EUROPÄISCHE ARBEITSGRUPPE ZUR BEWERTUNG VON BAUPRODUKTEMISSIONEN

PERSPEKTIVEN FÜR UMWELT & GESELLSCHAFT umweltbundesamt

BAUPRODUKTEVERORDNUNG 305/2011 (EU)

- **Bauprodukt** = *jedes Produkt oder jeder Bausatz das/der hergestellt und in Verkehr gebracht wird, um dauerhaft in Bauwerken oder Teilen davon eingebaut wird, und dessen Leistung sich auf die Leistung des Bauwerks im Hinblick auf die Grundanforderungen an Bauwerken auswirkt.*
- **CE**-Kennzeichnung für schrankenlose Vermarkung in der EU (Leistungserklärung)
- Techn. Details: Harmonisierte Europäische **Normen** oder Europäische Techn. Bewertungen

BAUPRODUKTEVERORDNUNG 305/2011 (EU)

- Das Bauwerk muss derart entworfen und ausgeführt sein, dass es während seines gesamten Lebenszyklus
  - weder die **Hygiene noch die Gesundheit und Sicherheit von Arbeitnehmern, Bewohnern oder Anwohnern** gefährdet
  - weder bei Errichtung noch bei Nutzung oder Abriss insbesondere durch folgende Einflüsse übermäßig stark auf die **Umweltqualität oder das Klima** auswirkt:

    - Emission von gefährlichen Stoffen, flüchtigen organischen Verbindungen, Treibhausgasen oder gefährlichen Partikeln in die Innen- oder Außenluft
    - Emission von Strahlen, Emission von Stoffen ins Grund-/Trinkwasser, Abfall,…

BAUPRODUKTEVERORDNUNG 305/2011 (EU)

- Gegebenenfalls sollten der Leistungserklärung Angaben über den Gehalt an gefährlichen Stoffen im Bauprodukt beigefügt werden (Bauprod VO)
- Genaue Anforderungen können von den Mitgliedsstaaten bestimmt werden

➢ Kommission kann **delegierte Rechtakte** erlassen um Leistungsklassen in Bezug auf die wesentlichen Merkmale von Bauprodukten festzulegen

EUROPÄISCHE TRADITIONEN (BESTANDSAUFNAHME 2011)

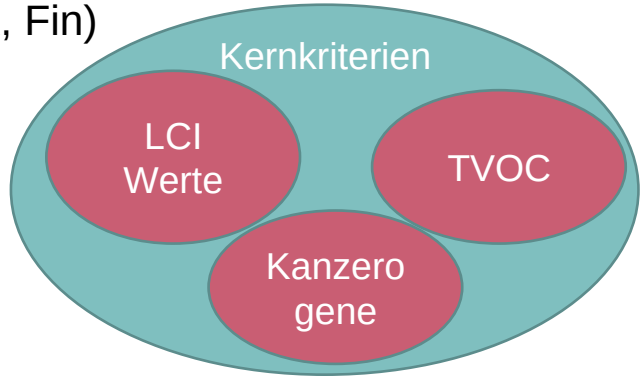
- Finnland: TVOC < 200 µg/m³ + Geruch = M1, M2, M3 (Klassen)
- Dänemark: Irritation + Geruch = 10, 20, 30 Tage
- Deutschland: LCI + TVOCs < 1000 µg/m³ = Ja/Nein
- Frankreich: LCI + TVOCs < 1000 µg/m³ = Ja/Nein

TVOC = Summe flüchtiger organ. Verbindungen

LCI = Lowest concentration of interest

HARMONISIERUNGS-INITIATIVEN

- 2007-2011: erste Initiativen engagierte MS (De, F, DK, Fin)
  - Vergleich vorhandener Systeme
  - Definition von Kernkriterien
  - Europ. Collaborative Action - Report Nr 27



- 2011: EU-LCI group (Joint Research Center)
  - Definitionen, Kriterien, Ableitungsschema
  - Europ. Collaborative Action - Report Nr 29

- 2015: Mandat der Europäischen Union (DG GROW)

LCI – „LOWEST CONCENTRATION OF INTEREST“

= gesundheitsbasierter Referenzwert

= Konzentration bei der, bei chronischer Exposition, keine Gesundheitsgefährdung zu erwarten ist

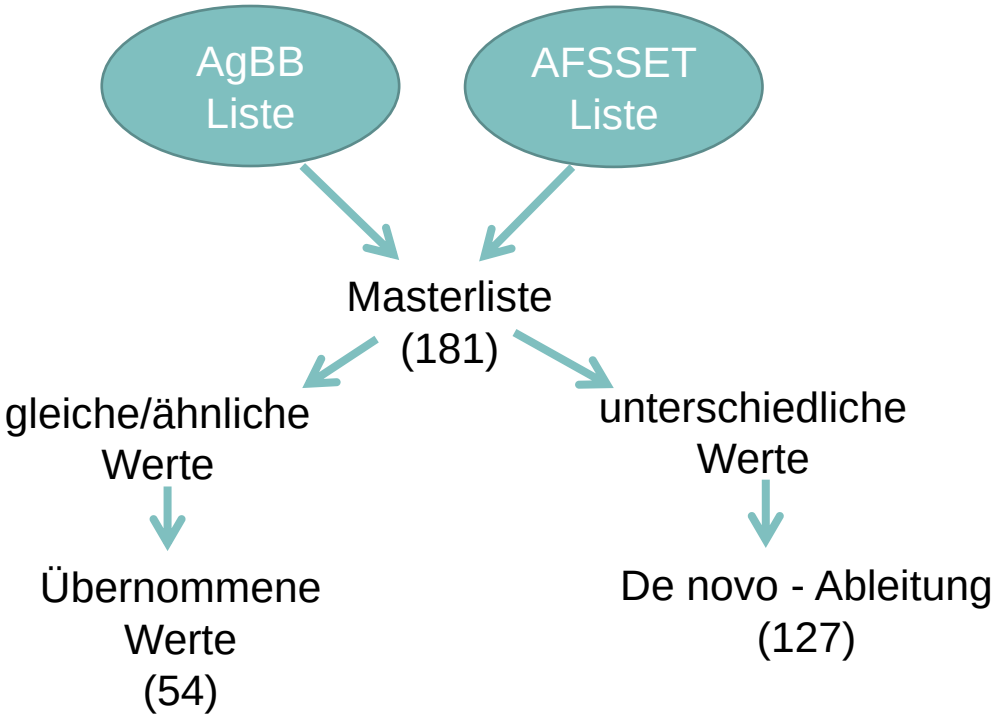
≠ Innenraumluftqualitätsziele

= zur Bewertung von Emissionen eines Produkts nach 28 Tagen, Prüfkammer-Test gem. CEN/TS 16516

= verwendet zur Produktbewertung hinsichtlich möglicher Risiken durch Langzeitexposition

= Konzentrationen in µg/m³

MASTERLISTE



DE NOVO ABLEITUNG VON LCI-WERTEN

- Zusammenstellung vorhandener humantoxikologischer Daten unter besonderer Berücksichtigung bereits vorhandener toxikologischer Referenz-Werte (WHO, EPA, AgBB, ANSES, REACH, OEL, …)
- Evaluierung der Daten → Wahl einer „Schlüsselstudie“
- Ableitung des LCI-Werts

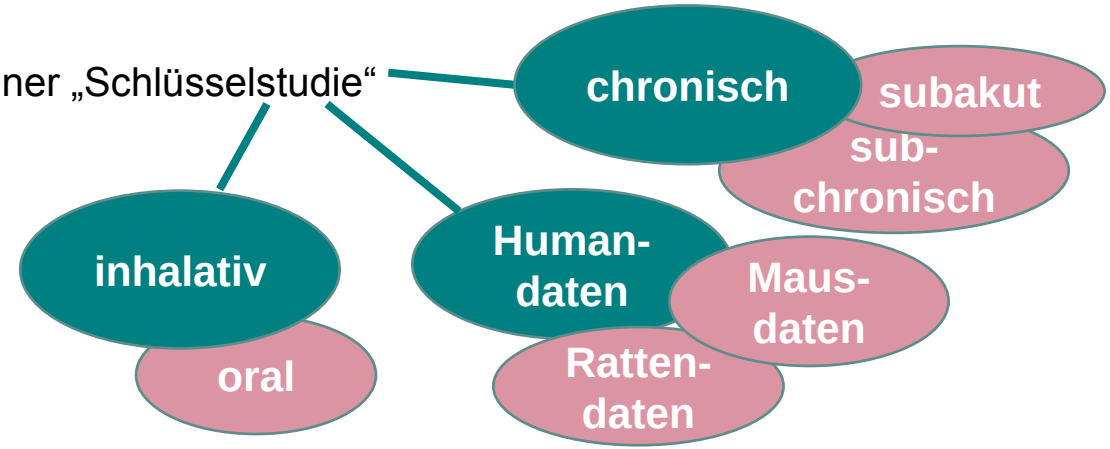
DATA COLLECTION SHEET

Compound	Phenol	*Data collection sheet (1/1)*
N°CAS 108-95-2	**CLP:** H301: Acute Tox. 3(oral), H311: Acute Tox. 3 (dermal), H331: Acute Tox. 3 (inhal.), H314: Skin Corr. 1B, H341: Muta. 2, H373: STOT RE 2	
1 ppm = 3.873 mg/m³		

Organization Name	OEHHA	RIVM	SCOEL	German Committee on Indoor Guide Values	EU-RAR	Reach Registrants
Risk Value Name	REL	TCA provisonal (lack of data)	OEL	IA guide value I (RW I)		DNEL
Risk Value (µg/m³)	200	20	8000	20		1320
Risk Value (ppb)	52	5.2	2078	5.2		342.9
Reference period	Chronic	Chronic	8 hours	Chronic	chronic	Chronic
Year	2000	1999 ; 2000	2003 (2009)	2011	2006	2011
Key Study	Sandage, 1961; Dalin and Kristofferson, 1974	Sandage, 1961	Sandage, 1961	Shamy, 1994; Dalin and Kristofferson, 1974	Shamy, 1994	Route to route extrapolation
Study type	90-day and 15-day; continuous inhalation	90-day inhalation study	90-day inhalation study	90-day and 15-day; continuous inhalation		
Species	Mice, Sprague Dawley rats and rhesus monkeys	Mice, Sprague Dawley rats and rhesus monkeys	Mice, Sprague Dawley rats and rhesus monkeys	human (Shamy) and b) rats (Dalin and Kristofferson)	Human workers	
Duration of exposure in key study	a) 90 days continuously to 5 ppm phenol b) 15 days cont. to 26 ppm	90 days continuously to 5 ppm phenol	90 days continuously to 5 ppm phenol	b) 15 days to a concentration of 26 ppm		

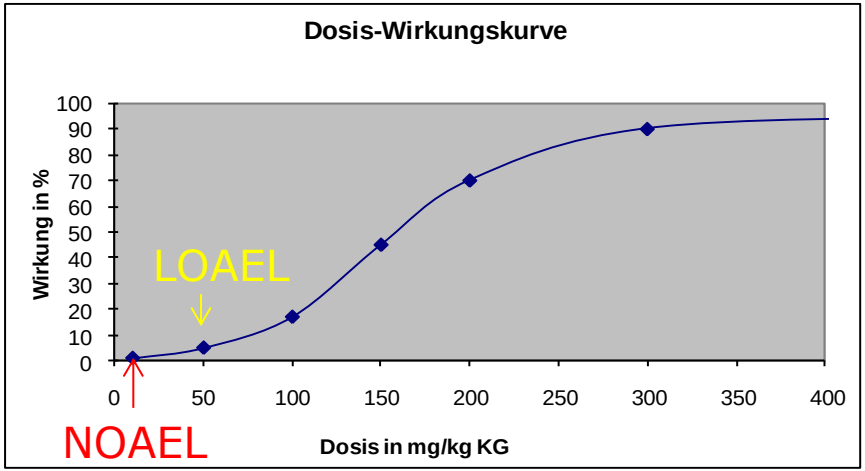
DE NOVO ABLEITUNG VON LCI-WERTEN

- Zusammenstellung vorhandener humantoxikologischer Daten unter besonderer Berücksichtigung bereits vorhandener toxikologischer Referenz-Werte (WHO, EPA, AgBB, ANSES, REACH, OEL, …)
- Evaluierung der Daten → Wahl einer „Schlüsselstudie“
- Ableitung des LCI-Werts



DE NOVO ABLEITUNG VON LCI-WERTEN

- Auswahl einer „Schlüsselstudie“ und des **POD (point of departure)**:
  - **NOAEL** (No Observed Adverse Effect Level)
    = höchste Dosis bei der keine schädigenden Effekte zu sehen waren
  - **LOAEL** (Lowest Observed Adverse Effect Level)
    = niedrigste Dosis bei der noch schädigende Wirkungen zu sehen waren
  - **BMD** (Benchmark Dose)
    = statistisch-mathematische Analyse



DE NOVO ABLEITUNG VON LCI-WERTEN

- **Assessment-Faktoren** (REACH guidance)
  - Anpassung an die Expositionsdauer (Tierversuchsbedingungen – kontinuierliche Exposition)
  - Studiendauer (akut, subakut, subchronisch, chronisch)
  - Anpassung der Expositionsroute
  - Dosis-Wirkungs-Beziehung (LOAEL, NOAEL)
  - Schwere des Effekts
  - Interspezies-Variabilität
  - Intraspezies-Variabilität
  - Besonders sensible Gruppen (z.B. Kinder)
  - Qualität der Daten

EU-LCI = POD/AF

FACT SHEET

Compound	Phenol C_6H_6O		*Factsheet*
Parameter	**Note**	**Comments**	**Value / descriptor**
EU-LCI Value and Status			
EU-LCI value	1	Mass/volume [µg/m³]	10
EU-LCI status	2	Interim/confirmed	Draft
EU-LCI year of issue	3	Year when the EU-LCI value has been issued	2017
General Information			
CLP-INDEX-Nr.	4	INDEX	604-001-00-2
EC-Nr.	5	EINECS – ELINCS - NLP	203-632-7
CAS-Nr.	6	Chemical Abstracts Service number	108-95-2
Harmonised CLP classification	7	Human Health Risk related classification	H301: Acute Tox. 3(oral) H311: Acute Tox. 3 (dermal) H331: Acute Tox. 3 (inhal.) H314: Skin Corr. 1B H341: Muta. 2 H373: STOT RE 2
Molar mass and conversion factor	8	[g/mol] – [ppm – mg/m³]	94.11 1 ppm = 3.873 mg/m³
Key Data / Database			
Key study, Author(s), Year	9	Critical study with lowest relevant effect level	Sandage (1961)
Read across compound	10	Where applicable	
Species	11	Rat,... human	rats, monkeys, mice
Route/type of study	12	Inhalation, oral feed,...	inhalation
Study length	13	Days, subchronic, chronic	subchronic
Exposure duration	14	Hrs/day, days/week	24h/d; 7 d/w; 90 days
Critical endpoint	15	Effect(s), site of	Elevated organ-pathology at monkeys and rats (liver, kidneys) and mice (liver, lungs)
Point of departure (POD)	16	LOAEC*L, NOAEC*L, NOEC*L, Benchmark dose,...	NOAEC
POD Value	17	[mg/m³] or [ppm] or [mg/kgBW*d]	4.72 ppm (time weighted average)
Assessment Factors (AF)	**18**		
Adjustment for exposure duration	19	Study exposure hrs/day, days/week	1
AF Study Length	20	~~sa~~→ ~~sc~~→ c *(R8-5)*	2
Route-to-route extrapolation factor	21		1
AF Dose-response	22 a	Reliability of dose-response, LOAEL → NOAEL	1
	22 b	Severity of effect *(R 8-6d)*	1
Interspecies differences	23 a	Allometric	
	23 b	Kinetic + dynamic	2.5
Intraspecies differences	24	Kinetic + dynamic Worker - General population	10
AF (sensitive population)	25	Children or other sensitive groups	1
Other adjustment factors Quality of whole database	26	Completeness and consistency Reliability of alternative data *(R8-6 d,e)*	5
Result			
Summary of assessment factors	27	Total Assessment Factor (TAF)	250
POD/TAF	28	Calculated value (µg/m³ and ppb)	73.12 µg/m³ and 18.88 ppb
Molar adjustment factor	29	Used in read-across	/
Rounded value	30	[µg/m³]	70
Additional Comments	31		

Absolute odour threshold of phenol is 0.0056 ppm (22 µg/m³ at 23°C) according to Nagata (2003).

REACH registrants have derived a DNEL (inhalation, systemic effects, general population) of 1.32 mg/m³, POD was a NOAEC exposition (no further explanations were given), applied TAF was 2.

In Germany, indoor air quality (risk) value of 0.2 mg/m³ (RWII) was derived on the study by Shamy et al., 1994, using a TAF of 84, the recommended (precautionary) value is 0.02 mg/m³ (RWI).

Most OELs (8h) in Europe are 2 ppm (8mg/m³), in Denmark and Sweden 1 ppm (4 mg/m³).

Rationale Section	32		

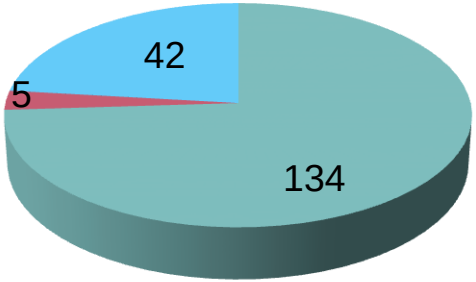
Phenol is well absorbed via gastrointestinal and respiratory tract, and the dermal route. Volunteers exposed to phenol concentrations of 6–20 mg/m³ via inhalation absorbed 60 to 88 % of the substance (ECB, 2006). Based on studies with humans exposed to phenol in air it was estimated that percutaneous absorption of vapors is about half of the absorption through the lungs. For inhalation by humans a half-life of 3.5 hours is reported (RIVM, 2001).

Limited data are available on chronic effects of phenol in humans from oral, dermal or inhalation exposure, indicating reduced spontaneous activity, muscle weakness, pain and disordered cognitive capacities. In animals, dysfunctions of the nervous system including tremor, convulsions, loss of coordination, paralysis, reduced motor and spontaneous activity, and reduced body temperature have been reported.
Phenol is positive with respect to various mutagenic effects in mammalian cell cultures. In general, relatively weak effects are induced. In vivo, phenol is a weak inducer of micronuclei in mouse bone marrow cells and chromosomal aberrations in rats; the effect is bound to high doses which are equivalent to or near to the maximum tolerable dose. Phenol is therefore classified as mutagen of category 2. Because of inadequate evidence, phenol could not be classified as carcinogen (Group 3) by IARC (1999).

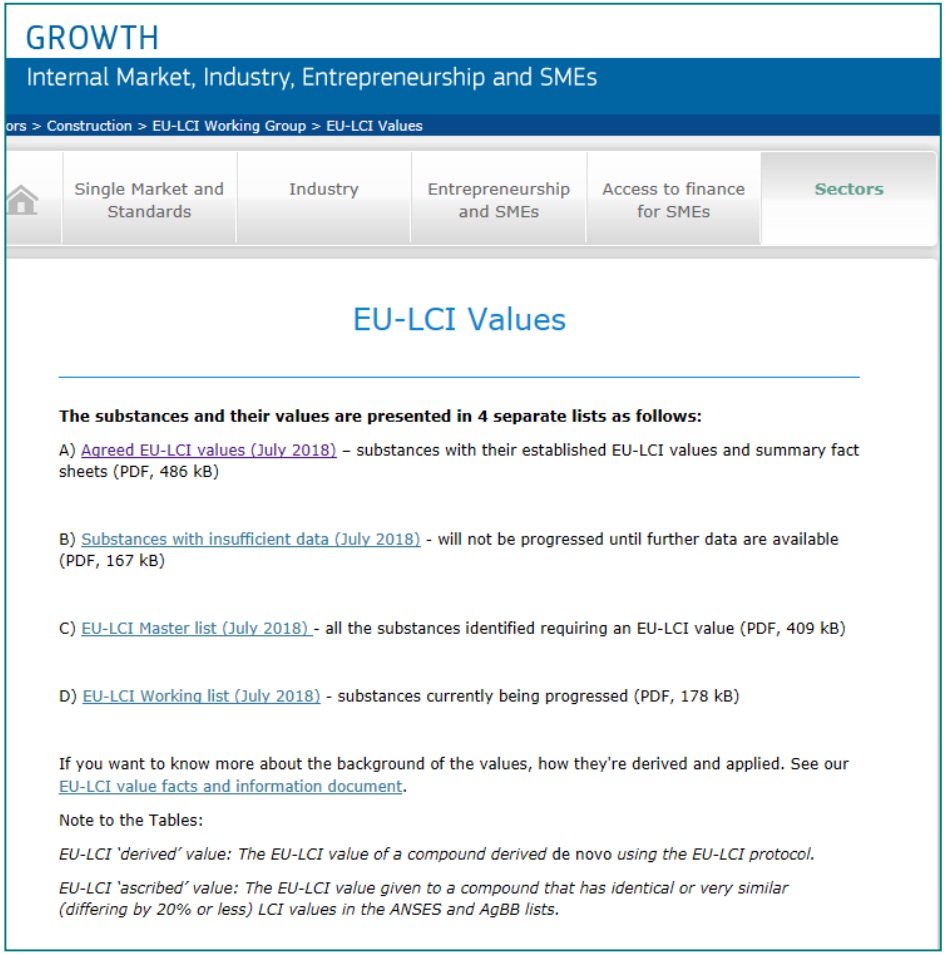
Human data
The study by Shamy et al., 1994, was used within the EU-RAR (ECB, 2006) and also the derivation of German Indoor Guide Values (RW I values) (AG IRK, 2011). Workers (n=20) were (according to the authors) solely exposed to phenol (extraction medium for oil refining) at an average exposure concentration of 5.4 ppm (21 mg/m³) (time weighted average, factory records) for a mean exposure duration of 13.5 years. Haematological and clinical chemistry parameters were examined only once at the end of the last shift at the end of the week and compared with a control collective (n=30). Exposed workers showed statistically significant higher transaminase levels (ALT, $p < 0.05$, AST $p < 0.01$) and clotting time ($p < 0.01$), and lower levels of serum creatinine ($p < 0.01$) than control subjects. Further, workers exposed to phenol showed statistically significant higher levels of haemoglobin ($p < 0.05$), haematocrit, colour index, MCH (each $p < 0.01$), MCV ($p < 0.05$), basophils ($p < 0.01$), and neutrophils ($p < 0.05$), and lower levels of monocytes ($p < 0.05$). Also, statistically significant higher levels ($p < 0.01$) of Mg, Mn and Ca were found. Local effects in the respiratory tract were not investigated. Elevated activities for liver enzymes, increased clotting time and increased concentration of metal-ions are indicators for hepatotoxicity and are consistent with toxicity of phenol observed at higher doses.

DOKUMENTATION

https://ec.europa.eu/growth/sectors/construction/eu-lci_de



- beschlossene EU-LCI-Werte
- keine LCI Wert aufgrund unzureichender toxikologischer Daten
- Ableitung in Arbeit/ausständig



GROWTH

Internal Market, Industry, Entrepreneurship and SMEs

ors > Construction > EU-LCI Working Group > EU-LCI Values

Single Market and Standards | Industry | Entrepreneurship and SMEs | Access to finance for SMEs | Sectors

EU-LCI Values

The substances and their values are presented in 4 separate lists as follows:

A) Agreed EU-LCI values (July 2018) – substances with their established EU-LCI values and summary fact sheets (PDF, 486 kB)

B) Substances with insufficient data (July 2018) - will not be progressed until further data are available (PDF, 167 kB)

C) EU-LCI Master list (July 2018) - all the substances identified requiring an EU-LCI value (PDF, 409 kB)

D) EU-LCI Working list (July 2018) - substances currently being progressed (PDF, 178 kB)

If you want to know more about the background of the values, how they're derived and applied. See our EU-LCI value facts and information document.

Note to the Tables:

EU-LCI 'derived' value: The EU-LCI value of a compound derived de novo *using the EU-LCI protocol.*

EU-LCI 'ascribed' value: The EU-LCI value given to a compound that has identical or very similar (differing by 20% or less) LCI values in the ANSES and AgBB lists.

EU-LCI LISTE

Agreed EU-LCI values

No.	CAS no.	Compound	EU-LCI (µg/m³)	Status of EU-LCI value	Year of adoption
1		*Aromatic hydrocarbons*			
1-1	108-88-3	Toluene	2900	Derived EU-LCI	2013
1-2	100-41-4	Ethylbenzene	850	Derived EU-LCI	2013
1-3	1330-20-7 106-42-3 108-38-3 95-47-6	Xylene (o-, m-, p-) and mix of o-, m- and p-xylene isomers	500	Derived EU-LCI	2013
1-4*	98-82-8	Isopropylbenzene (cumene)	1700	Derived EU-LCI	2017
1-5	103-65-1	n-Propylbenzene	950	Derived EU-LCI	2013
1-6	108-67-8 95-63-6 526-73-8	Trimethylbenzene (1,2,3-,1,2,4-,1,3,5-)	450	Derived EU-LCI	2013
1-7	611-14-3	2-Ethyltoluene	550	Derived EU-LCI	2014
1-8	527-84-4 535-77-3 99-87-6 25155-15-1	Cymene (o-, m- ,p-,) (1-isopropyl-2(3,4)-methylbenzene) and mix of o-, m-, and p-cymene	1000	Ascribed EU-LCI	2013

LCI - DNEL

Substanz	EU-LCI µg/m³	NIK-Wert (AgBB) µg/m³	DNEL (REACH) µg/m³
Toluene	2900	2900	192.000 x 66
Naphthalin	10	10	25.000 x 2500
2-Butenal (Crotonaldehyd)	5	1	300 x 60
Styrol	250	250	85.000 x 340

ZIELE

- EU-LCI-Werte für alle relevanten Substanzen
  - Abarbeiten der Masterliste
  - Überprüfung der „übernommenen Werte“
  - Laufende Erweiterung der Liste
- Delegierter Rechtsakt zu BauProdVO
- Europäisches Klassensystem zur Kennzeichnung von Bauprodukten
  - 2019 geplant, wird sich verzögern
- rechtlich bindendes Reportformat

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9. Innenraumlufttag
Wien ● 20.11.2018