SINTEF Technical Approval – Requirements for Health and Environmental Properties

1 Background

Products that will have SINTEF Technical Approval (TG) are also assessed with regard to health and environmental properties. The health and environmental assessments are based on TEK 17 - Building Technology Regulations, where, among other things, it is required to:

- choose products without any, or with low content of, substances that are harmful to health and the environment (§ 9-2)
- limit the amount of waste, and use products that can be reused and recycled (§ 9-5)
- use products that give low or no pollution to indoor air (§ 13-1)
- choose products in contact with drinking water that do not emit substances that impair the quality of the drinking water or cause health hazards (§ 15-5)

The obligation to make a substitution pursuant to Section 3a of the Product Control Act requires enterprises that use substances that are harmful to health and the environment to consider less harmful alternatives.

Figure 1 shows the main points in the health and environmental assessment. The scope of the product determines the scope of the assessment. Health and environmental assessments of products included in SINTEF Technical Approval are comprised of the construction phase, the use phase and the waste phase.

Product in production phase (factory)	**Not part of the health and environmental assessment for SINTEF Technical Approval**
Product in construction phase (assembly – construction site)	• **Waste during/after assembly** • **Content of hazardous substances**
Product in usage phase (finished in an enclosed building)	• **Content of hazardous substances** • **Products in contact with indoor air: Release of hazardous substances to indoor air** • **Products in contact with drinking water: Release of hazardous substances into drinking water** • **Products in contact with soil, groundwater or surface water: release of environmentally hazardous substances to soil, groundwater and surface water**
Products in the waste phase (after construction/assemby and usage phases)	• **Content of hazardous substances** • **Waste faction (eg wood, metal, hazardous waste)** • **Waste treatment (recycling, landfill)**

Figure 1. Assessment of products that will have SINTEF Technical Approval. The scope of application determines the scope of the assessment.

2 Documentation and Requirements/Limits

2.1 Documentation

A product that is to have SINTEF Technical Approval may consist of one or more components. The applicant must submit the following documents for all components to be included in the SINTEF Technical Approval:

- A list of all components included in the approval
- A brief description of the application/use for each component
- The "*Environmental Data Collection - Self-declaration*" form must be completed for each component. The proprietor should fill in the declaration, as long as this is the manufacturer. Alternatively, the subcontractor must complete the declaration.
- Technical data sheets or other product descriptions for all components included in the approval
- Safety data sheets (only applicable to components that must have safety data sheets)
- Products in contact with indoor air: see section 2.3
- Products in contact with soil, ground water or surface water: see chapter 2.4
- Products in contact with drinking water: see chapter 2.5
- EPS and XPS: see chapter 2.6

Requirements for content of hazardous substances - applies to all product types
Requirements for content of hazardous substances:

- Production phase: no requirements for content of hazardous substances
- Construction phase:
  - Chemical solutions that dry or harden during the construction phase: see table 1
  - Solid processed products: see table 2
- Usage and waste phases:
  - Dry or hardened chemical products: see table 2
  - Solid processed products: see table 2

Production, construction, usage and waste phases are all described in figure 1.

Table 1. Concentration limits for construction phases (the building of the product). The limit values apply to chemical preparations that dry or harden during the construction phase. Examples of chemical mixtures: adhesives, sealants, paints, mortars and screeds.

Classification	**Concentration limits (m/m) – before the product dries or cures - during installation / installation**	**Comments**
Carc. 1A H350 Carc. 1B H350	0.1 %	
Carc. 2 H351	1 %	
Repr. 1A H360 Repr. 1B H360	0.3 %	
Repr. 2 H361	3 %	
Muta. 1A H340 Muta. 1B H340	0.1 %	
Muta. 2 H341	1 %	
Brominated flame retardants	0.1 %	The group does not include PolyFR (CAS 1195978-93-8)
Priority list connections	0.1 %	
Candidate List Connections	0.1 %	
Hormone interfering - human and/or animal category 1	0.1 %	
PBT, vPvB	0.1 %	

Table 2.

Concentration limits for construction phase (solid processed products and dry or hardened chemical products), use phase and waste phase.

Classification	Concentration limits (m/m)	Comments
Skin Corr. 1A H314 Skin Irrit. 2 H315 Eye Dam. 1 H318 Eye Irrit. 2 H319	Sum H314: 1 % Sum H318: 10 % Sum H315 and H319: 20 %	Only substances in amounts of ≥ 1% are included in the calculation
STOT SE 1 H370	1 %	
STOT SE 2 H371	10 %	
STOT SE 3 H335	20 %	
STOT RE 1 H372	1 %	
STOT RE 2 H373	10 %	
Asp. Tox. 1 H304	10 %	
Acute Tox. 1	H300: 0,1 % H310: 0,25 % H330: 0,1 %	Only substances in amounts of ≥ 0.1% are included in the calculation
Acute Tox. 2	Sum H300: 0,25 % Sum H310: 2,5 % Sum H330: 0,5 %	Only substances in amounts of ≥ 0.1% are included in the calculation
Acute Tox. 3	Sum H301: 5 % Sum H311: 15 % Sum H331: 3,5 %	Only substances in amounts of ≥ 0.1% are included in the calculation
Acute Tox. 4	Sum H302: 25 % Sum H312: 55 % Sum H332: 22,5 %	Only substances in amounts of ≥ 0.1% are included in the calculation
Carc. 1A H350 Carc. 1B H350	0,1 %	
Carc. 2 H351	1 %	
Repr. 1A H360 Repr. 1B H360	0,3 %	
Repr. 2 H361	3 %	
Muta. 1A H340 Muta. 1B H340	0,1 %	
Muta. 2 H341	1 %	
Resp. Sens. 1 H334 Skin. Sens. H317	10 %	
Ozone H420	0,1 %	
Aquatic Acute H400	Sum Aquatic Acute H400: 25 %	Only substances in amounts of ≥ 0.1% are included in the calculation
Aquatic Chronic 1 H410 Aquatic Chronic 2 H411 Aquatic Chronic 3 H412 Aquatic Chronic 4 H413	100*Sum H410 + 10*Sum H411 + Sum H412: 25 % Sum H410 + Sum H411 + Sum H412 + Sum H413: 25 %	H410: Only substances in amounts of ≥ 0.1% are included in the calculation H411, H412 and H413: Only substances in amounts of ≥ 0.1% are included in the calculation
Brominated flame retardants	0,1 %	The group doesn't include PolyFR (CAS 1195978-93-8)
Priority list connections	0,1 %	
Candidate List Connections	0,1 %	
Hormone interfering - human and/or animal category 1	0,1 %	
PBT, vPvB	0,1 %	
Nanoparticles	No requirements, but we check whether if the product contains nanoparticles	

2.2 Requirements for products that affect the indoor environment

Products that affect the indoor environment: products used within the vapor barrier or are part of the vapor barrier / vapor barrier system.

2.3.1 Glued wood-based products

For bonded wood-based products (e.g. OSB, chipboard, glulam, plywood), the release of formaldehyde is tested according to EN 717-1, EN 12460-3 (replaces EN 717-2) or EN 12460-5 (replaces EN 120). The test must be carried out by independent test laboratories that are accredited for the test method. The product must achieve emissions class E1.

2.3.2 All products except glued wood-based products

Examination of emissions shall be carried out as follows:

- Release of volatile organic compounds (VOC) according to EN ISO 16000-9 in combination with ISO 16000-6. Trial for 28 days.
- Release of formaldehyde tested according to EN ISO 16000-9 in combination with ISO 16000-3. Trial for 28 days.

Test preparation, calculation of TVOC and reporting shall be in accordance with EN 16516. The test shall be carried out by an independent test laboratory which is accredited for the test method. Requirements needed to pass the emission test are given in table 3.

Products that have the following certifications meet the requirements for emissions for SINTEF Technical Approval:

- M1 Emission Class for Building Materials
- GEV Emicode EC1 and EC1 Plus

Table 3. Requirements needed to pass emissions test.

Parameter – 28 days	**Limit value - very small areas[1)] [µg/ (m^2 h)]**	**Limit value - floors/ceilings, walls and small areas[)] [µg/ (m^2 h)]**
TVOC	7100 µg/ (m^2 h)	200 µg/ (m^2 h)
Formaldehyde	700 µg/ (m^2 h)	50 µg/ (m^2 h)
Carcinogenic - sum	70 µg/ (m^2 h)	10 µg/ (m^2 h)

1) Very small areas are defined in PD CEN/TS16516 as sealants and similar products used in small quantities, i.e. load factor 0.007 m2 / m3.

2) Floors/ceilings, walls and small areas (windows/doors) are defined in CEN/TS16516. These are products that are used over larger areas than sealants.

2.4 Requirements for products which come into contact with soil or water

Products that come into contact with soil or water: products which come into contact with groundwater, surface water or soil - outdoor products with a large surface area.

2.4.1 Testing of larger products

For the testing of leaching from larger products, a leaching test as described in CEN / TS 16637-1 and CEN / TS 16637-2 is used. The following parameters are used:

- Every leaching stage must be tested (64 days).
- All products leaching water are referenced are analysed for the following:
  - Containment of As, Cr, Cu, Ni, Zn, Pb, Cd and Hg
  - pH
  - Conductivity
- Drainage water is analysed for organic substances according to EN 15768. Single compounds are reported with estimated concentration (toluene equivalents).

The test must be carried out by an independent test laboratory. Requirements for passed leaching test are given in table 4.

Table 4. Limit values based on leakage, according to CEN / TS 16637-2.

Parameter	**Maximum allowed cumulative emission after 64 days, $R_{64\ days}$ (=R_8) [mg/m^2]**
Arsenic, As	260
Cadmium, Cd	3,8
Chromium, Cr	120
Copper, Cu	98
Mercury, Hg	1,4
Nickel, Ni	81
Lead, Pb	400
Zinc, Zn	800

2.4.2 Testing of granules

For testing of leaching from granulated material, the leaching test as described in CEN / TS 16637-3 is used.

2.5 Requirements for products which come into contact with drinking water

Products which come into contact with drinking water: products used in the supply of drinking water and which are in direct contact with the water.

2.5.1 Testing of faucets and other fittings made of metal

Faucets, pipes and other metal products in contact with drinking water must be tested for leakage of lead and cadmium in accordance with NKB Product Rules, wherever these are found for the product group. The test must be carried out by an independent test laboratory that is accredited for the test method.

2.5.2 Testing of plastic products

Plastic products which are in contact with drinking water must be tested according to the following standards:

- Leakage from factory-manufactured products (for example, pipes) is tested in accordance with EN 12873-1
- Leaching from space-limited products (e.g. a surface treatment) is tested in accordance with EN 12873-2
- Determination of odour and taste of the leachate is tested in accordance with EN 1420 in combination with EN 1622

Products with the following documentation meet the requirements for SINTEF Technical Approval:

- Certified according to the German KTW guidelines from Umwelt Bundesamt or equivalent.
- Certified according to the Dutch "*Regeling materialen en chemicaliën drink- en warm tapwatervoorziening*".

The test must be carried out by an independent test laboratory that is accredited for the test methods.

2.6 Special requirements for documentation

2.6.1 XPS

XPS (extruded polystyrene) should be tested for:

- Test of Br using XRF or according to EN 14582.
- Content of chlorofluorocarbons and similar compounds:
  - CFC-11, CAS 75-69-4
  - CFC-12, CAS 75-71-8
  - HCFC-22, CAS 75-45-6
  - CFC-113, CAS 76-13-1
  - HCFC-142b, CAS 75-68-3
- The test must be performed by an independent, accredited laboratory.
- Limit values (brominated flame retardants and ozone-damaging substances) are shown in chapter 2.2.

2.6.2 EPS

EPS (expanded polystyrene) must be tested with consideration of:

- Test of Br using XRF or according to EN 14582.
- The test must be performed by an independent, accredited laboratory. The laboratory is selected by agreement with SINTEF Building and Infrastructure.
- Limit values (brominated flame retardants) are shown in chapter 2.2.

2.6.3 Other products

After assessment, separate requirements can be made for documentation for special product groups

3 References

CEN/TS 16637-1:2014 *Construction products – Assessment of release of dangerous substances – Part 1: Guidance for the determination of leaching tests and additional steps*

CEN/TS 16637-2:2014 *Construction products – Assessment of release of dangerous substances – Part 2: Horizontal dynamic surface leaching test*

CEN/TS 16637-3:2016 *Construction products – Assessment of release of dangerous substances – Part 3: Horizontal up-flow percolation test*

EN 120:1998. *Trebaserte plater - Bestemmelse av formaldehydinnhold - Ekstraksjonsmetode kalt perforatormetoden*

EN 717-1:2004. *Trebaserte platematerialer - Bestemmelse av formaldehydutslipp - Del 1: Formaldehydutslipp ved kammermetode*

EN 717-2:1994. *Trebaserte platematerialer - Bestemmelse av formaldehydutslipp - Del 2: Formaldehydutslipp bestemt ved gassanalysemetoden*

EN 1420:2016. *Innflytelse av organiske materialer på drikkevann til mennesker - Bestemmelse av odør- og smaksvurdering av vann i rørsystemer*

EN 1622:2006. *Vannundersøkelse. Bestemmelse av terskelverdi for lukt (TON) og terskelverdi for smak (TFN)*

EN 12873-1:2014 *Materialers påvirkning av drikkevann - Påvirkning ved migrering - Del 1: Prøving av fabrikkframstilte produkter laget av eller som inneholder organiske eller glassaktige materialer (porselen / glassaktig emalje)*

EN 12873-2:2005 *Materialers påvirkning på drikkevann – Påvirkning ved migrering – Del 2: Prøvingsmetode for ikke-metalliske og ikke-sementbaserte materialer brukt på stedet*

EN 15768:2015. *Materialers påvirkning på drikkevann. GC-MS-identifikasjon av vannløselige organiske forbindelser*

EN 16516:2017. *Byggevarer - Vurdering av frigjøring av farlige stoffer - Bestemmelse av utslipp til inneluft*

EN ISO 12460-3:2015. *Trebaserte plater - Bestemmelse av formaldehydutslipp - Del 3: Gassanalysemetode*

EN ISO 12460-5:2015. *Trebaserte plater - Bestemmelse av formaldehydutslipp - Del 5: Ekstraksjonsmetode (kalt perforatormetoden)*

EN ISO 16000-9:2006. *Luftundersøkelse i inneluft - Del 9: Bestemmelse av emisjon av flyktige organiske forbindelser fra byggevarer og innredning - Emisjonskammermetode*

ISO 16000-3:2011. *Indoor air – Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air – Active sampling method*

ISO 16000-6:2011. *Indoor air - Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA sorbent, thermal desorption and gas chromatography using MS or MS-FID*

Candidate list. https://echa.europa.eu/

NKB Product rules. The Nordic committee for building regulations Priority list.

http://www.miljostatus.no/prioritetslisten

Product Control Act. Act on control of products and consumer services. www.lovdata.no

TEK17. Regulations on technical requirements for building works (Building technical regulations). www.lovdata.no

Figures: https://www.freeiconspng.com/img/1218, https://www.freeiconspng.com/img/4214, https://www.freeiconspng.com/img/35631, https://www.freeiconspng.com/img/35635