

ISO 16000 and forthcoming CEN standard on emissions from construction products – common principles and differences

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- **ISO 16000:**
 - Part 3 (Aldehydes)
 - Part 6 (VOC; TVOC)
 - Part 9 (chamber) (earlier: EN 13419-1)
 - Part 10 (FLEC) (earlier: EN 13419-2)
 - Part 11 (Test specimen) (earlier: EN 13419-3)
- **EN 717-1 Formaldehyde testing for E1 classification**
- **New in development in CEN TC 351:**
Harmonized “umbrella” VOC emission testing norm
as frame for product specific norms for CE marking,
when including VOC specifications

■ ISO 16000:

■ Part 3 (Aldehydes)

Sampling on DNPH, then solvent desorption HPLC / UV

■ Part 6 (VOC; TVOC)

Sampling on Tenax TA, then thermal desorption / GC / MS

■ Part 9 (chamber) (earlier: EN 13419-1)

Chamber test parameters, model room

23 °C, 50 % RH, 0.5 ach, loading:

0.4 / 1.4 / 0.007 (floor, ceiling / walls / sealants)

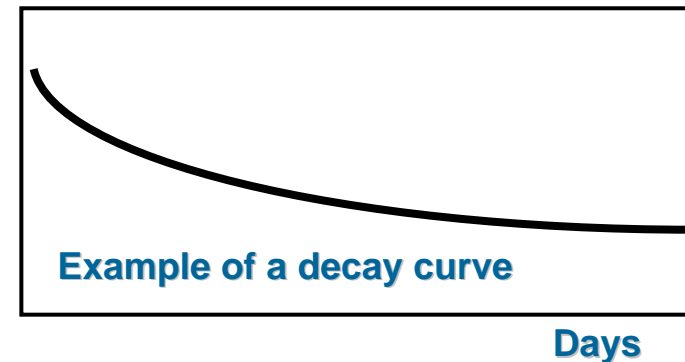
■ Part 10 (FLEC) (earlier: EN 13419-2)

Cell test parameters, model room

■ Part 11 (Test specimen) (earlier: EN 13419-3)

Guidance on test specimen preparation for several solid and liquid products

- Made for products with continuous release of FA
- Test chamber: 225 l or 1 m³ or 12 m³ volume
- 23 °C, 45 % RH, 1 ach, loading factor 1.0 m²/m³
- Sampling in water, acetyl acetone derivatization, UV
- Double measurement per day until steady state
(= less than ± 5% over 4 days)
- Testing duration:
 - 4 days, if no emissions
 - 10 days, if steady state
 - else max 28 days
- Derived methods with correlation factors established for some wood-based panels



- CE mark = basic requirements, declared or certified
 - CE mark is compulsory for many construction products
- Basis is a mandate from European Commission to CEN
 - Product specific Technical Committee then issues a performance standard
- Compliance with that standard allows use of CE Mark
 - VOC emissions shall be included in many such norms
- Present work goes for harmonized testing,
for use and reference in product specific norms
 - BUT – the accepted limit values will be set
by each EU Member State separately

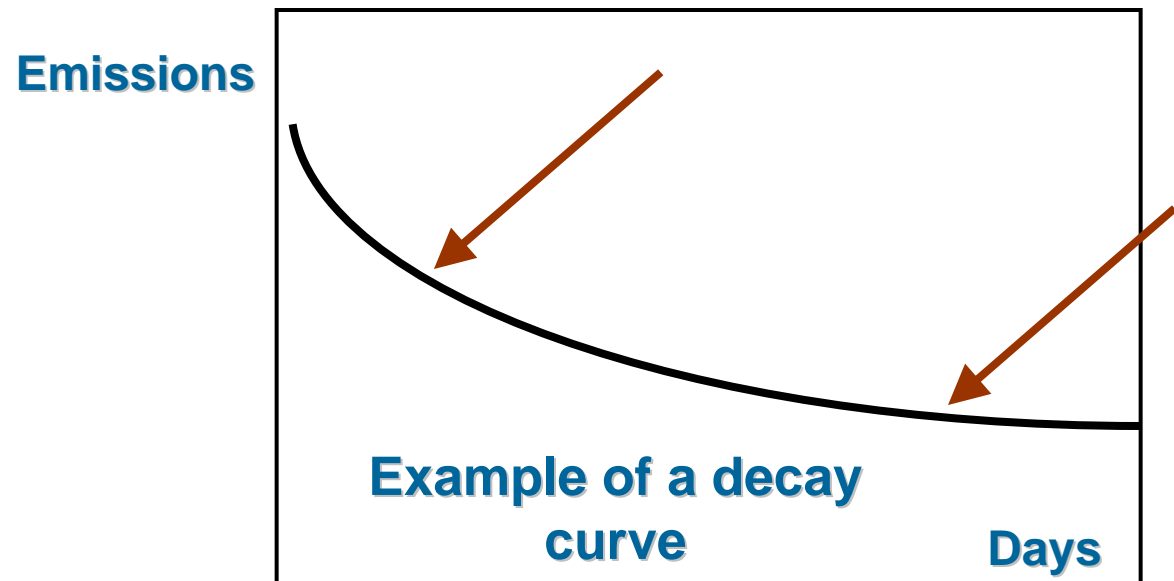
- **Basic considerations**
- **What you get from emission testing is:**
 - Chamber air concentration at given time $\mu\text{g}/\text{m}^3$**
 - **By calculation: emission rate per area $\mu\text{g}/\text{m}^2\text{h}$
(or per mass, or per device)**
 - **By calculation: contribution to air concentration $\mu\text{g}/\text{m}^3$
in reference room or in real room (source strength)**
- **CEN norm will slightly modify ISO 16000-9 model room**
 - **Slightly larger surface**
 - **More detailed specifications**
 - **In harmonisation with formaldehyde E1 procedures**

	ISO 16000-9	New CEN standard	CA office	CA classroom
Floor m²	7	12	11.1	89.2
Height m	2.5	2.5	2.7	2.6
Volume m³	17.4	30	30.6	231
Temperature °C	23	23	23	23
Relative Humidity %	50	50	50	50
Effective air change / h	0.5	0.5	0.675	0.81

	ISO 16000-9	New CEN standard	EN 717-1	CA Section 01350
Size	open	min. 20 l	0.225 – 12 m³	20 – 100 l
Loading floor	(0.4)	0.4	1.0	0.3 – 0.7
Loading wall	(1.4)	1.0	1.0	0.3 – 0.7
Effective air change / h	(0.5)	0.25 – 1.5	1.0	1.0 ± 0.05
Temperature °C	23 ± 2	23 ± 1	23 ± 0.5	23 ± 1
Relative Humidity %	50 ± 5	50 ± 5	45 ± 3	50 ± 5

ISO: The ratio between ventilation and loading is fixed, not absolute values

- **Evaluation, e.g. by emissions test, standard schedule:**
 - after 3 days (early exposure, renovation) and
 - after 28 days (long-term exposure)
- **Shorter testing accepted**
 - if emissions are low and do not increase



Analysis of differences between testing labs in recent round robin tests:

■ Minor contribution of

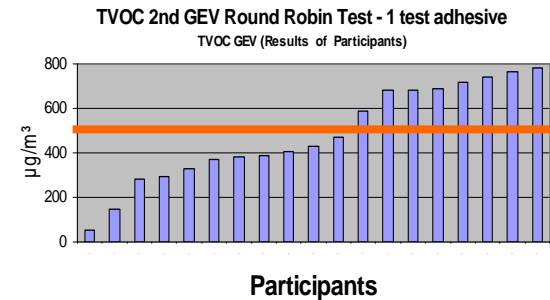
- Sample preparation
- Chamber device used
- Analytical device used

■ Main problem showed to be:

- Correct identification, with consequence for
 - Applying correct calibration factor (RRF)
 - Calculation of single substances
 - Calculation of sum parameters like TVOC

■ Core factor: Experience of the lab

■ Should analytical prescriptions be more detailed?



- **Various VOC / TVOC definitions are used today**
- **For VOC emission testing common definition is, as conventional method (ISO 16000-6):**
 - **Adsorption on Tenax TA / thermal desorption / GC/MS**
 - **Definition of what is VOC:**
 - **n-C6 – n-C16 on non-polar GC column**
 - **CHANGE in new CEN standard:**
 - **Use of slightly polar GC column for better separation of single VOC from each other, but still use the above definition**
 - **Calibration of single VOC and total TVOC, still up for debate:**
 - **TVOC as toluene equivalent**
 - **or TVOC as sum of all VOC**

- **Internal draft is written**
- **Validation is in planning**
 - **Robustness against change of test parameters**
 - **Within and between lab repeatability**
- **Chapter on sampling of product for representative testing is in preparation**
- **Still an issue of including further emitting substances**
 - **Now: VOC, some SVOC, some VVOC, volatile aldehydes,**
 - **What about ammonia?**
 - **What about other VVOC such as methanol?**
- **Final publication not realistic before 2011/2012**