Ministry of Environment and Food of Denmark
Environmental Protection Agency

Survey and risk assessment of chemical substances in chemical products used for "do-it-yourself" projects in the home

Survey of chemical substances in consumer products No. 167

September 2018

Publisher: The Danish Environmental Protection Agency

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ISBN: 978-87-93710-78-8

Contents

Preface

This study is part of the Danish EPA's program for surveys of chemicals in consumer products.

The purpose of the survey is:

- To get more knowledge about which chemical substances, including volatile organic compounds (VOCs), can be released from chemical products used in typical do-it-yourself (DIY) projects.
- To get an overview of the extent to which overall exposure to substances associated with a DIY project can pose risks, based on realistic "worst case" (DIY) scenarios and a health assessment.
- To form the basis for the Danish Environmental Protection Agency's assessment of whether it is relevant to convey additional advice on the use of DIY products for companies and consumers.

The project was conducted from April to December 2017 in collaboration with COWI (project management, mapping, exposure scenarios, quality control), DHI (health-related hazard and risk assessment) and the Danish Technological Institute (laboratory analyses).

The project has been followed by a steering committee with the following members:

- Louise Fredsbo Karlsson, Danish EPA
- Elisabeth Paludan, Danish EPA
- Peter Hammer Sørensen, Danish EPA
- Carsten Lassen, COWI
- Poul Bo Larsen, DHI
- Daniel Vest Christophersen, DHI

Summary and conclusions

Purpose and background
As a follow-up to the survey of substances on the List of Undesirable Substances (LOUS), the Danish Environmental Protection Agency implemented a project on undesired chemistry in sustainable construction in 2016. The project investigated which problematic substances occur in new construction, as well as in which products and quantities these substances are used. The study demonstrated the presence of a number of volatile organic substances (VOC) and semi-volatile organic substances (SVOC) in the construction products which were considered to have a potential for significant exposure of the users of the buildings.

In this project, it is examined whether there may be a health risk associated with the use of different products for DIY projects at home, both when used separately and when multiple products are used together. The survey has investigated the exposure of the person who carry out the DIY project as well as the subsequent exposure of the users of the buildings.

Mapping of products used for DIY projects
Based on an initial screening, it was chosen that the mapping should include products for the following DIY projects (including preliminary treatment and finishing):

- Renovation of wooden floors in the living room or kitchen
- Renovation of concrete floor
- Renovation of bathroom.

In the initial screening, a number of DIY projects were discarded because only water-based products were used. An example of a discarded project is the construction of a gypsum wall for space separation in a room.

For these selected applications, products with special requirements for durability are used, and for technical reasons, the products may contain more problematic substances than products used for other applications.

Scenarios were selected for both solvent and water-based products. Several of the selected water-based products did not contain substances considered to be problematic in the initial hazard assessment. These were chosen to allow the results to be used as an indicator of the risk that might be associated with other types of projects where only water based products are used.

Examples of 38 product types which may be used in the selected DIY projects were identified in DIY centres and on websites of manufacturers. Information on use, consumption, and content of chemical substances and their classification was obtained for a total of 54 products which combined contained 96 substances with a hazard classification.

Initial hazard assessment
In an initial hazard assessment, 29 substances were identified on the basis of the gross list of the 96 substances, which met a set of selection criteria that among others were based on the health classification of the substances. Products for subsequent laboratory analysis were selected to cover these 29 priority substances to the extent possible. Water-based products, which, to a lesser extent, contained priority substances were also selected to provide a basis to compare between the solvent-based products and the water-based. A risk assessment based on measurements of the emissions of chemical substances from a water-based floor

paint which, according to the safety data sheet, did not contain substances meeting the selection criteria, confirmed this assumption.

Most of the products did not contain substances that resulted in a selection for risk assessment, and these products are based on information on their ingredients assessed to be unproblematic. Most of these are water-based products such as filler, primer, wet room membrane, basic cleaner, tile adhesive, cement mortar, sealant, mounting glue, wet room silicone, oil for floor sanding and hand clean.

The list of priority substances was later extended on the basis of the results of the laboratory analyses with 16 substances, which were found in the analyses and which met the selection criteria.

The exposure scenarios in relation to the use situation are based on the use of the products by adults, and the total exposure to problematic substances is calculated for products used for different parts of the DIY project. When assessing the exposure of the users of the building, the risk for both children and adults is calculated.

Laboratory analysis

As a basis for the assessment of the inhalation of volatile substances, two types of laboratory analyses were carried out:

- Measurement of concentration in the respiratory zone during a realistic use of seven products in a test room. These measurements form the basis for calculating the exposure of the person who carry out the DIY project.
- Measurement of the degassing of the substances from 16 products in the climate chamber after 5 hours, 3 days and 28 days. These form the basis for calculating the exposure of users of the building after use of the products. The measurements after 5 hours are also used as an indicator of exposure of the person doing the do-it-yourself project for products where tests have not been carried out in the test rooms.

Hazard Assessment

For the selected critical substances in these products, literature searches were undertaken to identify tolerable exposure levels (in the REACH terminology indicated as DNEL values) for the substances by inhalation and/or dermal contact, and to identify the most critical effects.

Risk when using the products

In the laboratory tests, measurements of degassing of the products when applied to solid materials in accordance with the instructions were carried out. The results could thus be used directly in the exposure calculations by setting the exposure time in accordance with the time required to complete the given work process. In relation to the dermal exposure, a realistic worst case scenario was considered, where the total content of substances of the material on the skin was considered to be in contact with the skin.

Based on knowledge of exposure level and duration, risk assessments were then made for the selected exposure scenarios during product use.

The risk assessments were performed by comparing exposure to a given substance in the exposure scenario with the substance's DNEL value and calculating the risk characterisation ratio (RCR) of the substance, where RCR is calculated as:

$$RCR(1) = \frac{Calculated\ or\ measured\ exposure\ (substance\ 1)}{DNEL\ (substance\ 1)}$$

If the calculated or measured exposure for a given substance exceeds the DNEL value, and the RCR thus becomes greater than 1, the exposure scenario is considered to result in an unacceptable risk.

When simultaneously exposed to several similar-acting substances on the same day, it may be relevant to assess the overall risk of a given effect. This can be done by summing the individual RCR values for the given similar-acting substances:

$$RCR(sum) = RCR(1) + RCR(2) + \ ...RCR(n)$$

The only scenarios where selected individual scenarios can be combined on the same day is when treating floors with turpentine-based paint and wax and subsequent cleaning of brushes in turpentine and cleaning of the hands with turpentine.

The table below provides a summary of the risk assessment relating to the use of the nine products.

Table 1 Summary of the risk assessment

Product	**Scenario, process**	**Risk during work, inhalation**	**Risk when staying in rooms after 5 hours, 3 days, 28 days, inhalation**	**Risk during work, dermal**	**Substances giving rise to risk**
Chemical wood (two component)	Wooden floor Filling 2 hours	No	Yes at 5 h, 3 days neurotoxicity Mucosal irritation (eyes/respiratory tract) Increased cancer risk	Yes Skin irritation, Skin sensitization	Styrene; Benzene; Benzoic acid; Allyl glycidyl ether
Floor lacquer (acid curing)	Wooden floor Lacquering of floors 2 x 2 hours	Yes Mucosal irritation (eyes/respiratory tract) Neurotoxicity	Yes at 5 h, 3 days, (28 days) * Mucosal irritation (eyes/respiratory tract)	Yes Skin sensitization	Formaldehyde; Ethylbenzene; Acetic acid
Floor paint (water-based)	Wooden floor Painting of floors 2 x 2 hours	No	No	No	-
Floor wax	Wooden floor Waxing of floor 2 x 2 hours	Yes at 5 Neurotoxicity Increased cancer risk	Yes at 5 h Neurotoxicity Increased cancer risk	Yes Increased cancer risk Neurotoxicity	C7-C12 hydrocarbons; Benzene; Hexane
Mineral turpentine (with 0.1% benzene)	Wooden floor Cleaning brushes and hand cleaning 2 x 6 minutes	No	Not relevant	Yes (hand cleansing) Increased cancer risk Neurotoxicity	C7-C12 hydrocarbons

Product	Scenario, process	Risk during work, inhalation	Risk when staying in rooms after 5 hours, 3 days, 28 days, inhalation	Risk during work, dermal	Substances giving rise to risk
Floor paint (solvent-based)	Concrete floor Painting of floors 2 x 2 hours	Yes Neurotoxicity Mucosal irritation (eyes/respiratory tract) Increased cancer risk	Yes at 5 h, 3 days Neurotoxicity Mucosal irritation (eyes/respiratory tract) Increased cancer risk	Yes Reproductive effects Skin sensitization	C9-C13 hydrocarbons; 2-butanone oxime 2-ethylhexaneoate
Epoxy floor paint (water-based, two-component)	Concrete floor Painting of floors 2 x 2 hours	Yes Mucosal irritation (eyes/respiratory tract)	Yes at 5 h, 3 days, 28 days Mucosal irritation (eyes/respiratory tract)	Yes Skin sensitization	C12 -C14 alkyl glycidyl ether
PU sealing foam	Bathroom Grouting with foam, 1 hour	Yes Respiratory sensitization	No	Yes Skin sensitization	Diphenylmethane diisocyanate, isomeric and homologous
Wet room paint (water-based)	Bathroom Painting walls in wet rooms 2 x 2 hours	No	No	Yes Skin sensitization	MIT; CIT; BIT (preservatives)

Application phase

As can be seen, use of all products except the water-based floor paint and wet room paint presents risk if suitable precautions (thorough ventilation) or personal protective equipment (respiratory protection and protective gloves) are not applied.

For the solvent-based products this is to be expected, as these result in increased inhalation concentrations, especially upon application. The solvents are intended to evaporate in order for the product to cure.

Degassing phase

With regard to the risk of subsequent degassing, a risk of evaporation up until day 28 has been found for the products *epoxy floor paint* and *acid-curing floor lacquer*. For these products, evaporation of mucosal irritants from the treated surfaces occurs. Therefore, ample ventilating of the room is required for at least one month after treatment. It should be noted that a number of mucosal irritants (i.e. substances that irritate the eyes and respiratory tract) emitted are also skin sensitizing. Since there are many similarities regarding the mechanisms for skin sensitization and respiratory sensitization to occur, these skin sensitizers can also be suspected of a respiratory sensitizing effect, even though the substances are not classified as such. This applies for example to formaldehyde and epoxy compounds which are used in and emitted from the products.

Critical substances

Critical substances, especially hydrocarbon vapours including degassing of hexane, benzene and C7 - C13 aromatic, aliphatic and cycloaliphatic hydrocarbons, are considered to present risks of harmful effects to the central nervous system or as being carcinogenic (e.g. benzene). In connection with mucosal irritation and adverse effects on the respiratory tract, this is most

clearly seen for degassing of formaldehyde and 2-butanone oxime. While formaldehyde has been found in degassing from acid-curing lacquer, 2-butanone oxime is found to evaporate from solvent-based paints for concrete floors.

Evaluation of recyclability

A description and assessment has been made on a screening level of possible limitations of the recyclability of selected building materials due to possible content of health- and environmentally problematic substances in DIY products. The assessment has included renovated indoor wood floors, renovated indoor concrete floors and indoor tiles in bathrooms and other wet rooms.

The assessment does not identify relevant DIY products containing substances that are listed on the EU so-called candidate list under REACH. This list includes chemical substances with severe health and/or environmental properties, selected for restriction in the uses. There are some substances that either occur or are closely related to substances on the Danish Environmental Protection Agency's List of Undesirable Substances (LOUS).

In general, the presence of these substances is not considered to be of significance for the recyclability of the three assessed building materials. However, it cannot be excluded that certain substances classified as toxic to aquatic organisms may be leached from crushed concrete or crushed wet room tiles if these have been recovered as fillers, for example, under road surfaces.

Delimitations

Consumers can be exposed to different risks in relation to DIY projects in addition to those investigated in this project. Within the framework of this project, it has been necessary to focus on some types of DIY projects; the conclusions of the study only apply to the types of projects covered by the project. If the necessary safety measures are not applied, there may be significant exposures and risks in relation to a number of other DIY projects, which include:

- Renovation work involving materials containing hazardous substances allowed in the past, such as PCB-containing sealant and paint, asbestos, and lead and mercury-containing paint.
- Dusting work where exposure to mineral materials occurs, for example when cutting in concrete with angle grinders.
- Use of spray paint and spray glue.
- Use of hard woods indoors.
- Outdoor use of wood preservatives and paint based on organic solvents.

The Danish Environmental Protection Agency's website "Grønne tips til hjemmet" [Green advice for the home] provides a number of recommendations in relation to the above-mentioned do-it-yourself projects. In general, it is recommended that consumers use the same protective measures prescribed to professionals.

The project is not a control project. Therefore, compliance with labeling rules has not been controlled for all products.

1. Introduction

1.1 Background for the study

The Danish Environmental Protection Agency's survey of substances on the List of Undesirable Substances (LOUS) has shown that a number of these substances occur in many chemical products used in relation to DIY building projects, such as paint/varnish, sealants, adhesives, fillers, and insulation materials.

As a follow-up to the survey of substances on LOUS, the Danish Environmental Protection Agency has investigated which problematic substances occur in new construction, as well as products and quantities in which these substances are used (Pedersen et al. 2016).

Pedersen et al. (2016) state that there are a number of volatile substances (VOCs) with the potential for significant exposure in building users (stated as class 2 and 3 in the study): 2-ethoxyethanol, 2-ethoxyethyl acetate, 1-methyl-2-pyrrolidone, bisphenol-A, naphthalene, mineral turpentine, styrene and toluene. A portion of these are used mainly in paint/lacquer, but many are used in a variety of building materials. In addition, there is a number of semi-volatile substances (SVOCs) for which there is potential for significant exposure in building users, including certain brominated flame retardants, certain phthalates, phenol and 2-ethoxyethanol (stated as class 3 in the study).

In this project, it is examined as to whether there may be a health risk associated with the use of different products for DIY projects at home, both when used separately and when multiple products are used together.

1.2 Delimitation

The survey includes do-it-yourself construction projects and focuses on indoor projects. Therefore, it does not include more hobby-based projects nor does it include the use of impregnating agents (e.g. for textiles and leather) or detergents unless these are used as part of a construction project.

Consumers can be exposed to various risks in connection with DIY projects. The Danish Environmental Protection Agency's website "Grønne tips til hjemmet" [Green advice for the home] contains a number of recommendations to reduce these risks[1]. Within the framework of this project, it has been necessary to focus only on some types of DIY projects. If the necessary safety measures are not applied, there would also be significant exposure and risks in relation to a number of other DIY projects, which include:

- Renovation work involving materials containing hazardous substances that have previously been allowed for use, such as PCB-containing sealant and paint, asbestos, lead and mercury-containing paint or sealants with short-chain chlorinated paraffins. The Danish EPA's website "Grønne tips til hjemmet" [Green advice for the home] provides recommendations in relation to PCB-containing materials, and the Waste Management Order contains requirements for mapping in connection with major new building and renovation tasks.

[1] http://mst.dk/groenne-tips/hjemmet/

- Dusting work where exposure to mineral materials occurs, for example when cutting in concrete with angle grinders (some types of sanding are covered by the present scenarios).
- Use of spray paint and spray glue. The Danish Environmental Protection Agency's website "Grønne tips til hjemmet" [Green advice for the home] provides recommendations regarding the use of spray paint which also apply to the use of spray glue.
- Use of hard wood indoors. The Danish Environmental Protection Agency's website "Grønne tips til hjemmet" [Green advice for the home] provides recommendations to reduce exposure to chemical substances in tropical trees and other hardwoods.
- Outdoor use of wood preservatives and paint based on organic solvents. Large amounts of products based on organic solvents are often used in relation to certain outdoor projects, potentially causing high exposure in the user.

The exposure scenarios for the use situations are based on the use of the products by adults. The Danish Environmental Protection Agency's website "Green advice for the home" generally recommends that you avoid painting if pregnant or breastfeeding, and that you prevent children from being exposed to chemicals in connection with building projects in the home.

In a previous consumer project on toluene and other neurotoxic substances in nurseries (Larsen et al., 2016), a children's room with very high concentrations of several chemicals in the intake air was identified. Upon subsequent inspection it appeared that the outer wall of the children's room bordered on a shed where a lawnmower, gasoline and a variety of turpentine-containing products in plastic pockets were stored. In addition to the gasoline, VOCs could be specially released into storage rooms from solvent-based wood preservatives and paints, and from open containers and rags soaked in turpentine or other organic solvents used to clean brushes and other tools. In many cases, paint is stored inside the home because the substance must remain at a temperature above freezing. Exposure to VOCs from storage in rooms adjacent to living space has not been further investigated as such exposures depend entirely on the layout of the housing in question. In general, it must be ensured that packaging for the storage of solvent-containing products is properly sealed and that vapour barriers prevent that air from storage rooms enters adjacent living space.

1.3 Instructions related to the working environment

"Do-it-yourself" projects in the home are in principle identical to similar projects performed by professionals and consumers should, in order to protect themselves from possible risks, use the same safety measures as required when the tasks are performed by professionals. However, it is common for consumers not to use personal protective equipment based on the idea that the tasks are only performed occasionally and therefore, exposure does not occur in the same way as for professionals exposed daily.

In the present study, scenarios where products are based on organic solvents (high VOCs) and where there may be dermal contact with particularly problematic substances are considered. It is assumed that the persons carrying out the projects would not use personal protective equipment.

The selection of products has been based on the MAL code as shown in the packaging of the product (MAL = Måleteknisk Arbejdshygiejnisk Luftbehov [Measuring Technical Hygienic Air Needs]). As stated in the Danish EPA's instructions to consumers, the MAL code is introduced for the professional working environment, but it can also be a good guide for do-it-yourself people.

The MAL code consists of two numbers with a line in between them. The first number indicates those safety measures one must take as a minimum to avoid inhaling the product’s volatile substances. The second number indicates those safety measures one must take as a

minimum to counteract the health risk associated with the product if it comes into direct contact with the skin or airways, or if ingested.

The number before the hyphen ranges from 00 to 5, and the number after the hyphen ranges from 1 to 6. The higher the number, the higher the need for safety precautions.

The MAL codes and the stated protective measures are provided in Appendix 2 to the Danish Working Environment Authority's Order No. 302 of 13 May 1993 on working with code-numbered products. The codes and protective equipment are given in Appendix 4 to this report as reference for the codes specified for the individual products identified in the mapping in the next chapter.

Appendix 2 to the Danish Working Environment Authority's Executive Order also contains instructions on the highest allowed number before the hyphen in the code number for different types of work and safety measures for exposure to dust and combustion products in preparation work. In the scenarios used in this study it is assumed that the consumer is not familiar with the highest allowable numbers for different kinds of work.

2. Mapping of products and setting exposure scenarios

2.1 Purpose

The purpose of this chapter is:

- To get an overview of which products are relevant in relation to exposure when used for selected do-it-yourself projects at home.
- To set realistic exposure scenarios for:
  - Dermal exposure to ingredients in the products used;
  - Inhalation of VOCs degassed during use of the products and from the final materials in the first 2 weeks of the use phase.

2.2 Mapping

In consultation with the Danish Environmental Protection Agency, it was decided that the mapping should include both water and solvent based products for renovation and new construction of floors and bathing facilities. An initial screening indicated that in these scenarios, products would be used that could give rise to particularly problematic exposure. For both applications, products with special requirements for durability were used, and for technical reasons products that tend to be more problematic than for other applications (for example, walls and ceilings) were used.

Based on searches on DIY websites, the project group's own experiences and consultation with some craftsmen in the project group's network, a list of product types used for the renovation/new construction of floors and bathrooms as well as cleaning of tools in these do-it-yourself projects was established. The list was supplemented by visits to a DIY market where additional information and guidance on product types and the use of the products in the described scenarios were obtained through a consultancy agreement.

The list is shown in Table 2.

Table 2. Possible use of products in DIY projects.

Do-it-yourself project	Product type
Floor sanding and preparation for finishing	Oil for floor abrasion
	Sand filler
	Wood filler
	Chemical wood
	MDF filler
	Lye
	Basic cleaner
Levelling of concrete floor	Concrete filler
Lacquering of floors	Acrylic lacquer, water based
	Polyurethane lacquer, water based
	Alkyd lacquer (oil-based, for oiled wood)
	Epoxy lacquer (two-component lacquer)
	Turpentine
	Benzine
	Cellulose thinner/acetone
Painting of floor	Epoxy Paint
	Acrylic paint
	Oil-based paint
	Urethane alkyd paint
	Turpentine
	Brush cleaner
Surface treatment with soap, oil and/or wax	Hardening oil
	Non-curing oil/natural oil
	Floor soap
	Wax
	Turpentine
Full renovation of a bathroom	Primer
	Wet room membrane
	Tile adhesive
	Jointing mortar
	Sealant
	Wet and adhesive glue for floor and wall materials, e.g. PVC
	Woven fabric glue for glass fibre fabric or the like.
	Mounting glue
	Insulation foam (PU foam)
	Wet room silicone sealant
	Elastic joint filler
	Cleaning agent for sealant/silicone
	Wet room paint
	Turpentine

Subsequently, one or more products from each product type was identified on various retailers' websites. Appendix 1 indicates the list of retailers from which information was obtained.

Information on use, consumption, and content of chemical substances and their classification (as shown in the product safety data sheets) was collected for a total of 54 products containing about 96 substances with hazard classifications. This information was collected in Appendix 2 and Appendix 3, which serve as gross lists of products and ingredients.

2.3 Exposure scenarios

In consultation with the Danish EPA, it was decided that the exposure scenarios should focus specifically on solvent and oil based products. These products are used to a great extent for building parts where there are high demands on the durability of materials, such as on floors and in wet rooms.

The products which were taken into account in the exposure scenarios were selected based on the highest MAL codes and content of VOC and organic solvents as specified in the product safety data sheets and product descriptions. The list is supplemented with products containing the most critical substances according to the preliminary hazard assessment (Chapter 3). Product type, VOC content, content of organic solvents and MAL codes for the selected products included in the exposure scenarios are shown in Table 3 below.

In addition, the exposure scenarios also include other products that are necessary for the implementation of individual DIY projects.

Table 3 Selected product for the exposure scenarios

Product ID	Product type	MAL-code	Organic solvents (wt%))	The product's content of VOC
1	Turpentine	3-1	100 % [a]	85%
2	Lye	00-4	- [b]	- [b]
3	Basic cleaner	0-5	< 5 %	- [b]
4	Benzine	3-1	100 % [a]	100 % [a]
5	Cellulose thinner	5-3	100 % [a]	100 % [a]
6	Brush cleaner	- b	100 % [a]	- [b]
8	Urethane alkyd floor paint	2-1	- [b]	max. 500 g/L
9	Epoxy floor paint	00-5	- [b]	- [b]
10	Epoxy floor paint	00-5	- [b]	max. 5 g/L
12	Polyurethane reinforced alkyd floor lacquer, oil-based	2-1	Ca. 75 % [a]	max. 500 g/L
13	Epoxy lacquer	00-5	- [b]	max. 5 g/L
16	Floor wax	3-1	80-95 % [a]	81-96 % [a]
19	Wood filler	00-1	- [b]	- [b]
20	Chemical wood	5-6	- [b]	187 g/L
25	Wet room paint	00-3	- [b]	35 g/L
28	Sealant	00-1	- [b]	- [b]
30	PU foam	3-3	- [b]	- [b]
33	Cleaning agent for sealant/silicone	4-1	100 % [a]	max. 60-100
40	Two-component acid-curing floor lacquer	3-3 (hardener) 4-1 (mixture)	50	500 g/L
42	Epoxy lacquer	00-5	- [b]	<140 g/L
43	Alkyd floor paint	2-1 (1993)	36	371 g/L
44	Urethane alkyd floor paint	2-1 (1993)	Ca. 50 % [a]	400 mg/L
50	Hand cleanser	- [b]	- [b]	- [b]

a – evaluated based on the components of the product as specified in the SDS.

b – Information not available from SDS or product description.

The following tables describe the scenarios for the selected DIY projects. Only processes using chemical products are listed in the tables.

Three different scenarios are described, where the two floor scenarios contain several sub-scenarios using different products:

1. Renovation and lacquering of 30 m² of wooden floor in a living room or kitchen (Table 4)
2. Renovation and lacquering of 30 m² of concrete floor, e.g. in a workshop room (Table 5)
3. New construction of a bathroom involving tile construction (Table 6).

Scenarios were used to calculate the exposure of persons performing the DIY project.

The exposure times in the tables below are based on the number of treatments with the product concerned and an estimate of the processing time of the specific surface. The dermal exposure time is assumed to be equal to the time the consumer works with the product. This

corresponds to the worst-case scenario in which the consumer gets the product on their hands when work beings, only cleaning their hands when work ends. The inhalation exposure time is also assumed to be equal to the time the consumer works with the product, as the consumer will typically leave the room after the work is done and not stay in the room while the paint/lacquer dries.

In addition, the total exposure by inhalation of persons using the rooms was calculated for the first 28 days after completion of the project. For the person who performs the projects, the exposure was counted as the sum of the exposure during work and the first 28 days afterwards.

Table 4. Scenario for the renovation of 30 m² of wooden floor in the living room or kitchen

Process	Product type	Product ID	Coverage	Number of treatments	Application or application method	Estimated consumption in total (L)	Use/application time of the product per treatment (hours)	Retreatment time (hours) *	Exposure time total during execution of the work (hours)
Removing old lacquer or paint from floor	Oil for floor sanding	17	20 m²/L a	2 (1-flere)	Brush or roll	1.5	1	-	2
Filling before sand-ing	Chemical wood	20	10 m²/L a	1	Filling and sanding	3	2	-	2
	Wood filler	19	10 m²/L a	1	Filling and sanding	3	2	-	2
Preparation	Lye	2	10 m²/L	2 (1-2)	Brush or roll	3	1	-	2
Finishing treatment	Polyurethane reinforced alkyd floor lacquer, oil-based	12	10-12 m²/L	3 (2-5)	Brush or roll	9	2	8	6
	Or: two-component acid-curing lacquer	40+41	10 m²/L	2	Brush or roll	6	2	1.5	4
	Or: Floor wax	16	20-30 m²/L	1	Brush or roll	1	2	3	4
	Or: Water-based floor paint	7	8 m²/L	2	Brush or roll	7	2	2	4
Cleaning of tools	Turpentine	1	-	2	Wash of brush and roll in glass	1	0.1	-	0.2
	Or: Ethanol	- **	-	1	Wash of brush and roll in glass	1	0.5	-	0.5
Hand cleaning	Hand cleanser	50	-	2	Hand cleaning	20 g	0.02	-	0.16
	Or: Turpentine	1	.	2	Hand cleaning	2 g	0.02	-	0.04

a – estimated value due to lack of information in product description * - is indicated for information; it is assumed that the person is not in the room during curing

* - ethanol (alcohol) for cleaning tools is not assessed. It is classified as flammable, Flam. Liq. 2 but has no further classification in relation to health or the environment.

Table 5. Scenario for renovation of 30 m² of concrete floor e.g.in a workshop room.

Process	Product type	Product ID	Coverage	Number of treatments	Application or application method	Estimated consumption in total (L)	Use/application time of the product per treatment (hours)	Retreatment time (hours) *	Exposure time total during execution of the work (hours)
Removing old lacquer or paint from floor	Oil for floor sanding [b]	17	20 m²/L [a]	1	Brush or roll [b]	1.5	3	-	6
Levelling of floors	Concrete filler	39	1.85 kg mm/m²	1	Filling	120 kg	2	24	2
Paint or lacquer-ing	Epoxy floor paint (two-component)	9 + 37	6.5 - 8 m²/L	2	Brush or roll	9	2	24	4
	Or: Epoxy floor paint (two-component)	10	8 m²/kg	2	Brush or roll	8 kg	2	10	4
	Or: Alkyd floor paint	43	13 m²/L	2	Brush or roll	18	2	4	4
	Or: Urethane alkyd floor paint	44	8-10 m²/L	2	Brush or roll	6	2	4	4
	Or: Urethane alkyd floor paint	8	10-12 m²/L	2	Brush or roll	5	2	4	4
	Or: Epoxy lacquer	13	8 m²/kg	2	Brush or roll	8 kg	2	10	4
	Or: Epoxy lacquer	42	10 m²/L (8-14 m²/L)	2	Brush or roll	6	2	16	4
Cleaning of tools	Brush cleaner	6	-	2	Wash of brush and roll in glass	1	0.5	0.5	1
	Or: turpentine	1	-	2	Wash of brush and roll in glass	1	0.5	-	1
Hand cleaning	Hand cleanser	50	-	2	Hand cleaning	20 g	0.5	0.5	1
	Or: turpentine	1	.	2	Hand cleaning	2 g	0.02	-	0.04

a - Estimated value due to lack of information in product description, b - Product is applied (assumed 1 hour) and subsequently removed with paint/lacquer by sanding (assumed 2 hours), total 3 hours. * - is indicated for information, as it is assumed that the person is not in the room during curing.

Table 6. Scenario of new construction of a bathroom involving tile construction with 10 m² floor, 30 m² wall excl. door and window. Out of this 20 m² is a wet zone. It is assumed that the user is putting tiles on floors and walls. The scenario does not include the design of ceilings or the possibility of putting fibreglass on some of the walls, as the products used for these processes are not considered to give rise to particularly problematic exposures.

Process	Product type	Product ID	Coverage	Number of treatments	Application or application method	Estimated consumption in total (L)	Use/application time of the product per treatment (hours)	Retreatment time (hours) *	Exposure time total during execution of the work (hours)
Levelling of floor and/or construc-tion of descending gradient for drain	Filler	47	1.4 kg/m² pr. mm layer thickness	1	Filling knife	10 kg	1	-	1
	And: Binder to filler	48	0.08 L Pla-neMixBin-der/kg filling powder	1	Filling knife	0.8 L	1	-	1
Pre-treatment for wet room protec-tion in wet zone	Primer	22	150-250 ml/m²	1	Brush	4	1	-	1
Wet room protec-tion in wet zone	Wet room membrane	24 + 46	1.5 kg/m² (1.2 – 1.5 kg/m² per mm dry film layer thick-ness)	2	Filling knife/notched trowel	30 kg	1	1 hour during the 1st treat-ment, 6 hours during the 2nd treatment	2
Waterproof floor and wall coverings with tiles	Basic cleaner	3	30 m²/L (20-40 m²/L)	1	Sponge, cloth, brush or paint roller	1	1	-	1
	Tile adhesive	26	2 kg/m² (1.2-3.1 kg/m²)	1	Filling knife/notched trowel	80 kg	2	-	2
	Concrete filler	4	1 kg/m² (0.8 – 1.3 kg/m²)	1	Filling knife	40 kg	4	-	4

Process	Product type	Product ID	Coverage	Number of treatments	Application or application method	Estimated consumption in total (L)	Use/application time of the product per treatment (hours)	Retreatment time (hours) *	Exposure time total during execution of the work (hours)
Sealing of un-glazed tiles, floors and walls	Sealant	28	30 m²/L (20-40 m²/L)	2	Sponge, cloth, brush or paint roller	3	1	2	2
Construction of wall with built-in cisterns, wall-mounted toilet, washbasin, mirror mounting, etc.	Mounting glue	29	200-400 g /m²	1	Applied in glue strings	0.5	1	-	1
Insertion of win-dow or door incl. casing	PU-foam	30	-	1	Sprayed directly into grout/cavity space	1	1	-	1
Grouting	Wet room silicone	32	-	1		1	1	-	1
Painting of tiles and other surfaces (floor, ceiling, walls)	Wet room paint	25	8 m²/L	2	Brush or roll	48	3	4	6
Cleaning of rolls	Turpentine	1	-	2	Wash of brush and roll in glass	1	0.5	-	1
	Cleaning agent for seal-ant/silicone	33	-	-	Cleaning of filling knifes etc.	1	0.5	-	0.5

* - is indicated for information, as it is assumed that the person is not in the room during curing.

2.3.1 Exposure calculation model

Exposure calculations follow the methodology described in ECHA's REACH Guideline "Input Requirements and Chemical Safety Assessment", Part D, Chapter R.15. Calculations and modelling are based on data for the European population. The calculations are gradually refined if the worst-case scenarios indicate a risk.

In the three scenarios mentioned in the previous chapter, the person who performs the work will be subjected to dermal exposure to the products, as use of gloves during work is not assumed. In addition, the person will be exposed to exposure by inhalation during the execution of work and subsequent use of the room. The aggregate exposure is calculated for the first 28 days after completion of the relevant tasks. Persons who perform work as well as use the room afterwards are considered to represent the worst case. If this exposure proved to be problematic, more refined calculations were drawn up, which also included the realistic use of the rooms by other residents of the house - including particularly sensitive groups.

Dermal exposure

The dermal exposure is calculated as the external dermal dose, taking into account the concentrations of the substances in the products, the amount of product used and the skin area expected to be in contact with the product, as well as the number of applications. Parameters for calculating the external dermal dose are shown in Table 7. Conservatively, the external dosage corresponds to the content of the substances on the hands.

Table 7. Parameters for calculating dermal exposure

Parameter	Symbol	Value/calculation	Unit
Amount of product applied per unit area	Q_{prod,cm^2}		g/cm^2
Skin area in contact with product	A_{skin}		cm^2
Amount of product in contact with skin	Q_{prod}	$Q_{prod} = Q_{prod,cm^2} \bullet A_{skin}$	g
Concentration of substance in product	Fc_{prod}		mass %
Body weight	BW		kg
Number of applications	n		/d
Dermal load	L_{der}	$L_{der} = \frac{Q_{prod} \bullet Fc_{prod}}{A_{skin}} \bullet 1000$	mg/cm^2
Dermal dose, external	D_{der}	$D_{der} = \frac{Q_{prod} \bullet Fc_{prod} \bullet n}{BW} \bullet 1000$	mg/kg/d

Exposure by inhalation

Exposure by inhalation when performing the projects is based on the parameters given in Table 8 and the concentrations measured in the analysis program. In accordance with ECHA's guidance on calculation of consumer exposure, the volume of air in the room when using the products is reduced to a respiratory zone of 2 m³ to reflect the increased local exposure of the consumer through use of the products. The calculation is refined if necessary taking into account the emission rate of the substances and the exposure time.

Table 8. Parameters for calculation of exposure by inhalation when performing a project.

Parameter	Symbol	Value/calculation	Unit
Amount of product used per application	Q_{prod}		g
Concentration of substance in product	Fc_{prod}		mass %

Parameter	Symbol	Value/calculation	Unit
Air volume in the room/respiratory zone	V_{room}	2	m^3
Ventilation rate of person	IH_{air}		m³/d
Fraction of the substance that evaporates *, **	F_{resp}		-
Body weight	BW		kg
Mean number of events per day	n		/d
Duration of contact per event	$T_{contact}$		d
Concentration of substance in air of room [2]	C_{inh}	$C_{inh} = \frac{Q_{prod} \bullet Fc_{prod}}{V_{room}} \bullet 1000$	mg/m³
Inhalatory dose	D_{inh}	$D_{inh} = \frac{F_{resp} \bullet C_{inh} \bullet IH_{air} \bullet T_{contact}}{BW} \bullet n$	mg/kg/d

* Default value is 1. Emissions of the individual substances are examined in Chapter 4.

** For substances where climate chamber tests have been carried out, these values are replaced by the actual measured quantities.

For those substances where measurements are made in the respiratory zone, the inhalation dose is calculated directly from the measured values. Measurements in the respiratory zone are performed under realistic conditions, reflecting the actual exposure when performing the work.

For those substances where climate chamber tests have been carried out, a calculation of the concentration is made in a reference room, which is a room with a floor area of 7 m² with a volume of 17.4 m³ cf. the standard prEN16516 for measurement of VOC emissions from building materials for indoor environments. In the measurements, a plate with paint, filler, etc. is placed at the bottom of the test chamber. As the treated surfaces are proportional to the area of the rooms, it can be inferred that these values will also apply to larger spaces. The concentration in the room would be directly comparable with LCI values in the risk assessments (see the hazard assessment in Chapter 5). The LCI (Lowest Concentration of Interest) values should be perceived as the highest concentration of substances that the building user can be exposed to over a long period of time without effects.

3. Preliminary hazard assessment

3.1 Purpose

The purpose of this chapter is to identify possible problematic chemical substances in DIY projects, which should form the basis for selecting substances for the following laboratory analyses as well as for exposure and risk assessment.

3.2 Method

For the selection of products for further analysis and risk assessment in the project, an initial screening was conducted for products containing substances with the following classifications, relevant in relation to the risk of dermal contact and inhalation:

- Acute tox 1, Acute tox 2, Acute tox 3 (substances classified as toxic)
- Skin corr 1 (1A + 1B + 1C) corrosive to the skin
- Skin sens 1 (1A + 1B) skin sensitizing
- Resp sens (1A + 1B) respiratory sensitizing
- STOT RE (1 + 2)
- STOT SE (1 + 2)
- Carc (1A + 1B) + Carc 2
- Repr (1A + 1B) + Repr2
- Muta (1A + 1B) + Muta 2

In the next step, the substances were screened for whether they were appointed as undesired substances for construction and building materials, i.e. whether the substances are listed in Appendix 1 and Appendix 2 of the report “Uønsket kemi og bæredygtigt byggeri” [Undesirable Chemistry and Sustainable Construction].

Subsequently, the substances were screened according to whether they belong to the group of VOC substances, as this may, in addition to dermal contact, give rise to exposure via inhalation.

The screening also took into account whether the substances in the specific concentration in the product would lead to a classification of the product. Finally, the screening examined the amounts of substances in the products, i.e. products with highly concentrated substances (>10%, but assessed case by case) in combination with relatively large volumes used would indicate high priority.

For those substances selected for subsequent hazard assessment, Chapter 5 contains an extension of the hazard assessment.

3.3 Result of screening

An initial screening of all substances listed in Appendix 3 was performed based on the classification of the substances as indicated on the safety data sheets.

This screening resulted in a gross list of 30 substances as shown in Table 9.

The table indicates:

- The volatility of substances

- The classification of substances according to the Classification & Labelling database on ECHA's website
- Whether the substances are listed in Annex 1/Appendix 2 of the report ”Uønsket kemi og bæredygtigt byggeri” [Undesirable Chemistry and Sustainable Construction]
- The concentration of the substances and the type of product they form part of
- Priority and comments on prioritization.

The 29 substances designated on the basis of their composition in approx. 50 DIY products have been given priority +, ++ or +++ in the table. The substance "Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclic, <2% aromatics" is given '+' as priority due to a suspected incorrect classification, as aromatic turpentine is usually not classified as skin sens and STOT RE.

Five chemical substances have been given the highest priority +++. Common to these substances is that, in addition to being classified, they also occur in high concentrations in the products (10-100%); four of the five are VOCs and two are classified as Carc. Benzene is not declared but there has, as discussed later in section 4.4, been measured emission of benzene as a consequence of a presumably small content (<0.1%) in the hydrocarbon mixtures

Nine chemical substances have been given the second highest priority ++. Common to the substances is that they occur in floor lacquer and paints, which are applied on large surfaces, thus causing a relatively large exposure. Seven of the substances are classified as skin sens 1, where one of the substances is also classified as carc. and muta. In this group, there is as much as 40-60% content as regards skin sensitizing substances.

Fourteen chemical substances have been given the lowest priority +. All substances are only included in the products in low concentrations (0.0005% to 3%) and the content of these critical substances means that the product should not be classified for these effects. Of the fourteen substances, five of the substances are VOCs.

Table 9. Initial health screening of substances in products for "do-it-yourself" projects.

Substance	Cas no.	Volatility	Classification	Listed in Appendix 1/Appendix 2 of Pedersen et al. (2016)	Conc. (> 10%). /Product Name (Product ID)	Comment/Priority
Toluene	108-88-3	**VOC**	* Flam. Liq. 2, **Repr. 2,** Asp. Tox. 1, STOT SE 3, **STOT RE 2,** Skin Irrit. 2.	**1+2**	**30-60%**/ Cellulose thinner (5)	Priority: +++; VOC Classification of product with respect to Repr 2 and STOT RE 2 Appendix 1 + 2 high conc.
Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene) Mineral turpentine (aromatic)	64742-82-1	**VOC**	* Asp. Tox. 1, **STOT RE 1**.	**(1+2)**	**95-100%** / Turpentine (1) **80-95%** / Floor wax (16)	Priority: +++; VOC Classification of products for STOT RE 1 Appendix 1 + 2 high conc.
Styrene	100-42-5	**VOC**	* Flam. Liq. 3, **Repr. 2**, Acute Tox. 4, **STOT RE 1**, Skin Irrit. 2, Eye Irrit. 2.	**1+2**	**10-20%** / Chemical wood (two-component) (20)	Priority: +++; VOC Classification of product for Repr 2 and STOT RE 1 Annex 1 + 2 medium conc.
Diphenylmethane diisocyanate, isomeric, homologue and mixtures	9016-87-9	-	Acute Tox. 4, Skin Irrit. 2, Eye Irrit. 2, **Resp. Sens. 1,** **Skin Sens. 1,** **Carc. 2,** STOT SE 3, **STOT RE 2.**	**1+2**	**30-60 %** / PU foam sealant (30)	Priority: +++; Classification of product for Resp. Sens. 1, Skin Sens. 1 Carc. 2, STOT RE 2. high conc.

Substance	Cas no.	Volatility	Classification	Listed in Appendix 1/Appendix 2 of Pedersen et al. (2016)	Conc. (> 10%). /Product Name (Product ID)	Comment/Priority
Iso-butylated urea formaldehyde resin	68002-18-6	**VOC**	Flam. Liq. 3, Eye Dam. 1, STOT SE 3, **Carc. 1B**, Aquatic Chronic 4.	**1+2** (Formaldehyde)	**15-25%**/Floor lacquer (acid curing) (40)	Priority: +++; VOC Classification of product for Carc 1B Medium conc. Large amount
Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	EC-No: 919-164-8	**VOC**	**STOT RE 1,** Asp. Tox. 1, Aquatic Chronic.		1-5% / Floor paint (solvent-based) (44)	Priority: ++; VOC Classification of product for STOT RE in Category 2 low content but large amounts used during application
4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane	25068-38-6	Decomposes at 320 °C	* Skin Irrit. 2, Eye Irrit. 2, **Skin Sens. 1**, Aquatic Chronic 2.		**40-60%**/Epoxy floor paint (water-based, two-component) (9) **30-60%** /Floor paint comp A (two-component epoxy lacquer) (10) **3-60**% /Clear lacquer (two-component epoxy lacquer) (13) ≥5 - <10/Clear lacquer (two-component Epoxy lacquer) (42)	Priority: ++; Classification of products for Skin Sens 1 High concession.
2-(chloromethyl)oxirane; Formaldehyde; Phenol	28064-14-4		Skin Irrit. 2, **Skin Sens. 1,** Eye Irrit. 2, Aquatic Chronic 2.		**10-20%**/Epoxy floor paint (water-based, two-component) (9) § **10-20%**/Floor paint EP-V, comp A	Priority: ++; Classification of Product Skin Sens 1 Medium conc .; large amount
Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol	500-006-8	Decomposes	Skin Irrit. 2, Eye Irrit. 2, **Skin Sens. 1,** Aquatic Chronic 2.		<5% / Clear lacquer (two-component epoxy lacquer) (42)	Priority: ++ Classification of Skin Sens 1 product Low content Large amounts used during application

Substance	Cas no.	Volatility	Classification	Listed in Appendix 1/Appendix 2 of Pedersen et al. (2016)	Conc. (> 10%). /Product Name (Product ID)	Comment/Priority
Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.	68609-97-2	Decomposes	* Skin Irrit. 2, **Skin Sens. 1**.		**10-20%**/Epoxy floor paint (water-based, two-component) (9) 5-10%/floor paint comp A (two-component epoxy lacquer) (10) 5-10%/Clear lacquer (two-component epoxy lacquer) (42)	Priority: ++ Classification of Skin Sens 1 product Medium conc.
Formaldehyde	50-00-0	**VOC**	* **Carc. 1B,** **Muta. 2,** **Acute Tox. 3,** **Acute Tox. 3,** **Acute Tox. 3,** **Skin Corr. 1B,** **Skin Sens. 1.**	**1+2**	<1%/Floor lacquer (acid curing) (40)	Priority: ++; VOC; Classification of product with respect to Carc 1B (Limit 0.1%) Low content. (has got ++ since the substance is VOC and harmonized classified as Carc. 1B; Muta.2, Skin Sens 1.)
D-Limonene	5989-27-5	**VOC**	* Flam. Liq. 3, Skin Irrit. 2, **Skin Sens. 1.** Aquatic Acute 1: Aquatic Chronic 1:		<1%/Basic cleaner (3) <10%/Hand cleanser (50)	Priority: ++ VOC Product Classification For Skin Sens 1 (Specific products only) direct application to the skin
Sodium hydroxide	1310-73-2		* **Skin Corr. 1A**		<5 %/Lye (2)	Priority: ++ The substance is classified Skin Corr 1B down to 2% dissolution.
1,4-bis(2,3-epoxypro-poxy)butane	2425-79-8	SVOC	* Acute Tox. 4, Acute Tox. 4, Skin Irrit. 2, Eye Irrit. 2, **Skin Sens. 1**		1-5% / Epoxy floor paint (water-based, two-component) (9)	Priority: ++ Classification of Skin Sens 1 product Low content Large amounts used during application

Substance	Cas no.	Volatility	Classification	Listed in Appendix 1/Appendix 2 of Pedersen et al. (2016)	Conc. (> 10%). /Product Name (Product ID)	Comment/Priority
Butaneone oxime	96-29-7	VOC	* **Carc. 2,** Acute Tox. 4, Eye Dam. 1, Skin Sens. 1.		<1%/Floor paint (solvent-based) (8) <1%/Floor paint (solvent-based) (44) <0.2%/Floor paint (solvent-based) (43)	Priority: +; VOC Very low conc. Below the Carc 2 classification limit (1%) large amount.
Acetone oxime	127-06-0	**VOC**	**Carc. 2**		≥0.1-<0.3 % / Floor lacquer (solvent-based) (12)	Priority: +; VOC Low conc. Below the Carc 2 classification limit (1%) large amount.
2-aminoethanol	141-43-5	**VOC**	* Acute Tox. 4, Acute Tox. 4, Acute Tox. 4, **Skin Corr. 1B.**		<5%/Basic cleaner (3)	Priority: + Below the classification limit for Skin Corr (5%) Low content
Ammonium hydroxide solution	1336-21-6	**VOC**	* **Skin Corr. 1B,** Aquatic Acute 1.		<1%/Basic cleaner (3)	Priority: + Below the classification limit for Skin Corr (5%) Low content
Cobalt bis(2-ethylhexaneoate)	136-52-7		**Skin Sens. 1,** Eye Irrit. 2, **Repr. 2,** Aquatic Acute 1, Aquatic Chronic 3.		<1%/Floor paint (solvent-based) (8) <1%/Floor paint (solvent-based) (44) <0.02%/Floor paint (solvent-based) (43)	Priority: + Below the classification limits for Skin Sens 1 (1%) and Repr 2 (3%). Low content, large amount

Substance	Cas no.	Volatility	Classification	Listed in Appendix 1/Appendix 2 of Pedersen et al. (2016)	Conc. (> 10%). /Product Name (Product ID)	Comment/Priority
Hexane	110-54-3	**VOC**	* Flam. Liq. 2, **Repr. 2,** Asp. Tox. 1, STOT SE 3, **STOT RE 2,** Skin Irrit. 2, Aquatic Chronic 2.	**1+2**	<1%/Floor wax (16)	Priority: + Below classification the limits of Rep.2 (3%) and STOT RE 2 (10%).
5-Chloro-2-methyl-4-isothiazolin-3-one/ 2-Methyl-2H-isothiazol-3-one (3:1)	55965-84-9		* Acute Tox. 3, Acute Tox. 3, Acute Tox. 3, Skin Corr. 1B, **Skin Sens. 1,** Aquatic Acute 1, Aquatic Chronic 1.		<0.0015%/Wood filler (19) <0.0015%/Wet room paint (25) <0.0005%/Wet and adhesive glue (53) <0.0015%/Woven fabric glue (54)	Priority: + Below the classification limit for Skin sens 1 (0.0015%) Low content
3-Iodo-2-propynyl butylcarbamate	55406-53-6		* Acute Tox. 4, **Skin Sens. 1,** Eye Dam. 1, **Acute Tox. 3**, **STOT RE 1,** Aquatic Acute 1, Aquatic Chronic 1.		<1%/Wet room paint (25)	Priority: + Below the classification limits for STOT RE 2 (1%); Skin Sens 1 (1%); Low content
1,2-benzisothiazol-3(2H)-one (BIT)	2634-33-5	SVOC	* **Acute Tox. 3,** Acute Tox. 4, **STOT RE 1,** Eye Dam. 1, **Skin Sens. 1,** Aquatic Acute 1, Aquatic Chronic 1.		<0.05%/Wet room paint (25) <0.006%/Floor paint (water-based) (53)	Priority: + Below the classification limits for STOT RE 2 (1%); Skin Sens 1 (1%); Low content

Substance	Cas no.	Volatility	Classification	Listed in Appendix 1/Appendix 2 of Pedersen et al. (2016)	Conc. (> 10%). /Product Name (Product ID)	Comment/Priority
2-Methyl-2H-isothiazol-3-one (MIT)	2682-20-4		**Acute Tox. 3,** **Acute Tox. 3,** **Skin Corr. 1B,** **Skin Sens. 1A,** Eye Dam. 1, STOT SE 3, Aquatic Acute 1, Aquatic Chronic 2.		<0.05%/Wet room paint (25)	Priority: + Below the classification limit for Skin Corr (5%) and Skin Sens 1 (0.1%). Low content
Ammonium hydroxide solution	1336-21-6	**VOC**	* **Skin Corr. 1B**, Aquatic Acute 1.		%-concentration not disclosed/ Sealant (28)	Priority: ? Cannot be prioritized due to lack of knowledge about concentration.
Oxirane, reaction products with ammonia, N-benzyl derivative	1191251-49-6		**Skin Corr. 1B,** Aquatic Chronic 3.		1-3%/Hardening for floor lacquer (water-based) (37)	Priority: + Below the classification limit for Skin Corr 1B (5%) Low content
Calcium bis(2-ethylhexanoate)	136-51-6	Decomposes	Eye Dam. 1 **Repr. 2**		<0.7%/Floor paint (solvent-based) (43)	Priority: + Below the classification limit for Repr 2 (3%) Low content
Fatty acids, C14-18 and C16-18-unsatd., maleated, reaction products with oleylamine	85711-47-3	Decomposes	**Skin Sens. 1,** Aquatic Chronic 3		<1%/Floor paint (solvent-based) (44)	Priority: + Below the classification limit for Repr 2 (3%) Low content
2-Ethylhexanoic acid, zirconium salt	22464-99-9	Decomposes	**Repr. 2.**		≥0.1 - <0.3%/Floor lacquer (solvent-based) (12) <0.2%/Wood oil (14) <0.5%/Floor paint (solvent-based) (43) <1%/Floor paint (solvent-based) (44)	Priority: + Below the classification limit for Repr 2 (3%) Low content, large amount

Substance	Cas no.	Volatility	Classification	Listed in Appendix 1/Appendix 2 of Pedersen et al. (2016)	Conc. (> 10%). /Product Name (Product ID)	Comment/Priority
Hydrocarbons, C9-C11, n-alkanes, isoal-kanes, cyclics, < 2% aromatics	EC-No: 919-857-5	**VOC**	Asp. Tox. 1, Flam. Liq. 3, **Skin Sens. 1**, STOT SE 3, **STOT RE 2**.		15-25% / Floor paint (solvent-based) (44)	Priority: +; VOC Medium conc. The substance must be considered to have been classified incorrectly for Skin Sens 1 and STOT RE 2. **

Notes:
+++: High priority (in addition to classification, criteria are met in 2-3 columns)
++: middle priority (in addition to classification, criterion meets 1-2 columns)
+: Low priority (Completion criterion for classification only)
*: Harmonized classification
§: The manufacturer discloses a different CAS number than that given in the table. CAS No. (9003-36-8) for this bisphenol F-epoxy resin does not exist and therefore the product is included under CAS No. 28064-14-4.

4. Analysis of emissions

4.1 Purpose

The purpose of this chapter is to describe the results of the laboratory analyses that were used to form the basis of the subsequent health assessments.

4.2 Methodology

In consultation with the Danish Environmental Protection Agency, it was decided that the laboratory analyses should focus on analyses of emissions, as information on non-volatile ingredients was based on the product safety data sheets, assuming that the most problematic ingredients appear in the data sheets.

Exposure to the substances during use and in the air in the rooms where the products were used were investigated using two methods:

- Measurement of concentration in the respiratory zone during realistic use of the products in a test room. These measurements form the basis for calculating exposure of the person using the products.
- Measurement of degassing of the substances in the climate chamber, which provides a basis for calculating exposure of residents and others staying in the building after use of the products.

The measurements complement each other so that climate chamber tests are also performed on the products where the concentration in the respiratory zone is determined.

Ideally, one would first conduct climate chamber tests and, on the basis of an initial hazard assessment, select which products were to be included in concentration measurements in the respiratory zone. By doing so, it would be ensured that the more expensive tests in test rooms were performed on only the most problematic products. However, within the time frame of the project, it has been necessary to start climate chamber tests and measurements in the respiratory zone at the same time. The products for which to carry out the two types of analyses were selected based on the initial hazard assessment of ingredients.

4.2.1 Measurement of degassing of the substances in the climate chamber

The products' degassing of volatile substances was carried out in 113 l climate chambers according to well-established test methods (ISO 16000-9/11, prEN 16516) for building materials' degassing as well as product-specific test standards for liquid building materials such as paints, varnishes and adhesives.

Climate chamber test items were prepared according to current test standards for the specific product type. The surface area and film thickness of liquid products, such as paint and filler, are important for the measurement of volatile substances; these parameters are therefore documented for each test subject.

For testing the material degassing in small climate chambers, glass plates were used as neutral substrates for application.

Sampling and analysis of VOC was carried out according to ISO 16000-6, while sampling and analysis of aldehydes was conducted according to ISO 16000-3. An air sample was taken on the relevant collection medium with calibrated pumps from the empty chamber and air samples from the chamber were also taken with sample material after the following times after

application: 4-5 hours, 3 days and 28 days. In order to prevent the filters from exceeding their capacity, smaller air samples were collected immediately after application of the product and after the test samples had been placed for a while in the chamber. The collection volume is stated for each substance group and method. Air samples were collected using GilAir Plus pumps, which are calibrated concerning the filter and flow.

The products were selected from the solvents indicated on the safety data sheets, but the analyses included a wide range of VOC, so that the results could form the basis for an overall assessment of the health hazard by inhalation of substances released from the products.

The most volatile organic compounds, VVOC (very volatile organic compounds), are found in the air in the chamber in the beginning of the test period. At the end of the test period, moderately volatile organic compounds and semi-volatile organic compounds (SVOCs) are measured in the chamber air, whereas VVOC and VOC concentration have declined and several will have disappeared completely.

The estimated uncertainty for sample preparation and sampling is 20-40% depending on the sample type and collection volume.

Screening analyses for degassed substances from climate chamber testing at TDS-GC/MS

Just after application of the product and introduction to the climate chamber, 0.5 litres and 2 litres of air on Tenax pipes were collected, respectively. After 3 days 2-4 litres were collected and, after 28 days, 3-6 litres of air were collected at a flow of 80 mL/min.

The collected VOC on Tenax was thermally desorbed, separated by gas chromatography (GC) and detected by mass spectrometry (MS) on a Gerstel-Agilent system with a DB-5 column. The identity of the VOC was verified by searching for Wiley W9N11 and NIST 02/03 MS libraries by matching the MS spectrum of over 90%. Retention times were verified by pure reference substances, to the extent available. VOC was quantified to the extent possible with pure reference substances (> 2 µg/m^3), and otherwise the individual VOCs were reported as toluene equivalents cf. prEN 16516 in concentrations above 5 µg/m^3. The VOC identified in the mapping, shown in Table 9 and considered to be problematic substances, have been reported if detected at concentrations of > 1 µg/m^3.

For the analyses, a reference library with VOCs usually found in degassing from construction products (including DIY products) has been used.

The limit of detection: LOD is substance-dependent and depends on the amount of air collected. It is typically 1-2 µg/m³ when collecting a sample of 5 litres of air. Table 10 shows examples of detection limits.

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Table 10 Detection Limits (LOD) for selected volatile organic compounds (VOC) at Tenax TDS-GC/MS as a function of collected airflow.

CAS-No.	Substance	LOD (ng/tube)	LOD at 5 L air (µg/m^3)	LOD at 0.25 L air (µg/m^3)
100-42-5	Styrene	0.3	0.06	0.6
110-54-3	Hexane	4.8	0.96	9.6
2682-20-4	2-Methyl-2H-isothiazol-3-one (MIT)	0.2	0.04	0.4

In a large chamber respiratory zone test, 0.05 - 1 litre of air was collected at a flow of, respectively, 20 mL/min and 80 mL/min on Tenax for VVOC/VOC analysis and on Carbograph-Tenax (1TD) for additional screening for VVOC and VOC. The collected air samples on the 1TD tubes were analysed on TD-GC/MS on a Markes-Agilent system with a DB-624 column and the substances were identified by searching on NIST 14 MS library and quantified against toluene.

Degassed aldehydes from climate chamber test by HPLC

Aldehydes were collected on 2,4-dinitrophenylhydrazine (DNPH) filters which were then eluted with acetonitrile and analysed by HPLC with UV detection according to ISO 16000-3.

Aldehydes were identified by retention time and UV spectrum, and quantified using calibrated reference substances. A list of selected aldehydes with detection limits (LOD) is given in Table 11.

Table 11. Determination of C1-C4 aldehydes in air samples.

CAS-No.	Substance	LOD (µg/tube)	LOD at 60 L air (µg/m^3)	LOD at 5 L air (µg/m^3)
50-00-0	Formaldehyde	0.03	0.5	6
75-07-0	Acetaldehyde	0.03	0.5	6
123-38-6	Propanal	0.05	0.8	10
123-72-8	Butanal	0.03	0.5	6
107-02-8	Acryl aldehyde	0.03	0.5	6
4170-30-3	Crotonaldehyde	0.03	0.5	6

The analysis uncertainty was 15% (RSD, relative standard deviation).

Isocyanates from the climate chamber test

Air was collected on 1- (2-pyridyl) piperazine (1,2-PP) coated glass fibre filters. The filters were extracted with acetonitrile and subsequently analysed by HPLC/UV or HPLC/DAD. Clean reference substances were used for calibration and quantification. The analysis was performed according to MEL-18, "Isocyanates, Air Measurement" and EPA CTM-036. A list of selected isocyanates with detection limits (LOD) is given in Table 12.

Table 12. Determination of isocyanates in air samples

CAS-No.	Substance	LOD (µg/filter)	LOD at 240 L air (µg/m^3)	LOD at 35 L air (µg/m^3)
584-04-9	Toluene-2,4-diisocyanate (2,4-TDI)	1	4	29
91-08-7	Toluene-2,6-diisocyanate (2,6-TDI)	1	4	29
101-68-8	Diphenylmethane diisocyanate (4,4´-MDI)	1	4	29

Documentation of methods

The analyses used mainly accredited methods and recognized standard methods. The detection limits (LOD) are indicated along with the results in section 4.4.

4.2.2 Measurement of concentration in the respiratory zone using the products

To simulate the actual exposure upon application, measurements were made in 24 m^3 of climate chamber, as shown in the following photos.

Fotos af kammer

Figure 1 Climate chamber

The chamber is made of inert materials such as glass and steel. The chamber is air-conditioned by a cooling/heating unit as well as by the supply of humidified air that is filtered through activated carbon and a particulate filter. Air change, temperature and relative humidity are adjustable.

Specifications:
- Chamber 24 m^3 (WxLxH: 2.85m x 3.25mx 2.6m)
- Temperature 23ºC ± 2ºC (range 15-30 ° C)
- Relative humidity 50% RH ± 5% RH (range 30-70% RH)
- Air velocity 0.1 - 0.3 m/s
- Air change 0.50 h-1 ± 0.05 h-1 (range 0.25-0.75 h-1).

The chamber is equipped with Teflon hoses for external sampling of air. The chamber was used for simulation of work performance under conditions in the indoor climate of 23°C, 50% RH and an air shift of typically 0.25-0.50 times per hour.

Respiratory zone test procedure
Control samples were taken from the chamber's air with materials ready for application (e.g. plywood) depending on the analysis program: 2 litres on Tenax (VOC), 2 litres on Carbotrap (VVOC), 30 litres on DNPH (aldehydes) and 35 litres on 1,2- PP (Isocyanates).

The person who performed the work was wearing a full-length suit, respiratory protective equipment, gloves and a kettle or vest fitted with equipment. Air was collected in the respiratory zone during work performance with pumps mounted with collection media for various volatile substances in air.

The person left the chamber with the gear and the air samples were analysed.

The respiratory zone tests were performed at exposures of periods of 15 minutes, as the preliminary experiments showed that this was an appropriate time for performing the DIY work in exposure tests 1, 2, 3 and 4 (below) as well as regards air sampling.

Due to the very high concentrations of VOC measured in the air, the rate of air sampling on Tenax was increased. TD1 was reduced from 80 ml/min to a minimum of 20 ml/min to take air samples during the exposure period.

Exposure test 1 - Painting and painting of floors
Floor lacquer was tested with 4 m^2 surface of plywood. Although the standard floor load, according to prEN 16516 of floors, is 0.4 m^2/m^3, corresponding to 6 m^2 in a chamber of 24 m^3, it did not prove practical due to floor space.

Figure 2 Chamber ready for lacquering of a 4 m² floor.

It was covered with one layer of lacquer and then painted using a roller with the amount prescribed in Appendix 2 over a period of 15 minutes.

Figure 3 Lacquering of floor (left) and painting of floor (right)

Exposure test 2 – Application of filler
Plywood slabs were set with grooves for grouting, and the jointing was made in accordance with the instructions on the product. Conditioning and sampling were as stated above.


Figure 4 Filling.

Exposure test 3 - Cleaning of brush in turpentine
Course of action:
Pour approx. 2 decilitres (200 mL) turpentine to bucket 1
Put in brushes and stir around.
Wipe the brush with a cloth
Put away the brush
Pour the turpentine from bucket 1 to bucket 2
Pour new turpentine into bucket 1
Clean the brush is again
Wipe the brush with a cloth
The steps are performed slowly over a total of 15 minutes.

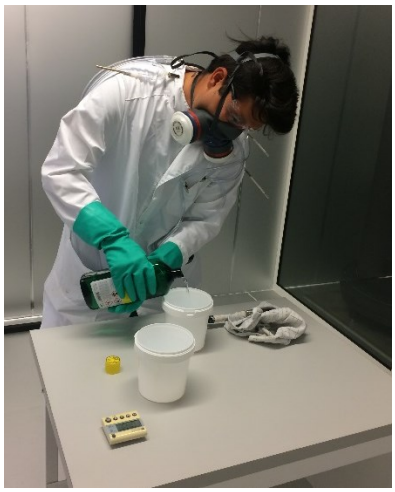

Figure 5 Cleaning of brush.

Exposure test 4 - Filling of holes in a floor with chemical wood
A plate with pre-drilled holes corresponding to small surfaces was laid out in a reference room with a material load of 0.007 m^2/m^3 cf. prEN 16516. The two components of chemical wood (plastic padding) were mixed immediately prior to application, after which the holes were filled and levelled with a filling knife.
This was done in two rounds with two holes taking a total time of 13 minutes.

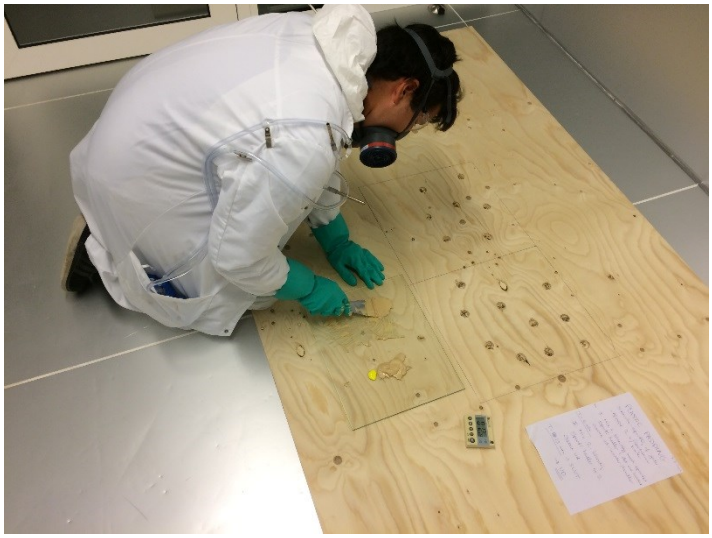

Figure 6 Filling.

Analyses

Analyses of substances collected on pipes were carried out in accordance with the methods described for climatic chamber tests.

4.3 Analysis programme

Products that were selected for analysis are listed in Table 13 below, which also indicates the scenarios in which the products are involved.

Table 13. Products containing the 31 priority substances, scenarios they form part of, as well as tests and analyses performed

No.	Product	Substance on the priority list/priority	Volatility (priority substances)	Scenario	Test	Analysis *
1	Turpentine	Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene) /+++	VOC	Wood floor*	Respiratory zone - cleaning of tools	VOCs /VVOC
3	Basic cleaner	D-Limonene /+	VOC	Bathroom	Climate chamber	VOCs
7	Floor paint (water-based)	None	-	Concrete floor Wood floor	Climate chamber	VOCs
8	Floor paint (solvent-based)	Butaneone oxime /+	VOC	Concrete floor	Climate chamber	VOCs Isocyanates Aldehydes
9	Epoxy floor paint (water-based, two-component) (mixed with comp B)	4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane /++ 2-(chloromethyl)oxirane; Formaldehyde; Phenol /++ Oxirane, mono[(C12-14-alkyloxy)methyl] derivs./+ 1,4-bis(2,3-epoxypropoxy)butane /+	Decomposes at 320 °C	Concrete floor*	Respiratory zone Climate chamber	VOCs /VVOC Aldehydes

No.	Product	Substance on the priority list/priority	Volatility (priority sub-stances)	Scenario	Test	Analysis *
10	Floor paint comp A (two-component epoxy lacquer) (mixed with comp B)	4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane /++ 2-(chloromethyl)oxirane; For-maldehyde; Phenol /++ Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.; (C12C14) alkylglycidylether /+	Decomposes at 320 °C Decomposes	Concrete floor	Climate chamber	VOCs Aldehydes
13	Clear lacquer (two-component epoxy lacquer) (mixed with comp B)	4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane /++ Oxiran, mono[(C12-14-alkyloxy) methyl]derivater; (C12C14) alkylglycidylether /+	Decomposes at 320 °C Decomposes	Concrete floor	Climate chamber	VOCs Aldehydes
15	Floor oil	None	-	Wood floor	Climate chamber	VOCs Aldehydes
16	Floor wax	Naphtha (petroleum), hy-drodesulfurized heavy (<0.1% benzene) /+++	VOC	Wood floor	Respiratory zone Climate chamber	VOCs /VVOC Aldehydes
20	Chemical wood	Styrene /+++	VOC	Wood floor (small sur-faces)	Respiratory zone Climate chamber	VOCs /VVOC
25	Wet room paint	None	-	Bathroom	Climate chamber	VOCs Aldehydes
30	PU foam sealant	Diphenylmethane diisocyanate, isomeric, homologue and mix-tures /+++		Bathroom**	Respiratory zone Climate chamber	VOCs /VVOC Isocyanates
40	Floor lacquer (acid curing)	Iso-butylated urea formaldehy-de resin /+++ Formaldehyde /+	VOC	Wood floor*	Respiratory zone Climate chamber	VOCs /VVOC Aldehydes
42	Clear lacquer (two-component epoxy lacquer) (mixed with comp B)	4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane /++ Formaldehyde, oligomeric reac-tion products with 1-chloro-2,3-epoxypropane and phenol /++	Decomposes at 320 °C Decomposes	Concrete floor	Climate chamber	VOCs
43	Floor paint (solvent-based)	Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, < 2% aromatics 2-Ethylhexanoic acid, zirconium salt /+	VOC	Concrete floor Wood floor	Climate chamber	VOCs Aldehydes
44	Floor paint (solvent-based)	Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) /++ 2-Ethylhexanoic acid, zirconium salt /+	VOC	Concrete floor*	Respiratory zone Climate chamber	VOCs /VVOC Isocyanates Aldehydes

No.	Product	Substance on the priority list/priority	Volatility (priority sub-stances)	Scenario	Test	Analysis *
55	Floor paint (water-based)	None	-	Concrete floor Wood floor	Climate chamber	VOCs

4.4 Results

The results of the small climate chamber test where the degassing was measured over time is given in detail in Tables 5.1 - 5.16 of Appendix 5, where the identified substances are reported.

Substance name may vary, as the chemical nomenclature is variable depending on the library search on MS spectra by GC-MS analyses of VOC. Therefore, the names of the substances in the appendix may in some cases be different from the names found in the mapping. However, the substances can be identified using their unique CAS number.

The hydrocarbons listed in the data sheets for the individual products are technical grades with shifting fractions from cracking/distillation of crude oil i.e. with varying hydrocarbon lengths. The substances are defined as intervals of hydrocarbon lengths. Using the GC/MS VOC analysis, it is difficult to determine the hydrocarbon intervals of the individual commodities.

An overview of the results of the volatiles studied is given in Table 14.
Other non-volatile substances such as waxes, salts and inorganic substances identified in the mapping are not possible to analyse with the methods used.

The table contains concentrations for:

- Volatile substances included in the gross list cf. Table 9 (marked with light green)
- Volatile substances included with a classification on safety data sheets cf. Appendix 3
- Other substances that have a harmonized classification corresponding to the selection criteria for substances found in the initial hazard assessment in section 3.2 and listed in Appendix 7 (marked with green).

Concentrations were converted into concentrations in an EU reference room with 12 m² floor area, a height of 2.5 m and a 0.5 hour shift of air.

Table 14. Analysis results for volatiles from initial gross list (highlighted light green), product data sheets and other priority substances cf. Appendix 7 (highlighted darker green). The concentrations are measured in small climate chambers, but calculated to correspond to the concentration in the reference room, according to prEN16516. For substances from the gross list and product data sheets that have been analysed but where concentrations above the detection limit have not been found, concentration is indicated by a "-" corresponding to <LOD.

Product ID	Product type	Substance name	CAS no.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)	LOD (µg/m^3)	M*
3	Basic cleaner	2-Aminoethanol	141-43-5	-	-	-	5	C
		D-Limonene	5989-27-5	6	-	-	1	C
		Phenol	108-95-2	41	9	-	2	C
		Alkylalcohol, ethoxylated	68439-46-3	-	-	-	5	C
		2-(2-Butoxyethoxy) ethanol	112-34-5	7,500	480	-	5	C
		(2-Hydroxyethyl) phenylether	122-99-6	-	-	-	5	C
		Sum of analysed VOCs	-	14,000	620	2		C
7	Floor paint (water-based)	Acetic acid	64-19-7	32	-	-	5	C
		Propionic acid	79-09-4	61	-	-	5	C
		Ethylbenzene	100-41-4	6	-	-	2	C
		Phenol	108-95-2	32	26	-	2	C
		2-(2-Butoxyethoxy)ethanol	112-34-5	25,000*	6,500*	30	5	C
		Sum of analysed VOCs	-	45,000	9,700	180		C
8	Floor paint (solvent-based)	Naphtha (petroleum), hydrotreated heavy	64742-48-9, 64742-82-1	440,000 (C10-C15)	2,100 (C10-C15)	27 (C10-C15)	5	C
		Butaneone oxime	96-29-7	1,500*	-	-	5	C
		Formaldehyde	50-00-0	6.7	13	3.2	1	A
		Acetaldehyde	75-07-0	4.1	63	3.1	1	A
		Crotonaldehyde	123-73-9	-	17	0.9	2	A
		Propionic acid	79-09-4	380	92	-	10	C
		Butyric acid	107-92-6	-	26	-	10	C
		Ethylbenzene	100-41-4	81	-	-	5	C
		Sum of analysed VOCs	-	510,000	4,500	200		C
9	Epoxy floor paint (water-based, two-component)	Oxiran, mono[(C12-14-alkyky-loxy)methyl]derivater; (C12C14) alkylglycidylether	68609-97-2	150	130	38	5	C
		1,4-bis(2,3-epoxypropoxy)butane	2425-79-8	-	-	-	5	C

Prod-uct ID	Product type	Substance name	CAS no.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)	LOD (µg/m^3)	M*
		Naphtha (petroleum), hydrodesulfurized heavy (<0.1% ben-zene)	64742-82-1	4,180 (C7-C13)	- (C7-C13)	- (C7-C13)	5	C
		Formaldehyde	50-00-0	-	1.7	1.9	1	A
		Acetaldehyde	75-07-0	24	1.9	17	1	A
		1,4-Dioxane	123-91-1	21	-	-	5	C
		Ethylbenzene	100-41-4	51	-	-	5	C
		Benzyl alcohol	100-51-6	4,500	1,800	64	5	C
		Sum of analysed VOCs	-	55,000	7,700	360		C
10	Floor paint comp A (two-component epoxy lacquer)	Oxiran, mono[(C12-14-alkyloxy)-methyl] derivater; (C12C14) alkylglycidylether	68609-97-2	160	170	12	5	C
		Formaldehyde	50-00-0	9.8	13	3.4	1	A
		Acetaldehyde	75-07-0	3.6	0.9	18	1	A
		Triethylamine	121-44-8	120	-	-	10	C
		Ethylbenzene	100-41-4	51	-	-	5	C
		Phenol	108-95-2	19	-	-	5	C
		Alcohols, C8-C22, ethoxylated	69013-19-0	-	-	-	5	C
		1,2-Ethane diol	107-21-1	-	-	-	5	C
		Sum of analysed VOCs	-	13,000	740	49		C
13	Clear lacquer (two-component epoxy lacquer)	Oxiran, mono[(C12-14-alkyloxy)methyl] derivater; (C12C14) alkylglycidylether	68609-97-2	230	40	-	5	C
		Formaldehyde	50-00-0	-	1.7	1.9	1	A
		Acetaldehyde	75-07-0	9	0.8	17	1	A
		Benzene	71-43-2	12	-	-	5	C
		Ethylbenzene	100-41-4	88	-	-	5	C
		Sum of analysed VOCs	-	23,000	180	88	5	C
15	Floor oil	Formaldehyde	50-00-0	2.7	15	1.7	1	A
		Acetaldehyde	75-07-0	4.6	29	1.3	1	A
		Crotonaldehyde	123-73-9	-	18	0.5	2	A
		Acetic acid	64-19-7	27	23	-	10	C
		Propionic acid	79-09-4	-	20	-	10	C
		Ethylbenzene	100-41-4	13	-	-	5	C
		Distillates (petroleum), hydrotreated light Alkanes, C11-15-iso	64742-47-8, 90622-58-5 (Sum C9-C15)	500,000	4,500	56	5	C
		Sum of analysed VOCs	-	500,000	6,700	73		C
16	Floor wax	Formaldehyde	50-00-0	4.3	2.3	1.2	1	A

Product ID	Product type	Substance name	CAS no.	5 hours (µg/m³)	3 days (µg/m³)	28 days (µg/m³)	LOD (µg/m³)	M*
		Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene)	64742-82-1	95,500 (C7-C13)	200 (C7-C13)	26 (C7-C13)	5	C
		Hexane	110-54-3	-	-	-	5	C
		Acetaldehyde	75-07-0	4.2	-	0.6	1	A
		Benzene	71-43-2	8			5	C
		Ethylbenzene	100-41-4	16			5	C
		Sum of analysed VOCs	-	100,000	200	25		C
20	Chemical wood (two-component)	Styrene	100-42-5	2,400	140	40	5	C
		Hexane	110-54-3	21	-	-	5	C
		Benzene	71-43-2	86	-	-	5	C
		Ethylbenzene	100-41-4	11	-	-	5	C
		Ally glycidyl ether	106-92-3	38	-	-	5	C
		Phenol	108-95-2	50	-	-	5	C
		Phenyloxiran	96-09-3	67	5	-	5	C
		1-Ethyl-2-pyrrolidinon	2687-91-4	190	21	5	5	C
		Benzoic acid	65-85-0	9	66	-	5	C
		Sum of analysed VOCs	-	3,700	356	89		C
25	Wet room paint (water-based)	Formaldehyde	50-00-0	9.7	2.0	2.1	1	A
		3-Iodo-2-propynyl butylcarbamate (IPBC)	55406-53-6	-	-	6	5	C
		2-Methyl-2H-isothiazol-3-one (MIT)	2682-20-4	18	36	7	5	C
		Styrene	100-42-5	6	-	-	5	C
		Ethylbenzene	100-41-4	25	-	-	5	C
		Acetaldehyde	75-07-0	3.3	0.5	15	5	C
		Phenol	108-95-2	-	30	-	5	C
		Sum of analysed VOCs	-	55,000	11,000	690		C
30	PU foam sealant	Hexane	110-54-3	24	-	-	1	A
		Toluene	108-88-3	12	-	-	29	B
		Styrene	100-42-5	3	-	-	5	C
		Acetaldehyde	75-07-0	3.3	0.5	15	1	A
		Ethylbenzene	100-41-4	25	-	-	5	C
		Phenol	108-95-2	-	30	-	5	C
		Sum of analysed VOCs	-	1,100	74	-		C
40	Floor lacquer (acid curing)	Iso-butylated urea formaldehyde resin	68002-18-6	-	-	-	5	C
		Formaldehyde	50-00-0	10,627*	1,772	85	1	A
		Acetaldehyde	75-07-0	-	-	1.7	1	A
		Acetic acid	64-19-7	2,800	44	-	10	C

Product ID	Product type	Substance name	CAS no.	5 hours (µg/m³)	3 days (µg/m³)	28 days (µg/m³)	LOD (µg/m³)	M*
		Butyric acid	107-92-6	-	11	-	10	C
		Ethylbenzene	100-41-4	1,300*	-	-	5	C
		Phenol	108-95-2	79	-	-	5	C
		Heptanoic acid	111-14-8	-	-	5	5	C
		Ethanol	64-17-5	12,000*	36	-	5	C
		n-Butyl acetate	123-86-4	12,000*	-	-	5	C
		Propane-2-ol	67-63-0	7,300*	-	-	5	C
		1-Methoxypropan-2-ol	107-98-2	800*	89	-	5	C
		2-Methylpropan-1-ol	78-83-1	19,000*	430	11	10	C
		Cyclohexanone	108-94-1	12,000*	210	9	5	C
		Xylene	1330-20-7	5,700*	-	-	5	C
		Sum of analysed VOCs	-	120,000	1,800	180		C
42	Clear lacquer (two-component epoxy lacquer)	Hexane	110-54-3	5	-	-	5	C
		Toluene	108-88-3	140	-	-	5	C
		Benzene	71-43-2	13	-	-	5	C
		Ethylbenzene	100-41-4	37	-	-	5	C
		Phenol	108-95-2	25	5	-	5	C
		1-Methoxypropan-2-ol	107-98-2	4,300*	17	-	5	C
		Benzyl alcohol	100-51-6	5,100*	85	7	5	C
		Sum of analysed VOCs	-	12,000	130	98		C
43	Floor paint (solvent-based)	Formaldehyde	50-00-0	6.7	12	4.4	1	A
		Butaneone oxime	96-29-7	720*	-	-	5	C
		Acetaldehyde	75-07-0	21	46	19	1	A
		Crotonaldehyde	123-73-9	2	8	0.6	1	A
		Benzene	71-43-2	14	-	-	5	C
		Butyric acid	107-92-6	-	41	-	10	C
		Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, < 2% aromatics	EC-No: 918-481-9	370,000 (C8-C14)	4,600 (C8-C14)	190 (C8-C14)	5	C
		Sum of analysed VOCs	-	380,000	5100	250		C
44	Floor paint (solvent-based)	Formaldehyde	50-00-0	1.5	8.0	4.0	1	A
		Hydrocarbons, C9-C13, n-alkanes, isoalkanes, cyclics, aromatics	EC-No: 919-857-5, EC-No: 918-481-9, EC-No: 919-164-8	760,000	3,400	150	5	C
		Butaneone oxime	96-29-7	7,300*	-	-	5	C
		Acetaldehyde	75-07-0	-	57	19	1	A
		Crotonaldehyde	123-73-9	-	13	1.0	1	A
		Benzene	71-43-2	20	-	-	5	C
		Butyric acid	107-92-6	-	33	-	10	C

Prod-uct ID	Product type	Substance name	CAS no.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)	LOD (µg/m^3)	M*
		Ethylbenzene	100-41-4	1,300*	-	-	5	C
		Sum of analysed VOCs	-	800,000	6,400	250		C
55	Floor paint (wa-ter-based)	2-Methyl-2H-isothiazol-3-one (MIT)	55965-84-9	30	27	-	5	C
		Hexane	110-54-3	19	-	-	5	C
		N-Ethyl-ethaneamine	109-89-7	560 *	-	-	5	C
		Triethylamine	121-44-8	3200 *	13	6	5	C
		Ethylbenzene	100-41-4	5	-	-	5	C
		Sum of analysed VOCs	-	245,000	9,600	120		C

Notes:

- LOD: Detection Limit
- - Not detected above the detection limit for litres of air (L): 5 L (DNPH/Method A), 35 L (1,2-PP/Method B), 1 L (Tenax/Method C)
- * The measured concentration may be higher as the amount of the substance exceeds the capacity of the collection medium and the upper quantitation limit of the method.

M: Analysis method:

A. Analysis of aldehydes by HPLC of air samples collected on DNPH by ISO 16000-3.
B. Analysis of isocyanates by HPLC of air samples collected on 1,2-PP by MEL-18EPA CTM-036.
C. Analysis of VOC by TDS-GC/MS of air samples collected on Tenax TA ® at ISO 16000-6 and reporting by prEN 16516.

The results of measurement in the respiratory zone of degassing under the performance of the "do-it-yourself" tasks are given in detail in Tables 6.1-6.7 of Appendix 6 and an overview of the results of expected substances is given in Table 15. For these results, other substance names may occur in the appendix.

Table 15. Analysis results for volatiles from initial gross list (highlighted light green), product data sheets and other priority substances cf. Annex 7 (highlighted darker green) measured in the respiratory zone by application of products in a large climate chamber

ID	Product type	Substance name	CAS no.	Concentration in air (µg/m^3)	LOQ (µg/m^3)	Method	Scenario
1	Mineral turpentine	Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene) Expressed as sum of measured C7-C13 hydrocarbons	64742-82-1	10,840 (C7-C13)	50	C	Cleaning of tools
		Benzene	71-43-2	10	5	C	
		Ethylbenzene	100-41-4	12	5	C	
		Sum of measured VOC	-	10,860		C	
9	Two-component epoxy floor paint (water-based)	Oxiran, mono[(C12-14-alkyloxy)methyl] derivater; (C12C14) alkylglycidylether	68609-97-2	42	20	C	Painting of floor
		Butanedioldiglycidylether	2425-79-8	-	50	C	
		Toluene	108-88-3	52	5	C	
		Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene)	64742-82-1	4,900 (C7-C13)	50	C	
		1,4-Dioxane	123-91-1	220	5	C	
		Ethylbenzene	100-41-4	350	5	C	
		Benzyl alcohol	100-51-6	580*	50	C	
		Sum of measured VOC	--	9,750		C	
16	Floor wax	Hexane	110-54-3	400	50	C	Application on the floor
		Toluene	108-88-3	1,900*	5	C	
		Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene)	64742-82-1	321,000 (C7-C13)	50	C	
		Benzene	71-43-2	120	5	C	
		Ethylbenzene	100-41-4	3,980*	5	C	
		Sum of measured VOC	-	379,820		C	
20	Chemical wood (two-component)	Styrene	100-42-5	730	50	D (C)	Filling of holes
		Limonen	5989-27-5	6			
		Sum of measured VOC	-	980		C	
30	PU foam sealant	Diphenylmethanediisocyanate, isomeric, homologue and mixtures	9016-87-9	6			Grouting of plates
		Propane	74-98-6	-	100	D	

ID	Product type	Substance name	CAS no.	Concentration in air (µg/m^3)	LOQ (µg/m^3)	Method	Scenario
		Butane	106-97-8	18,000	100	D	
		Isobutane	75-28-5	6,300	100	D	
		Dimethyl ether	115-10-6	-	100	D	
		Sum of measured VOC		419	50	C	
40	Floor lacquer acid curing	Formaldehyde	50-00-0	11,263*	16	A	Application on the floor
		Toluene	108-88-3	66	16	A	
		Acetaldehyde	000075-07-0	558*	15	A	
		Ethylbenzene	000100-41-4	7,700*	25	C	
		Ethanol	64-17-5	746,900*	50	C(D)	
		n-Butyl acetate	123-86-4	68,000	50	C(D)	
		Propane-2-ol	67-63-0	159,650*	50	C	
		1-Methoxypropan-2-ol	107-98-2	39,000*	50	C	
		2-Methylpropan-1-ol	78-83-1	30,983*	50	C	
		Cyclohexanone	108-94-1	13,000*	50	C	
		Xylene	1330-20-7	31,955*	50	C	
		Sum of measured VOC	-	1,096,200		C	
44	Floor paint (solvent-based)	Butaneone oxime	96-29-7	15,000	50	C	Application on the floor
		Toluene	108-88-3	171	16	A	
		Hydrocarbons, C9-C13, n-alkanes, isoalkanes, cyclics, aromatics	EC-No: 919-857-5, EC-No: 918-481-9, EC-No: 919-164-8	409,970	50	C	
		Benzene	71-43-2	69	25	C	
		Ethylbenzene	100-41-4	5,900*	25	C	
		Sum of measured VOC	-	630,000		C	

Notes:

- LOD: Detection Limit
- - Not detected above the detection limit for litres of air (L): 5 L (DNPH/Method A), 35 L (1,2-PP/Method B), 1 L (Tenax/Method C)
- * The measured concentration may be higher as the amount of the substance exceeds the capacity of the collection medium and the upper quantitation limit of the method.

* The measured concentration may be higher as the amount of the substance exceeds the capacity of the collection medium and the upper quantitation limit of the method.

M: Analysis method:

A. Analysis of aldehydes by HPLC of air samples collected on DNPH by ISO 16000-3.
B. Analysis of isocyanates by HPLC of air samples collected on 1,2-PP by MEL-18EPA CTM-036
C. Analysis of VOC by TDS-GC/MS of air samples collected on Tenax TA ® at ISO 16000-6 and reporting by prEN 16516.

Screening of VVOC and quantification of toluene by TDS-GC/MS of air samples collected on Carbograph-Tenax.

No isocyanates were found in the air samples from the climate chambers or in the respiratory zone for product nos. 8, 30 or 44.

4.5 Discussion and selection of substances for hazard and risk assessment

4.5.1 Discussion of results

As might be anticipated, solvents occur in very high concentrations in **solvent-based paints**. Therefore, after 5 hours in the climate chamber, the following concentrations of these substances (converted to concentrations in the reference room) were measured:

- Naphtha (petroleum), hydrotreated heavy (C6-C13), (C7-C12): 440,000 µg/m^3 (floor paint ID 8)
- Naphtha (petroleum), hydrodesulphurised heavy (<0.1% Benzene): 94,000 µg/m^3 (floor wax ID 16)
- Hydrogen C9-C13, n-alkanes, isoalkanes, cyclic aromatics: 760,000 µg/m^3 (floor paint ID 44)

The level after 3 days is typically reduced to 1% of the level after 5 hours and to less than 0.1% after 28 days. Upon application of paint ID 44, a concentration of 409,970 µg/m^3 for hydrocarbons C9-C13, n-alkanes, isoalkanes, and cyclic aromatics was measured in the respiratory zone. The measured concentration was therefore somewhat lower than measured in the climate chamber after 5 hours.

In comparison, the concentration in the respiratory zone was 10,800 µg/m³ during **cleaning of brushes** with turpentine, equivalent to a few percent of the levels that could be found in the reference room where the floor was painted with solution-based paint after 5 hours.

When using **floor wax**, approx. 321,000 µg/m^3 naphtha was measured in the respiratory zone, which was somewhat higher than the level after 5 hours in the climate chamber (calculated as reference room), where 94,000 µg/m^3 was measured. After 3 days, the level had fallen to below 0.2% of the level after 5 hours and further decreased to below 0.1% after 28 days.

Using water-based **two-component epoxy paint** (ID 9), the level of naphtha in the respiratory zone was approximately 4,900 µg/m^3 - only a few percent of the level using solvent-based paints and waxes. At application, a level of 220 µg/m^3 of 1.4 dioxane and 350 µg/m^3 ethylbenzene was measured, while the level in the climate chamber after 5 hours was significantly lower. After 5 days and 28 days, the main priority substance released from the paint was oxirane mono [(C12-14 alkyloxy) methyl] derivatives. Other substances that were delivered in substantial amounts were (C12C14) alkyl-glycidyl ether 1,2-propanediol and benzyl alcohol, whose classifications does not make them the priority substances. In another epoxy paint, the highest values were found for benzyl alcohol and 1-methoxypropan-2-ol.

When filling with two-component **chemical wood**, styrene constituted the major portion of the VOC in the respiratory zone, which was modest compared with other investigated processes. Higher concentrations were measured after 5 hours in the climate chamber, perhaps because the rate at which VOCs are released depends on the precise mixing of the components, since more VOCs can be dispensed if complete polymerization does not occur.

When painted with **alcohol-based floor lacquer**, formaldehyde, acetaldehyde and ethylbenzene formed the major concentrations in the respiratory zone out of the substances with priority classifications. The formaldehyde concentration was at the same level after 5 hours in the climate chamber and remained relatively high after 3 days. The level of ethylbenzene was significantly lower after 5 hours, whereas acetaldehyde could not be measured after 5 hours. In the respiratory zone, concentrations of 746,900 µg/m³ of ethanol and 159,650 µg/m³ of propan-2-ol were measured. After 5 hours the concentration of the two substances had fallen to 12,000 and 7,300 µg/m³, respectively. After 5 hours, concentrations between 5,000 and 20,000 µg/m^3 were found for a number of VOCs: ethanol, n-butyl acetate, propan-2-ol, 2-methylpropan-1 -ol, cyclohexanone and xylene. Therefore, a simultaneous exposure to a wide

range of VOCs with levels above 5,000 µg/m³ each occurred. The concentrations of these substances were at about the same level in the respiratory zone upon application.

No experiment was made with **water-based** acrylic floor paint. Climate chamber tests showed a total VOC concentration of 25,000 µg/m^3 after 5 hours, and the concentration remained around 25% of this after 3 days. About half of the VOC emission was 2- (2-butoxyethoxy) ethanol, classified as an eye irritant. After 28 days, total VOC emission was 0.4% of the level after 5 hours.

It is a common feature of the results that the concentration of many of the VOCs is about same level in the reference room (calculated from climate chamber trials) after 5 hours as in the respiratory zone upon application. However, the calculations of concentrations in the room were made assuming a standard air change without special ventilating. However, when painting with solvent-based paints, it is not common to open windows to ensure ventilation because of the increased risk of dust on the painted surface.

4.5.2 Selection of products and substances for hazard assessment

Selection of the substances for hazard assessment was based on the ability to compile overall assessments for selected products with particular focus on the products for which measurements were carried out in the respiratory zone.

Scenarios have been prepared for the following representative products with indications of which tests have been carried out:

1 Mineral turpentine: respiratory zone test
7 Floor paint (water-based): Climate chamber
9 Epoxy floor paint (water-based, two-component): Climate chamber and respiratory zone test
16 Floor wax: Climate chamber and respiratory zone test
20 Chemical wood (two-component): Climate chamber and respiratory zone test
25 Wet room paint (water-based): Climate chamber and respiratory zone test
30 PU foam sealant: Climate chamber and respiratory zone test
40 Floor lacquer (acid curing): Climate chamber and respiratory zone test
44 Floor paint (solvent-based): Climate chamber and respiratory zone test

The following table lists substances evaluated as regards inclusion in the hazard assessment to cover these scenarios. Substances not detected or not included in the selected products were discarded, resulting in a list of 32 substances for hazard assessment.

Table 16. Selection of substances for hazard assessment. Classification decisive for selection is indicated in bold.

Substance	CAS no.	Volatility	Classification	Conc. c.f. Safety Data Sheet/Product Name (Product ID)	Highest concentration found (µg/m3) (product ID)	In selected products, product ID
Preliminary gross list						
Toluene	108-88-3	**VOC**	Flam. Liq. 2, **Repr. 2,** Asp. Tox. 1, STOT SE 3, **STOT RE 2,** Skin Irrit. 2.	**30-60%**/ Cellulose thinner (5)	140 (42)	9, 16, 40, 44

Substance	CAS no.	Volatility	Classification	Conc. c.f. Safety Data Sheet/Product Name (Product ID)	Highest concentration found (µg/m3) (product ID)	In selected products, product ID
Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene) Mineral turpentine (aromatic)	64742-82-1	**VOC**	Asp. Tox. 1, **STOT RE 1**.	**95-100%** / Turpentine (1) **80-95%** / Floor wax (16)	321,000 (16)	1, 9, 16
Styrene	100-42-5	**VOC**	Flam. Liq. 3, **Repr. 2**, Acute Tox. 4, **STOT RE 1**, Skin Irrit. 2, Eye Irrit. 2.	**10-20%** / Chemical wood (two-component) (20)	2,400 (20)	20
Diphenylmethane diisocyanate, isomeric and homologue	9016-87-9	-	Acute Tox. 4, Skin Irrit. 2, Eye Irrit. 2, **Resp. Sens. 1,** **Skin Sens. 1,** **Carc. 2,** STOT SE 3, **STOT RE 2.**	**30-60 %** / PU foam sealant (30)	6 (30)	30
Iso-butylated urea formaldehyde resin	68002-18-6	**VOC**	Flam. Liq. 3, Eye Dam. 1, STOT SE 3, **Carc. 1B**, Aquatic Chronic 4.	**15-25%**/Floor lacquer (acid curing) (40)	< LOD	40
Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	EC-No: 919-164-8	**VOC**	**STOT RE 1,** Asp. Tox. 1, Aquatic Chronic.	1-5% / Floor paint (solvent-based) (44)	760,000 (44)	44
4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane	25068-38-6	Decomposes at 320 °C	Skin Irrit. 2, Eye Irrit. 2, **Skin Sens. 1**, Aquatic Chronic 2.	**40-60%**/Epoxy floor paint (water-based, two-component) (9) **30-60%** /Floor paint comp A (two-component epoxy lacquer) (10) **3-60**% /Clear lacquer (two-component epoxy lacquer) (13) ≥5 - <10/Clear lacquer (two-component epoxy lacquer) (42)	Not analysed for	9
2-(chloromethyl)oxirane; Formaldehyde; Phenol	28064-14-4		Skin Irrit. 2, **Skin Sens. 1,** Eye Irrit. 2, Aquatic Chronic 2.	**10-20%**/Epoxy floor paint (water-based, two-component) (9) § **10-20%**/Floor paint comp A (two-component epoxy lacquer) (36)	Not analysed for	9

Substance	CAS no.	Volatility	Classification	Conc. c.f. Safety Data Sheet/Product Name (Product ID)	Highest con-centration found (µg/m3) (product ID)	In selected products, product ID
Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol	500-006-8	Decompos-es	Skin Irrit. 2, Eye Irrit. 2, **Skin Sens. 1,** Aquatic Chronic 2.	<5% / Clear lacquer (two-component epoxy lacquer) (42)	Not analysed for	None
Oxiran, mono[(C12-14-alkyloxy) me-thyl]derivater; (C12C14) alkyl-glycidylether	68609-97-2	Decompos-es	Skin Irrit. 2, **Skin Sens. 1**.	**10-20%**/Epoxy floor paint (water-based, two-component) (9) 5-10%/Floor paint comp A (two-component epoxy lacquer) (10) 5-10%/Clear lacquer (two-component epoxy lacquer) (42)	Not analysed for	9
Formaldehyde	50-00-0	**VOC**	**Carc. 1B, Muta. 2, Acute Tox. 3, Acute Tox. 3, Acute Tox. 3, Skin Corr. 1B, Skin Sens. 1.**	<1%/Floor lacquer (acid curing)(40)	10,627 (40)	9, 16, 40, 44
D-Limonene	5989-27-5	**VOC**	Flam. Liq. 3, Skin Irrit. 2, **Skin Sens. 1.** Aquatic Acute 1: Aquatic Chronic 1:	< 1%/Basic cleaner (3) <10%/Hand cleanser (50)	6 (3)	None
Sodium hydroxide	1310-73-2		**Skin Corr. 1A**	< 5 %/Lye (2)		None
1,4-bis(2,3-epoxypro-poxy)butane	2425-79-8	SVOC	Acute Tox. 4, Acute Tox. 4, Skin Irrit. 2, Eye Irrit. 2, **Skin Sens. 1**	1-5% / Epoxy floor paint (wa-ter-based, two-component) (9)	< LOD	9
Butaneone oxime	96-29-7	VOC	**Carc. 2,** Acute Tox. 4, Eye Dam. 1, **Skin Sens. 1.**	<1%/Floor paint (sol-vent-based) (8) <1%/Floor paint (sol-vent-based) (44) <0.2%/Floor paint (solvent-based) (43)	15,000 (44)	44
2-Aminoethanol	141-43-5	**VOC**	Acute Tox. 4, Acute Tox. 4, Acute Tox. 4, **Skin Corr. 1B.**	<5%/Basic cleaner (3)	<LOD	Not detected
Ammonium hy-droxide solution	1336-21-6	**VOC**	**Skin Corr. 1B,** Aquatic Acute 1.	<<1/Basic cleaner (3)	Not analysed for	None

Substance	CAS no.	Volatility	Classification	Conc. c.f. Safety Data Sheet/Product Name (Product ID)	Highest concentration found (µg/m3) (product ID)	In selected products, product ID
Cobalt bis(2-ethylhexaneoate)	136-52-7		**Skin Sens. 1,** Eye Irrit. 2, **Rear. 2,** Aquatic Acute 1, Aquatic Chronic 3.	<1%/Floor paint (solvent-based) (8) <1%/Floor paint (solvent-based) (44) <0.02%/Floor paint (solvent-based) (43)	Not analysed for	44
Hexane	110-54-3	**VOC**	Flam. Liq. 2, **Repr. 2,** Asp. Tox. 1, STOT SE 3, **STOT RE 2,** Skin Irrit. 2, Aquatic Chronic 2.	< 1%/Floor wax (16)	400 (16)	16, 20, 30
5-Chloro-2-methyl-4-isothiazolin-3-one/ 2-Methyl-2H-isothiazol-3-one (3:1)	55965-84-9		Acute Tox. 3, Acute Tox. 3, Acute Tox. 3, Skin Corr. 1B, **Skin Sens. 1,** Aquatic Acute 1, Aquatic Chronic 1.	<0.0015%/Wood filler (19) <0.0015%/Wet room paint (25) <0.0005%/Wet and adhesive glue (53) <0.0015%/Woven fabric glue(54)	140 (25)	25
3-Iodo-2-propynyl butylcarbamate	55406-53-6		Acute Tox. 4, **Skin Sens. 1,** Eye Dam. 1, **Acute Tox. 3**, **STOT RE 1,** Aquatic Acute 1, Aquatic Chronic 1.	<1%/Wet room paint (25)	Not analysed for	25
1,2-benzisothiazol-3(2H)-one (BIT)	2634-33-5	SVOC	**Acute Tox. 3,** Acute Tox. 4, **STOT RE 1,** Eye Dam. 1, **Skin Sens. 1,** Aquatic Acute 1, Aquatic Chronic 1.	< 0.05%/Wet room paint (25) <0.006%/Floor paint (water-based) (53)	<LOD	25 but below LOD and not selected
2-Methyl-2H-isothiazol-3-one (MIT)	2682-20-4		**Acute Tox. 3, Acute Tox. 3, Skin Corr. 1B, Skin Sens. 1A,** Eye Dam. 1, STOT SE 3**,** Aquatic Acute 1, Aquatic Chronic 2.	< 0.05%/Wet room paint (25)	36 (25)	25
Oxirane, reaction products with ammonia, N-benzyl derivative	1191251-49-6		**Skin Corr. 1B,** Aquatic Chronic 3.	1-3%/Hardener for floor lacquer (water-based) (37)	Not analysed for	None

Substance	CAS no.	Volatility	Classification	Conc. c.f. Safety Data Sheet/Product Name (Product ID)	Highest concentration found (µg/m3) (product ID)	In selected products, product ID
Calcium bis(2-ethylhexanoate)	136-51-6	Decomposes	Eye Dam. 1 **Repr. 2**	<0.7%/Floor paint (solvent-based) (43)	Not analysed for	None
Fatty acids, C14-18 and C16-18-unsatd., maleated, reaction products with oleylamine	85711-47-3	Decomposes	**Skin Sens. 1,** Aquatic Chronic 3	<1%/Floor paint (solvent-based) (44)	Not analysed for	44
2-Ethylhexanoic acid, zirconium salt	22464-99-9	Decomposes	**Repr. 2.**	≥0.1 - <0.3%/Floor lacquer (solvent-based) (12) <0.2%/Tree oil (14) <0.5%/Floor paint (solvent-based) (43) <1%/Floor paint (solvent-based) (44)	Not analysed for	44
Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, < 2% aromatics	EC-No: 919-857-5	**VOC**	Asp. Tox. 1, Flam. Liq. 3, **Skin Sens. 1**, STOT SE 3, **STOT RE 2**.	15-25% / Floor paint (solvent-based) (44)	760,000 (44) Together with EC No: 919-164-8 and assessed as this	44
Substances found in laboratory tests with a classification corresponding to the selection criteria. The substances are not declared, but may be present in low concentrations or may be formed, for example, by the polymerization process.						
Ethylbenzene	100-41-4	**VOC**	Flam. Liq. 2 Acute Tox. 4 Asp. Tox. 1 **STOT RE 2**	-	1,300 (40)	7, 20, 25, 30, 40, 44
4,4'-Methylene diphenyl diisocyanate	101-68-8	**VOC**	**Carc. 2** Acute Tox. 4 STOT SE 3 **STOT RE 2** Skin Irrit. 2 Eye Irrit. 2 Resp. Sens. 1 **Skin Sens. 1**	-	< LOD	Below LOD
Allyl glycidyl ether	106-92-3	**VOC**	Flam. Liq. 3 **Carc. 2** **Muta. 2** **Repr. 2** Acute Tox. 4 Acute Tox. 4 STOT SE 3 Skin Irrit. 2 Eye Dam. 1 **Skin Sens. 1** Aquatic Chronic 3	-	38 (20)	20

Substance	CAS no.	Volatility	Classification	Conc. c.f. Safety Data Sheet/Product Name (Product ID)	Highest con-centration found (µg/m3) (product ID)	In selected products, product ID
Butyric acid	107-92-6	**VOC**	**Skin Corr. 1B**	-	41 (43)	40, 44
Phenol	108-95-2	**VOC**	**Muta. 2** Acute Tox. 3 Acute Tox. 3 Acute Tox. 3 **STOT RE 2** **Skin Corr. 1B**	-	79 (40)	7, 25, 30, 40
Diethylamine	109-89-7	**VOC**	Flam. Liq. 2 Acute Tox. 4 Acute Tox. 4 Acute Tox. 4 **Skin Corr. 1A**	-	560 (55)	None
Heptanoic acid	111-14-8	**VOC**	**Skin Corr. 1B**	-	5 (40)	40
Triethylamine	121-44-8	**VOC**	Flam. Liq. 2 Acute Tox. 4 Acute Tox. 4 Acute Tox. 4 **Skin Corr. 1A**	-	3,200 (55)	None
Crotonaldehyde	123-73-9	**VOC**	Flam. Liq. 2 **Muta. 2** Acute Tox. 2 Acute Tox. 3 Acute Tox. 3 STOT SE 3 **STOT RE 2** Skin Irrit. 2 Eye Dam. 1 Aquatic Acute 1	-	17 (8)	44
1,4-Dioxane	123-91-1	**VOC**	Flam. Liq. 2 **Carc. 2** STOT SE 3 Eye Irrit. 2	-	220 (9)	9
N-ethyl-2-pyrrolidone	2687-91-4	**VOC**	**Repr. 1B**	-	190 (20)	20
Acetic acid	64-19-7	**VOC**	Flam. Liq. 3 **Skin Corr. 1A**	-	2,800 (40)	7, 40
Benzoic acid	65-85-0	**VOC**	**STOT RE 1** Skin Irrit. 2 Eye Dam. 1	-	66 (25)	20
Benzene	71-43-2	**VOC**	Flam. Liq. 2 **Carc. 1A** **Muta. 1B** Asp. Tox. 1 **STOT RE 1** Skin Irrit. 2 Eye Irrit. 2	-	120 (16)	20, 44

Substance	CAS no.	Volatility	Classification	Conc. c.f. Safety Data Sheet/Product Name (Product ID)	Highest con-centration found (µg/m3) (product ID)	In selected products, product ID
Acetaldehyde	75-07-0	**VOC**	Flam. Liq. 1 **Carc. 2** STOT SE 3 Eye Irrit. 2	-	558 (40)	9, 16, 25, 30, 40, 44
Propionic acid	79-09-4	**VOC**	**Skin Corr. 1B**	-	380 (8)	7

5. Hazard Assessment

5.1 Purpose

In this chapter, a further hazard assessment of the selected substances is discussed. Information about the substances' limit values in the working environment and data on tolerable exposure levels for the private user/general population were collected. Furthermore, the most critical effects for the substances were assessed, i.e. the effects that can occur at the lowest exposure levels and for which the limit values are typically set to protect against.

Finally, the classification of the substances (typically from the product data sheets) was reviewed based on knowledge of the substances classification in the ECHA database.

The collected data was subsequently used in the risk assessment of the selected products, as the measured/calculated levels of use of the products can be compared with the tolerable exposure levels specified in this chapter.

5.2 Method

To assess measured degassing levels of volatile substances, information on the substances' limit values in the working environment was collected. The values were primarily sought in the Danish Working Environment Authority's current list of limit values for substances and materials. If the substances did not appear in this list, values were sought from the assessments of the German MAK Commission or from the European Scientific Committee for Occupational Exposure Limits, SCOEL.

Tolerable exposure levels for the general consumer/population are based on limit values established according to the guidelines in the REACH regulation regarding determination of DNEL values for the general population (ECHA, 2012).

A reference that should be highlighted in this context is a report from the European Commission Joint Research Center (JRC): "*Harmonization framework for health based evaluation of indoor emissions from construction products in the European Union using the EU-LCI concept*", as this report assessed a number of indoor climate-related substances, and calculated so-called Lowest Concentration of Interest (LCI values) associated with the degassing of these substances, based on a common European approach (JRC/European Commission 2013). The assessments in the report use the same guidelines as used by REACH to calculate DNEL values, so the calculated LCI values can be used as tolerable exposure levels or DNEL values from a toxicological point of view. The EU-LCI list "Agreed LCI values" is continuously updated and can be downloaded from the Internet (EU-LCI 2016).

A number of these values were recently used in connection with hazard and risk assessment in a number of the Danish EPA's consumer projects, where DNEL values have also been calculated for a number of other substances that may be relevant to this project and where the most critical effects of the substances are indicated.

Finally, the ECHA website was used to supplement data from the Agency's Risk Assessment Committee (RAC) assessments, as well as to seek missing data in substance registrations and to check up on the classification of substances.

5.3 Results

In Table 17 below, all the substances in Table 16 are listed and grouped in relation to the volatility of the substances and the chemical structure of the substances.

The substances in Table 17 could be considered a gross list of all 44 substances contained in or measured as degassing from the 17 products examined, listed in Table 16.

Based on the stated measurement results and the application areas of the products, nine out of 17 products were selected for a more detailed risk assessment. In the table below, the focus is on collecting knowledge regarding tolerable exposure levels on the substances that are relevant to these products. Therefore, compared with Table 16, seven substances are omitted (indicated in the comment column of the table).

Table 17 indicates, as far as possible, both a DNEL value for inhalation of the substance and a DNEL value for dermal exposure. However, it is not relevant to calculate DNEL for dermal exposure in cases where there is no information about the quantitative content of the analysed substance in the product (for example, products containing mineral turpentine are analysed for a number of single hydrocarbons, but there is no data on the content of these substances in the product, as only the mineral turpentine content is indicated).

Finally, it is not possible to calculate/specify DNEL values for substances classified as respiratory or skin sensitizing cf. ECHA (2012). The risk assessment in Chapter 6 is based on a more qualitative assessment of exposure for these substances.

Table 17. Indication of health classification, occupational exposure limit values, DNEL values and critical effects for the selected substances.

Substance, Cas no.	**Classification (health)**	**AT- LIMIT VALUE in the working environment mg/m^3**	**DNEL1, inhalation mg/m^3 (critical effect)**	**DNEL^2, dermal mg/kg/d (critical effect)**	**Comment**
Volatile substances (VOCs), hydrocarbons					
n-Hexane, 110-54-3	**Repr. 2,** Asp. Tox. 1, STOT SE 3 **STOT RE 2** Skin Irrit. 2	72.0	0.700[b] (neurotoxicity) 4.300[a] (critical effect not indicated)	0.2*	* DNEL for dermal exposure calculated by conversion of the DNEL value for inhalation
Benzene, 71-43-2	**Carc. 1A** **Muta. 1B** Asp. Tox. 1 **STOT RE 1** Skin Irrit. 2 Eye Irrit. 2	1.6 (1996)	0.00017[b] (exposure level corresponding to 10^{-6} life time risk for carcinogenic effect)	0.00005* (corresponding to 10^{-6} life time risk)	In accordance with REACH terminology, the value is actually a derived minimum effect level, since no DNEL values can be derived for genotoxic and carcinogenic substances
Toluene, 108-88-3	**Repr. 2** Asp. Tox. 1 STOT SE 3 **STOT RE 2** Skin Irrit. 2	94.0 (1996)	2,900[a,b] (neurotoxicity)	No data about content in the selected products. Hence exposure to the skin cannot be estimated and dermal DNEL value is not relevant	

Substance, Cas no.	**Classification (health)**	**AT- LIMIT VALUE in the working environment mg/m³**	**DNEL1, inhalation mg/m³ (critical effect)**	**DNEL², dermal mg/kg/d (critical effect)**	**Comment**
Ethylbenzene, 100-41-4	Acute Tox. 4 Asp. Tox. 1 **STOT RE 2**	217.0	0.850[a,b] (neurotoxicity)	No data about content in the selected products. Hence exposure to the skin cannot be estimated and dermal DNEL value is not relevant	
Styrene, 100-42-5	**Repr. 2** Acute Tox. 4 **STOT RE 1** Skin Irrit. 2 Eye Irrit. 2	105 (1994)	0.250[a] (neurotoxicity/ genotoxicity)	3.6* (content max 20% in product no. 20)	* DNEL for dermal exposure calculated by conversion of the DNEL value for inhalation
D-Limonene, 5989-27-5	Skin Irrit. 2 **Skin Sens. 1**	139 (value for terpenes)	5,000[a] (not listed)	No data about content in the selected products. Hence exposure to the skin cannot be estimated and dermal DNEL value is not relevant	
Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) , EC-No: 919-164-8	**STOT RE 1** Asp. Tox. 1	145 (mineral turpentine. max 20% aromatics)	5,700[b] (neurotoxicity)	23* Content in product no. 44 max 5%	* DNEL for dermal exposure calculated by conversion of the DNEL value for inhalation
Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, < 2% aromatics , EC-No: 918-481-9	Asp. Tox. 1, **Skin Sens. 1** STOT SE 3 **STOT RE 2**	350 (value for decan. isomerics)	-	-	Classification is considered to be misleading as purified saturated hydrocarbons are not considered sensitizing while data are not sufficient for a classification as STOT RE 2. ***The substance is omitted from the hazard assessment***
Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene) Mineral turpentine (aromatic), 64742-82-1	Asp. Tox. 1 **STOT RE 1**	145 (mineral turpentine. max 20% aromatics)	5,700[b] (neurotoxicity)	23 Content in product no 1 max 100% and product no 19 max 95%	* DNEL for dermal exposure calculated by conversion of the DNEL value for inhalation
Volatile substances (VOCs), aldehydes					
Formaldehyde, 50-00-0	**Carc. 1B** **Muta. 2** **Acute Tox. 3** **Acute Tox. 3** **Acute Tox. 3** **Skin Corr. 1B** **Skin Sens. 1**	0.4	0.100[a,c] (eye and respiratory irritants)	DNEL cannot be determined for skin sensitization	

Substance, Cas no.	Classification (health)	AT- LIMIT VALUE in the working environment mg/m^3	DNEL1, inhalation mg/m^3 (critical effect)	DNEL^2, dermal mg/kg/d (critical effect)	Comment
Acetaldehyde, 75-07-0	**Carc. 2** STOT SE 3 Eye Irrit. 2	45.0	1,200[a,c] (eye and respiratory irritants)	No data about content in the selected products. Hence exposure to the skin cannot be estimated and dermal DNEL value is not relevant	
Crotonaldehyde, 123-73-9	**Muta. 2** Acute Tox. 2 Acute Tox. 3 Acute Tox. 3 STOT SE 3 **STOT RE 2** Skin Irrit. 2 Eye Dam. 1	6.0	0.005[a,d] (eye and respiratory irritants)	No data about content in the selected products. Hence exposure to the skin cannot be estimated and dermal DNEL value is not relevant	
Iso-butylated urea formaldehyde resin, 68002-18-6	Flam. Liq. 3, Eye Dam. 1 STOT SE 3, **Carc. 1B**	0.4 (value for Formaldehyde)	0.100[a,c] (eye and respiratory irritants)	DNEL cannot be determined for skin sensitization (Formaldehyde)	The stated classification is considered highly uncertain and is not reported to ECHA's CLP database. However, 138 other reviewers do not use a classification regarding health, while a single notifier classifies it as corrosive. It is considered most relevant to assess the substance in line with Formaldehyde
Volatile substances (VOCs), organic acids					
Acetic acid, 64-19-7	**Skin Corr. 1A**	25.0	1,200[a] (mucous membrane irritation)	No data about content in the selected products. Hence exposure to the skin cannot be estimated and dermal DNEL value is not relevant	
Propionic acid, 79-09-4	**Skin Corr. 1B**	31.0	1,500[a] (mucous membrane irritation)	No data about content in the selected products. Hence exposure to the skin cannot be estimated and dermal DNEL value is not relevant	
Butyric acid , 107-92-6	**Skin Corr. 1B**		1,500[a] (mucous membrane irritation)	No data about content in the selected products. Hence exposure to the skin cannot be estimated and dermal DNEL value is not relevant	
Heptanoic acid, 111-14-8	**Skin Corr. 1B**		1,500[a] (mucous membrane irritation)	No data about content in the selected products. Hence exposure to the skin cannot be estimated and dermal DNEL value is not relevant	

Substance, Cas no.	**Classification (health)**	**AT- LIMIT VALUE in the working environment mg/m³**	**DNEL1, inhalation mg/m³ (critical effect)**	**DNEL², dermal mg/kg/d (critical effect)**	**Comment**
Benzoic acid, 65-85-0	**STOT RE 1** Skin Irrit. 2 Eye Dam. 1	0.5 (MAK)	0.015* (effect in lungs)	No data about content in the selected products. Hence exposure to the skin cannot be estimated and dermal DNEL value is not relevant	* calculated from data in MAK (2017) Benzoic acid is not a volatile substance, but is listed under organic acids as the substance has been measured in the air.
Volatile substances (VOCs), other					
2-aminoethanol, 141-43-5	Acute Tox. 4 Acute Tox. 4 Acute Tox. 4 S**kin Corr. 1B**	2.5			Not contained in any of the selected products. ***The substance is omitted from the hazard assessment***
Ammonium hydroxide solution, 1336-21-6	**Skin Corr. 1B**				Not contained in any of the selected products. ***The substance is omitted from the hazard assessment***
Diethylamine, 109-89-7	Acute Tox. 4 Acute Tox. 4 Acute Tox. 4 **Skin Corr. 1A**	15.0			Not contained in any of the selected products. ***The substance is omitted from the hazard assessment***
Triethylamine, 121-44-8	Acute Tox. 4 Acute Tox. 4 Acute Tox. 4 **Skin Corr. 1A**	4.1	1* (influence on vision)	No data about content in the selected products. Hence exposure to the skin cannot be estimated and dermal DNEL value is not relevant	* Value calculated from data in SCOEL (1999).
Butaneone oxime, 96-29-7	**Carc. 2,** Acute Tox. 4 Eye Dam. 1 **Skin Sens. 1**		0.020[d] (respiratory irritation)	DNEL cannot be determined for skin sensitization	
1,4-Dioxane, 123-91-1	**Carc. 2,** STOT SE 3 Eye Irrit. 2	36.0	0.400[a] (probably eye irritation)		
N-ethyl-2-pyrrolidone, 2687-91-4	**Repr. 1B,** Eye Dam.1	20.0 (value for *N*-Methyl-2-pyrrolidon)	0.400[a] (eye irritation)		Eye irritation is assessed as critical based classification as eye damaging (cat 1) in the REACH registration.
Phenol, 108-95-2	**Muta. 2,** Acute Tox. 3 Acute Tox. 3 Acute Tox. 3 **STOT RE 2** **Skin Corr. 1B**	4.0	0.100* (effects in airways)	0.5[g] (reduction in body weight)	*Based on data from SCOEL (2003) and data from REACH registration

Substance, Cas no.	Classification (health)	AT- LIMIT VALUE in the working environment mg/m^3	DNEL1, inhalation mg/m^3 (critical effect)	DNEL^2, dermal mg/kg/d (critical effect)	Comment
Allyl glycidyl ether, 106-92-3	**Carc. 2** **Muta. 2** **Repr. 2** Acute Tox. 4 Acute Tox. 4 STOT SE 3 Skin Irrit. 2 Eye Dam. 1 **Skin Sens. 1**	22	0.5[f] 0.02* (impact on mucous membranes)	DNEL cannot be determined for skin sensitization	* Calculated from data in REACH registration
4,4'-Methylene diphenyl diisocyanate, 101-68-8	**Carc. 2** Acute Tox. 4 STOT SE 3 **STOT RE 2** Skin Irrit. 2 Eye Irrit. 2 **Resp. Sens. 1** **Skin Sens. 1**	0.05	DNEL cannot be determined for respiratory sensitization	DNEL cannot be determined for skin sensitization	
Non-volatile substances (non-VOCs)					
1,2-benzisothiazol-3(2H)-one (BIT), 2634-33-5	**Acute Tox. 3** Acute Tox. 4 **STOT RE 1** Eye Dam. 1 **Skin Sens. 1**		Not measured by degassing measurements DNEL for inhalation therefore not relevant	DNEL cannot be determined for skin sensitization	
2-Methyl-2H-isothiazol-3-one (MIT), 2682-20-4	**Acute Tox. 3** **Acute Tox. 3** **Skin Corr. 1B** **Skin Sens. 1A** Eye Dam. 1 STOT SE 3		100[a] (probably mucous membrane irritation)	DNEL cannot be determined for skin sensitization	
3-Iodo-2-propynyl butylcarbamate , 55406-53-6	Acute Tox. 4 **Skin Sens. 1** Eye Dam. 1 **Acute Tox. 3** **STOT RE 1**		Not measured by degassing measurements DNEL for inhalation therefore not relevant	DNEL cannot be determined for skin sensitization	
5-Chloro-2-methyl-4-isothiazolin-3-one/ 2-Methyl-2H-isothiazol-3-one (3:1) , 55965-84-9	**Acute Tox. 3** **Acute Tox. 3** **Acute Tox. 3** **Skin Corr. 1B** **Skin Sens. 1** **(Skin Sens.1A suggested by RAC 2017)**		1[a] (value for 5-Chloro-2-methyl-2H-isothiazol-3-one) (probably mucous membrane irritation)	DNEL cannot be determined for skin sensitization	Measured in degassing

Substance, Cas no.	Classification (health)	AT- LIMIT VALUE in the working environment mg/m^3	DNEL1, inhalation mg/m^3 (critical effect)	DNEL^2, dermal mg/kg/d (critical effect)	Comment
2-(chloromethyl)oxirane; Formaldehyde; Phenol , 28064-14-4	Skin Irrit. 2 **Skin Sens. 1** Eye Irrit. 2		Not measured by degassing measurements DNEL for inhalation therefore not relevant	DNEL cannot be determined for skin sensitization	
1,4-bis(2,3-epoxypropoxy)butane, 2425-79-8	Acute Tox. 4 Acute Tox. 4 Skin Irrit. 2 Eye Irrit. 2 **Skin Sens. 1**		Not measured by degassing measurements DNEL for inhalation therefore not relevant	DNEL cannot be determined for skin sensitization	
Calcium bis(2-ethylhexanoate) , 136-51-6	Eye Dam. 1 **Repr. 2**				Not contained in any of the selected products. ***The substance is omitted from the hazard assessment***
Cobalt bis(2-ethylhexaneoate), 136-52-7	**Skin Sens. 1** Eye Irrit. 2 **Repr. 2**		Not measured by degassing measurements DNEL for inhalation therefore not relevant	DNEL cannot be determined for skin sensitization	
Diphenylmethane diisocyanate, isomeric, homologue and mixtures , 9016-87-9	Acute Tox. 4 Skin Irrit. 2 Eye Irrit. 2 Resp. Sens. 1 Skin Sens. 1 Carc. 2 STOT SE 3 STOT RE 2	0.05 (value for 4.4'-methylendiphenyl diisocyanate)	DNEL cannot be determined for respiratory sensitization	DNEL cannot be determined for skin sensitization	
Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol EC 500-006-8	Skin Irrit. 2 Eye Irrit. 2 **Skin Sens. 1**	-	-	-	Not contained in any of the selected products. ***The substance is omitted from the hazard assessment***
Fatty acids, C14-18 and C16-18-unsatd., maleated, reaction products with oleylamine , 85711-47-3	**Skin Sens. 1**	-	Not measured by degassing measurements DNEL for inhalation therefore not relevant	DNEL cannot be determined for skin sensitization	
Sodium hydroxide, 1310-73-2	**Skin Corr. 1A**	-	-	-	Not contained in any of the selected products. ***The substance is omitted from the hazard assessment***

Substance, Cas no.	Classification (health)	AT- LIMIT VALUE in the working environment mg/m^3	DNEL1, inhalation mg/m^3 (critical effect)	DNEL^2, dermal mg/kg/d (critical effect)	Comment
Oxiran, mono[(C12-14-alkyloxy) methyl]derivater; (C12-C14) alkylglycidylether, 68609-97-2	Skin Irrit. 2 **Skin Sens. 1**	22 (value for allyl glycidyl ether)	0.5^f 0.02* (impact on mucous membranes, value for allyl glycidyl ether)	DNEL cannot be determined for skin sensitization	
Oxirane, reaction products with ammonia, N-benzyl derivative 1191251-49-6	**Skin Corr. 1B**	-	-	-	Not contained in any of the selected products. ***The substance is omitted from the hazard assessment***
4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane , 25068-38-6	Skin Irrit. 2 Eye Irrit. 2 **Skin Sens. 1**	-	Not measured by degassing measurements DNEL for inhalation therefore not relevant	DNEL cannot be determined for skin sensitization	
2-Ethylhexanoic acid, zirconium salt 22464-99-9	**Repr. 2**	-	-	1*	* based on DNEL for 2-ethylHexaneoic acid in REACH registration

1) DNEL values are given for substances measured in degassing measurements from the nine selected products
2) DNEL values are given for the selected substances where there is information about their contents in the nine selected products
a) Agreed EU-LCI values. December 2016 European Commission. http://ec.europa.eu/growth/sectors/construction/eu-lci/values_da
b) Larsen et al. (2016)
c) Klinke et al. 2016
d) Umweltbundesamt (2015)
e) Larsen et al. 2017
f) DNEL value specified in the REACH registration for the substance.
g) Rated by EFSA (2013) * DNEL values prepared in this project, see appendices

5.4 Assessment of the critical effects of the substances

Hydrocarbons

The critical issue regarding almost all hydrocarbons is their neurotoxic effects. For all substances (except for benzene), DNEL values were prepared to protect against their chronic neurotoxic effects during long term exposure. However, in the case of short term exposure to elevated levels, eye and respiratory irritation as well as acute neurotoxic effects (dizziness, nausea, headache) may occur. Based on data from volunteers, SCOEL (2007) states that such symptoms may begin to occur after shorter exposure to vapours from mineral turpentine in the range of 290-580 mg/m^3.

For hydrocarbons, DNEL values with respect to long-term effects are in the range of 0.250 mg/m^3 (styrene) - 5.7 mg/m^3 (mineral turpentine, C7-C13 aromatic, aliphatic and cycloaliphatic hydrocarbons). For benzene, it is especially the carcinogenic effect that is significant, as the substance is a very potent carcinogen. The stated exposure value of 0.00017 mg/m^3 indicates the level of exposure that would result in increased cancer risk of one in one million during

lifetime continuous exposure. However, this is a low hypothetical cancer risk, as approximately one third of the population will develop cancer at some point in their lifetime.

Aldehydes and organic acids

For the aldehydes and the organic acids it is the eye and respiratory irritant properties that are critical to the stated DNEL values. The aldehydes in particular are potent eye and respiratory irritants and their DNEL values are 0.005 mg/m^3 for crotonaldehyde, 100 mg/m^3 for formaldehyde and 1,200 mg/m^3 for acetaldehyde.

For the organic acids, benzoic acid has a low DNEL value of 0.015 mg/m^3 to protect against lung damage while the other organic acids have significantly higher DNEL values of around 1.2 - 1.5 mg/m^{3}m, calculated for mucosal irritation.

In a subsequent risk assessment for these substances, in conjunction with simultaneous exposure to several of these substances, an overall assessment of the risk of eye and respiratory irritation was made by adding the irritation potential of the individual substances.

Other volatile substances

For this slightly mixed group of substances, the critical effect is also often respiratory and eye irritation. This applies, for example, to 2-butanone oxime, 1.4 dioxane, N-ethyl pyrrolidone, phenol and allyl glycidyl ether, with relatively low DNEL values in the range of 0.02 (allyl glycidyl ether) - 0.4 mg/m^3 (N-ethyl-pyrrolidone).

Non-volatile substances

For the non-volatile substances included in the nine selected products, all of them (except zirconium 2-ethylHexaneoate) are classified as allergenic for dermal contact, meaning that no DNEL value has been calculated for these substances as there is no method for determining such a value. Finally, there is also no DNEL value for inhalation, as the substances have not been detected in the degassing measurements.

6. Exposure assessment

The exposure scenarios for the selected DIY projects are described in section 3.2. Based on the scenarios, analysis programs were designed which measure the degassing of treated surfaces in climate chambers as well as concentrations in the respiratory zone of the person who performs the work. In the climate chambers and in tests for measurements in the respiratory zone, the products were used in accordance with the instructions. Based on the measurements for degassing in climate chambers, resulting concentrations in the reference rooms were calculated. These concentrations are reported in chapter 5. Since the height of the reference room corresponds to the height of rooms in a common house, it can be assumed that the concentration in the air in a larger room with a correspondingly larger treated floor surface corresponds to the concentration in the reference room. Therefore, in the risk calculation, there was no need to correct for the amount of product delivered per m² or take into account the size of the room. The parameters that were relevant to the further calculation as regards inhalation were the total treatment time and whether the different treatments may be expected to occur on the same day. In the case of multiple treatments on the same day, the person performing work on the second treatment was exposed to evaporation from the material being supplied as well as to the degassed substances present in the room from the previous treatment.
For products where no measurements were made in the respiratory zone, the release of substances after 5 hours were used as an indicator of the possible concentration in the respiratory zone. Results were similar whether taken from the respiratory zone or the concentration after 5 hours measurements. This indicates that the measurements after 5 hours in the reference room could be used as a good indicator of the exposure of the person who performs the work.

For all scenarios, it was assumed that the user did not wear personal protective equipment.

6.1 Renovation of wooden floor the living room or kitchen

The overall scenario for the renovation of wooden floors is shown in Table 4. Several of the products do not contain substances selected for the hazard and risk assessment based on their classification. This applies to oil for floor sanding (17), lye (2) and hand cleaner (50). Lye is highly corrosive, and it is widely known that personal protective equipment should be worn during its use. Therefore, no risk of using lye without the use of personal protective equipment has been calculated.

For the scenario as shown in Table 4, different products may be used.

For filling of the floor, it was assumed that chemical wood would be used and only one treatment required. It was assumed that no further treatment would be conducted on the floor on the same day. An absolute worst-case scenario would be to fully fill a wooden floor with chemical wood to remove holes in the floor before it is painted. It is likely common that this happens Usually, one would only fill the biggest holes, or completely avoid filling.

For treating the floor, three different finishing methods were calculated: two-component acid-curable paint (ID 40), water-based floor paint (ID 7) and wax treatment (ID 16). In all cases, two treatments of two hours on the same day were considered, so the total treatment time for each of the treatment methods was four hours. A turpentine-based paint may also be used. This paint is considered for the treatment of concrete floors, and therefore reference is made to this scenario.

After treatment, brushes were cleaned in ethanol (alcohol), water or turpentine and hands were cleaned with alcohol, hand cleaner, water (with soap) or turpentine.

Dermal exposure when cleaning brushes and hands

Only cleaning of brushes and hands with turpentine were considered, as cleaning with other means was considered to be unproblematic. In the scenario for cleaning brushes with turpentine, direct results of measurement in the respiratory zone were used, and as a worst case it was assumed that cleaning takes 0.1 hour per event (the brush was cleaned three consecutive times to get completely clean). It is assumed that the person who cleans the brushes would be working the turpentine into the hair of the brush so that dermal exposure occurs. As a worst case it was estimated that there would have been direct contact with approx. 2 ml (1.6 g) turpentine, which remains on the skin and can be dermally absorbed. For cleansing of hands, a turpentine cloth is expected to be used and 2 ml (1.6 g) remains on the skin. Both processes would be assumed to be done twice in a day.

Dermal exposure on contact with materials

In connection with paint, it was assumed that the person performing the work would be somewhat careless and during the process, paint and other materials would be applied to a large part of the skin on the hands. As a realistic worst case, the total skin area in contact with materials was calculated to be 200 cm² (equivalent to about ¼ of the total surface of the hands). It was estimated that the amount of product applied to skin was 0.03 g/cm², which for paint corresponds to a layer of the same thickness that would be applied to a wall or a floor. As a worst case it was assumed that all the contained substances in a layer of this thickness would be in contact with the skin. The parameters used in the calculations are shown in the table below. The concentration of the substance in the product was derived from the safety data sheets for the individual products, and is shown for each of the assessed products in Table 18.

Table 18. Parameters for calculating dermal exposure regarding paints

Parameter	Symbol	Value/calculation	Unit
Amount of product applied per unit area	Q_{prod,cm^2}	0.03	g/cm^2
Skin area in contact with product	A_{skin}	200	cm^2
Amount of product in contact with skin	Q_{prod}	6.7	g
Concentration of substance in product	Fc_{prod}	Different for the different paints: see Table 9	mass %
Body weight	BW	70	kg
Number of applications	N	2	/d

The exposed area as regards filling was considered to be somewhat less than for paint, as the product would not, as with paint, be spread over a larger area of skin. Typically, the filler mass would be on the ends of the fingers. Parameters for calculation are shown in Table 19.

Table 19. Parameters for calculating the dermal exposure associated with filling

Parameter	Symbol	Value/calculation	Unit
Amount of product applied per unit area	$Q_{prod,cm2}$	0.03	g/cm^2
Skin area in contact with product	A_{skin}	20	cm^2
Amount of product in contact with skin	Q_{prod}	0.6	g
Concentration of substance in product	Fc_{prod}	Shown in Table 9	mass %
Body weight	BW	70	kg
Number of applications	N	1	/d

Total exposures
In this scenario, no different products were used on the same day, so there is no basis for calculating the risk of aggregate exposure.

A combined scenario was used, involving wax for the treating the floor, the cleaning of brushes in turpentine and the cleaning of the hands with turpentine.

6.2 Renovation of concrete floor

Basically, the scenario for the renovation of concrete floors was similar to the renovation of wood floors since pre-treatment products do not contain substances selected for the hazard and risk assessment based on their classification. These products were therefore not included in the risk assessments. Calculations were made for different types of paint that can be used for the purpose. Just as in the case of the renovation of wooden floors, two treatments were scheduled for two hours on the same day.

In addition, a combined scenario was used which consists of using a solvent-based paint, cleaning brushes in turpentine or cleaning the hands with turpentine. The amounts used are given in the previous section.

6.3 Renovation of bathroom

When renovating the bathroom, products that do not contain substances selected on the basis of their classification were used for the risk and risk assessment. Most of the products, such as formula mass (47), primer (22), wet room membrane (24, 46), basic cleaner (3), tile adhesive (26), concrete filler (4), sealant (28), mounting glue (29) and wet room silicone (32) did not contain substances that resulted in a selection for risk assessment.

From this scenario, therefore, only PU foam for gouging around windows and a water-based wet room paint were selected. The wet room painting was not included in the risk assessment on the basis of the ingredients indicated in the safety data sheet but it was decided to include it along with the water-based floor paint to represent the kind of paint that the general consumer is usually exposed to.

The calculation was based on the fact that the painted surface corresponds to three times the surface of the floor; the concentration in the room would, therefore, be three times greater than the concentration calculated on the basis of the climate chamber measurements.

For PU foam, the design of measurements in the respiratory zone and in the climate chamber took into consideration the way the foam is used. Measurements in the respiratory zone could therefore directly be used to calculate the risk of the person performing the work, while the results of the climate chamber measurements were used as an indication of the concentration in the room after application.

7. Risk assessment

7.1 Method

Calculation of risk characterization ratio (RCR)
The risk assessment in this project is based on the guidelines used in the REACH Chemical Regulation (ECHA, 2012).

Risk assessment is performed by comparing exposure to a given substance in the exposure scenario with the substance's DNEL value and calculating the risk characterization rate (RCR) of the substance, where RCR is calculated as:

$$RCR(1) = \frac{Calculated\ or\ measured\ exposure\ (Substance\ 1)}{DNEL(Substance\ 1)}$$

If the calculated or measured exposure to a given substance exceeds the DNEL value and the RCR thus becomes greater than 1, the exposure is considered to pose an unacceptable risk.

When exposed to multiple similar-acting substances in the exposure scenario, it may be relevant to assess the overall risk of a given effect. This can be done by summing the individual RCR values for the similar-acting substances:

$$RCR(sum) = RCR(1) + RCR(2) + \ \ldots RCR(n)$$

This approach may be particularly relevant in this project for those substances that are considered to affect the central nervous system or those which have mucosal irritant effects (eye and respiratory irritation) as the most critical effects.

If RCR (sum) exceeds 1, the total exposure of the substances within a substance group is considered to be an unacceptable risk.

Use of the DNEL values
The listed DNEL values in Table 17, which are used in the risk assessments below, are based on daily exposure to the substances.

For substances where the critical effect is estimated to be a consequence of the total dose of the substance absorbed in the body per day, i.e. effects in the internal organs such as carcinogenic effects or central nervous system effects, a DNEL value expressed in air concentration (mg/m^3) applicable to 24 hours of continuous exposure can be converted to a DNEL value for e.g. 4 hours' exposure by multiplying by 24 hours/4 hours, i.e. a concentration higher by a factor of 6. However, when using this method, it must be ensured that no acute effects occur at this concentration, e.g. eye and respiratory irritation. Such a conversion of DNEL values was carried out in the risk assessments below for mineral turpentine (central nervous system) and benzene (carcinogenic effect), among others.

For the DNEL values that are set to protect against acute effects, e.g. eye and respiratory irritation, it is not possible do this kind of upscaling of the DNEL value as the effect is precisely linked to the instantaneous concentration in the air. This applies to the DNEL values for aldehydes and organic acids.

Risk assessment of the total product

The risk assessments below were made focusing on the release of vapours containing the selected critical substances based on the measured levels presented in Table 14 and Table 15 and from data from safety data sheets about the quantitative content of the critical substances in the products.

Risk assessment and calculation of RCR values were only carried out with respect to the selected critical substances contained in the products, but other, less critical substances can also have an impact on the risk assessment if included in high enough concentrations. Therefore, included in the overall classification of the product is an assessment of the product regarding high content of other less critical components, as mentioned above, which may affect the overall hazard and classification of the product.

In addition, a comparison is made between the measured evaporation levels and the Occupational Safety and Health Authority's limit value for the substance in question, as this may outweigh any possible DNEL values, which will typically be somewhat lower, as in some cases a working environment limit may well have a lower safety margin for the appearance of e.g. reversible nuisances in professional workers.

7.2 Renovation of wooden floor in living room or kitchen

The overall scenario for the renovation of a wooden floor is shown in Table 4. Several of the products do not contain substances selected for the hazard and risk assessment based on their classification. The following is a risk assessment for the selected processes/materials.

7.2.1 Chemical wood (two-component)

Composition: Composite solvent-based product

Classification (health): Skin Irrit.2 H315; Eye Iritt.2 H319; Repr 2 H361d; STOT RE1 H372

MAL-code: 5-6

Inhalation

For chemical wood, RCR is calculated for exposure in connection with 2 hours of filling as well as for 24 hours of stay starting 5 hours (very conservative), 3 days and 28 days after filling.

Table 20. Risk by inhalation of vapours when using chemical wood (two component). The measured exposure levels are described in more detail in Table 14 and Table 15, while DNEL values for inhalation can be found in Table 17.

Substance	CAS no	Respiratory zone	Concentration in room			Limit value	DNEL	RCR			
		Application	5 hours	3 days	28 days	Working environment	24h (DNEL 2h)*	Application	5 hours	3 days	28 days
		(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)				
Styrene	100-42-5	730	2,400	140	40	105,000	250 3,000	2.9 0.2	9.6	0.6	0.2
Hexane	110-54-3	-	21	-	-	72,000	700 8,400	0.0 0.0	0.0	0.0	0.0
Benzene	71-43-2	-	86	-	-	1,600	0.17 2.0	0.0 0.0	506	0.0	0.0
Ethylbenzene	100-41-4	-	11	-	-	217,000	850 10,200	0.0 0.0	0.0	0.0	0.0
Allyl glycidyl ether	106-92-3	-	38	-	-	22,000	20	0.0	1.9	0.0	0.0

Substance	CAS no	Respiratory zone	Concentration in room			Limit value	DNEL 24h (DNEL 2h)*	RCR			
		Application	5 hours	3 days	28 days	Working environment		Application	5 hours	3 days	28 days
		(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)				
Phenol	108-95-2	-	50	-	-	4,000	100	0.0	0.5	0.0	0.0
1-Ethyl-2-pyrrolidinon	2687-91-4	-	190	21	5	20,000	400	0.0	0.5	0.1	0.0
Benzoic acid	65-85-0	-	9	66	-	500	15	0.0	0.6	4.4	0.0
Sum of analysed VOCs	-	980	3,700	356	89	-	-	-	-	-	-

*For 2 hours' exposure, the DNEL value, which is a 24-hour value, can be converted to an exposure level over 2 hours for substances whose critical effects are related to the daily systemically absorbed dose in the body.

For the RCR values based on 2 hour DNEL values, only styrene exceeded a value of 1 (within 2 hours of application). The RCR value increased to 9.6 after 5 hours, and not until 3 days after application was the value below 1. In addition, after 5 hours, allyl glycidyl ether exceeds a value of 1, and values close to 1 for phenol, 1-ethylpyrrolidone and benzoic acid were observed. All of these substances (including high-level styrene as observed after 5 hours) may affect the eyes and nose mucous membranes, which may cause the risk of mucosal irritant effects up until day 3. On day 3, an RCR value of 4.4 for benzoic acid was obtained, indicating risk of effects on the respiratory tract.

For benzene, the tolerable risk level for carcinogenic effects is significantly exceeded at 5 hours after application. However, the increased level was of shorter duration.

Additional exposure to benzene, although considered to be undesirable, should be seen in relation to the background levels that are constantly present in both indoor and outdoor air, where background exposure to benzene is in the range of 2-5 µg/m^3 (indoor air in homes) and 2-8 µg/m^3 (outdoor air) (Larsen et al., 2017). Therefore, the background levels for benzene already exceed the tolerable 10^{-6} lifetime risk (which is usually sought to be met) by a factor of 12-47.

None of the measured levels exceeds the occupational exposure limit values.

Therefore, one should use suitable respiratory protective equipment when working with the product, especially in the case of working with larger areas and prolonged filling. In the days immediately after application, the room should be thoroughly vented.

Dermal contact

Below the calculations of the RCR based on filling are provided, where a dermal exposure of 0.7 g of filling mass was assumed.

Table 21. Risk by dermal contact when using chemical wood (two component). The specified concentrations are given in Appendix 3, while DNEL values for dermal contact are found in Table 17.

Substance name	CAS no	Concentration in product	Dermal load	Dermal dose, external	DNEL, mg/kg/d	RCR
		max%	mg/cm^2	mg/kg/d	mg/kg/d	
Total product			3.33			
Styrene	100-42-5	20	0.7	2	3.6	0.6

The exposure to styrene results in an RCR value of 0.6 which should in principle be added to the RCR values of 0.2 for styrene by inhalation during application, approaching a risk with a total RCR value of 0.8 and therefore, close to posing a risk.

Furthermore, styrene (and the product itself) is classified as skin irritant, so there is a risk of irritation during skin contact. Additionally, as allyl glycidyl ether was found in the degassing of the product, this substance must also be contained in the product, although not listed. Allyl glycidyl ether is skin sensitizing; as a result, there is a risk of skin sensitization by dermal contact.

Therefore, when working with the product, dermal contact should be avoided and suitable protective gloves should be used.

Overall assessment of the application
Increased risk of neurotoxicity, carcinogenicity and eye and respiratory irritation as a result of exposure to styrene and benzene was found, especially during the hardening process after application. Respiratory protection should be used or thorough ventilation provided. In the days/weeks immediately after use, the room should be thoroughly vented.

Regarding allergy and skin irritation, suitable protective gloves should be worn during work.

7.2.2 Floor lacquer (acid curing)

Composition: Composite solvent-based product

Classification (health): Eye Dam.1 H318; STOT SE3 H336; Carc. 1B H350

MAL-code: 3-3 (hardener); 4-1 (mixture)

Inhalation
For floor lacquering, RCR is calculated for exposure in connection with 2 x 2 hour application, and for 24 hours stay starting 5 hours (very conservative), 3 days and 28 days after application.

Table 22. Risk by inhalation of vapours during the use of acid-curing floor lacquer. The measured exposure levels are described in more detail in Table 14 and Table 15, while DNEL values for inhalation can be found in Table 17.

Substance	CAS no	Respiratory zone	Concentration in room			Limit value Working environment	DNEL 24h (DNEL 2h)*	RCR			
		Application	5 hours	3 days	28 days			Application	5 hours	3 days	28 days
		(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)					
Iso-butylated urea formaldehyde resin	68002-18-6	-	-	-	-		100	-	-	-	-
Formaldehyde	50-00-0	11,263	10,627**	1,772	85	400	100	**113**	**106**	**18**	0.9
Acetaldehyde	75-07-0	558	-	-	1.7	45,000	1,200	0.5	0.0	0.0	0.0
Acetic acid	64-19-7	-	2,800	44	-	25,000	1,200	0.0	**2.3**	0.0	0.0
Butyric acid	107-92-6	-	-	11	-	-	1,500	0.0	0.0	0.0	0.0
Ethylbenzene	100-41-4	7,700	1,300	-	-	217,000	850 5,100	**9.1** **1.5**	0.3	0.0	0.0
Phenol	108-95-2	-	79	-	-	4,000	100	0.0	0.8	0.0	0.0
Heptanoic acid	111-14-8	-	-	-	5	-	1,500	0.0	0.0	0.0	0.0
Toluene	108-88-3	66	-	-	-	94,000	2,900 17,400	0.0	0.0	0.0	0.0
Sum of analysed VOCs	-	1,096,200	120,000	1,800	180						

*For 4 hours exposure, the DNEL value, which is a 24 hour value, can be converted to an exposure level over 4 hours for substances whose critical effects are related to the daily systemically absorbed dose in the body.

**The measured concentration may be higher as the amount of the substance exceeds the capacity of the collection medium and the upper quantitation limit of the method.

For formaldehyde, RCR values greater than 1 are seen during application and up to 3 days after application. Only 28 days after application are formaldehyde levels at a tolerable level. In addition, RCR values above 1 are observed for ethylbenzene during application and for acetic acid 5 hours after application. Due to the very high RCR value for formaldehyde, suitable respiratory equipment should be worn during work with the product. In addition, the room should be thoroughly ventilated in the first month after application.

The formaldehyde levels for the first three days exceed the Occupational Exposure Limit for formaldehyde.

Dermal contact

The calculations of RCR are based on 2 applications, with a dermal exposure of 6.7 g each time, for a total of 13.4 g of lacquer.

Table 23. Effects on dermal contact from the use of acid-curing floor lacquer. The specified concentrations are given in Appendix 3, while DNEL values for dermal contact are found in Table 17.

Substance name	CAS no	Concentration in product	Dermal load	Dermal dose, external	DNEL	RCR
		max%	mg/cm²	mg/kg/d	mg/kg/d	
Total product			3.33			

Iso-butylated urea formaldehyde resin	68002-18-6	25	8	48	Sens*	-

*DNEL for skin sensitizers cannot be determined as safe limits for this type of substance are not known

Although the product contains less than 1% free formaldehyde according to the datasheet, formaldehyde is released from the product in use, cf. the high degassing levels of formaldehyde, posing a risk of skin sensitization by dermal contact. Therefore, suitable protective gloves should be used during work.

Overall assessment of the application
During application through to commissioning of the room during the first month after application, there is a high risk of acute respiratory and eye irritation due to formaldehyde vapours, characteristic of acid-cured paint. During work with the product there is a risk of developing a skin allergy through dermal contact.

Therefore, suitable respiratory protective equipment and suitable protective gloves should be used when working with the product and thorough ventilating of the room should be provided during the first month after application.

7.2.3 Floor paint (water-based)

Composition: Water-based acrylic floor paint

Classification (health): None

MAL-code: 00-1

Inhalation
For the water-based floor paint, no measurements were made in the respiratory zone, as the 5-hour measurements here were considered to be true to the levels during application as well. RCR is calculated in connection with 24 hours of residence starting 5 hours (very conservative), 3 days and 28 days after application

Table 24. Risk of inhalation of vapours from use of water-based floor paint. The measured exposure levels are described in more detail in Table 14, while DNEL values for inhalation can be found in Table 17.

Substance name	CAS no	Respiratory zone	Concentration in room			DNEL 24h	RCR			
		Application	5 hours	3 days	28 days		Application	5 hours	3 days	28 days
		(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)				
Acetic acid	64-19-7	-	32	0.0	0.0	1,200	-	0.0	0.0	0.0
Propionic acid	79-09-4	-	61	0.0	0.0	1,500	-	0.0	0.0	0.0
Ethylbenzene	100-41-4	-	6	0.0	0.0	850	-	0.0	0.0	0.0
Phenol	108-95-2	-	32	26	0.0	100	-	0.3	0.3	0.0
Sum of analysed VOCs	-	-	45,000	9,700	180	-	-	-	-	-

There does not appear to be a risk related to inhalation of vapours, either during application or by subsequent use of the room, as the RCR values are significantly below 1.

Dermal contact
The product's content of degassing substances is not indicated and must be presumed to be below the classification limit cf. the classification of the product. The product does not contain other critical substances designated for risk assessment, a fact also supported by the product's lack of classification. According to the information in the safe data sheet, other components are not expected to present a risk for dermal contact with the product.

Overall assessment of the application
Inhalation of vapours related to application of the product and subsequent residence in the room is not considered to present a risk. In addition, dermal contact with the product is not considered to present any risk. This supposition also complies with the product classification and MAL code.

7.2.4 Floor wax

Composition: The product is a composite solvent-based product.

Classification (health): Skin Irrit. 2; H315, STOT RE1; H372; STOT SE3; H336; Asp. Tox. 1 H304

MAL-code: 3-1

Inhalation
For floor waxing, RCR is calculated for exposure in connection with 2 x 2 hour application, and for 24 hours residence starting 5 hours (very conservative), 3 days and 28 days after application.

Table 25. Risk by inhalation of vapours when using floor wax. The measured exposure levels are described in more detail in Table 14 and Table 15, while DNEL values for inhalation can be found in Table 17.

Substance name	CAS no	Respiratory zone	Concentration in room			Limit value working environment	DNEL 24h DNEL 4h *	RCR			
		Application	5 hours	3 days	28 days			Application	5 hours	3 days	28 days
		(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)				
Formaldehyde	50-00-0	-	4.3	2.3	1.2	400	100	0.0	0.0	0.0	0.0
Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene) = mineral turpentine	64742-82-1	321,000	95,500	200	26	145,000	5,700 34,200	**56** **9.4**	**16.8**	0.0	0.0
Hexane	110-54-3	400	-	-	-	72,000	700 4,200	0.6 0.1	0.0	0.0	0.0
Acetaldehyde	75-07-0	-	4.2	-	0.6	45,000	1200	-	0.0	0.0	0.0
Benzene	71-43-2	120	8	-	-	1,600	0.17 1.0	**706** **120**	**47.1**	0.0	0.0
Ethylbenzene	100-41-4	3,980**	16	-	-	217,000	850 5,100	**4.7** 0.8	0.0	0.0	0.0
Toluene	108-88-3	1,900**	-	-	-	94,000	2,900 17,400	0.7 0.1	0.0	0.0	0.0
Sum of analysed VOCs	-	379,820**	100,000	200	25						

*For 4 hours' exposure, the DNEL value, which is a 24 hour value, can be converted to an exposure level over 4 hours for substances whose critical effects are related to the daily systemically absorbed dose in the body.

**The measured concentration may be higher as the amount of the substance exceeds the capacity of the collection medium and the upper quantitation limit of the method.

Table 25 shows that 4 hours of inhalation at the measured concentrations in the respiratory zone clearly exceeds the DNEL value for mineral turpentine (central nervous system damage) and benzene (carcinogenic), at least during the first day. The RCR value after 3 days is close to 0 for all substances.

Use of the product should therefore be carried out using respiratory protective equipment to protect against vapours, and the room should be thoroughly ventilated the first few days after treatment.

For the measured values in the respiratory zone, the level of mineral turpentine exceeds the limit value of the substance in the working environment, while the levels of the other substances are significantly below limit values.

Dermal contact

The calculations of RCR are based on 2 applications, with a dermal exposure of 6.7 g each time, for a total of 13.4 g of wax.

Table 26. Risk of dermal contact when using floor wax. The stated substance concentrations are listed in Appendix 3, while DNEL values for dermal contact are found in Table 17.

Substance name	CAS no	Concentration in product	Dermal load	Dermal dose, external	DNEL	RCR
		max%	mg/cm^2	mg/kg/d	mg/kg/d	
Total product			3.33			
Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene)= mineral turpentine	64742-82-1	95	32	181	23	**7.86**
Benzene	71-43-2	0.1 %	0.032	0.18	0.00005	**3600**
Hexane	110-54-3	1	0	1.9	0.2	**9.52**

For benzene, a particularly high RCR value is seen. However, it should be noted that the DNEL value for dermal contact due to a lack of data is not determined based on a specific absorption rate, and therefore does not take into account that the absorption due to the volatility of the substance would be lower than by inhalation. Nevertheless, the scenario indicates an increased risk of cancer during dermal contact with the floor wax, assuming that the mineral turpentine used in the floor wax has the highest permissible content of 0.1% benzene.

Dermal exposure is also seen to exceed DNEL values for mineral turpentine and hexane, and this exceedance is further enhanced as the RCR values can be summed because both substances affect the central nervous system. However, it should be noted that the DNEL value for hexane by dermal exposure is relatively conservative as, due to lack of data, the same amount of absorption over the skin as by inhalation is considered by converting the DNEL value. Therefore, dermal contact should be avoided and appropriate protective gloves should be used.

Overall assessment of application
Risk of central nervous system effects, as well as increased risk of carcinogenicity by inhalation and risk of central nervous system effects by dermal contact were identified. Work with the product should therefore be carried out with suitable respiratory protective equipment and suitable protective gloves.

7.2.5 Mineral turpentine

Composition: The product consists of 100% mineral turpentine.

Classification (health): Asp. tox 1; H304 og STOT RE2; H373

MAL-code: 3-1

Inhalation
In the scenario for cleaning tools and cleaning of hands with turpentine, this work was estimated to last 2 x 6 minutes a day for a total of 12 minutes (0.2 hours).

Table 27. Risk from inhalation of vapours from the cleaning of tools and hands with turpentine. The measured exposure levels are described in more detail in Table 15, while DNEL values for inhalation can be found in Table 17.

Substance name	CAS no	Respiratory zone cleaning	Limit value working environment	DNEL 24h	RCR
		(µg/m^3)	(µg/m^3)	(µg/m^3)	
Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene) Expressed as sum of measured C7-C13 hydrocarbons = mineral turpentine	64742-82-1	10,840	145,000	5,700	**1.9** << 1 at 12 minutes
Benzene	71-43-2	10	1,600	0.17*	**58.8**
Ethylbenzene	100-41-4	12	217,000	850	0.0
Sum of analysed VOCs	-	10,860			

*C.f. REACH terminology not DNEL but DME (Derived Minimal Effect Level), as the lower limit of the carcinogenicity of the benzene is unknown.

During brush cleaning, the DNEL value for mineral turpentine was exceeded by a factor of 1.9 for 0.2 hours. This was not considered critical as DNEL is established on the basis of continuous exposure over a long period of time.

For benzene, the RCR value of 1 was exceeded significantly. Since it is the total amount of benzene that is related to cancer risk, the DNEL (a 24-hour value) value can be "concentrated" to 0.2 hours, thereby achieving a 0.2 hour DNEL value of 20 µg/m^3. This is the reason that the short-term exposure of 10 µg/m^3 was considered tolerable.

It should also be noted that the measured concentrations in the respiratory zone were significantly below the occupational exposure limit values.

Dermal contact
Dermal exposure was estimated to occur twice a day using 2 ml mineral turpentine, for a total of 2 x 2ml x 0.8 g/ml = 3.2 g mineral turpentine.

Table 28. Risk from dermal contact when cleaning tools and hands with turpentine. The specified concentrations are given in Appendix 3, while DNEL values for dermal contact are found in Table 17.

Substance name	CAS no	Concentration in product	Dermal dose, external	DNEL, mg/kg/d	RCR
		max%	mg/kg/d	mg/kg/d	
Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene); Mineral turpentine	64742-82-1	100	46	23	2
Benzene	71-43-2	0.1 %	0.046	0.00005	920

For benzene, a particularly high RCR value was seen. However, it should be noted that the DNEL value for dermal contact, due to a lack of data, is not determined based on a specific absorption rate and therefore does not take into account that absorption due to volatility of the substance would be lower than by inhalation. Nevertheless, the scenario indicated increased cancer risk during dermal contact with mineral turpentine with the highest permissible content of 0.1% benzene.

DNEL for dermal exposure with mineral turpentine is determined by the fact that approx. 7% of this amount is absorbed through the skin (see Appendix 8); skin contact causes a significantly higher RCR than inhalation of vapours, considering the duration of the inhalation scenario.

To avoid this unnecessarily increased risk, one should therefore avoid dermal contact and not clean the hands with mineral turpentine.

Overall assessment of the application
Inhalation of vapours when cleaning tools was considered limited and without risk. Cleaning of hands with mineral turpentine should be avoided as exposure exceeds the tolerable exposure level, especially for carcinogenicity.

7.2.6 Overall assessment of the scenario, renovation of wooden floors

If application of all the risk-evaluated products for the renovation of wood floors took place, there would be a risk (except in the case of water-based floor paints) in the scenarios set out if no precautions are taken regarding the use of protective equipment in the form of respiratory protection and protective gloves.

The risk for two-component chemical wood is mostly related to the central nervous system and mucosal irritant effects (from styrene) and carcinogenicity (from benzene). Subsequent treatment with floor wax increases the risk of effects to the central nervous system and carcinogenicity due to additional exposure to turpentine vapour, including benzene.

Cleaning of tools with turpentine further contributes to central nervous system effects if dermal contact is not avoided.

During application of acid-curable paint, there is a risk of mucosal irritant effects from evaporation of formaldehyde and the risk of skin allergy by dermal contact. The levels of formaldehyde decline slowly and only reach acceptable levels after approx. one month.

No risk was detected in using the water-based floor paint.

Several of the products used for the DIY project contain no substances selected for hazard and risk assessment. This applies to oil for floor sanding (17), lye (2) and hand cleaning (50).

7.3 Renovation of concrete floor

Basically, the scenario for renovation of concrete floors was similar to the renovation of wood floors, since pre-treatment products did not contain substances which, on the basis of their classification, were selected for the hazard and risk assessment. These products were therefore not included in the risk assessments. Risk assessment was carried out for different types of paint that could be used for the purpose. Several of the paints evaluated for the wood floor renovation scenario could also be considered for the renovation of a concrete floor.

7.3.1 Floor paint (solvent-based)

Composition: Composite solvent-based product

Classification (Health): Skin Sens. 1; H317 STOT SE 3; H336 STOT RE 2; H373

MAL code: 2-1

Inhalation
For floor paints, RCR was calculated for exposure in connection with 2 x 2 hour application, and for 24 hours stay starting 5 hours (very conservative), 3 days and 28 days after application.

Table 29. Risk of inhalation of vapours by application of solvent-based floor paints. The measured exposure levels are described in more detail in Table 14 and Table 15, while DNEL values for inhalation can be found in Table 17.

Substance name	CAS no	Respiratory zone	Concentration in room			Limit value working environment	DNEL 24h DNEL 4j *	RCR			
		Application	5 hours	3 days	28 days			Application	5 hours	3 days	28 days
		(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)				
Formaldehyde	50-00-0	-	1.5	8	4	400	100	-	0.0	0.1	0.0
Hydrocarbons, C9-C13, n-alkanes, isoalkanes, cyclics, aromatics	EC-No: 919-164-8	409,970	760,000	3,400	150	145,000	5,700 34,200	**72**	**133**	0.6	0.0
Butaneone oxime	96-29-7	15,000	7,300	-	-	-	20 120	**750**	**365**	-	-
Acetaldehyde	75-07-0	-	-	57	19	45,000	1,200	-	-	0.0	0.0
Crotonaldehyde	123-73-9	-	-	13	1	6,000	5	-	-	**2.6**	0.2
Benzene	71-43-2	69	20	-	-	1600	0.17 1	**406**	**118**	-	-
Butyric acid	107-92-6	-	-	33	-	-	1,500	-	-	0.0	-
Ethylbenzene	100-41-4	5,900**	1,300**	-	-	217,000	850 510	**6.9** **1.1**	**1.5**	-	-
Toluene	108-88-3	171	-	-	-	94,000	2,900	0.1	-	-	-

Substance name	CAS no	Respiratory zone	Concentration in room			Limit value working environ-ron-ment	DNEL 24h DNEL 4j *	RCR			
		Application	5 hours	3 days	28 days			Appli-cation	5 hours	3 days	28 days
		(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)				
Sum of ana-lysed VOCs	-	-	800,000	6,400	250						

* For 4 hours' exposure, the DNEL value that is a 24 hour value can be converted to an exposure level over 4 hours for substances in cases where the critical effect is related to the daily systemically absorbed dose in the body.

**The measured concentration may be higher as the amount of the substance exceeds the capacity of the collection medium and the upper quantitation limit of the method.

It was seen that for the measurements performed in connection with application and a total of 4 hours' exposure, the RCR value exceeded 1 for the hydrocarbon mixture (RCR = 12), benzene (RCR = 6), ethylbenzene (RCR = 1.1) as well as for 2 butanone oxime (RCR = 125).

Such daily exposure therefore increases the risk of chronic neurotoxic damage from the hydrocarbon mixture and ethylbenzene while benzene exposure causes unnecessarily increased cancer risk. However, the greatest risk is considered to be exposure to 2-butanone oxime within the first day, whereby the DNEL value is determined to protect against permanent tissue damage in the nasal mucosa.

It was also seen that the limit value in the working environment for hydrocarbons is exceeded approx. three times during application.

Room measurements made 5 hours after application show that the RCR value of 1 is exceeded for the same substances, so the inhabitants should not stay for long periods in the room the first day after application.

It was seen that 3 days after application, the RCR values for the above substances were less than 1, whereas the RCR for crotonaldehyde exceeded 1 (RCR = 2.6), indicating the risk of mucosal irritation. After 28 days, RCR for all substances was below 1.

Overall, this assessment means that the solution-based floor paint should not be applied without respiratory protection against inhalation of vapours. In addition, thorough ventilation of the room should be ensured during the first days/weeks after application.

Dermal contact

In terms of dermal contact, the calculations of RCR were based on two applications, with a dermal exposure of 6.7 g each time, for a total of 13.4 g of paint.

Table 30. Effects regarding dermal contact from use of solvent-based floor paint. The specified concentrations are given in Appendix 3, while DNEL values for dermal contact are found in Table 17.

Substance name	CAS no	Concentration in product	Dermal load	Dermal dose, external	DNEL	RCR
		max%	mg/cm^2	mg/kg/d	mg/kg/d	
Total product			3.33	192	-	
Hydrocarbons, C9-C13, n-alkanes, isoalkanes, cyclics, aromatics	EC-No: 919-164-8	5	2	10	23	**0.4**
Fatty acids, C14-18 and C16-18-unsatd., maleated, reaction products with oleylamine	85711-47-3	1	0	2	Sens *	-
Butaneone oxime	96-29-7	1	0	2	Sens *	-
Cobalt bis(2-ethylhexaneoate)	136-52-7	1	0	2	1 Sens *	**1.90** -
2-Ethylhexanoic acid, zirconium salt	22464-99-9	1	0	2	1	**1.90**

*DNEL for skin sensitizers cannot be determined, as safe limits for this type of substance are not known.

For zirconium 2-ethylhexaneoate, RCR = 1.9, which was an unacceptably increased risk of reproductive toxicity. A corresponding effect and RCR was seen for cobaltbis (2-ethylhexaneoate), which also causes an allergic skin reaction. The constituents of fatty acids and 2-butanone oxime also cause allergic skin reactions; however, a specific tolerable exposure level cannot be established for this effect.

This risk assessment showed that dermal contact should be avoided and therefore the user should wear protective gloves during work.

Overall assessment of application
The solvent-based floor paint should not be applied without respiratory protective equipment guarding against inhalation of vapours, as there is an increased risk of neurotoxic effects, cancer and tissue effects in the nose. In addition, remaining in the room during the days immediately after application should be avoided and/or thorough ventilating of the room to avoid risk should be ensured.

Dermal contact with the product should be avoided, and protective gloves worn during work primarily to avoid risk of skin allergy.

7.3.2 Epoxy floor paint (water-based, two-component)

Composition: Composite epoxy based product

Classification (health): Skin Irrit.2 H315; Skin Sens.1 H317; Eye Irrit.2 H319

MAL-code: 00-5

Inhalation
For floor paints, the RCR is calculated for exposure in connection with 2 x 2 hours application, and for 24 hours stay starting 5 hours (very conservative), 3 days and 28 days after application.

Table 31. Risk of inhalation of vapours from the use of epoxy floor paint. The measured exposure levels are described in more detail in Table 14 and Table 15, while DNEL values for inhalation are found in Table 17.

Substance name	Cas no	Respiratory zone	Concentration in room			Limit value working environment	DNEL 24h DNEL 4h *	RCR			
		Application	5 hours	3 days	28 days			Application	5 hours	3 days	28 days
		(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)				
Oxiran, mono[(C12-14-alky-ky-loxy)methyl]derivater; (C12C14) alkylglycidylether	68609-97-2	42	150	130	38	22,000	20	**2.1**	**7.5**	**6.5**	**1.9**
Toluene	108-88-3	52	-	-	-	94,000	2,900 17,400	0.0 0.0	0.0	0.0	0.0
Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene) = mineral turpentine	64742-82-1	4,900	4,180	-	-	145,000	5,700 34,200	0.9 0.2	0.7	0.0	0.0
Formaldehyde	50-00-0	-	-	1.7	1.9	400	100	0.0	0.0	0.0	0.0
Acetaldehyde	75-07-0	-	24	1.9	17	45,000	1,200	0.0	0.0	0.0	0.0
1,4-Dioxane	123-91-1	220	21	-	-	36,000	400	0.6	0.1	0.0	0.0
Ethylbenzene	100-41-4	350	51	-	-	217,000	850 5,100	0.4 0.1	0.1	0.0	0.0
Sum of analysed VOCs	-	9,750	55,000	7,700	360						

* For 4 hours' exposure, the DNEL value that is a 24 hour value can be converted to an exposure level over 4 hours for substances in cases where the critical effect is related to the daily systemically absorbed dose in the body.

It was seen that for the epoxy compound oxirane mono [(C12-14 alkyloxy) methyl] derivatives; (C12C14) alkylglycidyl ether is exceeded by the acceptable RCR during application and in the room 5 hours, 3 days and 28 days after application. Therefore, there was a risk of acute mucosal irritation from this epoxy compound during this period.

For the other substances, the RCR value was below 1.

For mineral turpentine and ethylbenzene, the sum of their RCR values exceeded 1, but this was not considered critical since overall exposure to the substances over 4 hours was significantly lower compared to exposure at the DNEL level for 24 hours.

The occupational exposure limit was not exceeded for any of the substances.

Dermal contact

The calculations of RCR are based on 2 applications, each time with a skin exposure of 6.7 g, for a total of 13.4 g of paint.

Table 32. Risk of dermal contact from use of epoxy floor paint. The specified concentrations are given in Appendix 3, while DNEL values for dermal contact are found in Table 17.

Substance name	Cas no	Concentration in product	Dermal load	Dermal dose, external	DNEL, mg/kg/d	RCR
		max%	mg/cm²	mg/kg/d	mg/kg/d	
Total product			3.33			
4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane	25068-38-6	60	20	114	Sens*	-
2-(chloromethyl)oxirane; Formaldehyde; Phenol	28064-14-4	20	7	38.1	Sens*	-
Oxiran, mono[(C12-14-alkyloxy)methyl]derivater; (C12C14) alkylglycidylether	68609-97-2	20	7	38	Sens*	-
1,4-bis(2,3-epoxypropoxy)butane	2425-79-8	5	2	10	Sens*	-

*DNEL for skin sensitizers cannot be determined, as safe limits for this type of substance are not known.

The product's risk of dermal contact is determined by the content of the four epoxy compounds, all of which may cause skin allergy. Therefore, any dermal contact with the product should be avoided because of the risk for skin allergy.

Overall assessment of the process

By inhalation during application and by remaining in the room for 5 hours, 3 days and 28 days after application, there is a risk of mucosal irritation due to evaporation of epoxy compounds. Therefore, respiratory protective equipment against vapour should be used during application. The first month after application, extra ventilation of the room should be done.

7.3.3 Overall assessment of the scenario, renovation of concrete floor

Risks in using solvent-based floor paint were found if it was used without protective equipment in the form of respiratory protection and protective gloves.

Inhalation of turpentine (C9-C13 hydrocarbons) and ethylbenzene cause an increased risk of central nervous system damage, while benzene evaporation causes increased cancer risk. Furthermore, there is a risk associated with the evaporation of 2-butanone oxime in connection with adverse effects on respiratory mucous membranes. Allergenic substances (2-butanone oxime, cobalt bis(2-ethylhexaneoate) and fatty acids) also cause risk of skin allergy while the content of 2-ethylhexaneoate constitute risk for reproductive effects. Pre-treatment products did not contain substances which were selected for the hazard and risk assessment.

7.4 Renovation of bathroom

During the renovation of the bathroom, contrary to expectation after the initial survey, mainly products that did not contain substances selected for hazard and risk assessment were used. From this scenario, therefore, only PU foam for sealing around windows and a water-based wet room paint were selected.

7.4.1 PU foam sealant

Composition: Compound isocyanate-containing product

Classification (health): Acute Tox. 4, Lact., Skin Irrit. 2, Eye Irrit. 2, Resp. Sens. 1, Skin Sens. 1, Carc. 2, STOT SE 3, STOT RE 2

MAL-code: 3-3

Inhalation
For joint foam, RCR is calculated for exposure from 1 hour of jointing, and for 24 hours of stay starting 5 hours (very conservative), 3 days and 28 days after the job.

Table 33. Risk by inhalation of vapours using PU joint foam. The measured exposure levels are described in more detail in Table 14 and Table 15, while DNEL values for inhalation are found in Table 17.

Substance name	Cas no	Respiratory zone	Concentration in room			Limit value Working environment	DNEL 24h	RCR			
		Application	5 hours	3 days	28 days			Application	5 hours	3 days	28 days
		(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)				
Hexane	110-54-3	-	24	-	-	700	700	0.0	0.0	0.0	0.0
Toluene	108-88-3	-	12	-	-	94,000	2,900	0.0	0.0	0.0	0.0
Styrene	100-42-5	-	3	-	-	105,000	250	0.0	0.0	0.0	0.0
Acetaldehyde	75-07-0	-	3.3	0.5	15	45,000	1,200	0.0	0.0	0.0	0.0
Ethylbenzene	100-41-4	-	25	-	-	217,000	850	0.0	0.0	0.0	0.0
Phenol	108-95-2	-	-	30	-	4,000	100	0.0	-	0.3	-
Diphenylmethane diisocyanate, isomeric, homologue and mixtures	9016-87-9	6	-	-	-	50	**Resp sens***	**-**	-	-	-
Sum of analysed VOCs	-	419	1,100	74	-						

* DNEL for respiratory sensitizers cannot be determined, as safe limits for this type of substance are not known

Upon application, diphenylmethane diisocyanate vapour was measured in ambient air. The substance can cause respiratory allergy and no safe limit without effect is known. There may be a risk of developing respiratory allergy by inhalation of vapours during application. Therefore, suitable respiratory equipment should be worn during work. Inhalation risk after the product has been cured or in days immediately following use is negligible.

During application and days after no measured levels exceeded the occupational exposure limit values.

Dermal contact
The calculations for the RCR are based on one application, with a dermal exposure of 0.7 g of joint foam.

Table 34. Risk of dermal contact from application of PU joint foam. The specified concentrations are given in Appendix 3, while DNEL values for dermal contact are found in Table 17.

Substance name	Cas no	Concentration in product	Dermal load	Dermal dose, external	DNEL, mg/kg/d	RCR
		max%	mg/cm²	mg/kg/d	mg/kg/d	
Total product			3.3			
Diphenylmethane diisocyanate, isomeric, homologue and mixtures	9016-87-9	60	2.0	114	Sens*	-

* DNEL for skin sensitizers cannot be established, as safe limits for this type of substance are not known

The product has a very high content of a substance causing skin allergy, so there is a risk of skin sensitization through dermal contact with the product. Therefore, suitable protective gloves should be used during work.

Overall assessment of application
During application of the product there is a risk of development of airway allergy and skin allergy. Therefore, suitable respiratory equipment and suitable gloves should be used during work. There is no risk associated with remaining in the room after curing.

7.4.2 Wet room paint (water-based)

Composition: The product is a composite water based product with a VOC content of a maximum of 35 g/L.

Classification (health): no

MAL-code: 00-3

Inhalation
No measurements in the respiratory zone were made of this product. When using wet room paint, RCR was calculated for exposure during stay starting 5 hours (very conservative), 3 days and 28 days after application. Because the area used was three times larger than used in the test sample measurements, the measured concentrations for 5 hours, 3 days and 28 days are multiplied by a factor of 3.

Table 35. Risk of inhalation of vapours from the use of water-based paint in a wet room. The measured exposure levels are described in more detail in Table 14, while DNEL values for inhalation can be found in Table 17.

Substance name	Cas no	Respiratory zone	Concentration in room			DNEL	RCR			
		Application	5 hours	3 days	28 days		Application	5 hours	3 days	28 days
		(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)				
Formaldehyde	50-00-0		9.7x3= 29	2x3= 6	2.1x3= 6.3	100	-	0.2	0.1	0.1
3-Iodo-2-propynyl butylcarbamate (IPBC)	55406-53-6	-	-	-	6x3= 18	-	-	-	-	-
2-Methyl-2H-isothiazol-3-one (MIT)	2682-20-4	-	18x3= 54	36x3= 108	7x3= 21	100	-	0.2	0.4	0.1
Styrene	100-42-5	-	6x3= 18	-	-	250	-	0.1	-	-

Substance name	Cas no	Respiratory zone	Concentration in room			DNEL	RCR			
		Application	5 hours	3 days	28 days		Application	5 hours	3 days	28 days
		($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)				
Ethylbenzene	100-41-4	-	25x3= 75	-	-	850	-	0.0	-	-
Acetaldehyde	75-07-0	-	3.3x3= 10	0.5x3= 1.5	15x3= 45	1200	-	0.0	0.0	0.0
Phenol	108-95-2	-	-	30x3= 90	-	100	-	-	0.9	-
Sum of analysed VOCs	-	-	55,000x3= 165,000	11,000x3= 33,000	690x3= 2070					

There were no RCR values above 1. An RCR of 0.9 for phenol was obtained (measured only by the 3-days measurement). The substance can cause tissue damage in the respiratory tract.

Dermal contact

The calculations of RCR are based on two applications, with a dermal exposure of 6.7 g each time, for a total of 13.4 g of paint.

Table 36. Risk of dermal contact from the use of water-based wet room paint. The specified concentrations are given in Appendix 3, while DNEL values for dermal contact are found in Table 17.

Substance name	Cas no	Concentration in product	Dermal load	DNEL	RCR
		max%	mg/cm²		
Total product			3.33		
3-Iodo-2-propynyl butylcarbamate	55406-53-6	1	0.03	**Sens***	-
1,2-benzisothiazol-3(2H)-one (BIT)	2634-33-5	0.05	0.0015	**Sens***	-
2-Methyl-2H-isothiazol-3-one (MIT)	2682-20-4	0.05	0.0015	**Sens***	-
5-Chlor-2-methyl-2H-isothiazol-3-on/2-Methyl-2H-isothiazol-3-on (3:1) (CIT/MIT)	55965-84-9	0.0015	0.0005	**Sens***	-

* DNEL for skin sensitizers cannot be established, as safe limits for this type of substance are not known

The product contains four substances causing skin allergy, where MIT is considered a highly potent skin sensitizer. The Danish National Allergy Research Centre has just published data showing that the use of MIT in cosmetic products in particular has resulted in an epidemic of contact allergy to MIT. Furthermore, the use of MIT in water-based paint is considered to be unnecessarily high. In addition, cross-reactivity between MIT and BIT (Schwensen 2017) occurs.

Although the product is not classified as allergenic because of the quantities used, there is considered to be a risk of dermal contact with the product.

Overall assessment of the process

Measured values for CIT/MIT indicate the risk of eye/respiratory irritation, considered to be an issue during application as well up until at least one month after application. Therefore, adequate ventilation should be ensured during work and during the weeks/months after application.

7.4.3 Overall assessment of the scenario, renovation of bathroom

The results indicate risk arising from using PU joint foam and water based wet room paint if no protective equipment is used, such as respiratory protection and protective gloves. PU joint foam causes exposure to isocyanates that are both respiratory and skin sensitizing, whereas the water-based wet room paint causes exposure to four skin sensitizing preservatives (IPBS, CIT, MIT, BIT).

In this scenario, the majority of products do not contain substances which, based on their classification, have been selected for risk and risk assessment. Most of the products, such as filler (ID 47), primer (ID 22), wet room membrane (ID 24, ID 46), basic cleaner (ID 3), tile adhesive (ID 26), cement filler (ID 4), sealant (ID 28), mounting glue (ID 29) and wet room silicone (ID 32) did not contain substances that resulted in a selection for risk assessment.

7.5 Conclusions

The following table provides a summary of the estimated/assessed risks associated with use of the selected nine DIY products.

In the do-it-yourself scenarios, in general, there are no two products that are used on the same day that have the same content of hazardous substances; therefore, there is no basis for calculating the risk of aggregate exposure. The only complex scenarios where total exposure might be considered are the treatment of floors with turpentine-based paint and wax, with subsequent cleaning of turpentine brushes and cleaning hands with turpentine. The contribution of cleaning brushes and hands in relation to inhalation is modest compared with treating floors, while dermal contact is an issue for the individual jobs, more so in combination.

Table 37. Overall overview of risks for the selected products and scenarios

Product	Scenario, process	Risk during work, inhalation	Risk when staying in rooms after 5 hours, 3 days, 28 days, inhalation	Risk during work, dermal	Substances giving rise to risk
Chemical wood (two component)	Wooden floor Filling 2 hours	No	Yes at 5 h, 3 days neurotoxicity Mucosal irritation (eyes/respiratory tract) Increased cancer risk	Yes Skin irritation, Skin sensitization	Styrene; Benzene; Benzoic acid; Allyl glycidyl ether
Floor lacquer (acid curing)	Wooden floor Lacquering of floors 2 x 2 hours	Yes Mucosal irritation (eyes/respiratory tract) Neurotoxicity	Yes at 5 h, 3 days, (28 days) * Mucosal irritation (eyes/respiratory tract)	Yes Skin sensitization	Formaldehyde; Ethylbenzene; Acetic acid
Floor paint (water-based)	Wooden floor Painting of floors 2 x 2 hours	No	No	No	-
Floor wax	Wooden floor Waxing of floor 2 x 2 hours	Yes at 5 Neurotoxicity Increased cancer risk	Yes at 5 h Neurotoxicity Increased cancer risk	Yes Increased cancer risk Neurotoxicity	C7-C12 hydrocarbons; Benzene; Hexane

Product	Scenario, process	Risk during work, inhalation	Risk when staying in rooms after 5 hours, 3 days, 28 days, inhalation	Risk during work, dermal	Substances giving rise to risk
Mineral turpentine (with 0.1% benzene)	Wooden floor Cleaning brushes and hand cleaning 2 x 6 minutes	No	Not relevant	Yes (hand cleansing) Increased cancer risk Neurotoxicity	C7-C12 hydrocarbons;
Floor paint (solvent-based)	Concrete floor Painting of floors 2 x 2 hours	Yes Neurotoxicity Mucosal irritation (eyes/respiratory tract) Increased cancer risk	Yes at 5 h, 3 days Neurotoxicity Mucosal irritation (eyes/respiratory tract) Increased cancer risk	Yes Reproductive effects Skin sensitization	C9-C13 hydrocarbons; 2-butanone oxime 2-ethylHexaneoate
Epoxy floor paint (water-based, two-component)	Concrete floor Painting of floors 2 x 2 hours	Yes Mucosal irritation (eyes/respiratory tract)	Yes at 5 h, 3 days, 28 days Mucosal irritation (eyes/respiratory tract)	Yes Skin sensitization	C12 -C14 alkyl glycidyl ether
PU sealing foam	Bathroom Grouting with foam, 1 hour	Yes Respiratory sensitization	No	Yes Skin sensitization	Diphenylmethane diisocyanate, isomeric and homologous
Wet room paint (water-based)	Bathroom Painting walls in wet rooms 2 x 2 hours	No	No	Yes Skin sensitization	MIT; CIT; BIT (preservatives)

Application phase

As seen, there are risks inherent in using all products, except for the water-based floor paint and wet room paint, if suitable precautions (thorough ventilation) or protective equipment (respiratory protective equipment and protective gloves) are not applied.

For the solvent-based products, this is not a surprise, as upon application these products result in increased inhalation exposure concentrations, especially when the solvents are intended to evaporate in order for the product to subsequently cure.

With regard to combined scenarios, for the solvent-based products used for the renovation of wood floors, additive effects may be seen particularly on the central nervous system. Carcinogenic effects are also observed because of the evaporation of hydrocarbons, typically from the use of mineral turpentine.

For the other renovation scenarios for concrete flooring, in using solvent-based paint or water-based epoxy paint and wet room renovation using PU joint foam, a significant risk is seen from various allergenic substances that are components (e.g. 2-butanone oxime, epoxy compounds and isocyanates). The co-effects of these substances are unclear.

Evaporation phase

With regard to the exposure risks inherent in evaporation, there is a risk from evaporation up to day 28 for epoxy floor paint and acid-curing wood lacquer. Evaporation of mucosal irritants from the treated surfaces occurs; therefore, ample ventilating of the room is required for at least one month after treatment. It should be noted that a number of the mucosal irritants that are released are also skin sensitizing. Since there are many similarities with regard to the mechanisms for inducing skin sensitization and respiratory sensitization, these skin sensitizers

may also be suspected of respiratory sensitizing effect, even though the substances are not classified as such. This applies, for example, to formaldehyde and epoxy compounds.

Critical substances
With regard to critical substances, especially hydrocarbon vapour with evaporation of hexane, benzene and C7 - C13 aromatic, aliphatic and cycloaliphatic hydrocarbons is considered to present a risk of harmful effects on the central nervous system and of cancer (benzene). In connection with mucosal irritation and adverse effects on the respiratory tract, this is most clearly seen for evaporation of formaldehyde, 2-butanone oxime and preservative CIT which, in the scenarios studied, achieved an RCR value of greater than 100. While formaldehyde has been found by evaporation from acid-curing lacquer, 2- butanone oxime is found to evaporate from solvent-based concrete floor paints and CIT from water-based wet room paint.

7.6 Uncertainties and limitations

Exposure
In relation to inhalation associated with the use of the products, the uncertainty is considered to be insignificant, as it was measured directly in the respiratory zone using realistic application processes. In relation to dermal exposure by application, realistic worst case scenarios have been used. The biggest uncertainty relates to whether there would actually be contact between the ingredients in paint or other materials and the skin. Problems would be more or less serious depending on the migration of the individual substances in the product, the time the product is placed on the skin and how long it takes before the product dries/cures. A worst case assumption was applied, but it is not possible to estimate the difference between calculated exposure and actual exposure.

In relation to the exposure of residents and others staying in the home, the releases to the climate chamber were measured and converted into a reference room with a 0.5 hour shift of air. Actual exposure would depend on the air exchange in the building where the user would stay, and in the event of a lower rate of air exchange the exposure may be greater. This is slightly higher than the mean rate of 0.32 times/h found in 15 single and two-family houses as part of the national mapping of PCBs in buildings, where values were found ranging from 0.03 to 1.8 times/h (Grontmij / COWI , 2013).

Hazard assessment and risk assessment
Regarding the hazard assessment, the starting point was to use already established tolerable exposure levels, i.e. DNEL values; as well, the indication of critical effects was based on recent expert assessments. Therefore, reassessing background data from the literature in order to obtain a better understanding of the effects, and possibly the mechanisms behind the effects, has not been the intention.

In particular, there was uncertainty in determining for which substances a 24 hour DNEL concentration could be scaled to a 4 hour value by simple ratio. For genotoxic carcinogens, it is a well-established principle that risk is associated with the total dose over time and rarely depends on variations in the exposure level. As well, in connection with the principles used in REACH, daily exposure can be scaled relative to the duration of exposure per day for systemic effects. However, the principle is not applied to substances with local effects, e.g. mucosal irritation, as the effects here are more likely to be due to the substance concentration in the air than the duration of exposure.

For some of the measured substances, the actual concentration may have been higher than measured as it exceeded the capacity of the collection medium and the upper quantification limit of the method. For these substances, the calculated RCR could have been too low. These include ethylbenzene in the acid-wetting floor, floor wax and solvent-coated floor paint and formaldehyde in acid-wetting lacquer, where the RCR was significantly above 1. In addition, it may concern toluene in floor wax, for which the result may have been that RCR was actually above 1 for application.

8. Resource assessment

8.1 Purpose

The purpose of this chapter was to make an assessment at the screening level of the selected building materials and to assess whether the chemical do-it-yourself products applied to these materials could prevent the materials in question being recycled when disposed of.

8.2 Method

The assessment was based on the method developed in the Danish Environmental Protection Agency's project "Chemical substances in consumer products that can prevent recycling" (Christensen et al., 2016); however, the method was adapted to the screening level that is the basis for the assessment in this project.

The description of possible barriers to recycling includes the following elements:

- Description of the material group (e.g. plasterboard)
- Problematic chemistry in products that are included in the finished materials (e.g. pigments in paint)
- Waste characteristics
- Technical suitability for recycling
- Restrictions for recycling, as a result of content of problematic substances.

For the assessment, materials from the three exposure scenarios for DIY products described in section 2.3 were selected: renovation of wooden floors in the living room or kitchen (see Table 4), renovation of concrete floors in e.g. a workshop room (see Table 5) and new layout of tiles in the bathroom or similar (wet room) (see Table 6), respectively

There is a focus on the processes and products with the potential to cause the finished materials to contain residues of the DIY products used in larger or smaller quantities after the end of the DIY project. The assessment has therefore not taken into account the substances that were present in the building materials prior to the DIY project, but examines exclusively the contribution of the DIY products.

Regarding the chemical substances that are part of the DIY products, the focus was on the substances expected to remain in the building materials for a long time after use, e.g. volatile substances are expected to evaporate and disappear from the building materials before they are recycled.

In addition, the assessment focuses on substances with serious health or environmental properties that may prevent recycling, e.g. the substances listed on the Danish Environmental Protection Agency's LOUS list or on the so-called Candidate List under the EU Chemical Regulation, REACH (applied on 12.10.2017). Information on the health and environmental classification of the substances is derived from the annexes to this report, and, in addition, information on problematic substances in building materials from the report by Pedersen et al. (2016).

8.3 Results

Below the results of the screening are presented for each of the selected material groups: wood floors, concrete floors and indoor tiles (for wet rooms). For each material, the identified substances potentially present in the material when recycled are identified in table form and classified at the same time for significant problematic health and/or environmental properties

(primarily CMR properties (cat. 1 and 2) and/or high toxicity together with the risk of long-term effects in the environment). For each material, the summary assessment as to recyclability is also given in table form.

8.3.1 Renovation of wooden flooring in the living room

The assessed scenario relates to the renovation of indoor wood floors in the living room, room or bathroom where old surface coatings are removed, holes filled as needed, and new surface treatment applied.

According to the product types listed in Table 4 and the corresponding description of the ingredients in Appendix 3, some classified substances may appear in DIY products typically used for this purpose. However, Table 38 below lists only those substances that are considered to be recyclable in the material at the time of recycling and which also have relevant adverse health or environmental properties (see Appendix 3 for details on classification). Some volatile substances are therefore omitted from the overview.

Table 38. Hazard Classified chemicals believed to occur in wooden floors for long periods after renovation/treatment with do-it-yourself products. Processes/product types not considered relevant are marked with light green.

Process	Product type	Product ID	Substance	Cas no.	LOUS/ REACH*
Removing old lacquer or paint from floor	Oil for floor sanding	17			
Filling before sanding	Chemical wood	20	None relevant		
	Wood filler	19	5-Chloro-2-methyl-4-isothiazolin-3-one/ 2-Methyl-2H-isothiazol-3-one (3:1)	55965-84-9	
Preparation	Lye	2			
Finishing treatment	Polyurethane reinforced alkyd floor lacquer, oil-based	12	Naphtha (petroleum), hydrotreated heavy	64742-48-9	(X)
			2-Ethylhexanoic acid, zirconium salt)	22464-99-9	
			Acetone oxime	127-06-0	
	Or: Two-component acid-curing lacquer	40+41	Iso-butylated urea formaldehyde resin	68002-18-6	
	Or: Floor wax	16	Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene)	64742-82-1	(X)

* The substance is either on the LOUS list or Candidate List under REACH (see Pedersen et al., 2016), or is similar to a substance classified as such (in brackets).

There are no Candidate List substances among those listed except for a few naphtha fractions related to those on the LOUS list (CAS 64742-88-7). The biocide included in the wood filler is classified H410, i.e. "highly toxic with long term effects on aquatic organisms", but only in very low concentrations (in-can preservative).

Table 39. Rating for wooden floors.

Subject	Description/Rating
Material group	Wooden boards/planks for indoor use, i.e. not impregnated.
Problematic chemistry in products	There are no identified substances in the products used that are on the EU Candidate List or which have "heavy" health or environmental classifications; however, the substance in the wood filler is classified as H410, but is only included in very low concentrations.
Waste characteristics	Depending on the quality, used wood floors are either reused directly for other building purposes or recycled in the production of particle board and the like. The alternative is typical disposal by combustion.
Technical suitability for recycling	The technical suitability of wooden floor boards/planks for direct re-use can vary depending on where the floors are worn, but suitability for recycling other particle board or the like is regarded as good.
Restrictions due to problematic substances	Based on the given information on relevant DIY products and their composition, use of these products should not significantly limit the recycling of the products.

8.3.2 Renovation of concrete floor in a workshop

The assessed scenario relates to the renovation of an indoor concrete floor (e.g. in a workshop), where any older coatings are removed, a filler is possibly applied and new, durable surface paint or lacquer is applied.

According to the product types given in Table 5 and the corresponding description of the ingredients in Appendix 3, some classified substances may be present in the DIY products typically used. However, Table 40 below lists only those substances considered to be present in the material at the time of recycling and have relevant adverse health or environmental properties (see Appendix 3 for details on classification). Some substances, such as light hydrocarbons and degradable alcohols, are therefore omitted from the overview.

Table 40. Hazard classified chemicals that are considered to be present in concrete floors for long periods after refurbishment/treatment with DIY products. Processes/product types that are not relevant are marked with light green.

Process	Product type	Product ID	Substance	Cas no.	LOUS/ REACH*
Removal of old lacquer or paint from floor	Oil for floor sanding [b]	17			
Levelling of floors	Concrete filler	39	None relevant		
Paint or lacquering	Epoxy floor paint (two-component)	9 + 37	2-Ethylhexanoic acid, zirconium salt	22464-99-9	
			4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane	25068-38-6	(X)
			2-(chloromethyl)oxirane; Formaldehyde; Phenol	28064-14-4	

Process	Product type	Product ID	Substance	Cas no.	LOUS/ REACH*
	Or: Epoxy floor paint (two-component)	10	4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane	25068-38-6	(X)
			2-(chloromethyl)oxirane; Formaldehyde; Phenol	9003-36-8	
	Or: Alkyd floor paint	43	Cobalt bis(2-ethylhexaneoate)	136-52-7	
			Butaneone oxime	96-29-7	
	Or: Urethane alkyd floor paint	44	Butaneone oxime	96-29-7	
			Cobalt bis(2-ethylhexaneoate)	136-52-7	
	Or: Urethane alkyd floor paint	8	Butaneone oxime	96-29-7	
			Cobalt bis(2-ethylhexaneoate)	136-52-7	
			2-Ethylhexanoic acid, zirconium salt	22464-99-9	
	Or: Epoxy lacquer	13	4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane	25068-38-6	(X)
			2-(chloromethyl)oxirane; Formaldehyde; Phenol	9003-36-8	
	Or: Epoxy lacquer	42	4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane	25068-38-6	(X)

* The substance is either on the LOUS list or Candidate List under REACH (see Pedersen et al., 2016), or is closely related to such a substance (in brackets).

There are no Candidate List substances among those included, but a few related substances to bisphenol A (CAS No. 80-05-7) and bisphenol A diglycidyl ether polymer (CAS No. 25036-25-3) on the LOUS list occur in some of the products. Several of the substances are classified as either highly toxic or toxic in the aquatic environment with risk of prolonged effects on aquatic organisms (R50/53, R51/53 and H410, H411).

Table 41. Assessment for concrete floor.

Subject	Description/Rating
Material group	Concrete for indoor use, not in wet rooms - i.e. ordinary concrete without special additives for special purposes

Subject	Description/Rating
Problematic chemistry in products	There are no identified substances in the products used that are on the EU Candidate List or that have "heavy" health ratings. There are some of the substances in several of the listed products classified as R50/53 (H410) or H411. They occur in the products from low to fairly high concentrations (several percent).
Waste characteristics	Used concrete is used in some cases as a source for the production of new concrete, but in the specific case (concrete from a floor in a private home) use for different types of performance is more common.
Technical suitability for recycling	The recessed concrete is technically suitable for completion, and all concrete would also be recycled as a source for the production of new concrete. Even in the case of painted concrete, the amount of material involved will hardly affect the technical suitability as a contribution to the production of new concrete.
Restrictions due to problematic substances	The evaluated products do not contain metals in amounts of importance and should therefore be not be problematic in accordance with the provisions of the Decree on the use of residues, soil and sorted construction waste (Decree No. 1672 of 15/12/2016 [Restproduktbekendtgørelsen]), which focuses on the risk of leaching of heavy metals by utilization and the like. However, it cannot be ruled out that the release and siphoning of some of the mentioned substances could actually be effected if they are recovered as fillers. Content of health and/or environmentally problematic substances is not considered a limitation for recycling as aggregates for new concrete.

8.3.3 Installation of tiles in bathroom

The assessed scenario relates to the preparation and layout of a bathroom (i.e. a wet room) with tiles on walls and floors. The do-it-yourself project includes the layout of floors, etc., establishment of wet room safety and installation of tiling, incl. clamping and jointing etc. The recycling assessment only involves the recycling of tiles.

According to the product types listed in Table 6 and the corresponding description of the ingredients in Appendix 3, some classified substances may be present in the DIY products typically used. However, Table 42 below lists only those substances that are considered to be recyclable in the material at the time of recycling and which also have relevant adverse health or environmental properties (see Appendix 3 for details on classification).

Table 42. Hazard classified chemical substances considered to be found in tiles in bathrooms for long periods after reconstitution using DIY products. Processes/product types not considered to be relevant are marked with light green.

Process	Product type	Product ID	Substance	Cas no.	LOUS/ REACH*
Levelling of floor and/or construction of descending gradient for drain	Filler	47			
	And: Binder to filler	48			
Pre-treatment for wet room protection in wet zone	Primer	22			
Wet room protection in wet zone	Wet room membrane	24 + 46			

Process	Product type	Product ID	Substance	Cas no.	LOUS/ REACH*
Waterproof floor and wall coverings with tiles	Basic cleaner	3			
	Tile adhesive	26	None relevant		
	Concrete filler	4	Naphtha (petroleum), hydrodesulfurized light, dearomatized	92045-53-9	
Sealing of unglazed tiles, floors and walls	Sealant	28	None relevant		
Construction of wall with built-in cisterns, wall-mounted toilet, washbasin, mirror mounting, etc.	Mounting glue	29			
Insertion of window or door incl. casing	PU-foam	30			
Grouting	Wet room silicone	32	None relevant		
Painting of tiles and other surfaces (floor, ceiling, walls)	Wet room paint	25	3-Iodo-2-propynyl butylcarbamate	55406-53-6	
			1,2-benzisothiazol-3(2H)-one (BIT)	2634-33-5	
			2-Methyl-2H-isothiazol-3-one (MIT)	2682-20-4	
			5-Chloro-2-methyl-2H-isothiazole-3-one/2-Methyl-2H-isothiazole-3-one (3:1) (CIT/MIT)	55965-84-9	

* The substance is either on the LOUS list or Candidate List under REACH (see Pedersen et al., 2016), or is closely related to such a substance (in brackets).

There are no Candidate List or LOUS substances among those included. However, the substances in the wet room paint are all classified as either very toxic or toxic to the aquatic environment with risk of prolonged effects on aquatic organisms (H400, H410, H411).

Table 43. Rating for tiles for wet rooms.

Subject	Description/assessment
Material group	Glazed tiles for indoor use in bathrooms and other wet rooms.
Problematic chemistry in products	There are no identified substances in the products used that are on the EU candidate list or which have "heavy" health ratings. There are some of the substances in several of the mentioned products classified as H410 or H411. They occur only in products in low right concentrations (<0.05%).

Subject	Description/assessment
Waste characteristics	There may be exceptions where particularly expensive or rare tiles are carefully removed for direct recycling, but it is estimated that tiles are generally broken up less considerately and predominantly can only be recovered as residual products.
Technical suitability for recycling	The tiles are considered to be technically suitable for the purposes described above (with the corresponding assumptions).
Restrictions due to problematic substances	The assessed products do not contain metals, and therefore are not problematic in accordance with the provisions of the Remaining Product Order (Order No. 1672 of 15/12/2016), which focuses on the risk of leaching of heavy metals by recovery as filling material and the like. However, it cannot be ruled out that the release and degradation of the substances may be effected by recovery as filling material. However, the concentrations would be low. There are no restrictions on direct recycling whereby the tiles would be cleaned for residual dust and sealants.

9. References

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Appendix 1 List of companies

Product information was obtained from the following DIY stores and manufacturers of building materials

Company name	Type of company
Alfix	Producer
Bauhaus A/S	DIY store
Beck & Jørgensen A/S	Producer
Beckmann A/S	Paint shop/producer
Borup Kemi I/S	Producer
Casco - Sika Danmark A/S	Producer
DanaLim A/S	Producer
Deco Farver ApS	Paint shop
Flügger A/S	Paint shop/producer
Harald Nyborg A/S	DIY store
Jem & Fix A/S	DIY store
Junckers Industrier A/S	Producer
LavprisVVS	Plumbing dealer
Malgodt.dk	Paint shop
Sadolin - Akzo Nobel	Producer
Saint-Gobain Weber A/S	Producer
Scandinova A/S	Gross dealer
XL-Byg	DIY store
Æ´Gulvsliver	Floor sanding

Appendix 2 Overview of products

Table 44. Overview of products

Product ID	Product name	Project	Con-sumption	Number of applica-tions	Drying time (hours)	MAL-code	Organic solvent. (weight %)	VOC con-tent	1-/2-com-ponent
1	Turpentine	GA GL GM GO B	150 mL/ treatment			3-1 (1993)	100 % [a]	85%	One-component
2	Lye	GL GO	10 m²/L	1	5	00 - 4	- [b]	- [b]	One-component
3	Basic cleaner	GL	20-40 m²/L	1		0-5 (1993)	< 5 %	- [b]	One-component
4	Benzine	GL				3-1 (1993)	100 % [a]	100 % [a]	One-component
5	Cellulose thinner	GL				5-3 (1993)	100 % [a]	100 % [a]	One-component
6	Brush cleaner	GA GL GM GO B					100 % [a]	- [b]	One-component
7	Floor paint (water-based)	GM	8 m²/L	2	4-6	00-1 (1993)	< 3%	max. 140 g/L	One-component
8	Floor paint (solvent-based)	GM	10-12 m²/L	2	4-6	2-1 (1993)	- [b]	max. 500 g/L	One-component

Product ID	Product name	Project	Con-sumption	Number of applica-tions	Drying time (hours)	MAL-code	Organic solvent. (weight %)	VOC con-tent	1-/2-com-ponent
9	Epoxy floor paint (water-based, two-component)	GM	150-200 g/m² Den-sity 1.30 kg/L	min. 2	24	00-5	- [b]	- [b]	Two-component
10	Floor paint comp A (two-component epoxy lacquer)	GM	8 m²/kg	2	10	00 - 5	- [b]	max. 5 g/L	Two-component
11	Floor lacquer (water-based)	GL	10 m²/L	1-2	4	00-1 (1993)	The product con-tains organic sol-vents	max. 140 g/L	One-component
12	Floor lacquer (sol-vent-based)	GL	10-12 m²/L	2-5	8-10	2-1 (1993)	Ca. 75 % [a]	max. 500 g/L	One-component
13	Clear lacquer (two-component epoxy lacquer)	GL	8 m²/kg	2	10	00-5	- [b]	max. 5 g/L	Two-component
14	Tree oil	GO	12 m²/L	1-flere	5	2 - 1 (1993)	41 w%	max. 394 g/L	One-component
15	Floor oil	GO	10-50 m²/L	3	16-24	0-1 (1993)	- [b]	max. 500 g/L	One-component
16	Floor wax	GO	20-30 m²/L	1	10 min.	3-1 (1993)	**80-95 % [a]**	**81-96 % [a]**	One-component
17	Paint and lacquer remover	GF		1-flere	20 min. - 4 hours	3-5 (1993)	**- [b]**	648 g/L	One-component
18	Sand filler	GA				00-1 (1993)	0	**- [b]**	One-component

Product ID	Product name	Project	Con-sumption	Number of applica-tions	Drying time (hours)	MAL-code	Organic solvent. (weight %)	VOC con-tent	1-/2-com-ponent
19	Wood filler	GA			30-60 min.	00-1 (1993)	- [b]	- [b]	One-component
20	Chemical wood (two-component)	GA			5 min.	5-6 (1993)	- [b]	187 g/L	Two-component
21	MDF filler	GA			2	00-1 (1993)	- [b]		One-component
22	Primer (water-based)	B	150-250 mL/m²	1-2	1-3	00-3	0	0	One-component
23	One-components wet room membrane	B	1.2-1.8 kg/m²	2	2-4	0-1	- [b]	0	One-component
24	Two-components wet room membrane	B	1.2 - 1.5 kg/m² pr. mm dry film thick-ness	2	1+6	00-1/00-4	- [b]	- [b]	Two-component
24a	Two-components wet room membrane	B	1.2 - 1.5 kg/m² pr. mm dry film thick-ness	2	1+6	00-4	- [b]	- [b]	
25	Wet room paint	B	6-8 m²/L	1-2	16	00-3	- [b]	35 g/L	One-component
26	Tile adhesive	B	1.2-3.1 kg/m²		24-48	00-4 (1993)	- [b]		One-component

Product ID	Product name	Project	Con-sumption	Number of applica-tions	Drying time (hours)	MAL-code	Organic solvent. (weight %)	VOC con-tent	1-/2-com-ponent
27	Grout for bath	B	ca. 2 kg/mm/m²	1	12	00-4	- [b]	0	One-component
28	Sealant	B	20-40 m²/L	2	2	00-1 (1993)	- [b]		One-component
29	Mounting glue	B	200-400 g /m²	1	> 10 min.	00-1 (1993)	- [b]	0.40%	One-component
30	PU Foam sealant	B				3-3 (1993)	- [b]		One-component
31	Silicone for building and sanitary applica-tions	B					- [b]	0	One-component
32	Plumber silicone spray	B					- [b]	- [b]	One-component
33	Cleaning agent for sealant/silicone	B		2-3	2 min.	4-1	100 % [a]	max. 60-100	One-component
34	Polyurethane lacquer (water-based)	GL	8-10 m^2/L	2	3-4 hours	1-2	< 10%	max. 100 g/L	Two-component
35	Hardener for floor lacquer	GL	80-100 m²/L	2	3-4 hours	3-3	- [b]	- [b]	
36	Hardener for epoxy floor lacquer	GM	1 kg/8 m² Density: A-comp.: 1.05 kg/L, B-comp: 1.29 kg/L	2	24	00-3	- [b]	max. 5 g/L VOC.	

Product ID	Product name	Project	Con-sumption	Number of applica-tions	Drying time (hours)	MAL-code	Organic solvent. (weight %)	VOC con-tent	1-/2-com-ponent
37	Hardener for epoxy floor lacquer	GM	150-200 g/m² Den-sity: 1.30 kg/L	min. 2	24	00-4	- [b]	- [b]	Two-component
38	Paint and lacquer remover	GL GM B		2-3	20	3-3	- [b]	- [b]	
39	Concrete filler	GA	1.85 kg mm/m²	1	24		- [b]	- [b]	
40	Floor lacquer (acid curing)	GL	10 m²/L	2	24		50	500 g/L	Two-component
41	Hardener for two-component floor lacquer	GL	10 m²/L	2	24		60	- [b]	
42	Clear lacquer (two-component epoxy lacquer)	GL	8-14 m²/L	1-2	16	00-5	- [b]	<140 g/L	Two-component
43	Floor paint (solvent-based)	GM	13 m²/L	min. 1	16	2-1 (1993)	36	371 g/L	One-component
44	Floor paint (solvent-based)	GM	8-10 m²/L	min. 1	4	2-1 (1993)	Ca. 50 % [a]	400 mg/L	One-component
45	Floor paint (water-based)	GL	10 m²/L	min. 1	4	1-1	The product con-tains organic sol-vent	140 g/L	One-component
46	Sealant	B	0.8 - 1.3 kg/m²	1	30-45 min.	00-4	- [b]	- [b]	One-component

Product ID	Product name	Project	Con-sumption	Number of applica-tions	Drying time (hours)	MAL-code	Organic solvent. (weight %)	VOC con-tent	1-/2-com-ponent
47	Filler	B	1.4 kg/m² pr. mm layer thickness	1	2	00-4	- [b]	- [b]	One-component
48	Binder to filler	B	0.08 L Plane-MixBin-der/kg PlaneMix powder	1	2	00-1	- [b]	- [b]	Two-component
49	Oil / coolant for floor abrasion		15-20 m²/L	1		1-1	- [b]	- [b]	One-component
50	Hand cleanser						Does not contain petroleum-based solvents	- [b]	One-component
51	Wet room primer (water-based)	B	2-5 m²/L	1	2	00-3	- [b]	Max. 70 g/L	One-component
52	Elastic joint filler for floors	B		1	2 mm/day	00-1	- [b]	- [b]	One-component
53	Floor paint (water-based)	B	3.5-4 m²/L	1	0-60 min.	00-1	- [b]	- [b]	One-component
54	Woven fabric glue for wet room	B	3 - 6 m²/L	1	2	00-1	- [b]	Max. g/L	One-component
55	Floor paint (water-based)	GM	3.5-4 m²/L	1	0-60 min.	00-1	- [b]	- [b]	One-component

Appendix 3 Hazardous substances in do-it-yourself products

Table 45. Hazardous substances in DIY products according to information given in product data sheets (SDS).

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
1	Turpentine	Turpentine	Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene)	64742-82-1	95-100	Flam. Liq. 3; H226, Asp. tox 1; H304, STOT RE2; H373, Aquatic Chronic 2; H411, EUH 066 EUH 066
2	Lye	Lye	Sodium hydroxide	1310-73-2	< 5	Skin Corr. 1A; H314
3	Basic cleaner	Basic cleaner	Potassium pyrophosphate	7320-34-5	5-15	Met. Corr 1; H290. Eye Irrit 2, H319.
3	Basic cleaner	Basic cleaner	Alkylalcohol, ethoxylated	68439-46-3	< 5	Acute Tox. 4; H302 Eye dam. 1; H318.
3	Basic cleaner	Basic cleaner	Sodium cumenesulphonate	28348-53-0	< 5	Eye Irrit 2, H319
3	Basic cleaner	Basic cleaner	2-(2-butoxyethoxy) ethanol	112-34-5	< 5	Eye Irrit 2, H319.

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
3	Basic cleaner	Basic cleaner	(2-hydroxyethyl) phenylether	122-99-6	< 5	Acute Tox. 4; H302 Eye dam. 2; H319.
3	Basic cleaner	Basic cleaner	2-Aminoethanol	141-43-5	< 5	Acute tox 4 ; H302, H312, H332 Skin Corr 1B ; H314, STOT SE3; H335.
3	Basic cleaner	Basic cleaner	Ammonium hydroxide	1336-21-6	< 1	Skin Corr 1B; H314, Aquatic Acute 1; H400.
3	Basic cleaner	Basic cleaner	D-Limonene	5989-27-5	< 1	Flam. Liq. 3: H226; Skin Irrit. 2: H315; Skin Sens. 1: H317; Aquatic Acute 1: H400; Aquatic Chronic 1: H410
4	Benzine	Benzine	Naphtha (petroleum), hydrodesulfurized light, dearomatized	92045-53-9	100	Flam. Liq. 2; H225 Asp. tox 1; H304 Aquatic Chronic 2; H411
5	Cellulose thinner	Cellulose thinner	Toluene	108-88-3	30-60	F; R11 Rep 3; R63 Xn; R48/20, R65 Xi; R38 R67 Flam. Liq. 2; H225 Repr. 2; H361d Asp. Tox. 1; H304 STOT RE 2; H373 Skin Irrit. 2; H315 STOT SE 3; H336

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
5	Cellulose thinner	Cellulose thinner	4-methylpentan-2-on	108-10-1	10-30	F; R11 Xn; R20 Xi; R36/37 R66 Flam. Liq. 2; H225 Acute tox. 4; H332 Eye Irrit. 2; H319 STOT SE 3; H335
5	Cellulose thinner	Cellulose thinner	Acetone	67-64-1	10-30	F; R11 Xi; R36 R66 R67 Flam. Liq. 2; H225 Eye Irrit. 2;H319 STOT SE 3;H336 EUH066
5	Cellulose thinner	Cellulose thinner	Naphtha (petroleum), hydrodesulfurized light, dearomatized	92045-53-9	5-10	Xn; R65 Asp. tox 1; H304
6	Brush cleaner	Brush cleaner	Alcohols, C9-11 ethoxylated, < 2.5 EO	68439-46-3	19,31	Xn; R22 Xi; R41 N; R50 Acute tox. 4; H302 Eye Dam. 1; H318 Aquatic Acute 1; H400
6	Brush cleaner	Brush cleaner	Amides, coco, N,N-bis(hydroxyethyl)	68603-42-9	9,95	Xi; R38, R41 Skin Irrit. 2; H315 Eye Dam. 1; H318

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
6	Brush cleaner	Brush cleaner	1-ethylpyrrolidin-2-one	2687-91-4	2.03	Xi; R36/38 Skin Irrit. 2; H315 Eye Irrit. 2; H319
6	Brush cleaner	Brush cleaner	Oleic acid, chemically clean	112-80-1	0.3	Xi; R36/38 Skin Irrit. 2; H315 Eye Irrit. 2; H319
6	Brush cleaner	Brush cleaner	Dimethyl succinate	106-65-0	-	Xi; R36 Eye Irrit. 2; H319
7	Floor paint (water-based)	Acrylic paint	2-(2-Butoxyethoxy)ethanol	112-34-5	1-5	Eye Irrit. 2; H319
8	Floor paint (solvent-based)	Urethane alkyd floor paint	Naphtha (petroleum), hydrotreated heavy	64742-48-9	10-25	R10 Xn; R65 R66
8	Floor paint (solvent-based)	Urethane alkyd floor paint	Naphtha (petroleum), hydrotreated heavy	64742-48-9	5-15	Xn; R65 R66
8	Floor paint (solvent-based)	Urethane alkyd floor paint	Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene)	64742-82-1	1-5	Xn; R65 R66
8	Floor paint (solvent-based)	Urethane alkyd floor paint	Butaneone oxime	96-29-7	< 1	Xn;R21 Carc3;R40 Xi;R41 R43
8	Floor paint (solvent-based)	Urethane alkyd floor paint	Cobalt bis(2-ethylhexaneoate)	136-52-7	< 1	Xi; R38 R43 N; R51/53
8	Floor paint (solvent-based)	Urethane alkyd floor paint	2-Ethylhexanoic acid, zirconium salt	22464-99-9	< 1	Xi; R38 N; R50/53

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
9	Epoxy floor paint (water-based, two-component)	Epoxy floor paint	4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane	25068-38-6	40-60	Skin Irrit. 2, Skin Sens. 1, Eye Irrit. 2, Aquatic Chronic 2 ; H315, H317, H319, H411
9	Epoxy floor paint (water-based, two-component)	Epoxy floor paint	2-(chloromethyl)oxirane; Formal-dehyde; Phenol	28064-14-4	10-20	Skin Irrit. 2, Skin Sens. 1, Eye Irrit. 2, Aquatic Chronic 2 ; H315, H317, H319, H411
9	Epoxy floor paint (water-based, two-component)	Epoxy floor paint	Oxiran, mono[(C12-14-alkyloxy)methyl]derivater; (C12C14) alkylglycidylether	68609-97-2	10-20	Skin Irrit. 2, Skin Sens. 1; H315, H317
9	Epoxy floor paint (water-based, two-component)	Epoxy floor paint	1,4-bis(2,3-epoxypropoxy)butane	2425-79-8	1-5	Acute Tox. 4, Skin Irrit. 2, Skin Sens. 1, Eye Irrit. 2; H312, H315, H317, H319, H332
9	Epoxy floor paint (water-based, two-component)	Epoxy floor paint	Benzyl alcohol	100-51-6	1-5	Acute Tox. 4; H302, H332
10	Floor paint comp A (two-component epoxy lacquer)	Epoxy floor paint	4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane	25068-38-6	30-60	DPD: Xi, N, R36/38 - R43 - R51/53 CLP: Skin Irrit. 2 H315, Eye Irrit. 2 H319, Skin Sens. 1 H317, Aquatic Chronic 2 H411
10	Floor paint comp A (two-component epoxy lacquer)	Epoxy floor paint	2-(chloromethyl)oxirane; Formal-dehyde; Phenol	9003-36-8	10-20	DPD: Xi, Xi, N, R36/38 - R43 - R51/53 CLP: Skin Irrit. 2 H315, Eye Irrit. 2 H319, Skin Sens. 1 H317, Aquatic Chronic 2 H411
10	Floor paint comp A (two-component epoxy lacquer)	Epoxy floor paint	Oxiran, mono[(C12-14-alkyloxy)methyl]derivater; (C12C14) alkylglycidylether	68609-97-2	5-10	DPD: Xi, Xi, R38 - R43 CLP: Skin Irrit. 2 H315, Skin Sens. 1 H317

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
10	Floor paint comp A (two-component epoxy lacquer)	Epoxy floor paint	Alcohols, C8-C22, ethoxylated	69013-19-0	< 0.5	DPD: Xn, N, R22-R38-R41-R50 CLP: Acute Tox. 4 H302, Skin Irrit. 2 H315, Eye Dam. 1 H318, Aquatic Acute 1 H400
10	Floor paint comp A (two-component epoxy lacquer)	Epoxy floor paint	1,2-ethandiol, ethylenglycol, glykol	107-21-1	~ 1	DPD: Xn, R22 CLP: Acute Tox. 4 H302
11	Floor lacquer (water-based)	Acrylic floor paint, water-based	2-(2-butoxyethoxy)ethanol	112-34-5	1-5	Eye Irrit. 2; H319
12	Floor lacquer (solvent-based)	Polyurethane rein-forced alkyd floor lacquer, oil-based	Naphtha (petroleum), hy-drotreated heavy	64742-48-9	50-75	R10 Xn; R65 R66 CLP: Flam. Liq. 3, H226; STOT SE 3, H336; Asp. Tox. 1, H304
12	Floor lacquer (solvent-based)	Polyurethane rein-forced alkyd floor lacquer, oil-based	2-Ethylhexanoic acid, zirconium salt	22464-99-9	≥0.1 - <03	Repr. Cat. 3; R63 CLP: Repr. 2, H361d (Ufødte barn)
12	Floor lacquer (solvent-based)	Polyurethane rein-forced alkyd floor lacquer, oil-based	Acetoneoxim	127-06-0	≥0.1 - <0.3	DPD: Xn; R22 CLP: Carc. 2, H351
13	Clear lacquer (two-component epoxy lacquer)	Two-component epoxy lacquer	4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane	25068-38-6	3-60	DPD: Xi, N, R36/38 - R43 - R51/53 CLP: Skin Irrit. 2 H315, Eye Irrit. 2 H319, Skin Sens. 1 H317, Aquatic Chronic 2 H411
13	Clear lacquer (two-component epoxy lacquer)	Two-component epoxy lacquer	2-(chloromethyl)oxirane; Formal-dehyde; Phenol	9003-36-8	10-20	DPD: Xi, Xi, N, R36/38 - R43 - R51/53 CLP: Skin Irrit. 2 H315, Eye Irrit. 2 H319, Skin Sens. 1 H317, Aquatic Chronic 2 H411
13	Clear lacquer (two-component epoxy lacquer)	Two-component epoxy lacquer	Oxiran, mono[(C12-14-alkyloxy)methyl]derivater; (C12C14) alkylglycidylether	68609-97-2	5-10	DPD: Xi, Xi, R38 - R43 CLP: Skin Irrit. 2 H315, Skin Sens. 1 H317

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
14	Tree oil	Non-curing oil (natural oil)	2-Methyldecane	90622-57-4	10-25	Flam. Liq. 3; H226 Asp. Tox. 1;H304 Aquatic Chronic 4;H413
14	Tree oil	Non-curing oil (natural oil)	Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclic, <2 % aromatics	-	10-25	Asp. Tox. 1; H304
14	Tree oil	Non-curing oil (natural oil)	2-Ethylhexanoic acid, zirconium salt	22464-99-9	< 0.2	Repr. 2; H361d
15	Floor oil	Hardening oil	Distillates (petroleum), hydrotreated light	64742-47-8	25-40	DPD: Xn; R65 CLP: Asp. Tox. 1 H304, EUH066
15	Floor oil	Hardening oil	Alkaner, C11-15-iso	90622-58-5	25-40	DPD: Xn; R65; R66 CLP: Asp. Tox. 1 H304, EUH066
16	Floor wax	Floor wax	Naphtha (petroleum), hydrodesulfurized heavy (<0.1% benzene)	64742-82-1	80-95	DPD: R10 Xn; R65 Xn; R48/20 N; R51/53 R66 R67 CLP: Flam. Liq. 3, STOT RE 1, STOT SE 3, Asp. Tox. 1, Aquatic Chronic 2 H226, H304, H336, H372, H411, EUH066
16	Floor wax	Floor wax	Paraffin waxes (petroleum), clay-treated	64742-43-4	1-5	-
16	Floor wax	Floor wax	Carnauba vax	8015-86-9	1-5	-

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
16	Floor wax	Floor wax	Hexane	110-54-3	< 1	DPD: F; R11 Repr. Cat. 3; R62 Xn; R65-48/20 Xi; R38 R67 N; R51-53 CLP: Flam. Liq. 2, STOT RE 2, STOT SE 3, Skin Irrit. 2, Asp. Tox. 1, Rep. 2, Aquatic Chronic 2, H225, H304, H315, H336, H361, H373, H411
17	Paint and lacquer remover	Lacquer remover	Butyl acetate	123-86-4	≥15 - <20	Flam. Liq. 3, H226 STOT SE 3, H336
17	Paint and lacquer remover	Lacquer remover	Dimethyl sulfoxide	67-68-5	≥10 - <15	-
17	Paint and lacquer remover	Lacquer remover	Cyclohexanone	108-94-1	≥3 - <7	Flam. Liq. 3, H226 Acute Tox. 4, H332
18	Sand filler	Sand filler	Contains no information-obligatory substances.			"The product should not be classified ac-cording to the Ministry of the Environment's classification and labelling rules."
19	Wood filler	Wood filler	5-Chloro-2-methyl-4-isothiazolin-3-one/ 2-Methyl-2H-isothiazol-3-one (3:1)	55965-84-9	<0.0015	Acute Tox. 2, Skin Corr. 1B, Skin Sens. 1, Aquatic Acute 1, Aquatic Chronic 1 H300, H310, H314, H317, H330, H400, H410 (M-acute = 10) (M-chronic = 10)
20	Chemical wood (two-component)	Chemical wood	Styrene	100-42-5	10-20	Flam. Liq. 3 H226 Acute Tox. 4 H332 Asp. Tox. 1 H304 Eye Irrit. 2 H319 Skin Irrit. 2 H315 STOT RE 1; Inhalering H372 Repr. 2 H361d Aquatic Chronic 3 H412 STOT SE 3 H335

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
21	MDF filler	MDF filler	Contains no information on obligatory substances.			"The product is not classified as dangerous."
22	Primer (water-based)	Primer	Aqueous resin dispersion on a polystyrene acrylate basis 1,2-benzisothiazol-3(2H)-on, 2-methyl-2H-isothiazol-3-on			"This product is not classified according to the CLP Regulation. The product is not subject to labelling according to the calculation method in the "EU General Classification Directive for Preparations" in the latest version. May cause allergic reaction."
23	One-components wet room membrane	One-components wet room membrane	Aqueous resin dispersion on a polystyrene acrylate basis 1,2-benzisothiazol-3(2H)-one, 5-chloro-2-methyl-2H-isothiazol-3-one [EC No. 247-500-7], mixture (3:1) with 2-methyl-2H-isothiazol-3-on [EC No. 220-239-6], 2-octyl-2H-isothiazol-3-one			"This product is not classified according to the CLP Regulation. The product is not subject to labelling according to the calculation method in the "EU General Classification Directive for Preparations" in the latest version. May cause allergic reaction."
24	Two-components wet room membrane	Two-components wet room membrane	Methylchloroisothiazolinone/methylisothiazolinone, benzisothiazolinone andoctylisothiazolinone.			CLP: May cause allergic reaction. (EUH208)
24a	Two-components wet room membrane	Two-components wet room membrane	Cement powder	65997-15-1	10-50	Xi;R37/38, R41 CLP*: Skin Irrit.2;H315, Eye Dam 1;H318, STOT SE 3;H335

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
25	Wet room paint	Wet room paint	3-Iodo-2-propynyl butylcarba-mate	55406-53-6	< 1	Acute Tox. 4, Skin Sens. 1, Eye Dam. 1, Acute Tox. 3, STOT RE 1, Aquatic Acute 1, Aquatic Chronic 1 H302, H317, H318, H331, H372, H400, H410 (M-acute = 10) (M-chronic = 1)
25	Wet room paint	Wet room paint	1,2-benzisothiazol-3(2H)-one (BIT)	2634-33-5	< 0.05	Acute Tox. 4, Skin Irrit. 2, Skin Sens. 1, Eye Dam. 1, Aquatic Acute 1, Aquatic Chronic 3 H302, H315, H317, H318, H400, H412 (M-acute = 1)
25	Wet room paint	Wet room paint	2-Methyl-2H-isothiazol-3-one (MIT)	2682-20-4	< 0.05	Acute Tox. 3, Acute Tox. 3, Skin Corr. 1B, Skin Sens. 1A, Eye Dam. 1, STOT SE 3, Aquatic Acute 1, Aquatic Chronic 2 H301, H311, H314, H317, H318, H335, H400, H411 (M-acute = 1)
25	Wet room paint	Wet room paint	5-Chlor-2-methyl-2H-isothiazol-3-on/2-Methyl-2H-isothiazol-3-on (3:1) (CIT/MIT)	55965-84-9	< 0.0015	Acute Tox. 3, Acute Tox. 3, Skin Corr. 1B, Skin Sens. 1, Eye Dam. 1, Acute Tox. 3, Aquatic Acute 1, Aquatic Chronic 1 H301, H311, H314, H317, H318, H331, H400, H410 (M-acute = 10) (M-chronic = 1)
26	Tile adhesive	Tile adhesive	Cement powder	65997-15-1	10-50	CLP: Eye Dam. 1;H318, Skin Irrit. 2; H315, STOT SE 3; H335 DPD: Xi;R37/38, R41
27	Grout for bathroom	Grout	Portland Cement	65997-15-1	10-25	Xi R37/38-41; Xi R43 Eye Dam. 1, H318; Skin Irrit. 2, H315; Skin Sens. 1, H317; STOT SE 3, H335

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
28	Sealant	Sealant	Ammonium hydroxide solution	1336-21-6	-	EU: C;R34 N;R50 (M=1) CLP: Skin Corr. 1B;H314 Aquatic Acute 1;H400 (M=1)
29	Mounting glue	Mounting glue	"Contains no hazardous ingredients above the limit values from Regulation (EC)"			"Classification is not required."
30	PU foam sealant	Insulating foam (PU)	Diphenylmethane diisocyanate, isomeric, homologue and mixtures	9016-87-9	30-60	Carc.Cat.3; R40, Xn; R20, R48/20; Xi; R36/37/38, R42/43 Acute Tox. 4, Skin Irrit. 2, Eye Irrit. 2, Resp. Sens. 1, Skin Sens. 1, Carc. 2, STOT SE 3, STOT RE 2; H332, H373, H315, H319, H334, H317, H351, H335 "The substance is an isocyanate The substance is carcinogenic"
30	PU foam sealant	Insulating foam (PU)	Tris(2-chloro-1-methylethyl) phosphate	13674-84-5	< 25	Xn; R22 Acute Tox. 4; H302
30	PU foam sealant	Insulating foam (PU)	Alkaner, C14-17-, chlor	85535-85-9	< 20	R64, R66, N; R50-53 Lact., Aquatic Acute 1, Aquatic Chronic 1; H362, H400, H410, EUH066
30	PU foam sealant	Insulating foam (PU)	Propane	74-98-6	< 15	Fx;R12 Flam. Gas 1; H220
30	PU foam sealant	Insulating foam (PU)	Butane	106-97-8	< 15	Fx;R12 Flam. Gas 1; H220

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
30	PU foam sealant	Insulating foam (PU)	Isobutane	75-28-5	< 15	Fx;R12 Flam. Gas 1; H220
30	PU foam sealant	Insulating foam (PU)	Dimethyl ether	115-10-6	< 10	Fx;R12 Flam. Gas 1; H220
31	Silicone for building and sanitary applications	Wet room silicone sealant	Distillates (petroleum), hydrotreated middle	64742-46-7	< 30	Xn; R65 Asp. Tox. 1; H304 "The product is a paste, therefore Asp declines Asp. Tox. 1."
31	Silicone for building and sanitary applications	Wet room silicone sealant	Distillates (petroleum), hydrotreated light	64742-47-8	< 10	Xn; R65 Asp. Tox. 1; H304 "The product is a paste, therefore Asp declines Asp. Tox. 1."
32	Plumber silicone spray	Plumber silicone	Propane	74-98-6	25-50	Flam. Gas 1 H220
32	Plumber silicone spray	Plumber silicone	Butane	106-97-8	20-45	Flam. Gas 1 H220
32	Plumber silicone spray	Plumber silicone	Isobutane	75-28-5	20-45	Flam. Gas 1 H220
32	Plumber silicone spray	Plumber silicone	Pentane	78-78-4	< 2.5	Flam. Liq. 2, STOT SE 3, Asp. Tox. 1, Aquatic Chronic 2 H225, H304, H336, H411, EUH066
33	Cleaning agent for sealant/silicone	Cleaning agent for sealant/silicone	Acetone	67-64-1	40-45	F; R11 Xi; R36 R67
33	Cleaning agent for sealant/silicone	Cleaning agent for sealant/silicone		67-63-0	20-40	F; R11 Xi; R36 R67

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
33	Cleaning agent for sealant/silicone	Cleaning agent for sealant/silicone		74-98-6	< 40	F+; R12
33	Cleaning agent for sealant/silicone	Cleaning agent for sealant/silicone	Butane	106-97-8	< 40	F+; R12
34	Polyurethane lacquer (water-based)	Polyurethane lacquer, water-based	Dipropyleneglycol monomethyl ether	34590-94-8	2.5 - 10	"Not classified. Substance with a workplace exposure limit"
34	Polyurethane lacquer (water-based)	Polyurethane lacquer, water-based	Poly(oxy-1,2-ethanediyl), .alpha.-[3,5-dimethyl-1-(2-methylpropyl)hexyl]-.omega.-hydroxy-	60828-78-6	1 - 2.5	Xi; R36 N; R51/53
35	Hardener for floor lacquer	Hardener for floor lacquer	Hydrophilic, aliphatic polyisocyanate	160994-68-3	35 - 50	Aquatic Chronic 3, H412
35	Hardener for floor lacquer	Hardener for floor lacquer	1,3-Dioxolan-2-one, 4-methyl-	108-32-7	35 - 50	"Substance classified with a health or environmental hazard"
35	Hardener for floor lacquer	Hardener for floor lacquer	Hexane, 1,6-diisocyanato-, homopolymer	28182-81-2	10-20	"Substance classified with a health or environmental hazard Substance with a workplace exposure limit"
36	Hardener for epoxy floor lacquer	Hardener for floor lacquer	Polyamine epoxy adduct	238080-05-2	10-20	Acute Tox. 4 H302 Eye Dam. 1 H318
37	Hardener for epoxy floor lacquer	Hardener for floor lacquer	Oxirane, reaction products with ammonia, N-benzyl derivative	1191251-49-6	1-3	Skin Corr. 1B, Aquatic Chronic 3; H314, H412
38	Paint and lacquer remover	Lacquer remover	1,3-dioxolane	646-06-0	50 - 100	F - Highly flammable; R11
38	Paint and lacquer remover	Lacquer remover	Methanol	67-56-1	3 - 10	T - Toxic; R23/24/25, R39/23/24/25 F - Highly flammable; ; R11

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
38	Paint and lacquer remover	Lacquer remover	Naphtha (petroleum), hydrotreated heavy	64742-48-9	0 - 10	R10 Xn - Harmful: may cause lung damage if swallowed; R65, R66
38	Paint and lacquer remover	Lacquer remover	Solvent naphtha (petroleum), light arom.	64742-95-6	0 - 2.5	N - Toxic to aquatic organisms; R51/53 Xn - Harmful: may cause lung damage if swallowed; R65 Xi - Irritating to respiratory system; R37 R10, R66, R67
39	Concrete filler	Concrete filler	Portland Cement	65997-15-1	2-5%	Eye Dam. 1, H318; Skin Irrit. 2, H315; Skin Sens. 1, H317; STOT SE 3, H335
40	Floor lacquer (acid curing)	Floor lacquer	Iso-butylated urea formaldehyde resin	68002-18-6	15-25	Aquatic Chronic 4 H413
40	Floor lacquer (acid curing)	Floor lacquer	Ethanol	64-17-5	10-15	Flam. Liq. 2 H225
40	Floor lacquer (acid curing)	Floor lacquer	n-Butyl acetate	123-86-4	10-15	Flam. Liq. 3, STOT SE 3 H226, H336, EUH066
40	Floor lacquer (acid curing)	Floor lacquer	Propan-2-ol	67-63-0	5-10	Flam. Liq. 2, Eye Irrit. 2, STOT SE 3 H225, H319, H336
40	Floor lacquer (acid curing)	Floor lacquer	1-Methoxypropan-2-ol	107-98-2	5-10	Flam. Liq. 3, STOT SE 3 H226, H336
40	Floor lacquer (acid curing)	Floor lacquer	2-Methylpropan-1-ol	78-83-1	5-10	Skin Irrit. 2, Eye Dam. 1, STOT SE 3 H226, H315, H318, H335, H336
40	Floor lacquer (acid curing)	Floor lacquer	Cyclohexanone	108-94-1	1-3	Acute tox. 4 H226, H332

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
40	Floor lacquer (acid curing)	Floor lacquer	Xylene	1330-20-7	<1	Flam. Liq. 3, Acute Tox. 4, Skin Irrit. 2 H226, H312, H315, H332
40	Floor lacquer (acid curing)	Floor lacquer	Formaldehyde … %	50-00-0	<1	Acute Tox. 3, STOT SE 3, Skin corr. 1B, Skin Sens. 1, Muta. 2, Carc. 1B H301, H311, H314, H317, H331, H335, H341, H350, H351
41	Hardener for two-component floor lacquer	Floor lacquer	Toluene-4-sulphonic acid	104-15-4, 6192-52-5	25-50	36/37/38
41	Hardener for two-component floor lacquer	Floor lacquer	Propan-2-ol	67-63-0	25-50	Flam. Liq. 2, Eye Irrit. 2, STOT SE 3 H225, H319, H336
41	Hardener for two-component floor lacquer	Floor lacquer	Ethanol	64-17-5	25-50	Flam. Liq. 2 H225
42	Clear lacquer (two-component epoxy lacquer)	Epoxy lacquer	1-methoxypropan-2-ol	107-98-2	≥5 - <10	Flam. Liq. 3, H226 STOT SE 3, H336
42	Clear lacquer (two-component epoxy lacquer)	Floor lacquer	4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane	25068-38-6	≥5 - <10	Skin Irrit. 2, H315 Eye Irrit. 2, H319 Skin Sens. 1, H317 Aquatic Chronic 2, H411
42	Clear lacquer (two-component epoxy lacquer)	Floor lacquer	Benzyl alcohol	100-51-6	<5	Acute Tox. 4, H302 Acute Tox. 4, H332 Eye Irrit. 2, H319
42	Clear lacquer (two-component epoxy lacquer)	Floor lacquer	Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol	500-006-8	<5	Skin Irrit. 2, H315 Eye Irrit. 2, H319 Skin Sens. 1, H317 Aquatic Chronic 2, H411

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
43	Floor paint (solvent-based)	Alkyd floor paint	Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, < 2% aromatics	EC-No: 918-481-9	25 - 50	Flam. Liq. 3; H226 Asp. Tox. 1; H304 STOT SE 3; H336
43	Floor paint (solvent-based)	Alkyd floor paint	Calcium bis(2-ethylhexanoate)	136-51-6	<0.7	Eye Dam. 1; H318 Repr. 2;H361d
43	Floor paint (solvent-based)	Alkyd floor paint	2-ethylhexanoic acid, zirconium salt	22464-99-9	<0.5	Repr. 2; H361d
43	Floor paint (solvent-based)	Alkyd floor paint	Cobalt bis(2-ethylHexaneoate)	136-52-7	0<0.20	Skin Sens. 1; H317 Eye Irrit. 2; H319 Repr. 2;H361f Aquatic Acute 1;H400 Aquatic Chronic 3;H412
43	Floor paint (solvent-based)	Alkyd floor paint	Butaneone oxime	96-29-7	<0.2	Acute Tox. 4; H312 Skin Sens. 1; H317 Eye Dam. 1; H318 Carc. 2;H351
44	Floor paint (solvent-based)	Urethane alkyd floor paint	Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, < 2% aromatics	EC-No: 919-857-5	15-25	Flam. Liq. 3, Asp. Tox. 1, STOT SE 3 H226, H304, H336, EUH066 Organic solvent.
44	Floor paint (solvent-based)	Urethane alkyd floor paint	Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, < 2% aromatics	EC-No: 918-481-9	5-15	Asp. Tox. 1 H304, EUH066 Organic solvent.
44	Floor paint (solvent-based)	Urethane alkyd floor paint	Hydrocarbons, C9-C13, n-alkanes, isoalkanes, cyclics, aromatics	EC-No: 919-164-8	1-5	STOT RE 1, Asp. Tox. 1, Aquatic Chronic 3 H304, H372, H412, EUH066 Organic solvent..

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
44	Floor paint (solvent-based)	Urethane alkyd floor paint	Fatty acids, C14-18 and C16-18-unsatd., maleated, reaction products with oleylamine	85711-47-3	<1	Skin Sens. 1, Aquatic Chronic 3 H317, H412
44	Floor paint (solvent-based)	Urethane alkyd floor paint	Butaneone oxime	96-29-7	<1	Acute Tox. 4, Skin Sens. 1, Eye Dam. 1, Carc. 2 H312, H317, H318, H351 Organic solvent. Carcinogenic
44	Floor paint (solvent-based)	Urethane alkyd floor paint	Cobalt bis(2-ethylhexaneoate)	136-52-7	<1	Skin Sens. 1A, Eye Irrit. 2, Repr. 2, Aquatic Acute 1, Aquatic Chronic 3 H317, H319, H361f, H400, H412 (M-acute = 1) Carcinogenic
44	Floor paint (solvent-based)	Urethane alkyd floor paint	2-ethylhexanoic acid, zirconium salt	22464-99-9	<1	Repr. 2 H361d
45	Floor paint (water-based)	Floor lacquer	2-(2-butoxyethoxy)ethanol	203-961-6 (EINECS)	1-5	Xi, R36
45	Floor paint (water-based)	Floor lacquer	1-ethylpyrrolidin-2-on	2687-91-4	1-5	Xi, R41
46	Sealant	Sealant	Cement powder	65997-15-1	10-50	Xi;R37/38 R41 CLP: Skin Irrit. 2;H315 Eye Dam 1;H318 STOT SE 3;H335

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
47	Filler	Filler	Cement powder	65997-15-1	2-10	Xi;R37/38 R41 CLP: Skin Irrit. 2;H315 Eye Dam 1;H318 STOT SE 3;H335
48	Binder to filler	Binder to filler	2-Methylpentane-2,4-diol	107-41-5	<3%	Xi;R36/38 CLP*: Skin Irrit. 2; H315 Eye Irrit. 2; H319
49	Oil / coolant for floor abrasion	Oil / coolant for floor abrasion	Paraffins (petroleum), normal C5-20	64771-72-8	60-100	Xn; R65, R66 Asp. tox 1; H304 EUH 066
50	Hand cleanser	Hand cleanser	Limonene, D-	5989-27-5	<10	
51	Wet room primer (water-based)	Wet room primer	1,2-benzisothiazol-3(2H)-one and 5-chloro-2-methyl-2H-isothiazol-3-one (EC No. 247-500-7) mixture (3:1) with 2-methyl-2H-isothiazol-3-one (EC No. 220-239-6)	EF nr. 247-500-7		May cause an allergic reaction
51a	Wet room primer (water-based)	Wet room primer	2-methyl-2H-isothiazol-3-one	EF nr. 220-239-6		
52	Elastic joint filler for floors	Elastic joint filler for floors	Calcium carbonate	471-34-1	25-50	Not classified
52	Elastic joint filler for floors	Elastic joint filler for floors	SMP-polymer		10-25	Not classified

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
52	Elastic joint filler for floors	Elastic joint filler for floors	Limestone	1317-65-3	10-25	Not classified
52	Elastic joint filler for floors	Elastic joint filler for floors	Titanium oxide	13463-67-7	1-5	Not classified
52	Elastic joint filler for floors	Elastic joint filler for floors	Trimethoxyvinylsilane	2768-02-7	1-2.5	Flam. Liq. 2, H225 Eye Irrit. 2, H319
53	Floor paint (water-based)	Wet and joint adhesive	Water		20-30	Not classified
53	Floor paint (water-based)	Wet and joint adhesive	Limestone		25-50	Not classified
53	Floor paint (water-based)	Wet and joint adhesive	Turpentine free resin, maleated		10-25	Not classified
53	Floor paint (water-based)	Wet and joint adhesive	Acrylate copolymer		5-10	Not classified
53	Floor paint (water-based)	Wet and joint adhesive	1,2-benzisothiazol-3(2H)-on	2634-33-5	<0.006	H302, H315, H318, H317, H400, H410
53	Floor paint (water-based)	Wet and joint adhesive	1,2-benzisothiazol-3(2H)-one and 5-chloro-2-methyl-2H-isothiazol-3-one (EC No. 247-500-7) mixture (3:1) with 2-methyl-2H-isothiazol-3-one (EC No 220-239-6)	55965-84-9	<0.0005	H301, H311, H331, H314, H318, H317, H400, H410
54	Woven fabric glue for wet room	Woven fabric glue & -filler to wet room	Oxydipropyl dibenzoate	27138-31-4	<1	DSD: N;R51/53 CLP: Aquatic Chronic 2;H411

Product ID	Product name	Product type	Components	CAS no	Concentration (weight %)	Classification according to SDS (literally translation)
54	Woven fabric glue for wet room	Woven fabric glue & -filler to wet room	5-Chloro-2-methyl-4-isothiazolin-3-one/ 2-Methyl-2H-isothiazol-3-one (3:1)	55965-84-9	<0.0015	DSD: C; R34 Xi; R43 R36/38 T; R23/24/25 N; R50/53 CLP: Acute Tox. 3, Skin. Corr. 1B, Skin Sens. 1, Aquatic Acute 1, Aquatic Chronic 1 May cause an allergic reaction H301, H311, H314, H317, H331, H400, H410 (M-acute = 10)
55	Floor paint (water-based)	Acrylic paint	(2-methoxymethylethoxy)propanol	34590-94-8	≥0.1 - <25 v	Not classified

Appendix 4 MAL codes and personal protection equipment

The following MAL codes and the stated protective measures are given in Appendix 2 to the Danish Working Environment Authority's Order No. 302 of 13 May 1993 on work with code-numbered products.

The code number of a product represents the minimum safety precautions to be taken in certain work situations. When determining the code number all components of the product must be taken into consideration. The higher the numbers the higher is the need for safety precautions. The MAL-code was introduced in consideration of the working environment of painters, but can be a good guideline for DYI workers as well.

The code number consists of two numbers joined with a hyphen.

The number in front of the hyphen (00-, 0-, 1-, 2-, 3-, 4-, 5-) take into account the health risks from inhalations of vapours and therefore represents the safety precautions which as a minimum have to be taken against the inhalation of vapours from the volatile substances of the products.

The number after the hyphen (-1, -2, -3, -4, -5, -6) take into account the safety precautions to be taken if there is a risk that skin, and eyes will come into direct contact with the product also due to a spray mist or if there is a risk of inhalation of drops or dust from a spray mist, or dusts from the product.

The safety precautions depends on, among other things, whether the work is being conducted indoor or outdoor and how big a surface is being treated"

For further details about the codes and use of funds, see the Danish Working Environment Authority's Executive Order [in Danish only].

Table 46. Personal protective equipment and special clothing .**[In Danish]**

Kodenr.	**Udendørs**		**Indendørs**			
			(*) Lille flade		**Stor flade**	
Tallet før/ Efter stregen	Spartel, pensel, rulle o. lign.	Sprøjte	Spartel, pensel, Rulle o. lign.	Sprøjte	Spartel, pensel, rulle o. lign.	Sprøjte
00-	Ingen særlige	Helmaske med kombifilter[r)]	Ingen / Særlige	Helmaske med kombifilter[r)]	Ingen særlige[q)]	Helmaske med kombifilter[r)]
0-	Ingen særlige	Helmaske med kombifilter[r)]	Ingen / Særlige	Helmaske med kombifilter[r)]	Ingen særlige[q)]	Helmaske med kombifilter[r)]

Kodenr.	Udendørs		Indendørs			
			(*) Lille flade		Stor flade	
1-	Ingen særlige[o)]	Luftforsynet halvmaske[g), l)],øjenværn	Ingen særlige[n)]	Luftforsynet halvmaske[g), l)],øjenværn	Gasfiltermaske[r)]	Luftforsynet halvmaske[g), l)] øjenværn
2-	Gasfilter-maske[a), p), r)]	Luftforsynet hel-maske[g)]	Ingen særlige[n)]	Luftforsynet helmaske[g)]	Luftforsynet halvmaske	Luftforsynet helmaske[g)]
3-	Gasfilter-maske[a), r)]	Luftforsynet hel-maske[g)]	Gasfiltermaske[r)]	Luftforsynet helmaske[g)]	Luftforsynet helmaske	Luftforsynet helmaske
4-	Luftforsynet helmaske[f)]	Luftforsynet hel-maske[g)]	Gasfiltermaske[r)]	Luftforsynet helmaske[g)]	Luftforsynet helmaske	Luftforsynet helmaske
5-	Luftforsynet helmaske	Luftforsynet hel-maske	Luftforsynet hel-maske	Luftforsynet helmaske	Luftforsynet helmaske	Luftforsynet helmaske
-1	Handsker[h), i), k)]	Helmaske med kom-bifilter, overtræks-dragt, handsker, hætte	Handsker[h), i), k)]	Helmaske med kombifil-ter, over-træksdragt, handsker, hætte	Handsker[h), i), k)]	Helmaske med kombifil-ter, over-træksdragt, handsker, hætte
-2	Handsker[h), i), k)]	Luftforsynet halvma-ske[e), l)],øjenværn, overtræksdragt, handsker, hætte	Handsker[h), i), k)]	Luftforsynet halvma-ske[e), l)],øjenvær n, overtræks-dragt, hand-sker, hætte	Handsker[h), i), k)]	Luftforsynet halvma-ske[e), l)],øjenvæ rn, over-træksdragt, handsker, hætte
-3	Handsker[i), k), t)]	Luftforsynet helm-aske, overtræksdragt, hætte, handsker	Handsker[i), k), t)]	Luftforsynet helmaske, overtræks-dragt, hætte, handsker	Handsker[i), k)]	Luftforsynet helmaske, overtræks-dragt, hætte, handsker
-4	Handsker, an-sigtsskærm, hætte, beskyttel-sesdragt[s), u)]	Luftforsynet helm-aske, hætte, beskyt-telsesdragt, handsker	Handsker, ansigts-skærm, hætte, beskyttelses-dragt[s), u)]	Luftforsynet helmaske, hætte, beskyt-telsesdragt, handsker	Handsker, ansigts-skærm, hætte, be-skyttelsesdragt[s), u)]	Luftforsynet helmaske, hætte, be-skyttelses-dragt, hand-sker
-5	Handsker, an-sigtsskærm, hætte, beskyttel-sesdragt[s), u)]	Luftforsynet hel-maske, handsker, hætte, beskyttelses-dragt	Handsker, ansigts-skærm, hætte, beskyttelses-dragt[s), u)]	Luftforsynet hel-maske, handsker, hætte, beskyt-telsesdragt	Handsker, ansigts-skærm, hætte, be-skyttelsesdragt[s), u)]	Luftforsynet hel-maske, handsker, hætte, be-skyttelses-dragt

Kodenr.	Udendørs		Indendørs			
			(*) Lille flade		Stor flade	
-6	Handsker, ansigts-skærm, hætte, beskyttel-sesdragt[s), u)]	Luftforsynet hel-maske, handsker, hætte, beskyttelses-dragt	Handsker, ansigts-skærm, hætte, beskyttelses-dragt[s), u)]	Luftforsynet hel-maske, handsker, hætte, beskyt-telsesdragt	Handsker, ansigts-skærm, hætte, be-skyttelsesdragt[s), u)]	Luftforsynet hel-maske, handsker, hætte, be-skyttelses-dragt

* Små flader er overflader, der hver for sig ikke er større end 4 m², og som tilsammen højst udgør 1/10 af den samlede overflade i et rum.

Table 47. Personlige værnemidler og særligt arbejdstøj; Arbejde med produkter i forbindelse med fugning.

Kodenr. Tallet før/efter bindestregen	Lille flade	Stor flade *
00-	Ingen særlige	Ingen særlige[q)]
0-	Ingen særlige	Ingen særlige[q)]
1-	Ingen særlige[v)]	Gasfiltermaske[r)]
2-	Ingen særlige[v)]	Luftforsynet halvmaske
3-	Gasfiltermaske[r)]	Luftforsynet helmaske
4-	Gasfiltermaske[r)]	Luftforsynet helmaske
5-	Luftforsynet helmaske[y)]	Luftforsynet helmaske
-1	Handsker[h), k)]	Handsker[h), k)]
-2	Handsker[h), k)]	Handsker[h), k)]
-3	Handsker[k), t)]	Handsker[k)]
-4	Handsker, beskyttelses-dragt[u)]	Handsker, beskyttelses-dragt[u)]
-5	Handsker, beskyttelses-dragt[u)]	Handsker, beskyttelses-dragt[u)]
-6	Handsker, beskyttelses-dragt[u)]	Handsker, beskyttelses-dragt[u]

* Store flader er udfugning af fx klinker på gulve, lofter eller vægge og tagunderstrygning, hvor arealet, der udfuges på, er over 4 m^2.

Noter til tabeller:

a) På små flader, fx vindueskarme og -rammer, kan der arbejdes uden åndedrætsværn.

b) Ved kortvarigt arbejde med spartelmasse, fx pletspartling i begrænset omfang (maksimalt 1 time pr. dag), kan der arbejdes uden åndedrætsværn.

c) Ved pletning og efterreparation af mindre flader, hvor det samlede forbrug er højst 1 liter produkt pr. dag, kan der uden for nicher og lignende arbejdes uden åndedrætsværn.

d) Ved arbejde på et emne uden sammenhængende store flader, fx en gitterkonstruktion, og ved god naturlig ventilation, kan der arbejdes uden åndedrætsværn.

e) Ved kortvarigt arbejde, fx pletning og efterreparation i begrænset omfang (maksimalt 1 time pr. dag), kan der anvendes kombinationsfiltermaske. Dog skal der anvendes luftforsynet åndedrætsværn ved arbejde medprodukter, der indeholder lavtkogende væsker.

f) Ved kortvarigt arbejde, fx pletning og efterreparation i begrænset omfang (maksimalt 1 time pr. dag), kan der anvendes gasfiltermaske. Dog skal der anvendes luftforsynet åndedrætsværn ved arbejde med produkter, der indeholder lavtkogende væsker.

g) Ved kortvarigt arbejde, fx pletning og efterreparation i begrænset omfang (maksimalt 1 time pr. dag), kan der anvendes kombinationsfiltermaske. Hvis kombinationsfiltermaske erstatter helmaske, skal der også anvendes øjenværn. Dog skal der anvendes luftforsynet åndedrætsværn ved arbejde medprodukter, der indeholder lavtkogende væsker.

h) Hvis hænderne ikke tilsmudses af produktet, kan der arbejdes uden handsker.

i) Ved stænkende arbejde skal anvendes ansigtsskærm samt enten hætte, hjelm eller kasket med stor skygge. Eventuelt anvist øjenværn falder bort.

k) Overtræksdragt skal anvendes, hvor der sker tilsmudsning i en sådan grad, at almindeligt arbejdstøj ikke beskytter mod hudkontakt med produktet.

l) Hvis halvmaske og andre krævede værnemidler ikke let lader sig anvende samtidigt, skal der anvendes luftforsynet helmaske i stedet for halvmaske.

m) I nicher og lignende skal der anvendes samme personlige værnemidler som ved "indvendigt i tanke, siloer og lignende".

n) I nicher og lignende skal anvendes samme personlige værnemidler som ved "indendørs stor flade". En niche er fx inden i et skab.

o) I stillestående luft skal der anvendes samme åndedrætsværn som ved udendørsarbejde med produkter kodet 2-.

p) Ved effektiv naturlig ventilation kan der arbejdes uden åndedrætsværn, hvis den forurenede luft ved effektiv naturlig ventilation blæses bort fra inhalationszonen.

q) Gasfiltermaske eller hensigtsmæssig ventilation skal anvendes, når produktet påføres i et dårligt ventileret rum. Dog skal et eventuelt åndedrætsværn være luftforsynet, når der arbejdes med produkter, der indeholder lavtkogende væsker.

r) Luftforsynet halvmaske skal anvendes, hvis der arbejdes med produkter, som indeholder lavtkogende væsker.

s) Ved arbejde med limpistol eller limtube kan der arbejde uden ansigtsskærm og hætte.

t) Ved arbejde med fugepistol, limpistol eller limtube samt glitning af fuger med glittepind kan der arbejdes uden handsker, hvis hænderne ikke tilsmudses af produktet. Handsker skal anvendes ved skift af fugepatron, fugepose eller limpatron.

u) Ved arbejde med fugepistol, limpistol eller limtube, kan der arbejdes uden beskyttelses-dragt, hvis tøjet ikke tilsmudses af produktet.

v) I stillestående luft samt i nicher og lignende skal der anvendes gasfiltermaske. Dog skal der anvendes luftforsynet åndedrætsværn ved arbejde med produkter, der indeholder lavtkogende væsker.

y) Ved kortvarig prikning (maksimalt 1/2 time pr. dag) kan der anvendes gasfiltermaske. Dog skal der anvendes luftforsynet åndedrætsværn ved arbejde med produkter, der indeholder lavtkogende væsker.

Appendix 5 Volatile substances from climate chamber emission tests

In the following tables 5.1 – 5.16, the volatile compounds analysed and identified in the emissions from the 16 different product samples were reported.

Substances from the initial gross list are marked in grey. Other substances found with harmonised classification meeting the selection criteria as indicated in Annex 7 are marked in green.

Table 5.1 Emissions from product sample 3

Name	CAS-No.	5 hours ($\mu g/m^3$)	3 days ($\mu g/m^3$)	28 days ($\mu g/m^3$)
Ethanol	000064-17-5			7
Hexane	000110-54-3	17		
2-Butanone	000078-93-3	8		
1-Butanol	000071-36-3	5		
Furfural	000098-01-1	41	5	
Nonane	000111-84-2	5		
Butyl cellosolve	000111-76-2	39		
Benzaldehyde	000100-52-7	62	5	
Phenol	000108-95-2	41	9	
2-ethyltoluene	000611-14-3	5		
n-Decane	000124-18-5	6		
Limonene	005989-27-5	6		
Benzyl alcohol	000100-51-6	96		
Ethanone, 1-phenyl-	000098-86-2	32		
Undecane	001120-21-4	15		
Nonanal	000124-19-6	29		
Benzeneethanol #	000060-12-8	37		
Diethylene glycol monobutyl ether	000112-34-5	7500	480	
Decanal	000112-31-2	34		
n-Tridecane	000629-50-5	5		
n-Tetradecane	000629-59-4	10		
n-Pentadecane	000629-62-9	15		
Hexadecane	000544-76-3	7		
Sum of unidentified VVOC	Rt frem til C6	45	5	
Sum of unidentified VOC	Rt C6 til C16	6300	120	0

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Sum of unidentified SVOC	Rt efter C16	47	11	0
Sum of all measured VVOC*	Rt frem til C6	45	5	7
Sum of all measured VOC*	Rt C6 til C16	14000	620	2
Sum of all measured SVOC*	Rt efter C16	55	11	0

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

Table 5.2 Emission from sample 7 (Floor paint (water based))

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Acetone	000067-64-1	24		
Hexane	000110-54-3	7	6	
2-Butanone	000078-93-3	18	5	15
Acetic acid	000064-19-7	32		
1-Butanol	000071-36-3	44		
1-Methoxy-2-propanol	000107-98-2	9		
Propanoic acid	000079-09-4	61		
1,2-Propandiol	000057-55-6	140		
Propanoic acid, 2-methyl-	000079-31-2	760		
Hexamethylcyclotrisiloxane #	000541-05-9	50	24	
Furfural	000098-01-1	19	21	2
Ethylbenzene	000100-41-4	6		
m-xylene	000108-38-3	2		
Dibutyl ether #	000142-96-1	43		
Nonane	000111-84-2	11		
Cyclohexanone	000108-94-1	5		
Butyl cellosolve	000111-76-2	93	22	
Benzaldehyde	000100-52-7	13	6	
Octamethylcyclotetrasiloxane	000556-67-2	10	3	
Phenol	000108-95-2	32	26	
n-Decane	000124-18-5	31		
Carbitol	000111-90-0	44		
Dipropylene glycol methyl ether	034590-94-8	70		
Ethanone, 1-phenyl-	000098-86-2	7		
Undecane	001120-21-4	19	6	
Nonanal	000124-19-6	19	13	
Decamethylcyclopentasiloxane #	000541-02-6	14		
1-Nonanol	000143-08-8	22	47	
Decanal	000112-31-2	14	15	
Diethylene glycol monobutyl ether	000112-34-5	25000	6500	30
Dodecamethylcyclosiloxane #	000540-97-6	10		
Texanol A [(1-hydroxy-2,4,4-trimethylpentan-3-yl) 2-methylpropanoate]	074367-33-2	2400	780	54
Texanol B [3-Hydroxy-2,2,4-trimethylpentyl ester of isobutanoic acid]	074367-34-3	1800	840	80

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
n-Pentadecane	000629-62-9	9		
2, 2, 4-Trimethyl-1, 3-pentanediol	006846-50-0	46		
1-Hexadecanol	036653-82-4	6		
Sum of unidentified VVOC	Rt frem til C6	5	7	
Sum of unidentified VOC	Rt C6 til C16	15000	1300	
Sum of unidentified SVOC	Rt efter C16		12	
Sum of all measured VVOC*	Rt frem til C6	29	7	
Sum of all measured VOC*	Rt C6 til C16	45000	9700	180
Sum of all measured SVOC*	Rt efter C16	52	12	

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

Table 5.3 Emissions from sample 8 (Floor paint (solvent based))

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Formaldehyde	000050-00-0	6.7	13	3.2
Acetaldehyde	000075-07-0	4.1	63	3.1
Propanal	000123-38-6	16	66	1.6
Butanal	000123-72-8	-	19	1.4
Crotonaldehyde	000123-73-9	-	17	0.9
Isocyanates (4,4´-MDI)	000101-68-8	< 20	< 20	< 20
Acetone	000067-64-1	320	18	
Hexane	000110-54-3	17		
2-Butanone	000078-93-3	420		
1-Butanol	000071-36-3	26	5	
1-Methoxy-2-propanol	000107-98-2	76		
Pentanal	000110-62-3	140	160	7
Propanoic acid	000079-09-4	380	92	
1,2-Propandiol	000057-55-6	1500	51	
Amyl Alcohol	000071-41-0	26	41	
2-Butanone Oxime	000096-29-7	1500		
Butanoic acid	000107-92-6		26	
Octane	000111-65-9		6	
Hexanal	000066-25-1	1300	1200	55
Furfural	000098-01-1		5	2
Ethylbenzene	000100-41-4	81		
m,p-Xylene	179601-23-1	430		
o-Xylene	000095-47-6	210		
Nonane	000111-84-2	2300		
Pentanoic acid	000109-52-4		230	7
alpha-Pinene	007785-26-4	5		
Benzaldehyde	000100-52-7		8	
Hexanoic acid	000142-62-1			96
1-Nonadecene	018435-45-5		6	
Hexadecane	000544-76-3		110	
Heptadecane	000629-78-7		40	
n-Octadecan	000543-45-3		5	

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Sum of other aliphatic hydrocarbons VVOC	Rt frem til C6			
Sum of other aliphatic hydrocarbons VOC	Rt C6 til C16	3300	45	
Sum of other aliphatic hydrocarbons SVOC	Rt efter C16		34	
Sum of unidentified VVOC	Rt frem til C6	140	21	
Sum of unidentified VOC	Rt C6 til C16	57000	260	4
Sum of unidentified SVOC	Rt efter C16	240	260	
Sum of all measured VVOC*	Rt frem til C6	460	39	
Sum of all measured VOC*	Rt C6 til C16	510000	4500	200
Sum of all measured SVOC*	Rt efter C16	240	340	
Sum of C10 - C15 hydrocarbons $ #		440000	2100	27

* Calibrated compounds + Toluene equivalents

Toluene equivalents

$ Due to poor chromatographic resolution of individual components, the sum of hydrocarbons was determined by the area of the total ion chromatogram (TIC) quantified as toluene equivalents in the retention time range of the indicated hydrocarbons

Table 5.4 Emission from sample 9 (Epoxy floor paint)

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Formaldehyde	000050-00-0	-	1.7	1.9
Acetaldehyde	000075-07-0	24	1.9	17
Propanal	000123-38-6	8.4	-	-
Acetone	000067-64-1	42		
Hexane	000110-54-3	9		
2-Butanone	000078-93-3	8		
1-Methoxy-2-propanol	000107-98-2	200		
1, 4-Dioxane #	000123-91-1	21		
2-pentanone-4-methyl	000108-10-1	10		
Toluene	000108-88-3	12		
1,2-Propandiol	000057-55-6	18000	5100	110
Octane	000111-65-9	260		
m,p-Xylene	179601-23-1	560		
o-Xylene	000095-47-6	170		
Nonane	000111-84-2	1100		
Benzaldehyde	000100-52-7			13
3-ethyltoluene	000620-14-4	320		
2-ethyltoluene	000611-14-3	260		
4-ethyltoluene	000622-96-8	200		
Benzene, 1,2,3-trimethyl-	000526-73-8	330		
1,2,4-trimethyl-benzene	000095-63-6	670		
Dipropylene glycol methyl ether	034590-94-8	12000	380	10

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Benzene, 1,3,5-trimethyl-	000108-67-8	410		
p-Cymene	000099-87-6	41		
Benzyl alcohol	000100-51-6	4500	1800	64
Ethanone, 1-phenyl-	000098-86-2	17	9	
Undecane	001120-21-4	18		
Nonanal	000124-19-6	20		
Benzene, 1,2-dichloro-3-methyl- #	032768-54-0	26		
n-Dodecane	000112-40-3	16		
Decanal	000112-31-2	16		
n-Tridecane	000629-50-5	250		
n-Tetradecane	000629-59-4	420		
n-Pentadecane	000629-62-9	110		
Hexadecane	000544-76-3	20		
Oxiran, mono 1 (C12-C14 al-kyloxy)methylderivater	068609-97-2	150	130	38
n-Octadecan	000543-45-3	79		
Sum of other aliphatic hydrocarbons VVOC	Rt frem til C6			
Sum of other aliphatic hydrocarbons VOC	Rt C6 til C16	3300	81	
Sum of other aliphatic hydrocarbons SVOC	Rt efter C16			
Sum of other aromatic hydrocarbons VOC	Rt C6 til C16	2600	34	
Sum of other aromatic hydrocarbons SVOC	Rt efter C16			
Sum of unidentified VVOC	Rt frem til C6	97	110	5
Sum of unidentified VOC	Rt C6 til C16	8600	370	160
Sum of unidentified SVOC	Rt efter C16	24	11	30
Sum of all measured VVOC*	Rt frem til C6	140	110	5
Sum of all measured VOC*	Rt C6 til C16	55000	7700	360
Sum of all measured SVOC*	Rt efter C16	250	140	68
Sum of C7-C13 hydrocarbons # $	Rt C7 til C13	4180		

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

Table 5.5 Emission from sample 10 (Floor paint comp A (two-component epoxy lacquer))

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Formaldehyde	000050-00-0	9.8	13	3.4
Acetaldehyde	000075-07-0	3.6	0.9	18
Propanal	000123-38-6	20	-	-
1-Butanol	000071-36-3	35		
1-Methoxy-2-propanol	000107-98-2	140		
Triethylamine #	000121-44-8	120		
1,2-Propandiol	000057-55-6	1100	120	5

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Furfural	000098-01-1	10	6	2
Ethylbenzene	000100-41-4	51		
m,p-Xylene	179601-23-1	180		
o-Xylene	000095-47-6	93		
Butyl cellosolve	000111-76-2	6100	12	
Benzaldehyde	000100-52-7	11	10	
Phenol	000108-95-2	19	6	
Carbitol	000111-90-0	470		
Dipropylene glycol methyl ether	034590-94-8	3500	28	
Benzyl alcohol	000100-51-6	300	19	
Undecane	001120-21-4	4		
Nonanal	000124-19-6	7		
Benzofuran, 2-methyl- #	004265-25-2	33		
n-Tetradecane	000629-59-4	93		
1-Dodecanol	000112-53-8	610	480	
n-Pentadecane	000629-62-9	31		
Hexadecane	000544-76-3	9		
Heptadecane	000629-78-7	16		
Oxiran, mono 1 (C12-C14 al-kyloxy)methylderivater	068609-97-2	160	170	12
2-Butanone	000078-93-3			30
n-Octadecan	000543-45-3	89		
Sum of unidentified VVOC	Rt frem til C6	120	25	
Sum of unidentified VOC	Rt C6 til C16	320	66	
Sum of unidentified SVOC	Rt efter C16	65	23	
Sum of all measured VVOC*	Rt frem til C6	120	25	
Sum of all measured VOC*	Rt C6 til C16	13000	740	49
Sum of all measured SVOC*	Rt efter C16	340	200	

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

Table 5.6 Emission from sample 13 (transparent lacquer (to-component epoxy lacquer))

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Formaldehyde	000050-00-0	-	1.7	1.9
Acetaldehyde	000075-07-0	9	0.8	17
Propanal	000123-38-6	14	-	-
Benzene	000071-43-2	12		
1-Butanol	000071-36-3	110		
1-Methoxy-2-propanol	000107-98-2	3500		
2-pentanone-4-methyl	000108-10-1	30		
1,2-Propandiol	000057-55-6	1300	21	
Ethylene glycol monopropylether #	002807-30-9	4300		
Butylacetate	000123-86-4	270		
Ethylbenzene	000100-41-4	88		
m,p-Xylene	179601-23-1	330		
o-Xylene	000095-47-6	180		

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Butyl cellosolve	000111-76-2	2600		
Benzaldehyde	000100-52-7	140	11	
Dipropylene glycol methyl ether	034590-94-8	3400		
Benzyl alcohol	000100-51-6	3900	51	6
Ethanone, 1-phenyl-	000098-86-2	17	5	
Undecane	001120-21-4	9		
n-Dodecane	000112-40-3	130		
n-Tridecane	000629-50-5	15		
n-Tetradecane	000629-59-4	280		
1-Dodecanol	000112-53-8	970	62	
n-Pentadecane	000629-62-9	16		
Dodecanoic acid, methyl ester #	000111-82-0	10		
Hexadecane	000544-76-3	7		
Oxiran, mono 1 (C12-C14 al-kyloxy)methylderivater	068609-97-2	230	40	
Sum of unidentified VVOC	Rt frem til C6	66	15	36
Sum of unidentified VOC	Rt C6 til C16	2000	25	81
Sum of unidentified SVOC	Rt efter C16	120		
Sum of all measured VVOC*	Rt frem til C6	66	15	36
Sum of all measured VOC*	Rt C6 til C16	23000	180	88
Sum of all measured SVOC*	Rt efter C16	360	40	

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

Table 5.7 Emission from sample 15 (Floor oil)

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Formaldehyde	000050-00-0	2.7	15	1.7
Acetaldehyde	000075-07-0	4.6	29	1.3
Propanal	000123-38-6	-	22	-
Butanal	000123-72-8	-	3.5	0.5
Crotonaldehyde	000123-73-9	-	18	0.5
2-Butanone	000078-93-3	14		
Acetic acid	000064-19-7	27	23	
Pentanal	000110-62-3		39	
Propanoic acid	000079-09-4		20	
Amyl Alcohol	000071-41-0		7	
Hexanal	000066-25-1		320	16
Furfural	000098-01-1	5	3	2
Ethylbenzene	000100-41-4	13		
m,p-Xylene	179601-23-1	57		
o-Xylene	000095-47-6	21		
Pentanoic acid	000109-52-4		62	
2, 2, 4-Trimethyl-1, 3-pentanediol	006846-50-0	3	110	
Sum of other aliphatic hydrocarbons VVOC	Rt frem til C6			
Sum of other aliphatic hydrocarbons VOC	Rt C6 til C16	200	940	
Sum of other aliphatic hydrocarbons SVOC	Rt efter C16		400	

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Sum of other aromatic hydrocarbons VOC	Rt C6 til C16	48		
Sum of other aromatic hydrocarbons SVOC	Rt efter C16			
Sum of unidentified VVOC	Rt frem til C6	110	16	
Sum of unidentified VOC	Rt C6 til C16	690	670	
Sum of unidentified SVOC	Rt efter C16	22	230	
Sum of all measured VVOC*	Rt frem til C6	110	16	
Sum of all measured VOC*	Rt C6 til C16	500000	6700	73
Sum of all measured SVOC*	Rt efter C16	22	630	
Sum of C9 - C15 hydrocarbons $ #		500000	4500	56

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

$ Due to poor chromatographic resolution of individual components, the sum of hydrocarbons was determined by the area of the total ion chromatogram (TIC) quantified as toluene equivalents in the retention time range of the indicated hydrocarbons

Table 5.8 Emission from sample 16 (Floor wax)

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Formaldehyde	000050-00-0	4.3	2.3	1.2
Acetaldehyde	000075-07-0	4.2	-	0.6
2-Butanone	000078-93-3	6		
Benzene	000071-43-2	8		
1-Butanol	000071-36-3	7		
Octane	000111-65-9	57		
Hexanal	000066-25-1	15		
Ethylbenzene	000100-41-4	16		
m,p-Xylene	179601-23-1	100		
o-Xylene	000095-47-6	80		
Nonane	000111-84-2	1300		
n-Tetradecane	000629-59-4	12		
Isolongifolene	001135-66-6	8		
n-Pentadecane	000629-62-9	18		
Hexadecane	000544-76-3	11		
Sum of other aliphatic hydrocarbons VVOC	Rt frem til C6			
Sum of other aliphatic hydrocarbons VOC	Rt C6 til C16	6200		
Sum of other aliphatic hydrocarbons SVOC	Rt efter C16		5	
Sum of other aromatic hydrocarbons VOC	Rt C6 til C16	1200		
Sum of other aromatic hydrocarbons SVOC	Rt efter C16			
Sum of unidentified VVOC	Rt frem til C6	150	16	
Sum of unidentified VOC	Rt C6 til C16	920		
Sum of unidentified SVOC	Rt efter C16	10		
Sum of all measured VVOC*	Rt frem til C6	150	16	
Sum of all measured VOC*	Rt C6 til C16	100000	200	25
Sum of all measured SVOC*	Rt efter C16	22	5	
Sum of C7 - C13 hydrocarbons $ #		95500	200	26

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

$ Due to poor chromatographic resolution of individual components, the sum of hydrocarbons was determined by the area of the total ion chromatogram (TIC) quantified as toluene equivalents in the retention time range of the indicated hydrocarbons

Table 5.9 Emission from sample 20 (Chemical wood (two-component))

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Hexane	000110-54-3	21		
2-Butanone	000078-93-3	13		
Benzene	000071-43-2	86		
1-Butanol	000071-36-3	15		
1-Methoxy-2-propanol	000107-98-2	12	7	
1,2-Propandiol	000057-55-6	84	8	
Furfural	000098-01-1	43	3	2
Ethylbenzene	000100-41-4	11		
m,p-Xylene	179601-23-1	30	5	
Ally glycidyl ether	000106-92-3	38		
Styrene	000100-42-5	2400	140	40
Butyl cellosolve	000111-76-2	310	64	21
Benzaldehyde	000100-52-7	210	17	
Phenol	000108-95-2	50		
n-Decane	000124-18-5	12		
Octanal	000124-13-0	22		
Benzeneacetaldehyde #	000122-78-1	11		
Oxirane, phenyl- #	000096-09-3	67	5	
Ethanone, 1-phenyl-	000098-86-2	47		
Undecane	001120-21-4	20		
1-Ethyl-2-pyrrolidinone #	002687-91-4	190	21	5
Benzoic acid #	000065-85-0	9	66	
Decanal	000112-31-2	32		
Sum of unidentified VVOC	Rt frem til C6	16		
Sum of unidentified VOC	Rt C6 til C16	73	18	21
Sum of unidentified SVOC	Rt efter C16	14	15	
Sum of all measured VVOC*	Rt frem til C6	37		
Sum of all measured VOC*	Rt C6 til C16	3700	356	89
Sum of all measured SVOC*	Rt efter C16	14	15	

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

Table 5.10 Emission from sample 25 (Wet room paint)

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Formaldehyde	000050-00-0	9.7	2.0	2.1
Acetaldehyde	000075-07-0	3.3	0.5	15
Butanal	000123-72-8	6.0	0.5	-
Acetone	000067-64-1	74	30	
1-Methoxy-2-propanol	000107-98-2	16		
Heptane	000142-82-5		4	
1,2-Propandiol	000057-55-6	29000	6500	
Hexanal	000066-25-1	23		
Furfural	000098-01-1	20	21	2
Ethylbenzene	000100-41-4	25		
m,p-Xylene	179601-23-1	44		
1-Hexanol	000111-27-3	40		
Styrene	000100-42-5	6		
o-Xylene	000095-47-6	24		
Nonane	000111-84-2	6		
Butyl cellosolve	000111-76-2	25	9	
Cumene	000098-82-8	31		
Benzaldehyde	000100-52-7	50	14	
Octamethylcyclotetrasiloxane	000556-67-2	12		
Phenol	000108-95-2		30	
n-Decane	000124-18-5	19		
Carbitol	000111-90-0	11		
Dipropylene glycol methyl ether	034590-94-8	130		
Ethanone, 1-phenyl-	000098-86-2	6	3	
Undecane	001120-21-4	14		
Nonanal	000124-19-6		14	
Acetic acid, 2-ethylhexyl ester #	000103-09-3	200		
4-Ethylphenol	000123-07-9	5		
Diethylene glycol monobutyl ether	000112-34-5	1200	370	5
3(2H)-Isothiazolone, 2-methyl (MI)	002682-20-4	18	36	7
5-chloro-2-methyl-4-isothiazolin-3-one (MCI)	0026172-55-4			
Decanal	000112-31-2		15	
Dodecamethylcyclosiloxane #	000540-97-6	12		
Texanol B	074367-34-3	3300	1800	310
Texanol A	074367-33-2	4200	1700	270
n-Pentadecane	000629-62-9	9	8	
2, 2, 4-Trimethyl-1, 3-pentanediol	006846-50-0	130	8	8
3-Iodo-2-propyl-N_butyl carbamate (IPBC)	055406-53-6			6
Sum of unidentified VVOC	Rt frem til C6	180	30	6
Sum of unidentified VOC	Rt C6 til C16	16000	97	35
Sum of unidentified SVOC	Rt efter C16			
Sum of all measured VVOC*	Rt frem til C6	260	61	6
Sum of all measured VOC*	Rt C6 til C16	55000	11000	690
Sum of all measured SVOC*	Rt efter C16	130	8	6

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

Table 5.11 Emission from sample 30 (PU foam)

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Isocyanates (4,4´-MDI)	000101-68-8	< 20	< 20	< 20
Hexane	000110-54-3	24		
2-Butanone	000078-93-3	9		
Acetic acid	000064-19-7	150		
1-Butanol	000071-36-3	8		
Heptane	000142-82-5	7		
Propanoic acid	000079-09-4	11		
Toluene	000108-88-3	12		
Octane	000111-65-9	5		
Furfural	000098-01-1	25	2	2
Styrene	000100-42-5	3		
o-Xylene	000095-47-6	5		
Benzene, 1,2,3-trimethyl-	000526-73-8	31		
Benzaldehyde	000100-52-7	80	6	
Octamethylcyclotetrasiloxane	000556-67-2	4		
n-Decane	000124-18-5	9		
Ethanone, 1-phenyl-	000098-86-2	50		
Undecane	001120-21-4	12		
Nonanal	000124-19-6	15		
Decanal	000112-31-2	18		
n-Tetradecane	000629-59-4	11	6	
Sum of unidentified VVOC	Rt frem til C6	1100	74	
Sum of unidentified VOC	Rt C6 til C16	110	9	
Sum of unidentified SVOC	Rt efter C16	16		
Sum of all measured VVOC*	Rt frem til C6	1100	74	
Sum of all measured VOC*	Rt C6 til C16	600	23	2
Sum of all measured SVOC*	Rt efter C16	16		

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

Table 5.12 Emission from sample 40 (Acid curing paint)

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Formaldehyde	000050-00-0	10627 ¤	1772 ¤	85
Acetaldehyde	000075-07-0	-	-	1.7
Butanal	000123-72-8	-	-	1.4
Ethanol	000064-17-5	12000	36	
2-propanol	000067-63-0	7300		
1-Propanol	000071-23-8	160		
2-Butanone	000078-93-3	120	7	
Ethyl acetate	000141-78-6	610		
1-Methoxy-2-propanol	000107-98-2	800	89	
1-Butanol	000071-36-3			12
Acetic acid	000064-19-7	2800	44	
Pentanal	000110-62-3			5
Isobutyl Alcohol	000078-83-1	19000	430	11
2-Pentanone, 3-methyl- #	000565-61-7	84		
2-pentanone-4-methyl	000108-10-1	310		
1,2-Propandiol	000057-55-6		19	
Toluene	000108-88-3	5		
Acetic acid, 2-methylpropyl ester #	000110-19-0	550		
Butanoic acid	000107-92-6		11	
Hexanal	000066-25-1	35	75	81
Butylacetate	000123-86-4	12000		
Furfural	000098-01-1		5	2
Ethylbenzene	000100-41-4	1300		
m,p-Xylene	179601-23-1	3400		
Cyclohexanone	000108-94-1	12000	210	9
o-Xylene	000095-47-6	2300		
Benzaldehyde	000100-52-7	56	12	
Octamethylcyclotetrasiloxane	000556-67-2	27		
Hexanoic acid	000142-62-1		24	25
Phenol	000108-95-2	79		
n-Decane	000124-18-5	19		
Dipropylene glycol methyl ether	034590-94-8	430	8	
Trans-2-Octanal	002548-87-0		17	12
Heptanoic acid	000111-14-8			5
Ethanone, 1-phenyl-	000098-86-2	45	6	
Undecane	001120-21-4	33		
Nonanal	000124-19-6	33	5	5
Decamethylcyclopentasiloxane #	000541-02-6	13		
Trans-2-Nonenal	018829-56-6		270	7
n-Dodecane	000112-40-3	6	5	
Decanal	000112-31-2	37		
Dodecamethylcyclosiloxane #	000540-97-6	10		
n-Tetradecane	000629-59-4	10		
Sum of unidentified VVOC	Rt frem til C6	510	43	

Sum of unidentified VOC	Rt C6 til C16	59000	570	7
Sum of unidentified SVOC	Rt efter C16	90	73	
Sum of all measured VVOC*	Rt frem til C6	20000	79	
Sum of all measured VOC*	Rt C6 til C16	120000	1800	180
Sum of all measured SVOC*	Rt efter C16	90	73	

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

¤ The DNPH tube is overloaded, the concentration may be higher

Table 5.13 Emission from sample 42 (transparent lacquer)

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Acetone	000067-64-1	17		
Hexane	000110-54-3	5		
2-Butanone	000078-93-3	7		35
Benzene	000071-43-2	13		
1-Butanol	000071-36-3	15		
1-Methoxy-2-propanol	000107-98-2	4300 §	17	
Isooctane	000540-84-1	650		
1,2-Propandiol	000057-55-6	550		
Toluene	000108-88-3	140		
Octane	000111-65-9	5		
Furfural	000098-01-1	21	5	2
Ethylbenzene	000100-41-4	37		
m,p-Xylene	179601-23-1	130		
o-Xylene	000095-47-6	41		
Butyl cellosolve	000111-76-2	5		
Benzaldehyd	000100-52-7	250	13	5
Phenol	000108-95-2	25	5	
1,2,4-trimethyl-benzene	000095-63-6	12		
Benzene, 1,3,5-trimethyl-	000108-67-8	6		
Benzyl alcohol	000100-51-6	5100 ¤	85	7
Ethanone, 1-phenyl-	000098-86-2	8		
Undecane	001120-21-4	7		
Nonanal	000124-19-6	14		
Benzene, 1,2,4,5-tetramethyl-	000095-93-2	18		
Decanal	000112-31-2	16		
n-Tetradecane	000629-59-4	5		
n-Pentadecane	000629-62-9	7		
Sum of other aromatic hydrocarbons VOC	Rt C6 til C16	280		
Sum of other aromatic hydrocarbons SVOC	Rt efter C16			
Sum of unidentified VVOC	Rt frem til C6	130	19	5
Sum of unidentified VOC	Rt C6 til C16	600	3	84
Sum of unidentified SVOC	Rt efter C16	1		
Sum of all measured VVOC*	Rt frem til C6	150	19	39
Sum of all measured VOC*	Rt C6 til C16	12000	130	98
Sum of all measured SVOC*	Rt efter C16	1		

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

¤ Tenax tube was overloaded, underestimation of concentration most likely

Table 5.14 Emission from sample 43 (floor paint (solvent based))

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Formaldehyde	000050-00-0	6.7	12	4.4
Acetaldehyde	000075-07-0	21	46	19
Propanal	000123-38-6	78	34	1.3
Butanal	000123-72-8	4.6	22	1.3
Crotonaldehyde	000123-73-9	2	8	0.6
Acetone	000067-64-1	43	13	
2-Butanone	000078-93-3	450	6	20
Benzene	000071-43-2	14		
1-Butanol	000071-36-3	20		
Heptane	000142-82-5		36	
Pentanal	000110-62-3	210	90	
1,2-Propandiol	000057-55-6	110	20	
Amyl Alcohol	000071-41-0	40	46	
2-Butanone Oxime	000096-29-7	720		
Butanoic acid	000107-92-6		41	
Hexanal	000066-25-1			40
n-Pentadecane	000629-62-9	14	5	
Hexadecane	000544-76-3	5		
Sum of unidentified VVOC	Rt frem til C6	290	49	
Sum of unidentified VOC	Rt C6 til C16	300	260	
Sum of unidentified SVOC	Rt efter C16	51	5	
Sum of all measured VVOC*	Rt frem til C6	330	62	
Sum of all measured VOC*	Rt C6 til C16	380000	5100	250
Sum of all measured SVOC*	Rt efter C16	56	5	
Sum of hydrocarbons C8 - C14 $ #		370000	4600	190

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

$ Due to poor chromatographic resolution of individual components, the sum of hydrocarbons was determined by the area of the total ion chromatogram (TIC) quantified as toluene equivalents in the retention time range of the indicated hydrocarbons

Table 5.15 Emission from sample 44 (floor paint)

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Formaldehyde	000050-00-0	1.5	8.0	4.0
Acetaldehyde	000075-07-0	-	57	19
Propanal	000123-38-6	1.8	82	2.3
Butanal	000123-72-8	-	18	-
Crotonaldehyde	000123-73-9	-	13	1.0
Isocyanates (4,4´-MDI)	000101-68-8	< 20	< 20	< 20
Acetone	000067-64-1	44		
2-Butanone	000078-93-3	430		18
Isobuthyl Alcohol	000078-83-1	50		
Ethyl acetate	000141-78-6	38		
Benzene	000071-43-2	20		
1-Butanol	000071-36-3	120		
1-Methoxy-2-propanol	000107-98-2	230		
Heptane	000142-82-5	7		
Pentanal	000110-62-3		260	6
Amyl Alcohol	000071-41-0		49	
Butanoic acid	000107-92-6		33	
2-Butanone Oxime	000096-29-7	7300		
Octane	000111-65-9	290	20	
Hexanal	000066-25-1		1900	55
Furfural	000098-01-1		21	2
Ethylbenzene	000100-41-4	1300		
m,p-Xylene	179601-23-1	4400		
Pentanoic acid	000109-52-4		140	12
o-Xylene	000095-47-6	2500		
n-Pentadecane	000629-62-9	86	92	
Hexadecane	000544-76-3	32	100	
Heptadecane	000629-78-7	5	34	
Sum of other aliphatic hydrocarbons VVOC	Rt frem til C6			
Sum of other aliphatic hydrocarbons VOC	Rt C6 til C16	8300	98	
Sum of other aliphatic hydrocarbons SVOC	Rt efter C16		20	
Sum of unidentified VVOC	Rt frem til C6	520	240	
Sum of unidentified VOC	Rt C6 til C16	11000	390	
Sum of unidentified SVOC	Rt efter C16	43	150	
Sum of all measured VVOC*	Rt frem til C6	560	240	
Sum of all measured VOC*	Rt C6 til C16	800000	6400	250
Sum of all measured SVOC*	Rt efter C16	80	300	
Sum of hydrocarbons C9 - C14 $ #		760000	3400	150

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

$ Due to poor chromatographic resolution of individual components, the sum of hydrocarbons was determined by the area of the total ion chromatogram (TIC) quantified as toluene equivalents in the retention time range of the indicated hydrocarbons

Table 5.16 Emission from sample 55 (floor paint(water based))

Name	CAS-No.	5 hours (µg/m^3)	3 days (µg/m^3)	28 days (µg/m^3)
Ethanamine, N-ethyl- #	000109-89-7	560		
Hexane	000110-54-3	19		
Triethylamine #	000121-44-8	3200	13	6
1,2-Propandiol	000057-55-6	33000	410	
Ethylbenzene	000100-41-4	5		
m,p-Xylene	179601-23-1	21		
o-Xylene	000095-47-6	13		
Nonane	000111-84-2	8		
Butyl cellosolve	000111-76-2	42		
Formamide, N,N-diethyl- #	000617-84-5	16		
Benzaldehyde	000100-52-7	110	5	
Octamethylcyclotetrasiloxane	000556-67-2	190	1	
Dipropylene glycol methyl ether	034590-94-8	150000	410	
Dipropylene glycol	025265-71-8	3100	20	
Benzene, 2-ethyl-1,4-dimethyl- #	001758-88-9	25		
Ethanone, 1-phenyl-	000098-86-2	78		
Benzene, 4-ethyl-1,2-dimethyl- #	000934-80-5	23		
Benzene, 1-methyl-3-(1-methylethyl)- #	000535-77-3	6		
Undecane	001120-21-4	40		
Nonanal	000124-19-6	31		
Benzene, 1,2,4,5-tetramethyl-	000095-93-2	10		
Decamethylcyclopentasiloxane #	000541-02-6	200		
2-Methyisothiazol-3(2H)-one	055965-84-9	30	27	
n-Dodecane	000112-40-3	15		
Decanal	000112-31-2	35		
Di(propylene glycol)butyl ether	029911-28-2	22000	6300	
Diethylene glycol monobutyl ether	000112-34-5	3200		
Dodecamethylcyclosiloxane #	000540-97-6	62		
n-Tridecane	000629-50-5	10		
n-Tetradecane	000629-59-4	10		
n-Pentadecane	000629-62-9	15		
Hexadecane	000544-76-3	7		
Sum of unidentified VVOC	Rt frem til C6	540	4	
Sum of unidentified VOC	Rt C6 til C16	29000	2400	110
Sum of unidentified SVOC	Rt efter C16	29		
Sum of all measured VVOC*	Rt frem til C6	1100	4	
Sum of all measured VOC*	Rt C6 til C16	245000	9600	120
Sum of all measured SVOC*	Rt efter C16	36		

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

Appendix 6 Volatile substances found in breathing zone large chamber

In the following tables 6.1 – 6.7, the volatile compounds analysed and identified in the emissions from the 7 different product samples were reported. Emissions were sampled during application of product in breathing zone and the results were reported after subtraction of back-ground emissions.

Substances from the initial gross list are marked in gray. Other substances found with harmonised classification meeting the selection criteria as indicated in Annex 7 are marked in green.

Table 6.1: Emissions found during rinse of paintbrush in product 1S.

Name	CAS	µg/m^3
Ethanol	000064-17-5	21
2-Butanone	000078-93-3	16
Benzene	000071-43-2	10
Heptane (C7)	000142-82-5	11
Octane (C8)	000111-65-9	21
Hexamethylcyclotrisiloxane #	000541-05-9	15
Ethylbenzene (C8)	000100-41-4	12
m,p-Xylene (C8)	179601-23-1	54
o-Xylene (C8)	000095-47-6	59
Nonane (C9)	000111-84-2	820
Cumene (C9)	000098-82-8	74
3-ethyltoluene (C9)	000620-14-4	230
Benzaldehyde	000100-52-7	51
4-ethyltoluene (C9)	000622-96-8	120
2-ethyltoluene (C9)	000611-14-3	56
1,2,4-trimethyl-benzene (C9)	000095-63-6	230
n-Decane	000124-18-5	610
Benzene, 1,3,5-trimethyl- (C9)	000108-67-8	120
Undecane (C11)	001120-21-4	150
Nonanal	000124-19-6	18
Benzene, 1,2,4,5-tetramethyl- (C10)	000095-93-2	12
n-Dodecane (C12)	000112-40-3	16
Decanal	000112-31-2	23
n-Tridecane (C13)	000629-50-5	5
Hexadecane (C16)	000544-76-3	7
Sum of other aliphatic hydrocarbons VVOC	Rt frem til C6	0
Sum of other aliphatic hydrocarbons VOC	Rt C6 til C16	3388
Sum of other aliphatic hydrocarbons SVOC	Rt efter C16	0
Sum of other aromatic hydrocarbons VOC	Rt C6 til C16	1495
Sum of other aromatic hydrocarbons SVOC	Rt efter C16	0
Sum of unidentified VVOC	Rt frem til C6	55

Sum of unidentified VOC	Rt C6 til C16	3500
Sum of unidentified SVOC	Rt efter C16	0
Sum of all measured VVOC*	Rt frem til C6	78
Sum of all measured VOC*	Rt C6 til C16	10860
Sum of all measured SVOC*	Rt efter C16	7
Sum of C7-C13 hydrocarbons # $	Rt C7 til C13	10840

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

$ Due to poor chromatographic resolution of individual components, the sum of hydrocarbons was determined by the area of the total ion chromatogram (TIC) quantified as toluene equivalents in the retention time range of the indicated hydrocarbons

Table 6.2: Emissions found during application of sample 9S after subtraction of background emissions from plywood

Name	CAS	µg/m^3
Acetone	000067-64-1	36
Ethanol	000064-17-5	380
Butanal	000123-72-8	40
2-Butanone	000078-93-3	6
Ethyl acetate	000141-78-6	22
1-Butanol	000071-36-3	18
1-Methoxy-2-propanol	000107-98-2	110
Pentanal	000110-62-3	31
1, 4-Dioxane #	000123-91-1	220
2-pentanone-4-methyl	000108-10-1	330
1,2-Propandiol	000057-55-6	430
Toluene	000108-88-3	52
Amyl Alcohol	000071-41-0	17
Cyclohexane, 1,3-dimethyl-, cis- # (C8)	000638-04-0	26
Cyclohexane, 1,4-dimethyl-, trans- # (C8)	002207-04-7	18
Cyclopentane, 1-ethyl-2-methyl-, cis- # (C8)	000930-89-2	8
Octane (C8)	000111-65-9	99
Cyclohexane, 1,3-dimethyl-, trans- # (C8)	002207-03-6	18
Hexamethylcyclotrisiloxane #	000541-05-9	32
Heptane, 2,4-dimethyl- # (C9)	002213-23-2	8
Heptane, 2,6-dimethyl- # (C9)	001072-05-5	28
Cyclohexane, 1,2-dimethyl-, cis- # (C8)	002207-01-4	19
Cyclohexane, ethyl- # (C8)	001678-91-7	110
Cyclohexane, 1,1,3-trimethyl- # (C9)	003073-66-3	39
3-Octen-2-one, (E)- #	018402-82-9	8
CYCLOHEXANE, 1,3,5-TRIMETHYL- # (C9)	001839-63-0	11
Ethylbenzene (C8)	000100-41-4	350
Octane, 2-methyl- # (C9)	003221-61-2	54
m,p-Xylene (C8)	179601-23-1	1000
Cyclohexane, 1,2,4-trimethyl- # (C9)	002234-75-5	41
1-Ethyl-4-methylcyclohexane # (C9)	003728-56-1	69
o-Xylene (C8)	000095-47-6	220
Nonane (C9)	000111-84-2	420
Cyclohexane, (1-methylethyl)- # (C9)	000696-29-7	80
Cyclohexane, propyl- # (C9)	001678-92-8	130
Heptane, 3-ethyl-2-methyl- # (C10)	014676-29-0	28
Benzene, propyl- # (C9)	000103-65-1	57
2-ethyltoluene (C9)	000611-14-3	200
3-ethyltoluene (C9)	000620-14-4	220
4-ethyltoluene (C9)	000622-96-8	130
Benzene, 1,2,3-trimethyl- (C9)	000526-73-8	240
1,2,4-trimethyl-benzene (C9)	000095-63-6	430
Dipropylene glycol methyl ether	034590-94-8	1000
n-Decane (C10)	000124-18-5	19

Carbitol	000111-90-0	27
2-Propanol, 1-(2-methoxy-1-methylethoxy)- #	020324-32-7	28
o-Cymene # (C10)	000527-84-4	46
Benzene, 1,3,5-trimethyl- (C9)	000108-67-8	310
p-Cymene (C10)	000099-87-6	13
Benzyl alcohol	**000100-51-6**	**580**
BENZENE, 1,2-DIETHYL- # (C10)	000135-01-3	49
Benzene, 1-methyl-3-propyl- # (C10)	001074-43-7	72
Benzene, 2-ethyl-1,4-dimethyl- # (C10)	001758-88-9	120
Trans-2-Octanal	002548-87-0	48
Benzene, 1-methyl-2-propyl- # (C10)	001074-17-5	23
Benzene, 1-methyl-2-propyl- # (C10)	001074-17-5	22
Ethanone, 1-phenyl-	000098-86-2	5
Benzene, 4-ethyl-1,2-dimethyl- # (C10)	000934-80-5	62
Benzene, 1-ethyl-2,4-dimethyl- # (C10)	000874-41-9	49
Benzene, 1-methyl-3-(1-methylethyl)- # (C10)	000535-77-3	8
Benzene, 1,2,4,5-tetramethyl- (C10)	000095-93-2	8
Decamethylcyclopentasiloxane #	000541-02-6	18
Trans-2-Nonenal	018829-56-6	660
n-Tridecane (C13)	000629-50-5	19
n-Tetradecane (C14)	000629-59-4	32
2(1H)-Pyridinone, 1-methyl- #	000694-85-9	13
n-Pentadecane (C15)	000629-62-9	7
Oxiran, mono 1 (C12-C14 alkyloxy)methylderivater	068609-97-2	42
Sum of unidentified VVOC	Rt frem til C6	942
Sum of unidentified VOC	Rt C6 til C16	1464
Sum of unidentified SVOC	Rt efter C16	0
Sum of all measured VVOC*	Rt frem til C6	1358
Sum of all measured VOC*	Rt C6 til C16	9750
Sum of all measured SVOC*	Rt efter C16	42
Sum of C7-C13 hydrocarbons # $		4900

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

$ Due to poor chromatographic resolution of individual components, the sum of hydrocarbons was determined by the area of the total ion chromatogram (TIC) quantified as toluene equivalents in the retention time range of the indicated hydrocarbons

Table 6.3: Emissions found during application of sample 16 S after subtraction of background emissions from plywood

Name	CAS	µg/m^3
Acetone	000067-64-1	150
2-propanol	000067-63-0	7
Hexane	000110-54-3	400
2-Butanone	000078-93-3	11
Ethyl acetate	000141-78-6	33
Benzene	000071-43-2	120
1-Butanol	000071-36-3	330
Heptane	000142-82-5	3400
Toluene	000108-88-3	1900
Octane	000111-65-9	10000
Ethylbenzene	000100-41-4	3980
m,p-Xylene	179601-23-1	5300
o-Xylene	000095-47-6	6600
n-Tridecane	000629-50-5	5
n-Tetradecane	000629-59-4	10
Sum of other aliphatic hydrocarbons VVOC	Rt frem til C6	11
Sum of other aliphatic hydrocarbons VOC	Rt C6 til C16	33000
Sum of other aliphatic hydrocarbons SVOC	Rt efter C16	0
Sum of other aromatic hydrocarbons VOC	Rt C6 til C16	280
Sum of other aromatic hydrocarbons SVOC	Rt efter C16	0
Sum of unidentified VVOC	Rt frem til C6	478
Sum of unidentified VOC	Rt C6 til C16	23000
Sum of unidentified SVOC	Rt efter C16	10
Sum of all measured VVOC*	Rt frem til C6	638
Sum of all measured VOC*	Rt C6 til C16	379820
Sum of all measured SVOC*	Rt efter C16	10
Sum of C10-C12 hydrocarbons # $		289850
Sum of C7-C13 hydrocarbons # $		321000

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

$ Due to poor chromatographic resolution of individual components, the sum of hydrocarbons was determined by the area of the total ion chromatogram (TIC) quantified as toluene equivalents in the retention time range of the indicated hydrocarbons

Table 6.4: Emissions found during application of sample 20 S after subtraction of background emissions from plywood

Name	CAS	µg/m^3
2-Butanone	000078-93-3	8
Heptane	000142-82-5	16
Furfural	000098-01-1	34
Styrene	000100-42-5	730
o-Xylene	000095-47-6	9
Dipropylene glycol methyl ether	034590-94-8	9
Benzaldehyde	000100-52-7	51
Octanal	000124-13-0	21
Limonene	005989-27-5	6
Ethanone, 1-phenyl-	000098-86-2	26
Undecane	001120-21-4	1
Nonanal	000124-19-6	19
Decanal	000112-31-2	20
n-Pentadecane	000629-62-9	14
Hexadecane	000544-76-3	7
Sum of unidentified VVOC	Rt frem til C6	0
Sum of unidentified VOC	Rt C6 til C16	55
Sum of unidentified SVOC	Rt efter C16	0
Sum of all measured VVOC*	Rt frem til C6	0
Sum of all measured VOC*	Rt C6 til C16	980
Sum of all measured SVOC*	Rt efter C16	7

* Calibrated compounds + Toluene equivalents of unidentified

Table 6.5: Emissions found during application of sample 30 S after subtraction of background emissions from plywood

Name	CAS	µg/m^3
Propanal	000123-38-6	8
Isocyanates (4,4´-MDI)	000101-68-8	< 30 **
Isobutane #	000075-28-5	6300
Butane #	000106-97-8	18000
Ethyl acetate	000141-78-6	14
2-Butanone Oxime	000096-29-7	6
Hexanal	000066-25-1	9
Hexamethylcyclotrisiloxane #	000541-05-9	7
m,p-Xylene	179601-23-1	9
Nonane	000111-84-2	22
Benzaldehyde	000100-52-7	5
Octamethylcyclotetrasiloxane	000556-67-2	6
n-Decane	000124-18-5	99
Benzyl alcohol	000100-51-6	7
Undecane	001120-21-4	100
n-Dodecane	000112-40-3	22
Sum of unidentified VVOC	Rt frem til C6	44
Sum of unidentified VOC	Rt C6 til C16	110
Sum of unidentified SVOC	Rt efter C16	
Sum of all measured VVOC*	Rt frem til C6	44
Sum of all measured VOC*	Rt C6 til C16	419
Sum of all measured SVOC*	Rt efter C16	

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

** Sampling of air for isocyanates analysis during (15 minutes) and after (20 minutes) application at breating zone near to application area in order to obtain detection limit of 30 µg/m^3.

Table 6.6: Emissions found during application of sample 40 S after subtraction of background emissions from plywood

Name	CAS	µg/m^3
Formaldehyde	000050-00-0	11263 ¤
Acetaldehyde	000075-07-0	558 ¤
Propanal	000123-38-6	79 ¤
Ethanol	000064-17-5	746900
2-propanol	000067-63-0	159650
1-Propanol	000071-23-8	4300
2-Butanone	000078-93-3	8928
Ethyl acetate	000141-78-6	87951
Isobuthyl Alcohol	000078-83-1	30983
1-Butanol	000071-36-3	50000
1-Methoxy-2-propanol	000107-98-2	39000
Propanoic acid, ethyl ester #	000105-37-3	75
2-pentanone-4-methyl	000108-10-1	8100
Toluene	000108-88-3	66
Octane	000111-65-9	58
Butylacetate	000123-86-4	68000
Ethylbenzene	000100-41-4	7700
Xylene (o,m,p)	001330-20-7	31955
m,p-Xylene	*179601-23-1*	*(18978)*
o-Xylene	*000095-47-6*	*(12977)*
Cyclohexanone	000108-94-1	13000
Cumene	000098-82-8	47
Benzaldehyde	000100-52-7	78
4-Heptanone, 2,6-dimethyl- #	000108-83-8	73
Octamethylcyclotetrasiloxane	000556-67-2	6
1,2,4-trimethyl-benzene	000095-63-6	6
Ethanone, 1-phenyl-	000098-86-2	55
n-Tridecane	000629-50-5	21
n-Tetradecane	000629-59-4	42
n-Pentadecane	000629-62-9	64
Hexadecane	000544-76-3	3
Sum of unidentified VVOC	Rt frem til C6	169620
Sum of unidentified VOC	Rt C6 til C16	66870
Sum of unidentified SVOC	Rt efter C16	5
Sum of all measured VVOC*	Rt frem til C6	1096200
Sum of all measured VOC*	Rt C6 til C16	408300
Sum of all measured SVOC*	Rt efter C16	5

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

¤ The DNPH tube is overloaded, the concentration may be higher

Table 6.7: Emissions found during application of sample 44 S after subtraction of background emissions from plywood

Name	CAS	µg/m^3
Isocyanates (4,4´-MDI)	000101-68-8	< 30 **
Acetone	000067-64-1	36
2-Butanone	000078-93-3	14000
Isobuthyl Alcohol	000078-83-1	88
Benzene	000071-43-2	69
1-Butanol	000071-36-3	3100
1-Methoxy-2-propanol	000107-98-2	34000
Heptane	000142-82-5	1100
Toluene	000108-88-3	171
2-Methylpentanal	000123-15-9	2200
2-Butanone Oxime	000096-29-7	15000
Ethylbenzene	000100-41-4	5900
m,p-Xylene	179601-23-1	15995
o-Xylene	000095-47-6	8600
n-Tridecane	000629-50-5	140
n-Tetradecane	000629-59-4	47
Sum of other aliphatic hydrocarbons VVOC	Rt frem til C6	18
Sum of other aliphatic hydrocarbons VOC	Rt C6 til C16	110000
Sum of other aliphatic hydrocarbons SVOC	Rt efter C16	
Sum of unidentified VVOC	Rt frem til C6	1100
Sum of unidentified VOC	Rt C6 til C16	17000
Sum of unidentified SVOC	Rt efter C16	5
Sum of all measured VVOC*	Rt frem til C6	15000
Sum of all measured VOC*	Rt C6 til C16	630000
Sum of all measured SVOC*	Rt efter C16	5
Sum of C9-C12 hydrocarbons # $		409830
Sum of C9-C13 hydrocarbons # $		409970

* Calibrated compounds + Toluene equivalents of unidentified

Toluene equivalents

** Sampling of air for isocyanates analysis during (15 minutes) and after (20 minutes) application at breathing zone near to application area in order to obtain detection limit of 30 µg/m^3.

$ Due to poor chromatographic resolution of individual components, the sum of hydrocarbons was determined by the area of the total ion chromatogram (TIC) quantified as toluene equivalents in the retention time range of the indicated hydrocarbons

Appendix 7 Additional priority substances discovered by the analysis

The following table includes substances discovered during analysis and not included in the initial gross list which have a harmonised classification according to the CLP Regulation with the following hazard codes (used in section 3.2 for the initial hazard assessment):

- Acute tox. cat 1, cat2, cat3
- Skin corr 1 (1A+1B+1C)
- Skin sens 1 (1A+1B)
- Resp sens (1A+1B)
- STOT RE (1+2)
- STOT SE (1+2)
- Carc cat 1 (1A + 1B) + cat 2
- Repr cat 1 (1A + 1B) + cat 2
- Muta cat 1 (1A + 1B) + cat 2

Table 48. Substances discovered by the analysis meeting the priority classification (marked in bold) but not included in the gross list

CAS No	Substance name	Hazard Class and Category Code(s)	Hazard Statement Code(s
100-41-4	Ethylbenzene	Flam. Liq. 2	H225
		Acute Tox. 4 *	H332
		Asp. Tox. 1	H304
		STOT RE 2	H373 (hearing organs)
101-68-8	4,4'-Methylenediphenyl diisocyanate; diphenylmethane-4,4'-diisocyanate	**Carc. 2**	H351
		Acute Tox. 4 *	H332
		STOT SE 3	H335
		STOT RE 2 *	H373 **
		Skin Irrit. 2	H315
		Eye Irrit. 2	H319
		Resp. Sens. 1	H334
		Skin Sens. 1	H317
106-92-3	Allyl glycidyl ether; allyl 2,3-epoxypropyl ether; prop-2-en-1-yl 2,3-epoxypropyl ether	Flam. Liq. 3	H226
		Carc. 2	H351
		Muta. 2	H341
		Repr. 2	H361f ***
		Acute Tox. 4 *	H332
		Acute Tox. 4 *	H302
		STOT SE 3	H335
		Skin Irrit. 2	H315
		Eye Dam. 1	H318
		Skin Sens. 1	H317

CAS No	Substance name	Hazard Class and Category Code(s)	Hazard Statement Code(s
		Aquatic Chronic 3	H412
107-92-6	Butyric acid	**Skin Corr. 1B**	H314
108-95-2	Phenol	**Muta. 2**	H341
		Acute Tox. 3 *	H331
		Acute Tox. 3 *	H311
		Acute Tox. 3 *	H301
		STOT RE 2 *	H373 **
		Skin Corr. 1B	H314
109-89-7	Diethylamine	Flam. Liq. 2	H225
		Acute Tox. 4 *	H332
		Acute Tox. 4 *	H312
		Acute Tox. 4 *	H302
		Skin Corr. 1A	H314
111-14-8	Heptanoic acid	**Skin Corr. 1B**	H314
121-44-8	Triethylamine	Flam. Liq. 2	H225
		Acute Tox. 4 *	H332
		Acute Tox. 4 *	H312
		Acute Tox. 4 *	H302
		Skin Corr. 1A	H314
123-73-9	Crotonaldehyde; 2-butenal [1] (E)-2-butenal; (E)-crotonaldehyde [2]	Flam. Liq. 2	H225
		Muta. 2	H341
		Acute Tox. 2 *	H330
		Acute Tox. 3 *	H311
		Acute Tox. 3 *	H301
		STOT SE 3	H335
		STOT RE 2 *	H373 **
		Skin Irrit. 2	H315
		Eye Dam. 1	H318
		Aquatic Acute 1	H400
123-91-1	1,4-dioxane	Flam. Liq. 2	H225
		Carc. 2	H351
		STOT SE 3	H335
		Eye Irrit. 2	H319
2687-91-4	N-ethyl-2-pyrrolidone; 1-ethylpyrrolidin-2-one	**Repr. 1B**	H360D
64-19-7	Acetic acid	Flam. Liq. 3	H226
		Skin Corr. 1A	H314
65-85-0	Benzoic acid	**STOT RE 1**	H372 (lungs) (inhalation)
		Skin Irrit. 2	H315
		Eye Dam. 1	H318 (lungs) (inhalation
71-43-2	Benzene	Flam. Liq. 2	H225
		Carc. 1A	H350
		Muta. 1B	H340
		Asp. Tox. 1	H304
		STOT RE 1	H372 **
		Skin Irrit. 2	H315
		Eye Irrit. 2	H319
75-07-0	Acetaldehyde	Flam. Liq. 1	H224
		Carc. 2	H351
		STOT SE 3	H335

CAS No	Substance name	Hazard Class and Category Code(s)	Hazard Statement Code(s
		Eye Irrit. 2	H319
79-09-4	Propionic acid	**Skin Corr. 1B**	H314
96-09-3	Styrene oxide	**Carc. 1B**	H350
		Acute Tox. 4 *	H312
		Eye Irrit. 2	H319

Appendix 8 DNEL-values estimated for this project

Calculation of DNEL-values for this project

For **benzene**, DNEL for dermal exposure was obtained by converting the DNEL value for inhalation to dermal exposure for an adult who breathes 20 m^3 / d and weighs 70 kg:
Daily exposure by inhalation = 0.00017 mg/m^3 x 20m^3/d/70kg = 0.00005 mg/kg/d
This DNEL value for dermal contact of 0.00005 mg/kg/d corresponds to the DNEL value for inhalation for a tolerable cancer risk of 10^{-6} for life-long daily exposure. Due to the lack of specific data, the calculation of the value did not take into account that the absorption by skin is likely to be somewhat lower than by inhalation.

For **n-hexane,** DNEL for dermal exposure was obtained by converting the DNEL value for inhalation to dermal exposure for an adult who breathes 20 m^3/d and weighs 70 kg:
Daily exposure by inhalation = 0.700 mg/m^3 x 20 m^3/d/70 kg = 0.2 mg/kg/d
The value corresponds to a situation whereby absorption by skin is the same as in the case of inhalation. ECHA (2017) states that, due to a lack of data, no correction can be made for different degrees of absorption for the conversion between the two routes of exposure (inhalation and dermal exposure). Against this background, a DNEL = 0.2 mg/kg/d is proposed for n-hexane for dermal exposure.

For **styrene**, DNEL for dermal exposure was obtained by converting the DNEL value for inhalation to dermal exposure for an adult who breathes 20 m^3/d and weighs 70 kg:
Daily exposure by inhalation = 0.250 mg/m^3 x 20 m^3/d/70 kg = 0.071 mg/kg/d
The value corresponds to a situation whereby absorption by skin is the same as in the case of inhalation. By inhalation, absorption is considered to be 100%, while absorption by dermal contact is considered to be 2% (ECHA/RAC 2012). Therefore, when calculating DNEL for dermal absorption, this difference must be corrected for absorption and DNEL for dermal exposure can be calculated as: DNEL dermal = 0.071 mg/kg/d x abs inh/abs skin = 0.071 mg/kg/d x 100%/2% = 3.6 mg/kg/d.

For **mineral turpentine** (the substances naphtha (petroleum), hydrodesulphurised heavy (<0.1% benzene) and hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclic, <2% aromatics), DNEL for skin exposure is calculated from the DNEL value for inhalation: Daily exposure by inhalation = 5.7 mg/m^3 x 20 m^3/d/70 kg = 1.6 mg/kg/d.
This value corresponds to a situation whereby absorption by skin is the same as by inhalation. However, by inhalation, absorption is considered to be 100%, while absorption by dermal contact is considered to be 7% (ECHA/RAC 2011). Therefore, when calculating DNEL for dermal absorption, this difference must be corrected for absorption and DNEL for dermal exposure can be calculated as:
DNEL dermal = 1.6 mg/kg/d x abs inh/abs skin = 1.6 mg/kg/d x 100%/7% = 23 mg/kg/d.

For **benzoic acid**, MAK (2017) indicates a NOAEL of 12.6 mg/m^3 from a 28-day rat inhalation test as a starting point for their calculation of occupational exposure limit values. This data can also be used to calculate DNEL for the private user/general population.
First, adjustment is made from 6 hours' daily exposure in rats for 5 days of the week to continuous exposure:

NOAEL Continuous = 12.6 mg/m^3 x 6t/24t x 5d/7d = 2.3 mg/m^3
Then DNEL is calculated:
DNEL = N (L) OAEL/(AF1 x AF2 x AF3 x AFn)
DNEL = 2.3 mg/m^3/2.5 x 10 x 6 = 0.015 mg/m^3
using an uncertainty factor of AF1 = 2.5 (extrapolation from animal to human); AF2 = 10 (taking into account different sensitivity in the population); AF3 = 6 (extrapolation from 28 days to chronic exposure).

For **phenol**, an expert assessment of SCOEL (2003) was identified. In this assessment, the basis for establishing an OEL value is considered to be of a lack of quality. From 90-day inhalation experiments with monkeys, NOAEL is evaluated at 20 mg/m^3 with respect to development of adverse effects in the respiratory tract. A corresponding assessment is found in the REACH registration of the substance, but the DNEL calculation is not used in the ECHA (2012) guidelines.
Based on NOAEL = 20 mg/m^3 by inhalation for 90 days (8 hours / day; 5 days a week), the following DNEL is calculated:
$NOAEL_{Continuous\ Exposure}$ = 20 mg/m^3 x 8t/24t x 5d/7d = 4.8 mg / m^3
DNEL = N (L) OAEL / (AF1 x AF2 x AF3 x AFn)
DNEL = 4.8 mg/ m^3/2.5 x 10 x 2 = 0.1 mg/m^3

For **triethylamine**, SCOEL (1999) indicates the acute effects and influence of blurred vision as the most critical effects of the substance. SCOEL indicates a NOAEL of 10 mg/m^3 from a test with four volunteers, suggesting a limit of 1 ppm in the working environment (4.2 mg/m^3). As concerns the general population, a value of DNEL = 1mg/m^3 is suggested as it is considered appropriate to apply an uncertainty factor of 10 relative to the NOAEL value to take into account particularly sensitive groups in the population.

For **allyl-2,3-epoxypropyl ether**, in the REACH registration, a LOAEC of 19 mg/m^3 is indicated with regard to histopathological effects in the nasal mucosa from a 90-day inhalation test in rats exposed 6 hours daily 5 days a week. From this, the registrant calculated a DNEL for the general population of 0.5 mg/m^3. However, in this calculation, an uncertainty factor of 0.5 was used by extrapolating from animal experiments to humans, while no uncertainty factor is used to extrapolate from LOAEL to NOAEL. If the guidelines in ECHA (2012) are applied, the following DNEL can be calculated:
First, an adjustment is made from 6 hours' daily exposure of rats for 5 days a week to continuous exposure:
LOAEL continuously = 19 mg/m^3 x 6t/24t x 5d/7d = 3.4 mg/m^3
Then DNEL can be calculated:
DNEL = N (L) OAEL/(AF1 x AF2 x AF3 x AFn)
DNEL = 3.4 mg/m3/2.5 x 10 x 2 x 3 = 0.02 mg/m^3
using an uncertainty factor AF1 = 2.5 (extrapolation from animal to human); AF2 = 10 (taking into account different sensitivities in the population); AF3 = 2 (extrapolation from 90 days to chronic exposure); AF4 = 3 (extrapolation from LOAEL to NOAEL).

For ***zirkonium 2-ethylhexanoat*** er der ikke fundet konkrete ekspertvurderinger på stoffet. I REACH-registreringen foretages read-across til 2-ethylhexanoat, da denne bestanddel af stoffer er ansvarlig for stoffets klassificering som Rep 2. I REACH-registreringen af 2-ethylhexanoat er der beregnet en DNEL = 1 mg/kg/d for dermal eksponering baseret på et NOAEL på 100 mg/kg/d fra et teratogenforsøg med rotter. DNEL-værdien er beregnet ud fra principperne i ECHA (2012) og vurderes troværdig.

For **zirconium 2-ethylhexanoate**, no specific expert assessment was identified on the substance. In the REACH registration, read-across is made to 2-ethylhexanoate, as this component of the substance is responsible for the classification of the substance as Rep. 2. In the

REACH registration of 2-ethylhexanoate, a DNEL = 1 mg/kg/d for dermal exposure is calculated based on a NOAEL of 100 mg/kg/d from a teratogenic experiment with rats. The DNEL value is calculated from the ECHA principles (2012) and is considered credible.

Survey and risk assessment of chemical substances in chemical products used for "do-it-yourself" projects in the home

In this project, it has been investigated to what extent there may be a health risk associated with the use of different products for do-it-yourself (DIY) projects in the home.

Based on an initial screening, three do-it-yourself projects with particular risk of exposure to problematic substances were selected. Of the products which may be used for these projects, nine products were selected for the risk assessment, including 5 paint/lacquer products (2 water-based, 1 solvent-based, 1 epoxy-based and 1 acid curing product), 1 wax product, 1 two-component chemical wood product, 1 joint foam product and white spirit. Based on data on the constituent substances of the products and results of measurements of evaporation during application and the evaporation from the treated surfaces during the first month after application, a risk assessment of the products was performed.

The overall picture is that for eight of the nine products, there is a risk of work with the products if the user does not use personal protective equipment in the form of protective gloves or respiratory protective equipment during application. With regard to dermal contact it is in particular the skin sensitising substances which poses a risk, whereas for inhalation, it is the evaporation of chronic neurotoxic organic solvents, eye and respiratory irritants and carcinogens that cause increased risk.

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