



Nordic guide to sustainable materials

Workshop on Emerging Pollutants in Non-industrial Indoor Environments

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BYGGEVAREINDUSTRIEN

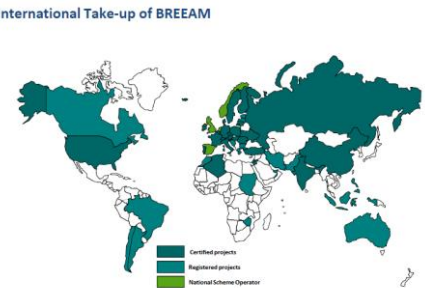
 **TILSLUTTET
NHO**

Three relevant building material projects concerning indoor emissions

- BREEAM Nor ver 2015
- Nordic guide for sustainable materials
- Ecoproduct

What is BREEAM Nor?

- BREEAM is an assessment system for construction and buildings
- Norwegian version of the international BREEAM
 - recognized by being holistic, and practical improvement of sustainability and quality in buildings
 - increases awareness of how owners, tenants and society t
 - Increased predictability of health, comfort and efficiency
 - Improved environment and lower energy consumption
 - Improved economy, performance and value
- Verified and certification
- Developed by representatives in the building sector
- Managed by the Norwegian Green Building Council (NGBC)
- 1. Norwegian version autumn 2011



BREEM[®]NOR



Energy



Materials



Health and wellbeing



Transport



Waste



Management



Landuse Ecology



Water



Polution

Hea 9 – Volatile Organic Compounds (ver 1)

No. of credits available				Issue Title	Minimum Standards				
Retail	Office	Indust.	Educat.		P	G	VG	E	O
2	2	2	2	Hea 9 – Pollutants in the indoor environment	-	-	1	2	2

- Clean and tidy building process, including documenting a given quality level
- Max VOC emissions for paint and varnishes
- Max VOC emissions for 5 (6) product groups

Hea2 – Emissions to indoor air (ver 2015)


- Minimum standard for all BREEAM levels: IAQ-plan New
 - Removal of contaminant sources
 - Dilution and control of contaminant sources
 - Procedures for pre-occupancy flush out
 - 3rd party testing and analysis
 - Maintaining indoor air quality in-use

- Minimum standard for documented product categories for the most ambitious BREEAM levels (1-2 credits)

- One or two credits - VOC emissions by product type
 - At least 6 (8) out of the 9 given product categories, including paints and varnishes, have been tested against and meet relevant criteria. New

- Extra credit (Exemplary level): VOC emissions by building level (post building, but pre-occupancy)
 - Formaldehyde concentration level is measured post construction New
 - Total volatile organic compound (TVOC) concentration is measured post construction

VOC criteria by product type

1. Paint and varnishes (applied on site)
2. Wood panels 
3. Timber structures (e.g glue laminated)
4. Wood flooring
5. Resilient textile and laminated floor coverings
6. Suspended ceiling
7. Flooring adhesives
8. Sealants
9. Screed material and floor screed

How to deal with "natural"
emissions from pine?

Testing according
to given standards

Performance levels - Products

- Established certifications are essential as documentation

	Very small areas - 0,007 m2/m3		Small areas - 0,05 m2/m3		Floor/ceiling - 0,4 m2/3		Wall - 1 m2/m3	
	ug/m3	ug/(m2 h)	ug/m3	ug/(m2 h)	ug/m3	ug/(m2 h)	ug/m3	ug/(m2 h)
M1 - 28 days								
TVOC	20	188	20	1420	160	200	417	200
Formaldehyde	10	94	10	710	40	50	104	50
Ammonia	10	94	10	710	24	30	60	30
Carcinogenic	1	9	1	71	4	5	10	5
EC1 - 28 days								
TVOC	100	7100			100	125		
Formaldehyde	50 - 3 days				50 - 3 days			
Ammonia								
Carcinogenic	1				1			
EC1 Plus - 28 days								
TVOC	60	4260			60	75		
Formaldehyde	50 - 3 days				50 - 3 days			
Ammonia								
Carcinogenic	1	71			1	1,25		

Ref. Thale Plesser, SINTEF

Performance levels and documentation - Products

M1 and EC 1 (and GUT for floor coverings) are accepted for all Products except for Sealants where M1 and EC 1 Plus is an accepted level

	Wall ug/m3	Floor/ceiling ug/m3	Small areas ug/m3
TVOC	417	160	60
Formaldehyde	E1 or 104	E1 or 40	50 after 3 days
Carcinogenic	10	4	1



Exception: Only E1 for wood panels based on pine wood

EGENDEKLARASJON

nå at sponplate-produktene i tabellen nedenfor tilfredsstiller de krav som stilles i BREEAM- NORs emne HEA 9.

Produsent: Forestia AS, Braskereidfoss.

Produkt:	Forestia Gulv Standard, Forestia Gulv Ekstra, Forestia Flytende Gulv Standard, Forestia Renoveringsgulv Standard, Forestia Prosjektgulv Ekstra, Tak Ess Inspirasjon (Alkorcell-folie), Forestia Møbel Standard.	Forestia Vegg Standard, Forestia Vegg Ekstra, Forestia 3 Vegg Standard, Forestia 3 Vegg Ekstra, Forestia 3 Vegg m/ grunning, Forestia Ferdigvegg (PVC-folie), Forestia Ferdigvegg (Alkorcell-folie), Forestia Walls 2 Paint.
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Krav:	Relevante standarder	Ja	Nei	Kommentar
1.a	Produktet kan klassifiseres som E1 iht. testmetode EN 717-1:2004	EN 13986:2004 EN 717-1:2004	X	
1.b	Undertegnede kan bekrefte at produktet ikke er tilsatt noen materialer som inneholder formaldehyd under produksjon eller ved bearbeiding etter produksjonen. Disse kan klassifiseres som E1 uten prøving.	Se NS-EN 13986:2004 for detaljert informasjon om dette.	X	Det benyttes et urea-formaldehyd lim ved produksjonen av plata.
2.	Produktet har en emisjonstest som viser at emisjoner av TVOC er under 0,2 mg/m³ h	NS-EN 15251:2007 (Tillegg C)	X	
3.	Produktet har en emisjonstest som viser at emisjoner av formaldehyd er under 0,05 mg/m³ h	NS-EN 15251:2007 (Tillegg C)	X	
4.a	Produktet har en emisjonstest som viser at emisjoner av ammoniakk er under 0,03 mg/m³ h	NS-EN 15251:2007 (Tillegg C)	X	
4.b	Produktet har ikke en emisjonstest som måler emisjoner av ammoniakk, men undertegnede kan bekrefte 1) At ammoniakk ikke er sporbart aktivt i produktet, OG 2) At produktet ikke inneholder stoffer som kan avspaltes til ammoniakk			Ammoniakk er en tilsetning i produktresepten, men bindes i plata og emitterer ikke til romluften etter at plata er herdet.

5.	Produktet har en emisjonstest som viser at emisjoner av kreftfremkallende forbindelser (IARC) er under 0,005 mg/m³ h	NS-EN 15251:2007 (Tillegg C)	X	
6.	Produktet har en emisjonstest som viser at misnøye med lukt er under 15% .	NS-EN 15251:2007 (Tillegg C)	X	
7.	Testene i punkt 2-6 er utført iht. ISO 16000-serien med målinger gjort etter 28 dager.	ISO 16000	X	
8.	Undertegnede kan bekrefte fravær av regulerte treimpregneringsmidler og at minimumsnivå er overholdt	NS-EN 13986:2004	X	

Juridisk ansvarlig: **Hans Kristian Eig,**

Dato: **13. 03. 2015.**

Stilling: **Kvalitets- og miljøsjef .**

Signatur:



Measurement post construction

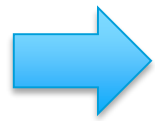
Air measurement: Post construction, but pre-occupancy.

Contaminant	Maximum concentration	Testing methods
Formaldehyde	100 $\mu\text{g}/\text{m}^3$ 4 hours average)	ISO 16000-3 ISO 16000-4
TVOC	300 $\mu\text{g}/\text{m}^3$ * (8 hours average)	ISO 16000-6 ISO 16017-2

- If levels > these limits, the project team confirms measures in accordance with the IAQ plan, to reduce the TVOC and formaldehyde levels to within the above limits.

The challenge

– post construction, pre occupancy



Nordic guide to sustainable materials

The objectives

- To agree on a common Nordic set of functional criteria
- Stimulate development of Environmental Product Declarations for Nordic products
- Simplifying the procurement process for sustainable materials



Four central indicators

Greenhouse gas emissions	Material resources	Hazardous substances	Emissions to indoor climate
Best Nordic practice			
High ambitions			
Good ambitions			

Emissions to indoor air

Emissions to indoor air
Low emission level (according to EN 15251) Documentation as M1, EC1, GUT or corresponding level based on these certification systems
Medium emission level Documentation as M2 or corresponding level base on this certification system
Self-declaration

- The highest level (Best Nordic practice) corresponds to the criteria in BREEAM Nor, 2015

EPD - Ecoprofile

- EPD
 - Standardized 3-part verified environmental declaration of products/materials
 - Based on life cycle assessment (LCA) – ISO 14025
 - Environmental impacts (Global warming -, acidification – potential)
 - Norwegian EPDs
 - Mandatory with indoor air emissions (for instance. M1, Emicode ...)



NORGIPS

Indoor environment

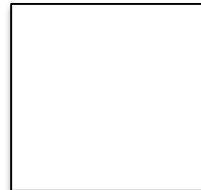
TVOC	<10	µg/m ³ h	Measured after 3 days
Formaldehyde	<10	µg/m ³ h	
Ammonia	22	µg/m ³ h	
Carcinogenic compounds	<2	µg/m ³ h	
Classified as category	M1	Classification according to EN 15251:2007	

Ecoprofile – based on EPDs

- Four indicators
 - Indoor air emissions
 - Hazardous substances
 - Greenhouse gas emissions
 - Use of resources

Assessment	Grade	Criteria
Excellent	1	Very low emitting, EN 15251 Stone, marble, glass, steel etc.
Good	2	Low emitting EN 15251 -M1 -GEV Ecode EC1 and EC1 Plus -GUT (Not if product contain ammonia) -SINTEF Technical approval
Average to good	3	
Average	4	
	5	
Marginally acceptable	6	-M2 -GEV Ecode EC2
Poor	7	
Unacceptable	8	M3

- Three characters



Conclusion

Indoor air emissions from building materials is important for

- The building producers
- The contractors
- The developers/real estate holders