



Selection of the right low VOC label for furniture from the offer in the market

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... allows working with VOC regulation and ecolabels in many countries



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Galten, Denmark
close to Arhus

Dealing with VOC emissions - Europe

- Blue Angel, Germany
- Ecolabel, Austria
- (AFSSET, France)
- Danish Indoor Climate Label
- LGA label, "Golden M", ...
- Indoor Air Comfort, Europe

Dealing with VOC emissions - USA

- California CDPH Section 01350
- ANSI/BIFMA, USA
- Indoor Advantage, USA
- Greenguard, USA

For PU foam:

- CertiPUR, Europe
- CertiPUR US

Dealing only with formaldehyde:

- E1 classification
- Regulations in Japan, USA, California
- European ecolabel

VOC emissions – Testing in chamber



VOC emissions – Testing in chamber

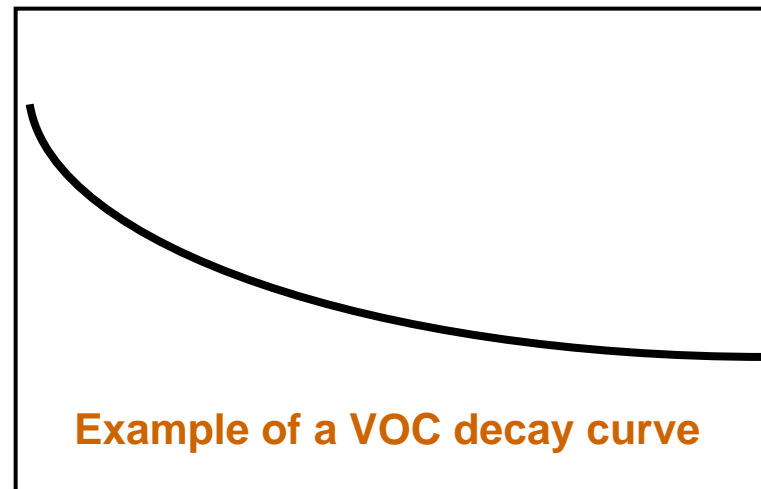


- **VOC content – almost no correlation with VOC emissions**
 - VOC in product can be encapsulated and never be emitted
 - No VOC in product – traces can always enter and be emitted
- **Character of VOC in product**
 - High volatile VOC – high start emissions, no long-term emissions
 - Low volatile VOC – low start emissions, some long-term emissions
 - Continuous production of formaldehyde from binder + humidity
- **Placement of VOC in product**
 - **Surface coating:**
 - Large emitting surface, any emissions will occur immediately
 - **Inner material, glues:**
 - Low emitting surface, emissions will occur with delay

Essential for any limit value:

- Time of emissions testing (typically after 3 + 28 days in test chamber)

Emissions



Days

- Geometry of reference room or test chamber, equipment, climate
 - EU reference room: 12 m² floor, 2,5 m high
 - ½ air change per hour, 23 °C, 50% relative humidity (in inlet air)
 - Blue Angel: 1 piece of furniture
 - BIFMA: Different typical office rooms and equipment

What you get from chamber testing is:

- Chamber air concentration at given time mg/m^3 , then calculate from that:
 - Emission rate per hour mg/h
 - Specific emission rate (US: emission factor)
 - per area $\text{mg}/\text{m}^2\text{h}$, or per piece of furniture
 - Contribution to air concentration mg/m^3 in a reference room or in a real room (source strength) after a specified time of off-gassing
 - This is compared with limit values
- Specific emission rate can be added (e.g. plate and legs of a chair)
 - Determine emissions of each component, determine relative surface of components in furniture, add up all contributions to total emissions

Labels for furniture

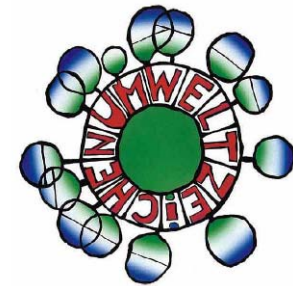
- European ecolabel (also called EU "Flower" due its logo) is having long lists of criteria for several products and services
- VOC emissions NOT touched in furniture criteria (2009/894/CE):
 - Formaldehyde emissions is limited for surface treatment but without testing time nor methodology (= *useless*)
 - Formaldehyde emissions is limited for wood-based material
 - VOC content only is limited for glues



- German Blue Angel is one of the oldest and largest ecolabels.
- Many Blue Angel criteria are specified for products where VOC is out of interest, e.g. energy saving lamps.
- Some criteria include requirements on emissions of VOC and formaldehyde into indoor air:
 - RAL UZ 38 – wooden furniture
 - RAL UZ 117 – upholstered furniture
 - RAL UZ 119 – mattresses
 - RAL UZ 148 – upholstery leather
- VOC emissions limited after 3 + 28 days
(RAL UZ 38 testing after 1 day will change to 3 days soon)
- Limits for VOC (LCI), TVOC, TSVOC, formaldehyde, carcinogens, ...
- LCI = Lowest Concentration of Interest, published by AgBB
= German limit value for VOC emissions after 28 days



- Many Umweltzeichen criteria are specified for products where VOC is out of interest.
- Some criteria include requirements on emissions of VOC and formaldehyde into indoor air:
 - UZ 06 – wooden furniture
 - UZ 54 – upholstered furniture
 - UZ 55 – mattresses
- VOC emissions limited after 3 + 28 days, or after 28 days only
- Limits for TVOC, formaldehyde;
UZ 54 also for VOC (LCI), TSVOC, carcinogens – like Blue Angel



- Special VOC related label for several product groups (construction products, furniture, ...)
- Emissions evaluation looks only at those VOC that are listed in a Danish database with irritation threshold limits ("VOCBASE").
 - Time (in days) is calculated when $\frac{1}{2}$ of each irritation threshold is reached in a model room. Then also an odor test has to be passed.
 - Earlier also $\frac{1}{2}$ odor threshold was included in the evaluation, but this was dropped recently.
- Detailed specifications of how many pieces of furniture are in the reference room



- Several private ecolabels are issued by special test houses or by trade associations for specific product groups:
 - LGA mark, TÜV mark, Golden M, Toxproof, ...
 - Purchase specifications, e.g. IKEA
- Some dangerous ingredients in the product are restricted.
- VOCs limits differ per product group, most times VOC is limited after 1 and/or 3 and/or 28 days.
- Not all of them well documented.

- Private label with some special properties:
 - Most focus on emissions into indoor air
 - No further restriction of substances than those given by law
 - Additional reliability of low VOC emissions statement is given by certification (including on-site audits, re-testing)
 - Basic level: Combines all legal requirements in Europe; the lowest limit value of each country is selected.
 - GOLD level: Combines most voluntary requirements (ecolabels) in Europe; the lowest limit value of each label is selected. *(some special labels such as the Danish label have not been considered)*
- Applicable for several construction products and furniture.



CDPH = California Department of Public Health

- Developed as purchase criteria in California
- Important as reference in the USA and for LEED
- Based on VOC emission testing
 - First 10 days storage, then 4 days in test chamber
 - Results are calculated for class room and for office room
 - Residential exposure scenario is in preparation
- Testing:
 - After (in total) 11, 12 and 14 days
- Evaluation after 14 days:
 - Limit values: $\frac{1}{2}$ of CREL (chronic respiratory exposure levels)
 - 35 VOCs are on CREL list of 2010
 - No TVOC limit value in California
- Revision is on-going in 2010



- **Ecolabel for office and institutional furniture (including e.g. schools)**
 - **Testing: After 3 and 7 days, then extrapolation to emissions after 14 days**
 - **Results are calculated for small private office room and for open-plan office – and as emission factors ($\mu\text{g}/\text{m}^2\text{h}$)**
 - **Limit values for: TVOC, formaldehyde, acetaldehyde, and 4-phenylcyclohexene after 14 days**
 - **Includes not only testing, but also certification (including on-site audits of manufacturing process, and re-testing)**
 - **Forms part of BIFMA level™ sustainability standard (ch. 7.6)**
- **Revision (2010) almost completed**
- **Not applicable to residential furniture, meeting rooms, restaurants, hotels, hospitals (except offices in those buildings)**



- Ecolabel for several construction products and furniture
- Indoor Advantage basic level: ANSI/BIFMA X7.1/M7.1
- Indoor Advantage Gold level:
ANSI/BIFMA X7.1/M7.1 plus CDPH Section 01350
- Includes not only testing but also certification
(including on-site audits of manufacturing process, and re-testing)



- Private-owned ecolabel for construction products, furniture, cleaners, ...
 - Two levels: Greenguard Product Certification, and Greenguard Children & Schools Certification
- Testing:
 - After 6 hours, then after 1, 2, 3, 4 and 7 days
 - Annual and quarterly simplified re-testing
- Limit values, evaluated after 7 days:
 - TVOC, carcinogens, and a list of VOCs
 - Includes not only testing, but also certification (including on-site audits of manufacturing process, and re-testing)



- **Several other labels include low VOC emissions requirements**
 - e.g. Green Label Hong Kong or Green Label China
 - Most of these specify TVOC limit value without specifying after which time this limit value shall be respected
- **Some regulation goes only for formaldehyde**
 - E1 formaldehyde class (developed for wood-based panels, now also used with CE marking of wooden floorings, and for some insulation foams)
 - Several ecolabels require ½ E1
 - So do LEED 2012, IKEA
 - CARB – Californian limitation of VOC emissions from wood-based panels, just recently taken over as US-wide national regulation; mostly lower limit values than in Europe
 - Japanese regulation, allowing only low formaldehyde emitting products (F****) in buildings without limitations

- Large variety of sustainability rating systems exists
 - Only some of these include product VOC or formaldehyde requirements, such as **LEED (USA, Italy, ...)**, **HQE (France)**
- Products can NOT be certified
 - Building projects earn points for achieving high ranking, e.g. for energy saving
 - Use of low VOC products can help earning some points by fulfilling specifications, “credits”, on low VOCs
 - Product testing may deliver essential documentation for showing compliance with these credits
 - Final decision on acceptance is with a building auditor
- As an example – the US GBC[®] logo on a product means nothing more than:
 - Manufacturer is member of US GBC[®] organization.



Which regulation and label is relevant?



Selection of most appropriate low VOC rating schemes depends on where and how a manufacturer wants to sell his products:

- In which countries?
- For which sustainable buildings system?
- On which level of low VOC ambitions?

The following 4 slides contain some overview over regulations and labels per products, per country, and per ambition level.

Final decision depends on the individual plans of each company.

For consulting on best selection, please email to:

voc@eurofins.com,

or ask other experts.

Which regulation and label is relevant?

Per country:

■ Pan-European:

- Indoor Air Comfort, EU ecolabel, Formaldehyde E1 class

■ Germany, Austria:

- Blue Angel, Austrian ecolabel

■ France:

- *(AFSSET plans extension to furniture)*

■ Scandinavia:

- Danish label

■ USA:

- CDPH Section 01350, Indoor Advantage, BIFMA, Greenguard

Which regulation and label is relevant?

Per sustainable building rating system:

- **LEED USA:**
 - **CDPH Section 01350, BIFMA**
- **LEED Italy:**
 - **Wood-based panels must not contain urea-formaldehyde resin**
- **HQE (France):**
 - **Formaldehyde E1 class, Blue Angel, ...**

Which regulation and label is more ambitious?



- **Lowest limit values:**
 - **Indoor Air Comfort GOLD**
- **Medium range:**
 - **Blue Angel, Austrian ecolabel, Danish label, Greenguard**
- **Less strict limit values:**
 - **AgBB, CDPH, BIFMA, Indoor Advantage, Indoor Air Comfort**
- **Exception - formaldehyde:**
 - **Lowest limit values in France and in California**
(10 µg/m³ emissions after 28 days in France,
and in California (Section 01350) 16.5 µg/m³ now, but 9 µg/m³ from 2012 on)

Save costs if you need several labels:

- If the testing lab is approved by all labels relevant for a manufacturer, then one combined test is possible including most regulations and ecolabels
- Costs saving comes from:
 - Use of test chamber only one time
 - Chamber air sampling and analysis can be used for different labels if all these require sampling at the same time, e.g. after 28 days
 - One example:
Combine Blue Angel + California CDPH in one test run:
Air analysis after 3, 11, 12, 14 and 28 days.
- Most involved labels still will require their license fees, but testing costs can be reduced this way.

More information, and links to original documents, is available at our homepage:

- www.product-testing.eurofins.com/ecolabels.aspx

Regular updates can be seen in several blogs, e.g. at WordPress.

- Links to VOC blogs can be found here:
www.product-testing.eurofins.com/voc-blogs.aspx

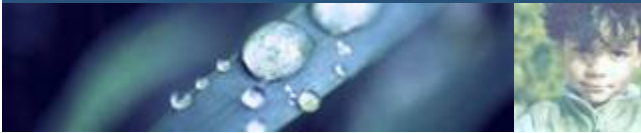
Seminars for more detailed information on this issue are offered in English and in German in December 2010.

- For details:
www.product-testing.eurofins.com/voc-events.aspx

**Use existing information and expertise,
and make a good plan on where and how
you may need low VOC emission specifications**

–

**then the variety of low VOC emissions specifications
can be handled in a somehow reasonable manner.**



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Please direct any questions to my email address:

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