16 000-11 principle:**
- **Backside not facing indoor air is covered with low emission aluminium tape.**
- **Product Technical Committees will specify sample preparation in the product standard:**
- Wet products, applicators, amounts etc.
- Possible separate installations
- Large and complex products: ”model sample” is specified
- Drying / curing time at conditions different from test chamber
- **Day 0: The sample is placed in the chamber and kept there for the test period of 28 days.**

Responsibility of the producer

- **The test sample is taken from the production and packed during the same day.**
- **The test sample is delivered to the test laboratory within 2 weeks.**
- **The test is started within 8 weeks after sampling.**
- **Testing of wet products (in can with use-by-date) within 4 months after sampling.**
- **The product Technical Committee defines how the sample is taken (population, scale, size of samples). The effect of sampling on sample (heat, cutting etc) should be taken into consideration.**

Loading in test chamber

European reference room:

Floor area 12 m^2, Volume 30 m^3 =>

Floor/ Ceiling: 0.4 m^2/m^3

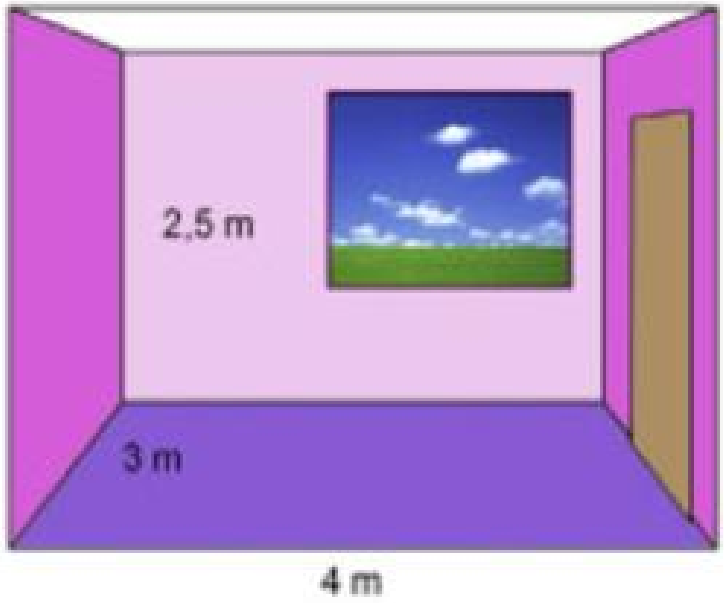
Walls: 1 m^2/m^3

Small surfaces, eg. doors: 0.05 m^2/m^3

Very small surfaces, eg. sealings: 0.007 m^2/m^3

Range 50% - 200 % is allowed.

Loading should always be below 2 m^2/m^3.



”If the above surfaces and loading factors do not represent the intended conditions of use => the product TC shall specify the nearest or sum of loading factors if appropiate...”

Sampling

- **Sampling is performed at day 3 and 28**
- **Volatile organic compounds (VOCs) ISO 16 000-6 (Tenax TA)**
- **Formaldehyde ISO 16 000-3 (DNPH)**

Analysis

ISO 16 000-6 with specifications:

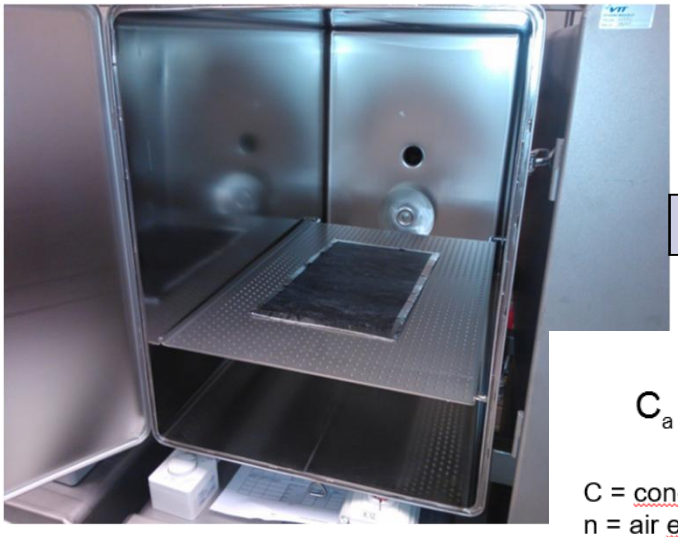
- **VOCs: thermal desorption + GC/MSD**
- **Column: 5% phenyl / 95% dimethylpolysiloxane**
- **LOQ ~ 1 µg/m³**

ISO 16 000-3

- **Formaldehyde: extraction + liquid chromatography**
- **LOQ 1 µg/m³**

Reporting of results

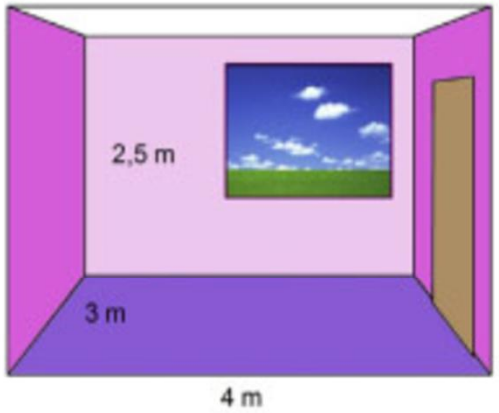
- **Specific emission rate, SER µg/m²h**
- **Conversion to reference room concentration, µg/m³**



$$C_a = \frac{L * SER_a}{n}$$

C = concentration (µg/m³)
n = air exchange rate (h^{-1})
SER_a = specific emission rate (µg/m²h)
L = loading m²/m³

European reference room



Dimensions:
Surfaces
- Floor: 12 m²
- Ceiling: 12 m²
- Walls: 31,4 m²
- 1 door – 1,6 m²
- 1 window – 2 m²

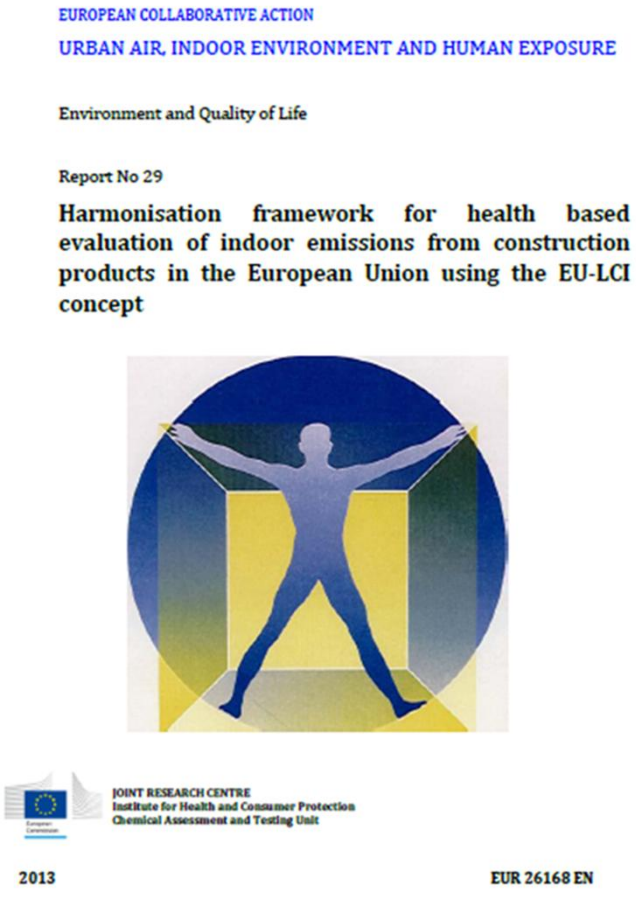
Air volume
- 30 m³

Climate and ventilation conditions for the reference room and the test chamber
- 23 °C
- 50 % relative humidity
- 0.5 air changes per hour

Implementation of reference room measures into corresponding product loading factors for the test chamber
- Floor, ceiling: each 0,4 m²/m³
- Walls: 1,0 m²/m³
- All large surfaces together: 1,8 m²/m³
- Small surface (e.g. door): 0.05 m²/m³
- Very small surface (e.g. sealants): 0.007 m²/m³

Evaluation of results: emission classes

- **The classes have to represent all existing products on the European market**
- **Proposal on emission classes is still under work- member states need to agree on it**
- **When available, member states can choose what classes should be used in buildings**
- **European Lowest Concentration of Interest (LCI) - values for VOCs are under development: https://ec.europa.eu/growth/sectors/construction/eu-lci/values_fi**



EUROPEAN COLLABORATIVE ACTION

URBAN AIR, INDOOR ENVIRONMENT AND HUMAN EXPOSURE

Environment and Quality of Life

Report No 29

Harmonisation framework for health based evaluation of indoor emissions from construction products in the European Union using the EU-LCI concept

JOINT RESEARCH CENTRE
Institute for Health and Consumer Protection
Chemical Assessment and Testing Unit

2013

EUR 26168 EN

Classes status in November 2018

- **There will be two classes; ”health” and ”comfort”**
- **Classes proposal under discussion:**

Parameter	Health class, µg/m³	Comfort class, µg/m³
Formaldehyde	≤10,60,120, >120	
Carcinogens	≤1 , >1	
LCI-value	Concentration/ LCI-value ≤1, >1	
TVOC – Total Volatile Organic Compounds		≤200/500/1500/2000, >2000
SVOC- Semi volatile Organic Compounds		≤100, >100
R-value		≤1, >1

Wood products: LCI- values

VOC	LCI-value µg/m³	SER floor&ceiling /wall µg/m²h
Terpenes	1400-5000	1750-6250 / 669- 2388
Aldehydes	800-900	1000-1125/ 382-430
Aldehydes with double bound, octenal etc.	5-7	6-9/ 2-3
Formaldehyde	100	125 / 48

EN16516 vs EN 717-1

Parameter	EN 717-1	EN16516
Loading	1 m^2/m^3	0.007-1 m^2/m^3
Temperature	23°C	23°C
Humidity	45 %	50 %
Air change rate	1 h^{-1}	0.5 h^{-1}
Measurement time point	4- 28 days	3-28 days
Test result	Test chamber concentration (=also emission rate in this case)	Model room concentration: ACR 0.5 h^{-1}
E1	124 µg/m^3	99-260 µg/m^3 (floor/ceiling- wall)

EN 717-1: both sides are open, ”steady state” result
EN 16516: backside is covered

Conclusion

- **EN16516 is available for emission testing. Only notified laboratories can do testing for CE marking.**
- **The Product Technical Committees need to define sample preparation and sampling methods.**
- **The Emission Classes are still under discussion. If the process runs without delay then classes are expected to be in use in 2020 at earliest.**
- **Evaluation of emissions from wooden products to consider in particular: Formaldehyde, LCI-values, TVOC**

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Eurofins emission testing laboratories are notified to do EN16516 testing

Thank You for Your attention !

Your industry, our focus

HelenaJarnstrom@eurofins.fi