National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Do-It-Yourself Products Fact Sheet

Default parameters for estimating consumer exposure – Updated version 2022

ConsExpo
consumer | exposure

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Colophon

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A. Cieszynski (author), Bundesinstitut für Risikobewertung (BfR)
C. Jung (author), Bundesinstitut für Risikobewertung (BfR)
T. Schendel (author), Bundesinstitut für Risikobewertung (BfR)
W. ter Burg (author), RIVM

Contact:
Wouter ter Burg
Veiligheid stoffen en Producten
consexpo@rivm.nl

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Synopsis

Do-It-Yourself Products Fact Sheet

Default parameters for consumer exposure estimates – revised version for 2022

It is important that consumers are able to use products safely. This requires an accurate estimate of the level at which consumers are exposed when they use the product. RIVM has developed the ConsExpo computer programme for this purpose. A web application for this programme (ConsExpo Web) is now available. Among other things, this makes it possible to calculate the level of exposure to a particular chemical when products such as paint, cleaning products or cosmetics are used indoors.

Fact sheets with default models and exposure values are available for the benefit of ConsExpo Web users. By using these models and values, ConsExpo Web users are able to estimate the level of exposure in a transparent and standardised way. Several fact sheets are available. The Fact Sheet on DIY Products has been revised.

The DIY Products Fact Sheet lists default values for the purpose of estimating the level of exposure to a particular chemical in a DIY product. Examples of such values are the frequency of use and the amount of product used. The revisions concern a description of the most recent data sources, a review of the quality of the new information and an adjustment of the default values wherever necessary.

In parallel with the publication of the revised DIY Products Fact Sheet, there will be an update to the default values in the ConsExpo database for glues, sealants, fillers, coatings and other products.

Keywords: ConsExpo Web, fact sheet, standardisation, consumer exposure estimate, DIY products

Publiekssamenvatting

Factsheet doe-het-zelfproducten

Standaardparameters voor de schatting van consumentenblootstelling – Herziene versie 2022.

Om mogelijke risico's van chemische stoffen in consumentenproducten te kunnen beoordelen, is een goede schatting nodig van de mate waarin mensen eraan blootstaan als zij het product gebruiken. Voor deze schatting heeft het RIVM het computerprogramma ConsExpo ontwikkeld, waarvoor recentelijk een webapplicatie is gemaakt (ConsExpo Web). Hiermee kan bijvoorbeeld de blootstelling van een bepaalde chemische stof binnenshuis tijdens het gebruik van bijvoorbeeld verf, schoonmaakmiddelen of cosmetica worden berekend.

Voor de gebruikers van ConsExpo Web zijn Factsheets geschreven waarin standaardmodellen en standaardwaarden (defaults) staan voorgeschreven. Door deze modellen en waarden te gebruiken, wordt de blootstellingsschatting op een transparante en gestandaardiseerde manier uitgevoerd. Er zijn meerdere Factsheets, waarvan nu de Factsheet over doe-het-zelfproducten is herzien.

In de Factsheet over doe-het-zelfproducten staan standaardwaarden die bruikbaar zijn om de blootstelling aan een stof in een doe-het-zelfproduct te schatten. Voorbeelden van die waarden zijn de frequentie van het gebruik en hoeveelheden van het gebruikte product. In de herziene versie staan de nieuwste beschikbare databronnen beschreven, is de nieuwe informatie beoordeeld en waar nodig zijn de standaardwaarden aangepast.

Parallel aan de publicatie van de herziene doe-het-zelfproducten Factsheet zullen ook de gepubliceerde standaardwaarden in de ConsExpo-database van onder meer lijmen, kitten, vullers, en coatings worden vernieuwd.

Kernwoorden: ConsExpo Web, Factsheet, standaardisering, schatting consumentenblootstelling, doe-het-zelfproducten

Contents

Samenvatting

Het doel van deze Doe-het-zelfproducten Factsheet is om te helpen beoordelen in welke mate consumenten bij het gebruik van doe-het-zelfproducten blootstaan aan stoffen.

Het rapport is een herziene versie van de factsheet voor doe-het-zelfproducten uit 2007, waarin standaard blootstellingsscenario's en standaardwaarden (defaults) staan beschreven voor het maken van een consumentenblootstellingschatting aan stoffen in doe-het-zelfproducten. Deze defaults zijn toepasbaar in de ConsExpo-software, die consumentenblootstelling aan chemische stoffen in consumentenproducten via de verschillende blootstellingsroutes kan berekenen. De waarden beschreven in de Factsheet doe-het-zelfproducten zijn recentelijk toegevoegd aan een database die is gekoppeld aan ConsExpo, een softwaremodel dat begin jaren negentig is ontwikkeld.

ConsExpo wordt gebruikt door diverse (inter)nationale organisaties en binnen verschillende wettelijke kaders. In 2016 is een online versie beschikbaar gekomen, ConsExpo Web. Product-specifieke defaults zijn essentiële waarden voor een consistente en geharmoniseerde bepaling en beoordeling van de blootstelling aan stoffen in consumentenproducten met behulp van ConsExpo. Deze defaults zijn ontwikkeld voor de verschillende productcategorieën en beschreven in een reeks van specifieke factsheets met blootstellingscenario's voor het gebruik van onder andere schoonmaakmiddelen, cosmetica, verfproducten, ongediertebestrijdingsmiddelen, desinfecterende middelen, luchtverfrissers en speelgoed. Daarnaast staan defaults voor generieke parameters zoals lichaamsgewicht, lichaamsoppervlak, kamergrootte en ventilatievoud beschreven in de Factsheet Algemeen, waarvan de meeste recente versie in 2014 is verschenen (te Biesebeek et al. 2014).

De data en de defaults zijn zoveel mogelijk gebaseerd op de Europese en Nederlandse situatie. Bij afwezigheid van geschikte data is er gebruikgemaakt van informatie uit andere landen. De onderliggende databronnen die gebruikt zijn voor het verkrijgen van de defaults worden uitgelegd en de betrouwbaarheid van de defaults wordt verantwoord met informatie over hun kwaliteit. De Factsheet doe-het-zelfproducten geeft gedetailleerde informatie en de blootstellingscenario's bij productgebruik staan expliciet beschreven. Voor elke mogelijke gebruikersactiviteit die kan leiden tot blootstelling zijn gestandaardiseerde waarden voorgeschreven. Dat houdt tevens in dat er specifieke modellen en defaults voor modelparameters staan voorgeschreven voor de blootstellingsschatting van stoffen in verschillende productgroepen van doe-het-zelfproducten die worden gebruikt door het hele huis. Het gaat om dertig productcategorieën, zoals lijmen, kitten, vullers, coatings, isolatieschuim en verwijderaars. Alle defaults zijn voorzien van een toelichting en een kwaliteitscore voor de onderliggende data. De databronnen waar het meest aan gerefereerd wordt, staan samengevat beschreven in een apart hoofdstuk.

Summary

Proper information on exposure assessment is often lacking in current risk assessment. Mathematical models, such as ConsExpo, can be used when experimental data is limited to assessing the exposure to consumer products and uptake of substances present. However, the large number of available consumer products prohibits the formulation of separate exposure models for every product. For this reason, products are categorised into several main categories, such as paint products, children's toys, cosmetics, pest control products, and cleaning products, for which Fact Sheets have already been prepared at the Dutch National Institute for Public Health and the Environment (RIVM).

In the Fact Sheet presented here, information on the use of Do-It-Yourself (DIY) products is provided. The use of the commercially available products from the main category of DIY products by consumers is described in thirty product categories, including the use of glues, sealants, fillers, coatings, insulation foams and removers. It aims to cover all uses of DIY products by means of a restricted number of product categories. To achieve this goal, products are categorised by type of DIY product use, and consequently by type of exposure for consumers. Each product category deals with the composition and the use of the products within that specific category. To assess the exposure to substances from the use of DIY products, default models under ConsExpo and default parameter values were established.

1 Introduction

1.1 Background

The ConsExpo software was developed in the early nineties at the request of the Dutch Keuringsdienst van Waren (currently known as the Netherlands Food and Consumer Product Safety Authority; NVWA) and the Ministry of Health, Welfare and Sport (VWS) in the Netherlands to calculate human exposure to chemicals in non-food consumer products. ConsExpo was designed and is used to estimate consumer exposure via all exposure routes (inhalation and dermal and oral exposure). Over the years, the ConsExpo project has been extended by the development of Fact Sheets, which are incorporated into the ConsExpo software as a data base.

The Fact Sheets are documents containing exposure scenario descriptions and default values for various product categories (Bremmer & van Veen 2002; Bremmer et al., 2006a, b; Bremmer & van Engelen 2007; ter Burg et al., 2007; Prud'homme de Lodder et al., 2006a, b). In addition, there is a General Fact Sheet containing default values for parameters, such as body weight, skin surface area, room volume, ventilation rate and activity patterns. The General Fact Sheet was updated in 2014 (te Biesebeek et al., 2014). The defaults described in the various Fact Sheets ensure that exposure assessments are conducted in a harmonised and standardised way, providing reasonable worst-case estimates, and are fit for use in the ConsExpo software.

1.2 ConsExpo Web

In October 2016, ConsExpo Web was launched as an online web tool (www.consexpoweb.nl) for estimating exposure to substances in consumer products. ConsExpo Web is easily available via the internet and, in principle, is similar to ConsExpo 4.1. The online tool is open for any future updates that improve the model. ConsExpo Web already allows the user to include multiple scenarios within a single assessment. A new model has been added to assess exposure to emissions from solid products (or articles), and a first-tier, screening-level model for estimating exposure to non-volatile substances in sprays has been added to the 'exposure to spray' model. Finally, the terminology for the outputs has been updated and the calculated exposure metrics have been adjusted. An updated manual describing how to use the ConsExpo Web version, as well as a description of the models available in the software, is accesible (Delmaar & Schuur, 2016).

The use of ConsExpo is recommended for consumer exposure assessment under REACH (EC, 2006) and the model is described in the updated REACH guidance (ECHA, 2016). It is also one of the models recommended for the assessment of consumer exposure to biocides (EU, 2012; ECHA, 2015a, b).

RIVM developed ConsExpo Web as an online software tool for the assessment of exposure to substances in consumer products. For this purpose, the software contains a set of coherent general, mathematical models. Consumer exposure can be estimated by choosing the most suitable model and filling in the required parameters of the product, such as the amount used or the concentration of the substance within a product, consistent with the scenario.

ConsExpo is constructed on the basis of data on the use of products contained in the Fact Sheets, which are then combined with mathematical models. The programme is based on relatively simple exposure models. The starting point for these models is the route of exposure, i.e., inhalation, or the dermal or oral route. The most appropriate exposure scenario and model is chosen for each route. Then, parameters needed for the exposure scenario and model, such as substance-specific data and the frequency and duration of use, are entered into the ConsExpo software for calculation of the exposure. Further details of the mathematics behind ConsExpo are described in the manual (Delmaar & Schuur, 2016).

ConsExpo can be used for a screening assessment (lower-tier, often used in regulatory frameworks) or for an advanced (higher-tier) assessment. For different exposure situations, different models are provided for calculating external exposure. ConsExpo also integrates the exposure via the different routes, resulting in a systemic dose. Different dosing regimens/exposure situations can be calculated (acute, daily, chronic). ConsExpo can also run calculations using distributed input parameters and perform sensitivity analyses. The models per route of exposure included in ConsExpo have different levels of detail and complexity.

The ConsExpo tool is publicly available via www.consexpoweb.nl. Default data is available via the data base, which is an integral part of the online tool. The manual and the various Fact Sheets can be consulted by following links to the website of the National Institute for Public Health and the Environment in the Netherlands (RIVM; www.rivm.nl/consexpo).

1.3 Fact Sheets

Fact Sheets are documents that present key information for consistent and harmonised estimation and assessment of exposure to substances from consumer products. In the Fact Sheets, information about exposure to chemical substances is bundled into certain product or exposure categories, and default parameters are provided. The main product categories, i.e., groupings of similar products, have been defined in the ConsExpo data base. Examples of these categories are cleaning products, paint, cosmetics, toys and pest control products. Categories are structured in such a way that products to which consumer exposure is similar are covered by one scenario. The choice of main product categories and subcategories is based on the product classifications used under REACH, by the United States Environmental Protection Agency (US-EPA) and the Swedish Chemical Agency (KEMI), as described by the Organisation for Economic Co-operation and Development (OECD, 2012).

The Fact Sheets have been developed in order to characterise and standardise the exposure estimation in combination with the ConsExpo software, but they are also useful for any exposure estimation without the use of the software. For each product category the composition and use of the type of products included in that category are described. To estimate exposure, default models with default parameter values are determined for each product category. These are available via a data base included in ConsExpo Web. Using this data, standardised calculations for consumer exposure to chemicals resulting from, for instance, the use of cleaning products can be performed. Fact Sheets for the product categories listed in Table 1 are currently available. In the near future, more Fact Sheets may be generated to cover other categories of consumer products.

Table 1 Main categories of consumer products, for which Fact Sheets are available.

Main categories of consumer products
Air fresheners Children’s toys Cleaning products Cosmetics Disinfectants Do-it-yourself products Paint Pest control products

Main product categories are divided into subcategories. For example, the main product category Cosmetics includes the following product subcategories: shampoo, make-up, lipstick, toothpaste and deodorant. Composition and use are examined for every product subcategory and, to estimate consumer exposure to substances, default models with default parameter values are determined for every product subcategory.

Scoping literature reviews (Arksey & O’Malley, 2005) are performed in order to collect the most appropriate data available to include in the Fact Sheets. The Fact Sheets therefore provide general background information on exposure models. They also describe various exposure scenarios for the specific products and set defaults for relevant exposure parameters. The default values are presented as deterministic values, but the statistical information is also provided if possible. This can be used in distributions in probabilistic (aggregate) exposure assessments. In general, the following topics are dealt with in the Fact Sheets:

- Background information about the main category that is relevant to exposure calculations.
- Delimitation of the main category and description of the product subcategories.

The Fact Sheets contain:

- General descriptions of the product categories.
- Descriptions of the composition of the products.
- Descriptions of the use of the products.
- Remarks about the products.
- Information on potentially problematic substances.
- Default scenarios and models.
- Default parameter values for the scenarios and models.
- Considerations that have been made in calculating the defaults.

The General Fact Sheet (te Biesebeek et al., 2014) gives general information about the Fact Sheets and deals with overarching topics that are relevant to several main product categories, such as:

- The boundary conditions under which the defaults are estimated.
- The way in which the reliability of data is evaluated.
- Parameters, such as ventilation rate and room size.
- Anthropometric parameters, such as body weight and the surface area of the human body, or parts thereof, and inhalation rates and activity patterns.

The default values from the General Fact Sheet are used in the specific Fact Sheets unless there is more profound data to define individualised values for the separate scenarios.

2 Default settings and quality of the data

The underlying data is used to estimate consumer exposure in the default scenarios described in the Fact Sheets. This data is collected from scientific literature, product information, legislation documents, survey data on consumer habits, and experimental data on substance release from consumer products. Default exposure values are set according to the default exposure scenarios. The quality of the collected data is assessed in order to describe whether and where further improvements in consumer exposure estimation with ConsExpo can be achieved, i.e., by collecting more and better data. ConsExpo users are also informed about the uncertainty associated with the data underlying the default exposure parameter values and exposure estimates.

2.1 Default setting

Default parameter values are selected to represent a reasonable worst-case scenario, i.e., one that represents consumers who frequently use a certain product under unfavourable conditions. For example, in the case of cleaning products, parameter values are selected to represent a scenario in which, relative to 'average' use, use is frequent, and the product is applied in large amounts and in a small room with a low ventilation rate, where the exposed person stays for a long time.

Although ConsExpo was originally developed for the Dutch consumer market, the parameter values are now aimed at consumers in general. When information is available, and if it is relevant, differences will be described for the European and North American population.

The parameter values are chosen to generate a conservative estimate to represent high-end users. To achieve this goal, the 75th or the 25th percentile is determined for each parameter. The 75th percentile is normally used for proportional parameters. However, a decrease in, for example, room volume or ventilation rate results in an increase of the exposure estimate. In the case of such reverse proportional parameters, the 25th percentile is used. For a significant number of parameters, there is actually too little data to calculate the 75th or 25thpercentile. In such cases, an estimate, corresponding to these percentiles, is made.

A probabilistic exposure assessment requires distributions of parameter values instead of deterministic point values. Such distributions were not reported in the previous version of the Fact Sheet (Prud'homme de Lodder et al., 2006a), but, if available, they are provided in this update. If a distribution is not available, a reference may be provided.

2.2 Quality of the default

The availability of data is different for each exposure parameter. For a number of parameters there is insufficient data to derive a reliable default. To indicate the reliability of a default value, a quality factor (Q-factor) is used. The quality factor ranges from 1 (low quality) to 4 (good quality), see Table 2.

Low Q-factors (Q=1 or 2) indicate that the default value is based on data that is not directly compatible with the exposure scenario or on data that comes from a limited data source and/or is based on expert judgement only. If such a default is used in an exposure analysis, it should be used with caution. If more representative data is supplied by applicants or producers or is available from other sources, it should be weighted higher than the default value.

High Q-factors (Q=3 or 4), however, indicate that the defaults are based on sufficient data. High-quality defaults are generally associated with less uncertainty than those with low Q-factors. It is possible that some parameters will need to be adapted according to the exposure scenario. For example, if the exposure estimation is carried out for a room of a size that differs from the default scenario, the actual value should weigh more heavily than the default value.

Table 2: Value of quality factor Q

Q-factor	**Description**
4	Good-quality data, parameter value reliable. Applicable to the exposure scenario description
3	Extent and quality of data satisfactory. Parameter value is applicable to the exposure scenario description.
2	Either: Extent and quality of the data are at least satisfactory. Default is subject to uncertainty on applicability to the specific exposure scenario. Or: data is considered to be limited, however applicable to the exposure scenario.
1	Educated guess, no relevant data available. Parameter value is based only on expert judgement and/or high uncertainty on applicability to the specific exposure scenario prevails.

3 Do-It-Yourself Products Fact Sheet

The previous Do-It-Yourself (DIY) Products Fact Sheet (ter Burg, 2007) was published by RIVM in 2007. It included exposure scenarios for 26 product categories with further details. Since then, the market has changed, either as a result of the introduction of new technologies or through changes in existing products. These changes have to be implemented into the Fact Sheet in order to cover the broad variety of products that are available on the DIY-market. Furthermore, if new data has become available regarding certain model parameters, defaults or Q-factors, it has been adopted. A summary of the changes is provided in Table 71 in Annex I.

3.1 DIY products

The range of products existing in the DIY sector is very wide, as is indicated in Table 3. These products are available to the consumer and their use is expected to result in inhalation, or in dermal and possibly oral exposure.

The Fact Sheet aims at predicting exposure emerging from the use of the entire product and is independent from the substance of interest. The default values that are presented serve to characterise consumer use of DIY products. Information about specific substances within the DIY product, such as concentrations and physicochemical properties, must be added separately to the exposure assessment.

Table 3 Product categories of DIY products described in this Fact Sheet

Chapter	Product type	Product categories
6	Glue	Tube glue Bottled glue • Universal/wood • Construction Super glue Two-component glue • Liquid in tubes • Adhesive putty/clay Wood parquet glue • Parquet glued to surface • Floating parquet Carpet glue Tile glue Wallpaper glue Hot-melt adhesive Spray glue
7	Sealant	Sealant – cartridge • Joint sealants • Assembly sealants
8	Fillers and Putty	General filler from powder Large hole filler Filler/putty from tubes

Chapter	Product type	Product categories
		Two-component filler Putty from spray
9	Plasters and equalisers	Floor equaliser Wall plaster • Wall plaster • Wall plaster spray
10	Coating	General Coatings Gutter coatings Spray coating
11	Remover	Paint remover • Liquid paint and lacquer remover • Paint and lacquer remover made from powder • Paint remover spray Glue remover • Glue remover liquid • Glue remover spray Wallpaper remover • Wallpaper remover liquid/powder • Application in spray form Sealant/foam remover • Sealant/foam remover liquid • Sealant/foam remover spay Rust remover • Rust remover liquid • Rust remover gel • Rust remover spray
12	Miscellaneous	Polyurethane foam Joint colour Emergency leak sealants (powder) Adhesive tape

Classification into product categories
For this Fact Sheet, DIY products have been classified into thirty product categories, which are characterised according to type of use and exposure (Table 3). The aim is to reduce the large number of individual products and applications to a limited number of product categories. The pattern of exposure within each category is very similar, so that one or, in some cases, two default exposure scenarios can be drawn up for all products that fall into that category. Only product categories are described for which exposure is expected. Furthermore, the product categories are grouped in such way that they can be used to assess exposure for other DIY products, for which no specific product category was drawn up.

3.2 Background information

In principle, default values are chosen for the European situation following the method described in subsection 2.1. However, information from other countries, such as Korea, the United States of America and Canada, is used as well. Bearing in mind the use of ConsExpo in various countries around the world with their specific legislative frameworks, special attention is given to information on sources outside Europe and to default values as set in guidance documents for the implementation of, for instance, the REACH (European Parliament and council, 2006) or Biocides Regulations (Parliament and Council, 2012).

Hobby use and DIY tasks
DIY tasks are carried out mainly in leisure time. According to data from Statistics Netherlands (Centraal Bureau voor de Statistiek), approximately 25% of the Dutch population (over 14 years of age) spends one to four hours per week on DIY tasks (Statistics Netherlands, 2005). Furthermore, Statistics Netherlands specifies that 6% of that population spends over five hours per week on DIY tasks in leisure time. There is a grey area between hobbying and conducting DIY tasks. For instance, fixing or making furniture can be seen as a hobby, but also as a DIY task. Still, some differences between hobby use and DIY tasks can be identified. First, the frequency of performing a hobby is higher than for DIY tasks, especially with regard to smaller tasks. For example, using glue for a DIY task, such as repairing a chair, is normally performed less frequently than gluing a model airplane. Second, people are likely to spend longer periods of time on hobby tasks than on DIY tasks.The hobby task is conducted voluntarily in leisure time and the hobbyist likes what he/she is doing. A DIY task, however, is an obligation because something needs to be repaired, fixed or improved. In most cases, it will be conducted accurately, to prevent reworking, but the consumer will not invest more time than is required. Third, the product amount used by a hobbyist is probably higher than for a DIY user. This is linked to the assumption that a hobbyist intends to conduct more extended tasks, such as gluing together several items on a regular basis instead of occasionally conducting just one obligatory gluing task as one might expect of a DIY user.

To conclude, the hobbyist is defined here as a '**very** high-end user' due to the higher frequency, longer duration and probably product amount defining his/her tasks in comparison to the DIY user. In this Fact Sheet, the focus is already on the high-end user of DIY tasks. It should be clarified that defining defaults and exposure scenarios for the hobbyist is not within the scope of this Fact Sheet. If products are specifically marketed for hobby use, it is strongly advised to adapt the presented defaults in order to allow a proper exposure assessment.

A hobby user scenario can potentially be modelled by using default parameters representing a higher percentile of data distribution. As explained in subsection 2.1, the 75th percentile is used for the DIY users' defaults in order to be realistic but still conservative. As a hobby user is defined here as a very high-end user, a higher percentile (90th, 95th) seems to be suitable for an exposure assessment.

The following exception is made in this context: The product type that is commonly used for hobbies and DIY tasks alike is glue (not applicable for parquet glue, carpet glue and tile glue). There are all sorts of glues, and their uses are consequently very diverse. For instance, glues are often used in several DIY tasks, but can also be used in crafting tasks. Nevertheless, their application is comparable and thus, the scenarios and the default values for these products are provided in the DIY

Products Fact Sheet (except for the product amount, use frequency and duration, see above). Another reason for taking up glues for hobby use here is so that all kinds of glues are categorised in one Fact Sheet. However, crafting by children is not described in this Fact Sheet. For this specific use, please refer to Van Engelen and Prud'homme de Lodder (van Engelen and Prud'homme de Lodder, 2004) for more information on children's exposure.

4 Generic scenarios and models for Do-It-Yourself products

The use of do-it-yourself products may result in either dermal, inhalation-related, oral, eye exposure or in a combination of these exposure routes. Users may be exposed during mixing and loading, during the application of DIY products as well as post-application. Most DIY products are ready to use, but some of them require mixing and loading prior to use. During the mixing and loading process, additional exposure may occur. The DIY products described in mixing and loading are glues (two-component glues, tile glue, wallpaper glue), fillers, two-component coatings, rust and paint removers and plasters made from powders.

In this Fact Sheet, the generic scenarios describe the use of the product, exposure conditions, as well as appropriate ConsExpo models to calculate expected exposure during the various stages of product use or the aftermath of the product use itself (e.g., clean-up phase). The various stages of product use that are considered generic for DIY products are:

- Mixing and loading (see subsection 4.1)
  - powders
  - liquids
  - two-component products
- Application (see subsection 4.2)
  - spray application
  - adhesives
- Post-application
  - clean-up phase (see subsection 4.3)

The current chapter only addresses generic default scenarios and their parameters, such as the mixing and loading of powder materials that are applicable to several products within this Fact Sheet. Chapters 6 to 12 provide the default scenarios, models, and parameter values (including those set in this chapter) to estimate the exposure in relevant exposure routes for the product categories mentioned in Table 3. Local eye exposure is not covered in this Fact Sheet because there is no model available in ConsExpo Web to derive this value.

Secondary exposure of bystanders may arise during and after DIY tasks have been conducted. Inhalation exposure may occur if another person is in the same room while the task is conducted. Dermal exposure can arise if a person tries to assist the user (pushing together freshly glued parts or cleaning up residues, e.g., wallpaper soaked with remover) or accidentally touches a treated surface or glued area after the task is completed. Nevertheless, in the following considerations regarding the default scenarios for different DIY products, the exposure of the user who carried out all contributing activities/tasks covers the secondary exposure during and after the DIY task, as well as the activities of any other person who takes over part of the tasks.

It is expected that the inhalation exposure of the user, who tends to be closest to the emission source, is higher than that of a bystander.

Therefore, once the inhalation exposure for the user is assessed, it can be assumed that the bystander's exposure is covered by this value. Please note that inhalation exposure to volatile substances (e.g., solvents) may occur over a long period of time (days to months) after the application of the product. In some cases, this may lead to chronic effects. This potentially long period of time after use exposure is not in the scope of the default scenarios described in this Fact Sheet. If necessary, it has to be assessed separately, using individually adjusted assumptions and default values.

Similar considerations apply to the dermal exposure of bystanders/assistants. The main user himself will be much more dermally exposed than a person who occasionally helps out during the task. Furthermore, DIY products are designed to harden very quickly in order to, for example, make it possible to use a treated surface or a restored object again as soon as possible. Therefore, accidentally touching DIY products following completion of the task will result in low dermal exposure, compared to the exposure levels during use.

4.1 Mixing and loading DIY products

As mentioned above, several DIY products require pre-treatment handling before they can be used. The additional operations may lead to additional exposure from the product besides application. In this Fact Sheet, three mixing and loading processes are described. The first mixing and loading process describes the mixing of two components where inhalation can occur due to evaporation and dermal exposure due to spills or direct contact (e.g., adhesive putty) with the product (see subsection 4.1.1). Similar considerations are made below regarding the second mixing and loading process, covering the mixing of two liquids (see subsection 4.1.2). The dilution of powders in water is the third mixing and loading process. Dust particles from the powder may enter the breathing zone and hence lead to inhalation exposure (see subsection 4.1.3).

4.1.1 Generic exposure scenario for mixing and loading: two-component products

The mixing of two components to prepare an adhesive agent or filler may lead to inhalation and dermal exposure. The mixed components vary from (low viscosity) liquids to solids, but the mixing and loading process is regarded as similar. The two components are put together in a shallow mixing cup or a bucket (e.g., two-component parquet glue) according to the ratio provided by the manufacturer. Usually two-component products consist of a basis, the resin, and a drying siccative, which are then mixed with a spatula, with another kind of tool or by hand (adhesive putty) until a homogeneous mass is obtained. When mixed, the two components react chemically, and hardening can occur.

Inhalation

Inhalation exposure can take place if volatile compounds evaporate during the mixing process. The ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model may apply here, where release from a constant area is considered. This model is selected as the default to describe the inhalation exposure from mixing and loading two-component DIY products.

Room volume and ventilation rate
Since the release of volatile substances from the mixing and loading activity occurs in the personal breathing zone, only this small area is relevant to inhalation. 'Room volume' is therefore interpreted here as personal breathing zone: a small area of 1 m^3 around the user, relevant to the inhalation exposure for the short use duration in which the mixing takes place. A Q-factor of 1 is assigned because this is an assumption based solely on expert judgement.
A ventilation rate of 0.6 h^{-1} (te Biesebeek et al., 2014) for an unspecified room is used. This value reflects the default value for air exchange between the room and the outside environment, while the air exchange between the personal breathing zone and the rest of the room is not accounted for, mainly because of the briefness of the mixing effort. A Q-factor of 1 is assigned.

Mass transfer coefficient (MTC)
A generic default value for the mass transfer coefficient of 10 m/h is proposed. This generic default is usable for a situation where specific properties of the substance, the product and the indoor environment are not considered. The Q-factor is set to 2, because of the generic and conservative character of the calculation from which the default is derived.

For further explanations regarding the derivation of the default, please check the overarching issues document provided by RIVM (RIVM, 2018).

Release area
Evaporation of volatile substances is expected from the surface of the mixture in the used mixing vessel.

According to the total product amount that has to be mixed, the vessel may differ. For smaller tasks (total mixed product amount < 5 kg) a bucket with a 12-l capacity seems sufficient. Commonly used buckets in this dimension provide a constant release surface area of 800 cm^2 (diameter = 32 cm), which is supported by information acquired in a short screening of the available products on the German market (see Table 121). For larger tasks (total mixed product amount > 5 kg) the vessel should provide enough capacity for 20 l product, which results in a release surface area of 1100 cm^2 (diameter = 37.5 cm) (see Annex II A.5). Both release area values will be set as the defaults in the mixing and loading processes with the related dimension of product amount. Because mixing buckets with these specifications are commonly offered by most DIY retailers, the Q-factor for the default is set to 2.

Molecular weight matrix
The products available on the DIY market are mainly mixtures containing several constituents with different physicochemical properties. Because the evaporation process is not only determined by the substance of interest but by all compounds, the molecular weight matrix parameter is necessary. It is used to correct the evaporation rate since it describes the average molecular weight of the rest of the total

product (product minus substance of interest). When the product only consists of substance, with a purity of 100%, this value can be left blank. However, in most cases the exact composition of a product is not exactly known. For this issue, a conservative default value of 3000 g/mol will be set, which is adapted from the Paint Fact Sheet where this value is used for solvent-rich paint. In this case, the main solvent is also the substance of interest, and its vapour pressure is not excessively influenced by other compounds in the paint because their concentration is expected to be rather low, or their molecular weight is very high. Further explanations regarding the molecular weight matrix are available in subsection 2.1.3 of the Paint Products Fact Sheet (Bremmer & van Engelen, 2007) and in the ConsExpo Web Manual (Delmaar & Schuur, 2016).

Dermal
Dermal exposure occurs when the two components are mixed together with some kind of tool. It is assumed that the surface area of two fingertips (small tasks; small mixing vessel, e.g., a cup) or of five fingers (larger tasks; bigger mixing vessels, e.g., a bucket) will be exposed from holding the tool or splattering. The ***dermal – direct product contact – instant application*** model is used to calculate the dermal exposure.

Exposed area
The fingertip is defined here as the top phalanx of one finger. According to the General Fact Sheet, the surface area of one hand (both sides) is 450 cm^2 (te Biesebeek et al., 2014). Half this area is assumed to belong to the fingers, which equals 225 cm^2. Consequently, the surface area of one finger is 45 cm^2 divided into 3 phalanges (15 cm^2 per phalanx). Therefore, the area of two fingertips, or rather top phalanges, is set at 30 cm^2 (default). Some products have to be mixed in much larger quantities (> 1 kg). In those cases, the dermal contact area is much larger, and it is assumed that the surface area of all 5 fingers will be exposed (=225 cm^2, see above) (te Biesebeek et al., 2014). An exception here is the mixing and loading of adhesive putty where extensive dermal exposure occurs while using just a small product amount (see subsection 6.5.2).

4.1.2 *Generic exposure scenario for mixing and loading: liquid-liquid*
Liquids are mixed in a suitable vessel. In most cases, this will be a bowl or a bucket, depending on the amount that needs to be mixed. The components will be poured into the mixing vessel either directly from the bottle or via an interposed measuring cup. It is expected that the physical efforts to homogenise two liquids are rather small. However, inhalation exposure may arise because of volatiles evaporating from the surface of the bottle opening/measuring cup and from the surface of the mixing vessel while the product is being homogenised. Moreover, the user can be dermally exposed during pouring and mechanical mixing through spills and spatters.

Inhalation
To calculate the inhalation exposure during mixing and loading within ConsExpo Web, the ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model is used.

Room volume and ventilation rate
The defaults for the room volume and the ventilation rate are set according to the considerations made in subsection 4.1.1. The room volume is set to 1 mm^3 (personal breathing zone), and the ventilation rate is 0.6 h^{-1}. The latter value reflects the default value for air exchange between the room and the outside environment, while the air exchange between the personal breathing zone and the rest of the room is not accounted for.

Release area
Evaporation of volatile substances is expected from the open bottle and the surface of the mixture in the vessel. The surface of any measuring cup is neglected at this point because the substance will not remain in the cup for long. Therefore, this potential exposure source will be covered by taking into account the evaporation from the bottle opening, too.

It is assumed that the product is contained in a one-litre bottle that has a circular opening of 5 cm diameter and a surface area of 20 cm^2.

According to the total product amount that has to be mixed, the vessel used may differ. For smaller tasks (total mixed product amount < 5 kg) a bucket with a 12 l capacity seems sufficient. Commonly used buckets in this dimension provide a constant release surface area of 800 cm^2 (diameter = 32 cm) which is supported by information acquired in a short internet and on site (2 DIY markets) screening of the available products on the German market conducted by the authors of this report. For larger tasks (total mixed product amount > 5 kg), the vessel should provide enough capacity for 20 l product which results in a release surface area of 1100 cm^2 (diameter = 37.5 cm) (see Annex II A.5). As the opening of the bottle (20 cm^2) has to be considered too, the default release area for mixing and loading liquids amounts to 820 cm^2 for smaller tasks and to 1120 cm^2 for larger tasks. Because mixing buckets with these specifications are commonly offered by most DIY retailers, the Q-factor for these defaults is set to 2.

Dermal
To estimate the dermal exposure within ConsExpo Web, the ***dermal – direct product contact – instant application*** model is used for both direct pouring and loading with measuring cups.

Exposed area
It is assumed that direct pouring of liquids leads to dermal exposure on the side of the hand directing the bottle to the bowl or bucket. The default for the exposed area is set to be equal to one side of the hand, 225 cm^2, which is in accordance with the General Fact Sheet (te Biesebeek et al., 2014). Since the assumption that one side of the hand is exposed is based solely on expert judgement (although the default for hand surface area is derived from a data-rich source), the Q-factor is set to 1.

Product amount – dermal
The Biocides Human Health Exposure Methodology Document (ECHA, 2015a) human dermal exposure to biocides during the process of

dispersing a concentrate from a container and diluting it with water in a vessel. The 75th percentile for dermal exposure during this mixing and loading event is 0.01 ml, irrespective of the amount poured (ECHA, 2015a). Assuming a liquid density of 1 g/cm^3, the default for the product amount landing on the skin during direct pouring is set to 0.01 g. Because of the availability of quantitative but specific (non-generic) and limited data (i.e., 4 measurements), the Q-factor is set to 2.

4.1.3 Generic exposure scenario for mixing and loading: powder liquid

During the mixing and loading process, powders may disperse into the air and can subsequently be inhaled or deposited on the skin. In the DIY sector, powder products are primarily meant to be mixed with water prior to usage, frequently in large quantities.

Inhalation
In the general mixing and loading scenario of a powder product, the powder is poured either directly from the package or with the help of a measuring cup into a mixing bucket. In the following considerations, no distinction is made between the two variations of pouring because they are not expected to result in exposure differences.

This Fact Sheet follows a different approach from the 2007 version (ter Burg, 2007) to describe the inhalation exposure while mixing and loading powders. The ConsExpo ***inhalation – exposure to spray – instantaneous release*** model (Delmaar & Schuur, 2016) is now recommended to estimate the exposure caused by inhalation of product particles. The physicochemical properties of solid aerosols emitted by sprays have much in common with the ones from powders, e.g., the very low volatility and their similar particle shapes. Although a powder is obviously not a spray, the instantaneous release of the spray model is thus best suited to approximate the exposure during the loading of powder. The release is expected to be very short-lived and therefore, the instantaneous release is preferred over the spray model. Default values are provided for the following model parameters for simulation of the generic scenario of exposure to powders (Meesters et al., 2018).

Frequency
In some cases, the amount of powder and water that needs to be mixed is too much to handle in one mixing effort. It is expected that the common DIY user will not have the equipment (automatic mixing device, sufficiently big mixing vessel) nor the physical properties (strength, endurance) in order to mix powder amounts that exceed 5 kg. Furthermore, it might become problematic to mix higher amounts because it is possible that the mixture will harden before it can be completely used.

Therefore, if the amount of 5 kg powder is exceeded, it is assumed that more than one mixing effort has to be conducted. The frequency of the mixing and loading scenario will then be set to be equal to the mixing repetitions that are required. If, for example, 30 kg powder have to be mixed with 7.5 l water, the frequency would be 6 times per event (event = use of tile glue, for instance).

Exposure duration
Specific data regarding the duration of mixing and loading filler products was recently gathered in a feasibility study. In total, there were 83 data points with a minimum of 0.5 minutes and a maximum of 20 minutes. The 75th percentile equals 3 minutes (Schneider et al., 2018). As there is no further data available for other DIY products, this value will be used as a default for the exposure duration taking into account the assumption that the mixing person is exposed during the whole mixing and loading process. The Q-factor is set to 2 because the parameter is based on only one source.

Released mass
Little information is available about the fraction of powder that is released to indoor air during mixing and loading powder products. Information on dust formation of washing powder is provided in the Cleaning Products Fact Sheet (Meesters et al., 2018; van de Plassche et al., 1999). The original experiments and home observation studies were performed by Hendricks (1970). The author found "that there is on average 0.27 µg detergent dust exposure per cup of product used". Here, the detergent dust exposure refers to the amount of laundry detergent inhaled while "pouring the product from the carton into a measuring aid and then to the washing machine" (Burg et al., 1977; Hendricks, 1970; van de Plassche et al., 1999). It is possible to recalculate the supposed released mass in the experiments of Hendricks (1970) based on the laboratory conditions described (sampling time of 2 minutes, distance to dust source within personal breathing zone, inhalation rate of 16.3 l/min), by assuming that Cons Expo's ***inhalation – exposure to spray – instantaneous release*** model (Delmaar & Schuur, 2016) is suitable for such a calculation and that the duration of the experiments is too short for the ventilation rate to be effective. The supposed released amount per cup (8.3 µg) is calculated as follows:

$$Released\ Mass = \frac{Inhaled\ Mass}{(Inhalation\ Rate \times Sampling\ Time)/(Personal\ Breathing\ Zone\ Volume)} = \frac{0.27\mu g}{(0.0163\ m^3/\min \times 2\min)/1m^3} = 8.3\mu g$$

8.3 µg released mass per 200 g powder used will be used as the default value. The following assumptions are made in the calculation of the released mass: an instant release model is suitable for the calculation above, ventilation and gravitational settling of the dust is negligible for the exposure time considered and the short distance of the analytical device to the loaded powder directly leads to a release into the personal breathing zone of 1 m^3. Because of these limitations, the Q-factor for this default is set to 1.

Room volume and ventilation rate
Room volume is interpreted here as the personal breathing zone, a small area of 1 mm^3 around the user. Only this small area is relevant for the inhalation exposure during the brief time period that mixing and loading takes. The Q-factor is considered to be 1, because the interpretation of the personal breathing zone is based on expert judgement.

A ventilation rate of 0.6 h^{-1} (te Biesebeek et al., 2014) for an unspecified room is used. This value reflects the default value for air exchange between the room and the outside environment, while the air exchange between the personal breathing zone and the rest of the room is not accounted for. A Q-factor of 1 is assigned.

Dermal
Dermal exposure to powders can be taken into consideration for mixing the powder with water. Within ConsExpo Web, the ***dermal – direct product contact – constant rate*** model is suggested to estimate dermal exposure to powder during loading.

Exposed area
It is assumed that both palms will be dermally exposed during mixing and loading through dust falling on hands or direct contact with the powder. According to the General Fact Sheet, 50% of two hands (=two palms) have a surface of 450 cm^2, which will be used as a default here (te Biesebeek et al., 2014). The Q-factor is set to 2 because the underpinning data for the size of the hands is quantitatively rich but the final determination which body parts will be affected during the task is based on expert judgement (see also subsection 4.5).

Contact rate
In the Guidance on the EU Biocidal Products Regulation (BPR), a dermal exposure study for the use of sprinkling/dusting powders to control dust mites has been described (ECHA, 2015a). The subjects in the study applied crack and crevice powders in a kitchen treating skirting boards, shelves and laminate surfaces. The dermal exposure on hands and forearms ranges from 0.4 to 4.18 mg/min with a 75th percentile of 2.83 mg/min. The contact rate for dermal exposure for legs, feet and face ranges from 0.22 to 6.56 mg/min with a 75th percentile of 2.15 mg/min. It is assumed that the values can be adapted for the mixing and loading of DIY powder products. The value for the contact rate of approximately 5.0 mg/min (2.83 + 2.15) is set as a default. The Q-factor is considered to be 1, because the underlying data is rich but collected for the application (not mixing and loading) of biocides in the form of powder.

Release duration
The release duration is assumed to be similar to the exposure duration for inhalation exposure. 3 minutes is set as the default with a Q-factor of 2 because underpinning data is limited.

4.2 Application

Definition of volatile substances
It is important to define whether a substance that has to be evaluated by means of ConsExpo is a volatile or a non- volatile substance. Following the definition provided by Snippe, a volatile substance is a compound with a vapour pressure > 0.1 Pa, non-volatile < 0.01 Pa, and slightly volatile between 0.01 and 0.1 Pa (Snippe et al., 2002).

4.2.1 Spray application
In this Fact Sheet, a few scenarios are described using the spray model, for examples glue spray, putty spray, plaster spray and several remover sprays. These are liquids and suspensions that are applied with the

spray mode of application. Here, general parameters for the spray model will be discussed.

Within the context of ConsExpo Web, a spray application is defined as the generation of slowly evaporating or non-volatile substances in droplets that are released from a spray can (Delmaar & Bremmer, 2009; Delmaar & Schuur, 2016). There are three main types of spray applications:

- Aerosol spray cans that use the expansion of a pre-pressurised propellant gas to drive out the aerosol
- Trigger sprays that operate by means of mechanical force from pulling the trigger.
- Pneumatic spraying where the product is applied using an air pressurised device (spray gun) and potentially a compressor. If no compressor is attached, the pressure has to be restored manually by pumping. After pulling the trigger, the product is mixed with the compressed air stream and released in a fine spray.
    - Additionally, in recent years, two subgroups of pneumatic spraying became more and more popular in the DIY sector:
    - High Volume Low Pressure (HVLP) spray guns require a compressor that provides a constant air flow to distribute a product through the spray gun onto the surface. The difference between this technology and the previously mentioned conventional pneumatic spraying is the lower pressure that is used. Conventional pneumatic spray systems work with a high pressure, which distributes the product as a fine, atomised mist, allowing the user to work on a very intricate level. HVLP systems, however, produce rather large droplets which will result in thicker coats of product on a surface.
    - Airless Systems are built similarly to HVLP technology. It requires an electrically run hydraulic pump to move a product from a container through a tube into a high-pressure hose that is connected to a spray gun, which then distributes it across a surface. As the name indicates, no air is involved here; only pressure is utilised to move the product.

The generated droplets comprise inhalable aerosols, but dermal exposure is also expected, as part of the droplets may deposit onto the unprotected skin of the hands and arms. Aerosol spray cans, trigger sprays and pneumatically/airlessly distributed products may contain volatile substances that can evaporate into the air after they have been sprayed upon a surface. Therefore, it is recommended to consider the exposure to such volatile substances as exposure to vapours, so that the inhalation exposure resulting from their evaporation is not neglected.

Inhalation
A major pathway of exposure to spray applications is the inhalation of respirable aerosols generated during the use of aerosol spray cans, trigger sprays and pneumatically/airlessly distributed sprays. Inhalation exposure to these aerosols is driven by a variety of exposure parameters, such as the ventilation rate of the room, the duration of presence of the exposed person in the room during or after spraying,

and the way the product is used. Additionally, product-specific characteristics such as the composition, the pressure or the used container (nozzle), are highly relevant to the resulting exposure.

The general exposure scenario for inhalation of substances from spray applications provides interpretations and/or defaults for parameters referring to spray duration, density of non-volatile substances and mass generation rate (i.e., the released mass per unit of time during spraying) for aerosol spray cans, trigger sprays and pneumatically/airlessly distributed sprays.

The ***exposure to vapour – evaporation – instantaneous release*** model is used to estimate the exposure to volatile substances from DIY products available on the market as sprays. The ***Exposure to spray – spraying*** model is used to estimate inhalation exposure to non-volatile substances when using DIY products as sprays. The parameters of this spray module within ConsExpo Web have been experimentally evaluated in the report by Delmaar & Bremmer (2009). Exposure duration, room volume and ventilation rate are parameters that are not generic. Instead, defaults are specifically derived for each scenario of consumer exposure. The other parameters in the ***exposure to spray – spraying*** model are discussed below, describing either the derivation of a generic default value or at least a generic approach to do so. These generic defaults and approaches are consistent with the ConsExpo Web manual (Delmaar & Schuur, 2016), the set of experiments evaluating the critical parameters of the model (Delmaar & Bremmer, 2009), and the General Fact Sheet (te Biesebeek et al., 2014). All consumer exposure scenarios described in the current Fact Sheet to substances in DIY sprays do not consider the ‘spraying toward person’ option, because the intended use is to spray towards surfaces that are to be treated.

Spray duration
‘Spray duration’ is defined here as the net spraying time between start and finish of spraying during the whole event, not counting the time between sprays (Delmaar & Schuur, 2016). A clear definition of ’spray duration’ is important, because the amount of spray available for inhalation is simulated in ConsExpo Web from the mass generation rate of the spray, the spray duration and ventilation (Delmaar & Schuur, 2016). Default values for spray durations are derived per specific scenario for consumer exposure.

Room height
The default of room height is based on a standard room height of 2.5 m as explained in the General Fact Sheet (te Biesebeek et al., 2014) with a Q-factor of 4 because the underpinning data is quantitatively rich.

Inhalation rate
Spray tasks are considered to be light exercise in the DIY sector. The inhalation rate is therefore set to 1.49 m^3/h by default for adults (te Biesebeek et al., 2014).

Mass generation rate of aerosol spray cans
The definition of mass generation rate of sprays is in contrast to that of the Cleaning Product Fact Sheet published in 2006 (Prud'homme de

Lodder et al., 2006) where mass generation rate is defined as the *average mass released per unit of time over the entire duration of the cleaning task*. In the current Cleaning Product Fact Sheet, and consistently in the DIY Products Fact Sheet, the mass generation rate of a spray product is defined as the *mass released per unit time of spraying*. In the study by Delmaar & Bremmer (2009) such mass generation rates were determined for aerosol spray cans by spraying for 10 seconds and determining the weight loss in the spray can afterwards. To get more insight into the variation of the mass generation rate during the lifetime of the product, the weight loss was measured when the spray container was still full and also when the container was nearly empty (Delmaar & Bremmer, 2009). In these experiments, performed on 17 aerosol spray cans, the mass generation rate ranged between 0.29 and 2.2 g/s. This is consistent with the data from a comparable series of experiments by Tuinman, which show a 75th percentile of 1.2 g/s (Tuinman, 2004; Tuinman, 2007). The default mass generation rate for aerosol spray cans is therefore set at 1.2 g/s. The Q-factor is set to 3, because the underpinning data is quantitatively rich but in a specific exposure scenario, a specific mass generation rate is still preferred over a generic one.

Mass generation rate of trigger sprays
In addition to the aerosol spray cans, Delmaar & Bremmer (2009) experimentally determined mass generation rates for trigger sprays by squeezing 10 times (which approximately takes 6 seconds) and determining the weight loss in the spray can afterwards. The obtained mass generation rates of 6 different trigger sprays ranged between 1.0 and 1.5 g/s. This is consistent with the data from the comparable series of experiments by Tuinman, which show a 75th percentile of 1.6 g/s for trigger sprays (Tuinman, 2004; Tuinman, 2007). The default mass generation rate for trigger sprays is therefore set at 1.6 g/s. The Q-factor is set to 3, because the underpinning data is quantitatively rich but in a specific exposure scenario a specific mass generation rate is still preferred over a generic one.

Please note that the above data on mass generation rates is based on pest control products, cleaning products, cosmetics, paints, lubricants, polishes and cockpit sprays, but not on DIY products. At present, there is no other data available to derive the mass generation rate for DIY products in spray form. The compositions and volume distributions may be significantly different for DIY products; nevertheless, the data will be used as a preliminary source and indication for the dimensions of the values.

Airborne fraction
The airborne fraction is defined as the fraction of the non-volatile material that becomes airborne after spraying as droplets. Default values for the airborne fraction depend on the way in which the product is being used, as well as on the aerosol diameter distribution that has been specified. DIY sprays (glue, putty, plaster, several types of removers) are used to treat surfaces and therefore, are sprayed away from the user onto the surface. Delmaar & Bremmer (2009) have derived a default airborne fraction of 0.2 for such surface spraying activities. This default airborne fraction for surface spraying is derived

from data collected for all purpose cleaner spray and flea spray. A specific airborne fraction for DIY sprays, however, was not included the series of experiments by Delmaar & Bremmer (2009). The default surface spraying airborne fraction of 0.2 is included in the calculation of an airborne fraction of DIY sprays that is scaled for the aerosol droplets < 22.5 µm.

Delmaar & Bremmer (2009) state that spray droplet sizes fitted from experimental data to lognormal distributions across the entire range generally proved to be poor. As the smaller aerosols in the distribution are the most critical with respect to inhalation exposure, Delmaar & Bremmer (2009) chose to fit the size distributions in the region of diameters up to 22.5 µm, realising that the fit of the distribution for larger aerosol sizes may not be valid. The airborne fraction for surface spraying is therefore multiplied by a scaling factor that refers to the mass fraction of sprayed droplets < 22.5 µm.

The default aerosol diameter for DYI sprays (see *aerosol diameter* below) actually refers to aerosol diameter distributions with a median diameter of 15.1 µm and a c.v. of 1.2 for pneumatic sprays and 7.7 µm and a c.v. of 1.9 for trigger sprays. These aerosol diameter distribution parameters are actually fitted to best represent the mass fraction of spray droplets, which are < 22.5 µm in series of experiments performed on spray paints and sprays against crawling insects. In addition, Delmaar & Bremmer (2009) derived a scaling factor of 0.7 for the spray paints and a scaling factor of 0.04 for sprays against crawling insects. The airborne fraction is to be multiplied by these scaling factors (Delmaar & Bremmer, 2009), so that the airborne fractions in this Fact Sheet are: 0.2 × 0.7 = 0.14 for the pneumatic DIY sprays and 0.2 × 0.04 = 0.008 for DIY trigger sprays (See Table 3 below).

The Q-factors are set to 2, because the surface sprays that are evaluated in the experiments of Delmaar & Bremmer (2009) include only a small number of samples and none of them belonged to the DIY sector.

Inhalation cut-off diameter
The inhalation cut-off diameter is defined as the diameter below which the sprayed aerosols can be inhaled and reach the lower areas of the lungs, i.e., the alveolar region (Delmaar & Schuur, 2016). It is only an approximation of the complicated process of deposition of aerosols in the lungs, but in practice, its value is suggested to be set at 10–15 µm (Delmaar & Schuur, 2016). In order to be conservative, the default for inhalation cut-off diameter is set here at 15 µm. The Q-factor is considered to be 3, because the value is specifically but qualitatively derived for the parameter inhalation cut-off diameter.

Density non-volatile
The density of the non-volatile fraction is one of the parameters included in the spray model and is defined here as the density of the aerosol droplets that become airborne. Together with the droplet diameter, the aerosol density determines the time that the aerosol droplet is airborne and therefore available for inhalation. Many non-volatile ingredients in DIY products are made of (very) large organic substances with densities

between 1.0 and 1.5 g/cm^3. The density of salts generally varies between 1.5 and 3.0 g/cm^3. For a complex mixture of (organic) substances, the default density is set at 1.8 g/cm^3. The Q-factor is set to 3, because density is a physicochemical property that is evident for most substances, but it is presented here on a generic level (Table 4).

Table 4 Default values for density non-volatile substances (Prud'homme de Lodder et al., 2006a)

Main ingredient	Density (g/cm^3)	Q-factor
Large organic substances	1.5	3
Salts	3.0	3
Complex mixtures	1.8	3
Density data lacking (non-volatile)	1.8	3

Aerosol diameter
The aerosol diameter of the sprayed droplets is an important parameter when estimating the exposure. Smaller drops fall at a lower speed and stay in the air longer. Large droplets will quickly disappear from the air after being formed. As an indication, the falling time of droplets with a diameter of 100 μm from a height of 3 metres is calculated to be 11 sec, and for droplets of 10 μm it is calculated to be 17 minutes (Biocides Steering Group, 1998). If a larger droplet is sprayed, part of the aerosol cloud will consist of finer droplets, which will stay in the air longer, as a result of edge effects around the nozzle and the 'bounce back' effect due to spraying onto a surface.

Measurements provided by Delmaar & Bremmer (2009) and Tuinman (2007) regarding the aerosol diameter distribution of various spray products lead to the default values listed in Table 5.

At present, there is no information available on the aerosol diameter distributions of DIY products. Nevertheless, as DIY sprays are exclusively used for surface spraying, it is assumed that results referring to similarly used spray products can be considered to be reasonable estimates for the DIY sector, too. Following this paradigm, the default for aerosol spray cans is set at a lognormal distribution with a 15.1 μm mass median diameter and c.v. of 1.2 (default for paint containing spray cans fitted to best represent the mass fraction of droplets < 22.5 μm). Furthermore, the default aerosol diameter distribution for the use of trigger sprays is a lognormal distribution with a mass median diameter of 7.7 μm and a c.v. of 1.9 that was originally fitted to best represent the mass fraction of droplets < 22.5 μm in sprays against crawling insects. The Q-factors are set to 1.

Table 5 Defaults for aerosol diameter distribution (median [µm] and coefficient of variation) (Delmaar & Bremmer, 2009)

Spray type	Airborne fraction by use	Scaling factor	Scaled airborne fraction	Mass median diameter (c.v.)	Q-factors	
					Airborne fraction	Aerosol diameter
Pneumatic spray	0.2	0.7	0.14	15.1 µm (1.2)	2	1
Trigger spray	0.2	0.04	0.008	7.7 µm (1.9)	2	1

Oral non-respirable material exposure
Non-respirable oral exposure is expected from material in aerosols with a diameter larger than the inhalation cut-off diameter. Aerosols of this size are deposited in the higher regions of the respiratory tract, so that they are taken up orally. ConsExpo offers the option 'include oral non-respirable material exposure'. If this option is checked, ConsExpo adds an oral route model to the exposure scenario and accounts for the non-respirable fraction of the inhaled spray. By default, the option is not 'included' for DIY sprays, because the larger aerosols are mostly prone to deposit on the surface at which the spray is directed.

Inhalation of volatiles
The inhalation exposure to volatile substances in cleaning sprays is estimated using the ***inhalation – exposure to vapour – instantaneous release*** model. The defaults for the parameters exposure duration, room volume, ventilation and inhalation rate described for non-volatiles in sprays (see above) also apply to volatile substances.

Dermal
In this general scenario of exposure to spray applications that are directed at surfaces, the ConsExpo ***dermal – direct product contact – constant rate*** model is used to calculate the dermal exposure. The generic exposure scenario for such dermal exposure explains the interpretation of contact rate and release duration. Defaults are derived for contact rate only.

Contact rate for aerosol spray cans
ECHA (2015a) provides data for consumer spray products available as pre-pressurised aerosol spray cans and hand-held trigger sprays, e.g., the consumer product spraying and dusting model developed by the UK Health Safety Laboratory (HSL) in 2001. This non-professional surface spraying model for indoor surfaces describes the use of pre-pressurised aerosol spray cans, e.g., for shelves and horizontal/vertical laminate surfaces. The model calculates a 75th percentile of 64.7 mg/min for dermal exposure on hands and forearms, while for legs/feet and face a 75th percentile of 35.7 mg/min is provided, so that the total contact rate for the use of aerosol spray cans is roughly 100 mg/min. Hence, the default for contact rate – aerosol spray cans is set at 100 mg/min. The Q-factor is 3, because the underpinning data is quantitatively rich but not specifically collected for DIY products available in aerosol spray cans.

Contact rate for trigger sprays
For the use of hand-held trigger sprays, ECHA (2015a) describes a non-professional surface spraying model for spraying indoors in small rooms, i.e., dining chairs and carpets. The 75th percentile for contact rate after dermal exposure on hands and forearms is 36.1 mg/min, while for legs/feet and face, it is 9.7 mg/min, yielding a total contact rate for trigger sprays of roughly 46 mg/min. Hence, the default for contact rate for trigger sprays is set at 46 mg/min with a Q-factor of 3. The Q-factor is 3 because the underpinning data is quantitatively rich but not specifically collected for DIY products available as trigger sprays.

Contact rate for pneumatic spraying
A contact rate regarding the use of a pneumatic spray system is not described in the Cleaning Products Fact Sheet. Therefore, the following description is provided.

In the TNsG's (European Commission, 2002) 'Consumer product spraying and dusting', a surface spraying model is stated in which the consumer uses an electric powered sprayer outdoors for spraying all types of fence with a wood preservative. The dermal exposure on hands and forearms ranges from 32.4 to 144 mg/min with a 75th percentile of 72.6 mg/min. The dermal contact rate for legs, feet and face ranges from 13.4 to 84 mg/min with a 75th percentile of 39.9 mg/min. Based on the data above, the default value for the contact rate during pneumatic spraying for the total dermal exposure is set at 110 mg/min with a Q-factor of 3 because underpinning data is quantitatively rich but not specifically collected for indoor use of DIY products (Bremmer & van Engelen, 2007).

Release duration
Dermal exposure is expected to occur both during the actual spraying event and the time between spray events. The release duration should therefore be equal to the intermittent spray duration (total duration of the whole spraying task) in case spraying is not continuous.

4.2.2 Evaporation pattern of adhesives

Inhalation
The evaporation pattern of adhesives is different from that of most other DIY products. In contrast to paints, for instance, the surface from which chemicals from adhesives can evaporate is not constantly 'open'. Adhesives are implicitly used to connect parts. This means that the adhesive is covered with the part that is to be connected. The time during which there actually is a surface–air situation is described as the 'open time' of glue. This open time may range from a few seconds to several minutes. The duration of this open time depends on the hardening process and thus on the type of glue. Solvent-based adhesives have relatively short open times, in contrast to (most) water-based adhesives, due to a relatively higher evaporation rate. Polyurethane-based glues are covered after application to prevent reaction with moisture, which is not desirable for a good end result.

The evaporation pattern of adhesives starts with a relatively high temporal evaporation rate (during open time), which is then followed by a relatively slow constant evaporation rate (when the surface is covered). Experimental data from solvent-based glue products shows that the starting emission rate is of the magnitude of 0.4 g/m^2 per second. After covering the applied product, the vapour concentration will rapidly drop below the odour (smell) detection limit (in the order of 10–20 ppm for solvents) (personal communication with Vereniging Nederlandse Lijmindustrie (VNL) conducted by RIVM during the preparation phase for the 2007 DIY Products Fact Sheet).

Currently, there is no evaporation model in ConsExpo which can describe this two-phased evaporation pattern of adhesives. For this reason, the ***exposure to vapour – evaporation – release area mode: increasing*** model is used for relatively small tasks (and amounts). The time during which evaporation takes place is set to be equal to the exposure duration, which is in fact a conservative approach.

Relevant parameters for the ***exposure to vapour – evaporation – release area mode: increasing*** model besides the general parameters (exposure duration, product amount, weight fraction of the substance, room volume and ventilation rate) are:

- Release area: The total surface area the product is applied to.
- Application duration: The time period during which the product is applied.
- Temperature: The room temperature prevailing during exposure.
- Molecular weight and vapour pressure: The physicochemical properties of the substance in question.
- Mass transfer coefficient: The rate that describes the transfer of the substance in question between the product’s surface and the air. For further explanations, see subsection 4.1.1.

However, this approach is not considered appropriate when larger gluing tasks are considered. A large task must be divided into segments when the total time required to apply the glue and connect the parts exceeds the open time of glue (see above). This will result in repeated ‘peak’ exposures during the task. Examples of such large tasks are gluing parquet, tiles and carpets. The ***exposure to vapour –evaporation – release area mode: constant*** model is used for repeated ‘peak’ exposures within a task. The relevant parameters for this model are largely similar to those mentioned above. One exception is the emission duration, which is necessary instead of the application duration.

- Emission duration: The time period during which the substance is released from the product.

Because (simultaneous) evaporation from the total surface area during a large project is not realistic (laying carpet, gluing parquet etc.), an alternative description of exposure is required to integrate the repeated exposures during these large tasks. The release area is set to be equal to the surface area one can treat per segment. It is assumed that an individual treats 1 m^2 per segment (4 m^2 for carpet gluing). After that, the surface is covered, and the exposure is considered negligible compared with the surface to be treated next. These steps are repeated until the task is completed. It is assumed that the inhalation exposure is described by evaporation of the total amount, rather than the adjusted amount, from a constant surface area, i.e., 1 m^2. The ***exposure to vapour – evaporation – release area mode: constant*** model is used. This simplification of the model is necessary, to overcome the problem of depletion of the source. The emission duration and the exposure duration are set to be equal during these tasks because considering the interval approach, a source depletion of the segments is not expected.

4.2.3 *Dermal exposure*

Describing the dermal exposure to certain DIY products can be troublesome. Because glue spills or other DIY products on hands can complicate the task for the user, he/she may tend to clean or wipe his/her hands. The result of this behaviour is that the exposure increases from the moment the user starts, decreases when the hands are cleaned, and increases again when the task is continued. When the product contains components that are not absorbed easily through the skin, lower internal exposure is expected; but when a component is absorbed rather easily, internal exposure is evident. However, for many components the dermal absorption rate is unknown.

Currently, there is no dermal exposure model available to describe this fluctuation in exposure. ConsExpo provides two models, the ***dermal – direct product contact – instant application*** model and the ***dermal – direct product contact – constant rate*** model, both of which can be used to describe this kind of exposure. To illustrate the difference between the two models, consider a total dermal load (e.g., X) that a subject is exposed to on completion of the task. The instant application model assumes that the subject is exposed instantly to X amount of the product which remains on the skin during the task. This results in an overestimation of the exposure. For large tasks, the dermal load may rise up to grams. Being exposed instantly to such an amount is not realistic. The constant rate model describes a more gradual increase in the dermal load over time, up to the amount X. The contact rate is determined by dividing the total amount by the time of use. Information on the release duration is required. In total, this is a conservative approach for products that contain volatile substances because it neglects that a part of the substance evaporates over time and is therefore not available for dermal exposure anymore. Another point is that glues are designed to harden in a certain (mostly short) period of time, which also reduces dermal exposure. Furthermore, during the use of two-component products, a chemical reaction takes place when both components are mixed. During this process, part of the substance in question may be consumed by the reaction, which would also lead to lower exposure values. However, this model seems to describe a somewhat more realistic scenario because it is not known to what extent a subject is exposed during the task. In other words, the constant rate model describes the pattern of exposure better than the instant application model does, although we do not know the pattern exactly.

In this Fact Sheet, it is recommended to apply the ***dermal – direct product contact – instant application*** model when dermal exposure is expected to be low or the task relatively small. In such cases, a subject will not clean his/her hands during the task. Then again, for relatively large tasks where large spills can be expected, the ***dermal – direct product contact – constant rate*** model is applied because this provided a more realistic scenario for the subject's behaviour in view of dermal exposure.

Dermal – direct product contact – instant application
Dermal exposure: product amount
Dermal exposure while using DIY products is often caused by spills. The product amount which actually contacts the skin directly depends on the consumer's behaviour, the DIY task, the product itself and the total amount used. To obtain more insight into the amount spilled during a task, a short experiment was conducted (see Annex II, A.2). During the experiment it was established that a drop of glue weighs approximately 50 mg. Spreading a small amount of glue twice, using one finger which led to exposures of 30 mg and 90 mg. When the palm of a hand is fully covered with glue, it was estimated that the product amount contacting the skin is 1 g. When such an amount is spilled, the subject may not be able to proceed without cleaning their hand first.

In an update of the Paint Products Fact Sheet (2007), the relationship between the manner of painting (overhead, downward, or painting to the side at chest height) and the spilled amount is described (Bremmer & van Engelen, 2007). The amount of paint spilled also depends heavily on the type of paint, surface area and its accessibility. For several paints it was described that the amount spilled equalled on average up to 0.2% of the total amount required. This figure ranged from 0.09% to 0.56%. The product amounts ranged from 250 g to 1,800 g.

In contrast to paint, there is a wider range of product amounts in DIY products – in some cases the amount can add up to several kilograms. Furthermore, dermal exposure to paint is different from dermal exposure to specific DIY products, such as glue or sealant, which might hamper the user from completing the task. The user will then have to clean their hands before continuing with the task. In those situations, the relationship between product amount and amount spilled is different compared to paint. Nevertheless, the described relationship can provide useful estimates of spilled amounts. A general default value could not be derived for DIY products. See the product categories for the default values for dermal product amounts.

Dermal – direct product contact – constant rate
Contact rate
The dermal contact rate is required when the constant rate model is advised. A dermal contact rate has not been determined for DIY products so far. For several paints, contact rates were determined under various circumstances, summarised in the TNsG (European Commission, 2002). Four exposure models are described for consumer painting. Values (75^{th} percentiles) were found to range from 17 to 186 mg/min, with most values around 50 mg/min. In the Paint Products Fact Sheet (2007), the manner of painting affects the dermal contact rate. Three default values for the contact rate were established; overhead painting with low viscosity products, overhead painting with 'normal' viscosity products, and downward painting or painting at chest heigh. These defaults were 120 mg/min, 60 mg/min, and 30 mg/min, respectively. It is assumed that the use of DIY products can best be compared with

either overhead painting with products of 'normal' viscosity or with downward or chest-height painting tasks.

It is acknowledged that no data is available on DIY products. Thus, the comparison with paints is made qualitatively rather than quantitatively. A contact rate of 50 mg/min seems low (equal to one drop of glue spilled per minute; see Annex II, A.2), but it may add up to several grams when a task is conducted for several hours. In that case, spills from DIY products may hamper a subject from performing a task, causing subjects to clean their hands more often. Therefore, for large tasks a default value of 30 mg/min is set, with a Q-factor of 1.

4.2.4 *Generic exposure scenario – application of diluted products*

As described in subsection 4.1.2, several DIY products require dilution (with water) prior to use. These products mainly involve remover products in the DIY segment. During application, dermal contact with the product is highly probable. Furthermore, diluting a product in hot water may increase the evaporation process and the subsequent inhalation of volatile substances.

Inhalation
Inhalation of water-diluted products is calculated using the ConsExpo ***inhalation –exposure to vapour – evaporation*** model (Delmaar & Schuur, 2016). In order to follow the generic exposure scenario for product dilution with water, some interpretation and defaults are required for the parameters product amount (dermal) and dilution times.

Dilution (times)
For products that are diluted with water, it is necessary to correct for dilution in order to correctly simulate the evaporation of substances (Delmaar & Schuur, 2016). Such corrections are done with a dilution factor that was presented as a new feature in the ConsExpo Web tool in 2018. The equation to calculate the dilution times is derived as:

$$dilution = (A_{solvent} + A_{product})/A_{product}$$

Dilution: dilution as 'times'; $A_{solvent}$: amount (mass) of solvent (g); $A_{product}$: amount of pure product (g).

Thus, the dilution is calculated as the inverse of the weight of the amount (mass) of pure product used divided by the total mass of the diluted product (i.e., the sum of the pure product and the solvent).

For example, consider liquid rust remover that has to be diluted in water prior to use. 200 ml rust remover has to be mixed with 1800 ml water, both with a density of 1 g/ml. The amount of solution used represents the sum of the solvent amount and the product amount, which in the example is 1800 g + 200 g = 2000 g. The weight fraction of the product amount in the amount of solution used is then 200 g / 2000 g = 0.1. The number of dilution times is the inverse of this weight fraction, 1/0.1 = 10 times.

Dermal
If the ***dermal – direct product contact – instant application*** model is used to calculate dermal exposure from diluted products, the following considerations for the product amount should be taken into account (mainly for smaller applications).

Product amount
The default product amount on the skin is calculated from the concentration of the product following dilution in a container, such as a bucket. This concentration is calculated by dividing the amount of product ($A_{product}$) inserted into the container by the volume of water in the container ($l_{water\ in\ mixing\ vessel}$). The volume of water that comes into contact with the skin ($l_{water\ on\ skin}$) is derived by means of the surface area of the exposed skin multiplied by the layer thickness of liquid film (0.01 cm), which is taken from the Guidance on Information Requirements and Chemical Safety Assessment Chapter R.15: Consumer exposure assessment (ECHA, 2016), where a general layer thickness for liquid runoffs is set at 0.01 cm. The product amount that comes into contact with the skin is then calculated by multiplying the concentration of the product in the water by the volume of water that comes into contact with the skin, calculated as follows:

$$A_{product\ on\ skin} = \frac{A_{product}}{l_{water\ in\ mixing\ vessel}}\, x\ l_{water\ on\ skin}$$

The Q-factor for such a calculated parameter value is 2 at most because that is the lowest Q-factor of the variables from which product amount is calculated (layer thickness).

Please note that if a powder product is mixed with just a small amount of water resulting in a more paste-like final product, this approach is not feasible. In these cases, the dermal load will be determined individually.

Dilution
The *dilution* for estimating dermal exposure will be presented as an additional parameter in the new features of ConsExpo Web. It refers to the number of times the product is diluted into a solvent, which is most often water, and can be derived using the same approach as described above for estimating inhalation exposure. In the current Fact Sheet, dilution times for dermal exposure are not explicitly presented. All external dermal exposure estimations are either done with the **dermal –direct product contact – instant application** model or the **dermal – direct product contact – constant rate** model, where dilution is not a parameter. However, the current Fact Sheet does describe consumer exposure scenarios that include dermal exposure from applications of diluted products. In these scenarios, dilution is nonetheless accounted for by calculating the product amount that is in contact with the skin by multiplying the concentration of the product in the water by the volume of water that is on the skin of the consumer (see above). Please note that it is necessary to correct substance properties such as diffusion and permeability coefficients for the properties of water upon contact with diluted products when using dermal exposure models other than those prescribed in the current Fact Sheet, e.g., diffusion models.

4.3 Post-application

Post-application exposure is interpreted across the Fact Sheets as exposure to a product while the exposed person is not actively performing the task the product is intended for. In the case of DIY-products the most common post application activity is cleaning up. Additional dermal exposure (for instance, through contact with product-soaked residues) and onward inhalation exposure, because the consumer stays in the same room after using the product, possibly occur during cleaning.

The clean-up phase may include several steps, such as the gathering of residues (e.g., detached wallpaper), removal of product from surfaces accidentally treated (e.g., inaccurate spray application), cleaning of used tools/utensils (e.g., with a solvent) or cleaning dirt from the work area resulting from the conducted task (e.g., rust/remover mix after removing rust from an object). This process mainly affects the default for the exposure duration, which has to be expanded depending on the extent of the cleaning task in order to assess the exposure sufficiently conservatively. The dimension of the cleaning task is not generic and therefore explained in the particular exposure scenarios.

4.4 User population

The defaults described in this Fact Sheet are derived for consumers, not for professional use of the products concerned, for example on constructions sites. Therefore, only products are considered that are available on the market for the average consumer.

Non-professional users of DIY products comprise both men and women. The average size of body parts for adults, their body weight and their inhalation rates are taken from the defaults provided in the General Fact Sheet (te Biesebeek et al., 2014). The inhalation rate depends on the task conducted and the related physical effort the user has to exert. It is therefore not generic and needs to be determined individually for the particular exposure scenarios.

Body weight
The body weight of the adult user is set at 68.8 kg as a default with a Q-factor of 4 (te Biesebeek et al., 2014). Please note that in the regulatory context, it may be necessary to adjust this default according to the obligations of a specific regulation (e.g., in the REACh context, the default for the body weight of an adult user is considered to be 60 kg).

Surface areas
It is most likely that individuals will be dermally exposed to their hands while working with DIY products, where both intentional and accidental contact may occur. The surface area for both hands is set at 900 cm^2 by default (te Biesebeek et al., 2014), whereas sometimes only one hand or one palm will be taken as an exposure area. These surface areas relate to the total surface area by a factor 0.5 or 0.25, respectively. Fingertips are quite often used during DIY tasks, for example to smooth joints made from sealants. Their surface area is set at 15 cm^2 per fingertip (see subsection 4.1.1).

4.5 Addendum regarding the derivation of Q-factors

During the work on the Fact Sheets, a special case was identified when it comes to the quantification of the Q-factor. This case is characterised by the following conditions:

- The value for a parameter is based on a sufficient and quantitatively rich dataset
- An assumption, based on expert judgement is made to derive the final default

One example for such a case is the exposed dermal area. For one thing, we have a profound dataset regarding the sizes of different skin surface areas (e.g., for the hands, upper body etc.) from the General Fact Sheet (te Biesebeek et al., 2014) which would result in the assignment of a Q-factor of 3. Then again, the estimation of the extent of the affected area is in most cases expert judgement without underpinning data, which would result in a Q-factor of 1.

In these cases, it is proposed to assign a Q-factor that represents the quality of the derived default value in the context of the individual exposure scenario in order to avoid the implication of an unjustified quality level.

In practice, the Q-factor is set to 2 if expert judgement is combined with profound data in order to derive the final default because of the resulting uncertainty that correlates with subjective assumptions.

5 New information after 2007

5.1 Experimental evaluation of critical parameters of the ConsExpo spray model

A series of experiments on propellants and trigger sprays was performed in 2009 in order to validate and calibrate the spray models included in ConsExpo (Delmaar & Bremmer, 2009). Two critical exposure parameters for spray products are the mass generation rate of the product, and the size distribution of the generated aerosols. These parameters have been experimentally determined for 23 spray cans and trigger sprays. Mass generation rates were determined by spraying for 10 seconds (spray cans) or squeezing 10 times (trigger spray; squeezing 10 times takes approximately 6 seconds) and subsequently determining the weight loss of the spray.

Particle size distributions were determined by light scattering experiments using the Mastersizer S (Delmaar & Bremmer, 2009). The study included products from various product groups, including pest control products, personal care products, cleaning products and paints.

Information from the experiments is used to derive defaults for mass generation rates and particle size distributions for aerosol spray cans and trigger sprays for the various product categories.

The default mass generation rates described in the Fact Sheets generated in 2006/2007 have been updated in 2010 in ConsExpo 4.1, based on the experimental measurements by Delmaar & Bremmer (2009).

In the previous version of the DIY Products Fact Sheet (ter Burg, 2007), mass generation rates of sprays were defined as the mean mass generation rate over the total time span of the spraying task. This required the mass generation rates from Delmaar & Bremmer (2009) to be adjusted by averaging over the total time span (RIVM, 2010). In the current version of the DIY Products Fact Sheet, a different approach is adopted. In contrast to the 2007 version, the mass generation rate is defined as the mass generated during the net spraying time. Using this definition, the mass generation corresponds directly to the generation rates determined in the experiments described in Delmaar & Bremmer (2009). For, further explanations regarding the mass generation rate and other parameters for the spray model, see subsection 4.2.1.

5.2 BfR-market analysis

As a basis for further considerations, the German Federal Institute for Risk Assessment (BfR) conducted a small market analysis to get an overview of the available DIY products on the consumer market. As a starting point, a small delegation of the BfR colleagues performed an on-site visit to a local DIY market. The 5 groups identified 89 products of interest during their visit. In the follow up, 20 products were further investigated and, if appropriate, implemented into the Fact Sheet with a default scenario.

As a next step, in February 2018, the online presences of four of the biggest DIY retailers in Germany were screened in order to create a compilation of representative products (and product information) for every product category. In exceptional cases, especially if not enough products could be identified on the relevant retailer sites, a pursuing search was conducted expanding the search with international websites. The goal was to find ten different products for each category. Given the limited resources available, the goal was not completed for all product categories and therefore, in some cases, fewer than ten products were listed.

As selection criteria, the products listed in the market analysis should be available for order to the casual consumer and easy to find, which means that no excessive investigation should be necessary in order to find the product online. It is assumed that the casual user would rather buy a product that is prominent on the market (easy to find, supported by user ratings) and does not tend to inquire more deeply in order to purchase a lesser-known product.

For the identified products, safety and technical data sheets were acquired. A total amount of more than 200 products and the related data sheets were screened. The gathered information was used if possible (sufficient specific data available) to develop defaults for product consumption, product density and water consumption (if a product has to be mixed with water prior to use). Furthermore, the market analysis provided a database to give an overview on possible compositions of the products. Defaults were, if possible, determined following the approach provided by RIVM to calculate the 75th percentile taking into account values of several products from the same product category and using Excel´s *QUANTIL.EXKL-formula*. The gathered product information is listed in Annex II.

5.3 Exposure factors for cleaning, automotive care, and surface protection products for exposure assessments (Park, 2016)

Park et al. conducted a field survey regarding 18 consumer products[1] between November 2013 and January 2014 in 17 metropolitan areas and provinces in Korea, including rural areas. Face to face interviews using a questionnaire were carried out with 10,000 participants (5010 men and 4990 women) aged 15 years or older. Besides the information referring to demographic key figures and lifestyle, detailed information (product amount per use, use frequency) on the use of the relevant consumer products were collected.

For the DIY Products Fact Sheet, the data of adhesive remover and rust inhibitor are usable. Even though the survey was conducted in Korea, it is assumed that the results can be adopted for the European population.

[1] household bleach, mold stain remover, all-purpose cleaner, washing machine cleaner, air conditioner cleaner, glass cleaner, drain cleaner, adhesive remover, liquid snow chain, tire shine spray, wheel cleaner, rain repellent, car wax spray, leather polish, furniture polish, anti-fog product, fabric waterproofing spray, and rust inhibitor

5.4 Short title: Feasibility study consumer behaviour chemicals (Schneider et al., 2018)

This project was a collaboration of aproxima, a corporation for market and social research, and FoBiG (Forschungs- und Beratungsinstitut Gefahrstoffe GmbH), an expert group in the field of chemical safety and toxicological risk assessment, on behalf of the BfR. The main purpose was to test survey methodologies to improve the data situation regarding consumer behaviour when using products containing chemical compounds. A concept to gather data was created and tested in a feasibility study, and on that basis, a final concept was designed to conduct a major survey in the near future.

The feasibility study tested which method (Consumer Product Questionnaire (CPQ), 24-Hour-Recall (RFQ), Diary/Protocol or Observation) is the most suitable to gather information regarding the parameters application duration, used product amount, location of application and way of application for selected products (hand dishwashing detergent, cockpit-spray, filler, lacquer and paint, leisure shoes (plastic or rubber) and writing instruments).

In total, 2399 out of the almost 6000 members of the test panel contributed to the results of the study. 4139 probands took part in the CPQ interviews (1186 by telephone, 2953 online), 1034 answered the RFQ-questions (729 by telephone, 305 online) and 124 written protocols were sent back by the users supplemented by 17 video protocols.

The collected data was analysed in order to find the most suitable method for every considered parameter. The results are also usable in the context of the DIY Products Fact Sheets to derive default parameters for putty products.

5.5 Consumer survey for estimating use frequencies of glues

In June 2017, Kantar Emid conducted a consumer survey commissioned by the BfR. The purpose of the survey was to obtain information regarding the consumer use frequencies of various glue types. The survey was conducted in the form of an omnibus interview integrating a total of 2044 consumers. The results of the survey, its limitations and the way the data is used in the Fact Sheet are described and discussed in Annex II A.4.

5.6 Consumer behaviour while using glue products (unpublished (status 09/2022), data described in Annex II, A.4)

The BfR commissioned a survey to gather exposure-related information during the use of universal glue and wallpaper glue. The survey was conducted between June and December 2018 via telephone interviews with a field of 1335 participants. The used questionnaire consisted of questions regarding the use frequency and the use patterns (usage of tools, read/respect of safety instructions, safety measures…) of consumers.

Subsequently, and in addition to the CATI (Computer Assisted Telephone Interviews), interviews, respondents who claimed that they would most likely use universal glue or wallpaper glue in the next 4 weeks were asked to fill out a provided protocol in order to describe their individual use conditions as realistically as possible. The users were asked to document aspects such as product amount used, duration of use, exposed body parts and duration of contact. For universal glue, 56 out of the 57 filled out protocols were considered for further evaluation. In the case of wallpaper glue, 52 out of 54 protocols could be taken into account. If feasible, the results were used to derive defaults for the exposure scenarios described in this Fact Sheet.

6 Glues

6.1 General use

Glues or adhesives are products that are used to connect parts without making use of machinery or other techniques (such as welding, soldering and bolts). There are many types of glue available for very diverse tasks. Some are used for simple tasks, such as crafting, while other glues are used for construction purposes, e.g., wood glue and construction glue. In addition, there are glues made for special purposes in which specific materials can be glued together (e.g., plastic to metal). Furthermore, the glue may function as a kind of multipurpose filling material with adhesive effects for small repair jobs (adhesive putty). Different glues have different characteristics and require different handling methods. Cleaning procedures before gluing are required in order to obtain a clean, dry, and a dust and grease-free surface that glue can adhere to. These cleaning procedures will not be discussed in this Fact Sheet. Instead, the reader is referred to the Cleaning Products Fact Sheet (Meesters et al., 2018).

Glue constituents depend on the type of glue and its purpose of use. In principle, glues are composed of the following components: an adhesive agent, additives (e.g., filling agent, resins, preservatives, moisturisers), and solvents. There are natural adhesive agents, i.e., natural rubbers, starch, and casein, but synthetic adhesive agents, such as polyvinyl acetate or polyurethane, are more commonly used. Additives are used to improve the adhesive strength and the shelf life. Frequently appearing examples for additives in glues (and furthermore within other product categories of the DIY-field) are preservatives, such as benzisothiazolinone (BIT), methylchloroisothiazolinone (MCI), and methylisothiazolinone (MIT). These substances occur not only in wood glue, carpet glue and tile glue but also in joint sealants, large hole fillers, and ready-to-use wall plaster.

As binding agents are solids, they are dissolved in solvents in order to become manageable. Most used solvents are acetone, boiling point spirit (60–95 ^{o}C), ethyl acetate, methyl acetate, methyl ethyl ketone (MEK), butyl acetate and white spirit. Furthermore, there are glues that are ‘solvent-free’. In such cases, water is mostly used to dissolve the binding agent and additives.

Hardening processes of glues
The difference in use of various glues can be influenced by their hardening process. For instance, water-based glues function by dehydration (water evaporates slowly or diffuses into the material). Solvent-based glues harden by evaporation of the solvent. Two-component glues function by chemical reaction, similar to certain one-component glues where UV-light is a catalyst in the chemical reaction. In addition, there are pressure bindings (contact glue) and hot melts.

The hardening process plays a major role in how a subject may be exposed to the chemicals present in that glue and is therefore considered in the following paragraphs.

Categorisation of glues
In Table 6, glues are categorised according to their main purpose (please note that this is not a complete list of glues). Exposure to glues and its constituents can also be categorised according to the way the glues are used, and hence to user exposure (e.g., grouping all tube glues into one category). In most cases, however, there are several alternatives for a specific task. At the same time, multi-purpose glues can also be used for various tasks. Describing a single default for such a glue would not cover all uses. It is therefore necessary to think carefully about the task, the type of glue, and its container before a default scenario is selected to determine exposure to that glue.

For this Fact Sheet, glues have been categorised on the basis of their container type. By grouping glues this way, glues are also grouped in terms of exposure and use. This is an alternative categorisation to the one shown in Table 6. For example, universal glues are contained in tubes, bottles, spray cans, and glue guns. The use (and hence the exposure scenario) varies for glues contained in different containers because the glues are handled differently; moreover its constituents may differ from each other. Please note that while some glues are kept in similar containers, their use is dissimilar, for example tile glue and carpet glue. In those cases, separate product categories were described. All glues are described with just a few scenarios in order to keep the Fact Sheet concise and easy to use.

The following scenarios for glues have been chosen: tube glue, bottled glue, super glue, two-component glue, wood parquet glue, carpet glue, tile glue, wallpaper glue, hot-melt adhesives, and spray glue, as described in Table 6.

Table 6 Glues sorted by purpose[a]

Group	Purpose (materials)	Utility form	Surface size	Container
1. Universal glue	Various	Liquid, paste, gels, contact (two-sided)	Small	Tubes, bottles, spray cans, glue guns (heated)
2. Wood glue, PVAc in water	Wood-wood	Liquid (white), paste, powders	Variable	Bottles, cartridge gun-tubes, cans
3. Construction glue (PU-based)	Construction	Liquid, paste	Variable	Cartridge gun tubes
4. Super glue	Various	Liquid, gel	Small	Small tubes, dose pen
5. Two-component glues	Metal, wood, plastic combinations	Liquids, paste, plasticine	Small	2 small tubes (stuck) together, plastic pipe

Group	Purpose (materials)	Utility form	Surface size	Container
6. PVC glues	PVC (drainpipes)	Liquid	Variable	Cans with brush
7. Special glue	Glass, plastic, textiles,	Liquid, gel	Small	Small tubes
8. Tile glues	Tiles (various)	Paste, powder	Large	Cans, buckets, bags
9. Wallpaper glue	Paper	Powder	Large	Box containing powder
10. Carpet glue	Textile-concrete	Liquid, paste	Large	Cans, buckets
11. Parquet glue	Wood-concrete, Wood-wood	Liquid	Large	Large tubes, bottles, cans

[a] Please note: this table is far from complete and was not used to categorise glues in the Fact Sheet.

6.2 Glues from tubes

Table 7 The type of tube glue and its possible applications; please note that this list is not complete but can be considered in order to get an overview of possible applications (see Annex II A.5, Table 84 and Table 85)

Type of tube glue	Product density (g/cm^3)	Application
Universal glue	0.9	Various
Contact glue	0.8-0.9	Various, plastics (soft PVC), polystyrene, Glue-glue

Use

Many glues are contained in (small) tubes. These glues are taken as one category since the way they are used is very similar. Hence, it is expected that the exposure is also similar. These glues are: universal glues (including hobby and household glues) and contact glue. Keep in mind that these glues may also be contained in other types of containers and do not reflect the entire segment of universal glues.

The tubes vary in size and range from 5 ml to 125 ml glue per tube. The glues are liquids or gels with moderate viscosities. They are used for many purposes, but generally for small tasks, e.g., crafting or gluing photos. The glue is simply put on the surface to be attached. It is then spread out (with a tool, finger, or the tip of the tube; not always necessary for smaller surfaces) to cover the surface and dried for a few minutes. According to the instructions on the container, one should check whether the glue will attach properly using one's finger. Then, the other object is pushed against the surface and the objects are clamped tightly together. For somewhat smaller surfaces, simply holding the surfaces together should be sufficient.

Contact glues often require two-sided application of the glue, so that the adhesion is glue-glue. This increases the chance that an individual will be dermally exposed (assumed to be twofold).

Scenario for tube glue
In this scenario, two small objects are glued together with universal glue from a tube. The ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: increasing*** model is used to estimate inhalation exposure. Dermal exposure can occur when glues are spread out with the fingers or when excess glue is removed manually. The exposure duration will not be much longer than the application duration, because individuals will wash off glue immediately after use. The exposure is estimated using the ConsExpo ***dermal – direct product contact – instant application*** model because the task is rather small and therefore of short duration.

Frequency
Taking into account the information provided by a survey for the use frequency of universal glue by consumers, the default for this parameter is set to 36 times per year (see Annex II A.4.2). Because universal glue is assumed to be a common product distributed in tubes in the glue sector, the default seems appropriate in this scenario. A Q-factor of 2 is assigned because data is sufficient albeit limited.

Exposure duration
The period of time during which volatile compounds can evaporate may be longer than the application duration (see below) because the glue needs to harden. Assuming that a person stays in the room after use, an exposure duration of 240 minutes will be used as a default. The Q-factor is set to 1 because underpinning data is currently not available.

Product amount – inhalation
The amount of glue also depends on the surface being glued. In the report by Magré (2005), conclusions considering the product amount used per square metre were not drawn. In a consumer survey conducted in Germany in 2019, a 75th percentile of 6 g for the used product amount was documented (see Annex II A.4.2). According to the directions for use of the products per 100 ml, a surface of 0.2 m^2 can be treated (see Annex II, product data collection Table 85). Assuming that a surface of 0.02 m^2 (small task) has to be treated with glue, 10 ml will be sufficient in this scenario. As in the consumer survey the treated surface was not further specified (e.g., size), it is assumed that considering the product information will provide a more conservative result. Therefore, this option is preferred.

Taking into account a product density of 0.9 g/cm^3, the default for the product amount is set to 9 g. The Q-factor is set to 2 because there is underpinning data from the BfR market analysis for several products.

Room volume and ventilation rate
A room volume of 20 m^3 and a ventilation rate of 0.6 per hour are used in this case because the room the user is working in is not specified (te Biesebeek et al., 2014).

Release area
The release area is interpreted here as the surface that is glued with the product amount used. According to the product information, 10 ml of universal glue (=9 g) is sufficient to treat an area of 200 cm^2, which is set as a default for this scenario. The Q-factor is set to 1 because underpinning data for this value is currently not available at the moment.

Application duration
According to an observational study about consumer use of DIY products (Magré, 2005), the average duration for a glue job for small surfaces amounts to approximately 6.5 minutes. Although this figure includes glues for other uses, it is also considered indicative for the use of tube glues. Time spent on gluing is heavily dependent on the surface area to be treated and not on what kind of glue is used (except for super glue due to its very short application time). According to information acquired during a consumer survey (including protocols), the application duration of universal glue can range from 1 minute to a maximum of 266 minutes. The 75^{th} percentile is 36 minutes (see Annex II A.4.2). As this value is more conservative and based on a more robust and extended data set, it is preferred here as an indicative value. Therefore, a default application duration of 36 minutes is taken into consideration. The Q-factor is set to 2 because the underpinning data is sufficient, albeit limited.

Exposed area – dermal
In general, only the fingertips of one hand are used to spread out tube glue. The surface area of one fingertip or rather one top phalanx of a finger is approximately 15 cm^2 (see subsection 4.1.1). It is assumed that only one side of a fingertip is used to spread out or remove the glue. Fifty percent of the surface area of one phalanx is 7.5 cm^2. Assuming the user applies two fingertips to this task, a dermal exposure area of 15 cm^2 is provided. The Q-factor is set to 1, because the underpinning data is quantitatively rich but rather compromised by the calculation in subsection 4.1.1.

Product amount – dermal
Spills can occur on the skin or while the glue is spread out. According to our own experiments (see Annex A.2), two performed trials yielded a mean of 0.06 g and a maximum of 0.09 g for the product amount on the skin. Therefore, as a conservative default, a product amount of 0.08 g is taken into account The Q-factor is set to 1 because the experiment was only conducted twice, which can provide an impression for the dimensions of the dermal product amount but is not sufficient for the default to be rated higher.

Table 8 Default values for tube glue

Default value		Q-factor	Source
General			
Frequency	36 per year	2	See above
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	240 min	1	See above
Product amount	9 g	2	Estimate
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	200 cm^2	1	See above
Application duration	36 min	2	See above
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	15 cm^2	1	50% of two phalanges (te Biesebeek et al., 2014)
Product amount	0.08 g	1	See above

6.3 Bottled glue – moderate-size surfaces

This product category includes all glues that are available in small bottles. It includes, amongst others, universal glue, wood glue and construction glue.

Use

The bottles or jars contain glue in the range of 25 to 1000 g. In general, these glues are used for larger surfaces than tube glues. The most commonly known bottled glue is wood glue, which is used for various glue jobs ranging from small to large. The glue is easily squeezed from the bottle onto the objects and spread out with one’s finger, tool or with the nozzle. To keep the glues free from fungi and bacteria, preservatives are added. In addition, additives may be present to make the glue water-resistant. Hobby or universal glues also display a wide range of uses and are used similarly to wood glues (see Table 9).

Table 9 Possible applications of different types of bottled glue; please note that this list is not complete but can be considered in order to get an overview of possible applications (see Annex II A.5, Table 84, Table 85 and Table 86)

Type of bottled glue	**Product density (g/cm^3)**	**Application**
Universal glue	0.9	Various, hobby glue
Wood glue	1.1-1.2	Wood-wood/various
Construction glue	1.1-1.6	Construction
PVC glue	0.92	Gluing of hard PVC and ABS two-sided

The exposure duration is not expected to be much longer than the one estimated for tube glues. One does not have to work precisely in this case and that saves time. Although bottled glues are taken up as one category, their uses and hence exposure may vary considerably. Therefore, two scenarios will be described with specific defaults for universal/wood glue and for construction glue, respectively.

For PVC glue (for hard plastics), no separate scenario is described. To calculate inhalation exposure, the default parameters for universal/wood glue can be used. PVC glue is applied with a brush, which is attached to the lid. Glue is applied to both ends of PVC pipes, which are then stuck together. Dermal exposure will be lower than is expected for other bottled glues and therefore considered negligible.

Scenario for universal/wood glue
The default scenario for this product category is gluing together two slides of wood. The inhalation exposure to bottled glues occurs from the (open) bottle itself, during and after application. For this task, the ConsExpo ***inhalation*** – ***exposure to vapour – evaporation – release area mode: increasing*** and ***dermal – direct product contact – instant application*** models are used to estimate the expected exposure.

Frequency
As shown in Table 10, glues sold in bottles are mainly universal glue, wood glue, construction glue and PVC glue. Information regarding the use frequencies of universal and wood glue per year is provided in Annex II A.4.1 Table 74 Wood glue is used 6.3 times per year whereas universal glue is used up to 13 times per year. According to information acquired during a consumer survey regarding the use of universal glue, it is used up to 36 times per year (Annex II A.4.2). The latter value is used as a default for this scenario, following a more conservative approach. A Q-factor of 2 is assigned because underpinning data is sufficient albeit limited.

Exposure duration
It is expected that the individual will stay in the room after the application of the glue. A default of 240 minutes (4 hours) is stated. The Q-factor is set to 1 because underpinning data is currently not available.

Product amount – inhalation
The applied amount varies per task and the surface to be treated. According to product information 200 g wood glue are sufficient to treat a 1 m^2 surface (see Annex II, product data collection Table 86). For this scenario, a smaller surface of 0.05 m^2 is taken into account because it fits the usage pattern for wood glue from bottles. Excessively larger tasks (e.g., laying wood parquet) would be conducted using wood glue from buckets applied with a brush or a roller. For the referred surface, 10 g glue has to be used. As described in subsection 6.2, a recently conducted survey documented a used product amount of 6 g (see Annex II A.4.2). However, because the survey data was not specifically gathered for tube glue and the product information indicates a more conservative product consumption, the latter value (10 g) will be preferred as a default. The Q-factor is set to 2 because underpinning data is sufficient to derive a default, albeit limited.

Room volume and ventilation rate
Given the various types of tasks that could be conducted in nearly any indoor environment, it is assumed that a task is carried out in an unspecified room (20 m^3 room volume with a ventilation rate of 0.6 per hour) (te Biesebeek et al., 2014).

Release area
The default for the used product amount is set to 10 g glue. Taking into account the results of the BfR-market analysis (see Annex II; product data collection Table 86), this relates to a surface area of 0.05 m^2 according to product information, which will be used as a default for the scenario. The Q-factor is set to 1 because the release area itself is an assumption and cannot be supported by underpinning data.

Application duration
According to the report by Magré (Magré, 2005), the average application duration for small surfaces is 6.5 minutes. As described previously in subsection 6.2**,** the results provided by a consumer survey lead to an application duration of 36 minutes (see Annex II A.4.2) for universal glue. However, in this survey, the size of the treated surface was not further specified by the users. Therefore, in accordance with the scenario for tube glue (approximately the same product amount), the default for the application duration is set at 36 minutes (estimation) for wood glue and universal/hobby glue alike. The Q-factor is set to 1 because the underpinning data by Magré (2005) and the survey (see Annex II A.4.2) are not specifically gathered for bottled/wood glue.

Exposed area – dermal
Dermal exposure occurs when the glue is spread out with one's finger. Assuming that one uses only two fingertips of one hand, and only one side of each fingertip is exposed, a dermal exposure area of 15 cm^2 is used (see subsection 6.2). The Q-factor is set to 1, because the underpinning data for the surface area of a fingertip is quantitatively rich but rather compromised by the calculation in subsection 4.1.1. Furthermore, the assumption that the front side of two fingertips will be exposed is based on expert judgement.

Product amount – dermal
Spills can occur on the skin or while the glue is spread out. According to our own experiments (see Annex A.2), two performed trials yielded a mean of 0.06 g and a maximum of 0.09 g for the product amount on the skin. Therefore, as a conservative default, a product amount of 0.08 g is taken into account (see also subsection 6.2). It is assumed that the glue will be immediately removed after the task is completed. The Q-factor is set to 1 because the experiment was only conducted twice, which can provide an impression for the dimensions of the product amount but is not sufficient for the default to be rated higher.

Table 10 Default values for bottled glue: universal/wood glue

Default value		**Q-factor**	**Source**
General			
Frequency	36 per year	2	See above
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	240 min	1	See above
Product amount	10 g	2	Product information, estimate
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	500 cm^2	1	See above
Application duration	36 min	1	See above
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	15 cm^2	1	50% of two phalanges (te Biesebeek et al., 2014)
Product amount	0.08 g	1	See above

Scenario for construction glue
Construction glue is used more often for larger tasks than wood glue, here the construction of a closet is described as the default scenario. Construction glues are often water-resistant, possess a high initial adhesion (150-200 kg/m^2) and final strength, and have filling properties (up to a gap size of 20 mm), which make them suitable for specific tasks (connecting wooden or metallic plates, gluing heavy objects to a surface for example a mirror, etc.). The manner of application is different from the manner of application of wood glue. It needs more precision because removal of construction glue from surfaces is more difficult. This means that exposure is expected to be different from exposure for universal or wood glue.

Inhalation exposure may occur during application and hardening of the glue, which occurs under atmospheric humidity (reaction with water in air). Inhalation exposure is estimated using the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: increasing*** model. When no evaporation is expected, based on the constituents, inhalation exposure will be negligible. Dermal exposure, which is estimated using the ConsExpo ***dermal – direct product contact – instant application*** model, occurs during application of the glue, when spreading it with one's fingers, or is caused by spills during clamping of materials.

Frequency
The frequency of these kinds of tasks is much lower in comparison to the use of universal or wood glue (e.g., for crafting) because they are far more specific and somehow more complex. A frequency of twice a year is assumed and a Q-factor of 1 is assigned because the value relies on expert judgement.

Exposure duration
Partially, the different parts of the closet have to be clamped or nailed together in order to give the glue the opportunity to harden without the parts coming apart. Such procedures take time. Additionally, assuming the user will stay in the room after he or she assembled the closet, an exposure duration of 240 minutes (4 hours) is set as a default. A Q-factor of 1 is assigned because the default relies on expert judgement.

Product amount – inhalation
Considering the area that has to be treated with glue (1 m^2), a product amount of 250 g will be sufficient to fulfil the task according to the product information acquired in the BfR market analysis (see Annex II, product data collection Table 87). A Q-factor of 2 is assigned because the underpinning data is limited.

Room volume and ventilation rate
Because no room is specified to build a closet there or conduct a construction task that mainly consists of gluing, the default values for an unspecified room are set as defaults. A room size of 20 m^3 and a ventilation rate of 0.6 per hour are assumed (te Biesebeek et al., 2014).

Release area
The product amount used is sufficient to treat a surface area of 1 m^2. Therefore, this value will be set as the default for the release area. As the dimension of the treated area (release area) is directly linked to the product consumption and vice versa, the underpinning data for the used product amount seems adequate to justify a Q-factor of 2 for the release area too.

Application duration
Assembling a closet is considered to be a rather big and complicated task even if the used product amount is comparatively low. The user has to work precisely to achieve a decent result. It is assumed that these kinds of tasks take 90 minutes of actual gluing. The Q-factor here is set to 1 because the value is based on expert judgement.

Exposed area – dermal
Dermal exposure will, in this case, occur from holding the glued materials with one hand while putting the counterpart of the closet in place and, if necessary, clamping the two parts together. This can lead to accidental contact with the applied glue and results in a potential exposed area of the palm of one hand, which equals 225 cm^2. The Q-factor is set to 2 because the underpinning data for the size of one palm is quantitatively rich, but the assumption that only this surface area of the hands will be exposed is based on expert judgement (see also subsection 4.5).

Product amount – dermal
According to Project A.2 in Annex II, when a palm is completely covered with glue, the amount of glue is approximately 1 g. Because the glue is hard to remove and the accompanying product information often advises wearing gloves, it can be assumed that subjects will cautious. Therefore, it is expected that the palm is only covered by 25%, hence 0.25 g is assumed as a default. The Q-factor is set to 1 since the assumption of 25% coverage relies solely on expert judgement.

Table 11: Default values for bottled glue: construction glue

Default value		**Q-factor**	**Source**
General			
Frequency	2 per year	1	Estimate
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	240 min	1	See above, estimate
Product amount	250 g	2	See above
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	1 m^2	2	See above
Application duration	90 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	225 cm^2	2	palm of one hand (te Biesebeek et al., 2014)
Product amount	0.25 g	1	See above, see Annex II

6.4 Super glue

Use
Because of their high curing speed, super glues are mainly used for very small surfaces that need to be glued very securely and fast. According to information acquired during the BfR market analysis, super glues are contained in small tubes or dosage pens of 1-10 g per product (see

Annex II, product data collection Table 88), which make it easy to dose small amounts of glue. An example of the use of super glue are the repairs on a mug that has lost its handle (ear). One droplet per end of the handle should be sufficient to reattach the handle to the mug. The mug and handle have to be pressed together and kept in place for a period of time ranging from a few seconds to two minutes at most. During this time, the glue polymerises to a solid synthetic resin. After 24 hours, the glue has attained its full strength. Product information warns about the fast and strong adhesive properties (super glue adheres very strongly to skin), but it is not advised to wear gloves. Furthermore, product information warns of inhalation exposure, even if the used product amount will be low, because super glues contain cyanoacrylate, which can cause irritation to the airways.

Scenario for super glue
As indicated in the prior paragraph, the reattachment of a displaced handle to a mug will be used as the default scenario for the use of super glue. Because the expected release area and product amount are very small, the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: constant*** and ***dermal – direct product contact – instant application*** models were chosen to assess the exposure from super glues.

Frequency
Because of their fast curing speed, which doesn't provide much time for the user to make amendments, super glues aren't used in as many situations as universal glues are. According to the information and results provided in Annex II A.4 Table 75, the default for the use frequency of super glue is set to 9 times per year. A Q-factor of 2 is assigned because of the limitations that are also explained in the afore-named Annex section.

Exposure duration
Assuming the subject stays in the room after finishing the task, which has to be conducted with precision, but also quickly (curing time), the exposure duration is set to 240 minutes with a Q-Factor of 1 because the value relies on personal judgement.

Product amount – inhalation
Per event, it is expected that an individual will not use more than a few droplets of glue. According to a letter from APA (Aromatic Product Association, 1998; as cited in (EU, 2003b)), the amount used for this type of glue will be 0.5 g per event. As a default parameter, 0.5 g glue per event will be assumed, with an assigned Q-factor of 2.

Room volume and ventilation rate
Because this kind of task could be conducted in nearly any indoor surroundings, it is assumed that it is carried out in an unspecified room (20 m^3 room volume with a ventilation rate of 0.6 per hour) (te Biesebeek et al., 2014).

Release area
According to the product information acquired in the preparation phase for writing the 2007 DIY-Fact Sheet (ter Burg, 2007), 0.5 g super glue is

sufficient to treat a surface of at least 2 cm^2, which will be used as a default for the release area. The Q-factor is set to 2 because the underpinning data is limited, but sufficient.

Emission duration
The emission duration is defined here as a reasonable estimate of the time during which the substance in question is released from the product. At most, it will take five minutes to glue a handle to a mug. A source depletion in this short time period is not expected. Surplus glue that may ooze when both surfaces (mug and handle) are pressed together will be immediately removed before it can harden and is therefore negligible for the emission duration default. A value of 5 minutes is therefore set as a default. A Q-factor of 1 is assigned because it is based on an estimate.

Exposed area – dermal
Although product information warns the user against letting the glue contact the skin because it will adhere very strongly, dermal exposure may occur because of spills or accidental touching of the glued surfaces. It is assumed that 50% of the surface area of two fingertips (see subsection 6.2) will be exposed during the task. 15 cm^2 is set as the default for the exposed area, with the Q-factor set to 1, because the underpinning data for the surface area of a fingertip is quantitatively rich but rather compromised by the calculation in subsection 4.1.1. However, individuals will try to avoid any dermal contact since the glue is difficult to remove and stuck fingers are hard to separate.

Product amount – dermal
Dermal exposure may occur, because objects may be very small making it easier to spill glue. Furthermore, it is advised by product information to remove surplus glue from the dosing tip with a cloth in order to prevent the tube from getting blocked. The amount that is spilt from surplus glue during application and the following clean-up phase will be very low, because the total amount used is already low. Half a droplet size (0.025 g) is considered as a default. A Q-factor of 1 is advised because the value is mainly based on expert judgement.

Table 12 Default values for super glue

Default value		**Q-factor**	**Source**
General			
Frequency	9 per year	2	See above, see Annex II A.4
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	240 min	1	Estimate
Product amount	0.5 g	2	(EU, 2003b; Magré, 2005)
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature

Default value		Q-factor	Source
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	2 cm^2	2	See above, (ter Burg, 2007)
Emission duration	5 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	15 cm^2	1	50% of two phalanges (te Biesebeek et al., 2014)
Product amount	0.025 g	1	See above

6.5 Two-component glue

6.5.1 Liquid in tubes

Ingredients
Liquid two-component glues are composed of two separated formulations that have to be mixed together prior to use. Their ingredients are different from all the other types of glues. They consist of two components: i.e., a resin and a siccative (hardener). The chemical reaction between the two components provides the glue's strength. Liquid two-component glues are used for many specific purposes that require fast and strong binding. In general, liquid two-component glues are resistant against water, cold, heat and chemicals.

Use
There are two kinds of liquid two-component glues available: glue based on polyurethane (PU) and glue based on epoxy resins. PU-based glues are well suited for binding wood, concrete, stone, ceramics and different kinds of plastics. Epoxy-based glues are more suitable for metals, pottery, porcelain, glass, ivory and plastics (Vereniging Nederlandse Lijmindustrie, 1999). However, the purposes of the liquid two-component glues may overlap, because there is no rule which glue is to be used for a specific task.

Liquid two-component glues are most often contained in duo-syringes or in tubes, and sometimes in buckets or cans (for larger tasks). There are very small duo-syringes that ensure the correct ratio between resin and siccative, which are used for optimal adhesion and are therefore easy to use. The duo-syringe contains approximately 60 g glue (both resin and siccative together). Besides syringes, separate tubes (of 100 ml each) are also used, where the products are designed in such a manner that an identical length of the lines of glue will provide the optimum volume ratio for optimal adhesive power. The resin and siccative are then mixed together (a mixing cup and a spatula are provided) until a homogeneous colour or mass is obtained. The mixing ratio of resin and siccative has a direct impact on the properties of the resulting glue product. A 2:1-ratio (Resin: siccative; epoxy-based) results in a very hard end product that is strongly resistant to outside influences. If the siccative percentage increases, the end product becomes more flexible but loses resistance.

The mixture is manageable for approximately 15 minutes (polyurethane-based) to 90 minutes (epoxy resin-based) before the mixture will harden. It is therefore important that the resin and siccative remain separated until usage. Before hardening, solvents such as acetone and MEK (methyl ethyl ketone) can be used to remove spilled glue. After hardening, the mixture can only be removed by mechanical force. Dermal contact is to be avoided and according to product information, the use of gloves is advised. However, accidental dermal contact to the mixture may still occur.

In general, liquid two-component glues are used for moderate-sized surfaces. Epoxy resin-based liquid two-component glues are manageable for longer periods of time and may be more suitable for larger surfaces. Then again, some PU- based liquid two-component glues are used to glue parquet and are used for a large surface size.

The mixing and loading process and the application (hence the exposure) are similar for both kinds of liquid two-component glues. Furthermore, no clear distinction can be made in the product amount or treated surface size between the uses of either liquid two-component glue. For these reasons, one default scenario will be described for the use of liquid two-component glue.

Scenario for liquid two-component glue
The scenario of gluing a large broken vase with a liquid two-component glue is described here. Assuming the vase has broken into several parts, this leads to an overall surface area of 500 cm^2 to be treated.

Mixing and loading: liquid two-component glue
When one of the products (resin or siccative) contains volatile agents, the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model should be used to estimate the inhalation exposure. The formation of volatile substances during the chemical reaction between resin and siccative is unlikely (see section 4.1.1). Because the task’s duration is rather short, the ConsExpo ***dermal – direct product contact – instant application*** model is used to estimate dermal exposure (see subsection 4.1.1).

Frequency
According to the information provided in Annex II A.4 Table 75, a default of 7 times per year is assumed. A Q-factor of 2 is assigned because of the limitations explained in the afore-named Annex section.

Exposure duration
The exposure duration from the mixing and loading process is estimated to be 5 minutes due to the low product amount that has to be mixed. A Q-factor of 1 is assigned because the default is based on personal judgement.

Product amount – inhalation
For a surface area of 500 cm^2, approximately 20 g glue is needed, according to product information explained in the 2007 DIY-Fact Sheet (ter Burg, 2007). In contrast, the amount of glue used for the gluing events observed by Magré (Magré, 2005) was very low (< 0.5 g and

4 g). The surfaces that were treated were correspondingly small; the task consisted of gluing the ear of a mug and a broken dinner plate. However, 20 g mixed product amount is considered as a default here in order to follow a conservative approach. The Q-factor is set to 2 because the underpinning data is sufficient to derive a default but limited.

Release area
Evaporation takes place from a constant surface area, i.e., the mixing cup. The surface area is calculated using the radius of a small mixing cup (=4.5 cm) as it is usually sold in German DIY markets, resulting in a release area of approximately 60 cm^2. A Q-factor of 2 is assigned because the size of a mixing cup is easily traceable through market research.

Emission duration
The emission duration in this case equals the exposure duration (see above) because it is assumed that the VOC substance in question is released during the entire mixing and loading process and a source depletion is not expected in this short period. The Q-factor is set to 1 because the value was derived by expert judgement.

Exposed area – dermal
It is expected that 50% of the surface area of two phalanges, 15 cm^2, of the fingers are exposed while mixing because of spills or residues on the mixing tool (see subsection 4.1.1). The Q-factor is set to 1 because the underpinning data for the surface area of a fingertip is quantitatively rich but rather compromised by the calculation in subsection 4.1.1.

Product amount – dermal
The product amount contacting the skin is assumed to be low. Based on the results of the glue project explained in Annex II, A.2, it is assumed that in total, one drop of glue will remain on the fingertips: 0.05 g. A Q-factor of 1 is assigned because the value is mainly based on assumptions.

Table 13 Default values for mixing and loading: liquid two-component glue

Default value		**Q-factor**	**Source**
General			
Frequency	7 per year	2	See above, Annex II A.4
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	5 min	1	See above
Product amount	20 g	2	See above, Product information
Room volume	1 m^3	1	See subsection 4.1.1
Ventilation rate	0.6 per hour	1	Unspecified room (te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1

Default value		Q-factor	Source
Release area Emission duration Molecular weight matrix	60 cm^2 5 min 3000 g/mol	2 1 3	See above See above See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area Product amount	15 cm^2 0.05 g	1 1	50% of two phalanges (te Biesebeek et al., 2014) See above

Application
The resin and siccative are put in a mixing cup in the proper ratio. With a matchstick or small spatula, the components are mixed before being applied to the surface with the same matchstick or spatula.
Because the composition of liquid two-component glues is not completely known, inhalation exposure cannot be ignored. If there is evidence to suggest that the inhalation exposure to liquid two-component glues is negligible, one can leave out this route of exposure. For now, the model used to estimate inhalation exposure is the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: increasing*** model.
Dermal exposure is estimated using the ConsExpo ***dermal – direct product contact – instant application*** model because the task itself and the used product amount are relatively small.

Exposure duration
In the EU RAR on bisphenol A, an exposure duration of 210 minutes was estimated for the application of two-component glue. Here, the exposure duration is set at 240 minutes as a default, which is the time a subject stays in the room during and after application. A Q-factor of 1 is assigned because the underpinning data is limited and is supplemented with assumptions.

Room volume and ventilation rate
No room was specified or is preferred for such a task. Thus, the specifications of an `unspecified room´ are considered as defaults. The parameters for an unspecified room are 20 m^3 for room volume and 0.6 per hour for ventilation rate. (te Biesebeek et al., 2014)

Release area
It is assumed that a vase that has broken in half provides a surface area of 500 cm^2 that has to be treated with glue in order to repair the object. The Q-factor is set to 1 because the value is based on personal judgement.

Application duration
The application duration is estimated to be 30 minutes. This is not comparable with the application durations observed by Magré (Magré, 2005), which covered time spans of 2 and 12 minutes per event, respectively. The tasks Magré observed were smaller, which may explain the difference. The Q-factor is set to 1 because the value is based on expert judgement.

Exposed area
Dermal exposure can occur during application when the parts are pressed together; surplus glue can be spilled on the hands. For consumers, the EU RAR document on bisphenol A (EU, 2003a) (constituent of epoxy resin) departed from a surface area of 54 cm^2 (=5% of the total surface of both hands = 1075 cm^2) for its dermal exposure assessment for bisphenol A. The figure of 5% surface area is not related to the manner of use, but merely based on assumptions. In the scenario of holding the materials while applying the glue mixture, spills on the palm of one hand may occur. Assuming that approximately 20% of one palm (te Biesebeek et al., 2014) is exposed results in a surface area of 45 cm^2. This value is preferred to the EU assumption, because it is more related to the manner of use. A Q-factor of 2 is assigned because the underpinning data for the size of one palm is quantitatively rich but the assumption that only this surface area of the hands will be exposed is based on expert judgement (see also subsection 4.5).

Product amount – dermal
The product amount is not assumed to be high because relatively low amounts are used in the first place. Referring to the considerations explained in subsection 4.2.3, a palm provides space for approximately 1 g glue. As mentioned in the previous paragraph, it is assumed that 20% of the palm of a hand is exposed during this task. Adapting this for the product amount contacting the skin, a value of 0.2 g has to be considered. The Q-factor is set to 1 because the value relies heavily on assumptions.

Table 14 Default values for liquid two-component glue

Default value		**Q-factor**	**Source**
General			
Frequency	7 per year	2	See above, Annex II A.4
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	240 min	1	See above
Product amount	20 g	2	See above, product information
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	500 cm^2	1	Estimate, see above
Application duration	30 min	1	Estimate, see above
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	45 cm^2	2	20% of the palm of one hand (te Biesebeek et al., 2014)
Product amount	0.2 g	1	See above

6.5.2 Adhesive putty

Use

Adhesive putty is a special type of two-component glue. As the name indicates, this type of glue has an appearance and a texture that are similar to putty. It is stored in a plastic pipe with a content of 30 g to 60 g. The customer buys the product as one unit, but before application the two components are clearly divided and must be mixed prior to use. Therefore, a piece of the putty which is assumed to be sufficient for the upcoming task is cut off and kneaded with the hands until a homogeneous mass is obtained. The more thoroughly the components are mixed, the firmer the putty will be once it is hardened.

Adhesive putty is multifunctional. As an adhesive it can be used to connect materials like ceramics, porcelain, glass, metal, stone, wood and hard plastics. Furthermore, it is usable for filling tasks (e.g., for holes in wood furniture or walls) and as a sealant. After the mixing process, the homogenous mass is easy to manage for about 4 minutes according to product information. It has to be put in place, for example in a hole in wood furniture, before the first hardening phase is completed after 10 to 15 minutes. One hour after application the putty can be treated further (e.g., painting, grinding). It attains its ultimate strength after approximately 24 hours.

There is expected to be an immediate transition from mixing the two components via kneading the application of the finished product for its desired purpose. The common user won’t waste any time with other tasks between these steps because of the immediate start of the hardening process. Therefore, the default scenario for adhesive putty will only consist of an application scenario that includes the mixing phase.

Scenario for adhesive putty

This scenario represents the use of adhesive putty as a filler for a hole in a wooden chair. The more or less circular hole has a diameter of 4 cm and is about 2 cm deep. Due to the lack of information about the use of adhesive putty, it is assumed that 49 g product is sufficient to fill and cover the hole. Once it is mixed and is in a homogeneous state, the putty is placed into the hole in the chair without any tools. It is pressed into the hole by hand until the putty fills out properly. The product is then smoothed by hand or with the help of a flat object. For this task there is no need for exceptional precision (in part because the putty can be treated after hardening, with a grinding machine, for example). It is therefore assumed that it won’t take much time.

To estimate inhalation exposure, the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model is used. Dermal exposure is estimated in this case using the ***dermal – direct product contact – instant application*** model due to the short application duration and the low product amount.

Frequency

Because of its multifunctional purposes in different areas of the DIY-sector there is reason to believe that adhesive putty is used on a frequent basis. Taking the information provided in Annex II A.4, Table

75 into account, it is indicated that the use frequency of such products is 7 times per year. Considering that this product is pretty new and that many consumers are not aware of its existence, it is expected that in the future it will be used more often as soon as it becomes more popular. However, the default is set at 7 times per year. A Q-factor of 2 is assigned because of the limitations explained in the Annex II A.4.

Exposure duration
The application is not expected to take very long. The putty has to be homogenised and brought into position within a short time period while it is still (easily) manageable (5-15 minutes). However, the exposure duration is set at 240 minutes because it is assumed that the user will stay in the room after the task was conducted, which can potentially lead to further inhalation exposure (conservative approach). The Q-factor is considered to be 1 because the value is based on expert judgement.

Product amount
No information could be identified to clarify the consumption of adhesive putty. It is therefore estimated that 49 g will be sufficient to conduct the described task, which equals the volume of 25 cm^3 (12.5 cm^2 (hole surface, see also release area below) x 2 cm (depth of the hole)) and an expected density of the product of 1.95 g/cm^3 (see product information in Annex II A.5 Table 89). A Q-factor of 1 has to be assigned here because source information is lacking.

Room volume
Because adhesive putty is primarily used for small repair and gluing tasks, it is not assumed that the user would only use it in a working area such as a garage or another specific room. Therefore, the parameters for an unspecified room are taken into account in this case, which are a room volume of 20 mm^3 and a ventilation rate of 0.6 per hour (te Biesebeek et al., 2014).

Release area
As mentioned before, the hole has a diameter of 4 cm. Assuming the hole is roughly of a circular shape, this leads to a surface of 12.5 cm^2 from which evaporation can be expected once the hole has been completely filled. Because no underpinning data is available, a Q-factor of 1 is assigned for this default.

Emission duration
The emission duration is defined here as a reasonable estimate of the time during which the substance in question is released from the product. As the putty is not covered after it has been applied and as no information is available indicating that a source depletion may occur, it is assumed that the emission duration is as long as the exposure duration which is a worst-case estimate. This is an expert judgement. Therefore, the Q-factor is set to 1.

Exposed area – dermal
It is expected that the surface area of both palms is exposed because the user tends to swap the putty between both hands while mixing. Furthermore, it is clearly visible in application video footage that

extensive areas of the palms are more or less completely covered with a thin layer of residue from the putty. Following a conservative approach, a surface area of 450 cm^2 is chosen as a default. The Q-factor is set to 2 because the data set for the size of the palms is sufficient and quantitatively rich, but the determination of which body parts are affected is based on assumptions with a poor underpinning data set (video footage; see also subsection 4.5).

Product amount – dermal
As mentioned before, dermal exposure is expected to be significant. Both palms may potentially be covered with product residue. The product amount contacting the skin is calculated on the basis of the assumption that the exposed skin area is covered with a homogeneous layer of product with a layer thickness of 0.01 cm. Taking into account a skin area of 450 cm^2 and a density of 1.95 g/cm^3 (for both, see above) the resulting product amount is approximately 9 g (0.01 cm x 450 cm^2 x 1.95 g/cm^3 = 8.775 g ~ 9 g).
The default is therefore set to 9 g with a Q-factor of 1 because the calculation is based on assumptions.

Table 15 Default values for adhesive putty

Default value		**Q-factor**	**Source**
General			
Frequency	7 per year	2	See above, Annex II A.4
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	240 min	1	Estimate
Product amount	49 g	1	Estimate
Room volume	20 m^3	4	Unspecified room (te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	Unspecified room (te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	12.5 cm^2	1	Estimate
Emission duration	240 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	450 cm^2	2	Both palms (te Biesebeek et al., 2014)
Product amount	9 g	1	see above

6.6 Wood parquet glue

Use
These glues are used to glue wood parquet, where the parquet is meant to lie on top of the surface (the parquet is glued onto the floor) or to

float above it (individual parts are glued together, but not glued onto the floor). Because the application of the two parquet glues is different, the product (amount) used may differ significantly. Furthermore, for parquet glued onto the floor, there are also two-component glues, which need to be mixed and loaded before they can be used. The application of the two-component glue is regarded as similar to parquet glue that is used to glue parquet onto a surface. The application of glue for floating parquet is entirely different, which results in different exposure. For this reason, two scenarios and related defaults will be described.

Scenario for parquet glued to surface
Gluing parquet onto a surface in the living room was selected as a default scenario. Inhalation exposure during mixing and loading may occur because of volatiles evaporating from the opened bucket (component A) and can (component B) the product is delivered in. In addition, evaporation is expected from the product surface in the mixing bucket while the two components are homogenised. Dermal exposure is expected because of spatters and spills first, while pouring the two components into the mixing bucket, and subsequently while the resin and the siccative are mixed. Consequently, inhalation and dermal exposure are estimated in accordance with the generic scenario for mixing two-component products (see subsection 4.1.1).

Mixing and loading: two-component parquet glue
When one of the products (resin or siccative) contains volatile agents, the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model should be used to estimate inhalation exposure. However, formation of volatile substances during the chemical reaction between resin and siccative is considered very unlikely (see subsection 4.1.1). Dermal exposure during the mixing and loading phase is estimated using the ***dermal – direct product contact – instant application*** model and the default parameters described in subsection 4.1.1.

Frequency
The endurance of such a floor is estimated to be 30 years, which is considered to be the lifetime of massive parquet floors. However, people tend to redecorate. According to the information acquired in a consumer survey and explained in Annex II A.4, a frequency of once in 2 years is set as a default for this scenario.

The product amount required for this task is very high (25.3 kg, see below). The mixing and loading step will need to be repeated approximately 3 times, because the product amount is simply too much to handle in one step. As a result, the default for the frequency of the mixing and loading phase is set to 3 times a day (once every 2 years). A Q-factor of 2 is assigned because of the limitations, which are also explained in Annex II A.4.

Exposure duration
Because the amount that has to be mixed is rather large (approximately 8.5 kg per repetition) the mixing duration/exposure duration is assumed to be extensive in order to achieve a homogenous mass in the end. A

duration of 10 minutes should be sufficient for this purpose. The Q-factor is set to 1 because the default is the result of assumptions.

Product amount – inhalation
The product information acquired in the BfR market analysis shows a consumption rate of 1150 g per m^2 (see Annex II, product data collection Table 90). Extrapolating from this and keeping in mind the 22 m^2 of floor that has to be treated in an average living room (te Biesebeek et al., 2014), the result is a total product amount of 25.3 kg wood parquet glue, which should be sufficient for the task. In each mixing and loading repetition an amount of 8.5 kg product is mixed. This value is used as the default here. A Q-factor of 3 is assigned because the underpinning data is sufficient to derive a default, albeit limited. Please note that in most cases, the task is performed by professionals, but this scenario relates to non-professional users.

Release area
The mixing and loading is done in a bucket. The bucket has a capacity of 20 l which is sufficient for the task and a diameter of approximately 37.5 cm. This leads to a surface area of 1100 cm^2 from which evaporation can be expected. A Q-factor of 2 is assigned because several bucket products with these specifications are available on the market. For the common user, a 20 l bucket will be sufficient for most tasks.

Emission duration
The emission duration in this case equals the exposure duration (see above) because it is assumed that VOC/SVOC substances are released during the entire mixing and loading process if present and a source depletion is not expected. The Q-factor is set to 1 because the value relies on personal judgement.

Product amount – dermal
The amount of product contacting the skin during mixing and loading through spatters and spills is considered to be comparatively high because of the high product amount that has to be mixed and the three repetitions which always include the pouring of the components into the mixing bucket. The dermal product amount is set at 0.5 g by estimation. A Q-factor of 1 is assigned because this value is based on expert judgement.

Table 16 Default values for mixing and loading: two-component parquet glue

Default value		**Q-factor**	**Source**
General			
Frequency	3 per day	2	Additional definition: 3 times per day, once every 2 years
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	10 min	1	See above
Product amount	8.5 kg	3	See above, product information
Room volume	1 m^3	1	See subsection 4.1.1
Ventilation rate	0.6 per hour	1	Unspecified room (te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	1100 cm^2	2	Product information, surface mixing bucket
Emission duration	10 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	225 cm^2	1	See subsection 4.1.1
Product amount	0.5 g	1	Estimate

Application
After the parquet glue has been mixed, it has to be spread out on a segment of the floor by means of a tool. Afterwards, the parquet is put in place and is kept there by putting heavy objects on top, thereby preventing the parquet from warping. This is repeated several times until the floor is completely covered. Once the task is finished, it takes approximately 48 hours for the parquet floor to settle. During this period, one should not walk on the floor.

Exposure to parquet glue may occur via inhalation and by dermal contact. Inhalation exposure is estimated using the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model, taking into account the simplification explained in subsection 4.2.2 and in the explanation regarding the release area default below. The ***dermal – direct product contact – constant rate*** model will be used to describe the dermal exposure.

Frequency
The endurance of such a floor is estimated to be 30 years, which is considered to be the lifetime of massive parquet floors. However, people tend to redecorate. According to the information acquired in a consumer survey and explained in Annex II A.4, a frequency of once every 2 years

is set as a default for this scenario. A Q-factor of 2 is assigned because of the limitations also explained in Annex II A.4.

Exposure duration
By estimation, it takes individuals an entire day to lay a parquet floor, as was also seen in the EU RAR draft report on MDI (EU, 2003c). For this reason, an exposure duration of 480 minutes (8 hours) is taken into account. Once the task is completed, there will be no after-use activity, because the parquet has to settle, and any spills or surplus glue have to be removed immediately after they occur. The Q-factor is set to 2 because the supporting data is sufficient to derive a default, albeit limited.

Room volume and ventilation rate
According to the General Fact Sheet (te Biesebeek et al., 2014), a living room has a volume of 58 m^3 with a floor surface area of 22 m^2 and a ventilation rate of 0.5 per hour.

Release area
An alternative description of the release area is required because exposure to a very high product amount released from large areas is not considered realistic. Furthermore, ConsExpo Web is not able to integrate exposure intervals. This scenario would lead to erroneous estimates. Instead, the release area is set to be equal to the surface area that can be treated per interval. It is assumed that an individual treats 1 m^2 per interval (see subsection 4.2.2). Subsequently, the surface is covered, and the user's inhalation exposure will be negligible compared with the newly treated surface (nonetheless, please note that inhalation exposure to volatile substances is possible over a long time, weeks or maybe months, after application which can lead to chronic effects). These steps are repeated until the task is completed, comprising 22 repetitions. The inhalation exposure is described by evaporation of the total amount rather than by the adjusted amount from a constant surface area, i.e., 1 m^2. This simplification of the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model is necessary, because otherwise, depletion of the source can occur. 1 m^2 is set as the default for the release area in this scenario. Because of this simplification, a Q-factor of 1 is assigned.

Emission duration
As a simplification, it is assumed that the task is divided into 1 m^2 sections (see above) that are treated with glue. On that basis, a reasonable estimate would be that a VOC substance is released during the entire period it takes to conduct the task, if present. Therefore, the emission duration is set on the same level as the exposure duration, which is 480 minutes (see above). A Q-factor of 1 is assigned because the value is based mainly on assumptions.

Exposed area – dermal
Exposure to parquet glue may occur through inhalation and by dermal contact. It is assumed that approximately 50% of both hands (450 cm^2) will be exposed (te Biesebeek et al., 2014). The Q-factor is set to 2 because the underpinning data for the surface size of the hands is

quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Release duration – dermal
The substance is applied during the entire task because it is assumed that it is divided into sections of 1 m^2. Dermal exposure may also occur when the user is placing the parquet elements in their final position. Repetitive cleaning of the hands may lead to a fluctuation of the dermal exposure, but the user will not tend to completely remove all of the product from the skin because it is too time-consuming with a rather small benefit (hands will be exposed again in a short time). Therefore, the release duration is set to be equal to the exposure duration. A Q-factor of 2 is assigned because the underpinning data is sufficient to derive a default, albeit limited.

Table 17 Default values for parquet glue: gluing on surface

Default value		**Q-factor**	**Source**
General			
Frequency	1 per 2 years	2	See above, Annex II A.4
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	480 min	2	See above
Product amount	25.3 kg	3	Product information, see above
Room volume	58 m^3	4	Living room (te Biesebeek et al., 2014)
Ventilation rate	0.5 per hour	3	Living room (te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	1 m^2	1	See above
Emission duration	480 min	1	See above
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – constant rate			
Exposed area	450 cm^2	2	See above (te Biesebeek et al., 2014)
Contact rate	30 mg/min	1	See subsection 4.2.3
Release duration	480 min	2	See above (EU, 2003c)

Scenario for floating parquet
The task of constructing a floating parquet floor is considered easier than constructing a parquet floor onto the surface. The glue is applied to the groove joints and tongue of the parquet elements. The glue is

allowed to be absorbed for 2-3 minutes before the next element is placed and tapped with a rubber mallet.
Assuming the same indoor environment as above (scenario for parquet glued to surface) for constructing floating parquet; it will take less time and far less glue to conduct the task.

Frequency
According to the Dutch Environmental Information Centre (*Milieu Centraal*), the durability of laminate or thin parquet is ten years at most, and the durability of use for an average floor cover in the Netherlands is eight years (Milieu Centraal, 2005). Nowadays, laminate that can be clicked together is more common than laminate that requires gluing. Considering a person who prefers parquet, the frequency of laying parquet may be higher. This is supported by the information provided in Annex II A.4 Table 75. A frequency of once every two years for constructing floating parquets will be considered as a default. A Q-factor of 2 is assigned because of the limitations also explained in the afore-named Annex section.

Exposure duration
The task is estimated to take 240 minutes while the construction itself is performed in intervals. Hence, the exposure duration and emission duration are the same. The Q-factor is set to 1 because the default is based on expert judgement.

Product amount – inhalation
According to the product information 37.5 g is sufficient to treat the groove joints of 1 m^2 of floating parquet (see Annex II, product data collection Table 91). For an area of 22 m^2 it is derived that 825 g glue is used. A Q-factor of 3 is considered because underpinning data is limited but sufficient.

Room volume and ventilation rate
According to the General Fact Sheet (te Biesebeek et al., 2014), a living room has a volume of 58 m^3 with a floor surface area of 22 m^2 and a ventilation rate of 0.5 per hour.

Release area
It is assumed that 1 m^2 is treated per interval which will be set as the default for the effective release area (see subsection 4.2.2). This interval is repeated 22 times to complete the task (see also application scenario for parquet glued to surface). A Q-factor of 1 is assigned because the default is derived using assumptions that are based on expert judgement.

Emission duration
The emission duration is estimated to be as long as the exposure duration (240 minutes). The task is conducted in intervals (see application scenario for parquet glued to surface). Therefore, it is assumed that evaporation processes can occur during the entire parquet laying task, because the emission source is constantly renewed. A Q-factor of 1 is assigned because there is currently no underpinning data available.

Exposed area – dermal
Surplus glue must be removed with a moist cloth as soon as possible. The container is a flask with a nozzle, which indicates that the glue can be administered precisely to the groove joints. Spills may occur when the parts are pressed together. The exposure area will be approximately 50% of one palm (112.5 cm^2) (te Biesebeek et al., 2014). The Q-factor is set to 2 because the underpinning data for the surface size of the hands is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Product amount – dermal
The product amount contacting the skin is estimated to be 0.5 g by expert judgement. A Q-factor of 1 is assigned because no data source is given.

Table 18 Default values for parquet glue: floating parquet

Default value		**Q-factor**	**Source**
General			
Frequency	0.5 per year	2	See above, Annex II A.4
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	240 min	1	Estimate, see above
Product amount	825 g	3	Product information, see above
Room volume	58 m^3	4	Living room (te Biesebeek et al., 2014)
Ventilation rate	0.5 per hour	3	Living room (te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	1 m^2	1	See above
Emission duration	240 min	1	Estimate, see above
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	112.5 cm^2	2	See above (te Biesebeek et al., 2014)
Product amount	0.5 g	1	Estimate

6.7 Carpet glue

Scenario for carpet glue
Carpet glue is used to keep floor covers in place and prevent them from warping. Carpet glue can be used for several kinds of floor covers such as carpets, carpet tiles, and PVC floor covers. Here, the laying of a carpet floor in the living room is considered.

During this process, individuals may be exposed through inhalation or by the dermal route. For inhalation exposure, the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model is used. Additionally, the ***dermal – direct product contact – constant rate*** *model* is used to estimate dermal exposure.

Frequency
The durability of the carpet is heavily dependent on the type of carpet and its quality. The average durability according to the Environmental Information Centre (Milieu Centraal, 2005) is eight years. The results from a consumer survey explained in Annex II A.4 and summarised in Table 75, lead to a default for the use frequency of carpet glue of once every four years. A Q-factor of 2 is assigned because of the limitations also explained in the afore-named Annex section.

Exposure duration
The glue is spread across the surface using a glue spatula. A manageable time for this specific glue is 40 minutes (flash-off time according to product information). An alternative description of exposure is required, because exposure to a very high product amount released from large release areas is not realistic in this case. Instead, the release area is set to be equal to the surface area one can treat per interval. It is assumed that 4 m^2 per interval can be treated, which is assumed to take 15 minutes per effort. Assuming that the carpet is already cut to size and is only moved to fit, an exposure duration of 90 minutes will be considered in order to complete the task for the entire surface area of 22 m^2 (see below). The Q-factor is set to 1 for this default because it relies on expert judgement.

Product amount – inhalation
According to product information, 650 g product is sufficient for laying 1 m^2 of carpet (see Annex II, product data collection Table 92). To treat the entire surface area of 22 m^2 (see below), a total amount of 14.3 kg carpet glue will be required. This value will be used as a default for this scenario. A Q-factor of 3 is assigned because the underpinning data is sufficient to derive a default, albeit limited.

Room volume and ventilation rate
A room volume of 58 m^3, a floor surface area of 22 m^2 and a ventilation rate of 0.5 per hour are selected as defaults in accordance with the General Fact Sheet (te Biesebeek et al., 2014).

Release area
As described above in the exposure duration section, the surface area a user can treat per interval is assumed to be 4 m^2. This will serve as the default value for the release area in this scenario. The Q-factor for this default is set to 1 because it strongly depends on assumptions that are based on expert judgement.

Emission duration
The emission duration is set to equal the total exposure duration because the task is conducted in intervals. Therefore, the potential evaporating source is constantly renewed. A Q-factor of 1 is assigned because no underpinning data is available.

Exposed area – dermal
The affected skin surface area is assumed to be approximately 50% of one palm, resulting in 112.5 cm^2 contact area (te Biesebeek et al., 2014). The Q-factor is set to 2 because the underpinning data for the surface size of a palm is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Release duration – dermal
It is assumed that the user will clean his or her hands during the task in order to not leave behind stains of glue on the top side of the carpet pieces when they are put in place. Nevertheless, the user is not expected to be able to totally remove all the product contacting his skin because it would be too time-consuming and elaborate. Therefore, a release duration of 90 minutes is estimated. Since this default is based on assumptions and expert judgement, the Q-factor is set to 1.

Table 19 Default values for carpet glue

Default value		Q-factor	Source
General			
Frequency	1 per year	2	See above, Annex II A.4
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	90 min	1	See above
Product amount	14.3 kg	3	See above, product information
Room volume	58 m^3	4	Living room (te Biesebeek et al., 2014)
Ventilation rate	0.5 per hour	3	Living room (te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	4 m^2	1	See above
Emission duration	90 min	1	See above
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – constant rate			
Exposed area	112.5 cm^2	2	50% of one palm (te Biesebeek et al., 2014)
Contact rate	30 mg/min	1	See subsection 4.2.2
Release duration	90 min	1	See above

6.8 Tile glue

Use
Tile glues are glues for wall and floor tiles that must be attached to all kinds of surfaces, such as cement walls, concrete, wood, chipboards,

other tiles et cetera. Tile glues can be used to cover floors in the living room, hall and kitchens or covering walls in, for instance, kitchens and bathrooms. Tile glues are available in paste form, which are ready to use, and as powder. In general, the pastes are used to attach tiles to absorbing surfaces, while the powders are used to attach tiles to non-absorbing surfaces. The powder is diluted with water until the desired ratio for the job is obtained. Tile glue (paste or obtained paste) is applied and spread out using a glue spatula. Wet stains or spills can be removed with water; hardened stains or spills must be removed mechanically (see product information).

Scenario for tile glue
The scenario selected for tile glue is for two walls in a bathroom, amounting to a surface area of 10 m^2 (two bathroom walls of 2 m wide and 2.5 m high) in total. Tile glues are available as pastes, primarily based on styrene acrylate dispersions, or as powders. During the task, the glue is applied to the tile or directly onto the surface using a glue spatula. The tiles are then attached by pressing them while shifting the tile into the right position. This must be done within a 15-minute time frame when the glue is still manageable.

Mixing and loading: tile glue
Mixing the powders, which have a mortar and a cement base, with water provides a paste that is applied in a manner similar to the ready-to-use products. Additional dermal/inhalation exposure from the mixing and loading process may occur. According to product information, a product consumption of 2.5 kg/m^2 (tile teeth of 6 mm) is sufficient (see Annex II; product data collection Table 93). Additionally, 1 kg powder has to be mixed with 0.3 l water in order to achieve the required texture. Therefore, the total product amount (powder mixed with water) will be 32.5 kg. This is obtained by mixing 25 kg powder with 7.5 l water. The mixing and loading process is repeated 5 times; otherwise, the quantity is too large to mix. The product amount is 32.5 kg, divided by 5 (= 6.5 kg) per mixing and loading event.

The inhalation exposure from mixing and loading DIY powders is estimated using the ConsExpo ***inhalation – exposure to spray – instantaneous release*** model. For dermal exposure, the ***direct product contact – constant rate*** model (see subsection 4.1.3) is advised. Defaults for the parameters product amount for inhalation exposure, room volume, exposed area (dermal) and dermal contact rate are chosen in accordance with the generic scenario for loading powders (see subsection 4.1.3).

Frequency
Covering walls or floors with tiles is not expected to occur at high frequency. The information extracted from a consumer survey and explained in Annex II A.4, leads to a default of once every two years. A Q-factor of 2 is assigned because of the limitations also explained in the above-named Annex section. Because the required product amount for this task is simply too much to handle (32.5 kg in total; 25 kg powder and 7.5 kg water; see above) in one mixing step, five repetitions are estimated to be required.

Exposure duration
According to product information, every mixing interval consists of pouring the right amount of powder into the water, homogenisation of the two components using a suitable mixing tool (e.g., a driller with attachment) for at least 3 minutes, a maturing time of five minutes and a concluding mixing effort in the end (see Annex II; product data collection, Table 93). Summing up the four phases leads to the estimate that the exposure duration is set to a default of 15 minutes. The Q-factor is set to 1 because underpinning data is only available for two of the 4 phases.

Released mass
In each repetition, 5 kg powder is mixed with 1.5 l water. Referring to the considerations in subsection 4.1.3, the default for the released mass is set to 8.3 µg per 200 g powder. Taking into account a product amount of 5 kg, a total amount of 207.5 µg is released into the air and will therefore be taken as a default. The Q-factor is set to 1 as explained in subsection 4.1.3.

Release duration – dermal
The release duration is assumed to be as long as the exposure duration because the user is not expected to clean his or her hands during the mixing task. Therefore, dermal exposure is not intermittent, and the default is set to 15 minutes with a Q-factor of 1 because underpinning data are not available for the entire mixing task (see the paragraph about exposure duration above)

Table 20 Default values for mixing and loading: tile glue

Default value		**Q-factor**	**Source**
General			
Frequency	5 per day	2	5 per day, once every 2 years
Inhalation – exposure to spray – instantaneous release			
Exposure duration	15 min	1	See above
Released mass	207.5 µg	1	See above, see subsection 4.1.3
Room volume	1 m^3	1	See subsection 4.1.3
Ventilation rate	0.6 per hour	1	Unspecified room, (te Biesebeek et al., 2014); See subsection 4.1.3
Dermal – direct product contact – constant rate			
Exposed area	450 cm^2	2	See subsection 4.1.3
Contact rate	5 mg/min	1	See subsection 4.1.3
Release duration	15 min	1	Estimate, product information (see Annex II; product data collection)

Application
Although no solvents are present in tile glue, inhalation exposure may occur from other materials present. If there are sufficient arguments that inhalation exposure is negligible, the inhalation route can be ruled out. Otherwise, the inhalation exposure can be described by assuming an effective release area of 1 m^2 during the entire task. This is the surface a subject is assumed to cover per interval for this scenario (for an explanation, see subsection 4.2.2). Thus, the release area from which evaporation can be expected stays the same during the entire application phase. The inhalation exposure will consequently be estimated using the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model***.*** Because the source strength is renewed per interval the product amount is considered to be the amount required for the entire task. Therefore, the total product amount is taken to prevent an underestimation of exposure due to source depletion. For dermal exposure, the ConsExpo ***dermal – direct product contact – constant rate*** model is applied because it is assumed that individuals will clean their hands during the task.

Exposure duration
Because this task is rather big and has to be conducted with a high level of diligence in order to place the tiles straight, it is assumed that a time period of 360 minutes will be sufficient to treat the entire wall. The Q-factor is 1 because the default depends strongly on assumptions that are based on expert judgement only.

Amount of solution used
The product amount used whilst conducting this task depends on the size of the tiles and the resulting tile teeth (thickness of the glue layer). 6-mm tile teeth is sufficient for tiles with an edge length of 10 cm, which seems adequate for this scenario. According to product information, a product amount of 2.5 kg/m^2 is required for a task with these preferences. Therefore, 25 kg powder have to be mixed with 7.5 l water (0.3 l/kg powder) resulting in a solution with a total amount of 32.5 kg (see Annex II, product data collection Table 93). A Q-factor of 3 is assigned, because the underpinning data is sufficient to derive a default, albeit limited.

Dilution
The dilution in number of times is defined here as the inverse of the product concentration of tile glue powder in the water in the mixing vessel. According to the above given information about the used product amount, 25 kg powder are mixed with 7.5 l water. Therefore, the ultimately mixed solution amounting to roughly 32.5 kg contains 25 kg powder, which leads to a dilution factor of: 32.5 kg / 25 kg = 1.3. The Q-factor is set to 3 because the data used for this calculation is limited.

Room volume and ventilation rate
According to the information provided in the General Fact Sheet, a bathroom has a default room volume of 10 m^3. The ventilation rates are generally high in bathrooms. A default of 2 per hour was derived (te Biesebeek et al., 2014).

Release area
In this case, the release area is considered to be the area treated with tile glue. Because the task is conducted in intervals, as was mentioned above, a release area of 1 m^2 will be used as the default value (for an explanation, see subsection 4.2.2). The Q-factor is considered to be 1 because the value strongly depends on assumptions that are based on expert judgement.

Emission duration
The emission duration is interpreted here as the time during which evaporation from the surface of the glue is possible because it is not covered with a tile and the emission source is not depleted. Because the task is conducted in intervals, a constant (i.e., constantly renewed) release area of 1 m^2 of glue-treated surface is 'open' and allowing evaporation. Therefore, the emission duration equals the exposure duration and is set to 360 minutes. The Q-factor is considered to be 1 because no underpinning data is available.

Exposed area – dermal
Dermal exposure results from spills or surplus glue removal. An exposure area of two palms (0.5 × 900 cm^2 from General Fact Sheet (te Biesebeek et al., 2014)) will be considered as a default. A Q-factor of 2 is assigned because the underpinning data for the surface size of two palms is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Release duration – dermal
The user needs to work precisely during the entire task. In order to prevent the hands from getting too sticky because of surplus glue, it is assumed that the user will clean his hands from time to time. However, a release duration of 360 minutes is estimated because dermal exposure is likely to occur during the entire task. The Q-factor is set to 1 because the value is based on expert judgement.

Table 21 Default values for application of tile glue.

Default value		**Q-factor**	**Source**
General			
Frequency	0.5 per year	2	Annex II A.4
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	360 min	1	Estimate, see above
Amount of solution used	32.5 kg	3	Product information, See above
Dilution (times)	1.3	3	See above
Room volume	10 m^3	4	Bathroom, (te Biesebeek et al., 2014)
Ventilation rate	2 per hour	3	Bathroom (te Biesebeek et al., 2014)
Temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1

Default value		Q-factor	Source
Release area	1 m^2	1	See above
Emission duration	360 min	1	Estimate, see above
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – constant rate			
Exposed area	450 cm^2	2	See above (e Biesebeek et al., 2014)
Contact rate	30 mg/min	1	See subsection 4.2.2
Release duration	360 min	1	Estimate, see above

6.9 Wallpaper glue

Use

Wallpaper glues are available as powder or as flakes, which have to be mixed with water before use. The powder may contain poly anionic cellulose (PAC), methyl cellulose or polyvinyl acetate (PVAc) and does not normally contain any solvents. The adhesive powder is poured into cold water in the proper ratio (according to use directions) and stirred until there is a solution without any lumps. According to product information, 125 g glue powder can be mixed in 6 l to 10 l water (this is for normal wallpaper); there are also special (e.g., fleece wallpaper) and heavy wallpapers for which alternative wallpaper glue is used (in different mixing ratios). Although heavy wallpaper glue is based on the same constituents, it is likely to have other volume percentages. The obtained mix can be used for surfaces ranging from 30m^2 to 50 m^2, depending on the type of wallpaper. After the powder is mixed in, the mixture can be easily applied to the wallpaper using a brush. The wallpaper covered with glue is folded to make sure it is properly soaked with glue and left to rest before attaching it to the wall.

Scenario for wallpaper glue

In the default scenario, the walls in a living room will be covered with normal wallpaper. According to the General Fact Sheet (te Biesebeek et al., 2014), the volume and surface area are 58 m^3 and 22 m^2, respectively. A total surface area of 40 m^2 for the walls (corrected for doors and windows) is assumed for hanging wallpaper.

Mixing and loading: wallpaper glue

The inhalation exposure from mixing and loading DIY powders is estimated using the ConsExpo ***inhalation – exposure to spray – instantaneous release*** model. For dermal exposure, the ***direct product contact – constant rate*** model (see subsection 4.1.3) is advised. Defaults for the parameters exposure duration, release duration (dermal), product amount for inhalation exposure (released mass), room volume, exposed area (dermal) and dermal contact rate are chosen in accordance with the generic scenario for loading powders (see subsection 4.1.3).

Frequency

Applying wallpaper is a rather big task that, in most cases, requires elaborate preparation and diligent execution. According to the information provided in Annex II A.4, wallpaper glue is used approximately 4 times per year, which will be set as a default. A Q-factor of 2 is assigned because of the limitations also explained in the above-named Annex section.

Exposure duration
The mixing duration of wallpaper glue powder with water was documented during a consumer survey as described in Annex II A.4.2. The duration varies from 1 minute up to 60 minutes with a 75^{th} percentile of 19.5 minutes. As this information is specifically gathered for this product category, this value will be preferred instead of the generic default described in subsection 4.1.3. A Q-factor of 2 is assigned because underpinning data is sufficient, albeit limited.

Released mass
For normal wallpaper and a surface area of 40 m^2, a 7.5 l mixture (125 g wall-paper glue mixed with 7.5 l water) must be made according to product information (see Annex II; product data collection Table 94). A recently conducted consumer survey (including protocol documentation) delivered results which indicates that a product amount (powder) of 271.3 g (75^{th} percentile) ~ 270 g wallpaper remover is used by a common consumer (see Annex II A.4.2). As this value is more conservative than the product information, it will be used in the following considerations. Referring to subsection 4.1.3, a default value of 11.2 µg released mass is set for a powder amount of 270 g. The Q-factor is set to 1, as described in subsection 4.1.3.

Released duration
The release duration is assumed to be similar to the exposure duration explained above. It is unlikely that the user will interrupt the mixing process in order to clean his hands before the mixture is homogenised. A Q-factor of 2 is assigned because underpinning data is limited.

Table 22 Default values for mixing and loading: wallpaper glue

Default value		**Q-factor**	**Source**
General			
Frequency	4 per year	2	Annex II A.4
Inhalation – exposure to spray – instantaneous release			
Exposure duration	19.5 min	2	See above
Released mass	11.2 µg	1	See above, see subsection 4.1.3
Room volume	1 m^3	1	See subsection 4.1.3
Ventilation rate	0.6 per hour	1	Unspecified room (te Biesebeek et al., 2014); See subsection 4.1.3
Dermal – direct product contact – constant rate			
Exposed area	450 cm^2	2	See subsection 4.1.3
Contact rate	5 mg/min	1	See subsection 4.1.3
Release duration	19.5 min	2	See above

Application
The obtained mixture is applied with a brush after which the wallpaper is folded to allow it to soak properly. Afterwards, the wallpaper can be attached to the wall. Surplus glue should be removed instantly, using a moist cloth.

Because exposure to a very high product amount from a large surface is not realistic, it is assumed for this scenario that the task is conducted in segments of 1 m^2 (see descriptions in subsections 4.2.2 and 6.7).

In contrast to the considerations of the previous DIY Products Fact Sheet (ter Burg, 2007), inhalation exposure to substances evaporating from wallpaper glue will be taken into account at this point. New data acquired during the screening of the products available on the DIY market (see Annex II, product data collection Table 94 lead to the conclusion that wallpaper glue may contain VOC substances. The inhalation exposure is estimated using the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model because the task is conducted in intervals and the considered size of the release area (1 m^2) is constant (while the source strength is renewed) throughout the task. For dermal exposure the ***dermal – direct product contact – constant rate*** model is applied.

Exposure duration
Covering the walls of a living room with wallpaper is a task that has to be conducted precisely in order to achieve acceptable and sustainable results. According to the information provided in Annex II A.4.2 from a consumer survey regarding the exposure duration (including mixing, application and staying in the same room after use) of wallpaper glue, a 75^{th} percentile of 498 minutes (~500 minutes) is derived. Therefore, 500 minutes will be used as a default for this scenario. A Q-factor of 2 is assigned because the data set is rather limited.

Amount of solution used
The entire amount of mixture used of ~ 16.5 kg (16.2 l water and 270 g product powder mixed with an approximate density of 1 g/cm^3), as indicated by product information (7.5 l water per 125 g powder product; see Annex II; product data collection Table 94) and by a consumer survey (75^{th} percentile of amount used: 270 g; see Annex II A.4.2) is considered here because the source evaporation potential is restored in every interval. This prevents an underestimation of exposure through source depletion. A Q-factor of 3 is assigned because the underpinning data is sufficient to derive a default, albeit limited.

Dilution
The dilution as described in subsection 4.2.4 has to be considered in this scenario in order to properly assess the inhalation exposure. It is defined as the inverse of the product concentration of wallpaper glue powder in the water in the mixing vessel. As mentioned above, 270 g product has to be mixed with 16.2 l water, which yields a dilution factor of 16470 g / 270 g = 61 times. This value will be used as a default for the scenario, with a Q-factor of 3 because the calculation can be underpinned by limited quantitative data.

Room volume and ventilation rate
According to the General Fact Sheet, a living room has a room volume of 58 m^3 and a ventilation rate of 0.5 per hour (te Biesebeek et al., 2014).

Release area
In accordance with the application scenario for tile glue (see subsection 6.7) and the explanations given in subsection 4.2.2, the effective release area in this case is assumed to be 1 m^2 (= one strip of wallpaper) throughout the task because this is the surface a user is able to treat per interval. The Q-factor is considered to be 1 because the value strongly depends on assumptions that are based on expert judgement.

Emission duration
The emission duration is estimated to be as long as the exposure duration (500 minutes). Because of the interval approach, it is assumed that, due to the constant renewal of the emission source, no depletion should be expected. The Q-factor is 1 because the default depends strongly on assumptions that are based on expert judgement.

Exposed area – dermal
Dermal exposure is expected to occur during application. The spreading of the glue and the folding and hanging of wallpaper will cause spills on both hands. The dermal exposure can be significant, depending on how the subject handles the wallpaper. Since wallpaper glue is not considered harmful and is easy to remove afterwards, subjects tend to be more careless and both hands will be exposed (= 900 cm^2) (te Biesebeek et al., 2014). A Q-factor of 2 is assigned because the underpinning data for the surface size of both hands is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Release duration – dermal
The exposure duration is set at 500 minutes. The release duration is set to be equal to the exposure duration because it is assumed that the user is dermally exposed, throughout application, because a high product amount is used and lastly because of possible carelessness while handling the glue. It is also assumed as a conservative approach that the user will not clean the exposed body parts until he or she leaves the room. Nevertheless, a Q-factor of 1 is assigned for this default because it is based on assumptions.

Table 23 Default values for application of wallpaper glue

Default value		**Q-factor**	**Source**
General			
Frequency	4 per year	2	Annex II A.4
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	500 min	2	See above
Amount of solution used	16.5 kg	3	See above
Dilution (times)	61	3	See above

Default value		Q-factor	Source
Room volume	58 m^3	4	Living room (te Biesebeek et al., 2014)
Ventilation rate	0.5 per hour	3	Living room (te Biesebeek et al., 2014)
Temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	1 m^2	1	Estimate, see above
Emission duration	500 min	2	See above
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – constant rate			
Exposed area	900 cm^2	2	Both hands (te Biesebeek et al., 2014)
Contact rate	30 mg/min	1	See above
Release duration	500 min	1	See above

6.10 Hot-melt adhesives

Use

Hot-melt adhesives are solidified glues that are primarily for hobby use. They have a wide range of application and are used mainly for small surfaces, such as connections of model parts and flowers for decorative purposes. The adhesive agent is a thermoplastic, such as ethylene vinyl acetate (EVA). A glue gun is required to use a hot-melt adhesive. The glue gun is an electric device which heats up the solidified glue bar (20 g; see Annex II, product data collection Table 95). There are two variations of hot-melt adhesives available on the consumer market. The conventional hot-melt adhesive is manageable at a temperature range from 150 °C to 200 °C and more commonly used. The low-melt version works at a temperature level of 110 °C and is predominantly used for crafting or decorating tasks. The main advantage of this technology is its ability to also connect polystyrene and soft PVC, for which the 200 °C version of the glue is too hot. The glue is inserted in the rear and then heated up for approximately 5 minutes. As a result, the glue bar will melt inside the glue gun. By triggering the glue gun, the melted glue is squeezed out onto the surface. The parts must then be attached to each other within 15 to 20 seconds; otherwise, the glue has cooled down too much.

Scenario for hot-melt adhesives

The scenario of gluing the soles of the shoes (surface area approximately 100 cm^2) with a hot-melt adhesive is described here. The effective release area, however, is much lower due the gradual release of the hot-melt in combination with the cooling down of the glue. The effective release area is estimated to be approximately 5 cm^2.

Exposure to a hot-melt adhesive takes place during the heating of the adhesive. Inhalation exposure may be caused by a chemical reaction due to heating, or from evaporation at high temperature. ConsExpo does not include models to evaluate chemical reactions. An estimate of the amount of chemical produced in the reaction has to be made separately. The exposure can then be calculated using the instantaneous release model. Similarly, the evaporation models in ConsExpo do not include an option where the evaporation takes place at a different (much higher, in this case) temperature than the surrounding space (room temperature). As the evaporation in this case is likely to be much higher than evaporation at room temperature, the use of the ConsExpo ***inhalation – exposure to vapour – evaporation*** model could lead to an underestimation of the exposure. Therefore, it is advised to use the ***inhalation – exposure to vapour – instantaneous release*** model in this case as well. The modelled concentration can be limited to the vapour pressure of the substance at room temperature to prevent the occurrence of unrealistically high concentration levels that may arise from the immediate release of the substance. Ticking the box: 'limit the air concentration to the vapour pressure of pure substance' in ConsExpo is required.

Inhalation exposure takes place when the glue is being heated or melted.

Due to the temperature of the glue after heating, the user tends to be very cautious during its use. Dermal exposure is therefore expected to be rather low and will predominantly occur when the glue stick is inserted prior to use. It is estimated using the ConsExpo ***dermal – direct product contact – instant application*** model.

Frequency
Because of its wide range of application, the frequency of use of hot-melt adhesives could be assumed to be rather high. The information provided in Annex II A.4 indicates that this kind of glue is used by the consumer 6 times per year, which will be used as the default. The Q-factor is set to 2 because of the limitations also explained in the above-named Annex section.

Exposure duration
In total, an application duration of 25 minutes will be taken into account for this task, which is spread over a longer period of time (gluing occurs in intervals). The default for the exposure duration is also set at 25 minutes due to the rapid cooling of the glue. The Q-factor is considered to be 1 since there is no underpinning data available.

Product amount – inhalation
According to assumptions, during this task, a total product amount of 60 g will be consumed equalling three commonly used glue bars. This value relies on expert judgement resulting in a Q-factor of 1.

Room volume and ventilation rate
The task is conducted in an unspecified room. This room is therefore defined to have a volume of 20 m^3 and a ventilation rate of 0.6 per hour (te Biesebeek et al., 2014).

Exposed area – dermal
Dermal exposure during use is considered negligible, because one can work very precisely with a glue gun and, moreover, the glue is too hot to spread over the surface of the skin after heating up. Before use, there is dermal contact when the glue bar is inserted. Assuming that only one hand will be used to insert the glue bar; 20% of a palm will be exposed. This equals a contact surface of 45 cm^2 (te Biesebeek et al., 2014). A Q-factor of 2 is assigned because the underpinning data for the surface size of one palm is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Product amount – dermal
The product amount contacting the skin will be low because the glue is still solid at room temperature. The glue is more or less rubbed off the glue bar during the insertion of the glue bar into the device. The product amount is estimated to be of the order of 0.1 g. In the EU RAR on MDI (EU, 2003c), a similar product amount was provided (65 g), resulting in an estimated dermal exposure of 168 mg from MDI alone, which was a conservative estimation. For this default, a Q-factor of 2 is assigned because the underpinning data is limited and supplemented with estimations.

Table 24 Default values for hot-melt adhesive

Default value		**Q-factor**	**Source**
General			
Frequency	6 per year	2	Annex II A.4
Inhalation – exposure to vapour – instantaneous release			
Exposure duration	25 min	1	Estimate, see above
Product amount	60 g	1	Three glue bars, estimate
Room volume	20 m^3	4	(Bremmer et al., 2006a)
Ventilation rate	0.6 per hour	3	(Bremmer et al., 2006a)
Dermal – direct product contact – instant application			
Exposed area	45 cm^2	2	20% of one palm (te Biesebeek et al., 2014)
Product amount	0.1 g	2	See above (EU, 2003c)

6.11 Glue from spray

Use
Apart from glues in tubes, bottles, cartridges, syringes and canisters, glue is also available as sprays. Generally, glue spray is used on materials such as paper, cardboard, photos, textiles, cork and metal foils. Glue spray is also suitable for temporary attachment of materials. The glue is applied on both surfaces that are to be attached, except when porous materials are used, in those cases only one side should be sprayed with glue.

Scenario for glue spray
The scenario of gluing a poster to a wall or door, or mounting a poster in a frame, is described here. The inhalation exposure to the fraction of the non-volatile substances in the product can be estimated using the ConsExpo ***inhalation – exposure to spray – spraying*** model while the inhalation exposure to the volatile substances can be assessed using the ***inhalation – exposure to vapour – instantaneous release*** model. The defaults for the parameters exposure duration, room volume, ventilation and inhalation rate described for non-volatiles in sprays are used in the exposure estimation of both volatile and non-volatile substances. Defaults for the mass generation rate and the density of non-volatiles in the product are applicable only to the non-volatile substances and comply with the generic scenario for spray application (4.2.1). For the dermal exposure, however, the ***dermal – direct product contact – constant rate*** model is used.

Frequency
Glue spray is a product that is relatively easy to handle and has multifunctional application options. According to the information provided and explained in Annex II A.4, it is used by consumers at a frequency of 6 times per year. The Q-factor is considered to be 2 in this case because of the limitations also explained in Annex II A.4.

Spray duration
The surface of the poster is assumed to be 1.5 m^2. According to product information, 440 ml (375 g; product density =0.85 g/cm^3; see Annex II, product data collection Table 96) is required to glue the poster onto a surface with application both on the poster and, for example, on a door. Using the mass generation rate for aerosol spray cans explained in subsection 4.2.1 (1.2 g/sec) provides a spraying duration of 315 seconds. A Q-factor of 2 is assigned in this case because the data basis for the product consumption is limited but sufficient.

Exposure duration
The exposure duration is the time that a person stays in the room during and after the task. The total exposure duration is set at 240 minutes as an estimation with the assumption that the user won’t leave the room once the task is conducted. Therefore, the Q-factor is considered to be 1.

Ventilation rate, room volume and height
The room is not specified. The default values for room volume, room height and ventilation rate from the General Fact Sheet for an unspecified room are considered in this case. These values are 20 m^3, 2.5 m, and 0.6 per hour, respectively (te Biesebeek et al., 2014).

Product amount (default needed for the exposure assessment for volatile substances)
The product amount required for a 1.5 m^2 surface (poster) is 375 g according to the product information. A Q-factor of 3 is assigned here because the source data is sufficient to derive a default, albeit limited.

Exposed area – dermal
Dermal exposure may occur during the process of spraying because spray particles that bounce back from the treated surface or miss it can disperse in the room air and settle on the skin of the user. Furthermore, the user may accidently have dermal contact with surfaces already treated with glue while putting the object (the poster in this case) in position. The exposed area is assumed to be the surface of both hands (900 cm^2) (te Biesebeek et al., 2014). A Q-factor of 2 is assigned because the underpinning data for the surface size of both hands is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Release duration – dermal
The release duration is the time during which the substance is present on the skin, resulting in dermal exposure. In this case, the release duration is assumed to equal the spray duration because intermittent spraying is not expected due to the small area that has to be treated. Furthermore, the user is not expected to work very precisely on this kind of task, which leads to the assumption that he will cover both surfaces with glue with just one short break when he switches between the wall and the poster. After spraying, the user tend to clean his hands in order to properly put the object in position without leaving behind stains of glue in undesired spots. The Q-factor is set to 2 because the data set for the derivation of the duration is limited but sufficient.

Table 25 Default values for glue spray

Default value		**Q-factor**	**Source**
General			
Frequency	6 per year	2	Annex II A.4
Inhalation – exposure to spray – spraying			
Spray duration	315 sec	2	See above, product information
Exposure duration	240 min	1	Estimate
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Room height	2.5 m	4	Standard room height
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Mass generation rate	1.2 g/sec	3	See subsection 4.2.1
Airborne fraction	0.14 g/g	2	See subsection 4.2.1
Density non-volatile	1.5 g/cm^3	3	See subsection 4.2.1
Aerosol diameter – median (C.V.)	15.1 µm (1.2)	3	See subsection 4.2.1
Inhalation cut-off diameter	15 µm	3	See subsection 4.2.1
Inhalation – exposure to vapour – instantaneous release			
Product amount	375 g	3	See above
Dermal – direct product contact – constant rate			
Exposed area	900 cm^2	2	both hands (te Biesebeek et al., 2014)
Contact rate	100 mg/min	1	See subsection 4.2.1
Release duration	315 sec	2	See above

7 Sealants

Sealants are products that are used in several DIY tasks, ranging from sealing gaps in the bathroom to gluing materials together during major home renovations. Sealants are typically contained in cartridges of approximately 300 ml, or in larger cartridges of approximately 750 ml. The sealants are applied using a cartridge gun or caulk gun in which the cartridge is placed. By triggering the cartridge gun, a barrel is pushed slowly through the cartridge, which presses the sealant out.

The use of sealants can be divided into two applications: (1) sealing gaps to obtain an air- and watertight joint, and (2) as a glue to adhere materials to each other. The difference in use leads to a difference in exposure and therefore sealants are divided into two corresponding product categories. These product categories are defined as joint sealants and assembly sealants. They are discussed in sections 7.1 and 7.2, respectively.

7.1 Joint sealants

Use

Joint sealants are used in and around the house to seal joints or small gaps to prevent air and/or water from passing through. 'Use' of joint sealants is varied because each different sealant has its own characteristics. Silicone-based sealants are known for their elastic and water-resistant properties and will be used in moist environments, such as bathrooms, toilets and kitchens. Here, it is important that no water can penetrate the sealant to cause moisture problems, such as mould or leakages. Sealants used for water-resistant purposes are often referred to as caulk. Furthermore, due to their elasticity, silicone-based sealants are often used to seal off glass. However, the disadvantage of silicone-based sealants is that they cannot be painted.

Acrylate-based sealants have stronger adhesive abilities than silicone-based sealants and are more suitable for sealing gaps around windows, windowsills, and doors. For this purpose, it is important that the sealant can be attached to several types of surfaces (e.g., brick, wood, plastic, metal, and glass). These sealants have the main advantage that they can be painted without reacting with the paint (see links in Annex II, product data collection Table 97). However, acrylate-based sealants lack elasticity and cannot be used on joints that are prone to warping.

In addition to the two sealants already mentioned above, there are also sealants based on butylene. Butylene-based sealants have a long hardening time and attach easily to glass. The main advantage of these sealants is that they harden by forming a 'skin' on the surface but remain plastic, thereby making it easy to detach an object when necessary.

Although each of the above sealants' uses are different, their application is the same. The sealants are applied with a cartridge gun. Joint sealants will not be used for large surfaces, but rather for long joints with small diameters. The amount used depends on the job at hand. On average, one cartridge of 300 ml will suffice to seal off a 7 m long joint of 5 x 5 mm (41.5 ml/serial meter; see Annex II, product data collection Table 97).

Only one scenario will be described for joint sealants: in this case, sealing joints in a bathroom. The task is conducted indoors in a relatively small room, while the task itself is relatively large. The scenario can therefore be regarded as a reasonable conservative scenario.

Table 26 Possible purposes for different kinds of sealants are listed below; please note that this list is not complete but can be considered in order to get an overview of possible purposes (information from Terwoert et al. in addition to product information) (Terwoert et al., 2002)

Type of sealant	**Main purpose**
Silicone-based I	Construction, window frame
Silicone-based II	Sanitary use (e.g., in bathrooms and kitchens)
Silicone-based III	Glazing, sealing 'glass' joints (source VNVI: www.nrk.nl)
Acrylate-based I (waterborne)	Construction Masonry, window frame-stone joints
Acrylate-based II (solvent-based)	Masonry, window frame-stone joints
Butylene-based	Wooden window frames
Polysulphide (one-component)	Glazing, sealing 'glass' joints
PU-based (one-component)	Glazing, sealing 'glass' joints Flexible joints
Bitumen-based	Sealing gaps in walls indoors and outdoors
Hybrid	Glazing, sealing 'glass' joints

Some of the uses of joint sealants overlap with other DIY groups. For instance, sealants can be used to fill gaps in cement joints. However, this is not the main use for these products. Only the main purposes of sealants will be described here.

Scenario for joint sealant

The scenario for joint sealants is assumed to be performed in a bathroom (moist environment), where the joints between bathtub, shower cabinet, or washstands and wall will be sealed. The total joint length when sealing the joints between a bathtub and wall is estimated to be five metres.

The sealants are liquid and gel-like and harden quite quickly. Safety directions present on the product indicate that inhalation exposure may occur for silicone-based sealants. Mainly, the solvents present in the silicone sealants will evaporate from the joints. No such indications were present on the two acrylate-based sealants (Magré, 2005). Inhalation exposures can result from solvents being present (see Table 26);

however, most acrylate-based sealants do not contain solvents. To estimate the inhalation exposure, the ConsExpo ***inhalation*** – ***exposure to vapour – evaporation – release area mode: increasing*** model is used. For dermal exposure the ***dermal – direct product contact – constant rate*** model is used.

Frequency
Because sealants are useful in several situations, it is assumed that a frequency of 3 times per year is applicable. Because the value is based on expert judgement, a Q-factor of 1 will be considered.

Exposure duration
The time needed to perform the task was also observed by Magré. Exact application durations are not clear, but the observed time ranged from 14 to 24 minutes (Magré, 2005). Because Magré's observations focused on rather small sealing tasks, these values can only give an indication for the dimension of the exposure duration in the scenario considered here. It is estimated that the exposure duration will last 45 minutes, assuming that finishing off after use consists of cleaning up, which should not consume much time, and that the user will leave the bathroom once the task is complete. A Q-factor of 1 is assigned because the underpinning data is limited and can only give an indication on the dimension of the exposure duration.

Product amount – inhalation
According to product information, 41.5 ml sealant product per serial meter is sufficient to seal a joint (see Annex II; product data collection Table 97). Sealing a 5 m long joint can therefore be calculated to require 207.5 ml. Silicone-based sealants are most suitable for this type of DIY task. A product density of 1.69 g/cm^3 is used here (75th percentile of the joint sealant products found on the German market, see Annex II Table 93), which provides a product amount of 350 g. The product density of joint sealants in general ranges from 1 to 1.7 g/cm^3. The Q-factor is set to 3 because the underpinning data is limited but sufficient.

Room volume and ventilation rate
The room is a bathroom, therefore the default values for a room volume of 10 m^3 and a ventilation rate of 2 per hour from the General Fact Sheet are considered in this case (te Biesebeek et al., 2014).

Release area
The release area is calculated using the joint length (5 metres) and width (5 mm) resulting in 250 cm^2. The Q-factor is considered to be 1 because underpinning data is lacking, and the value relies on personal judgement.

Application duration
Referring to the results by Magré, as described above in the paragraph about exposure duration, it is estimated that the application duration for this kind of task is 30 minutes (12-24 minutes in Magré's observations of partially smaller tasks). Because the underpinning data is limited, gathered for another (smaller) kind of task and refined with expert judgement a Q-factor of 1 is assigned here.

Exposed area
According to product information, the sealant must be pressed into the joint with a spatula or with a finger dipped in water containing soap. The latter option is simple; it does not require a tool and is used more often. After smoothening the sealant, the finger is wiped clean, dipped and subsequently used to smoothen the next section of sealant. The dermal exposure area is the tip of one finger (one phalanx = 15 cm^2). Due to the amount of surplus sealant the exposure area is set at 30 cm^2 (two phalanges) instead of just one fingertip (see subsection 4.1.1). The Q-factor for this value is set at 1 because the derivation of the surface of a phalanx is underpinned with a solid data set regarding the size of a hand but compromised by assumptions (see subsection 4.1.1).

Contact rate
The product amount contacting the skin can be significant and is estimated to be 1.5 g in total. The contact rate is calculated to be 50 mg/min (1.5 g divided by release duration of 30 minutes). Even though only small sections can be smoothened, each time the fingertip is completely covered with sealant. The Q-factor is set to 1 because the derivation is supplemented with assumptions (product amount).

Release duration
The release duration is set at 30 minutes because it is assumed that the fingertips are dermally exposed during the entire application period. A Q-Factor of 1 is assigned because the underpinning data by Magré is limited and not gathered for the kind of task described in the default scenario.

Table 27 Default values for the use of joint sealant

Default value		**Q-factor**	**Source**
General			
Frequency	3 per year	1	Estimate
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	45 min	1	See above
Product amount	350 g	3	See above
Room volume	10 m^3	4	Bathroom (te Biesebeek et al., 2014)
Ventilation rate	2 per hour	3	Bathroom (te Biesebeek et al., 2014)
Temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	250 cm^2	1	5 m x 5 mm
Application duration	30 min	1	See above
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – constant rate			
Exposed area	30 cm^2	1	Two phalanges (te Biesebeek et al., 2014)
Contact rate	50 mg/min	1	See above
Release duration	30 min	1	See above

7.2 Assembly sealants

Use
Assembly sealants (modified silicone polymers) have multiple purposes. The main purpose is to attach materials to each other during construction, but these products are also used to seal gaps. The product can be used to glue all kinds of materials together, both indoor and outdoor, which is indicative for the broad scale of applications. The product is generally sold as glue; however, its use is similar to the use of joint sealants. For this reason, assembly sealants are discussed in this chapter.

Scenario for assembly sealant
The scenario for assembly sealant is the construction of a wooden frame inside the house. Assembly sealant is suitable for this task because the wooden parts are glued rapidly and firmly. The frame is assumed to be constructed indoors before being placed.

There is no information on inhalation exposure; however, safety instructions point out that vapours are not to be inhaled, which indicates that there can be inhalation exposure. When exposure through the respiratory tract occurs, it will be similar to the exposure described for joint sealant (see subsection 7.1). This is the reason why the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: increasing*** model was selected. The dermal exposure estimation can be done using the ***dermal – direct product contact – instant application*** model.

Frequency
The task described above is typically a professional one. The frequency of use of assembly sealants is low, because of the product’s focus on professionals. Therefore, the use of once a year is assumed for the general population. The default relies on expert judgement which leads to a Q-factor of 1.

Exposure duration
The time a subject stays in the room during and after the DIY task is 240 minutes, which will be used in the default scenario. US EPA estimated an exposure duration of 210 minutes for assembly glue without specifying the tasks conducted (as cited from EU RAR on Toluene section consumer exposure in glues – original reference: US EPA 1987 (EU, 2003b)). A Q-factor of 2 is assigned for this default because the underpinning data is limited and supplemented with assumptions.

Product amount – inhalation
Assembly sealant applied with cartridge guns is kept in cartridges of 310-390 g according to product information acquired during preparational research for the previous DIY products Fact Sheet (ter Burg, 2007). It is assumed that the task will consume an entire cartridge of 390 g (for approximately 1.5 m^2 treated surface, see below). The value is based on expert judgement. Therefore, a Q-factor of 1 is assigned.

Room volume and ventilation rate
Since the room is not specified, the default values for room volume (20 m^3) and ventilation rate (0.6 per hour) from the General Fact Sheet for an unspecified room are considered (te Biesebeek et al., 2014).

Release area
The treated area, which, in this case, consists of the parts of the frame on which assembly sealant is applied, is assumed to have a total size of 1.5 m^2. Because this is personal judgement, a Q-factor of 1 is assigned here.

Application duration
The task is fairly large but gluing the parts together will not consume much time because the glue can be applied very precisely via cartridge gun. An application duration of 30 minutes is chosen here as a default. A Q-factor of 1 is assigned because underpinning data is lacking.

Exposed area
The application of assembly sealant with a cartridge gun is performed very precisely on the objects, even for hard-to-reach places. Spreading out the glue with a tool or the fingertip is not necessary in most cases. Therefore, the dermal exposure is dissimilar to joint sealants. However, when using clamping tools, surplus sealant can be spilled on the user's hand. The surface area will be approximately 20% of one palm which equals 45 cm^2 in accordance with the information provided by the General Fact Sheet (te Biesebeek et al., 2014). A Q-factor of 2 is assigned because the underpinning data for the surface size of one palm is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Product amount – dermal
Due to the precise way of application via cartridge gun and the fact that it is not necessary to further position the sealant with a tool or the fingers, the product amount contacting the skin is expected to be low. A default value of 0.5 g is assumed to be sufficient in this case. The Q-factor is set to 1 because the value is based on expert judgement.

Table 28 Default values for assembly sealant

Default value		**Q-factor**	**Source**
General			
Frequency	1 per year	1	Estimate
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	240 min	1	See above
Product amount	390 g	1	See above
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	1.5 m^2	1	Estimate
Application duration	30 min	1	Estimate, see above

Default value		Q-factor	Source
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	45 cm^2	2	See above (te Biesebeek et al., 2014)
Product amount	0.5 g	1	See above

8 Fillers and putties

General information
Fillers and putties are DIY products that are used to remove unevenness from surfaces. The fillers are generally used to fill gaps and holes in walls and wood. Putty is used to smooth relatively small, uneven surfaces containing screw holes, scratches or consisting of rough materials. The DIY tasks can be very specific. For these specific purposes, several fillers and putties are available on the consumer market. These include general powder-based filler, ready-to-use large hole filler, filler and putty in tubes, two-component filler, and spray putty. An overview of available fillers and putties is presented in Table 29.

A default scenario is described for each of the above-mentioned types of filler or putty because exposure and exposure conditions may differ during mixing and loading, during application, and with respect to the magnitude of the task at hand.

Table 29 Possible purposes of different types of fillers are listed below; please note that this list is not complete but can be considered in order to get an overview of possible purposes ((Terwoert et al., 2002), (Danish Environmental Protection Agency, 2018)

Type filler	**Container**	**Main purpose**
Filler – powder	Carton	Universal filler Up to 5 cm depth
Large amount fillers	Bucket, jar	Universal filler Up to 10 cm depth
Filler/putty – water-based	Bucket, Tube	For inside and outside use, re-paintable
Lacquer filler/putty – solvent-based	Tube	For inside use, or for both inside and outside
Bitumen-based putty	Bucket	For outside use especially for repair and filling tasks in the roof area
Liquid wood (water-based or solvent-based)	Tube	For wood repair, layer thickness maximum of 1 cm
General wood repair filler (two-component)	Tubes, cans	Repair of (decayed) wood, where cracks and gaps are filled.
Two-component filler	Tubes, cans	Filling and repair of wood or steel
Putty – spray	Spray can	Superficial, small scratches. For metal

8.1 General filler from powder

Use

The general fillers are used for the filling of holes and cracks with a maximum depth of 5 cm. Furthermore, the filler can be used to set corners when a new wall is constructed or to smooth small uneven surfaces. The general fillers are powders, which have to be mixed and loaded with water in ratio of 2:1 (powder:water). As soon as a lump-free paste is obtained, the filler can be applied to the hole with a filling knife. This step is repeated until the hole is completely filled and can be smoothed with the filling knife. When an uneven surface is treated, the homogeneous paste is spread out and then smoothed with a trowel. These fillers are suitable for indoor use (some are also suitable for outdoor use) and can be painted with different types of paints, according to the product information (see Annex II, product data collection Table 98).

Scenario for general filler from powder

The restoration of an uneven wall surface is described here as a default scenario. More precisely a crack/hole with a size of 1 m^2 and a depth of 2 mm has to be filled. According to product information, 2 kg powder (mixed with 1 l water) is sufficient for this task (see Annex II; product data collection Table 98). The task is performed in an unspecified room. Using the parameters for this room from the General Fact Sheet (te Biesebeek et al., 2014) provides a room volume of 20 m^3 and a ventilation rate of 0.6 per hour.

Mixing and loading: general filler from powder

The inhalation exposure from mixing and loading DIY powders is estimated using the ConsExpo ***inhalation – exposure to spray – instantaneous release*** model. For the dermal exposure the ***direct product contact – constant rate*** model is advised (see subsection 4.1.3). Defaults for the parameters product amount for inhalation exposure, room volume, exposed area and dermal contact rate are from the generic scenario for loading powders (see subsection 4.1.3).

Frequency

According to the feasibility study conducted on behalf of the BfR (Schneider et al., 2018), fillers from powder are used with a frequency of 0.5 times per month leading to a default of 6 times per year with a Q-factor of 2.

Exposure duration

During a recently conducted feasibility study, the duration of mixing and loading of filler/putty products was asked via recall foresight methodology. According to the results, 3 minutes are sufficient to complete the mixing task (Schneider et al., 2018). Therefore, this will be taken as a default for this scenario. The Q-factor is set to 2 because underpinning data is limited.

Released mass
As mentioned above, 2 kg powder has to be mixed with 1 l water. Referring to the considerations in subsection 4.1.3, a released mass of 83 µg is set as a default with a Q-factor of 1.

Release duration
The release duration is assumed to be as long as the exposure duration in this case. The user tends not to clean his hands before the mixing task is done. A default of 3 minutes is taken into account with a Q-factor of 2.

Table 30 Default values for mixing and loading of general filler from powder

Default value		**Q-factor**	**Source**
General			
Frequency	6 per year	2	(Schneider et al., 2018)
Inhalation – exposure to spray – instantaneous release			
Exposure duration	3 min	2	(Schneider et al., 2018)
Released mass	83 µg	1	See above, see subsection 4.1.3
Room volume	1 m^3	1	See subsection 4.1.3
Ventilation rate	0.6 per hour	1	Unspecified room, (te Biesebeek et al., 2014); See subsection 4.1.3
Dermal – direct product contact – constant rate			
Exposed area	450 cm^2	2	See subsection 4.1.3
Contact rate	5 mg/min	1	See subsection 4.1.3
Release duration	3 min	2	(Schneider et al., 2018)

Application
After the filler is prepared for use, it is applied to the surface with the filling-knife. This takes approximately 30 minutes according to information from the feasibility study (Schneider et al., 2018). Afterwards, the filler hardens by water diffusion and evaporation. After the hardening process the filler can be sanded so that a smooth surface is obtained. Inhalation exposure is expected to be negligible because the product does not contain constituents which are likely to evaporate except water. For this reason, no inhalation scenario is proposed. Dermal exposure, however, does occur during application and can be estimated using the ConsExpo ***dermal – direct product contact – instant application*** model.

Exposed area
The surface area is the same as during the mixing and loading process described above: 450 cm^2 (= half of both hands) (te Biesebeek et al., 2014). A Q-factor of 2 is assigned because the underpinning data for the surface size of both hands is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Product amount
The filler product is mixed with water prior to use. Because the result of this mixing process is a rather pasty mass, an individual description of the dermal load is necessary.
The filler may be spilled onto the hands while applying it to the surface. The spilled amount will be low because working with fillers is relatively easy. The product amount contacting the skin is estimated at 0.25 g, which is 0.1% (estimation) of the total mixed product amount. The Q-factor is set to 1 because underpinning data is lacking.

Table 31 default values for general filler from powder - application

Default value		**Q-factor**	**Source**
General			
Frequency	6 per year	2	(Schneider et al., 2018)
Dermal-direct product contact – instant application			
Exposed area	450 cm^2	2	half of both hands (te Biesebeek et al., 2014)
Product amount	0.25 g	1	See above

8.2 Large hole filler

Use
Large hole fillers are used for gaps and holes that have depths from more than 5 cm up to 10 cm. The large hole fillers are stored in buckets or jars (ready to use) or are made from powders. The product can be used indoors and outdoors and can be painted after the hardening process. The filler is applied to the hole or the uneven surface either via direct pouring or a (plastic) spatula and has to be smoothed with a tool when the hole is filled.

Scenario for large hole fillers
Filling the holes in a cement/concrete wall is considered as a starting point. In total, 5 holes, each with a surface area of 5 cm^2 (=25 cm^2) and a depth of 10 cm (=250 cm^3) shall be filled.

Mixing and loading
The large hole fillers made from powders require the mixing and loading of the powder with water. According to product information for filler made from powder (see also subsection 8.1) 250 g powder (mixed with 125 ml water) is sufficient for a task with the above mentioned specifications.
The inhalation exposure from mixing and loading DIY powders is estimated using the ConsExpo ***inhalation – exposure to spray – instantaneous release*** model. For the dermal exposure the ***direct product contact – constant rate*** model (see subsection 4.1.3) is advised. Defaults for the parameters product amount for inhalation exposure, room volume, exposed area and dermal contact rate are from the generic scenario for loading powders (see subsection 4.1.3).

Frequency
Because of the size of the task the frequency of use is expected to be less than that for the use of fillers for smaller holes (see subsection 8.1)

which was derived from the results of a recently conducted feasibility study (Schneider et al., 2018). Large hole fillers are estimated to be used at a frequency of 3 times per year (half of the use frequency of fillers for small holes/tasks). A Q-factor of 1 is assigned because the data from the feasibility study was not gathered specifically for large hole fillers and is therefore only an indicator for the frequency of use.

Exposure duration
Following the approach for mixing and loading of general filler from powder, the default for exposure duration of mixing and loading large hole filler will be set at 3 minutes (Schneider et al., 2018). It is assumed that both tasks are comparable. The Q-factor is considered to be 2 because underpinning data is available but limited.

Released mass
In accordance with the considerations in subsection 4.1.3 the default for the released mass (considering a powder consumption of 250 g) is set to 10.4 µg with a Q-factor of 1.

Release duration
The release duration is assumed to be as long as the exposure duration. The user tends not to clean his hands before the mixing task is complete. A default of 3 minutes is taken into account with a Q-factor of 2.

Table 32 Default values for mixing and loading of large hole filler from powder

Default value		**Q-factor**	**Source**
General			
Frequency	3 per year	1	Estimate
Inhalation – exposure to spray – instantaneous release			
Exposure duration	3 min	2	(Schneider et al., 2018)
Released mass	10.4 µg	1	See above, see subsection 4.1.3
Room volume	1 m^3	1	See subsection 4.1.3
Ventilation rate	0.6 per hour	1	Unspecified room, (te Biesebeek et al., 2014); See subsection 4.1.3
Dermal-direct product contact – constant rate			
Exposed area	450 cm^2	2	See subsection 4.1.3
Contact rate	5 mg/min	1	See subsection 4.1.3
Release duration	3 min	2	(Schneider et al., 2018)

Application
In contrast to the default scenario for general hole fillers from powder the inhalation exposure has to be considered here because at least in ready-to-use large hole fillers, VOC substances could be identified during a market screening (see Annex II, product data collection Table 99). The

ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: increasing*** model is used to estimate the inhalation exposure. Furthermore, dermal exposure during application occurs via spills. The model of choice in this case is the ***dermal – direct product contact – instant application*** model.

Exposure duration
Performing this task will not take much more time than it takes for a general filler (see subsection 8.1) since large holes can be filled in a few repeated steps as well. According to the results of the feasibility study 30 minutes are sufficient to conduct such a task (Schneider et al., 2018). However, based on the assumption that the user will stay in the room after the task is complete, an exposure duration of 240 minutes is set as a default with a Q-factor of 1.

Amount of solution used
According to product information acquired during a market screening, a product amount of 0.1 g powder is required per cm^2 and mm layer thickness (see Annex II, product data collection Table 98). Because the scenario includes filling 5 holes with a surface area of 5 cm^2 each (= 25 cm^2 in total) and a depth of 10 cm each, the resulting product amount that is sufficient for the task is 250 g powder mixed with 125 ml water resulting in 375 g solution. It is assumed that the same product consumption is valid for ready-to-use filler. The data basis for the default value is limited so the Q-factor is set to 3 in this case.

Dilution
A dilution factor has to be considered in this scenario because the filler product is mixed with water prior to use (further explanation can be found in subsection 4.2.4). Taking into account the information provided above of 250 powder mixed with 125 ml water, a dilution factor of 1.5 (375 g final solution/ 250 g powder) is considered as a default. The Q-factor is set to 2 because the calculation is not underpinned by quantitative data.

Room volume and ventilation rate
It is assumed that this task is conducted in an unspecified room leading to a room volume of 20 m^3 and a ventilation rate of 0.6 per hour according to the General Fact Sheet (te Biesebeek et al., 2014).

Release area
The total release area is derived from the accumulated surface areas of all holes which were filled with the product. The default is therefore set to 25 cm^2. A Q-factor of 1 is assigned here because the value is based on expert judgement.

Application duration
As indicated before the application duration is not estimated to be much longer than in the general filler scenario (see subsection 8.1). According to the information provided in the feasibility study commissioned by the BfR the default is set at 30 minutes (Schneider et al., 2018). The Q-factor is considered to be 2 because the underpinning data is sufficient to derive a default but limited.

Exposed area
Dermal exposure is highly probable during application. The surface area of the skin which might get into contact with the product is assumed to be 50% of both hands which equal 450 cm^2. A Q-factor of 2 is assigned because the underpinning data for the surface size of both hands is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Product amount – dermal
Even if the product is diluted in water prior to use the considerations provided in subsection 4.2.4 are not applicable because the final product is rather pasty and won´t distribute on the skin surface as a liquid would. Because of this, an alternative description of the dermal load is provided here.
The task itself is not very complicated. Given the low product amount, the amount of product in contact with the skin will not be significant. It is estimated that 0.4 g, or 0.1% of the total amount of solution, will be in contact with the skin. Because the value is based on expert judgement, a Q-factor of 1 is assigned here.

Table 33 Default values for application of large hole fillers

Default value		**Q-factor**	**Source**
General			
Frequency	3 per year	1	Estimate
Inhalation-exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	240 min	2	Estimate
Amount of solution used	375 g	3	Product information, see above
Dilution (times)	1.5	2	See above
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	25 cm^2	1	Estimate, see above
Application duration	30 min	2	(Schneider et al., 2018)
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	450 cm^2	2	half of both hands (te Biesebeek et al., 2014)
Product amount	0.4 g	1	See above

8.3 Filler / putty from tubes

Use
The fillers and putties from tubes are generally used for shallow holes and gaps. The products are ready to use or may require a mixing and loading process (i.e., the two-component fillers). The two-component

fillers will be discussed in section 8.4. The fillers and putties from tubes include the water-based fillers/putties, lacquer-based fillers/putties and liquid wood. These fillers are mainly used to repair little scratches and fill (screw) holes in wood to prepare the materials for another DIY task such as painting, gluing or sanding. The application of these products is rather superficial and should not be used for depths over 1 cm. Furthermore, the products can be applied indoors and outdoors. Liquid wood is different from the lacquer and water-based fillers/putties because it is available in different wood colours. In the UK approximately 800 kg wood filler is sold per year according to information from EU RAR on bisphenol A (EU, 2003a). This is not a large number, indicating that the product is not used that often.

Scenario for filler / putty from tubes
Here, the treatment with filler of screw-holes across an entire bookcase is considered before it is painted. The filler or putty is squeezed from the tube onto the filling-knife. The product is then applied to the small gap or hole and smeared over it. The hole is filled in this way and the filler/putty is smoothed where application is uneven.

The model chosen for inhalation exposure is ***inhalation – exposure to vapour – evaporation – release area mode: increasing***, because the evaporation is related to the surface area. Dermal exposure is expected to be small, because of the easy -to-use application method. However, spills may occur. In order to estimate the dermal exposure, the ***dermal – direct product contact – instant application*** model is used.

Frequency
Tasks conducted with filler or putty from tubes are diverse but rather small and associated with a low product consumption. Therefore, it is expected to occur with a high frequency. In accordance with the information provided by the feasibility study, a default value of 6 times per year is set (Schneider et al., 2018). The Q-factor is considered to be 2 because the data basis is sufficient to derive a default but limited.

Exposure duration
The application itself isn’t expected to take very long. Nevertheless, assuming that the subject stays in the room after the task, a total exposure duration of 240 minutes is estimated. Because this value is based on personal judgement, a Q-factor of 1 is assigned here.

Product amount – inhalation
In total, it is assumed that 40 screw holes with a surface area of 1 cm^2 and a depth of 2 cm each will be filled with the product. According to product information, a layer of 1 mm thickness consumes 0.175 g filler per cm^2 (see Annex II, product data collection Table 100). Taking this information into account, an estimated total product amount of 140 g is needed to complete the task. A Q-factor of 3 is assigned because the underpinning data set is limited.

Room volume and ventilation rate
No room is specified for this task, therefore the parameters for an unspecified room are used here; room volume is 20 m^3 and ventilation

rate is 0.6 per hour according to the General Fact Sheet (te Biesebeek et al., 2014).

Release area
The surface area is determined by summing each cover of a screw hole. The maximum diameter of a wooden drill bit available in consumer retail stores is 1 cm, which leads to holes with a surface area of 0.785 cm^2. Assuming that the hole made with a drill is slightly bigger than the drill bit itself, 1 cm^2 is estimated to be the surface area of one screw hole. For 40 screw holes, a total surface area of 40 cm^2 is assumed. The Q-factor is set to 1 because the value is based on expert judgement and assumptions.

Application duration
It is assumed that the application by tube takes as much time as in the previous scenarios for general filler (see subsection 8.1) and large hole filler (see section 8.2), which equals 30 minutes referring to the results of the feasibility study as well (Schneider et al., 2018). The filling tasks are estimated to be similar. The Q-factor is considered to be 2 because the data basis is sufficient to derive a default but limited.

Exposed area – dermal
The product can be applied very precisely from the tube or with use of a filling knife. Nevertheless, dermal exposure may occur because of spills and surplus product. It is not assumed that wide skin surface areas will be exposed during use. As a default, 5% of one hand (equal to 22.5 cm^2) is estimated to contact the product (te Biesebeek et al., 2014). A Q-factor of 2 is assigned because the underpinning data for the surface size of a hand is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Product amount – dermal
The amount of filler that comes into contact with the skin is estimated to be rather low because of the simple method of application (product applied via tube directly into the holes and using a filling knife) and the low product amount used. A default of 0.05 g is taken into account. The value is based on expert judgement, which leads to a Q-factor of 1 due to lack of data.

Table 34 Default values for application of fillers/putty from tube

Default value		**Q-factor**	**Source**
General			
Frequency	6 per year	2	(Schneider et al., 2018)
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	240 min	1	Estimate, see above
Product amount	140 g	3	Product information, see above
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)

Default value		Q-factor	Source
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	40 cm^2	1	See above
Application duration	30 min	2	(Schneider et al., 2018), see above
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	22.5 cm^2	2	See above
Product amount	0.05 g	1	Estimate

8.4 Two-component filler

Use
Two-component fillers are used to repair decayed wood (wood decay fillers), stone, polyester, or steel (extra strong filler). These products are required to be very strong, water-resistant and capable of stopping further decay (wood decay filler). The two components are mixed in a ratio of 1:1. The two-component filler consists of a resin and a siccative (2-4% volume percentage); otherwise, the filler will not harden properly.

Scenario for two-component filler
Repairing all spots in the decayed wood of a window frame is considered as the default scenario.

Mixing and loading: two-component filler
For the default scenario of mixing and loading, two-components please refer to subsection 4.1.1. During the mixing and loading process, inhalation exposure may occur, which is estimated using the ConsExpo ***inhalation – exposure to vapour – evaporation release area mode: constant*** model. For the assessment of dermal exposure, the ***dermal – direct product contact – instant application*** model is advised.

Frequency
The frequency of use of two-component fillers is set at 6 times per year based on the results of the feasibility study conducted in 2016/2017 and commissioned by the BfR (Schneider et al., 2018). Because the underpinning data set is sufficient to derive a default, albeit limited, a Q-factor of 2 is assigned here.

Exposure duration
The exposure duration is assumed to be as long as it takes to achieve a homogeneous mass consisting of the two components. This process is estimated to take 5 minutes. The value is based on expert judgement. Therefore, a Q-factor of 1 is assigned.

Product amount – inhalation
It is assumed that a total of 200 g filler is used to fill the holes and gaps after the decayed wood has been removed. The two components can be

put on the filling-knife and mixed according to product instructions. Equal amounts of 100 g are taken from each component. They are mixed with the help of a tool (another filling knife or spatula) until a homogenous colour is obtained. The Q-factor for this default is set to 1 because it is based on expert judgement.

Release area
The two components are usually mixed directly on the tool used to apply the prepared product in the holes. In this case, a filling knife is used for this purpose. It is assumed that the usable area on such a tool is approximately 100 cm^2, which will be used as a default. Because the value is based on expert judgement, a Q-factor of 1 is assigned.

Emission duration
Because the mixing and loading process takes only 5 minutes, a depletion of the source is unlikely. Therefore, the estimated emission duration is also set to 5 minutes (similar to exposure duration). A Q-factor of 1 is considered because the underpinning data is not available.

Product amount – dermal
Dermal exposure is not expected to be high because of the use of tools and a relatively low total product amount. The amount of product contacting the skin is therefore estimated to be 0.02 g. The Q-factor is set to 1 in this case.

Table 35 Default values for mixing and loading of a two-component filler

Default value		**Q-factor**	**Source**
General			
Frequency	6 per year	2	(Schneider et al., 2018)
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	5 min	1	See above
Product amount	200 g	1	See above
Room volume	1 m^3	1	See subsection 4.1.1
Ventilation rate	0.6 per hour	1	Unspecified room (te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	100 cm^2	1	See above
Emission duration	5 min	1	See above
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	30 cm^2	1	See subsection 4.1.1
Product amount	0.02 g	1	See above

Application
Before mixing the components together the decayed wood has to be removed and the surface cleaned properly. The mixed product is then applied with the filling knife into the hole until it is filled completely. The filler can be smoothed with the help of the filling knife too.
During that time, inhalation exposure may occur from the volatile components present in the product. The model selected here is ***inhalation – exposure to vapour – evaporation – release area mode: increasing***. Dermal exposure can occur due to spills. The dermal exposure scenario is similar to the dermal exposure scenario for filler/putty from tubes. The ConsExpo ***dermal – direct product contact – instant application*** model is used.

Exposure duration
The application duration itself is not estimated to be very long (see below). But based on the assumption that an intensive clean-up phase is required, and that the user will stay in the room after the task is completed, an exposure duration of 240 minutes is set as a default with a Q-factor of 1.

Product amount – inhalation
As explained in the considerations regarding the default scenario for the mixing and loading process of two-component filler, a product amount of 200 g is assumed to be sufficient to conduct such a task. As no underpinning data is available for this value a Q-factor of 1 is assigned.

Room volume and ventilation rate
This task can be conducted in any room. An unspecified room with a volume of 20 m^3 and ventilation rate of 0.6 per hour in accordance with the General Fact Sheet (te Biesebeek et al., 2014) is considered.

Release area
The surface from which the chemicals can evaporate is estimated to be 50 cm^2 (5 holes, 10 cm^2 each). Additionally, 100 cm^2 is considered, which is the surface of the tool on which the two components were mixed. Therefore, a default of 150 cm^2 is estimated. Because the release area is estimated, the Q-factor is set to 1.

Application duration
The application duration is not long because the mixture tends to harden quickly. A period of 30 minutes is assumed to be needed to repair the wood, according to the information received from a feasibility study (Schneider et al., 2018). The data set is sufficient to derive a default but limited in this case; therefore, a Q-factor of 2 is assigned.

Exposed area
Dermal contact with the product is highly probable due to the method of application. The dermal contact area is assumed to be 50% of both hands (=450 cm^2), which is set as a default (te Biesebeek et al., 2014) in accordance with the default scenarios for general filler and large hole filler. The Q-factor is set to 2 because the underpinning data for the size of one hand is quantitatively rich but the estimation of the extent of the affected area is an assumption (see also subsection 4.5).

Product amount – dermal
The product amount contacting the skin is estimated at 0.2 g, which is 0.1% (assumption) of the total product amount. A Q-factor of 1 is assigned due to a lack of underpinning data.

Table 36 Default values for application of two-component filler

Default value		**Q-factor**	**Source**
General			
Frequency	6 per year	2	(Schneider et al., 2018)
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	240 min	1	See above
Product amount	200 g	1	See above
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	150 cm^2	1	See above
Application duration	30 min	2	(Schneider et al., 2018)
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	450 cm^2	2	See above
Product amount	0.2 g	1	Estimate, see above

8.5 Putty from spray

Use
Putty from spray is generally used for very small scratches on wood and metal. The spray produces a superficial layer that fills even the smallest scratches. For this reason, the product can be used to finish a task using fillers from tubes or powders. The product is a common asset in automobile and paint shops. Generally, a thick layer is sprayed onto the surface from a distance of at least 25 cm. Special equipment is required to shave and polish the treated surface into form prior to a paint job. Therefore, this product is generally used by professionals. This scenario, however, is described for non-professional users and won´t display any further activities following the spray application.

Scenario for putty from spray
The default scenario described for putty from spray is the removal of the scratches on a metal surface before the surface is re-painted: in this case, restoring a kettle to its natural state. This kind of task is generally not conducted inside the house, but more often in a garage.

The inhalation exposure to non-volatile substances will be estimated using the ***inhalation – exposure to spray – spraying*** model. In contrast to that, the ***inhalation – exposure to vapour –***

instantaneous release model can be used to assess inhalation exposure to volatile substances contained in the putty product. The defaults for the parameters exposure duration, room volume, ventilation and inhalation rate described for non-volatiles in sprays are used in both the exposure estimation of volatile and non-volatile substances. Defaults for the mass generation rate and the density of non-volatiles in the product are applicable only to the non-volatile substances and comply with the generic scenario for spray application (4.2.1).
Dermal exposure may occur when the spray unintentionally settles on the skin because it bounced back from or missed the targeted surface. It can be estimated using the ConsExpo ***dermal – direct product contact – constant rate*** model.

Frequency
No data is available on the frequency of use of putty from spray. Therefore, a default of one time per year is set, based on expert judgement. The Q-factor is considered to be 1.

Spray duration
The putty is not applied all at once, but three spraying efforts are assumed to be needed to cover the scratches completely. According to product information, an amount of 500 ml of spray is sufficient to treat an area of 1 m^2 with a thickness layer of 20 µm (see Annex II, product data collection Table 101). The surface of the kettle is estimated to be 500 cm^2. Assuming that the desired layer thickness is 40 µm, a product amount of 50 ml (with a density of 1 g/cm^3) will be needed. A mass generation rate of 1.2 g/sec (see subsection 4.2.1) leads to a spray duration of 42 seconds, which will be distributed during 3 spraying efforts of 14 seconds each. The underpinning data is limited, so a Q-factor of 2 is assigned for this value.

Exposure duration
The exposure duration is estimated to be 30 minutes in total because of possible after-use activities in the area of the product use, such as a clean-up phase. However, it is assumed that the user won´t stay in the garage once the task and clean up are completed. Because this is based on expert judgement, a Q-factor of 1 is assigned.

Ventilation rate, room volume and height
The task is conducted in a garage. According to the information from the General Fact Sheet (te Biesebeek et al., 2014) a room volume of 34 m^3 and a ventilation rate of 1.5 per hour are considered. The standard room height which will be used here is set at 2.5 m.

Product amount (default needed for the exposure assessment for volatile substances)
As previously described in the passage about the spray duration default, the required product amount for the considered scenario is 50 g (see Annex II, product data collection Table 101), which will be used as a default here. A Q-factor of 3 is assigned here because the underpinning data is limited.

Exposed area
In most cases, spray application causes extensive dermal exposure because the spray is dispersed in the room and may settle on large areas of the skin. Therefore, the exposed dermal area will be the surface of both hands (900 cm^2 according to the General Fact Sheet) (te Biesebeek et al., 2014). The Q-factor is set to 2 because the underpinning data for the size of both hands is quantitatively rich but the estimation of the extent of the affected area is an assumption.

Release duration
The release duration is defined here as the time during which the substance settles on the skin resulting in dermal exposure. The net spraying time is 42 seconds but at this point, the time spans between the three spraying events have to be considered too because the common user won’t clean the exposed body areas between efforts. The dermal exposure is therefore expected to last during the entire task of spraying. It is estimated that it will take 180 seconds to apply the required amount of spray (i.e., 3 spraying events). The task does not require a high degree of precision; however, the user will ensure that the product fully covers the surface. Furthermore, random actions, such as shaking the spray can, may extend the duration of the task. A Q-factor of 1 is assigned because the determination of the default is based on expert judgement.

Table 37 Default values for application of putty spray

Default value		**Q-factor**	**Source**
General			
Frequency	1 per year	1	Estimate
Inhalation – exposure to spray – spraying			
Spray duration	42 sec	2	See above
Exposure duration	30 min	1	Estimate, see above
Room volume	34 m^3	4	Garage (te Biesebeek et al., 2014)
Room height	2.5 m	4	Standard room height
Ventilation rate	1.5 per hour	3	Garage (te Biesebeek et al., 2014)
Mass generation rate	1.2 g/sec	3	See subsection 4.2.1
Airborne fraction	0.14 g/g	2	See subsection 4.2.1
Density non-volatile	1.5 g/cm^3	3	See subsection 4.2.1
Aerosol diameter – median (C.V.)	15.1 µm (1.2)	3	See subsection 4.2.1
Inhalation cut-off diameter	15 µm	3	See subsection 4.2.1
Inhalation – exposure to vapour – instantaneous release			
Product amount	50 g	3	See above
Dermal – direct product contact – constant rate			
Exposed area	900 cm^2	2	Both hands (te Biesebeek et al., 2014)
Contact rate	100 mg/min	3	See subsection 4.2.1
Release duration	180 sec	1	Estimate

9 Plasters and equalisers

General use

Plasters are used to smooth or apply structure on walls. This task is conducted for decorative purposes rather than repairing purposes. Equalising a wall, however, is very difficult and generally will not be performed by consumers. Floor equalisers are mainly used to level large surfaces such as uneven floors. Although these tasks are mainly performed by professionals, there is a tendency for consumers to conduct these rather large tasks themselves.

In this chapter, three scenarios will be described:
(1) a floor equaliser which is used to fill small holes and smooth the floor,
(2) the use of plaster to structure the walls, and
(3) the use of spray plaster with the help of a pneumatic spraying device.

Floor equalisers primarily come in the form of powders, which are to be dissolved in water. The mixing ratio must be such that the product spreads easily over the surface. Plasters are available as ready-to-use pastes and as powders that require dissolving in water. Furthermore, it is possible to apply spray plaster with a grain size of ≤ 1 mm by means of a pneumatic spray system (typically used for paint application).

9.1 Floor equaliser

Scenario for floor equaliser

In this default scenario, the floors of three (expert judgement) rooms (all have the same dimensions) in a house are equalised during a renovation process in a short time period (1-2 weeks). To level the floor, which has slight unevenness and holes, only a thin film of equaliser is needed to obtain a smooth surface. A surface area of 8 m^2 is used as the treated area per room, in accordance with the information provided in the General Fact Sheet for an unspecified room. Additional specifications of the unspecified rooms are: 20 m^3 for room volume and a ventilation rate of 0.6 per hour (te Biesebeek et al., 2014).
The floor equaliser is made from a powder that is dissolved in water prior to use. When the powder is dissolved to form a runny liquid, the product is poured over the surface and spread out using a squeegee. The time it takes for the product to harden amounts to approximately 30 minutes; however, repeated pouring will prohibit the equaliser from hardening too soon. It is expected to take half an hour to equalise a floor in one room and another 24 hours before the equaliser is completely hardened. The thickness of the equaliser applied may vary from 1 mm to 50 mm. The consumption rate of the product is 1.7 kg/m^2 per mm thickness (see Annex II, product data collection Table 102). A surface area of 8 m^2 and an average layer thickness of 2 mm provide a total product amount of 27 kg powder for the task in one room, mixed with 7 l water (0.26 l/kg powder; see Annex II, product data collection Table 102).

Mixing and loading: floor equaliser
The inhalation exposure from mixing and loading DIY powders is estimated using the ConsExpo ***inhalation – exposure to spray – instantaneous release*** model. For dermal exposure, the ***direct product contact – constant rate*** model (see subsection 4.1.3) is advised. Defaults for the parameters exposure duration, product amount for inhalation exposure, room volume, exposed area, dermal contact rate and release duration are used according to the generic scenario for loading powders (see subsection 4.1.3).

Frequency
The entire amount of powder (27 kg) is not mixed all at once because it is simply too much to handle in one effort. It is assumed that 6 intervals are needed to mix the total product amount. Therefore, the frequency of the mixing and loading process is set to 6 per task. 5 kg powder is suspended in water (2.3 l) per occasion (last occasion: 2 kg powder suspended in 0.52 l water). The Q-factor is set to 1 because no underpinning empirical data is available.

Released mass
In accordance with the considerations in subsection 4.1.3, the released mass for 5 kg powder is set to 207.5 µg (8.3 µg per 200 g powder) for the first 5 mixing efforts. The sixth effort only includes mixing of 2 kg powder with 0.52 l water. The released mass is therefore set to 33.2 µg. The Q-factor is considered to be 1 as described in the above-mentioned subsection.

Table 38 Default values for mixing and loading of floor equaliser

Default value		**Q-factor**	**Source**
General			
Frequency	6 (5+1 repetition, see released mass) per day	1	6 times per day on 3 days per year
Inhalation – exposure to spray – instantaneous release			
Exposure duration	3 min	2	See subsection 4.1.3
Released mass	207.5 µg (first 5 repetitions); 33.2 µg (sixth repetition)	1	See above and subsection 4.1.3
Room volume	1 m^3	1	See subsection 4.1.3
Ventilation rate	0.6 per hour	1	Unspecified room, (te Biesebeek et al., 2014); See subsection 4.1.3
Dermal – direct product contact – constant rate			
Exposed area	450 cm^2	2	See subsection 4.1.3
Contact rate	5 mg/min	1	See subsection 4.1.3
Release duration	3 min	2	See subsection 4.1.3

Application
Inhalation exposure is not expected in this case because floor equaliser does not contain ingredients that are likely to evaporate.

Since application consists of pouring and spreading the floor equaliser but does not require further treatment; the ConsExpo ***dermal – direct product contact – instant application*** model is selected to describe the dermal exposure.

Frequency
The frequency of this task is assumed to be rather low because of its level of difficulty and the large area involved. However, it is a reasonably conservative assumption that a user equalises several rooms in a short time period (1-2 weeks), for example during the renovation of an entire house. Therefore, the default will be set at 3 times per year with a Q-factor of 1 because no data is available to underpin it.

Exposed area
Due to the relatively large amount and the assumed non-toxicity of the product by the user, subjects will be more careless, which can result in a relatively high dermal exposure. Thus, the exposed area is both hands, with a surface area of 900 cm^2 according to General Fact Sheet (te Biesebeek et al., 2014). The Q-factor is set to 2 because the underpinning data for the size of both hands is quantitatively rich but the estimation of the extent of the affected area is an assumption (see also subsection 4.5).

Product amount – dermal
The product amount that possibly contacts the skin is calculated according to the information provided in subsection 4.2.4. Following these the volume of water contacting the skin is derived to be 9 ml (exposed skin x layer thickness of 0.01 cm). Furthermore, the volume of water in the mixing vessel is stated in the product information and mentioned above: 7 l. Taking into account the powder amount of 27 kg (see also above) and the equation provided in subsection 4.2.4, a product amount of approximately 35 g is derived and set as a default. The Q-factor is considered to be 2 because the calculation is not underpinned by quantitative data.

Table 39 Default values for application of floor equaliser

Default value		**Q-factor**	**Source**
General			
Frequency	3 per year	1	Estimate
Dermal – direct product contact – instant application			
Exposed area	900 cm^2	2	Both hands (te Biesebeek et al., 2014)
Product amount	35 g	2	See above

9.2 Wall plaster

Scenario for wall plaster
Decorating an entire wall in the living room with plaster is considered as the default scenario in this instance. In this case, decorating means: applying structure and maybe colour to the wall. It is assumed that only one wall will be treated per task.

In contrast to the considerations made in the previous DIY Products Fact Sheet (ter Burg, 2007), this scenario includes ready-to-use plaster, mainly based on lime wash and/or calcium sulfate, that are applied using a brush or a roller as well as wall plaster that has to be applied via trowels and/or taping knives. These plasters, made from powders and often based on mortar or cement, are mostly used by professionals. However, the wide range of these products available on the consumer market indicates that there is a tendency for consumers to conduct such complex tasks by themselves.

Mixing and loading: wall plaster
The inhalation exposure from mixing and loading DIY powders is estimated using the ConsExpo ***inhalation – exposure to spray – instantaneous release*** model. For dermal exposure, the ***direct product contact – constant rate*** model (see subsection 4.1.3) is advised. Defaults for the parameters exposure duration, product amount for inhalation exposure, room volume, exposed area, dermal contact rate and release duration comply with the generic scenario for loading powders (see subsection 4.1.3).

Frequency
Because it will not be possible in most cases to mix the whole product amount at once, the frequency of the mixing and loading process is set to 7 intervals per task. In the first 6 intervals, 5 kg powder is mixed with 2.5 l water. In the seventh interval 1 kg powder is mixed with 0.5 l water. The frequency for the task itself is estimated to be once every five years. No underpinning data is available for this default, which leads to a Q-factor of 1.

Released mass
Referring to the approach described in subsection 4.1.3, the released mass for the first 6 intervals is set to 207.5 µg (8.3 µg per 200 g powder). In the seventh interval, only 1 kg powder is used. Therefore, the released mass is set to 41.5 µg, with a Q-factor of 1.

Table 40 Default values for mixing and loading of wall plaster

Default value		**Q-factor**	**Source**
General			
Frequency	7 (6+1 repetitions, see released mass) per day	1	7 per day once every 5 years
Inhalation – exposure to spray – instantaneous release			
Exposure duration	3 min	2	See subsection 4.1.3
Released mass	207.5 µg (first 6 repetitions); 41.5 µg (seventh repetition)	1	See above, see subsection 4.1.3
Room volume	1 m^3	1	See subsection 4.1.3
Ventilation rate	0.6 per hour	1	Unspecified room, (te Biesebeek et al., 2014); See subsection 4.1.3

Default value		Q-factor	Source
Dermal – direct product contact – constant rate			
Exposed area	450 cm^2	2	See subsection 4.1.3
Contact rate	5 mg/min	1	See subsection 4.1.3
Release duration	3 min	2	See subsection 4.1.3

Application
Inhalation exposure during application is assessed using the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: increasing*** model.
However, dermal exposure can occur during this DIY task and may be even higher when a sponge is used to add structure to the surface. The product amount contacting the skin is therefore considered to be high. To describe the dermal exposure the ConsExpo ***dermal – direct product contact – constant rate*** model is used.

Exposure duration
Once the plaster is applied, the user may stay in the room for cleaning up purposes or for other activities unrelated to the DIY task. To follow a conservative approach, an exposure duration of 300 minutes is estimated. The Q-factor is set to 1 because the value cannot be underpinned with literature sources.

Amount of solution used
The consumption rate is dependent on the layer thickness. Here, a layer of 2 mm is assumed. This task therefore requires an amount of 31 kg powder mixed with 15.5 l water (0.5 l per kg powder) according to product information, which amounts to a consumption of 2.5 kg/m^2 with a layer thickness of 2 mm (see Annex II, product data collection Table 104). A Q-factor of 2 is assigned for this default because underpinning data is sufficient to derive a default, albeit limited.

Dilution
As described in subsection 4.2.4, the dilution has to be considered in this scenario in order to properly assess the inhalation exposure. It is defined as the inverse of the product concentration of wall plaster powder in the water in the mixing vessel. As mentioned above, 31 kg product has to be mixed with 15.5 l water. Thus, 1 kg of the mixed solution contains 670 g plaster powder. Therefore, the dilution is calculated as 1000 g / 670 g = 1.5 times. This value will be used as a default for the scenario with a Q-factor of 3 because the underpinning data (product information) used for this calculation is sufficient to derive a default, albeit limited.

Room volume and ventilation rate
Regarding the information provided in the General Fact Sheet, the specifications for a living room are a volume of 58 m^3 and a 0.5 per hour ventilation rate (te Biesebeek et al., 2014).

Release area
The wall in the living room is 5 m by 2.5 m (standard room height according to the General Fact Sheet) which equals a surface area of 12.5 m^2. As the dimension of the wall is (partly) based on assumptions, a Q-factor of 1 is assigned.

Application duration
The application is interrupted by repeated mixing and loading phases (see above). Nevertheless, this phase should be conducted with minimal interruptions in order to provide a good result without unintended curvatures or similar errors. The application duration is therefore estimated at 120 minutes. A Q-factor of 1 is assigned here because underpinning data is currently not available.

Exposed area
Working beside a wall and sometimes overhead will rapidly lead to dermal exposure, where both hands and forearms may be exposed. The exposed surface area is set at 2200 cm^2 as a default for the surfaces of both hands and forearms (te Biesebeek et al., 2014). The Q-factor is set to 2 because the underpinning data for the size of both hands and forearms is quantitatively rich but the estimation of the extent of the affected area is an assumption (see also subsection 4.5).

Release duration
The user may not clean the exposed body parts until the application phase is completed. The application duration is assumed to be 120 minutes as explained above. Taking into account a short clean-up phase and assuming the user will clean the affected body parts after cleaning up, a release duration of 150 minutes seems adequate. A Q-factor of 1 is assigned because the value is based on expert judgement.

Table 41 Default values for application of wall plaster

Default value		**Q-factor**	**Source**
General			
Frequency	0.2 per year	1	Estimate
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	300 min	1	Estimate
Amount of solution used	46.5 kg	2	Product information
Dilution (times)	1.5	3	
Room volume	58 m^3	4	Living room, (te Biesebeek et al., 2014)
Ventilation rate	0.5 per hour	3	Living room, (te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	12.5 m^2	1	Estimate
Application duration	120 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – constant rate			
Exposed area	2200 cm^2	2	Hands and forearms (te Biesebeek et al., 2014)
Contact rate	30 mg/min	1	See subsection 4.2.3
Release duration	150 min	1	See above, estimate

9.3 Plaster spray

Scenario for plaster spray
The default scenario for plaster spray includes the application of plaster with a layer thickness of 1 mm to a wall with a surface area of 4 m^2 via a pneumatic pump (also used for the spray application of paints) in an unspecified room. A pneumatic pump system can handle decorative plaster up to a grain size of 1 mm.

Mixing and loading: plaster spray
In the mixing and loading phase, plaster powder is mixed with water. In this case, 9.6 kg plaster powder is required to execute the task which has to be mixed with 2.9 l water (0.3 l per kg powder).

The inhalation exposure from mixing and loading DIY powders is estimated using the ConsExpo ***inhalation – exposure to spray – instantaneous release*** model. For dermal exposure, the ***direct product contact – constant rate*** model is advised. Defaults for the parameters exposure duration, product amount for inhalation exposure, room volume, exposed area, dermal contact rate and release duration comply with the generic scenario for loading powders (see subsection 4.1.3).

Frequency
It is assumed that it is possible to mix the requisite product amount all at once. Nevertheless, it is necessary to refill the tank of the spray gun because its capacity is limited to an amount that is light enough not to hinder the user while spraying. To prevent the product from hardening before use, only the amount that can be filled into the tank (approximately 1.5 kg) is mixed per interval (1.1 kg powder plus approximately 0.3 l water). For applying a total of 9.6 kg plaster powder, the spray gun needs to be refilled 9 times. The frequency of the task itself is assumed to be once every 5 years. A Q-factor of 1 is assigned because the default is based on assumptions.

Released mass
Taking into account the considerations in subsection 4.1.3, the default for the released mass in relation to the powder amount of 1.1 kg is set to 46 µg (8.3 µg per 200 g powder) with a Q-factor of 1.

Table 42 Default values for mixing and loading of plaster spray

Default value		**Q-factor**	**Source**
General			
Frequency	9 per day	1	9 per day, once every 5 years
Inhalation – exposure to spray – instantaneous release			
Exposure duration Released mass Room volume Ventilation rate	1.33 min 46 µg 1 m^3 0.6 per hour	1 1 1 1	See subsection 4.1.3 See above, see subsection 4.1.3 See subsection 4.1.3 Unspecified room, (te Biesebeek et al., 2014); See subsection 4.1.3
Dermal – direct product contact – constant rate			

Default value		Q-factor	Source
Exposed area	450 cm^2	2	See subsection 4.1.3
Contact rate	5 mg/min	1	See subsection 4.1.3
Release duration	1.33 min	1	See subsection 4.1.3

Application
After the plaster is mixed, it is consistently spread across the wall surface via the spray gun.

To estimate the inhalation exposure to non-volatile substances, the ***inhalation – exposure to spray – spraying*** model is used. For volatile compounds the ***inhalation – exposure to vapour – instantaneous release*** model is advised to assess inhalation exposure. The defaults for the parameters exposure duration, room volume, ventilation and inhalation rate described for non-volatiles in sprays are used in the exposure estimation of both volatile and non-volatile substances. Defaults for the mass generation rate and the density of non-volatiles in the product are applicable only to the non-volatile substances and comply with the generic scenario for spray application (4.2.1).

The dermal exposure is assessed using the ConsExpo ***dermal – direct product contact – constant rate*** model with a contact rate of 110 mg/min (see subsection 4.2.1).

Frequency
Because this is a rather big task involving extensive preparation measures and large effort, the frequency is assumed to be low. The user is likely to conduct the task very diligently in order to achieve a satisfying and sustainable result. A default of once every 5 years is assumed. The Q-factor is set to 1 because the value is based on expert judgement.

Spray duration
For this task a plaster amount of 12.5 kg is sufficient for a layer thickness of 1 mm according to product information. Here the product consumption for powder based plaster is taken into account in order to follow a conservative approach. Therefore, 2.4 kg powder per m^2 and mm layer thickness has to be mixed with 0.3 l water leading to the afore-mentioned total plaster amount (see Annex II; product data collection Table 105). For spray application, this amount is very high. Regarding the mass generation rate of 7.5 g/sec provided by the product information of pneumatic spray systems, a spray duration of approximately 28 minutes is calculated and set as a default (Wagner, 2013). The Q-factor is considered to be 2 because the underpinning data is limited.

Exposure duration
Taking into account that the user has to refill the plaster tank 9 times and that he or she will be very diligent during application to achieve an acceptable result, the exposure duration is set to 90 minutes by estimation. Because this value is based on expert judgement a Q-factor of 1 is used.

Ventilation rate, room volume and room height
According to the General Fact Sheet, the assumption that the task is conducted in a non-specific room leads to a room volume of 20 m^3 and a ventilation rate of 0.6 per hour. The standard room height used here is set at 2.5 m (te Biesebeek et al., 2014).

Product amount (default needed for the exposure assessment for volatile substances)
As explained in the mixing and loading section, according to product information, 9.6 kg plaster powder (see Annex II; product data collection Table 104) has to be mixed with water in order to result in enough plaster to conduct the task properly. Therefore, 9.6 kg is used as a default, with a Q-factor of 3 because underpinning data is limited.

Exposed area
Because the pneumatic system allows the user to apply plaster not only to walls but also to ceilings overhead, it is assumed that the exposed skin surface area is larger than in usual applications with aerosol spray cans. Hands and forearms will be exposed leading to a surface area of 2200 cm^2 according to the General Fact Sheet (te Biesebeek et al., 2014). The Q-factor is set to 2 because the underpinning data for the size of both hands and forearms is quantitatively rich but the estimation regarding the extent of the affected area is an assumption (see also subsection 4.5).

Release duration
The release duration is defined here as the total time span between the first spraying effort and the completion of the task following the last spraying effort, which not only includes the net spraying time but also intermediate actions, such as filling up the plaster tank or moving from one spot to another. On completion of the task, the user is expected to clean the exposed body parts, which will usually end the dermal exposure. The net spraying time is derived to be 28 minutes. Taking into account 9 refill intervals of the plaster tank (see above) and the necessary position changes between the spraying efforts, the release duration is set at 90 minutes. A Q-factor of 1 is considered because underpinning data is currently not available.

Table 43 Default values for the application of plaster spray

Default value		**Q-factor**	**Source**
General			
Frequency	0.2 per year	1	Estimate
Inhalation – exposure to spray – spraying			
Spray duration	28 min	2	See above, product information
Exposure duration	90 min	1	Estimate
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Room height	2.5 m	4	Standard room height
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Mass generation rate	7.5 g/sec	2	Product information

Default value		**Q-factor**	**Source**
Airborne fraction	0.14 g/g	2	(Delmaar & Bremmer, 2009)
Density non-volatile	3 g/cm^3	3	See subsection 4.2.1
Aerosol diameter – median (C.V.)	15.1 µm (1.2)	1	See subsection 4.2.1
Inhalation cut-off diameter	15 µm	3	See subsection 4.2.1
Inhalation – exposure to vapour – instantaneous release			
Product amount	9.6 kg	3	See above
Dermal – direct product contact – constant rate			
Exposed area	2200 cm^2	2	Hands and forearms (te Biesebeek et al., 2014)
Contact rate	110 mg/min	2	See subsection 4.2.1
Release duration	90 min	1	Estimate

10 Coatings

General use

Coatings are used to apply a protective layer to large surfaces: for instance, walls, roof tops, gutters, pavements, wood, and so on. These products are meant to protect materials against weather influences, filth and, in some cases, oily liquids and moss. There are specific coatings that protect against fungi (e.g., wood decay stopper). Coatings can be categorised according to their use: covering a large surface such as walls, floors, and roofs (general and two-component coatings), repairing rooftops and gutters, and impregnating walls or wood. Impregnating walls or wood is not considered here because its use is rather complicated, and therefore, it is only carried out by professionals. As the application conditions and the intended use of general coatings and two-component coatings are similar, these two products will be treated as one product category named 'general coating'. Please note that the following scenario for mixing and loading only needs to be applied to tasks where two-component coatings are used.

10.1 General coatings

Use

General coatings are used mainly to protect walls or floors made of wood or stone surfaces against oily liquids, fungi, and moss or weed. Examples of general coatings are primer, wood decay stopper and surface coating. The coatings are contained in cans or buckets and are available as liquids and powders. When applying coatings indoors on walls and floors, it is important to ventilate well according to safety directions. Vapours from coatings can be toxic and flammable. For the use of some coatings in closed spaces, the operator is advised to wear an air mask to protect him or herself. Furthermore, the product information states that multiple layers should be applied and that individual layers should be thick in order to function properly. The coatings are generally used outdoors or in sheds and garages. However, the use of coatings indoors is of interest and will be described in this chapter.

Scenario for general coatings on a floor

The coatings are applied with a large brush or roller. In general, the application of these coatings is very similar to painting. In this case, the coating is poured over the surface and spread out using a brush. The coating is then allowed to soak into the surface. Obviously, the coating cannot be applied on non-absorbing surfaces because it cannot soak in. Therefore, only the application of general coatings on horizontal surfaces is described. For the other applications please refer to the Paint Products Fact Sheet (Bremmer and van Engelen, 2007), concerning solvent-rich paint.

The coating of a floor in a garage is considered as a default scenario. Coatings are often applied in garages since individuals often work with oily liquids or vehicles that are stationed there. To keep the floor clean from oil and grease, coatings are considered suitable. After approximately one hour the coating will be dry. It will take another 48 hours before the surface can be accessed, and yet another 48 hours before a vehicle can be put in the garage. The task itself will not take long.

Mixing and loading: two-component coating
In the mixing and loading phase, the base coating component has to be mixed with the hardener. Sometimes, the correct ratio is already prepared by the manufacturer in the container. In these cases, the user just has to mix the contents. Otherwise, it is necessary to follow the instructions regarding the mixing ratio stated in the product information. After the two components are mixed homogenously, some products have to be supplemented with 10-30% of water depending on the intended use of the product (for instance, as a primer or a final layer). An electrical stirrer is advised in these cases. Furthermore, the finished mixture has to be decanted into a clean bucket to rest for at least 10 minutes.

Inhalation exposure while mixing and loading is estimated using the ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model because evaporation arises from the surface area of the mixing bucket. Dermal exposure occurs through spills while mixing the components and pouring the finished mixture into the clean bucket in the end. It is calculated using the ConsExpo ***dermal – direct product contact – instant application*** model.

Frequency
The frequency of use is not considered to be high because the task is rather big, and the coating is designed to last for several years. As a default, a value of once per three years is estimated. Because underpinning data is lacking, a Q-factor of 1 is considered.

Exposure duration
The mixing process can be realised within one operation because of the relatively moderate product amount (3.9 kg, see below). The mixing process itself will not take too long, but because the finished mixture has to be decanted into a clean bucket where it has to rest for at least 10 minutes, an exposure duration of 20 minutes is set as a default assuming that the user stays in the room the whole time. The value is mainly based on assumptions. Therefore, the Q-factor is set to 1.

Product amount – inhalation
The consumption rate of the coating is 260 g/m^2 per layer according to product information (see Annex II, product data collection Table 106). Therefore, a total amount of 3.9 kg is sufficient for this task (floor of a garage = 15 m^2 according to the General Fact Sheet). The underpinning data is limited but sufficient. A Q-factor of 3 is assigned. If the product also needs to be diluted with water, as mentioned in the introduction, a product amount of 4.3 kg (3.9 kg + 10% of water) is set as a default. Likewise with a Q-factor of 3.

Room volume and ventilation rate
The defaults for a garage are listed in the General Fact Sheet (te Biesebeek et al., 2014): 34 m^3 room volume and a surface area of

15 m². The ventilation rate in a garage is relatively high in comparison to rooms inside the house: 1.5 per hour.

Release area
Two buckets with a 12-l capacity are used: one for the mixing task; the other (a clean bucket) to decant the finished mixture into. The buckets typically sold in this dimension provide a constant release surface area of 800 cm² (radius = 16 cm), which will be used as a default. The value can be easily double-checked on the websites of common DIY retailers. A Q-factor of 2 is assigned because many product examples with the afore-mentioned specifications were, and still can be, found.

Emission duration
Source depletion or other emission restricting processes are not expected during the mixing and loading phase. Therefore, the emission duration is estimated to be as long as the exposure duration. The default is set at 20 minutes. The Q-factor is set to 1 because underpinning data is not available.

Exposed area
Due to the large total product amount, a surface area of 225 cm² is considered to be exposed (see subsection 4.1.1), which equals the surface area of the fingers on one hand. A Q-factor of 2 is assigned to this value because the underpinning data for the surface of the fingers is quantitatively rich, but the estimate in which extent the skin surface is exposed is based on expert judgement (see also subsection 4.5).

Product amount – dermal
The product amount contacting the skin during mixing and loading is not assumed to be very high because of the use of (maybe electrical) mixing tools, such as a stirrer. An amount of 0.2 g is estimated. Because this is expert judgement the Q-factor is set to 1.

Table 44 Default values for mixing and loading two-component coating

Default value		**Q-factor**	**Source**
General			
Frequency	0.33 per year	1	See above
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	20 min	1	Estimate
Product amount	3.9 (4.3, if diluted) kg	3	Product information, see above
Room volume	1 m³	1	See subsection 4.1.1
Ventilation rate	0.6 per hour	1	Unspecified room (te Biesebeek et al., 2014)
Application temperature	15 °C	2	Estimate
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	800 cm²	2	See above
Emission duration	20 min	1	Estimate

Default value		Q-factor	Source
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	225 cm^2	2	Fingers of one hand (te Biesebeek et al., 2014)
Product amount	0.2 g	1	Estimate

Application
Following the finished mixing and loading process, the coating is spread out with a brush or a squeegee.

Inhalation exposure is estimated using the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: increasing*** model while dermal exposure can be assessed using the ***dermal – direct product contact – instant application*** *model* because the mixed product is just spread out homogenously on the surface without further treatment.

Exposure duration
The task itself won’t take too long because it is rather easy and doesn’t need to be conducted very diligently (besides a uniform distribution of the product). Assuming that the user will leave the garage after the task is completed, a total exposure duration of one hour is estimated. A Q-factor of 1 is considered because underpinning data is lacking.

Product amount – inhalation/Amount of solution used
As indicated in the considerations regarding the mixing and loading of two-component coatings, a total product amount of 3.9 kg is set as a default with a Q-factor of 3 (see above) if no dilution is required. However, if the product is used as a primer, water is added (10%) and a default of 4.3 kg (for amount of solution used) is set with a Q-factor of 3.

Dilution
As mentioned before, in some cases (depending on the intended use), water is added and stirred in after the two components of the coating product are homogenously mixed. On these occasions, a dilution factor has to be considered in order to correctly simulate the evaporation of a substance (see subsection 4.1.2). According to product information water needs to be added in the ratio of 10-30% of the product amount (see Annex II, product data collection Table 106). For this scenario, it is assumed that only 10% of water is added, following a conservative approach, because the inhalation exposure decreases with rising dilution. The product amount is set at 3.9 kg (see above). Adding the water will result in a final amount of solution of approximately 4.3 kg. The dilution factor is therefore set at 1.1 times. A Q-factor of 3 is assigned because underpinning data is limited.

Release area
The release area equals the surface that is treated with the coating product. According to the General Fact Sheet, the surface of garage floor

is 15 m^2 which will be used as a default for this scenario. A Q-factor of 4 is assigned (te Biesebeek et al., 2014).

Application duration
As mentioned before, this task is rather easy. The product is poured on the floor and spread out evenly with a tool. The application duration is therefore assumed to be one hour in total with a Q-factor of 1 because it is based on expert judgement.

Exposed area
Because a tool is used to conduct this task the contact area is assumed to be rather small in view of its dimensions: approximately 50% of the palm of one hand. According to the General Fact Sheet, the surface area for the two hands comes to 900 cm^2. The palm of one hand is one-fourth of the surface area of both hands, resulting in a contact area of 225 cm^2 (te Biesebeek et al., 2014). The Q-factor is considered to be 2 because no data is available to underpin the assumption that during the task, the palm of one hand is exposed. Then again, the data set for the size of a palm itself is quantitatively rich which justifies the Q-factor (see also subsection 4.5).

Product amount – dermal
The product amount contacting the skin is not expected to be high (usage of tools) and results solely from spills. An amount of 0.25 g is estimated. Because this is based on expert judgement, a Q-factor of 1 is assigned at this point.

Table 45 Default values for the use of general and two-component coating on a floor

Default value		**Q-factor**	**Source**
General			
Frequency	0.33 per year	1	Estimate
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	60 min	1	Estimate
Product amount (Amount of solution used)	3.9 (4.3, if diluted) kg	2	Product information
Dilution (times)	1.1	2	See above
Room volume	34 m^3	4	Garage (te Biesebeek et al., 2014)
Ventilation rate	1.5 per hour	3	Garage (te Biesebeek et al., 2014)
Temperature	15 °C	1	Estimate
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	15 m^2	4	Garage (te Biesebeek et al., 2014)
Application duration	60 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			

Default value		Q-factor	Source
Exposed area	225 cm^2	2	One palm (te Biesebeek et al., 2014),
Product amount	0.25 g	1	See above

10.2 Gutter coating

Use

Coatings used to protect and repair gutters, rooftops and walls are described in a different scenario, because their application is different from the general coatings. Rubber and metal-based coatings are used mainly for protecting gutters (and roofs), making them weather- and corrosion-resistant. For rooftop protection, mainly acrylate-based coating or metal-based coating is used. Gutter coatings can contain volatile organic compounds such as xylene.
These products are only used outdoors. ConsExpo does not provide a model that describes inhalation exposure to consumer products used outdoors. Weather conditions are highly variable and affect ventilation rate, and temperature, as well as an infinitely large 'room' volume, prevents any sensible estimate of outdoor exposure using ConsExpo. Therefore, no defaults are proposed for inhalation exposure. Currently available models can be used to assess the inhalation exposure to gutter coating indoors. The single conclusion of this exposure assessment, then, is that outdoor inhalation exposure will be lower than assessed for indoor use of the product. The evaporation model can be used where room volume and ventilation rate are set at 20 m^3 and 0.6 per hour (te Biesebeek et al., 2014), respectively (unspecified room) in combination with task specification mentioned below.

Since dermal exposure can occur, a scenario has been drawn up for this specific application using the ConsExpo ***dermal – direct product contact – instant application*** *model*.

Scenario for gutter coating

This task is performed outdoors. In this paragraph, the repair of gutters is described. A thick layer of paste is spread out over a crack or hole with a filling knife (pre-treated with white spirit). A glass cloth is then put over the applied layer before another thick layer is applied. Subsequently, the layers and the glass cloth are allowed to harden, a process which normally takes 24 hours. A number of holes and weak spots are repaired on a single occasion. Because application requires multiple layers, the product consumption per unit area is relatively high, according to information acquired in the literature research done prior to the development of the previous DIY products Fact Sheet (0.5 l/m^2 per layer)(ter Burg, 2007). The holes with a combined surface area of 0.5 m^2 which can be treated with 0.75 l gutter coating (= approximately 1 kg). The task is expected to take half a working day due to the application of the three layers. The exposure duration is assumed to be the same, because afterwards individuals are not expected to linger.

Frequency

The frequency of use is once per 10 or 15 years (EU RAR on MDI) (EU, 2003c). This estimation is considered representative for liquid roof coatings. As a default, a frequency of once per 10 years is assumed. The Q-factor is set to 1 because underpinning data is limited.

Exposed area
Gloves may be worn during this task because the product is very sticky and considered to be unpleasant to work with. Product information does not mention the use of gloves and warns solely against vapours from the product. Here, it is assumed that the fingers on both hands will be exposed when the glass cloth is put in place. The surface area is set at half of the area covered by the two hands (450 cm^2). A Q-factor of 2 is assigned because the underpinning data for the size of both hands is quantitatively rich but the estimation of the extent of the affected area is an assumption (see also subsection 4.5).

Product amount – dermal
The product amount is estimated to be 0.25 g due to the fact that the product will stick to one's hand. The dermal product amount is not related to the total product amount used. Furthermore, gutter coating is hard to remove; therefore, individuals will take precautionary actions, explaining the relatively low product amount contacting the skin. This value is based on expert judgement. Therefore, a Q-factor of 1 is assigned.

Table 46 Default values for the use of gutter coating

Default value		**Q-factor**	**Source**
General			
Frequency	0.1 per year	2	See above (EU, 2003c)
Dermal – direct product contact – instant application			
Exposed area	450 cm^2	2	50% of both hands (te Biesebeek et al., 2014)
Product amount	0.25 g	1	Estimate

10.3 Spray coating

Use
Spray coatings are used to treat/restore (compensate small bumps) and protect metal surfaces from harmful environmental influences. It is mostly used on automotive parts or shelf spaces and applied via an aerosol spray can. The surface has to be degreased and cleaned before the product is applied. Following application. the coating has to harden for several hours. Depending on the desired result, several coating layers need to be applied.

Scenario for general coating on a floor
In this default scenario, the product has to be applied to a surface of an outdoor metal storage rack. In total, the rack has a surface of 2 m^2 that has to be treated.
Inhalation exposure to the fraction of the non-volatile substances in the product can be estimated using the ConsExpo ***inhalation – exposure to spray – spraying*** model, while the inhalation exposure to the volatile substances can be assessed using the ***inhalation – exposure to vapour – instantaneous release*** model. The defaults for the

parameters exposure duration, room volume, ventilation and inhalation rate described for non-volatiles in sprays are used in both the exposure estimation of volatile and non-volatile substances. Defaults for the mass generation rate and the density of non-volatiles in the product are applicable only to the non-volatile substances and comply with the generic scenario for spray application (4.2.1). For the dermal exposure the ***dermal – direct product contact – constant rate*** model is used.

Frequency
The task itself is rather small and once it's done, the coating will last for several years. However, as there are various objects/surfaces that can potentially be treated with such products, the frequency is assumed to be higher than for the general coating. The default will be set at one time per year. The Q-factor is 1 because underpinning data is currently not available.

Spray duration
According to product information, 380 ml product are sufficient to treat 1 m^2 surface (see Annex II, product data collection Table 107). Therefore, the default scenario requires 760 ml spray coating. Taking into account a density of 1.1 g/cm^3 (also see Table 107), the total considered product amount is approximately 840 g. Using the mass generation rate for aerosol spray cans explained in subsection 4.2.1 (1.2 g/sec) provides a spraying duration of 700 seconds. A Q-factor of 2 is assigned in this case because the data basis for the product consumption is limited but sufficient.

Exposure duration
The exposure duration is the time that a person stays in the room during and after the task. The task itself is not very complicated but needs to be conducted diligently in order to cover the entire surface. Furthermore, in some cases, several layers of the product have to be applied in order to achieve a coating thickness that provides a sufficient protection. In these scenarios, the user applies one layer, waits for a certain time (> 10 minutes) for it to harden and subsequently applies the next layer. After the desired layer thickness is achieved, the coating needs to harden for 1-6 hours (depending on the products properties) before it can be further treated. It is not assumed that the user will stay in the same room throughout the final curing time. However, taking into account the diligent application of the product, the net spraying duration (see above) and the waiting time, during which a single layer has to harden before the next one can be applied a total exposure duration of 120 minutes is set as a default. The Q-factor for this value is set to 1 because underpinning data is currently not available.

Ventilation rate, room volume and height
It is expected that these kinds of products are not used in the areas of a house where the user lives. It is more likely to be used outdoors or in working areas, such as a workshop or a garage. As a conservative approach, the specifications for a garage are used here as default values that are extracted from General Fact Sheet. The room volume is 34 m^3 with a standard room height of 2.5 m and a ventilation rate of 1.5 per hour (te Biesebeek et al., 2014).

Product amount (default needed for the exposure assessment for volatile substances)
The product amount is 840 g according to product information as explained above under "spray duration". The Q-factor is set to 3 because underpinning data is limited.

Exposed area – dermal
During the spray application, the dermal exposure is assumed to be significant. Bounced back spray particles can settle on wide areas of the skin, for instance, spray that missed the target area. Furthermore, the user may accidentally touch already treated surfaces. An exposed surface area of both hands (=900 cm^2) is assumed (te Biesebeek et al., 2014). A Q-factor of 2 is assigned to this value because the underpinning data for the surface of the hands is quantitatively rich, but the estimate to what extent the skin surface is exposed is based on expert judgement (see also subsection 4.5).

Release duration – dermal
The release duration is the time during which the substance is present on the skin, resulting in dermal exposure. For this scenario, it is assumed that the user will finish the application of the product before he tries to clean the exposed parts of the body. Therefore, the release duration is set to be equal to the exposure duration at 120 minutes. The Q-factor is set to 1 because the value is not underpinned by supportive data.

Table 47:Defaults for the use of spray coating

Default value		**Q-factor**	**Source**
General			
Frequency	6 per year	2	Annex II A.4
Inhalation – exposure to spray – spraying			
Spray duration	700 sec	2	See above, product information
Exposure duration	120 min	1	Estimate
Room volume	34 m^3	4	Garage (te Biesebeek et al., 2014)
Room height	2.5 m	4	Standard room height
Ventilation rate	1.5 per hour	3	(te Biesebeek et al., 2014)
Mass generation rate	1.2 g/sec	3	See subsection 4.2.1
Airborne fraction	0.14 g/g	2	See subsection 4.2.1
Density non-volatile	1.5 g/cm^3	3	See subsection 4.2.1
Aerosol diameter – median (C.V.)	15.1 µm (1.2)	3	See subsection 4.2.1
Inhalation cut-off diameter	15 µm	3	See subsection 4.2.1
Inhalation – exposure to vapour – instantaneous release			

Default value		Q-factor	Source
Product amount	375 g	3	See above
Dermal – direct product contact – constant rate			
Exposed area	900 cm^2	2	both hands (te Biesebeek et al., 2014)
Contact rate	100 mg/min	1	See subsection 4.2.1
Release duration	120 min	2	See above

11 Removers

Use

Removers are used to remove old layers or remnants of paint, lacquer, glue, wallpaper, cement, sealants, rust and foam. Removing tasks are generally carried out before another DIY task is conducted or directly afterwards, when spills have to be removed. There are products specially designed for removing paint, carpet glue, wallpaper, cement, rust, sealant or insulation foam. In addition, there are general solvents such as white spirit, acetone and thinners, which not only dissolve paint, glue, sealants and insulation foam, they are also used to clean tools and thin paints (for which scenarios are described in the Paint Fact Sheet (Bremmer and van Engelen, 2007)).

In this chapter, 12 scenarios with defaults will be provided for removers. These are:

- paint remover in liquid and spray form
- paint and lacquer remover made from powder
- glue remover in liquid and spray form
- wallpaper remover liquid/powder and in spray form
- sealant/foam remover in liquid and spray form
- rust remover in liquid, gel and spray form

Just like glue remover, cement remover is used to remove spills or remaining spots. As the expected exposure is similar, both product categories are described in one default scenario (glue remover).
The removal of wallpaper is regarded to be specific and is therefore described in a separate scenario.
The removal of sealant works identically to the removal of insulation foam and for this reason, it is described in one default scenario.
The composition of paint and lacquer remover is comparable. Often, it is possible to use a paint remover to remove lacquer, too. Paint and lacquer removers are sold as a ready-to-use liquid and as a powder that has to be mixed with water prior to use. Even though the type of application is the same, the consumption of paint and lacquer remover made from powder is higher than it is for the liquid form of the product. Because of this and because of the additional mixing and loading phase, paint/lacquer remover made from powder and liquid paint/lacquer remover will be treated in separate chapters.
Furthermore, paint remover, glue remover and sealant/foam remover are available on the consumer market as aerosol sprays. Each spray product will be described in a separate default scenario as well.
Wallpaper remover can be applied as a spray via pneumatic pump devices and will also be described in a default scenario of its own.

Removers are applied directly onto the layer that has to be removed, such as graffiti or pieces of foam. With some wallpapers, it is required to perforate the surface prior to product use in order to allow the remover to function properly. Removers soak into the layer for a minimum of 15 minutes (initiation period), and then the resulting pulp is removed (often with the help of a tool). These products are frequently used simultaneously to other DIY tasks, such as painting, carpet gluing, sealing, and insulating with foam to remove old remains or to remove spills. The frequencies used for the mentioned tasks are therefore also used for the complementary removal tasks.

11.1 Paint remover

11.1.1 Liquid paint and lacquer remover

Scenario for liquid paint and lacquer remover

The removal of paint or lacquer from a surface area of 2 m^2 is described in this chapter. After the remover is applied, it is left to soak in for a time period of at least 2 minutes (very thin paint layer) up to 4 hours (lacquer) or in extreme cases 3 days. Then, the resulting pulp is removed with a scratching tool.
During the task, inhalation exposure to vapours of solvents (e.g., methanol) can occur, which is estimated using the ConsExpo ***exposure to vapour – evaporation – release area mode: increasing*** model. Dermal exposure occurs during application and removal of the paint or lacquer and is assessed using the ***direct product contact – instant application*** model.

Frequency

According to the results of a survey conducted for the U.S. Consumer Product Safety Commission, paint stripper is used at a frequency of 3 times a year (Boast, 1992). The Q-factor is considered to be 2 because the underpinning data is sufficient to derive a default, albeit limited.

Exposure duration

The product has to soak in. In some cases, this phase can last up to 4 hours (in extreme cases, even for 3 days, but it is not assumed that the user will stay near the treated surface the whole time). Following a reasonable, conservative approach, the default for the exposure duration will therefore be set at 300 minutes covering application, soak-in time and scratching the pulp off the surface, assuming the user stays in the same room the whole time. A Q-factor of 1 is assigned because the value is based on expert judgement supplemented with limited product information regarding the soak-in time.

Product amount – inhalation

According to product information, a product amount of 0.7 l remover is sufficient to treat a surface of 1 m^2. Therefore, 1.4 l (=1.4 kg; density ~ 1 g/cm^3) is needed to conduct the described task (see Annex II, product data collection Table 108). The Q-factor is considered to be 3 because the data basis is sufficient to derive a default, albeit limited.

Room volume and ventilation rate

The specifications of an unspecified room are taken into consideration here: 20 m^3 room volume and 0.6 per hour ventilation rate (te Biesebeek et al., 2014).

Release area
The release area equals the treated surface. As a default, 2 m^2 is estimated. The value is not supported by data. Therefore, the Q-factor is set to 1.

Application duration
The application itself is not considered to take long. It is assumed that 20 minutes are adequate to spread the product across the surface using a brush. The Q-Factor is 1 in this case because no underpinning data is available.

Exposed area
Pulp is removed from the surface with a scratching tool. During this removal, contact with the pulp is likely to occur. It is assumed that a surface as big as both palms (450 cm^2) will come into contact with the product (te Biesebeek et al., 2014). A Q-factor of 2 is assigned because the underpinning data for the size of both palms is quantitatively rich but the estimation of the extent of the affected area is an assumption (see also subsection 4.5).

Product amount – dermal
The product amount from the pulp and product remnants is estimated to be 0.5 g. Because the product is allowed to soak in for up to several hours, a substantial part of it might have already evaporated. The pulp will therefore not contain large amounts of the product. However, the Q-factor is set to 1 because underpinning data is currently not available.

Table 48 Default values for liquid paint and lacquer remover

Default value		**Q-factor**	**Source**
General			
Frequency	3 per year	2	(Boast, 1992)
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	300 min	1	Estimate
Product amount	1.4 kg	3	See above
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	2 m^2	1	See above
Application duration	20 min	1	Estimate
Molecular Weight Matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	450 cm^2	2	Both palms (te Biesebeek et al., 2014)
Product amount	0.5 g	1	See above

Addendum to the application scenario for liquid paint remover
During product research for paint removers, information was identified indicating that for the time being, a smaller quantity of these kinds of products can also be applied using airless spray gun systems (see subsection 4.2.1). As there is the possibility that in the future the usage of this type of application will rise it should be noted here that in these cases the exposure has to be assessed similar to the considerations made for the spray application (see subsection 4.2.1). Currently, underpinning data is not available, but it has to be assumed that the default parameters (e.g., mass generation rate, airborne fraction, etc.) has to be adjusted if an airless system is used.

11.1.2 Paint and lacquer remover made from powder

Scenario for paint and lacquer remover made from powder
Based on the previous default scenario for liquid paint and lacquer remover (see subsection 11.1.1), this chapter describes the removal of paint and lacquer from a part of a door, with a surface of 2 m^2. After mixing the powder with water, the resulting pasty product is applied to the surface using a spatula or brush. The treated area can potentially be covered with a foil to avoid desiccation. Subsequently, the product is left to soak in for several hours, or overnight in some cases (e.g., a very thick layer of paint or lacquer). The resulting pulp is then removed with a spatula, containing the detached paint or lacquer layers and residues of the remover product.
The task is not conducted in a specified room because it is assumed that the user won’t take the door from its hinges before removing the paint. Therefore, the specifications for an unspecified room as described in the General Fact Sheet are taken into account (te Biesebeek et al., 2014).

Mixing and loading paint and lacquer remover made from powder
The inhalation exposure from mixing and loading DIY powders is estimated using the ConsExpo ***inhalation – exposure to spray – instantaneous release*** model. For dermal exposure the ***direct product contact – constant rate*** model is advised. Defaults for the parameters product amount for inhalation exposure, room volume, exposed area and dermal contact rate comply with the generic scenario for loading powders (see subsection 4.1.3).

Frequency
Referring to the results of a consumer survey the frequency of this task is set at 3 times per year (Boast, 1992) with a Q-factor of 2 because the data basis is sufficient to derive a default but limited.

Exposure duration
Instructions stated in the product information indicate that, after mixing the powder and the water homogenously, the mixture has to rest for a period of 10 to 30 minutes (see Annex II, product data collection Table 109). After this, it has to be briefly stirred once more before it is ready to use. Assuming that the user will stay in the room the whole time, an exposure duration of 30 minutes is set. The Q-factor is set to 2 because underpinning data is limited.

Released mass
According to product information, 2500 g powder mixed with 5 l water is sufficient to remove the paint/lacquer from a surface of 2 m^2 (see Annex II, product data collection Table 109). Taking into account the approach described in subsection 4.1.3, the released mass for 2.5 kg powder is set to ~ 104 µg (8.3 µg per 200 g powder) with a Q-factor of 1.

Release duration
It is assumed that dermal exposure will occur due to spills while pouring the components into the mixing bucket. Furthermore, the skin may unintentionally come into contact with the product during the mixing process in spite of the used tool. The release duration is estimated to be rather short. The mixture needs a short developing time (approximately 30 minutes) after which it has to be briefly stirred again. This developing time is not considered in the release duration because it is assumed that the user will clean his or her hands after he/ she conducted the first mixing step. The default value is set at 10 minutes with a Q-factor of 1 because underpinning data is currently not available.

Table 49 Default values for mixing and loading of paint and lacquer remover made from powder

Default value		**Q-factor**	**Source**
General			
Frequency	3 per year	2	(Boast, 1992)
Inhalation – exposure to spray – instantaneous release			
Exposure duration	30 min	2	Product information
Released mass	104 µg	1	See above, see subsection 4.1.3
Room volume	1 m^3	1	See subsection 4.1.3
Ventilation rate	0.6 per hour	1	Unspecified room, (te Biesebeek et al., 2014); See subsection 4.1.3
Dermal – direct product contact – constant rate			
Exposed area	450 cm^2	2	See subsection 4.1.3
Contact rate	5 mg/min	1	See subsection 4.1.3
Release duration	10 min	1	Estimate

Application
This default scenario includes the application of the product to the surface, the removal of the resulting pulp using a spatula and the following clean-up phase. The surface treated with remover can potentially be covered with a foil during soak-in time. To follow a conservative approach, it is assumed that the user will not cover the surface. Therefore, inhalation exposure in this period is also expected. In addition, the user is assumed to clean exposed skin surfaces after he or she applied the product to the service. Therefore, the time during which the product is soaking in is not part of the considerations for dermal exposure in this default scenario.

In order to estimate the inhalation exposure, the ***exposure to vapour – evaporation – release area mode: increasing*** model is advised.

Dermal exposure is described using the ConsExpo ***dermal – direct product contact – instant application*** model.

Exposure duration
The exposure duration is set at 300 minutes, taking into account the application of the product, the soak-in time (see subsection 11.1.1), the removal of the resulting pulp and a short clean-up phase once the paint is removed. The Q-factor for this value is set to 1 because it is based on expert judgement.

Amount of solution used
According to product information, a product amount (powder) of 1250 g/m^2 is needed (see Annex II; product data collection Table 110). Further information imply that 1 kg powder has to be mixed with 2 l water in order to be usable. Therefore, a total of 2500 g powder has to be mixed with 5 l water in the described scenario. The default value for the used amount of solution is considered to be 7.5 kg. A Q-factor of 3 is assigned because the underpinning data is limited.

Dilution
The dilution factor has to be considered in the assessment of the inhalation exposure because the powder product is diluted in water prior to use, which potentially affects, inter alia, evaporation processes and thus the extent of the exposure (see subsection 4.2.4). According to the product information stated above, 1 kg powder has to be mixed with 2 l water, therefore the dilution factor is 3 times, which will be used as a default. The Q-factor is set to 2 because underpinning product information is currently very limited.

Room volume and ventilation rate
It is assumed that this task is conducted in an unspecified room leading to a room volume of 20 m^3 and a ventilation rate of 0.6 per hour according to the information provided by the General Fact Sheet (te Biesebeek et al., 2014).

Release area
The release area equals the surface of one side of a door. As a default, 2 m^2 is estimated, which is assumed to be the dimension of a common door. The value is derived using expert judgement. Therefore, the Q-factor is set to 1.

Application duration
The application duration is not assumed to be long. Nevertheless, it includes applying the product to the surface using a spatula or brush. 20 minutes will be sufficient in this context. The Q-factor is 1 because underpinning data is currently not available.

Exposed area
A surface area of 50% of both hands (450 cm^2) is assumed to be exposed to residues of the product (te Biesebeek et al., 2014). A Q-factor of 2 is assigned to this value because the underpinning data for the surface of the hands is quantitatively rich but the estimate to what extent the skin surface is exposed is based on expert judgement (see also subsection 4.5).

Product amount – dermal
The product amount – dermal is derived following the considerations in subsection 4.2.4. The skin volume contacting water is derived to be 4.5 ml (considering the affected dermal area and a layer thickness of 0.01 cm). Furthermore, the volume of water in the mixing vessel is a requisite parameter, which is 5 l, as mentioned above. Dividing the skin contacting water by the total water amount and multiply this with the amount of powder used (2500 g, see above) leads to a product amount of 2.25 g which will be set as a default. A Q-factor of 2 is considered as explained in subsection 4.2.4.

Table 50 Default values for paint and lacquer remover made from powder

Default value		**Q-factor**	**Source**
General			
Frequency	3 per year	2	(Boast, 1992)
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	300 min	1	Estimate, see above
Amount of product used	7.5 kg	3	Product information
Dilution (times)	3	2	See above
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	2 m^2	1	Estimate
Emission duration	20 min	1	Estimate
Molecular weight matrix	3000 g/mol	2	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	450 cm^2	2	50% of both hands (te Biesebeek et al., 2014)
Product amount	2.25 g	2	See above

11.1.3 Paint remover aerosol spray
Scenario for paint remover spray
In accordance with the previous chapters dealing with the consumer use of paint remover, the scenario described here will consist of the removal of paint from a surface of 2 m^2. The application of the spray to the surface is described here. Subsequently, the removal of the paint from the surface with a tool (e.g., a spatula) will be treated in a post-application scenario because inhalation and, especially, dermal exposure are expected to be different once the spraying is done and the removing task is conducted.

The inhalation exposure to non-volatile substances during the spraying phase is estimated using the ***inhalation – exposure to spray – spraying*** model. Furthermore, for volatile compounds the ***inhalation – exposure to vapour – instantaneous release*** model is advised to assess inhalation exposure. The defaults for the parameters exposure duration, room volume, ventilation and inhalation rate described for non-volatiles in sprays are used in the exposure estimation of both volatile and non-volatile substances. Defaults for the mass generation rate and the density of non-volatiles in the product are applicable only to the non-volatile substances and comply with the generic scenario for spray application (4.2.1).

The ConsExpo ***dermal – direct product contact – constant rate*** model is used to calculate dermal exposure, taking into account a contact rate of 100 mg/min (see subsection 4.2.1).

Frequency
The use frequency is assumed to be the same as for the other forms of paint remover (see subsections 11.1.1 and 11.1.2). It is assumed that, if a user has the tendency to use the aerosol spray form of the paint remover, he will stick to that type of product if it is suitable and for as long as the results are satisfying. The default for this parameter is therefore set to 3 times per year. The Q-factor is considered to be 2 because the underpinning data is sufficient but not specifically focused on the use of aerosol sprays.

Spray duration
Referring to product information, a product amount of 1 kg (0.5 l/m^2; a density of 1 g/cm^3 is assumed) aerosol spray is required for this task. Note that this is based on information for just one product (see Annex II, product data collection Table 111). Through calculations using a mass generation rate of 1.2 g/sec (see subsection 4.2.1) a spray duration of 14 minutes is determined. The Q-factor is set to 2 because underpinning data is limited.

Exposure duration
After the product is applied via aerosol spray can from a distance of 10 – 20 cm, it has to soak in for 10–40 minutes before the resulting pulp can be removed with a spatula or a cloth. Considering this, added to the assumption that the user will not leave the room after spraying, an exposure duration of 60 minutes is assumed. A Q-factor of 1 is assigned because the value is based on expert judgement.

Ventilation rate, room volume and room height
The task is performed in an unspecified room, leading to a room volume of 20 m^3 and a ventilation rate of 0.6 per hour. The standard room height, which will be used here, is set at 2.5 m (te Biesebeek et al., 2014).

Product amount (default needed for the exposure assessment for volatile substances)
According to product information (for one product), product consumption for this task is 1 kg (see Annex II, product data collection Table 111. Therefore, this will be used as a default with a Q-factor of 3 because of the limited data set.

Exposed area
Dermal exposure is assumed to be significant. Spray particles that bounce back from the treated surface or miss the targeted area may settle on large areas of the skin. In order not to underestimate the dermal exposure, an affected surface area of 900 cm^2 is estimated, which equals the surface of both hands (te Biesebeek et al., 2014). A Q-factor of 2 is assigned to this value because the underpinning data for the surface of the hands is quantitatively rich but the estimate in which extent the skin surface is exposed is based on expert judgement (see also subsection 4.5).

Release duration
The release duration, during which dermal exposure can occur, is interpreted here as the intermittent spray duration. This consists of the spraying task itself and the breaks between the sprayings, when, for example, a new spray can has to be opened and used (1000 ml are needed, the common can size is 400 ml). After the required product amount is applied, the soak-in time begins. The user will tend to clean his or her hands after spraying in order to be able to perform other activities during the waiting period. Considering this, the release duration is set at 14 minutes assigning a Q-factor of 1 because the value is based on a calculation but supported with assumptions.

Table 51 Default values for paint remover aerosol spray

Default value		**Q-factor**	**Source**
General			
Frequency	3 x per year	2	(Boast, 1992)
Inhalation – exposure to spray – spraying			
Spray duration	14 min	2	See above
Exposure duration	60 min	1	Estimate
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Room height	2.5 m	4	Standard room height
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Mass generation rate	1.2 g/sec	3	See subsection 4.2.1
Airborne fraction	0.14 g/g	2	See subsection 4.2.1
Density non-volatile	1.5 g/cm^3	3	See subsection 4.2.1
Aerosol diameter – median (C.V.)	15.1 μm (1.2)	3	See subsection 4.2.1
Inhalation cut-off diameter	15 μm	3	See subsection 4.2.1
Inhalation – exposure to vapour – instantaneous release			
Product amount	1 kg	3	See above
Dermal – direct product contact – constant rate			
Exposed area	900 cm^2	2	Surface of both hands (te Biesebeek et al., 2014)
Contact rate	100 mg/min	3	See subsection 4.2.1
Release duration	14 min	1	Estimate

Post-application: paint remover aerosol spray
A post-application phase is considered necessary here because the exposure pattern changes once the spraying is completed. It is not reasonable to assume that during the scratching off phase, the inhalation exposure and the dermal contact rate are still of a similar order of magnitude as during the spray application. Inhalation exposure is not expected because of evaporation of substance during spray in case of a volatile substance. In case of a non-volatile substance, the inhalation to vapour is not relevant. In the worst case, the user will be exposed dermally to part of the product in the pulp that is not already evaporated. The post-application phase begins after the soak-in time of the spray product.

In order to estimate the dermal exposure, the ***dermal – direct product contact – instant application*** model is advised.

Frequency
As this is seen as a follow-up phase to the previously explained spraying phase, both tasks are linked and therefore conducted with the same frequency of 3 times per year (Boast, 1992). A Q-factor of 2 is assigned because the data set is sufficient to derive a default, albeit limited.

Exposed area
The task is conducted in a similar manner to the removal of paint using liquid paint remover explained in subsection 11.1.1. Therefore, the same default value will be assumed which is 450 cm^2, the surface of both palms (te Biesebeek et al., 2014). A Q-factor of 2 is assigned because the underpinning data for the size of both palms is quantitatively rich but the estimation of the extent of the affected area is an assumption (see also subsection 4.5).

Product amount – dermal
The dermal product amount is also assumed to be comparable to the amount that contacts the skin during the task explained in subsection 11.1.1. Therefore, and because the order of magnitude of the total product amount is comparable, the default value for this parameter is also set to 0.5 g. This estimate is highly related to assumptions. A Q factor of 1 is assigned.

Table 52 Default values for post-application: paint remover aerosol spray

Default value		**Q-factor**	**Source**
General			
Frequency	3 per year	2	(Boast, 1992)
Dermal – direct product contact – instant application			
Exposed area	450 cm^2	2	Both palms (te Biesebeek et al., 2014)
Product amount	0.5 g	1	See above

11.2 Glue remover

11.2.1 Glue remover in liquid form

Scenario for glue remover in liquid form

In general, all glue removers function in the same manner. The remover is allowed to soak in for a minimum of 15 minutes before the glue can be removed with a scratching tool. Glue removers can be used for many removing tasks, ranging from very small (removing super glue) to very large tasks (removing carpet glue). The product is therefore available in containers ranging in size from 10 ml bottles to 750 ml cans.

The removal of carpet glue will be considered as a default scenario, because the main difference in use between the small and large containers is the product amount used and the surface treated. When the product amount and surface treated are taken into account, the same defaults can be used for different containers of glue remover.

For the default scenario of glue remover, it is assumed that the stairs of a stairway, with a total surface of 5 m^2, are stripped of their carpet and carpet glue.

Inhalation exposure is estimated using the ConsExpo ***exposure to vapour – evaporation – release area mode: increasing*** model. The glue remover is applied with a brush on the stairs. As a result, the amount of spills will not be high. During the removal of the glue (scratching off glue), dermal exposure may be significant, requiring application of the ***dermal – direct product contact – constant rate*** model.

Frequency

It is assumed that the remover of a product is used as often as the product itself. Therefore, the use frequency of carpet glue, one every four years, is set as a default for this scenario. The Q-factor is set to 1 because the value is based on a conclusion by analogy.

Exposure duration

The total exposure duration is set at four hours, which is equivalent to the application duration (see below), given that the subject will not stay in the same room after the task is completed. The value is based on expert judgement, which results in a Q-factor of 1.

Product amount –inhalation

According to product information acquired in the preparation phase for the previous DIY Products Fact Sheet, a product consumption of 0.35 l/m^2 is realistic for glue remover. Therefore, approximately 2 kg (density = 1 g/cm^3) of the product is sufficient for the described scenario. The Q-factor is set to 2 because underpinning data is limited.

Room volume and ventilation rate

In most cases, the stairway is connected to hallways, providing a large room volume. Accordingly, the ventilation is expected to be relatively high. The room volume is estimated at 30 m^3 and the ventilation rate is assumed to be 1.5 per hour. For both defaults a Q-factor of 1 is assigned because they are based on assumptions.

Release area
The surface of the stairs is assumed to be approximately 5 m^2. Because underpinning data is lacking, a Q-factor of 1 is considered.

Application duration
The application duration is based on the application and distribution of the remover. 30 minutes are assumed to be sufficient to apply the product to the stairs properly. Because this is expert judgement, the Q-factor is set to 1.

Exposed area
As indicated before, dermal exposure is mainly expected while the old glue is scratched off, as prior to this step a tool (a brush for example) is used to distribute the remover. The surface area exposed to the product is assumed to be 50% of both palms (equal to 225 cm^2 (te Biesebeek et al., 2014)). A Q-factor of 2 is assigned because the underpinning data for the surface size of both hands is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Release duration
The dermal release duration equals the application duration and is set at 240 minutes. It is assumed that the user will not clean his or her hands after distributing the product on the surface and during the activation time (15 minutes), as the time frame is rather short and dermal exposure during these steps is usually not expected to be high. The Q-factor is considered to be 1 because underpinning data is currently lacking.

Table 53 Default values for glue remover

Default value		**Q-factor**	**Source**
General			
Frequency	0.25 per year	1	See above
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	240 min	1	See above
Product amount	2 kg	2	Product information, see above
Room volume	30 m^3	1	Estimate, see above
Ventilation rate	1.5 per hour	1	Estimate, see above
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	5 m^2	1	Estimate
Application duration	30 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – constant rate			
Exposed area	225 cm^2	2	50% of both palms (te Biesebeek et al., 2014)
Contact rate	30 mg/min	1	See subsection 4.2.3
Release duration	240 min	1	See above

11.2.2 *Glue remover spray*

Scenario for glue remover spray
As the default scenario for the usage of glue remover spray, the removal of a label with a surface of 150 cm^2 is considered. Glue remover in spray form is sold in aerosol spray cans (200-500 ml) and used for a wide range of rather small tasks.

In order to be able to estimate the inhalation exposure to non-volatile compounds, the ***inhalation – exposure to spray – spraying*** model is used. In contrast to this, for volatile substances the ***inhalation – exposure to vapour – instantaneous release*** model is advised to assess inhalation exposure. The defaults for the parameters exposure duration, room volume, ventilation and inhalation rate described for non-volatiles in sprays are used the exposure estimations of both volatile and non-volatile substances. Defaults for the mass generation rate and the density of non-volatiles in the product are applicable only to the non-volatile substances and comply with the generic scenario for spray application (4.2.1).
The dermal exposure is calculated using the ConsExpo ***dermal – direct product contact – constant rate*** model.

Frequency
In accordance with the results of a survey conducted by Park et al., a frequency of 3 times a year is set as a default (Park, 2016). Note that this is not the 75th percentile but the median value in this case. The Q-factor is set to 2 because the underpinning data is limited.

Spray duration
It is assumed that for this task a product amount of 6 g will be sufficient, which equals the median of the mass per use of glue remover sprays Park et al presented as a result in their survey from 2016 as well (Park, 2016). Considering a mass generation rate of 1.2 g/sec for aerosol spray cans (see subsection 4.2.1), a spray duration of 5 seconds will be set as a default. A Q-factor of 2 is considered, due to the limited but sufficient data set.

Exposure duration
After application, the product has to soak in for a period of up to 3 minutes (product information). Therefore, the exposure duration is set at 10 minutes by estimate, taking into account the removal of the label with a tool or a cloth followed by a short clean-up phase. Because the value is mainly based on expert judgement, the Q-factor is considered to be 1.

Ventilation rate, room volume and room height
The task is conducted in an unspecified room. According to the General Fact Sheet the defaults for the room volume and the ventilation rate are set at 20 m^3 and 0.6 per hour, respectively. The standard room height used here is set at 2.5 m (te Biesebeek et al., 2014).

Product amount (default needed for the exposure assessment for volatile substances)
As described in the spray duration passage above, a product amount of 6 g is assumed to be sufficient for this task, based on the results

presented by Park (Park, 2016). This value will therefore be used as a default with a Q-factor of 2 because underpinning data is limited but sufficient.

Exposed area
During the spray application, the dermal exposure is assumed to be significant. Bounced back spray particles can settle on the skin, such as spray that missed the target area. A surface area of both hands (=900 cm^2) is assumed to be exposed (te Biesebeek et al., 2014). A Q-factor of 2 is assigned to this value because the underpinning data for the surface of the hands is quantitatively rich but the estimate to what extent the skin surface is exposed is based on expert judgement (see also subsection 4.5).

Release duration
The release duration equals the spray duration because intermittent spraying is not expected due to the small task and the correspondingly low product amount used. It is assumed that, compared to the dermal exposure arising while spraying, the subsequent exposure during the removal of the label and the clean-up phase is negligible. A Q-factor of 2 is assigned because the spray duration is underpinned with limited data.

Table 54 Default values for glue remover spray

Default value		**Q-factor**	**Source**
General			
Frequency	3 per year	2	(Park, 2016)
Inhalation – exposure to spray – spraying			
Spray duration	5 sec	2	See above
Exposure duration	10 min	1	Estimate
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Room height	2.5 m	4	Standard room height
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Mass generation rate	1.2 g/sec	3	See subsection 4.2.1
Airborne fraction	0.14 g/g	2	See subsection 4.2.1
Density non-volatile	1.5 g/cm^3	3	See subsection 4.2.1
Aerosol diameter – median (C.V.)	15.1 µm (1.2)	3	See subsection 4.2.1
Inhalation cut-off diameter	15 µm	3	See subsection 4.2.1
Inhalation – exposure to vapour – instantaneous release			
Product amount	6 g	2	See above
Dermal – direct product contact – constant rate			
Exposed area	900 cm^2	2	surface of both hands (te Biesebeek et al., 2014)
Contact rate	100 mg/min	3	See subsection 4.2.1
Release duration	5 sec	2	See above

11.3 Wallpaper remover

Scenario for wallpaper remover
Removing wallpaper from walls in the living room is chosen as a default scenario. In accordance with the settings for the wallpaper glue scenario (see section 6.9), a wall surface area of 40 m^2 will be treated. Wallpaper remover is available in a powder and a liquid form. Both have to be mixed with water prior to use. Each product form will be treated in a separate mixing and loading scenario because the mixing process and the resulting exposure differ. After the product is mixed, it is applied with a brush or sponge onto the wallpaper (regardless of its initial form). For water-resistant and washable wallpapers, perforation of the wallpaper prior to the use of the remover is required to allow the solution to soak in and function properly. It is assumed that this will not result in additional exposure.

Mixing and loading: liquid wallpaper remover
The mixing and loading process of liquid wallpaper remover is different from that of most other DIY products, because it involves the mixing of two liquids.

In contrast to the considerations in the previous DIY Products Fact Sheet (ter Burg, 2007), VOC substances were identified in wallpaper remover during the market screening of the currently available product range. Therefore, previous considerations will be supplemented by an assessment regarding the inhalation exposure, which is calculated using the ***exposure to vapour – evaporation – release area mode: constant*** model. Evaporation may arise from the open bottle containing the product and from the product surface in the mixing vessel. The dermal exposure results from liquid spills around the opening of the bottle and spatters of the product. The ConsExpo ***dermal – direct product contact – instant application*** model is used here to describe exposure, assuming that all compounds in the product are directly applied to the skin.

Frequency
Because the wallpaper removal is a rather big and elaborate task, it is not assumed to be conducted frequently. Following the approach that a remover of a product is used as often as the product itself, once a year is set as a default, in accordance with the considerations regarding the use of wallpaper glue (see subsection 6.9). A Q-factor of 1 is assigned because underpinning data for wallpaper remover itself is currently lacking.

Exposure duration
Mixing two liquids is not assumed to take very long because the requisite mechanical effort is comparatively low (in comparison to a powder/liquid system). However, because the product amount is relatively high and the product is pastier, the user tends to stir for a longer period in order to be sure to achieve a homogenous end result. It is estimated that this task can be completed within 10 minutes. Because this value is based on expert judgement, the Q-factor is considered to be 1.

Product amount – inhalation
It is derived from the product information that 185 ml/m^2 of the mixture (product/water, mixed in a ratio of 1:40) are needed for this task (see Annex II, Table 112). Considering the mixing ratio, a total product amount of 185 ml liquid wallpaper remover has to be mixed with water to treat a 40 m^2 wall. To follow a conservative approach, 185 ml (=185 g; with a density of 1 g/cm^3) pure product are set as a default here without considering the dilution that occurs during the mixing and loading process. The Q-factor is set to 3 because the underpinning data is limited.

Release area
The mixing and loading is done in a bucket. The bucket has a capacity of 20 l and a diameter of approximately 37.5 cm. This leads to a surface area of 1100 cm^2 from which evaporation can be expected. Furthermore, the product is poured into the bucket from a bottle with an opening of approximately 20 cm^2 (see subsection 4.1.2). Inhalation exposure may occur from both surfaces. A Q-factor of 2 is assigned because several bucket products with these specifications are available on the market. For the common user, a 20 l bucket will be sufficient for most tasks.

Emission duration
No source depletion is expected during the mixing and loading phase because its duration is rather short, and the mixed product amount is pretty high. Therefore, the emission duration is set to 10 minutes, equal to the exposure duration. The Q-factor is set to 1 because underpinning data is currently not available.

Exposed area
The mixing and loading phase of two liquids is described in the Cleaning Products Fact Sheet (Meesters et al., 2018). It is stated that direct pouring of liquids into a bucket, bowl or machine can lead to dermal exposure through spatters on one side of the hand directing the bottle to the vessel. Therefore, the default for the exposed surface is set at 225 cm^2 in accordance with the information from the General Fact Sheet (te Biesebeek et al., 2014). A Q-factor of 2 is assigned because the underpinning data for the surface size of both hands is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Product amount – dermal
In this case, the default value for the product amount contacting the skin is derived from the value referred to biocides provided in the Biocides Human Health Exposure Methodology Document for dispersing a concentrate from a one-litre can and diluting it with water in a small vessel. The 75th percentile is 10 ml per operation, irrespective of the amount poured (ECHA, 2015a). Adapting this and assuming a density of 1 g/cm^3, the default for the product amount in the mixing and loading phase of liquid wallpaper remover is set at 0.01 g. Because the data are quantitatively rich but specific (non-generic), the Q-factor is set to 2.

Table 55 Default values for mixing and loading of liquid wallpaper remover

Default value		**Q-factor**	**Source**
General			
Frequency	1 per year	1	Estimate
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	10 min	1	Estimate
Product amount	185 g	3	Product information
Room volume	1 m^3	1	see subsection 4.1.2
Ventilation rate	0.6 per hour	1	Unspecified room, (te Biesebeek et al., 2014); See subsection 4.1.2
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	1120 cm^2	2	see subsection 4.1.2
Emission duration	10 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	225 cm^2	2	one side of one hand (te Biesebeek et al., 2014), see subsection 4.1.2
Product amount	0.01 g	2	Undiluted product (ECHA, 2015a), see subsection 4.1.2

Mixing and loading wallpaper remover (powder)
Wallpaper remover in powder form has to be mixed with water in a ratio of 1:25. A package of 320 g is therefore mixed with approximately 7.7 l water leading to 8 kg of mixed product, which is sufficient for 40 m^2, according to product information (please note that just one product was found during market screening; see Annex II; product data collection Table 113).

The inhalation exposure from mixing and loading DIY powders is estimated using the ConsExpo ***inhalation – exposure to spray – instantaneous release*** model. For dermal exposure, the ***direct product contact – constant rate*** model is advised. Defaults for the parameters product amount for inhalation exposure, room volume, exposed area, release duration and dermal contact rate comply with the generic scenario for loading powders (see subsection 4.1.3).

Frequency
Because wallpaper removal is a rather big and elaborate task, it is not assumed to be conducted frequently. Following the approach that a remover of a product is used as often as the product itself, once a year is set as a default, in accordance with the considerations regarding the use of wallpaper glue (see subsection 6.9). A Q-factor of 1 is assigned

because underpinning data for wallpaper remover itself is currently lacking.

Exposure duration
According to product information, the powder has to be mixed with the water for a short time period (up to 15 seconds). Nevertheless, the user has to further stir the mixture until a gel-like texture is achieved. The mixture has to rest for 10 minutes before it is stirred for another short period. It is assumed that the user stays in the same room for the whole time. An exposure duration of 15 minutes is set as a default with a Q-factor of 1 because the value is based on expert judgement.

Released mass
In total, 320 g powder are mixed with 7.7 l water. Considering subsection 4.1.3, the default value for the released mass is set to 13 µg (8.3 µg per 200 g powder). The Q-factor is set to 1.

Release duration
Dermal exposure arises from spills around the mixing bucket. It is assumed that the user will clean his or her hands after the first stirring phase and gets exposed again when he or she stirs the mixtures after the 10 minutes resting period. Therefore, the release duration is set to 3 minutes in accordance with the considerations in subsection 4.1.3. A Q-factor of 2 is assigned.

Table 56 Default values for mixing and loading of: wallpaper remover (powder)

Default value		**Q-factor**	**Source**
General			
Frequency	1 per year	1	Estimate
Inhalation – exposure to spray – instantaneous release			
Exposure duration	15 min	1	Product information; expert judgement
Released mass	13 µg	1	See above, see subsection 4.1.3
Room volume	1 m^3	1	See subsection 4.1.3
Ventilation rate	0.6 per hour	1	Unspecified room, (te Biesebeek et al., 2014); See subsection 4.1.3
Dermal – direct product contact – constant rate			
Exposed area	450 cm^2	2	See subsection 4.1.3 (te Biesebeek et al., 2014)
Contact rate	5 mg/min	1	See subsection 4.1.3
Release duration	3 min	2	See subsection 4.1.3

Application
Removing wallpaper glue is expected to occur at the same frequency as gluing wallpaper, because it is often used prior to renewal of wall decorations. Wallpaper removal in the living room with 40 m^2 of wall surface is taken into consideration. The product is applied with a sponge and rubbed onto the surface. After the mixture has soaked in for 15 to 40 minutes, the wallpaper is removed with a filling knife or other tools.

To estimate the inhalation exposure the ConsExpo ***exposure to vapour – evaporation – release area mode: increasing*** model is advised. The ***dermal – direct product contact – constant rate*** model is used to assess the dermal exposure.

Exposure duration
The task is rather big and time-consuming. The mixture has to be applied to the whole surface area with a brush or a sponge. Subsequently, the user is assumed to stay in the room while the product soaks into the surface. The removal of the resulting pulp will take up to 90 minutes, and after-use clean-up activities, during which evaporation can still occur from the wallpaper pulp, has to be considered too. The total exposure duration is therefore estimated to be 240 minutes. However, the Q-factor is set to 1 because underpinning data is not available.

Amount of solution uses
In comparison with the liquid products, the consumption of powder-made wallpaper remover is significantly higher (powder products: 320 g; liquid products: 185 ml for 40 m^2 (density ~ 1 g/cm^3, product information)). Nevertheless, the consumption of liquid wallpaper remover (185 ml product mixed with 7.4 l lukewarm water = 7.6 l with a density of 1 g/cm^3; see Annex II, Table 112) will be used as a default for the inhalation exposure in this scenario because powder-based product doesn't seem to contain volatile organic compounds. Exposure assessment regarding the inhalation exposure while application can be skipped when wallpaper remover made of powder is used. A Q-factor of 3 is assigned for this default because the data basis is sufficient to derive a default, albeit limited.

Dilution
As described in subsection 4.2.4, a dilution factor has to be considered in this case because the product is diluted in a solvent (water). As mentioned above, according to product information, 250 ml wallpaper remover has to be mixed with 10 l lukewarm water in order to fulfil its function properly (see Annex II; product data collection Table 113). The dilution factor is therefore set to 41 times. A Q-factor of 3 is assigned because the underpinning data regarding the product information is limited.

Room volume and ventilation rate
The task is performed in a living room which leads to a room volume of 58 m^3 and a ventilation rate of 0.5 per hour according to the General Fact Sheet (te Biesebeek et al., 2014).

Release area
It is assumed that a total surface area of 40 m^2 of the living room walls (corrected for doors and windows) is covered with the wallpaper that has to be removed. This value is therefore used as a default. A Q-factor of 1 is considered because it is based on expert judgement.

Application duration
The application duration includes the time during which the product is applied to the wallpaper with a sponge. Because this task is rather big,

an application duration of 60 minutes is assumed. The Q-factor is set to 1 because underpinning data is currently not available.

Exposed area
Dermal exposure is expected to be high, especially when the wallpaper remover mixture is applied with a sponge. During application and removal of the pulp product-to-skin contact is highly probable. The watery liquid is prone to running down the hands and forearms. The dermal exposure area is therefore set at 2200 cm^2, which equals the surface area of both hands and forearms (te Biesebeek et al., 2014). A Q-factor of 2 is assigned because the underpinning data for the surface sizes is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area.

Release duration
It is assumed that dermal exposure can occur during the whole application, excluding the time frame when the product has to soak into the surface. According to product information, this period varies among the product range from 15 up to 60 minutes (see Annex II, A.5 Product data collection Table 113). It is assumed that the user tends to clean his or her hands after (s)he applied the product to the surface and waits for it to interact with the wallpaper. Considering this, a release duration of 120 minutes, equal to the application duration, is set as a default for this scenario. A Q-factor of 1 is assigned because underpinning data is only available for the soak-in time.

Table 57 Default values for wallpaper remover

Default value		**Q-factor**	**Source**
General			
Frequency	1 per year	1	Estimate
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	240 min	1	Estimate
Amount of solution used	7.6 kg	3	Product information
Dilution (times)	41	3	See above
Room volume	58 m^3	4	Living room (te Biesebeek et al., 2014)
Ventilation rate	0.5 per hour	3	Living room (te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	40 m^2	1	Estimate
Application duration	60 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – constant rate			
Exposed area	2200 cm^2	2	Both hands and forearms (te Biesebeek et al., 2014)

Default value		Q-factor	Source
Contact rate	30 mg/min	1	See subsection 4.2.3
Release duration	120 min	1	See above

11.3.1 *Wallpaper remover spray application*

In addition to the already mentioned application variant with a brush or a sponge, liquid wallpaper remover can also be distributed via pneumatic spray devices. In that case, the distribution can possibly be conducted in a shorter period of time. Furthermore, it is claimed by the manufacturers that, because of the strong spray jet, the product can penetrate the wallpaper faster and leads to easy detachable wallpaper pulps. The default scenario for the spray application is chosen in accordance with the prior wallpaper remover scenarios. The walls of a living room with a surface size of 40 m^2 have to be freed from old wallpaper.
As described above, the mixing and loading phase of liquid wallpaper remover is also requisite prior to the use of the spray application and has to be considered in the exposure assessment.

To estimate the inhalation exposure to non-volatile substances in the application phase the ConsExpo ***inhalation – exposure to spray – spraying*** model is used. For volatile substances the ***inhalation – exposure to vapour – instantaneous release*** model is advised to assess inhalation exposure. The defaults for the parameters exposure duration, room volume, ventilation and inhalation rate described for non-volatiles in sprays are used in the exposure estimation of both volatile and non-volatile substances. Defaults for the mass generation rate and the density of non-volatiles in the product are applicable only to the non-volatile substances and comply with the generic scenario for spray application (4.2.1).
The dermal exposure is assessed using the ConsExpo ***dermal – direct contact – constant rate*** model with a contact rate of 110 mg/min (see subsection 4.2.1).

Frequency
In accordance with the prior assumptions that wallpaper removal is a rather big and elaborate task, the frequency is set at once a year, taking into account the considerations regarding the use of wallpaper glue too (see subsection 6.9). A Q-factor of 1 is assigned because underpinning data is currently lacking.

Spray duration
Because the product itself stays the same and just the type of application is changed, the same product amount is taken into account as for the previously explained use of liquid wallpaper remover (7.6 kg). According to product information, a pneumatic spraying device for such products works with a maximum pressure of 3 bar. If this level could be maintained, the mass generation rate of the device would be 51.7 g/sec (3.1 l/min with a density of ~ 1.0 g/cm^3) (Gloria, 2011). This value is not considered realistic. During usage, the pneumatic devices lose pressure, which has to be recovered from time to time via pumping. There are battery-operated attachments on the market that take over pumping, but this is not common practice at the moment. However, a

constant working pressure of 3 bar is not achievable. The product information indicates that the pneumatic spray device enables a mass generation rate of 7.2 g/sec (0.43 l/min with a density of ~ 1.0 g/cm^3) at a working pressure of 2 bar (Gloria, 2011). It is assumed that this is a realistic value. The user will tend to spray until the pressure decreases to a certain level and then pump again. Taking into account a mass generation rate of 7.2 g/sec and the product amount of 7.6 kg that has to be distributed, a net spray duration of 17.6 minutes is derived. A Q-factor of 2 is assigned because underpinning data is sufficient to derive a default but limited.

Exposure duration
It is assumed that the distribution of the product can be realised faster via spray application than with a brush or sponge. Nevertheless, the information provided in the above-described scenario has to be considered, which includes a soak-in time (~ 15 minutes), the removal of the resulting pulp (product/loosened wallpaper), which will take 90 minutes by estimation, and a clean-up phase once the task is conducted. Furthermore, the pneumatic spraying devices have limited capacities, usually around 5 l, which will force the user to refill the tank during the application process. The default for the exposure duration is therefore set at 180 minutes. Underpinning data for this default is currently not available. A Q-factor of 1 is considered.

Ventilation rate, room volume and room height
According to the General Fact Sheet the assumption that the task is conducted in an average-sized living room leads to a room volume of 58 m^3 and a ventilation rate of 0.5 per hour. The standard room height which will be used here is set at 2.5 m (te Biesebeek et al., 2014).

Product amount (default needed for the exposure assessment for volatile substances)
According to product information for liquid wallpaper remover and as described in section 11.3, 185 ml liquid wallpaper remover has to be mixed with water prior to use in order to remove the wallpaper from a 40 m^2 wall. Therefore, 185 ml (=185 g; density = 1 g/cm^3) will be used as a default with a Q-factor of 3 because underpinning data is limited but sufficient.

Exposed area
Dermal exposure is assumed to be significant. Spray particles that bounce back from the treated surface or miss the targeted area may settle on wide areas of the skin. Furthermore, during the removal of the resulting pulp, intensive dermal contact with the product is almost unavoidable. In order not to underestimate the dermal exposure, an affected surface area of 900 cm^2 is estimated, which equals the surface of both hands (te Biesebeek et al., 2014). A Q-factor of 2 is assigned to this value because the underpinning data for the surface of the hands is quantitatively rich but the estimate in which extent the skin surface is exposed is based on expert judgement (see also subsection 4.5).

Release duration
The release duration is defined here as the total time span between the first spraying effort and the completion of the task with the last spraying

effort. This includes not only the net spraying time but also intermediate actions, such as changing the position, pumping the device to restore pressure or refilling its tank. Because it is not foreseeable that the user will clean his or her hands during the whole process, the default for this parameter is set at 180 minutes, which is a very conservative estimate. A Q-factor of 1 is considered because underpinning data is currently not available.

Table 58 Default values for the application of wallpaper remover in spray form

Default value		**Q-factor**	**Source**
General			
Frequency	1 per year	1	Estimate
Inhalation – exposure to spray – spraying			
Spray duration	17.6 min	2	See above, product information
Exposure duration	180 min	1	Estimate
Room volume	58 m^3	4	Living room, (te Biesebeek et al., 2014)
Room height	2.5 m	4	Standard room height
Ventilation rate	0.5 per hour	3	Living room, (te Biesebeek et al., 2014)
Mass generation rate	7.2 g/sec	2	Product information
Airborne fraction	0.14 g/g	2	(Delmaar & Bremmer, 2009)
Density non-volatile	1.5 g/cm^3	3	See subsection 4.2.1
Aerosol diameter – median (C.V.)	15.1 µm (1.2)	1	See subsection 4.2.1
Inhalation cut-off diameter	15 µm	3	See subsection 4.2.1
Inhalation – exposure to vapour – instantaneous release			
Product amount	185 g	3	See above
Dermal – direct product contact – constant rate			
Exposed area	900 cm^2	2	Surface of both hands (te Biesebeek et al., 2014)
Contact rate	110 mg/min	2	See subsection 4.2.1
Release duration	180 min	1	Estimate

11.4 Sealant / insulation foam remover

11.4.1 Sealant / foam remover in liquid form

Scenario for sealant / foam remover

Presented below is the default scenario for removing old sealant, which is comparable in use with the removal of hardened insulation foam. Product information on both products warn of inhalation exposure to vapours. The starting point is the DIY task to replace the old sealant with new sealant, as partly described in Chapter 7, where a scenario was set up for the use of sealants in a bathroom (see section 7.1). Before that task can be conducted, the old sealant has to be removed with sealant remover, as described below.

Before applying the sealant remover, the sealant has to be mechanically removed so that most of it will have been removed prior to the application of the product. Remnants of the sealant then have to be removed with the chemical remover. Contained in a small bottle or tube of 100 ml, the gel-like substance is applied with a small brush. It takes approximately 15 minutes before the remover has soaked into the remnants, which can then be removed with a filling knife.

To estimate the inhalation exposure the ConsExpo ***exposure to vapour – evaporation – release area mode: increasing*** model is advised. The ***dermal – direct product contact – instant application*** model is used to assess the dermal exposure.

Frequency
Sealants and insulation foams are products with a rather long life whose removal is, in some cases, a challenging and exhausting task. Therefore, the use frequency for this kind of project is assumed to be low. Referring to the considerations regarding the use of sealants (see subsection 7.1) 3 times per year will be set as the default with a Q-factor of 1 assigned because underpinning data is currently not available.

Exposure duration
The exposure duration includes the application of the product onto the sealant/foam, the soak-in time during which the user is assumed to stay in the same room, the period that is needed to remove the loosened remnants from the surface with a tool and after-use clean-up activities. Especially the removal of the remnants is very time consuming. The total exposure duration is set at 3 hours. A Q-factor of 1 is considered because the value is based on expert judgement.

Product amount – inhalation
According to product information, a product amount of 37.5 ml/serial meter (see Annex II; product data collection Table 114) is sufficient (assuming a standard joint width of 5 mm). To perform the whole task and remove the remnants from a joint with a length of 5 m, 190 g of the product is required, assuming a product density of 1.0 g/cm^3). The Q-factor is set to 3 because the underpinning data is sufficient to derive a default, albeit limited.

Room volume and ventilation rate
It is assumed that this task is conducted in a bathroom leading to a room volume of 10 m^3 and a ventilation rate of 2 per hour according to information from the General Fact Sheet (te Biesebeek et al., 2014).

Release area
The joint that has to be treated is assumed to have a length of 5 m and a width of 5 mm. The release area considered is therefore 250 cm^2. Because underpinning data is currently not available, a Q-factor of 1 is assigned.

Application duration
The application is not considered to take very long because it is not necessary to be very precise. The product has to be applied with a

brush, which is assumed to be manageable within 20 minutes as a conservative estimate. The Q-factor is considered to be 1 because the value is based on expert judgement.

Exposed area
After the pulp is removed with a filling knife, subjects are assumed to remove the pulp from the filling knife with their hands. Another imaginable scenario for dermal exposure to sealant remover is picking up pieces of sealant or insulation foam. In both situations, the fingertips of one hand will be exposed, which is a conservative approach (75 cm^2, see subsection 4.1.1 for the area of one fingertip). A Q-factor of 1 is assigned because the underpinning data for the surface size of hands is quantitatively rich but the derivation of the size of the fingertips is associated with assumptions and uncertainties.

Product amount – dermal
The amount of product contacting the skin is estimated to be 0.1% of the total amount used: 0.19 g. Underpinning data is not available. Therefore, a Q-factor of 1 is assigned here.

Table 59 Default values for the use of sealant remover

Default value		**Q-factor**	**Source**
General			
Frequency	3 per year	1	Estimate
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	180 min	1	See above
Product amount	190 g	3	Product information
Room volume	10 m^3	4	Bathroom (te Biesebeek et al., 2014)
Ventilation rate	2 per hour	3	Bathroom (te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	250 cm^2	1	From 5 m x 5 mm joint
Application duration	20 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	75 cm^2	1	Five phalanges (te Biesebeek et al., 2014)
Product amount	0.19 g	1	See above

11.4.2 *Sealant / foam remover spray*

Scenario for sealant/foam remover spray
In this section, a default scenario for the application of sealant/insulation foam remover with an aerosol spray is described. The removal of sealant from a joint with a length of 5 m and a width of 5 mm (= 250 cm^2) is considered as a representative scenario. Prior to the use of the spray, as much sealant as possible has to be removed mechanically with a knife. The spray is applied via an aerosol spray can

from a distance of 20-30 cm and left to soak in for 10 minutes. Subsequently, the resulting pulp is removed with a tool or a cloth.
The inhalation exposure to non-volatile substances can be estimated using the ConsExpo ***inhalation – exposure to spray – spraying*** model. For volatile substances the ***inhalation – exposure to vapour – instantaneous release*** model is advised to assess inhalation exposure. The defaults for the parameters exposure duration, room volume, ventilation and inhalation rate described for non-volatiles in sprays are used in the exposure estimation of both volatile and non-volatile substances. Defaults for the mass generation rate and the density of non-volatiles in the product are applicable only to the non-volatile substances and comply with the generic scenario for spray application (4.2.1).
The ConsExpo ***dermal – direct product contact – constant rate*** model is used to calculate the dermal exposure for this scenario.

Frequency
As explained in subsection 11.4.1, sealant and insulation foam removers are used for rather bigger and more laborious occasions (e.g., bathroom renovation/sealant renewal). Therefore, the use frequency of this product is assumed to be 3 times per year. Because this value is based on expert judgement the Q-factor is set to 1.

Spray duration
It is assumed that a product amount of 190 g is sufficient for this task. This value refers to the consumption of sealant/foam remover applied in a liquid form (see subsection 11.4.1). Regarding a mass generation rate of 1.2 g/sec (see subsection 4.2.1), a spray duration of 160 seconds is calculated and set as a default. A Q-factor of 1 is assigned, as underpinning data for the product consumption is not specific to the spray application.

Exposure duration
The exposure duration is set at 120 minutes by estimate. It includes the application, the soak-in time (user stays in the room), the removal of the pulp and the following clean-up phase. Because underpinning data is currently not available, the Q-factor is considered to be 1.

Ventilation rate, room volume and room height
This kind of task is mainly performed in bathrooms or kitchens. In this case, the specifications for a bathroom are considered providing a room volume of 10 m^3 and a ventilation rate of 2.0 per hour. The standard room height which will be used here is set at 2.5 m (te Biesebeek et al., 2014).

Product amount (default needed for the exposure assessment for volatile substances)
As explained above in the spray duration passage a product amount of 190 g is assumed to be sufficient for the task. Because this is just an estimation based on the usage of liquid sealant/foam remover, a Q-factor of 1 is assigned to this default.

Exposed area
The exposed skin surface will be significant because the spray particles that bounce back from the treated surface and the ones missing the target area may disperse into the air around the user and can settle on the skin. In total, 900 cm^2 (= both hands) will be used as a default for this scenario (te Biesebeek et al., 2014). A Q-factor of 2 is assigned to this value because the underpinning data for the surface of both hands is quantitatively rich but the estimate in which extent the skin surface is exposed is based on expert judgement (see also subsection 4.5).

Release duration
Because a relatively long joint has to be treated (5 m), it is assumed that the user has to change position several times between spraying events. Therefore, the release duration is interpreted here as the intermittent spray duration, which includes the spraying and the intermediate changes of position. The default is set to 180 seconds by estimation.
Dermal exposure arising from removing the loosened sealant/foam remnants from the surface with a tool is assumed to be negligible in comparison to the exposure arising from the spray which may settle on the skin. The Q-factor is considered to be 1 because underpinning data is not available.

Table 60 Default values for sealant/foam remover spray

Default value		**Q-factor**	**Source**
General			
Frequency	3 per year	1	Estimate
Inhalation – exposure to spray – spraying			
Spray duration	160 sec	1	See above
Exposure duration	120 min	1	Estimate
Room volume	10 m^3	4	Bathroom (te Biesebeek et al., 2014)
Room height	2.5 m	4	Standard room height
Ventilation rate	2 per hour	3	Bathroom (te Biesebeek et al., 2014)
Mass generation rate	1.2 g/sec	3	See subsection 4.2.1
Airborne fraction	0.14 g/g	2	See subsection 4.2.1
Density non-volatile	1.5 g/cm^3	3	See subsection 4.2.1
Aerosol diameter – median (C.V.)	15.1 μm (1.2)	3	See subsection 4.2.1
Inhalation cut-off diameter	15 μm	3	See subsection 4.2.1
Inhalation – exposure to vapour – instantaneous release			
Product amount	190 g	1	See above
Dermal – direct product contact – constant rate			

Default value		Q-factor	Source
Exposed area	900 cm^2	2	Surface of both hands (te Biesebeek et al., 2014)
Contact rate	100 mg/min	3	See subsection 4.2.1
Release duration	180 sec	1	See above

11.5 Rust remover

11.5.1 Liquid rust remover

Scenario for liquid rust remover

The removal of moderate rust from an old wrench is chosen as a default scenario for the use of liquid rust remover. Described here is the bathing method, which means that the wrench is sunk in a bath of rust remover. The wrench can be pre-treated with a steel brush to remove loose rust and other remnants on the surface. This is not mandatory because these particles would be removed by the rust remover as well, but the more remnants are left on the surface, the longer the removing process with the product would take. After the wrench is sunk in the bath, it is left there for a time period of 30 minutes up to 24 hours to soak in, depending on the degree of rusting. During the soak-in phase, the wrench is taken out repeatedly to remove loosened rust with a steel brush. Finally, the wrench is taken out, rinsed with water and, if necessary, once again treated with a steel brush to remove the last remnants of rust.

Mixing and loading rust remover

It has to be noted that not all liquid rust remover products need to be mixed with water. Some of them are sold in a ready-to-use state. If this is the case, this default mixing and loading scenario can be ignored. The mixing and loading process consists of the mixing of two liquids. In total, 200 ml rust remover product are mixed with 1.8 l water in a mixing vessel. Evaporation is expected to arise from the surface area of the product (from the mixing vessel and the bottle opening of the product vessel), which is constant during the task. Therefore, to estimate the inhalation exposure the ConsExpo ***exposure to vapour – evaporation – release area mode: constant*** model is used. To assess the dermal exposure, the ***dermal – direct product contact – instant application*** model is advised.

Frequency
In the survey conducted by Park et al., the value for the use frequency of rust inhibitors is 6 times per year (Park, 2016). Following the assumption that most users do not treat newly purchased objects with rust inhibitors but use them to protect old items they just freed from rust, it can be estimated that the use frequency of rust remover can also be set at 6 times per year as a conclusion by analogy. The Q-factor is set to 2 because underpinning data is sufficient but not specifically gathered for liquid rust remover.

Exposure duration
It is estimated that this task will not consume too much time because no excessive mechanical mixing is necessary when both liquids are less viscous. Therefore, the default for the exposure duration is set at 5 minutes. A Q-factor of 1 is considered because the value is based on expert judgement.

Product amount – inhalation
For this task, it is assumed that the rust remover product needs to be diluted in a ratio of 1:9 (product information). Therefore, 200 ml liquid rust remover (= 200 g; assuming a density of 1 g/cm^3) is mixed with 1.8 l water resulting in 2 kg usable rust remover/water mix. To follow a conservative approach, the amount of the pure product is set as a default here without considering that during mixing and loading, the rust remover is diluted. Because no underpinning data is available regarding the product consumption of liquid rust remover, a Q-factor of 1 is assigned here.

Release area
One bucket with a 12 l capacity is used for the mixing task. The typically sold bucket in this dimension provides a constant release surface area of 800 cm^2 (radius = 16 cm) from which evaporation can be expected to occur. Furthermore, the product is poured into the bucket from a bottle with an opening of approximately 20 cm^2 (see subsection 4.1.2). Inhalation exposure may occur from both surfaces. In total, 820 cm^2 will be used as a default. The dimension of a common bucket with a 12 l capacity can be easily double checked on websites of the major DIY retailers. A Q-factor of 2 is assigned because many product examples with the indicated specifications (among others) can be found.

Emission duration
The emission duration is assumed to be as long as the exposure duration because source depletion in this short period is not likely regarding the high product amount. Therefore, 5 minutes is set as a default with a Q-factor of 1.

Exposed area
Dermal exposure arises from spatters while pouring the product into the vessel, according to the explanations mentioned in the Cleaning Products Fact Sheet regarding the dermal exposure while mixing two liquids. The default for the exposed area is set at 225 cm^2, which is the surface of one side of the hand that is directing the bottle to the bucket while pouring (Meesters et al., 2018). A Q-factor of 2 is assigned because the underpinning data for the surface size of both hands is

quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Product amount – dermal
The product amount contacting the skin is derived according to the results provided in the Biocides Human Health Exposure Methodology Document published by ECHA, which describes the dermal exposure of users to biocides when diluting a concentrate (one-litre can) with water in a small vessel. Adapting their results, the product amount contacting the skin while mixing two liquids equals 10 mg (assuming a density of 1 g/cm^3), irrespective of the amount poured (ECHA, 2015a). This value is set as a default. The underpinning data is quantitatively rich, which justifies a Q-factor of 3.

Table 61 Default values for mixing and loading of rust remover

Default value		**Q-factor**	**Source**
General			
Frequency	6 per year	2	Estimate, (Park, 2016)
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	5 min	1	Estimate
Product amount	200 g	1	Estimate
Room volume	1 m^3	1	see subsection 4.1.2
Ventilation rate	0.6 per hour	1	Unspecified room (te Biesebeek et al., 2014)
Application temperature	15 °C	1	Estimate, garage
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	820 cm^2	2	see subsection 4.1.2
Emission duration	5 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	225 cm^2	2	One side of one hand (te Biesebeek et al., 2014), see subsection 4.1.2
Product amount	0.01 g	2	Undiluted product (ECHA, 2015a), see subsection 4.1.2

Application
As described above the application phase of rust removal via bathing method consists of the repeated switch of soak in phases (minimum is 30 minutes) and mechanical removal of rust with a steel brush. The ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model is used to calculate the inhalation exposure because the regarded surface (mixing vessel) stays the same

over the whole treating period. The dermal exposure is assumed to be significant and can be estimated using the ***dermal – direct product contact – instant application*** model.

Exposure duration
It is estimated that the described task takes 90 minutes, including two treating phases (soak-in time for half an hour followed by brush treatment) and a clean-up phase at the end. Assuming that the user will stay in the same room the whole time, the default for the exposure duration is also set at 90 minutes by estimation. A Q-factor of 1 is assigned because underpinning data is currently lacking.

Amount of solution used
As described in the considerations regarding the mixing and loading scenario of liquid rust removers (see above), the amount of solution is assumed to be 2 kg containing 0.2 l rust remover (density ≈ 1 g/cm^3; see Annex II; Product data collection Table 114) and 1.8 l water. The Q-factor is considered to be 1 because the value is based on expert judgement.

Dilution
As described above, the rust remover product is mixed with water prior to use. Therefore, as explained in subsection 4.1.2, a dilution factor has to be assigned that enables a correct simulation of the evaporation process. These products have to be mixed in a ratio of 1:9 according to product information (see Annex II; product data collection Table 116. This means for example 200 ml rust remover is mixed with 1.8 l water. A dilution factor of 10 times is therefore set as a default. The Q-factor is set to 2 because underpinning data regarding the mixing ratio is sufficient to derive a default, albeit limited.

Room volume, ventilation rate and temperature
The task is performed in a garage with a default room volume of 34 m^3, a ventilation rate of 1.5 per hour according to the General Fact Sheet (te Biesebeek et al., 2014) and an estimated temperature of 15 °C. The Q-factor for the temperature is set to 1 because the value is not underpinned by empirical data.

Release area
A release area of 800 cm^2 is set as a default, which is the surface area of the product in a bucket with a 12-l capacity (radius = 16 cm) in which the wrench is submerged. A Q-factor of 1 is assigned because specific underpinning data for this application is not available.

Emission duration
The emission duration equals the exposure duration because, taking into account the amount of product, it is not assumed that source depletion can be expected during the task. Because the value is based on expert judgement a Q-factor of 1 is considered.

Exposed area
Dermal exposure is assumed to be significant due to the way of application. Picking the wrench out of the solution exposes both palms. In addition, wide-ranging spatters through the steel brush treatment

affect the area of both hands, and lead to a high contact rate. A default of 900 cm^2 is set for the surface area according to the General Fact Sheet (te Biesebeek et al., 2014). The Q-factor is set to 2 because underpinning data for the surface size of the hands is quantitatively rich but the determination of the dimension of the affected area is an assumption (see also subsection 4.5).

Release duration
The user is not assumed to clean his hands between the mechanical removing intervals. Therefore, the release duration is set at 60 minutes because dermal exposure is estimated to start after the first soak in period, when the object is taken out of the rust remover bath to be further treated. The Q-factor is set to 1 because underpinning data is not available.

Table 62 Default values for liquid rust remover

Default value		**Q-factor**	**Source**
General			
Frequency	6 per year	2	Estimate, (Park, 2016)
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	90 min	1	Estimate
Amount of solution used	2 kg	1	Estimate
Dilution (times)	10	2	See above
Room volume	34 m^3	4	Garage (te Biesebeek et al., 2014)
Ventilation rate	1.5 per hour	3	Garage (te Biesebeek et al., 2014)
Temperature	15 °C	1	Estimate
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	800 cm^2	1	See above
Emission duration	90 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – constant rate			
Exposed area	900 cm^2	2	Surface of both hands (te Biesebeek et al., 2014)
Contact rate	50 mg/min	1	See subsection 4.2.3
Release duration	60 min	1	Estimate

11.5.2 Rust remover gel
Scenario for rust remover gel
Rust removers that have the form of a rather viscous gel have the advantage that they are usable on vertical surfaces because they do not tend to run down. Their composition is similar to the liquid removers (with different mass fractions of the individual components), but the

application is different from the bathing method. Therefore, a separate default scenario for the use of gel is described below.
Removing rust from the surface of an old metal shelf with an overall area of 1500 cm^2 is chosen as the default scenario. The gel is applied to the surface with a paintbrush and distributed across the surface in a thick layer. It has to soak in for at least 30 minutes. Subsequently, the loosened rust and the gel can be removed using a scrubber or a similar tool. If the rust is persistent, these steps should be repeated until the result is satisfying. According to product information, the remover gel should be covered with foil after it was applied on bigger surfaces in order to prevent the product from drying. As it is not foreseeable that the common user will follow this advice, it is not taken into account in the following default scenario.
Inhalation exposure is estimated using the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: increasing*** model while dermal exposure can be assessed using the ***dermal – direct product contact – instant application*** *model*.

Frequency
Taking into account the use frequency (6 times per year) of liquid rust inhibitor products provided by Park et al. as an indicator (Park, 2016) and considering the assumption that rust remover is commonly used prior to rust inhibitors (see subsection 11.5.1), it is estimated that rust remover gels are used 2 times per year. Because gels are intended to be used for bigger or immovable objects that cannot be treated via the bathing method, a lower frequency is estimated. The Q-factor is set to 1 because underpinning data is limited, supplemented with assumptions and not specifically collected for rust remover gels.

Exposure duration
After application, a soak in-time of at least 30 minutes is required. For this scenario, a conservative soak-in time of 60 minutes is considered. Subsequently, the gel and the rust can be removed with a scrubber and then rinsed off with water. An application duration of 120 minutes is estimated for the task, including the soak-in period of 60 minutes during which the user stays in the room, the removal of product and rust with a scrubber and water and a short clean-up phase following the main task. Because the value is based on expert judgement, a Q-factor of 1 is assigned.

Product amount – inhalation
Because rust remover gel has to be applied with a brush and in a minimum layer thickness of 1.5 mm in order to prevent a dry-out, it is estimated that an amount of 1 l gel (=1 kg with an assumed density of 1 g/cm^3) is sufficient for the task (expert judgement). The Q-factor is considered to be 1 because underpinning data is currently not available.

Room volume, ventilation rate and temperature
The task is performed in a garage with a default room volume of 34 m^3, a ventilation rate of 1.5 per hour, according to the General Fact Sheet (te Biesebeek et al., 2014), and an estimated temperature of 15 °C. The Q-factor for the temperature is set to 1 because the value is not underpinned by empirical data.

Release area
The area that has to be treated is part of an old metal shelf. Since this kind of storage option is available in several sizes depending on its purpose, an assumption is made, assigning a surface area of 1500 cm^2 that has to be treated. This value relies on expert judgement which leads to a Q-factor of 1.

Application duration
Applying the product on the metal shelf with a brush may be more time-consuming than in the case of liquid rust removers because of its low viscosity (gel-like form). As a conservative assumption, it is estimated that it will take up to 45 minutes to cover the whole surface, which will be used as a default. The Q-factor is set to 1 because no data is currently available to underpin the value.

Exposed area
Dermal exposure may arise because of spatters while applying the product on or removing the rust off the surface, or through direct contact with an already treated surface. It is estimated that an area of half of both hands is exposed during the process (=450 cm^2) (te Biesebeek et al., 2014). A Q-factor of 2 is assigned because the underpinning data for the surface size of both hands is quantitatively rich but compromised by assumptions regarding the dimensions of the affected skin area (see also subsection 4.5).

Product amount – dermal
The product amount contacting the skin is assumed to be 1 g, which equals 0.1% of the total product amount used. The Q-factor is considered to be 1 because underpinning data is currently lacking.

Table 63 Default values for rust remover gel

Default value		**Q-factor**	**Source**
General			
Frequency	2 per year	1	Estimate, see above
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	120 min	1	Estimate
Product amount	1 kg	1	Estimate
Room volume	34 m^3	4	Garage (te Biesebeek et al., 2014)
Ventilation rate	1.5 per hour	3	Garage (te Biesebeek et al., 2014)
Temperature	15 °C	1	Estimate
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	1500 cm^2	1	Estimate
Application duration	45 min	1	Estimate
Molecular Weight Matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			

Default value		Q-factor	Source
Exposed area	450 cm^2	2	50% of both hands (te Biesebeek et al., 2014)
Product amount	1 g	1	Estimate

11.5.3 Rust remover spray

Scenario for rust remover spray

Rust remover spray is mainly used to loose rusted connections, such as screws and screw nuts or other rusty parts. The main advantage of the spray is its high penetrating capability, allowing it to reach the smallest cracks. It can be applied comprehensively over a surface by trigger and aerosol spray cans. A higher precision during application can be achieved by using a pipe attached to the spray nozzle of an aerosol can. Following a conservative estimate, this scenario describes the application without the pipe because exposure (dermal and inhalation) is expected to be higher in this scenario variation. The disengagement of 10 rusted screw nuts in a car engine is described below.

The inhalation exposure to non-volatile compounds can be estimated using the ConsExpo ***inhalation – exposure to spray – spraying*** model, whereas the ***inhalation – exposure to vapour – instantaneous release*** model is advised for volatile substances. The defaults for the parameters exposure duration, room volume, ventilation and inhalation rate described for non-volatiles in sprays are used in the exposure estimation of both volatile and non-volatile substances. Defaults for the mass generation rate and the density of non-volatiles in the product are applicable only to the non-volatile substances and comply with the generic scenario for spray application (4.2.1).
The ConsExpo ***dermal – direct product contact product: constant rate*** model is used to calculate the dermal exposure for this scenario.

Frequency

The default for the frequency is set at 4 times per year, referring to the results of Park et al. (Park, 2016). Even though these results relate to the use of rust inhibitor, it is assumed that prior to the use of this kind of product it is useful to apply a rust remover to free the treated object from rust in the first place (note that this value represents not the 75^{th} percentile but the 95^{th}). The Q-factor is set to 2 because underpinning data is limited and not specifically gathered for rust remover spray, albeit for a similar product.

Spray duration

It is assumed that every screw nut has to be sprayed for 5 seconds leading to a total spray duration of 50 seconds and a product amount of 60 g for aerosol spray cans (regarding a mass generation rate of 1.2 g/sec, see subsection 4.2.1) and 80 g for trigger sprays (regarding a mass generation rate of 1.6 g/sec, see subsection 4.2.1). Because the value(s) are supplemented with assumptions regarding the spraying time per screw nut, the Q-factor is considered to be 1.

Exposure duration

First, the screw nuts are pre-treated with a steel brush to remove dirt and already loosened rust. The following step is spraying from a short distance onto the screw nut. The product has to be left on to soak in for up to 15 minutes (depending on the severity of rust). Subsequently, the screw nuts can be screwed off with a tool, which, can be very time-consuming if the screw is very rusty. Considering all application phases, a default of 60 minutes is set for the exposure duration by estimate, taking into account a short clean-up phase once the task is completed. Underpinning data for this default is currently not available. Therefore, the Q-factor is set to 1.

Ventilation rate, room volume and room height
It is assumed that this kind of task is mainly performed in garages leading to a room volume of 34 m^3 and a ventilation rate of 1.5 per hour. The room height which will be used here is set at 2.25 m which is derived from the surface area of a garage (15 m^2) and its volume (see above) as provided by the General Fact Sheet (te Biesebeek et al., 2014).

Product amount (default needed for the exposure assessment for volatile substances)
As explained in the spray duration passage, it is assumed that an amount of 60 g is consumed if an aerosol spray can is in use, and 80 g if the product is distributed via a trigger spray system. Because these values are mainly based on assumptions, a Q-factor of 1 is assigned.

Exposed area
Because the spray is applied to a surface from a rather short distance, it has to be considered that the spray particles may partly bounce back and settle onto the skin of the user. Furthermore, the part of the spray that misses the targeted area and disperses into the room air may also lead to dermal exposure. Following the previous considerations, the affected skin area is assumed to be significant. The default is consequently set at 900 cm^2 which equals the surface of both hands (te Biesebeek et al., 2014). A Q-factor of 2 is assigned to this value because the underpinning data for the surface of both hands is quantitatively rich but the estimate to what extent the skin surface is exposed is based on expert judgement (see also subsection 4.5).

Release duration
Several screw nuts have to be treated, which indicates that it is not possible to conduct the task within only one spraying effort. Instead, breaks between the sprayings and relocating of the spray can are required. In this case, the release duration is therefore interpreted as the intermittent spray duration including the net spray duration and the intervals, during which the user relocates the can to treat the next screw nut. The default is set to 120 seconds by estimation.
In relation to the dermal exposure arising from the spray, it is assumed that the exposure resulting from contacting the sprayed surface is negligible, especially because the screw nuts are screwed off using a tool, such as a plier. The dermal exposure arising from this phase of the treatment is not expected to be significant. The Q-factor is set to 1 because underpinning data is currently not available.

Table 64 Default values for rust remover spray

Default value		**Q-factor**	**Source**
General			
Frequency	4 per year	2	Estimate (Park, 2016)
Inhalation – exposure to spray – spraying			
Spray duration Exposure duration Room volume	50 sec 60 min 34 m^3	1 1 4	See above Estimate Garage (te Biesebeek et al., 2014)
Room height	2.25 m	3	Garage (te Biesebeek et al., 2014)
Ventilation rate	1.5 per hour	3	Garage (te Biesebeek et al., 2014)
Mass generation rate			See subsection 4.2.1
-Pneumatic spray	1.2 g/s	3	
-Trigger spray	1.6 g/s	3	
Airborne fraction			See subsection 4.2.1
-Pneumatic spray	0.14	2	
-Trigger spray	0.008	2	
Density non-volatile	1.5 g/cm^3	3	See subsection 4.2.1
Aerosol diameter – median (C.V.)		3	See subsection 4.2.1
-Pneumatic spray	15.1 µm (1.2)		
-Trigger spray	7.7 µm (1.9)		
Inhalation cut-off diameter	15 µm	3	See subsection 4.2.1
Inhalation – exposure to vapour – instantaneous release			
Product amount -aerosol spray can -trigger spray	 60 g 80 g	 1 1	 See above See above
Dermal – direct product contact – constant rate			
Exposed area	900 cm^2	2	Surface of both hands (te Biesebeek et al., 2014)
Contact rate			See subsection 4.2.1
- aerosol spray can	100 mg/min	3	
- trigger spray	46 mg/min	3	
Release duration	120 sec	1	Estimate

12 Miscellaneous

12.1 Polyurethane foams

Polyurethane foams can be used for many purposes, including filling, insulation, sealing, attaching and assembling. These foams attach easily to many different kinds of surfaces.

The product is released from the nozzle as a viscous foam, rather than as a sprayed aerosol. The foam will expand to several times its original volume, hardens (the speed of hardening differs between insulation foams) and can then be treated (e.g., the foam can be sawed, cut, and painted).

Polyurethane foams in the consumer sector are normally applied from pressurised cans using straw applicators or dedicated foam guns. These typical products should be distinguished from special equipment for the application of big amounts of one-component foam (OCF) spray on walls, roofs, ceilings or in crawling spaces for insulation purposes. Professional contractors normally perform these tasks using personal protection, such as full respirators. They are not covered by the scenarios in this fact sheet

Most polyurethane foams in the consumer sector are OCF foams that react with moisture in order to harden. Two-component polyurethane foams in the consumer sector are also normally applied from pressurised cans containing both components.

Information about the formulation to produce a rigid PU foam has been described in the draft report EU RAR on Methylene diphenyl diisocyanate (MDI) (EU, 2003c). It includes monomeric or polymeric MDI, polyols, a catalyst, a silicone oil to control cell structure and stabilisation, a blowing agent and, optionally, a fire retardant. Variations of the formulations are available in order to reduce or cap free isocyanate endings, to allow for application in cold temperature or to give different expanding or elastic properties.

Low pressure two-component spray foam kits for sealing and insulation purposes consist of two tanks for the isocyanate and the polyol component, gun hoses, a dispensing spray gun and different types of nozzles. Consumer use of these products has raised concern in recent evaluations (Canada, 2017). The products are not covered by the scenarios in this fact sheet, because in Europe, they are normally applied by professionals. However, they may be accessible for consumers, too, as they are in Canada and in the USA.

It should also be noted that, in several countries, there is a polyurethane foam on the consumer market that allows for insulation of larger areas using pressurised cans in the typical consumer size and a typical foam gun with a special nozzle. This product is not covered by the scenarios in the present fact sheet, because it is still not considered a typical consumer use. Other uses of polyurethane foam that are not covered include uses in the construction of wells, car and caravan tuning and a big variety of hobby and modelling uses.

Use
There is a wide variety of uses for polyurethane foam in the consumer sector. A classical use that was described in the EU RAR for MDI is filling the joints between the frames of windows or doors and the walls for insulation purposes. (Please note that nowadays, additional sealing to the foam, e.g., with dedicated sealing tapes, is required for state-of-the-art settings of windows.) Another classical use for polyurethane foam is to fill, seal and insulate many kinds of holes and gaps in the house, e.g., roof and wall openings, hollow spaces behind roller shutter boxes, around pipes or in connection joints.

Polyurethane foam is also used as an adhesive for attaching construction materials, e.g., thermal insulation composite systems (TICS), or for bonding non-load-bearing interior walls.

In order to cover the variety of possible uses and the resulting exposure three default scenarios for polyurethane foam will be described consecutively:

- Filling joints and gaps in order to insulate an attic
- Filling small holes in one room
- Using foam as an adhesive to connect construction materials

Because the product is released as a foam, the spray model was not considered relevant for this application. Evaporation of volatile and semi-volatile components takes place from the nozzle of the spray and from the foam itself. To describe the inhalation exposure, the ConsExpo ***inhalation – exposure to vapour – instantaneous release*** model was selected as being the most suitable model.
Dermal exposure can occur during application, as foam spatters may fall on the skin during spraying. The ***dermal – direct product contact – instant application*** model is used to quantify the dermal exposure.

Scenario for polyurethane foam for filling gaps and joints
Insulation foams are often used to fill gaps and joints to overcome the problem of draught and to fixate, for example, a window or a door directly after installation. A standard DIY use concerning insulation foam is during the renovation of an attic (insulation, installation of new windows) to avoid heat loss and prevent draught. Therefore, this is set as the default scenario with the following specifications.

Frequency
Once the foam is applied, it lasts for a long period of time. Therefore, the frequency of use is assumed to be low and set at once per 5 years by estimate. The Q-factor for this default is considered to be 1 because it is based on personal judgement.

Exposure duration
It is assumed that a consumer will need plenty of time due to lack of experience and possible difficulties during the handling of the polyurethane foam. No after-use activity has to be considered, so the

exposure duration is set at 120 minutes. A Q-factor of 1 is assigned because the value is based on expert judgement.

Product amount – inhalation
Assuming two horizontal joints, each with a length of 6 m and four vertical joints (in the corners), each with a length of 4 m (total joint length of 28 m) have to be filled with polyurethane foam, it is expected that an entire spray can is used to insulate the attic. The product amount is 750 ml which equals 825 g when 1.10 g/cm^3 is the assumed product density (product information gathered in preparation for the previous DIY Products Fact Sheet). One spray can (750 ml concentrate) provides up to 37 l foam and can fill up to 30 m of joints (see Annex II; product data collection Table 119), which is considered sufficient to insulate the attic. The Q-factor is set to 1 because underpinning data for the product amount required to insulate an attic is limited.

Room volume, ventilation rate and room height
Taking into account the previously named specification, the attic has a surface area of 6 m x 6 m = 36 m^2. Considering a room height of 2.5 m (standard room height), and the shape of the roof (pitched roof) leads to a room volume of (36 m^2 x 2.5 m) / 2 = 45 m^3. Normally, the ventilation is supposed to be relatively high, but it is also possible that an attic is very stuffy and only equipped with small windows that are normally closed. Therefore, a ventilation of 0.5 per hour is assumed. The Q-factors for the room volume and the ventilation rate are considered to be 1 because they are based on assumptions and estimations.

Exposed area
It was assumed by Lansink ((1998) from EU RAR on MDI) that both hands and part of the forearms can be exposed, corresponding to an exposed area of 2200 cm^2 (te Biesebeek et al., 2014), due to bouncing spatters. The Q-factor is set to 2 because underpinning data for the skin surface dimension is quantitatively rich but further data regarding the affected area (both hands and forearms) is currently lacking (see also subsection 4.5).

Product amount – dermal
The amount which spatters on the skin is thought to be minimal. By estimation, the amount will be set at 0.5 g with a Q-factor of 1.

Table 65 Default values for polyurethane foam for filling gaps and joints

Default value		**Q-factor**	**Source**
General			
Frequency	0.2 per year	1	See above
Inhalation – exposure to vapour – instantaneous release			
Exposure duration	120 min	1	See above
Product amount	825 g	1	Estimate
Room volume	45 m^3	1	See above
Ventilation rate	0.5 per hour	1	Estimate
Dermal – direct product contact – instant application			
Exposed area	2200 cm^2	2	both hands and forearms (te Biesebeek et al., 2014)
Product amount	0.5 g	1	See above

Scenario for polyurethane foam for filling small holes
In practice, polyurethane foam is used on various occasions. Because of its properties (e.g., water resistant, editable after application, usable on most surfaces) there is a tendency to use it as filling material even for smaller tasks (Hochwarth, 2019). Therefore, a scenario for filling up 10 round shaped holes, each with a diameter of 3 cm and a depth of 5 cm in an attic will be described subsequently.

Frequency
Even if polyurethane foam is a long lasting product after application, it is assumed that this type of small reparation task is more frequent than the previously described scenario. A frequency of twice per year is assumed. The Q-factor is set to 1 because underpinning data is not available.

Exposure duration
The exposure duration for this task is assumed to be rather low. The task itself doesn’t require a certain skill level or precision. Furthermore, the product is applied via a pressurised spray can with an attached small pipe which saves time, for example in comparison to a filler product which is applied via a spatula. Also, the user is expected to leave the area after application and to return once the foam has hardened for any further treatment. It is assumed that the user will need 1 minute per hole to apply the product. Taking into account changes of positions, failures while spraying or problems with the handling of the product due to lack of experience, a total exposure duration of 20 minutes is set as a default. As there is no underpinning data available for this default, a Q-factor of 1 is assigned.

Product amount – inhalation
Assuming that the holes that have to be filled are approximately of a cylindrical shape and taking into account the above-named size specifications (diameter=3 cm; depth/height=5 cm), for all 10 holes a space of 353 cm^3 has to be filled with foam. This means that 0.35 l foam is needed for this task. According to product information, one spray can (750 ml concentrate) provides up to 37 l foam (see Annex II; product data collection Table 119). Therefore, approximately 7.5 ml concentrate would be sufficient to fill the holes. Taking into account a density of 1.1 g/ml (product information gathered in preparation for the previous DIY products Fact Sheet), a product amount of 8.25 g will be set as a default. The Q-factor is set to 1 because underpinning data is currently not available.

Room volume, ventilation rate and room height
Taking into account the specification named above in the scenario for filling gaps and joints, the attic has a surface area of 6 m x 6 m = 36 m^2. Considering a room height of 2.5 m (standard room height), and the shape of the roof (pitched roof) leads to a room volume of (36 m^2 x 2.5 m) / 2 = 45 m^3. The ventilation is normally assumed to be relatively high, but it is also possible that an attic is very stuffy and only equipped with small windows that are normally closed. Therefore, a ventilation of 0.5 per hour is assumed. The Q-factors for the room volume and the ventilation rate are considered to be 1 because they are based on assumptions and estimations.

Exposed area
In comparison to the previously described polyurethane foam scenario for filling gaps and joints, the filling of holes is a rather small and coarse task. However, bouncing spatters and spills may also occur, be it on a smaller scale. Considering this, the exposed dermal area is assumed to be 225 cm^2 which is equivalent to 50% of one hand (te Biesebeek et al., 2014). A Q-factor of 2 is assigned to this value because the underpinning data for the surface of both hands is quantitatively rich but the estimate in which extent the skin surface is exposed is based on expert judgement (see also subsection 4.5).

Product amount- dermal
Considering the small total product amount used and the way of application (pressure gun with an extended nozzle that can be directly stuck into the hole), the amount that splatters on the skin is thought to be minimal. By estimation, the amount will be set at 0.01 g with a Q-factor of 1.

Table 66 Default values for using polyurethane foam to fill small holes

Default value		**Q-factor**	**Source**
General			
Frequency	2 per year	1	See above
Inhalation – exposure to vapour – instantaneous release			
Exposure duration	20 min	1	See above
Product amount	8.25 g	1	Estimate
Room volume	45 m^3	1	See above
Ventilation rate	0.5 per hour	1	Estimate
Dermal – direct product contact – instant application			
Exposed area	225 cm^2	2	50% of one hand (te Biesebeek et al., 2014)
Product amount	0.01 g	1	See above

Scenario for using polyurethane foam as an adhesive
A further purpose of polyurethane foam is the use as an adhesive. In this context, it is used for rather big DIY tasks, such as like building a wall (substitution for mortar) and attaching insulation panels or dry construction boards. In the past, these kinds of tasks were mostly done by professionals but since then, they became more widely present in the DIY sector because of the evolved and easy handling of polyurethane foam products. The attachment of insulation panels on a surface of 20 m^2 will be explained subsequently as a default scenario.
During this task, the insulation panels will be prepared by applying polyurethane foam on the edges of one side of the panels. Additionally, it is advised to evenly apply as much product as required to cover at least 40% of the panels' surface. Subsequently, the panel is pressed against the surface for a moment until it stays in place. After this, the panel is still movable for up to 15 minutes. After the foam has hardened the surplus product has to be cut off with a knife.

Frequency
It is not assumed that such a big and elaborate task will be conducted very frequently. Additionally, insulation materials have a rather high

durability. However, reparation tasks may be necessary from time to time, and there is a tendency to renovate as a precaution in order to maintain a high efficiency of the insulation. Therefore, a frequency of once every 5 years is set as a default. A Q-factor of 1 is assigned because underpinning data is currently lacking.

Exposure duration
Because this task is rather big and has to be conducted with a high level of diligence in order to place the panels straight and without unintended gaps, it is assumed that a time period of 360 minutes will be sufficient to treat the whole surface. The Q-factor is 1 because the default is based on expert judgement only.

Product amount –inhalation
According to product information, 1 l foam concentrate provides enough foam to glue an area of 21.5 m^2 (see Annex II; product data collection Table 120). Taking into account that 20 m^2 of panels have to be glued to a surface, it is expected that 1 l foam concentrate is sufficient for this task. Bearing in mind a density of 1.1 g/ml (product information gathered in preparation for the previous DIY products Fact Sheet), a total product amount of 1100 g is set as a default. The Q-factor is set to 1 because underpinning data is limited.

Room volume and ventilation rate
It is assumed that this task is conducted in an unspecified room leading to a room volume of 20 m^3 and a ventilation rate of 0.6 per hour according to the General Fact Sheet (te Biesebeek et al., 2014).

Exposed area
The product is applied with a pipe-like nozzle which offers the user the opportunity to work very precisely and to keep a certain distance. However, because the product is sprayed out of the container with a certain pressure, spatters and foam bouncing back from the surface are possible in a potentially high range. Therefore, and to follow a conservative approach, the exposed dermal area is assumed to be 900 cm^2, which is the area of both hands (te Biesebeek et al., 2014). A Q-factor of 2 is assigned to this value because the underpinning data for the surface of both hands is quantitatively rich but the estimate in which extent the skin surface is exposed is based on expert judgement (see also subsection 4.5).

Product amount – dermal
As the product can be applied very precisely using the provided elongated nozzle, the dermal exposure due to spatters is not assumed to be high. The default is set to 0.25 g. A Q-factor of 1 is assigned because supportive data is not available at the moment.

Table 67 Default values for polyurethane foam used as an adhesive

Default value		**Q-factor**	**Source**
General			
Frequency	0.2 per year	1	See above
Inhalation – exposure to vapour – instantaneous release			
Exposure duration	360 min	1	See above
Product amount	1100 g	1	Estimate

Default value		Q-factor	Source
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Dermal – direct product contact – instant application			
Exposed area	900 cm^2	2	Both hands (te Biesebeek et al., 2014)
Product amount	0.25g	1	See above

12.2 Joint colour

Use

Joint colour is used to colour the joints between ceramic tiles on floors and walls. Joints can take up filth, fungus, and/or moisture that will have an effect on the colour of the joint. Joint colour works as follows: joints should be cleaned properly and dried before the product is applied. Joint colour can be applied with a small brush; afterwards the product is allowed to soak into the joints. After the joints have dried completely, the tiles and joints are wetted with water and allowed to soak for a short period of time. The walls and/or floors are then cleaned again with a sponge to finish the task (according to product information).

Scenario for joint colour

The task of cleaning and colouring joints can be performed wherever walls or floors are covered with tiles. Most likely, joints used in bathrooms and kitchen are exposed to moisture, fungus and/or filth. The colouring of joints in a bathroom is considered for the present scenario.
Inhalation exposure can be caused by dispersion-based paint. Whether this kind of paint contains volatile components is unknown; for this reason, a default scenario for inhalation exposure was set up, using the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: increasing*** model. Dermal exposure, arising through contact with the product in the sponge or through spatters from the brush during application of the joint colour, is assessed using the ***dermal – direct product contact: instant application*** model.

Frequency

Tasks such as these are not likely to occur very frequently. By estimate, the default for the frequency is set to once per year with a Q-factor of 1 that reflects personal judgement.

Exposure duration

The application with the brush is precise, but time-consuming. It is estimated that it will take 45 minutes to treat the grid of joints. Afterwards, the user will leave the bathroom because the joint colour has to soak in for one hour. Subsequently, when the joint colour is properly absorbed, the surface (tiles included) is cleaned and washed with a sponge, thus removing surplus joint colour. In total, the application is assumed to take 2 hours. The exposure duration is the same, because a subject will not stay in the bathroom and is therefore set to 120 minutes. Because underpinning data is not available a Q-factor of 1 is considered.

Product amount – inhalation
According to product information 34 ml joint colour is sufficient to treat a surface of 1 m^2 (see Annex II; product data collection Table 121). Therefore, the whole area (4 m^2 = one shower cabinet; see below) that has to be handled requires a total amount of 136 ml of the product. Taking into account a density of 1.7 g/cm^3 (see Annex II; product data collection Table 121) the product amount is set to 230 g, with a Q-factor of 3 because underpinning data is limited.

Room volume and ventilation rate
The defaults for a bathroom are set according to information provided in the General Fact Sheet: a room volume of 10 m^3 with a ventilation rate of 2 per hour (te Biesebeek et al., 2014).

Release area
The surface that has to be treated is assumed to be 4 m^2 (shower cabinet, walls) in total. Although, in principle, only the joint will be treated, the joint grid is regarded as being equal to the treated surface (i.e., surface area of tiles is considered instead of the joints). Since the default value is not underpinned with data, a Q-factor of 1 is assigned.

Application duration
As described above in the paragraph discussing the exposure duration, the application duration is set at 45 minutes. A Q-factor of 1 is assigned because the value is based on expert judgement.

Exposed area
Dermal exposure can occur during application of the joint colour and cleaning of the tiles. Because a sponge is used, the dermal exposure can be substantial. The surface area is set at both forearms and hands (= 2200 cm^2), because water can run down one's arms during the treatment (te Biesebeek et al., 2014). The Q-factor is set to 2 because underpinning data for the surface size of hands and forearms is sufficient but the specification which body parts are affected is based on expert judgement (see also subsection 4.5).

Product amount –dermal
The product amount is estimated to be 0.5% of the total product amount and mounts up to 1.15 g. A Q-factor of 1 is considered because underpinning data is currently not available.

Table 68 Default values for joint colour

Default value		**Q-factor**	**Source**
General			
Frequency	1 per year	1	Estimate
Inhalation – exposure to vapour – evaporation – release area mode: increasing			
Exposure duration	120 min	1	Estimate, see above
Total product amount	230 g	3	Product information

Default value		Q-factor	Source
Room volume	10 m^3	4	Bathroom (te Biesebeek et al., 2014)
Ventilation rate	2 per hour	3	Bathroom (te Biesebeek et al., 2014)
Temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	4 m^2	1	Estimate
Application duration	45 min	1	Estimate, see above
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	2200 cm^2	2	Both hands and forearms (te Biesebeek et al., 2014)
Product amount	1.15 g	1	Estimate

12.3 Emergency leak sealant

Use

Emergency leak sealants are powdery special cements used to instantly seal off leaks in, for example, concrete walls. It can be applied on a wide variety of mineral surfaces. Additionally, it is used on boats to stop water penetrating until the ship can reach land.

These sealants are applied using bare hands and without the help of tools. The powdery product is pressed on the leak and rubbed in for up to ten seconds. The treated area is then moistened with clear water. Both steps are repeated until the flow of water is stopped. According to product information up to 6 intervals may be required to properly seal off a leak (see Annex II; product data collection Table 122). After the sealed surface has hardened for 12 to 24 hours, it can be further treated (e.g., plastered) if needed.

Scenario for emergency leak sealant

Sealing off a leaking gap in a concrete wall is chosen as the default scenario for this product. The sealant is a ready to use product that is applied in powder form directly onto the leak.

Since there is no model available in ConsExpo to calculate the inhalation exposure to the powder itself due to a lack of available particle size distribution, airborne fraction and mass generation data, the ConsExpo ***inhalation – exposure to spray – instantaneous release*** model and the considerations made in subsection 4.1.3 are used to assess the exposure for this scenario.

Intensive dermal exposure is expected considering the application without any help of tools. It is assessed using the ConsExpo ***dermal – direct product contact – constant rate*** model.

Frequency
Usage of such products is not expected to occur very frequently. They are not designed to function as permanent solutions but to provide a quick possibility to seal holes in emergency situations. A frequency of once per year is estimated as a default with a Q-factor of 1 because underpinning data is currently not available.

Exposure duration
As the user has to conduct 6 repetitions (conservative assumption) of applying the product to the leak area, application duration is estimated to be 15 minutes. A duration of 2.5 minutes per repetition is considered as it includes the application of the powder to the wall, rubbing it in for a short period and subsequently moistening the treated surface with clear water. A more extensive clean-up phase (high product amount used; potentially leaked water has to be cleaned up) following completion of the treatment has to be considered here. Taking into account that the user will stay in the immediate surroundings for some time after he or she used the product, the exposure duration is estimated to be 1 hour in total. Underpinning data is currently not available. Therefore, the Q-factor is set to 1.

Released mass
According to product information, the consumption of the product can amount up to 3 kg per leak (see Annex II; product data collection Table 122). As a conservative assumption, this product amount is taken into account. Following the considerations provided in subsection 4.1.3, a released mass of 8.3 µg per 200 g powder is expected. Therefore, a total of 124.5 µg is released into the room air. The Q-factor for this value is 1.

Exposed area
The way of application, as described above, indicates that the exposed area and the related dermal exposure can be significant. Safety data sheets give the advice to wear protective gloves during application, which may be ignored by the user during an emergency. Therefore, it is estimated that both hands will be exposed, which equals 900 cm^2 according to the General Fact Sheet (te Biesebeek et al., 2014). The Q-factor is set to 2 because underpinning data regarding the size of the hands is quantitatively rich but the definition of which body parts are affected is based on expert judgement (see also subsection 4.5).

Release duration
The release duration is defined here as the time span from the first contact with the product until the user has cleaned the exposed body parts after the leak was sealed. To achieve a (temporarily) satisfying result, up to 6 repetitions of sealant application may be required as described above. Therefore, a release duration of 15 minutes (2.5 minutes per repetition) is estimated to be sufficient. Underpinning data for this default is currently lacking which leads to a Q-factor of 1.

Table 69 Default values for application of emergency leak sealant

Default value		**Q-factor**	**Source**
General			
Frequency	1 per year	1	Estimate
Inhalation – exposure to spray – instantaneous release			
Exposure duration	60 min	1	Estimate
Released mass	124.5 µg	1	See above, see subsection 4.1.3
Room volume	1 m^3	1	See subsection 4.1.3
Ventilation rate	0.6	1	Unspecified room, (te Biesebeek et al., 2014)
Dermal – direct product contact – constant rate			
Exposed area	900 cm^2	2	Both hands (te Biesebeek et al., 2014)
Contact rate	5 mg/min	1	See subsection 4.1.3
Release duration	15 min	1	Estimate

12.4 Adhesive tape

Use/Composition

Adhesive tapes are used on several different occasions in the DIY sector. Depending on its characteristics, tape can be used to:

- Attach (heavy) objects to walls or other surfaces,
- Repair/bond broken parts (e.g., leaking gutters),
- Prepare renovation measures (e.g., paint work)
- Lay a carpet temporarily or permanently

Regarding the attachment of objects to walls, using double-sided adhesive tapes has become an attractive alternative to drilling in recent years. It is comparatively easier, cleaner, quicker, cheaper and not as irreversible as using an expensive drilling machine. Furthermore, if the user wants to redecorate, he/she wouldn’t have to fill holes. Instead, he/she just removes the tape from the wall and relocates the formerly attached object at will.

One-sided adhesive tape consists of 4 layers:

1. Separation layer (Liner): The top layer of the tape that has to separate the adhesive layers from each other when the tape is coiled. Liner usually consist of silicone paper, PE coated paper, PE foil or PET foil, depending on the intended use of the tape.
2. Carrier layer: Carries the adhesive substance and consists, for example, of synthetic material or paper.
3. Primer layer: Increases the surface tension of the carrier layer which leads to higher adhesion between adhesive and carrier.
4. Adhesive layer: The adhesive used in tapes is normally pressure-sensitive. The main advantage here is an instant and persistent adhesion already triggered by minimal pressure. Other adhesives need time to harden after they are applied in order to develop an adhesion effect. Pressure-sensitive adhesives are often natural rubber- or acrylate-based.

Two-sided adhesive tapes have two additional layers usually in the following order: liner (silicone-coated), adhesive layer (closed side), primer, carrier, primer and adhesive layer (open side). According to product information, these kinds of adhesive tapes can provide a holding strength of 10 kg/m up to 100 kg/m tape (see Annex II, Table 123) but additionally, it is advised that for optimal results, a maximum weight of 6 kg per application/object shouldn't be exceeded. Furthermore, the object attached to a surface shouldn't be thicker than 10 mm.

The application of two-sided adhesive tape is rather simple. First, the tape is affixed to the surface or the object that has to be attached. Subsequently, the top layer is removed to expose the outer adhesive layer of the tape. The object is attached to the surface and pressed on for a few seconds. Inhalation exposure is expected from evaporation arising from the adhesive layer during the first step, from the moment the tape is detached from the roll until it is applied to the surface because the adhesive layer is 'open' in the meantime. Furthermore, the user can inhale VOC substances from the moment the top layer is removed until the object is put in place and the adhesive areas are permanently closed. Dermal exposure is expected if the user accidently touches the adhesive layers at any time during the task.

The use of two-sided adhesive tape is assumed to result in a higher dermal and inhalation exposure, compared to using one-sided tape because in the case of two sided tape, the adhesive layer is bigger and, as a result, open for longer. Therefore, the default scenario will reflect the usage of two-sided tape assuming that it also covers off the use of one sided tape.

Scenario for adhesive tape
The scenario described in this section is the attachment of a mirror to a concrete wall using two-sided adhesive tape. The dimensions of the mirror are 175 cm (height), 30 cm (width), 0.3 cm (depth) and it weighs about 3.5 kg. The task is rather simple but will be conducted precisely so that the mirror is attached straight, and the result is acceptable.

Inhalation exposure is estimated using the ConsExpo ***inhalation – exposure to vapour – evaporation – release area mode: constant*** model. For the assessment of the dermal exposure the ***dermal – direct product contact – instant application*** model is used.

Frequency
Due to the multifunctional possible uses of tape, the frequency is assumed to be once per month. The results presented in Annex II A.3 support this value. However, the conducted consumer survey did not differ between DIY tapes and adhesive tapes that are used for hobby tasks. Because of this limitation, a Q-factor of 1 is considered despite the underpinning data.

Exposure duration
It is assumed that 10 minutes are sufficient to place the tape on the wall and put the mirror in place. This will be used as the default value. A Q-factor of 1 is assigned because the default depends on expert judgement.

Product amount – inhalation
Product amount is defined in this case as the amount of glue that forms the adhesive layers on both sides of the tape. The thickness of these layers is estimated to be 0.3 mm on each side, considering information provided by Adchem (www.adchem.com). It is assumed that a product amount of 0.1 g/cm^2 and 0.3 mm layer (adhesive) thickness is distributed across the two adhesive sides of the tape. Since both adhesive layers are not open for evaporation processes at the same time (i.e., one side is open until it is attached to a surface, while the other one is open afterwards once the top liner is removed), the product amount is only derived for 380 cm^2 (surface of one side of the tape; 2 m length x 19 mm width (see below)) but the entire exposure duration (10 minutes, see above) is considered. The product amount is therefore derived to be 12 g (0.1 g/(cm^2 mm) x 0.3 mm x 380 cm^2=11.4 g ~ 12 g) which is used as a default. Since this value is based on expert judgement and assumptions, the Q-factor is set to 1.

Room volume and ventilation rate
Because tape is used on different occasions and for several tasks, the room is not further specified for this scenario, which leads to a room volume of 20 m^3 and a ventilation rate of 0.6 per hour according to the General Fact Sheet (te Biesebeek et al., 2014).

Release area
As mentioned previously, it is advised by the available product information not to tape objects that are heavier than 6 kg to surfaces, even though the holding strength is much higher. One meter of tape would be sufficient for the described task (mirror weight: 3.5 kg). Nevertheless, it is assumed that a consumer would at least use two pieces of tape (1 m each) to prevent an early detachment of the mirror keeping in mind that the tape is only 19 mm wide (50 mm tape for carpet laying). A release area of 380 cm^2 (200 cm x 19 mm) is estimated according to the previous information. A Q-factor of 1 is assigned for this default because it is mainly based on assumptions.

Emission duration
The emission duration is assumed to be as long as the exposure duration (10 minutes) because throughout the task, adhesive layers are open from which evaporation can occur. Furthermore, the task duration is very short. A source depletion during this short time period is unlikely. The Q-factor is considered to be 1 because the value is based on expert judgement and assumptions. Post-application emissions are assumed to be negligible because the potentially evaporating surfaces are covered.

Exposed area
Dermal exposure may occur through accidental contact with the adhesive surface during unrolling and ripping the tape from the roll, when the tape is applied to the surface and when the top layer (liner) is removed. Furthermore, residues that remain on the top liner following removal can expose the skin while the user holds it in one hand. It is assumed that the fingertips of both hands will be exposed (=150 cm^2, see subsection 4.1.1). A Q-factor of 1 is assigned because the underpinning data for the surface size of a finger is quantitatively rich

but the derivation of the size of one fingertip is compromised by assumptions (see subsection 4.1.1).

Product amount – dermal
The product amount contacting the skin during the task is not estimated to be very high, due to the low total product amount available on the tape and the fact that it is distributed across the whole surface. A default of 0.025 g will be used. The Q-factor is set to 1 because underpinning data is not available.

Table 70 Default values for adhesive tape

Default value		**Q-factor**	**Source**
General			
Frequency	1 per month	1	Estimate
Inhalation – exposure to vapour – evaporation – release area mode: constant			
Exposure duration	10 min	1	Estimate
Product amount	12 g	1	See above
Room volume	20 m^3	4	(te Biesebeek et al., 2014)
Ventilation rate	0.6 per hour	3	(te Biesebeek et al., 2014)
Application temperature	20 °C	4	Room temperature
Mass transfer coefficient	10 m/h	2	See subsection 4.1.1
Release area	380 cm^2	1	See above
Emission duration	10 min	1	Estimate
Molecular weight matrix	3000 g/mol	3	See subsection 4.1.1
Dermal – direct product contact – instant application			
Exposed area	150 cm^2	1	10 phalanges (te Biesebeek et al., 2014)
Product amount	0.025 g	1	Estimate

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Annex I Changes to default parameter values in updated 2022 version compared to the 2007 version

All Do-It-Yourself Products Fact Sheet data for exposure scenarios, selected ConsExpo models and default parameter values reported in the current Fact Sheet and the 2007 version are presented in one table below (Table 68). Alterations compared to 2007 are marked in yellow.

Table 71 All Do-It-Yourself Products Fact Sheet data for exposure scenarios, selected ConsExpo models and default parameter values published in 2007 and 2022

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022			Do-It-Yourself Products Fact Sheet 2007		
			Default Value	Unit	Q-	Default Value	Unit	Q-
Glues from tubes (6.2 ~ 3.1)	General	Frequency	36	per year	2	1	per week	2
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	240	min	1	240	min	2
		Product amount	9	g	2	9	g	2
		Room volume	20	m³	4	20	m³	3
		Ventilation rate	0.6	per hour	3	0.6	per hour	3
		Release area	200	cm²	1	200	cm²	2
		Application duration	36	min	2	10	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal – direct product contact – instant application model	Exposed area	15	cm²	1	2	cm²	2
		Product amount	0.08	g	1	0.08	g	1
Bottled glue – universal/wood glue (6.3 ~ 3.2)	General	Frequency	36	per year	2	1	per week	2
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	240	min	1	240	min	2
		Product amount	10	g	2	10	g	1
		Room volume	20	m³	4	20	m³	3
		Ventilation rate	0.6	per hour	3	0.6	per hour	3
		Release area	500	cm²	1	400	cm²	2

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-factor	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-factor
		Application duration	36	min	1	20	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application model	Exposed area	15	cm^2	1	2	cm^2	2
		Product amount	0.08	g	1	0.08	g	1
Bottled glue – construction glue (6.3 ~ 3.2)	General	Frequency	2	per year	1	2	per year	2
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	240	min	1	240	min	2
		Product amount	250	g	2	250	g	2
		Room volume	20	m^3	4	20	m^3	3
		Ventilation rate	0.6	per hour	3	0.6	per hour	3
		Release area	1	m^2	2	1	m^2	2
		Application duration	90	min	1	30	min	1
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application model	Exposed area	225	cm^2	2	215	cm^2	3
		Product amount	0.25	g	1	0.25	g	2
Super glue (6.4 ~ 3.3)	General	Frequency	9	per year	2	1	per month	1
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	240	min	1	240	min	2
		Product amount	0.5	g	2	0.5	g	2
		Room volume	20	m^3	4	20	m^3	3
		Ventilation rate	0.6	per hour	3	0.6	per hour	3
		Release area	2	cm^2	2	2	cm^2	3

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022			Do-It-Yourself Products Fact Sheet 2007		
			Default Value	Unit	Q-	Default Value	Unit	Q-
		Emission duration	5	min	1	5	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application model	Exposed area	15	cm^2	1	2	cm^2	2
		Product amount	25	mg	1	25	mg	1
Mixing and loading – liquid two-component glue (6.5.1~ 3.4)	General	Frequency	7	per year	2	3	per year	1
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	5	min	1	5	min	2
		Product amount	20	g	2	20	g	2
		Room volume	1	m^3	1	1	m^3	1
		Ventilation rate	0.6	per hour	1	0.6	per hour	1
		Release area	60	cm^2	2	20	cm^2	2
		Emission duration	5	min	1	5	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application model	Exposed area	15	cm^2	1	2	cm^2	3
		Product amount	50	mg	1	50	mg	2
Application – liquid two-component glue (6.5.1~ 3.4)	General	Frequency	7	per year	2	3	per year	1
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	240	min	1	240	min	2
		Product amount	20	g	2	20	g	1
		Room volume	20	m^3	4	20	m^3	3
		Ventilation rate	0.6	per hour	3	0.6	per hour	3
		Release area	500	cm^2	1	500	cm^2	2

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
		Application duration	30	min	1	30	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application model	Exposed area	45	cm^2	2	43	cm^2	2
		Product amount	0.2	g	1	0.1	g	1
Adhesive putty (6.5.2)	General	Frequency	7	per year	2	Not included in FS 2007		
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	240	min	1			
		Product amount	49	g	1			
		Room volume	20	m^3	4			
		Ventilation rate	0.6-12	per hour	3			
		Release area	12.5	cm^2	1			
		Emission duration	240	min	1			
		Temperature	20	°C	4			
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
	Dermal –direct product contact – instant application model	Exposed area	450	cm^2	2			
		Product amount	9	g	1			
Mixing and loading – two-component parquet glue (6.6 ~ 3.5.1)	General	Frequency	3	per day	2	3	per day	1
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	10	min	1	10	min	1
		Product amount	8.5	kg	3	7	kg	1
		Room volume	1	m^3	1	1	m^3	1
		Ventilation rate	0.6	per hour	1	0.6	per hour	1

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-factor	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-factor
		Release area	1100	cm^2	2	320	cm^2	1
		Emission duration	10	min	1	10	min	1
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application model	Exposed area	225	cm^2	1	215	cm^2	2
		Product amount	0.5	g	1	200	mg	1
Application – two-component parquet glue – gluing to surface (6.6 ~ 3.5.1)	General	Frequency	0.5	per year	2	1/8	per year	2
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	480	min	2	480	min	2
		Product amount	25.3	kg	3	22	kg	2
		Room volume	58	m^3	4	58	m^3	4
		Ventilation rate	0.5	per hour	3	0.5	per hour	3
		Release area	1	m^2	1	1	m^2	1
		Emission duration	480	min	1	480	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – constant rate model	Exposed area	450	cm^2	2	430	cm^2	3
		Contact rate	30	mg/min	1	30	mg/min	1
		Release duration	480	min	2	480	min	2
Application – two-component parquet glue – floating parquet (6.6 ~ 3.5.2)	General	Frequency	0.5	per year	2	0.25	per year	1
	Inhalation – exposure to vapour – evaporation –	Exposure duration	240	min	1	240	min	2
		Product amount	825	g	3	750	g	2
		Room volume	58	m^3	4	58	m^3	4

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022			Do-It-Yourself Products Fact Sheet 2007		
			Default Value	Unit	Q-	Default Value	Unit	Q-
	release area mode: constant	Ventilation rate	0.5	per hour	3	0.5	per hour	3
		Release area	1	m^2	1	1	m^2	1
		Emission duration	240	min	1	240	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application model	Exposed area	112.5	cm^2	2	110	cm^2	3
		Product amount	0.5	g	1	0.5	g	2
Carpet glue (6.7 ~ 3.6)	General	Frequency	1	per year	2	0.25	per year	3
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	90	min	1	75	min	2
		Product amount	14.3	kg	3	9	kg	2
		Room volume	58	m^3	4	58	m^3	4
		Ventilation rate	0.5	per hour	3	0.5	per hour	3
		Release area	4	m^2	1	4	m^2	1
		Emission duration	90	min	1	75	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – constant rate model	Exposed area	112.5	cm^2	2	110	cm^2	3
		Contact rate	30	mg/min	1	30	mg/min	1
		Release duration	90	min	1	75	min	2
Mixing and loading – tile glue (6.8 ~ 3.7)	General	Frequency	5	per day	2	5	per day	1
	Inhalation – exposure to	Exposure duration	15	min	1	Not included in FS 2007		

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
	spray – instantaneous release	Released mass	207.5	µg	1			
		Ventilation rate	0.6	per hour	1			
		Room volume	1	m³	1			
	Dermal –direct product contact – constant rate model	Surface area	450	cm²	2	430	cm²	2
		Contact rate	5	mg/min	1	0.33	mg/min	1
		Release duration	15	min	1	1.33	min	2
Application – tile glue (6.8 ~ 3.7)	General	Frequency	0.5	per year	2	0.5	per year	2
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	360	min	1	360	min	2
		Amount of solution used	32.5	kg	3	15	kg	2
		Dilution (times)	1.3	times	3	Not included in FS 2007		
		Room volume	10	m³	4	10	m³	3
		Ventilation rate	2	per hour	3	2	per hour	3
		Release area	1	m²	1	1	m²	1
		Emission duration	360	min	1	360	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – constant rate model	Exposed area	450	cm²	2	430	cm²	2
		Contact rate	30	mg/min	1	30	mg/min	1
		Release duration	360	min	1	360	min	2
Mixing and loading – wallpaper glue (6.9 ~ 3.8)	General	Frequency	4	per year	2	0.5	per year	1
	Inhalation – exposure to spray – instantaneous release	Exposure duration	19.5	min	2	Not included in FS 2007		
		Released mass	11.2	µg	1			
		Ventilation rate	0.6	per hour	1			
		Room volume	1	m³	1			

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022			Do-It-Yourself Products Fact Sheet 2007		
			Default Value	Unit	Q-	Default Value	Unit	Q-
	Dermal –direct product contact – constant rate model	Surface area	450	cm^2	2	430	cm^2	2
		Contact rate	5	mg/min	1	0.033	mg/min	1
		Release duration	19.5	min	2	1.33	min	2
Application – wallpaper glue (6.9 ~ 3.8)	General	Frequency	4	per year	2	0.5	per year	1
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	500	min	2	Not included in FS 2007		
		Amount of solution used	16.5	kg	3	7.5	kg	2
		Dilution (times)	61	times	3	Not included in FS 2007		
		Room volume	58	m^3	4			
		Ventilation rate	0.5	per hour	3			
		Release area	1	m^2	1			
		Emission duration	500	min	2			
		Temperature	20	°C	4			
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
	Dermal –direct product contact – constant rate model	Exposed area	900	cm^2	2	860	cm^2	2
		Contact rate	30	mg/min	1	30	mg/min	1
		Release duration	500	min	1	240	min	1
Hot-melt adhesive (6.10 ~ 3.9)	General	Frequency	6	per year	2	1	per month	1
	Inhalation – exposure to vapour – instantaneous release	Exposure duration	25	min	1	25	min	2
		Product amount	60	g	1	65	g	3
		Room volume	20	m^3	4	20	m^3	3
		Ventilation rate	0.6	per hour	3	0.6	per hour	3
	Dermal –direct product contact – instant application model	Exposed area	45	cm^2	2	43	cm^2	3
		Product amount	0.1	g	2	0.1	g	2

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Do-It-Yourself Products Fact Sheet 2022 Unit	Do-It-Yourself Products Fact Sheet 2022 Q-	Do-It-Yourself Products Fact Sheet 2007 Default Value	Do-It-Yourself Products Fact Sheet 2007 Unit	Do-It-Yourself Products Fact Sheet 2007 Q-
Glue spray (6.11 ~ 3.10)	General	Frequency	6	per year	2	1	per month	1
	Inhalation – exposure to spray – spraying model	Spray duration	315	sec	2	170	sec	2
		Exposure duration	240	min	1	240	min	2
		Room volume	20	m^3	4	20	m^3	3
		Room height	2.5	m	4	2.5	m	4
		Ventilation rate	0.6	per hour	3	0.6	per hour	3
		Mass generation rate	1.2	g/sec	3	1.5	g/sec	3
		Airborne fraction	0.14	g/g	2	1	g/g	2
		Density non-volatile	1.5	g/cm^3	3	1.3	g/cm^3	3
		Aerosol diameter – median (C.V.)	15.1 (1.2)	µm	3	40 (0.4)	µm	3
		Inhalation cut-off diameter	15	µm	3	15	µm	3
	Inhalation – exposure to vapour – instantaneous release	Product amount	375	g	3	Not included in FS 2007		
	Dermal –direct product contact – constant rate model	Exposed area	900	cm^2	2	430	cm^2	2
		Contact rate	100	mg/min	1	100	mg/min	1
		Release duration	315	sec	2	170	sec	2
Joint sealant (7.1 ~ 4.1)	General	Frequency	3	per year	1	3	per year	1
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	45	min	1	45	min	2
		Product amount	350	g	3	75	g	2
		Room volume	10	m^3	4	10	m^3	3
		Ventilation rate	2	per hour	3	2	per hour	3
		Release area	250	cm^2	1	250	cm^2	2
		Application duration	30	min	1	30	min	2
		Temperature	20	°C	4	20	°C	4

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – constant rate model	Exposed area	30	cm^2	1	2	cm^2	3
		Contact rate	50	mg/min	1	50	mg/min	2
		Release duration	30	min	1	30	min	2
Assembly sealant (7.2 ~ 4.2)	General	Frequency	1	per year	1	1	per year	1
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	240	min	1	240	min	2
		Product amount	390	g	1	390	g	1
		Room volume	20	m^3	4	20	m^3	3
		Ventilation rate	0.6	per hour	3	0.6	per hour	3
		Release area	1.5	m^2	1	1.5	m^2	1
		Application duration	30	min	1	30	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application model	Exposed area	45	cm^2	2	43	cm^2	3
		Product amount	0.5	g	1	0.5	g	2
Mixing and loading – general filler from powder (8.1 ~ 5.1)	General	Frequency	6	per year	2	2	per year	1
	Inhalation – exposure to spray – instantaneous release	Exposure duration	3	min	2	Not included in FS 2007		
		Released mass	83	µg	1			
		Ventilation rate	0.6	per hour	1			
		Room volume	1	m^3	1			
	Dermal –direct product contact – constant rate model	Exposed area	450	cm^2	2	430	cm^2	2
		Contact rate	5	mg/min	1	0.033	mg/min	1
		Release duration	3	min	2	1.33	min	2

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
Application – general filler from powder (8.1 ~ 5.1)	General	Frequency	6	per year	2	2	per year	1
	Dermal –direct product contact – instant application model	Exposed area	450	cm²	2	430	cm²	2
		Product amount	0.25	g	1	0.25	g	1
Mixing and loading – large hole filler (8.2 ~ 5.2)	General	Frequency	3	per year	1	1	per year	1
	Inhalation – exposure to spray – instantaneous release	Exposure duration	3	min	2	Not included in FS 2007		
		Released mass	10.4	µg	1			
		Ventilation rate	0.6	per hour	1			
		Room volume	1	m³	1			
	Dermal –direct product contact – constant rate model	Exposed area	450	cm²	2	430	cm²	2
		Contact rate	5	mg/min	1	0.033	mg/min	2
		Release duration	3	min	2	1.33	min	2
Application – Large hole filler (8.2 ~ 5.2)	General	Frequency	3	per year	1	1	per year	1
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	240	min	2	Not included in FS 2007		
		Amount of solution used	375	g	3			
		Dilution (times)	1.5	times	2			
		Room volume	20	m³	4			
		Ventilation rate	0.6	per hour	3			
		Release area	25	cm²	1			
		Application duration	30	min	2			
		Temperature	20	°C	4			
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
	Dermal –direct product contact – instant	Exposed area	450	cm²	2	430	cm²	3
		Product amount	0.4	g	1	0.5	g	2

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-factor	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-factor
	application model							
Filler/putty from tube (8.3 ~ 5.3)	General	Frequency	6	per year	2	3	per year	1
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	240	min	1	240	min	2
		Product amount	140	g	3	40	g	1
		Room volume	20	m³	4	20	m³	3
		Ventilation rate	0.6	per hour	3	0.6	per hour	3
		Release area	40	cm²	1	200	cm²	1
		Application duration	30	min	2	20	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application model	Exposed area	22.5	cm²	2	22	cm²	3
		Product amount	0.05	g	1	0.05	g	2
Mixing and loading – two-component filler (8.4 ~ 5.4)	General	Frequency	6	per year	2	2	per year	1
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	5	min	1	5	min	1
		Product amount	200	g	1	200	g	1
		Room volume	1	m³	1	1	m³	1
		Ventilation rate	0.6	per hour	1	0.6	per hour	1
		Release area	100	cm²	1	100	cm²	1
		Emission duration	5	min	1	5	min	1
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant	Exposed area	30	cm²	1	2	cm²	3
		Product amount	0.02	g	1	0.02	g	1

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
	application model							
Application – two-component filler (8.4 ~ 5.4)	General	Frequency	6	per year	2	2	per year	1
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	240	min	1	240	min	2
		Product amount	200	g	1	200	g	1
		Room volume	20	m^3	4	20	m^3	3
		Ventilation rate	0.6	per hour	3	0.6	per hour	3
		Release area	150	cm^2	1	50	cm^2	1
		Application duration	30	min	2	30	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application model	Exposed area	450	cm^2	2	22	cm^2	3
		Product amount	0.2	g	1	0.2	g	2
Putty spray (8.5 ~ 5.5)	General	Frequency	1	per year	1	1	per year	1
	Inhalation- – exposure to spray – spraying model	Spray duration	42	sec	2	135	sec	2
		Exposure duration	30	min	1	30	min	2
		Room volume	34	m^3	4	34	m^3	3
		Room height	2.5	m	4	2.5	m	4
		Ventilation rate	1.5	per hour	3	1.5	per hour	3
		Mass generation rate	1.2	g/sec	3	1.5	g/sec	3
		Airborne fraction	0.14	g/g	2	1	g/g	2
		Density non-volatile	1.5	g/cm^3	3	1.3	g/cm^3	3
		Aerosol diameter – median (C.V.)	15.1 (1.2)	µm	3	40 (0.4)	µm	3

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-f	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-f
		Inhalation cut-off diameter	15	µm	3	15	µm	3
	Inhalation – exposure to vapour – instantaneous release	Product amount	50	g	3	Not included in FS 2007		
	Dermal –direct product contact – constant rate model	Exposed area	900	cm^2	2	860	cm^2	2
		Contact rate	100	mg/min	3	100	mg/min	2
		Release duration	180	sec	1	135	sec	2
Mixing and loading – floor equaliser (9.1 ~ 6.1)	General	Frequency	6	per day	1	3	per day	1
	Inhalation – exposure to spray – instantaneous release	Exposure duration	3	min	2	Not included in FS 2007		
		Released mass	207.5 (5 repetitions); 33.2 (sixth repetition)	µg	1			
		Ventilation rate	0.6	per hour	1			
		Room volume	1	m^3	1			
	Dermal –direct product contact – constant rate model	Exposed area	450	cm^2	2	430	cm^2	2
		Contact rate	5	mg/min	1	0.033	mg/min	2
		Release duration	3	min	2	1.33	min	2
Application – floor equaliser (9.1 ~ 6.1)	General	Frequency	3	per year	1	0.5	per year	1
	Dermal –direct product contact – instant	Exposed area	900	cm^2	2	860	cm^2	2
		Product amount	35	g	2	2	g	1

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-factor	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-factor
	application loading model							
Mixing and loading –plaster made from powder (9.2 ~ 6.2)	General	Frequency	7	per day	1	Not included in FS 2007		
	Inhalation – exposure to spray – instantaneous release	Exposure duration	3	min	2			
		Released mass	207.5 (first 6 repetitions); 41.5 (seventh repetition)	µg	1			
		Ventilation rate	0.6	per hour	1			
		Room volume	1	m^3	1			
	Dermal –direct product contact – constant rate model	Exposed area	450	cm^2	2			
		Contact rate	5	mg/min	1			
		Release duration	3	min	2			
Application – wall plaster (9.2 ~ 6.2)	General	Frequency	0.2	per year	1	0.2	per year	2
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	300	min	1	Not included in FS 2007		
		Product amount	46.5	kg	2			
		Dilution (times)	1.5	times	3			
		Room volume	58	m^3	4			
		Ventilation rate	0.5	per hour	3			
		Release area	12.5	m^2	1			

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
		Application duration	120	min	1			
		Temperature	20	°C	4			
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
	Dermal –direct product contact – contact rate model	Exposed area	2200	cm^2	2	1900	cm^2	3
		Contact rate	30	mg/min	1	50	mg/min	1
		Release duration	150	min	1	120	min	1
Mixing and loading –plaster made from powder (9.3)	General	Frequency	9	per day	1	Not included in FS 2007		
	Inhalation – exposure to spray – instantaneous release	Exposure duration	1.33	min	1			
		Released mass	46	µg	1			
		Ventilation rate	0.6	per hour	1			
		Room volume	1	m^3	1			
	Dermal –direct product contact – constant rate model	Exposed area	450	cm^2	2			
		Contact rate	5	mg/min	1			
		Release duration	1.33	min	1			
Application – plaster spray (9.3)	General	Frequency	0.2	per year	1	Not included in FS 2007		
	Inhalation – exposure to spray – spraying model	Spray duration	28	min	2			
		Exposure duration	90	min	1			
		Room volume	20	m^3	4			
		Room height	2.5	m	4			
		Ventilation rate	0.6	per hour	3			
		Mass generation rate	7.5	g/sec	2			
		Airborne fraction	0.14	g/g	2			
		Density non-volatile	3	g/cm^3	3			

Scenario (Section FS 2022 - Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
		Aerosol diameter – median (C.V.)	15.1 (1.2)	µm	1			
		Inhalation cut-off diameter	15	µm	3			
	Inhalation– exposure to vapour – instantaneous release	Product amount	9.6	kg	3			
	Dermal – direct product contact – constant rate model	Exposed area	2200	cm^2	2			
		Contact rate	110	mg/min	2			
		Release duration	90	min	1			
Mixing and loading – two-component coating 10.1)	General	Frequency	0.33	per year	1	Not included in FS 2007		
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	20	min	1			
		Product amount	3.9 (4.3, if diluted)	kg	3			
		Room volume	1	m^3	1			
		Ventilation rate	0.6	per hour	1			
		Release area	800	cm^2	2			
		Emission duration	20	min	1			
		Temperature	15	°C	1			
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
	Dermal –direct product contact – instant application model	Exposed area	225	cm^2	2			
		Product amount	0.2	g	1			

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022			Do-It-Yourself Products Fact Sheet 2007		
			Default Value	Unit	Q-	Default Value	Unit	Q-
Application – general coating (10.1 ~ 7.1)	General	Frequency	0.33	per year	1	0.33	per year	2
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	60	min	1	60	min	2
		Product amount (Amount of solution used)	3.9 (4.3, if diluted)	kg	3	3	kg	1
		Dilution (times)	1.1	times	3	Not included in FS 2007		
		Room volume	34	m^3	4	34	m^3	3
		Ventilation rate	1.5	per hour	3	1.5	per hour	3
		Release area	15	m^2	4	15	m^2	3
		Application duration	60	min	1	60	min	2
		Temperature	15	°C	1	15	°C	1
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application model	Exposed area	225	cm^2	2	108	cm^2	2
		Product amount	0.25	g	1	0.25	g	1
Application – gutter coating (10.2 ~ 7.2)	General	Frequency	0.1	per year	2	0.1	per year	2
	Dermal –direct product contact – instant application model	Exposed area	450	cm^2	2	430	cm^2	3
		Product amount	0.25	g	1	0.25	g	2
Application – spray coating (10.3)	General	Frequency	6	per year	2	Not included in FS 2007		
	Inhalation – exposure to spray – spraying model	Spray duration	700	sec	2			
		Exposure duration	120	min	1			
		Room volume	34	m^3	4			
		Room height	2.5	m	4			
		Ventilation rate	1.5	per hour	3			

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-.	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
		Mass generation rate	1.2	g/sec	3			
		Airborne fraction	0.14	g/g	2			
		Density non-volatile	1.5	g/cm^3	3			
		Aerosol diameter – median (C.V.)	15.1 (1.2)	µm	3			
		Inhalation cut-off diameter	15	µm	3			
	Inhalation – exposure to vapour – instantaneous release	Product amount	375	g	3			
	Dermal –direct product contact – constant rate model	Exposed area	900	cm^2	2			
		Contact rate	100	mg/min	1			
		Release duration	120	min	2			
Application – liquid paint and lacquer remover (11.1.1 ~ 8.1)	General	Frequency	3	per year	2	1	per year	1
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	300	min	1	60	min	2
		Product amount	1.4	kg	3	1	kg	2
		Room volume	20	m^3	4	20	m^3	3
		Ventilation rate	0.6	per hour	3	0.6	per hour	3
		Release area	2	m^2	1	2	m^2	3
		Application duration	20	min	1	60	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact– instant application model	Exposed area	450	cm^2	2	430	cm^2	3
		Product amount	0.5	g	1	0.5	g	1

Scenario (Section FS 2022 - Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-factor	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-factor
Mixing and loading –paint/lacquer remover made from powder (11.1.2)	General	Frequency	3	per year	2	Not included in FS 2007		
	Inhalation – exposure to spray – instantaneous release	Exposure duration	30	min	2			
		Released mass	104	µg	1			
		Ventilation rate	0.6	per hour	1			
		Room volume	1	m^3	1			
	Dermal –direct product contact – constant rate model	Exposed area	450	cm^2	2			
		Contact rate	5	mg/min	1			
		Release duration	10	min	1			
Application – paint and lacquer remover made from powder (11.1.2)	General	Frequency	3	per year	2	Not included in FS 2007		
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	300	min	1			
		Product amount	7.5	kg	3			
		Dilution (times)	3	times	2			
		Room volume	20	m^3	4			
		Ventilation rate	0.6	per hour	3			
		Release area	2	m^2	1			
		Application duration	20	min	1			
		Temperature	20	°C	4			
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
	Dermal – direct product contact – instant application model	Exposed area	450	cm^2	2			
		Product amount	2.25	g	2			
Application – paint remover spray (11.1.3)	General	Frequency	3	per year	2	Not included in FS 2007		
	Inhalation – exposure to spray – spraying model	Spray duration	14	min	2			
		Exposure duration	60	min	1			
		Room volume	20	m^3	4			
		Room height	2.5	m	4			

Scenario (Section FS 2022 - Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
		Ventilation rate	0.6	per hour	3			
		Mass generation rate	1.2	g/sec	3			
		Airborne fraction	0.14	g/g	2			
		Density non-volatile	1.5	g/cm³	3			
		Aerosol diameter – median (C.V.)	15.1 (1.2)	µm	3			
		Inhalation cut-off diameter	15	µm	3			
	Inhalation – exposure to vapour – instantaneous release	Product amount	1	kg	3			
	Dermal – - direct product contact – constant rate model	Exposed area	900	cm²	2			
		Contact rate	100	mg/min	3			
		Release duration	14	min	1			
Post-application – paint remover spray (11.1.3)	General	Frequency	3	per year	2	Not included in FS 2007		
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	90	min	1			
		Product amount	1	kg	1			
		Room volume	20	m³	4			
		Ventilation rate	0.6	per hour	3			
		Release area	2	m²	1			
		Emission duration	90	min	1			
		Temperature	20	°C	4			
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
	Dermal –direct product contact – instant	Exposed area	450	cm²	2			
		Product amount	0.5	g	1			

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-factor	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-factor
	application model							
Application – liquid glue remover (11.2.1 ~ 8.2)	General	Frequency	0.25	per year	1	0.25	per year	2
	Inhalation- – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	240	min	1	240	min	2
		Product amount	2	kg	2	2	kg	2
		Room volume	30	m^3	1	30	m^3	2
		Ventilation rate	1.5	per hour	1	1.5	per hour	2
		Release area	5	m^2	1	5	m^2	2
		Application duration	30	min	1	240	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – constant rate model	Exposed area	225	cm^2	2	230	cm^2	3
		Contact rate	30	mg/min	1	30	mg/min	1
		Release duration	240	min	1	240	min	1
Application – glue remover spray (11.2.2)	General	Frequency	3	per year	2	Not included in FS 2007		
	Inhalation – exposure to spray – spraying model	Spray duration	5	sec	2			
		Exposure duration	10	min	1			
		Room volume	20	m^3	4			
		Room height	2.5	m	4			
		Ventilation rate	0.6	per hour	3			
		Mass generation rate	1.2	g/sec	3			
		Airborne fraction	0.14	g/g	2			
		Density non-volatile	1.5	g/cm^3	3			
		Aerosol diameter – median (C.V.)	15.1 (1.2)	µm	3			

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Do-It-Yourself Products Fact Sheet 2022 Unit	Do-It-Yourself Products Fact Sheet 2022 Q-factor	Do-It-Yourself Products Fact Sheet 2007 Default Value	Do-It-Yourself Products Fact Sheet 2007 Unit	Do-It-Yourself Products Fact Sheet 2007 Q-factor
		Inhalation cut-off diameter	15	µm	3			
	Inhalation – exposure to vapour – instantaneous release	Product amount	6	g	2			
	Dermal –direct product contact – constant rate model	Exposed area	900	cm^2	2			
		Contact rate	100	mg/min	3			
		Release duration	5	sec	2			
Mixing and loading –wallpaper remover made from powder (11.3)	General	Frequency	1	per year	1	Not included in FS 2007		
	Inhalation – exposure to spray – instantaneous release	Exposure duration	15	min	1			
		Released mass	13	µg	1			
		Ventilation rate	0.6	per hour	1			
		Room volume	1	m^3	1			
	Dermal –direct product contact – constant rate model	Exposed area	450	cm^2	2			
		Contact rate	5	mg/min	1			
		Release duration	3	min	2			
Mixing and loading –liquid wallpaper remover (11.3 ~ 8.3)	General	Frequency	1	per year	1	0.5	per year	1
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	10	min	1	Not included in FS 2007		
		Product amount	185	g	3			
		Room volume	1	m^3	1			
		Ventilation rate	0.6	per hour	1			
		Release area	1120	cm^2	2			
		Emission duration	10	min	1			
		Temperature	20	°C	7			
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
		Exposed area	225	cm^2	2	2	cm^2	2

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
	Dermal –direct product contact – instant application model	Product amount	0.01	g	2	0.01	mg/operation	3
Application – wallpaper remover (11.3 ~ 8.3)	General	Frequency	1	per year	1	0.5	per year	1
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	240	min	1	Not included in FS 2007		
		Product amount	7.6	kg	3			
		Dilution (times)	41	times	3			
		Room volume	58	m^3	4			
		Ventilation rate	0.5	per hour	3			
		Release area	40	m^2	1			
		Application duration	60	min	1			
		Temperature	20	°C	4			
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
	Dermal –direct product contact – constant rate model	Exposed area	2200	cm^2	2	1900	cm^2	3
		Weight fraction (dilution)	Not included in current Fact Sheet			0.2		3
		Product amount (dilution)				19	g	1
		Contact rate	30	mg/min	1	Not included in FS 2007		
		Release duration	120	min	1			
Application – wallpaper remover spray (11.3.1)	General	Frequency	1	per year	1	Not included in FS 2007		
	Inhalation – exposure to spray – spraying model	Spray duration	17.6	min	2			
		Exposure duration	180	min	1			
		Room volume	58	m^3	4			
		Room height	2.5	m	4			
		Ventilation rate	0.5	per hour	3			

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
		Mass generation rate	7.2	g/sec	2			
		Airborne fraction	0.14	g/g	2			
		Density non-volatile	1.5	g/cm^3	3			
		Aerosol diameter – median (C.V.)	15.1 (1.2)	µm	3			
		Inhalation cut-off diameter	15	µm	3			
	Inhalation – exposure to vapour – instantaneous release	Product amount	185	g	3			
	Dermal –direct product contact – constant rate loading model	Exposed area	900	cm^2	2			
		Contact rate	110	mg/min	2			
		Release duration	180	sec	1			
Application – liquid sealant/foam remover (11.4.1 ~ 8.4)	General	Frequency	3	per year	1	5	per year	2
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	180	min	1	180	min	2
		Product amount	190	g	3	100	g	1
		Room volume	10	m^3	4	10	m^3	3
		Ventilation rate	2	per hour	3	2	per hour	3
		Release area	250	cm^2	1	250	cm^2	3
		Application duration	20	min	1	120	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application model	Exposed area	75	cm^2	1	5	cm^2	3
		Product amount	0.19	g	1	0.1	g	1

Scenario (Section FS 2022 - Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-f	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
Application – sealant/foam remover spray (11.4.2)	General	Frequency	3	per year	1	Not included in FS 2007		
	Inhalation – exposure to spray – spraying model	Spray duration	160	sec	1			
		Exposure duration	120	min	1			
		Room volume	10	m^3	4			
		Room height	2.5	m	4			
		Ventilation rate	2	per hour	3			
		Mass generation rate	1.2	g/sec	3			
		Airborne fraction	0.14	g/g	2			
		Density non-volatile	1.5	g/cm^3	3			
		Aerosol diameter – median (C.V.)	15.1 (1.2)	µm	3			
		Inhalation cut-off diameter	15	µm	3			
	Inhalation – exposure to vapour – instantaneous release	Product amount	190	g	1			
	Dermal –direct product contact – constant rate model	Exposed area	900	cm^2	2			
		Contact rate	100	mg/min	3			
		Release duration	180	sec	1			
Mixing and loading – liquid rust remover (11.5.1)	General	Frequency	6	per year	2	Not included in FS 2007		
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	5	min	1			
		Product amount	200	g	1			
		Room volume	1	m^3	1			
		Ventilation rate	0.6	per hour	1			
		Release area	820	cm^2	2			
		Emission duration	5	min	1			
		Temperature	15	°C	1			

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-.	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
	Dermal –direct product contact – instant application model	Exposed area	225	cm^2	2			
		Product amount	0.01	g	2			
Application – liquid rust remover (11.5.1)	General	Frequency	6	per year	2	Not included in FS 2007		
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	90	min	1			
		Amount of solution used	2	kg	1			
		Dilution (times)	10	times	2			
		Room volume	34	m^3	4			
		Ventilation rate	1.5	per hour	3			
		Release area	800	cm^2	1			
		Emission duration	90	min	1			
		Temperature	15	°C	1			
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
	Dermal –direct product contact – constant rate model	Exposed area	900	cm^2	2			
		Contact rate	50	mg/min	1			
		Release duration	60	min	1			
Application – rust remover gel (11.5.2)	General	Frequency	2	per year	1	Not included in FS 2007		
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	120	min	1			
		Product amount	1	kg	1			
		Room volume	34	m^3	4			
		Ventilation rate	1.5	per hour	3			
		Release area	1500	cm^2	1			

Scenario (Section FS 2022~Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-factor	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-factor
		Application duration	45	min	1			
		Temperature	15	°C	1			
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
	Dermal –direct product contact – instant application model	Exposed area	450	cm^2	2			
		Product amount	1	g	1			
Application – rust remover spray (11.5.3)	General	Frequency	4	per year	2	Not included in FS 2007		
	Inhalation – exposure to spray – spraying model	Spray duration	50	sec	1			
		Exposure duration	60	min	1			
		Room volume	34	m^3	4			
		Room height	2.25	m	3			
		Ventilation rate	1.5	per hour	3			
		Mass generation rate (aerosol/trigger)	1.2/1.6	g/sec	3			
		Airborne fraction	0.14 / 0.008	g/g	2			
		Density non-volatile	1.5	g/cm^3	3			
		Aerosol diameter – median (C.V.) (aerosol/trigger)	15.1/7.7 (1.2/1.9)	µm	3			
		Inhalation cut-off diameter	15	µm	3			
	Inhalation – exposure to vapour –	Product amount (aerosol spray)	60	g	1			
		Product amount (trigger spray)	80	g	1			

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-factor	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-factor
	instantaneous release							
	Dermal –direct product contact – constant rate loading model	Exposed area	900	cm^2	2			
		Contact rate (aerosol/trigger)	100 /46	mg/min	3			
		Release duration	120	sec	1			
Application – polyurethane foam for filling gaps and joints (12.1 ~ 9.1)	General	Frequency	0.2	per year	1	0.2	per year	1
	Inhalation – exposure to vapour – instantaneous release	Exposure duration	120	min	1	30	min	1
		Product amount	825	g	1	825	g	1
		Room volume	45	m^3	1	57.5	m^3	2
		Ventilation rate	0.5	per hour	1	1.5	per hour	1
	Dermal – direct product contact – instant application	Surface area	2200	cm^2	2	1900	cm^2	2
		Product amount	0.5	g	1	0.25	g	1
Application – polyurethane foam for filling small holes (12.1)	General	Frequency	2	per year	1	Not included in FS 2007		
	Inhalation – exposure to vapour – instantaneous release	Exposure duration	20	min	1			
		Product amount	8.25	g	1			
		Room volume	45	m^3	1			
		Ventilation rate	0.5	per hour	1			
	Dermal – direct product contact – instant application	Surface area	225	cm^2	2			
		Product amount	0.01	g	1			
Application – polyurethane foam used as an adhesive (12.1)	General	Frequency	0.2	per year	1	Not included in FS 2007		
	Inhalation – exposure to vapour – instantaneous release	Exposure duration	360	min	1			
		Product amount	1100	g	1			
		Room volume	20	m^3	4			

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022			Do-It-Yourself Products Fact Sheet 2007		
			Default Value	Unit	Q-	Default Value	Unit	Q-
		Ventilation rate	0.6	per hour	3			
	Dermal – direct product contact – instant application	Surface area	900	cm^2	2			
		Product amount	0.25	g	1			
Application – joint colour (12.2 ~ 9.2)	General	Frequency	1	per year	1	1	per year	2
	Inhalation – exposure to vapour – evaporation – release area mode: increasing	Exposure duration	120	min	1	120	min	2
		Product amount	230	g	3	100	g	1
		Room volume	10	m^3	4	10	m^3	3
		Ventilation rate	2	per hour	3	2	per hour	3
		Release area	4	m^2	1	4	m^2	3
		Application duration	45	min	1	120	min	2
		Temperature	20	°C	4	20	°C	4
		Mass transfer rate	10	m/h	2	Langmuir		
		Molecular weight matrix	3000	g/mol	3	3000	g/mol	3
	Dermal –direct product contact – instant application	Exposed area	2200	cm^2	2	1900	cm^2	3
		Product amount	1.15	g	1	0.5	g	1
Application – emergency leak sealant (12.3)	General	Frequency	1	per year	1	Not included in FS 2007		
	Inhalation – exposure to spray – instantaneous release	Exposure duration	60	min	1			
		Released mass	124.5	µg	1			
		Ventilation rate	0.6	per hour	1			
		Room volume	1	m^3	1			
	Dermal --direct product contact – constant rate	Exposed area	900	cm^2	2			
		Contact rate	5	mg/min	1			
		Release duration	15	min	1			
Application – adhesive tape (12.4)	General	Frequency	1	per month	1	Not included in FS 2007		

Scenario (Section FS 2022 ~ Section FS 2007)	Selected Exposure Model	Parameter	Do-It-Yourself Products Fact Sheet 2022 Default Value	Unit	Q-	Do-It-Yourself Products Fact Sheet 2007 Default Value	Unit	Q-
	Inhalation – exposure to vapour – evaporation – release area mode: constant	Exposure duration	10	min	1			
		Product amount	12	g	1			
		Room volume	20	m^3	4			
		Ventilation rate	0.6	per hour	3			
		Release area	380	cm^2	1			
		Emission duration	10	min	1			
		Temperature	20	°C	4			
		Mass transfer rate	10	m/h	2			
		Molecular weight matrix	3000	g/mol	3			
	Dermal –direct product contact – instant application	Exposed area	150	cm^2	1			
		Product amount	0.025	g	1			

Annex II Data collection

A.1 Powder experiment *(Note that this experiment was conducted in the course of the preparation for developing the Do-It-Yourself Fact Sheet of 2007)*

Exposure to powders during the mixing and loading process can be described using the spray model. An important parameter in this model is the particle size distribution because it determines in part the amount that actually can be inhaled by the user. As a cut-off point, particles larger than 15 µm are assumed not to lead to inhalation exposure.

The particle size distributions of most DIY products are not known. For this reason, a small observational experiment was set up to provide an indication of the distribution. Some information on the particle size distribution is available for both Portland cement (Ferraris et al., 2004) and lime (Bremmer et al., 2006b). The following products were included in this experiment: tile glue, wallpaper glue, filler, washing powder, cement, and lime. In the experiment, the powders were observed and compared to each other on a piece of paper and while dispersed in the air. The observations provided insight into the dispersion and size of the powders compared to the reference materials. The results of this experiment are described below and summarised in Table 72.

Portland cement: This reference material contains the finest particles of the powders. The dispersion of the cement is wide and forms a cloud. The cloud can be seen floating in the air for a relatively long period (over 1 minute). Data derived by Ferraris showed that the particle size distribution of Portland cement has a lognormal distribution rather than a normal distribution.
A median of 14 µm with a coefficient of variation of 0.5 was established.

Lime: The second reference material, lime, also contained very fine particles, but nevertheless appeared to contain larger particles than Portland cement. However, lime also forms a wide cloud when dispersed into the air. When the powders were simply dropped from a certain height (eye level), lime dropped faster than Portland cement indicating that larger particles are present.

Data on the particle size distribution of lime originate from dusting powders discussed in the Pest Control Products Fact Sheet (Bremmer et al., 2005). It is assumed that dusting powders and agricultural lime have a somewhat similar particle size distribution, because both are based on caulk. For lime marl, the legal requirement is that 99% of the lime particles are smaller than 1000 µm and 90% are smaller than 150 µm. It is assumed that most of the particles will have a diameter between 50 and 150 µm.
In the TNsG under 'Consumer product spraying and dusting' (European Commission, 2002), a model is described in which the consumer uses a hand-held dusting applicator pack for crack and crevice powders against

fleas and ants. The products were found to contain particles of inert filler such as fine talc or chalk (median, 45% of dust less than 75 µm).

On the basis of these data, the default value for the initial particle distribution was determined to be a lognormal distribution with a median of 75 µm and a coefficient of variation (C.V.) of 0.6.

General filler: The filler consists of very fine material. In comparison to the reference materials, it was observed that the filler is finer than lime, but less fine than Portland cement. Again, a wide dispersion cloud was formed after blowing the product from a piece of paper and the cloud remained suspended in the air for a while.

No data is available on the particle size distribution of general filler. As a worst case, the distribution of Portland cement was assumed for general filler: median of 14 µm (C.V. of 0.5).

Tile glue: The powder was clearly coarser than Portland cement, lime, and filler. It appeared that the tile glue contained small sand grains. When the powder was blown from the paper some of the sand grains remained on the paper while a dust cloud was formed by the smaller particles. In that respect, there was no difference between the powders except for the washing powder and wallpaper glue.

Neither is data available for tile glue. Therefore, as a worst case, the particle distribution of lime was assumed: median of 75 µm (C.V. of 0.6).

Washing powder: Washing powder did not contain many fine particles. Cloud formation was almost not visible and disappeared immediately. When dropped from eye level, a conic dispersion and relatively high falling speed were observed. This indicates that washing powder contains larger particles than the previously discussed powders. In the Cleaning Products Fact Sheet, the exposure to washing powder is described as the amount of dust that can be formed and consequently inhaled. Van de Plassche (1999) observed that 0.27 µg dust was formed from 200 g washing powder. As a worst-case scenario, it is assumed that all formed dust can be inhaled by the user.

Wallpaper glue: Wallpaper glue powder showed similarities with washing powder when placed on a piece of paper. The particles are coarser than the other powders used in DIY products. In contrast to washing powder, however, the product does disperse into the air when dropped from eye level, which indicates that the particles are finer. However, it was concluded that the spray model should not be used for wallpaper glue, as wallpaper glue powder differs from other powders too much to obtain a realistic particle size distribution. Assigning the particle size distribution of lime would not provide a realistic worst-case scenario.

Since wallpaper glue is comparable to washing powder, the amount of dust formed from wallpaper glue during mixing and loading was assumed to be the same as that of washing powder.

Table 72 Results of elementary experiments concerning the particle size distributions of powders used in DIY products

Powder	PSD[a] (median (C.V.)	Remark	Q-factor
Portland cement	14 µm (0.5)	Very fine particles, very wide dispersion. PSD from Ferraris et al. 2004	2
Lime	75 µm (0.6)	Very fine particles with some larger particles. Dispersion wide. PSD from Pest Control Products Fact Sheet 2005	2
General filler	14 µm (0.5)	Very fine particles, less fine than Portland cement, finer than lime. PSD from Portland cement adopted	1
Tile glue	75 µm (0.6)	Very fine particles, but less fine than lime. PSD from lime adopted.	1
Washing powder	-	No PSD known for washing powder. From 200 g product, 0.27 µg dust is formed (Prud'homme de Lodder et al., 2006) (Q = 1). Particles fine, but no clear dispersion.	-
Wall-paper glue	-	Particles are finer than particles of washing powder, but no clear dispersion. No PSD was determined.	-

[a] PSD: Particle size distribution; C.V.: coefficient of variation.
- No PSD was determined and no quality factor was assigned.

A.2 Glue experiment *(Note that this experiment was conducted in the course of the preparation for developing the Do-It-Yourself Fact Sheet 2007)*

To obtain an indication of the magnitude of the dermal load from glue spills, a small experiment was performed. In this experiment, hobby/universal glue (from a bottle) was simply applied to a piece of paper or directly onto the skin.

We first determined the mass of one drop of glue. The bottle was weighed before and after a drop was placed on a fingertip. This procedure was conducted twice providing two measurements close to 50 mg. Therefore, the weight of one drop of glue was established to be 50 mg.

Then the dermal load was determined. A piece of paper was covered with glue spread out with one finger. The glue bottle and paper were weighed separately before the glue was applied. After the glue was applied and spread out, the bottle and paper were weighed again. Simple calculations provided the amount of glue which remained on the fingertips. Again, this procedure was performed twice. The dermal loads calculated were 0.03 g and 0.09 g. Averaging these figures gave a dermal load of 0.06 g.

These observations provide an idea of the amount of glue when small amounts of glue are spilled. However, during large tasks requiring large amounts, it can be expected that the product amount which comes into contact with the skin is also larger. This raised the question: How much glue can fully cover one palm? To answer this question glue was applied and spread out over the palm of one hand. The difference in weight of the bottle before and after application provided the amount of glue applied. Again, this was conducted twice and resulted in 0.96 g and 0.52 g glue. From these results, it can be assumed that the maximum dermal load from glue on one palm during a DIY task is 1 g. A subject will most definitely clean or wipe his/her hands when covered with this amount of glue before continuing the DIY task.

A.3 Preliminary observational study

At present, there are limited data available on exposure assessment concerning DIY products. Information on consumer use of these kinds of products is lacking. Therefore, in 2004, an observational study was conducted at RIVM by Magré (Magré, 2005) to provide more insight in the way consumers use DIY products. This behavioural study revealed habits of consumers when working on DIY tasks in their homes. During the observational study, twenty-five observations were conducted in four main product categories, i.e., glues for small surfaces, glues for large surfaces, sealants, and fillers. During the observations, measurements were taken, and the following parameters were taken into account: duration of use, amount product used per task, ventilation, frequency of use, contact with the product, behavioural characteristics such as reading safety or product information and experience level. The number of observations was rather low; furthermore, the range of DIY products included was rather small. Therefore, it is not expected that the limited amount of observations represents the habits of the Dutch population. However, the information gathered in the study by Magré (Magré, 2005) can be used as preliminary data which can be considered indicative for consumer use of DIY products.

A.4 Consumer surveys for estimating parameters for the consumer use of glues

A.4.1 First survey: Use frequencies of glues (conducted by Kantar Emnid)

Study description

In June 2017, BfR commissioned a consumer survey aiming at estimating rough use frequencies of all the glue product types in the DIY Fact Sheet, including those newly identified in the revision process. The survey was part of an omnibus telephone survey and consumers were asked the question: “Have you used one or more of the following glues in the last four weeks/last year?” As part of an omnibus survey the results are representative for the German adult population. In total, 2044 consumers took part in the survey and the results are summarised in the following table:

Table 73 Results consumer survey on use of various glue types. ("Have you used one or more of the following glues in the last month/last year?")

	Users	
Product Type	Last four Weeks [%]	Last Year [%]
Adhesive Tape	59.2	76.2
Universal Glue	36.8	58.6
Super Glue	22.7	47.7
Hot Melt Adhesives	9.5	26.5
Wood Glue	9.7	25.3
Wallpaper Glue	5.6	21.7
Two-component Glue	8.6	20.8
Tile Glue	3.7	11
Wood Parquet Glue	3.9	8.5
Glue from Spray	2.1	6.1
Carpet Glue	1.8	6.1
Adhesive Putty	2.1	5.6

Estimation of use frequencies
In principle, stratification by age/sex/household/income is possible but was omitted for this analysis. The data were intended to be used for the selection of product types for a follow-up study aimed at generating consumer behaviour data, and as such the aim of this survey was not primarily to generate data for use in the Fact Sheet. As a result, the question formulated was rather simple. Therefore, the results do not allow direct use as input parameters for the Fact Sheet as they do not differentiate between single or multiple uses in the respective time period. Nevertheless, these data can be used for estimating average use frequencies with some additional assumptions. Below, we will present two different approaches.

The first approach (denoted in the following as the "simple Poisson model") assumes that the population is homogeneous regarding the mean use of a given glue (the underlying probability of the use of a specific type of glue in a given time frame is the same for everyone). Furthermore, assuming that individual glue use events are independent of each other, and that the probability of use is constant over time and small for a sufficiently small period of time, the number of events can be described using a Poisson distribution:

$$P_\mu(k) = \frac{\mu^k}{k!} e^{-\mu}$$

P denotes the probability to observe exactly k events in a given time period. The only parameter of the Poisson distribution, μ, describes the average number of events in this period. μ can be estimated from the data by calculating the probability to observe exactly no events in the respective time frame:

$$P_\mu(0) = e^{-\mu}$$

This information was part of the survey (see Table 73) and therefore the average number of events per year can be obtained. It was chosen to only use the four-week data for this analysis as, especially for the rare product types, it should be much less impaired by the memory of the participants. The results were then converted to a period of one year.

The second approach (denoted in the following as the “two-group Poisson model”) uses exactly the same assumptions as the first approach, except that the population is split into two parts: the principal users (which in general use that type of glue) and, additionally, people that will never use the respective type of glue. Let POP_{never} be the part of the population that never uses a certain type of glue and μ be the average number of uses per four weeks (of principal users). Both variables are now determined, such that the percentage of uses both in a four-week period and a one year period are reproduced consistently. In detail, for both time frames, the fraction of principal users multiplicated with the probability that a use (of this population segment) will actually occur, is supposed to match the corresponding data in Table 73:

$$(1 - POP_{never})\left(1 - P_{\mu}(0)\right) = (1 - POP_{never})(1 - e^{-\mu}) = Prob_{use}(4\,weeks)$$
$$(1 - POP_{never})\left(1 - P_{13\mu}(0)\right) = (1 - POP_{never})(1 - e^{-13\mu}) = Prob_{use}(52\,weeks)$$

The parameter $Prob_{use}$ denotes the fraction of the population that has used a given type of glue in a given time period (found in Table 69). A year is here assumed to have exactly 52 weeks. Further rearranging of these equations yields:

$$Prob_{use}(4\,weeks)(1 - e^{-13\mu}) = Prob_{use}(52\,weeks)(1 - e^{-\mu})$$

This equation can be solved numerically for μ and subsequently, POP_{never} can be determined. The results of both approaches (the simple as well as the two-group Poisson model) are summarised in Table 74.

Table 74 Derived use frequencies for different glue types for both model approaches

Product Type	**Simple Poisson model**	**Two-group Poisson model**
	User frequency [1/year]	User frequency [1/year]
Adhesive Tape	11.57	19.5
Universal Glue	5.98	12.9
Super Glue	3.38	8.4
Hot Melt Adhesives	1.43	5.8
Wood Glue	1.43	6.3
Wallpaper Glue	0.78	3.8
Two-component Glue	1.17	6.9
Tile Glue	0.52	5.2
Wood Parquet Glue	0.52	8.0
Glue from Spray	0.26	5.6
Carpet Glue	0.26	4.5
Adhesive Putty	0.26	6.2

In general, the simple Poisson model will underestimate user frequency of principal users, since the proportion of (not considered) people that simply never use that kind of glue will dilute the result. Therefore, for most glue types, the results are taken from the two-group Poisson model. For example, glue from spray is actually used by only a small fraction of the population, but since it has a variety of applications the use frequency of 5.6 per year (for the actual users) seems much more realistic than 0.26. However, another problem is the under- and overreporting of the consumer survey. Underreporting might occur for the time frame of one year, since uses during this period of time could be easily forgotten. For the four-week period, overreporting can be a problem, since uses that were carried out six weeks ago might be erroneously reported too. This problem is more pronounced for the two-group Poisson model, since it influences the average user frequency of principal users twice: first it influences average use frequency of all users (including those who never use the particular type of glue) and second, it influences the ratio of actual users and therefore implicitly the average use frequency of the users. Perhaps this explains why, for instance, wood parquet glue has the unrealistic use frequency of 8.0 (two-group Poisson model). To account for this problem, it was decided that for tile glue, wood parquet glue and carpet glue, the simple Poisson model is employed, since these uses are rarely carried out. Therefore, the two-group Poisson model is especially vulnerable to over- and underreporting. The results used in the DIY factsheet are presented in Table 75 (rounded to two digits):

Table 75 Use frequencies used in this factsheet for different glue types

Product Type	**User frequency [1/year]**
Adhesive Tape	19
Super Glue	8.4 ~ 9
Hot Melt Adhesives	5.8 ~ 6
Wood Glue	6.3
Wallpaper Glue	3.8 ~ 4
Two-component Glue	6.9 ~7
Tile Glue	0.52
Wood Parquet Glue	0.52
Glue from Spray	5.6 ~ 6
Carpet Glue	0.26
Adhesive Putty	6.2 ~ 7

At a side note, while the frequency for wallpaper glue seems large, it is important to bear in mind that it can be used for other tasks than papering walls.

Limitations of the data

The data has several important limitations. It is, for example, unclear whether the assumptions required for using a Poisson distribution are fulfilled, especially the independence of the events. The direction of this effect is unknown. Moreover, both model approaches do not allow for distinctions between different user frequencies among the users, only the average user frequency and not the 75th percentile can be reported, which underestimates the target value.

The user frequencies for tile glue, wood parquet glue, and carpet glue do not consider parts of the population that never use this type of glue (therefore underestimating user frequency of actual users). Another problem is the already mentioned underreporting of glue uses for the period of one year and possibly the overreporting for the much smaller time period of four weeks, which in turn would tend to overestimate user frequency, especially for the other glue types.

Additionally, the way the question was formulated does not exclude the possibility of professional use of the glue products. Thus, the use frequency estimated on the basis of these values could be higher than the real use frequencies considering only consumer uses. This will lead to an overestimation of the use frequency of consumers. Finally, as the data were estimated in June and July of 2017, it is unclear whether this period is representative for the whole year or whether there is seasonality in the use of the glue products (which might even be different for different glues). This could over- or underestimate the use frequencies. Taking all these limitations into account, it was decided to assign a rather low Q-factor of 2, since empirical data was used but its suitability for the question at hand is limited and therefore additional assumptions and expert judgement (in terms of which model is applied) needed to be included.

A.4.2 Second survey: Consumer behaviour during use of universal glue and wallpaper glue (CATI survey and protocols; conducted by approxima)

The survey itself was described in subsection 5.6. At this point, only the relevant data which is useful to derive defaults for scenarios described in this Fact Sheet shall be presented. Further information, for example the complete data set will be part of a publication in the near future.

Frequency for the use of universal glue

The following derivation of a default for the use frequency of universal glue by the consumer is based on the data gathered during the CATI telephone interviews. The results are aggregated in the following Figure 1.

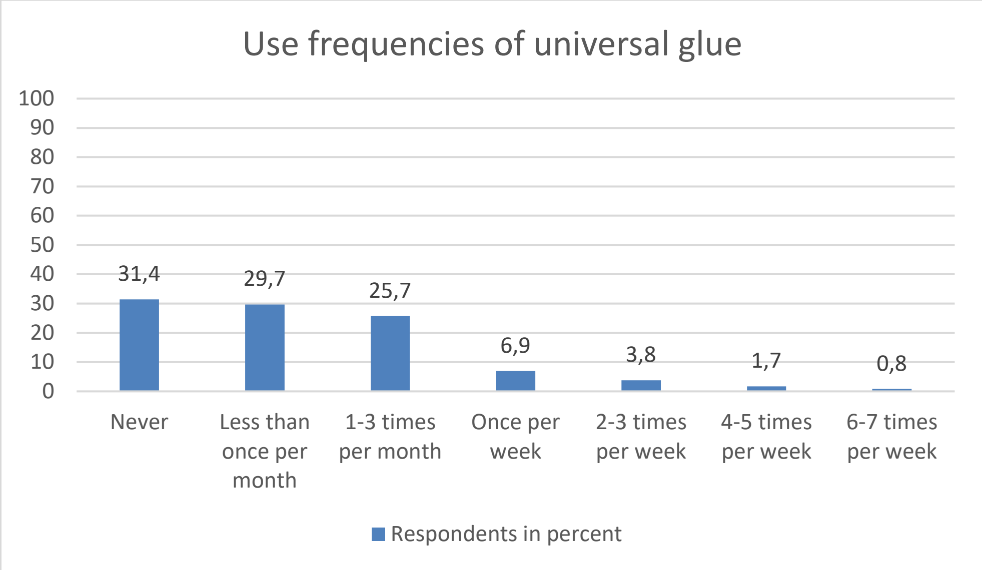

Figure 1 Use frequencies of universal glue

To determine the 75th percentile of user frequency for universal glue, it was assumed that during the study, the non-users (31.4%) never use universal glue. That means that 25% x (100-31.4) % = 17.15% of all participants use universal glue more often than the value of the 75th percentile of use frequency. Summing up the frequencies of those interviewed persons who use universal glue at least once per week yields 13.2-3.95% missing to 17.15% determined above. Given that 25.7% of all interviewed persons use universal glue 1-3 times per month, the upper value (3 times per month) was chosen, since 3.95% is small compared to 25.7%. Therefore, the value of the 75th percentile of the use frequency of universal glue is set to be 36 times per year. This will be used in the corresponding scenario in subsections 6.2 and 6.3

Product amount, application duration of and length of stay after the usage of universal glue

For universal glue, the following key figures were derived from the data of the filled out protocols. If necessary, a short description of the measured parameter is provided:

Table 76 Product amount used (in grams)

	n	**Min**	**Median**	**75th Perc.**	**90th Perc.**	**95th Perc.**	**Max**
User	55 Respondents	0.001	3.0	6.0	13.8	18.0	25.0

In Table 76 and Table 77, the results for the application duration and length of stay are summarised. The application duration is the time during which the glue was actually used. In order to derive this value, the starting and ending time of the conducted gluing task was documented in the protocol.

Table 77 Application duration of universal glue (in min)

	n	Min	Median	75th Perc.	90th Perc.	95th Perc.	Max
User	56 Respondents	1	10	36	93	119	266

Table 78 Length of stay in the same room after the usage of universal glue (in min)

	n	Min	Median	75th Perc.	90th Perc.	95th Perc.	Max
User	54 Respondents	2	30	60	135	255	600

Product amount, mixing duration, application duration of and length of stay after the usage of wallpaper glue

For wallpaper glue, the following key figures were derived from the data of the filled out protocols. If necessary, a short description of the measured parameter is provided:

In the protocol, the users were able to specify if they conducted only one mixing process or two. Furthermore, they could document how much powder they used for each mixing process. The product amounts provided in Table 78 represent the total amount of powder (=potentially for both mixing processes) used prior to the requisite mixing with water.

Table 79 Product amount (powder) used (in grams)

	n	Min	Median	75th Perc.	90th Perc.	95th Perc.	Max
User	52 Respondents	12	205.5	271.3	517.2	630.9	1000

The mixing duration is defined here as the time the users needed to homogenise the powder-water mixture in order to achieve a usable wallpaper glue. It was derived using the documented starting and ending times of the mixing processes.

Table 80 Mixing duration (in min)

	n	Min	Median	75th Perc.	90th Perc.	95th Perc.	Max
User	49 Respondents	1	11	19.5	30	50	60

In accordance with the application duration for universal glue, the values provided in Table 77 were derived using the documented starting and ending times of the usage of wallpaper glue to adhere wallpaper to a surface.

Table 81 Application duration (in min)

	n	Min	Median	75^{th} Perc.	90th Perc.	95^{th} Perc.	Max
User	50 Respondents	32	267	413.8	553.5	623.5	750

Table 82 Length of stay in the same room after the usage of wallpaper glue (in min)

	n	Min	Median	75^{th} Perc.	90^{th} Perc.	95^{th} Perc.	Max
User	29 Respondents	1	20	35	60	71	82

The following use duration includes the mixing duration, the application of the wallpaper glue and the time the user potentially stays in the same room after usage.

Table 83 Use duration (mixing, application and staying in the same room) (in min)

	n	Min	Median	75^{th} Perc.	90^{th} Perc.	95^{th} Perc.	Max
User	33 Respondents	48	285	498	592.8	613.5	645

A.5 Product data collection

The following data collection is extracted from technical data sheets and safety data sheets acquired via internet search. A few pieces of information were also gathered directly from the websites of the producer or retailer of the products.

Table 84 Product information on universal glue

Product name	Consumption [g/m²]	Density [g/cm³]	Ingredients		Container	% solid	Package Size	Link	Last visit
			Adhesive	Solvent					
UHU Der Alleskleber		0.98	polyvinyl acetate	acetone 2.5-10%, methyl acetate 50-100%, ethanol 2.5-10%	tube, can, pot	32-35	tube: 7 g, 20 g, 35 g, 45 g, 60 g, 125 g can: 500 g pot: 5 kg	https://www.uhu-profi.de/de/produktseite/der-alleskleber/63625#ps2 https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700450200_uhu_der_alleskleber_35g_bl_defrit.pdf	04.04.2022
UHU Alleskleber ohne Lösungsmittel flex+clean		1.05	polyacrylate	water	tube	27	20 g	https://www.wasklebtwas.de/datasheets/tds/en_tds_0000040267821_uhu_alleskleber_ohne_loesungsmittel_flex_clean_kunststofftube_20g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_0000040267821_uhu_alleskleber_ohne_loesungsmittel_flex_clean_kunststofftube_20g.pdf	04.04.2022

Product name	Consumption [g/m^2]	Density [g/cm^3]	Ingredients		Container	% solid	Package Size	Link	Last visit
			Adhesive	Solvent					
UHU Alleskleber kraft		0.92	polyurethan elastomer	acetone 50-80%, ethyl acetate 10-25%	tube, can, pot	25	Tube: 6 g, 42 g,125 g can: 650 g pot: 4,5 kg	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700450651_uhu_alleskleber_kraft_tube_125g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700450750_uhu_alleskleber_kraft_dose_650g.pdf	04.04.2022
UHU Alleskleber super strong and safe			cyanoacrylate 70-100%		tube		7 g	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700469608_uhu_alleskleber_super_strong_safe_tube_7g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700468151_uhu_alleskleber_super_strong_safe_dosiersystem_3g.pdf	04.04.2022

Product name	Consumption [g/m^2]	Density [g/cm^3]	Ingredients		Container	% solid	Package Size	Link	Last visit
			Adhesive	Solvent					
UHU allplast		0.9	Acrylester / PVC-Copolymer	acetone 25-50%, ethyl acetate 25-50%, Butanone 10-25%	tube	19-22	30 g	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700484106_uhu_allplast_kunststoffe_universal_mittelviskos_tube_30g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700484106_uhu_allplast_kunststoffe_universal_mittelviskos_tube_30g.pdf	04.04.2022
tesa Alleskleber				acetone <50%, ethanol <25%				www.tesa.de/files/download/225475,msds-tesa-8800.pdf?date=201611	04.04.2022
UHU sekunden Alleskleber geruchsfrei superflex		1.09	cyanoacrylate acid		tube		3 g	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700455656_uhu_sekunden_alleskleber_geruchsfrei_superflex_gel_tube_3g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700455656_uhu_sekunden_alleskleber_geruchsfrei_s	04.04.2022

Product name	Consumption [g/m^2]	Density [g/cm^3]	Ingredients		Container	% solid	Package Size	Link	Last visit
			Adhesive	Solvent					
								uperflex_gel_tube_3g.pdf	
Pattex 100% Kleber	230	1.1	silane 1-5%	benzole 10-20%	tube, bottle		Tube: 50 g Bottle: 50, 100, 200 g	https://images.obi.de/PROD/DE/document/596/596948_datasheet_1.pdf https://cdn-images.otto-office.com/oode/b2b/deu/mediadatacat/sheets_step/2113845.pdf	04.04.2022
Pattex Multi Alleskleber		1.06	polyurethane		tube		20 g, 50 g	https://modellbau-planet.de/media/docs/sdb-pattex-multi-alleskleber.pdf	04.04.2022
Roxolid UniX		0.95	resin	acetone 15%, ethyl acetate 25%, butanone 30%	Tube	22	20 g, 55 g	https://www.hornbach.de/data/shop/D04/001/780/491/105/095/6044052_Doc_02_DE_20171221140613.pdf https://www.hornbach.de/data/shop/D04/001	04.04.2022

Product name	Consumption [g/m²]	Density [g/cm³]	Ingredients		Container	% solid	Package Size	Link	Last visit
			Adhesive	Solvent					
								/780/491/105/039/6044052_Doc_01_DE_20170215214656.pdf	
75th percentile		1.0825							

Table 85 Product information on contact glue

Product name	Consumption [g/m²]	Density [g/cm³]	Ingredients		Container	% solid	Package Size	Link	Last visit
			Adhesive	Other					
UHU Kontakt Kraftkleber gel	425	0.85	polychloroprene rubber	Ethyl acetate 25-50%, cyclohexane 1%	tube, can, pot	20	tube: 42 g, 120 g can: 750ml/ 670 g pot: 4,25 kg	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700464801_uhu_kontakt_kraftkleber_gelfoermig_tube_42g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700464801_uhu_kontakt_kraftkleber_gelfoermig_tube_42g.pdf	04.04.2022
UHU Kontakt Kraftkleber flüssig	430	0.86	polychloroprene rubber	methylcyclohexane 10-25%, ethyl acetate 10-25%, butanone 10-25%, Acetone 5-10%	tube, can, pot	25	tube: 42 g, 120 g can: 750ml/ 650 g pot: 4,3 kg	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700460858_uhu_kontakt_kraftkleber_fluessig_tube_120g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700460803_uhu_kontakt_kraftkleber_fluessig_tube_42g.pdf	04.04.2022

Product name	Consumption [g/m²]	Density [g/cm³]	Ingredients		Container	% solid	Package Size	Link	Last visit
			Adhesive	Other					
Pattex CONTACT Kraftkleber Air Classic	100	0.83						https://www.haefele.at/INTERSHOP/static/WFS/Haefele-HAU-Site/-/Haefele/de_AT/documents/01733853_0.pdf?canonicalUrl=%2Fde%2Fprodukt%2Fkontaktkleber-pattex-air-classic-pxs6l-spritzbar%2F00302300%2F	04.04.2022
Pattex CONTACT Kraftkleber Transparent	350	0.87	polyurethan	acetone 75%, n-Butyl acetate 15%	tube, can		tube: 50 g, 125 g can: 650 g	https://epos.henkel.com/media/2cf74f13e474f8c20680f79e8f5fbf33/Pattex_Kraftkleber_Transparent/tds_pattex_kraftkleber_transparent_31_03_2017.pdf https://assets.eshop-live.com/S_4000353445_EN_20180712_en.pdf	04.04.2022

Product name	**Consumption [g/m²]**	**Density [g/cm³]**	**Ingredients**		**Container**	**% solid**	**Package Size**	**Link**	**Last visit**
			Adhesive	Other					
Pattex Gel Compact		0.89	chlorinated rubber	ethyl acetate 20-40%, methylcyclohexane 20-40%	tube, can		tube: 50 g, 125 g can: 300 g, 625	https://epos.henkel.com/media/7a318a721ad721625b6329a4729e2596/Pattex_Kraftkleber_Gel/tds_pattex_contact_kraftkleber_gel_13_03_2017.pdf https://www.sefra.at/fileadmin/user_upload/Pattex%20Kraftkleber%20Gel%20Compact/S_Pattex%20Kraftkleber%20Gel%20Compact.pdf	04.04.2022
Pattex CONTACT Kraftkleber Liquid	350	0.89	polychloroprene rubber	ethyl acetate 20-40%, methylcyclohexane 25-40%	tube, can, pot		tube: 50 g, 125 g can: 650 g bucket: 4,5 kg, 24 kg	https://www.hornbach.de/data/shop/D04/001/780/491/258/07/2560329_Doc_02_DE_20120807102303.pdf https://assets.eshop-live.com/S_4000353435_DE_20210902_de.pdf	04.04.2022

Product name	Consumption [g/m²]	Density [g/cm³]	Ingredients		Container	% solid	Package Size	Link	Last visit
			Adhesive	Other					
Roxolid ContaX		0.85		naphtha 40%, ethyl acetate 25%, cyclohexane 17%, acetone 5%, zinc oxide 3%	tube	25	63 ml, 150 ml	https://www.hornbach.de/data/shop/D04/001/780/491/105/078/6044057_Doc_01_DE_20171221140803.pdf https://www.hornbach.de/data/shop/D04/001/780/491/108/872/6044057_Doc_02_DE_20170725083153.pdf	04.04.2022
Terokal 2444	300	0.89	polychloroprene rubber	cyclohexane 20-40%, ethyl acetate 20-40%, zinc oxide 0.25-2.5%, n-hexane 0.25-2.5%	tube, can, bucket	30	tube: 58 g,175 g can:340 g, 670 g bucket: 5 kg	https://docs.rs-online.com/f2b3/0900766b810816c0.pdf https://www.granit-parts.hu/product/datasheet/sdb/SDB-12026_EN_20141203.PDF	04.04.2022

Product name	**Consumption [g/m²]**	**Density [g/cm³]**	**Ingredients**		**Container**	**% solid**	**Package Size**	**Link**	**Last visit**
			Adhesive	Other					
Decotric Kontaktkleber	250	1		CMI, MIT (3:1)	bucket		700g, 2.5 kg	https://decotric.de/site/assets/files/1849/ti_kontaktkleber.pdf https://media.bahag.com/assets/14/22/1422449_22629580.pdf	04.04.2022
75^{th} percentile	425	0.89							

Table 86 Product information on wood glue

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients		Container	% solid	Package Size	Link	Last visit
			Adhesive	Additive					
Ponal Express	150	1.1	polyvinyl acetate	Benzisothiazolinone 50-500 ppm	bottles, bucket		bottles: 440 g bucket: 10 kg	https://www.hornbach.de/data/shop/D04/001/780/491/258/01/2549986_Doc_02_DE_20120806113838.pdf https://www.haefele.de/prod-live/static/WFS/Haefele-HDE-Site/-/Haefele/en_DE/documents/02226225_0.pdf?canonicalUrl=%2Fen%2Fprodukt%2Fglue-ponal-express-for-bonded-connections%2F00000029000308f800010023%2F	04.04.2022
Ponal Classic	150	1.1	polyvinyl acetate	Benzisothiazolinone 50-500 ppm	bottles, bucket			https://cdn.befestigungsfuchs.de/shop/docs/technisches_datenblatt_ponal_classic.pdf https://www.tbs-online.de/xs_db/xs_dokumente/www/Gesamt/www_Datenblaetter_o	04.04.2022

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients		Container	% solid	Package Size	Link	Last visit
			Adhesive	Additive					
								nline/91/91_119_10--SDB-01-de.pdf	
UHU Holzleim original	200	1.1	polyvinyl acetate	CMI, MIT	bottle	50	bottle: 75 g, 250 g, 750 g	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700485608_uhu_holzleim_original_en_204_d2_ohne_loesungsmittel_flasche_75g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700485608_uhu_holzleim_original_en_204_d2_ohne_loesungsmittel_flasche_75g.pdf	04.04.2022

Product name	Product amount [g/m^2]	Density [g/cm^3]	Ingredients		Container	% solid	Package Size	Link	Last visit
			Adhesive	Additive					
UHU Holzleim express	200	1.13	polyvinyl acetate	CMI, MIT	bottle	58-60	bottle: 75 g, 250 g, 750 g	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700485806_uhu_holzleim_express_en_204_d2_ohne_loesungsmittel_flasche_75g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700485806_uhu_holzleim_express_en_204_d2_ohne_loesungsmittel_flasche_75g.pdf	04.04.2022
UHU Holzleim wasserfest	200	1.1	polyvinyl acetate	CMI, MIT	bottle	51	bottle: 75 g, 250 g, 750 g	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700485103_uhu_holzleim_wasserfest_en_204_d3_ohne_loesungsmittel_flasche_75g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700485103_uhu_holzleim_wasserfest_en_204_d3_ohne_loesungsmittel_flasche_75g.pdf	04.04.2022

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients		Container	% solid	Package Size	Link	Last visit
			Adhesive	Additive					
Ponal Holzleim Wasserfest	150	1.1	polyvinyl acetate	aluminium chloride 1-3%	bottle		75 g	http://www.iconomy.at/internet/pictures/i00561/file_g505p522.pdf https://images.obi.de/PROD/DE/document/250/250343_safety_1.pdf	04.04.2022
Sycofix Holzleim D3 wasserfest	200	1.1	polyvinyl acetate		bottle, tube, bucket	52	bottle: 75 g tube: 250 g bucket: 1 kg, 5 kg	https://www.bauchemie24.de/WebRoot/Store/Shops/61179455/MediaGallery/TDM/Sieder/tm_sycofix_holzleim_d3.pdf https://www.bauchemie24.de/media/wysiwyg/_PDF/Sieder/SDB/sdb_sycofix_holzleim_d3.pdf	04.04.2022
75^{th} percentile	200	1.1							

Table 87 Product information on construction glue

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	solvent	Container	% solid	Package Size	Link	Last visit
Ponal Construct PUR-Express	200	1.48	polyurethane	Diphenyl methane diisocyanate 50-100%	cartridge		440 g	https://cdn.befestigungsfuchs.de/shop/docs/Technisches_Merkblatt_Ponal_Construct_PUR_Express.pdf https://content.ostermann.eu/webcontent/content/hlr-system/pdf-Dokumente/Sicherheitsdatenblaetter/Henkel/SDB_Henkel_PonalConstructPUExpress_DE.pdf	04.04.2022
UHU Montagekleber Super	250	1.28	acrylate	water 35%	bottle, cartridge	65	cartridge: 370 g	https://www.wasklebtwas.de/datasheets/tds/de_tds_4026700479454_uhu_montagekleber_super_kartusche_370g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700479454_uhu_montagekleber_super_kartusche_370g.pdf	04.04.2022

Product name	**Product amount [g/m²]**	**Density [g/cm³]**	**Ingredients**	**solvent**	**Container**	**% solid**	**Package Size**	**Link**	**Last visit**
UHU Montagekleber universal	250	1.5	acrylate	water 25,8%	tube, cartridge	74,2	tube: 200 g cartridge: 440 g	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700478006_uhu_montagekleber_universal_tube_200g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700478006_uhu_montagekleber_universal_tube_200g.pdf	04.04.2022
UHU Montagekleber ultra	200	1.54	silane, trimethoxyvinylsilan 5-10%		tube, cartridge	100	tube: 75 g cartridge: 435 g	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700443103_uhu_ultra_montagekleber_tube_100g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700443103_uhu_ultra_montagekleber_tube_100g.pdf	04.04.2022

Product name	**Product amount [g/m²]**	**Density [g/cm³]**	**Ingredients**	**solvent**	**Container**	**% solid**	**Package Size**	**Link**	**Last visit**
Pattex Montage Kleber Superpower		1.35			cartridge		400 g	https://epos.henkel.com/media/78b81ff3c5d62751e3a60bdf8f29d480/PXS37/tds_pattex_montage_superpower_pxs37_1825900_032015.pdf	04.04.2022
Pattex Montage Kleber Power		1.3			tube, cartridge		tube: 250 g cartridge: 370 g	https://epos.henkel.com/media/e1a25b85fe2b421bb16430aee8850911/PXP25/tds_pattex_montage_power_pxp25_1829589_072015_de.pdf https://dm.henkel-dam.com/is/content/henkel/sds-1829524-at-pattex-montage-power-cartridges-370-g	04.04.2022

Product name	**Product amount [g/m²]**	**Density [g/cm³]**	**Ingredients**	**solvent**	**Container**	**% solid**	**Package Size**	**Link**	**Last visit**
Pattex Montage Kraftkleber spezial	250	1.1	Silane		tube, cartridge			https://epos.henkel.com/media/c7a4618a72ef7dba925e93a8275c6247/PXK29/tds_pattex_montage_special_pxk29_1829531_032015.pdf http://img.nordwest.com/S_4000353472_DE_20151112_de.pdf	04.04.2022
Pattex All Materials		1.6			cartridge		450 g	https://epos.henkel.com/media/1ec3b32bda57c8034e772d26af1175a4/PXA45/tds_pattex_montage_allmaterials_pxa45_1828610_082015_de.pdf	04.04.2022
75^{th} percentile	250								

Table 88 Product information on super glue

Product name	Density [g/cm^3]	Ingredients	Container	% solid	Package Size	Link	Last visit
UHU Sekundenkleber blitzschnell supergel	1.03	cyanoacrylate acid esters	tube	10	3 g, 10 g	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700487206_uhu_sekundenkleber_blitzschnell_supergel_tube_10g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700487206_uhu_sekundenkleber_blitzschnell_supergel_tube_10g.pdf	05.04.2022
UHU Sekundenkleber blitzschnell präzision	1.07	cyanoacrylate acid esters	tube	10	3 g	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700487008_uhu_sekundenkleber_blitzschnell_praezision_fluessig_3g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700487008_uhu_sekundenkleber_blitzschnell_praezision_fluessig_3g.pdf	05.04.2022

Product name	Density [g/cm³]	Ingredients	Container	% solid	Package Size	Link	Last visit
UHU Sekundenkleber blitzschnell Pipette	1.07	cyanoacrylate acid esters	tube	6	3 g, 10 g	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700455700_uhu_sekundenkleber_blitzschnell_pipette_fluessig_3g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700455700_uhu_sekundenkleber_blitzschnell_pipette_fluessig_3g.pdf	05.04.2022
Pattex Sekunden Alleskleber Ultragel	1.1	ethyl cyanoacrylate 80-100%	tube		3 g, 10 g	https://epos.henkel.com/media/7f537f6c8022263ee7171e0eab0e75ea/Pattex_Sekundenkleber_Ultra_Gel_/tds_pattex_diy_sekundenkleber_psg2c_1518040_de.pdf https://asset.conrad.com/media10/add/160267/c1/-/de/000887237SD01/security-datasheet-887237-psg14-10-g.pdf	05.04.2022

Product name	Density [g/cm3]	Ingredients	Container	% solid	Package Size	Link	Last visit
Pattex Sekundenkleber flüssig	1.05	ethyl cyanoacrylate 80%	tube		3 g, 10 g	https://epos.henkel.com/media/a9206e46f7a99850ffbfc97263bd8a97/Pattex_Sekundenkleber_Classic_fluessig/tds_pattex_diy_sekundenkleber_psk1c_1865401_de.pdf https://cdn-s1.lyreco.com/staticswebshop/sds/ENCH/SDS_ENCH_4675031_2015-05-23.pdf	05.04.2022
Pattex Sekundenkleber Plastix flüssig	1.1	ethyl cyanoacrylate 80-100%				https://epos.henkel.com/media/719453e805b2cfe6db70410ceb06b23d/PSA1C/tds_pattex_sekundenkleber_plastix_flssig_psa1c_1865992_052015_de.pdf https://www.handwerker-versand.de/images/datenblaetter/0001.1865992.3300.de.MSDS_UT_DE.pdf	05.04.2022

Table 89 Product information on adhesive putty

Product name	Density [g/cm^3]	Ingredients	Processing time [min]	Link	Last visit
Pattex Repair Express Powerknete	1.8	BPA 1-20%, BPF 1-10%	15	https://www.hornbach.de/data/shop/D04/001/780/491/138/874/6289288_Doc_01_DE_20170327103950.pdf https://www.hornbach.de/data/shop/D04/001/780/491/138/875/6289288_Doc_02_DE_20170327103954.pdf	05.04.2022
UHU Repair All Powerkitt	2	epoxy resin, polymercaptan, silicate	10	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700467208_uhu_repair_all_powerkitt_minis_6x5g.pdf https://media.bahag.com/assets/39/62/396269_19514996.pdf	05.04.2022
AGT Universal Kraftknete		epoxy resin 15%, silicon dioxide 40%, calcium carbonate 29%, diethylenetriamine 8%, methyl acrylate 5%, pyromellitic dianhydride 3%	15	https://www.pearl.de/pdocs/NX5921_11_150346.pdf https://www.pearl.de/pdocs/NX5921_11_157124.pdf	05.04.2022

Product name	Density [g/cm^3]	Ingredients	Processing time [min]	Link	Last visit
Quicksteel Epoxid Powerknete		2,4,6-tri-(dimethylaminomethyl)phenol 1-5%, aluminium 1-5%	5	https://asset.conrad.com/media10/add/160267/c1/-/de/000479065ML01/bedienungsanleitung-479065-quiksteel-16402eu-epoxid-powerknete-aluminium-57-g.pdf https://asset.conrad.com/media10/add/160267/c1/-/de/000479065SD01/sicherheitsdatenblatt-479065-quiksteel-16402eu-epoxid-powerknete-aluminium-57-g.pdf	05.04.2022
Teroson	1.77			http://tds.loctite.com/tds5/Studio/ShowPDF/TEROSON%20RB%20XI%20D-EN?pid=TEROSON%20RB%20XI%20D&format=MTR&subformat=TERO&language=EN&plant=WERCS	05.04.2022
AGT Universal Super-Kraftknete	1.75	reaction product of BPA and epichlorohydrin resin 10-20%, 2,4,6-tri-(dimethylamonimethyl)phenol) 5-10%, 3-Mercaptopropane-1,2-diol 5-10%		https://www.pearl.de/pdocs/PE-4653.pdf https://www.pearl.de/pdocs/PE4653_11_156613.pdf	05.04.2022
Tesa Tack Klebeknete				https://www.tesa.com/de-de/buero-und-zuhause/tesa-tack-klebeknete.html	05.04.2022
Mean	1.83				
75th percentile	1.95				

Table 90 Product information on wood parquet glue (parquet glued to surface)

Product name	**Product amount [g/m²]**	**Density [g/cm³]**	**Ingredients**	**Container**	**Package Size**	**Link**	**Last visit**
Bostik Parkettklebstoff	1150	1.7	silane polymer (trimethoxyvinylsilane)	bucket		https://www.hornbach.de/data/shop/D04/001/780/492/638/94/7771579_Doc_02_DE_20170324110458.pdf https://www.hornbach.de/data/shop/D04/001/780/492/638/52/7771580_Doc_01_DE_20170327105316.pdf	05.04.2022
Ponal Flächenkleber	800	1.6		bucket	4 kg, 8 kg	https://cdn.befestigungsfuchs.de/shop/docs/technisches_datenblatt_ponal_parkett_flaechenkleber.pdf	05.04.2022
Soudal Fix All Floor and Wall	1000	1.67		bucket		https://www.soudal.co.uk/sites/default/files/soudal_api/document/F0018142_0001.pdf http://www.soudal.com.au/pdf/SDS%20-%20Fix%20ALL%20Floor%20&%20Wall.pdf	05.04.2022
Bona Home Parkettklebstoff	1000	1.51	trimethoxyvinylsilan	bucket		https://www.bona.com/de/produkte/privatkunden/holzbodenrenovierung/parkett-klebstoffe/bona-parkettklebstoff-10kg/ https://www.bona.com/global	05.04.2022

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	Container	Package Size	Link	Last visit
						assets/catalogassets/sds-bona-home-wood-floor-adhesive---default-english-gb.pdf	
Sika Bond Parkettkleber		1.3	isophoronedialdimine, 1,6-hexanedialdimine			https://www.leyendecker.de/fileadmin/62leyendecker/medien/Service/Lieferantenverzeichnis/Sika/produktdatenblatt_SikaBond-54_Parquet.pdf https://deu.sika.com/content/dam/dms/deaddconst01/6/SDB%20SikaBond-54%20Parquet_DE.pdf	05.04.2022
RETOL BASE Fusion 2K PU	1100		PU, isocyanate			https://www.retol.de/base-fusion-2k-pu-plus	05.04.2022
Lechner Parkettklebstoff 2-K PU	1200	1.55	PU			https://pehl-gruppe.de/fileadmin/template/downloads/parquet_glue/Parkettklebstoff_2-K-PU_02.pdf	05.04.2022
Parat 2-K PU Parkettkleber	1100	1.7				https://www.hinterseer.com/datenblatt/produktdatenblatt/hinterseer/parat/Produktdatenblatt%20PARAT%202%20kp-u.pdf	05.04.2022
75^{th} percentile	1150	1.7					

Table 91 Product information on wood parquet glue (floating parquet)

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	Container	Package Size	Link	Last visit
Ponal Fugenleim	15 g/serial meter	1.1	polyvinyl acetate, aluminium chloride	bottle		https://www.sahlberg.de/tradepro/shop/artikel/allgemein/Ponal_PN12P_PN42P.pdf https://www.raiffeisen.com/agrar_sdb/26095/abb3e148004c7c2e5d04c4d2dfdc3493?variante=	05.04.2022
Würth Parkettleim	37.5	1.13	2-(2-butoxyethoxy)ethyl acetate	bottle	750 g	https://www.klickparts.com/out/media/2455950.pdf http://ehs.wuerth.com/ehs4customers/export/01772246.PDF	05.04.2022
Prinz Parkettleim	33.33			bottle	1000 g	https://www.hornbach.de/shop/Parkett-Leim-1000-g/5099407/artikel.html https://www.hornbach.ch/data/shop/D04/001/780/491/058/665/5099407_Doc_02_CH_20161224011653.PDF	05.04.2022
Stauf Kaltleim	30			bottle	750 g	https://www.parkett-aktion.com/de/zubehoer/parkett-verlege-zubehoer/parkettkleber/parke	05.04.2022

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	Container	Package Size	Link	Last visit
						ttleim.html https://stauf.de/fileadmin/import/files/121200/de/safety/STAUF%20Kaltleim_(D)_121200.PDF	
75th percentile	37.5						

Table 92 Product information on carpet glue

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	Container	Package Size	Remarks	Link	Last visit
Decotric Kleber für Teppich und PVC	450	1.3	synthetic resin dispersion, natural resin ester, MCI/MIT (3:1), BIT	can, bucket	can: 750g bucket: 3kg, 5kg, 10kg		https://decotric.de/site/assets/files/1860/ti_d_kleber_fur_teppich_und_pvc.pdf https://decotric.de/site/assets/files/1860/sd_d_kleber_fur_teppich_und_pvc.pdf	05.04.2022

Product name	Product amount [g/m^2]	Density [g/cm^3]	Ingredients	Container	Package Size	Remarks	Link	Last visit
Bostik Multi Klebstoff	650	1.3	synthetic resin dispersion, MCI/MIT (3:1), BIT	can, bucket	can: 850g bucket: 3.5kg, 7kg, 14kg	Consumption is worst case for "toothing B2"; further data: toothing B1=400 g/m^2; A2=300 g/m^2	https://www.bostik.com/files/live/sites/shared_bostik/files/import-germany/tm-sf-711-multi-klebstoff--de-.pdf https://www.hornbach.at/data/shop/D04/001/780/492/638/56/7771585_Doc_01_DE_20130315172944.pdf	05.04.2022
Pattex Teppich und PVC Kleber Universal	650	1.45	MCI/MIT (3:1) 1,5-15 ppm, BIT 50-500 ppm	can, bucket	can: 1kg bucket: 4kg, 6.6kg, 15kg	Consumption is worst case for "toothing B2"; further data: toothing B1=450 g/m^2; A3=370 g/m^2	https://epos.henkel.com/media/9a7654610d4e4d62db2e97f93a0afc5d/PTK01/tds_pattex_boden_teppichpvc_kleber_ptk01_1493277_de.pdf https://static.toom.de/produkte/docs/sicherheitsdatenblatt_PTK01.pdf	05.04.2022

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	Container	Package Size	Remarks	Link	Last visit
Decotric Vliesfixierung für Teppichböden	200	1.2	synthetic resin dispersion, natural resin, MCI/MIT (3:1), silica sand	bucket	3 kg, 5 kg, 10k g		https://www.decotric.de/site/assets/files/1870/ti_d_vliesfixierung_fur_teppichboden.pdf https://decotric.de/site/assets/files/1870/sd_d_vliesfixierung_fuer_teppichboeden.pdf	07.04.2022
Decotric Fixierung für Teppich und PVC	250	1.2	synthetic resin dispersion, natural resin, MCI/MIT (3:1)	can, bucket	can: 750 g bucket:3 kg, 5 kg, 10 kg		https://decotric.de/site/assets/files/1865/ti_d_fixierung_fur_teppich_und_pvc.pdf https://decotric.de/site/assets/files/1865/sd_d_fixierung_fuer_teppich_und_pvc.pdf	07.04.2022
MEM Teppich Kontaktkleber	300	1.1	BIT, MIT, zinc oxide 1-3%, potassium salt 1-3%	bucket	750 g, 5.5 kg		https://mem.de/sites/diy_mem/files/2017-11/tm-mem-teppich-kontaktkleber-01.pdf http://www.baupirat.de/manuals/SDB%20300122.pdf	07.04.2022

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	Container	Package Size	Remarks	Link	Last visit
Thomsit T440 Dispersions-Teppichkleber	650	1.45		bucket	15 kg	Consumption is worst case for "toothing B2"; further data: toothing B1=450 g/m²; A2=370 g/m²	https://doc.pci-augsburg.com/php/index.pdf?download&pfile=0_30986_1&prod=4358&lang=0&check=3e6cbbcb122d08d87e1624f701c93f99&changed=1606950000 https://doc.pci-augsburg.com/php/index.pdf?download&pfile=0_35564_1&prod=4358&lang=0&check=5f48f78d174f543b36c100f17876c9c9&changed=1618783200	07.04.2022
M-Plus Multi Kleber Plus	650	1.44		bucket	12 kg	Consumption is worst case for "toothing B2"; further data: toothing B1=450 g/m²; A2=350 g/m²	https://www.m-plus.de/fileadmin/user_upload/m_plus/m_plus_katalog/zubehoer/bauchemie_boden/2019/downloads/10_M_Plus_TM-Multi-Kleber_Plus.pdf https://www.m-plus.de/fileadmin/user_upload/m_plus/m_plus_katalog/zubehoer/bauchemie_boden/2019/downloads/mplus_boden_bauchemi	07.04.2022

Product name	**Product amount [g/m²]**	**Density [g/cm³]**	**Ingredients**	**Container**	**Package Size**	**Remarks**	**Link**	**Last visit**
							e_multikleber_sicherheitsdatenblatt.pdf	
75th percentile	650	1.4475						

Table 93 Product information on tile glue (powder)

Product name	Product amount [kg/m²] (toothing 6mm)	Density [g/cm³]	Ingredients	Water consumption l/kg	Maturing time (min)	Processing time [min]	Hardening time [h]	Container	Package Size	Remarks	Link	Last visit
PCI Carrament	4.7-8.1		cement, mortar, Portland cement		3	60	24	sack	25 kg		https://www.hornbach.de/data/shop/D04/001/780/495/995/11/3818469_Doc_02_DE_20150407105433.pdf https://www.fliesendiscount.de/media/pdf/f5/53/4b/Sicherheitsdatenblatt-PCI-1139-Carrament.pdf	07.04.2022
Akkit Flexkleber	2		Portland cement 25-50%	0.34		240	72	box, sack	box: 5 kg sack: 25 kg	Mixing time: at least 3 minutes	https://www.hornbach.de/data/shop/D04/001/780/491/824/97/8582242_Doc_02_DE_20140129140428.pdf https://www.hornbach.de/data/shop/D04/001/780/491/787/78/8582242_Doc_01_DE_20160411141551.pdf	07.04.2022
Lugato Flexkleber	2.6	2.9-3.2	Portland cement 30-34%, calcium formate	0.26	5	300	48		30 kg		https://www.lugato.de/fileadmin/user_upload/s_f_tm_d_RZ_20150520_lr.pdf https://www.lugato.de/fileadmin/user_upload/s_f_tm_d_RZ_20150520_lr.pdf	07.04.2022
Lugato Sicherheitskleber Flexibel	2.4	2.9-3.2	Portland cement 30-50%, calcium formate 2,5%	0.26	5	360	7 d		5 kg, 25 kg		https://www.lugato.de/fileadmin/user_upload/DE/Produkte/SKF/skf_TM_2015_04.pdf https://www.lugato.de/fileadmin/user_upload/ZG__RBSA_SKF_SKF430_SKG_ZE_04.16.pdf	07.04.2022
Knauf Flexkleber schnell	2.2		silica sand, polyvinyl acetate, cellulose ether, Portland cement, limestone meal	0.22	5	30	7 d	sack	20 kg		https://www.knauf.de/diy/produkte/flexkleber-schnell.html#showtab-tab_36245_4 https://media.bahag.com/assets/58/29/582995_20382240.pdf	07.04.2022
75th percentile	2.55			0.32	5							

Table 94 Product information on wallpaper glue for normal wallpaper

Product name	Product amount [g/m^2]	Coverage [m^2] (125 g)	Ingredients	Package Size	Water consumption [l/125 g powder]	Maturing time [min]	Link	Last visit
Metylan Normal Kleister	3.125	40	methyl cellulose	125 g	7.5	20	https://epos.henkel.com/media/fb5eeb704d10eddd07f428f892e66d6d/Metylan_Normal/tds_metylan_kleister_mk40_72205_de.pdf https://asset.re-in.de/add/160267/c1/-/de/000890286SD02/SI_Metylan-normal-Tapetenkleister-MK40-125g.pdf	07.04.2022
OBI Kleister normal	5		methyl cellulose, polyvinyl acetate, starch ethers	125 g	3.125	30	https://images.obi.de/PROD/DE/document/604/604364_datasheet_1.pdf	07.04.2022
Swin Decor Tapetenkleister	3.125	40		125 g	7.5		https://www.bauhaus.info/tapetenkleister/swing-decor-tapetenkleister/p/15358984 https://media.bahag.com/assets/14/25/1425036_22636173.pdf	07.04.2022

Table 95 Product information on hot-melt adhesive

Product name	Density [g/cm^3]	Ingredients	Working temperature	% solid	Package Size	Remarks	Links	Last visit
UHU Klebepatronen Hot Melt		ethylene-vinyl acetate	200 °C	100	200 g, 500 g		https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700478655_uhu_klebepatronen_hot_melt_transparent_200g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700478655_uhu_klebepatronen_hot_melt_transparent_200g.pdf	07.04.2022
UHU Klebepatronen Low Melt		ethylene-vinyl acetate	110 °C	100	125 g, 200 g, 500 g		https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700486308_uhu_klebepatronen_low_melt_transparent elastisch_200g.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700486308_uhu_klebepatronen_low_melt_transparentelastisch_200g.pdf	07.04.2022

Product name	Density [g/cm^3]	Ingredients	Working temperature	% solid	Package Size	Remarks	Links	Last visit
Pattex Hot Sticks transparent	0.98	ethylene-vinyl acetate, hydrocarbon resin	200 °C		200 g, 500 g, 1 kg	20 g per stick	https://dm.henkel-dam.com/is/content/henkel/tds-827353-at-pattex-hot-sticks https://www.hostra.at/fileadmin/templates/pdf/produkte/sicherheitsdatenblaetter/henkel/Pattex_Hot_Sticks_transparent.PDF	07.04.2022
3M Hot Melt Adhesive	0.97	ethylene-vinyl-acetate 55-75%, hydrocarbon resin 25-45%	121-132 °C 177-196 °C	100			https://multimedia.3m.com/mws/media/1245168O/3m-hot-melt-adhesive-3747-3779-3789-3797-technical-data-sheet.pdf https://multimedia.3m.com/mws/mediawebserver?mwsId=SSSSSuUn_zu8lZNU4x_Um8_e5v70k17zHvu9lxtD7SSSSSS--	07.04.2022

Table 96 Product information on glue from spray

Product name	Product amount [g/m^2] application both sided	Density [g/cm^3]	Ingredients	% solid	VOC [%]	Package Size	Link	Last visit
UHU Sprühkleber	90	0.9	dimethyl ether 25-50%, butane 10-25%, ethanol 5-10%, propane 5-10%	24	76	200 ml, 500 ml	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700467406_uhu_spruehkleber_permanent_transparent_spruehdose_200ml.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700467406_uhu_spruehkleber_permanent_transparent_spruehdose_200ml.pdf	07.04.2022
UHU Sprühkleber 3 in 1	150	0.75	styrene butadiene rubber, naphtha 50-80%, dimethyl ether 25-50%, n-hexane 2,5%	13.5	86.5	200 ml, 500 ml	https://www.wasklebtwas.de/datasheets/tds/en_tds_4026700489002_uhu_spruehkleber_3_in_1_permanent_korrigierbar_wieder_abloesbar_spruehdose_200ml.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700489002_uhu_spruehkleber_3_in_1_permanent_korrigierbar_wieder_abloesbar_spruehdose_200ml.pdf	07.04.2022
Pattex Powerspray permanent	250	0.72	styrene butadiene rubber, methyl acetate 25%, n-butane 20%, propane			400 ml	https://epos.henkel.com/media/44d8764447b4bf4d4cedcb0f17757a4b/PXSP6/tds_pattex_spruehkleber_powersprayperma	07.04.2022

Product name	Product amount [g/m²] application both sided	Density [g/cm³]	Ingredients	% solid	VOC [%]	Package Size	Link	Last visit
			10%, isobutane 5%, ethyl acetate 5%				nent_pxsp6_272776_de.pdf https://dm.henkel-dam.com/is/content/henkel/sds-272776-at-pattex-spray-permanent-can-400-ml	
Pattex Powerspray korrigierbar	250	0.72	styrene butadiene rubber, dimethyl ether 70%, ethyl acetate 1-10%, n-heptane 1-10%, naphtha 1-10%			400 ml	https://epos.henkel.com/media/f2872817375283bb9d1351ac6ef6328c/PXSC6/tds_pattex_sprhkleber_power_spray_korrigierbar_pxsc6_272827_052015.pdf https://media.bahag.cloud/m/47922/1.pdf	07.04.2022
Tesa Sprühkleber permanent			naphtha <50%, cyclohexane <25%, propane <25%, isobutane <25%, butane <10%	18.7	(83.1)	500 ml	https://www.tesa.com/de-at/files/download/9389335,0,tesa-60021-spray-glue-permanent-en-us.pdf http://www.tesa.de/ueber-uns/zertifizierungen-sicherheitshinweise/sicherheitsdatenblaetter-msds	07.04.2022

Product name	Product amount [g/m^2] application both sided	Density [g/cm^3]	Ingredients	% solid	VOC [%]	Package Size	Link	Last visit
3M Spraymount	50	0.7	acetone 25-40%, butane 10-20%, propane 10-20%, hydrocarbon C7 7-13%, isobutane 5-10%, hydrocarbons C6 5-10%, pentane 1-5%, 2-methybutane 0.5-2%, n-hexane <1%, cyclohexane <0.5%		88.5		https://content.ostermann.eu/webcontent/content/mamdata/PDF_Daten/Technische_Merkblaetter/Leime/Sonstige_Klebstoffe/740SpaymountTM-EN.pdf http://multimedia.3m.com/mws/mediawebserver?mwsId=SSSSSuUn_zu8lZ0ZM8m1M82Z5v7zg17zHvu9lxUb7SSSSSS--	07.04.2022
Tensospray		1	butane 25-50%, isobutane 10-25%, methylal 10-25%, ethanol 10-25%, propane 2.5-10%, glycerol rosinate 2.5-10%, paraffin <1%				https://www.svggermany.de/media/pdf/ae/eb/2e/sdb_tensospray.pdf	07.04.2022
3M Super77 Classic		0.7	cyclohexane 10-30%, naphtha 10-30%, dimethyl ether 7-13%, isobutane 7-13%, propane 7-13%, hexane <1%	25	75		http://multimedia.3m.com/mws/media/826598O/datasheets-klebstoffe-spruhklebstoffe.pdf https://multimedia.3m.com/mws/mediawebserver?mwsId=SSSSSuUn_zu8l00x4x_ZM8_1Pv70k17zHvu9lxtD7SSSSSS--	07.04.2022
75th percentile	250	0.8625		24.75				
Mean	158							

Table 97 Product information on joint sealants

Product name	Product amount [ml/serial meter] for 5mm*5mm and 6mm*6mm joints	Density [g/cm^3]	Ingredients	VOC [%]	Package Size	Remarks	Link	Last visit
Probau Bau- und Fenster-Silikon	25	1	silicone, naphtha 10-30%, butanone oxime 1%,	0	310 ml	5 mm*5 mm joint	http://www.probau.eu/uploads/tx_probauprodukte/TI-Probau%20Bau-%20und%20Fenster-Silikon_%28DE%29.pdf http://www.probau.eu/uploads/tx_probauprodukte/SDB-27681_-_PROBAU_Bau-_und_Fenster-Silikon_%28DE%29.pdf	08.04.2022
Probau Acryl eco	67	1.72	acryl, MCI/MIT (3:1), water 0.5%	1	310 ml	6 mm*6 mm joint	http://www.probau.eu/uploads/tx_probauprodukte/TI-Probau%20Acryl_eco_%28DE%29.pdf https://media.bahag.com/assets/72/22/722299_21054756.pdf	08.04.2022
Soudal Acryrub		1.7	acryl	1	300 ml, 310 ml, 600 ml		http://www.soudal.com/soudalweb/images/products/4078/Acryrub%20P.pdf https://media.contorion.de/content/pdf/soudal/de	08.04.2022

Product name	Product amount [ml/serial meter] for 5mm*5mm and 6mm*6mm joints	Density [g/cm^3]	Ingredients	VOC [%]	Package Size	Remarks	Link	Last visit
							/Acryrub_Pro_P_-_47745de_rev206.pdf	
MEM Dach- und Fugendicht	32.5	1.3	bitumen, naphtha 10-25%	24	300 ml	5 mm*5 mm joint	https://mem.de/sites/diy_mem/files/2017-11/tm-mem-dach-und-fugendicht-01.pdf https://media.bahag.com/assets/79/04/790454_21247938.pdf	08.04.2022
Akkit Sanitär Silikon	32	1.03	polysiloxane (silicone), methylsilantriyl triacetate 1-5%, n-alkane 1-25%		310 ml	5 mm*5 mm joint	https://www.hornbach.de/data/shop/D04/001/780/491/962/14/8582454_Doc_02_DE_20121207090909.pdf https://www.hornbach.de/data/shop/D04/001/780/491/842/01/8582454_Doc_01_DE_20160609131903.pdf	08.04.2022

Product name	Product amount [ml/serial meter] for 5mm*5mm and 6mm*6mm joints	Density [g/cm^3]	Ingredients	VOC [%]	Package Size	Remarks	Link	Last visit
Lugato Riss und Fugen Zu	41.5	1.66	acryl, synthetic resin, natural resin, defoamer		310 ml	5 mm*5 mm joint	https://www.lugato.de/fileadmin/user_upload/DE/Produkte/RFZ/RFZ_TM_2017_03.pdf https://images.obi.de/PROD/DE/document/149/149740_safety_1.pdf	08.04.2022
Knauf Sanitärsilikon	25	1.01	polydimethylsiloxane (silicone)		300 ml	6 mm*6 mm joint	https://images.obi.de/PROD/DE/document/189/189283_datasheet_1.pdf https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwj9o7yk0YP3AhWfR_EDHbqIDvEQFnoECAMQAQ&url=https%3A%2F%2Fmdbapi.knauf.com%2Fv1%2Fpdf_download.php%3Faction%3Ddownload%26a%3D1187974%26c%3D2d96ee4c7f865acc0e58588e179786d0%26p%3Dg&usg=AOvVaw03xNLJZmrwmiGdWfsWt7MX	08.04.2022

Product name	Product amount [ml/serial meter] for 5mm*5mm and 6mm*6mm joints	Density [g/cm^3]	Ingredients	VOC [%]	Package Size	Remarks	Link	Last visit
Soudal Bau- und Fenstersilikon	20	1.23	hydrocarbons C14-C18 1-20%, 2-butanonoxim 0.1-1%		300 ml	6 mm*6 mm joint	http://www.soudal.com/soudalweb/images/products/1183/Bau%20%20Fenster%20Silikon.pdf https://www.newcolors.bz/wp-content/uploads/sites/6/2015/07/Soudal-TM-Silikon-Edilizia-neutral1.pdf	08.04.2022
SHELL information			silicone 65-50%, silicone oil, dialkyl phthalates, high boiling paraffin oil 25-40%, acetoxy, alkoxy, oxime, amine, fumed silica, calcium carbonate, carbon black, catalysts, adhesion promotors, water scavengers, pigments, rheology additive, biocides				Email contact with SHELL	
75th percentile	41.5	1.69						

Table 98 Product information on filler from powder

Product name	Product amount (powder) [g/m^2 and mm]	Density [g/cm^3]	Ingredients	Package Size	Link	Last visit
Molto Moltofill Spachtelpulver	600	1	calcium sulfate 90%	500 g, 1 kg, 2 kg, 5 kg	https://images.obi.de/PROD/DE/document/210/210352_datasheet_1.pdf https://images.obi.de/PROD/DE/document/210/210353_safety_1.pdf	08.04.2022
OBI Füllspachtel	1000	0.75	methyl cellulose, calcium sulfate 90%	500 g, 1 kg, 5 kg, 10 kg, 20 kg	https://images.obi.de/PROD/AT/document/325/325267_datasheet_1.pdf https://images.obi.de/PROD/DE/document/604/604161_safety_1.pdf	08.04.2022
PUFAS Renovierspachtel	1000		calcium carbonate 65-70%, polyvinyl acetate 5-10%, Portland cement 2-2.5%	5 kg, 25 kg	https://pufas.de/site/assets/files/1174/ti_p_pufaplast_renovier-spachtel_r40.pdf https://pufas.de/site/assets/files/1174/sd_p_pufaplast_innen_renovier_spachtel_r40_extrem.pdf	08.04.2022
PUFAS Blitzzement		1.3	silicon dioxide 50-60%, high-alumina cement 20-25%, Portland cement 20-25%, calcium hydroxide 2-2.5%	1 kg, 5 kg	https://pufas.de/site/assets/files/1188/ti_p_blitzzement.pdf https://proma-farben.de/wp-content/uploads/2021/03/Sicher	08.04.2022

Product name	**Product amount (powder) [g/m^2 and mm]**	**Density [g/cm^3]**	**Ingredients**	**Package Size**	**Link**	**Last visit**
					heitsdatenblatt-Pufas-Blitzzement-BZ.pdf	
Decotric Decofill	1000	0.75		2 kg	https://decotric.de/site/assets/files/1946/ti_d_fertigspachtel_tube.pdf https://decotric.de/site/assets/files/1946/sd_d_decofill_fertig_spachtel.pdf	08.04.2022
PUFAS Füllspachtel innen	1000	0.75	calcium sulfate 95-100%	500 g, 1 kg, 5 kg, 10kg, 25kg	https://pufas.de/site/assets/files/1672/ti_p_fuellspachtel_innen.pdf https://pufas.de/site/assets/files/1672/sd_p_fuellspachtel_fsi_innen.pdf	08.04.2022
Rotband Flächenspachtel	800	2.7	calcium sulfate	1 kg, 5 kg, 10 kg, 20 kg	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjnpJyB1IP3AhV1Q_EDHZuzBz4QFnoECAQQAQ&url=https%3A%2F%2Fwww.knauf.de%2Fwmv%2F%3Fid%3D13400&usg=AOvVaw2C_efB7oCsqVpBlXwV67lt https://www.hornbach.de/data/shop/D04/001/780/491/818/45/7	08.04.2022

Product name	Product amount (powder) [g/m^2 and mm]	Density [g/cm^3]	Ingredients	Package Size	Link	Last visit
					928823_Doc_01_DE_20120914115434.pdf	
Modulan Reparaturspachtel	900	2.62	calcium sulfate 80%, methyl cellulose, limestone meal 20%		https://www.hornbach.de/data/shop/D04/001/780/496/322/53/5803366_Doc_01_DE_20151204112514.pdf https://www.hornbach.de/data/shop/D04/001/780/496/818/95/5803366_Doc_03_DE_20170721102059.pdf	08.04.2022
75th percentile	1000					

Table 99 Product information on large hole filler (ready to use)

Product name	Product amount [g/m^2 and mm layer thickness]	Density [g/cm^3]	Ingredients	Package Size	Link	Last visit
Watco Flowpatch Tiefenfüller	2000				https://assets.watco.de/files/initial_import/8237/flowpatch-tiefenfueller-technisches-datenblatt.pdf https://assets.watco.de/files/initial_import/8238/flowpatch-tiefenfueller-sicherheitsdatenblatt.pdf	08.04.2022
Molto Holz Universal Spachtel Plus (liquid wood)		0.6	styrol acrylate, dolomite, water, CIT, MIT	500 ml	http://www.molto.de/files/2015/03/Holz-Universal-Spachtel-Plus-M%C3%A4rz-2015.pdf https://images.obi.de/PROD/DE/document/427/427897_safety_1.pdf	08.04.2022
Molto Tiefenfüller Moltofill Innen-Fertigspachtel (water-based)		0.9	vinyl acetate, styrol acrylate, titanium dioxide, dolomite, water, BIT, CIT, MIT	1 l	https://images.obi.de/PROD/DE/document/490/490172_datasheet_1.pdf https://images.obi.de/PROD/DE/document/490/490172_safety_1.pdf	08.04.2022

Product name	Product amount [g/m² and mm layer thickness]	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
MEM Profi Spachtelmasse (bitumen-based)	1400	1.5	bitumen, BIT, MIT, oxydipropyl dibenzoate	1 kg, 4 kg, 7 kg	https://mem.de/sites/diy_mem/files/2022-01/TM%20MEM%20Spachtelmasse.pdf https://www.handwerker-versand.de/images/EEK/pdfs/MEM_Profi_Spachtelmasse_7_kg.pdf	08.04.2022
Modulan 104 Tiefenfüller (water-based)		1.53	acrylate, limestone, BIT, **ammonia (VOC)**	1 kg	https://www.hornbach.de/data/shop/D04/001/780/496/322/66/5803353_Doc_01_DE_20151204112404.pdf https://www.hornbach.de/data/shop/D04/001/780/496/818/80/5803353_Doc_02_DE_20170721102053.pdf	08.04.2022

Table 100 Product information on filler from tube

Product name	Product amount [g/m² and mm layer thickness]	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
Molto Reparatur Moltofill innen		1.5	vinyl acetate, calcium sulfate, kaoline, propane-2-ol 10-15%, water	330 g, 1 kg	http://www.molto.de/files/2015/03/Innen-Reparatur-Moltofill-M%C3%A4rz-2015.pdf https://www.hornbach.de/data/shop/D04/001/707/980/2570312_Doc_01_DE_20160309121119.pdf	08.04.2022
Modulan 350 Reparaturspachtelmasse	1200		synthetic resin, calcium carbonate, water	330 g, 500 g, 1 kg	https://www.hornbach.de/data/shop/D04/001/780/496/322/54/5803368_Doc_01_DE_20151204112659.pdf https://www.hornbach.de/data/shop/D04/001/780/496/818/99/5803368_Doc_02_DE_20160218154258.pdf	08.04.2022
Modulan 101 Holzreparaturspachtel			styrol acrylate, water	400 g	https://www.hornbach.de/data/shop/D04/001/780/496/322/67/5803352_Doc_01_DE_20151204112351.pdf https://www.hornbach.de/data/shop/D04/001/780/496/818/85/5803352_Doc_02_DE_20160413161504.pdf	08.04.2022
Molto Holz Kitt		1.5	vinyl acetate, titanium dioxide, dolomite, CIT, MIT, BIT	50 ml	https://images.obi.de/PROD/DE/document/176/176732_datasheet_1.pdf https://images.obi.de/PROD/DE/document/176/176734_safety_1.pdf	08.04.2022

Product name	**Product amount [g/m^2 and mm layer thickness]**	**Density [g/cm^3]**	**Ingredients**	**Package Size**	**Link**	**Last visit**
OBI Fertigspachtel	1200	1.7		400 g, 1 kg, 4 kg	https://images.obi.de/PROD/DE/document/991/991381_datasheet_1.pdf https://images.obi.de/PROD/AT/document/774/774109_safety_1.pdf	08.04.2022
PUFAS Instant Spachtel	1700	1.7	CIT:MIT (3:1), styrol acrylate	400 g, 1 kg, 4 kg, 8 kg, 14 kg	https://pufas.de/site/assets/files/1208/tip_instant_spachtel_si.pdf https://pufas.de/site/assets/files/1208/sd_p_instant-spachtel_si.pdf	08.04.2022
PUFAS Feinspachtel	1800	1.8	CIT:MIT (3:1), acrylate	400 g	https://pufas.de/site/assets/files/1218/tip_feinspachtel.pdf https://pufas.de/site/assets/files/1218/sd_p_fein_spachtel_fe.pdf	08.04.2022
Decofill instant für innen und außen	1700	1.7	CIT:MIT (3:1), styrol acrylate, calcium carbonate	400 g, 1 kg, 4 kg, 8 kg, 14 kg	https://shop.doenges-rs.de/media/pdf/db/91/e5/Datenblatt_DE_4007955333067_20211123.pdf https://shop.doenges-rs.de/media/pdf/a1/a4/40/SDB_DE_4007955333067_20211123.pdf	08.04.2022
75th percentile	1750					
Mean	1520					

Table 101 Product information on putty spray

Product name	Product amount [ml/m^2] 20 µm layer thickness	Density [g/cm^3]	Ingredients	Package Size	Link	Last visit
presto finish Spritzfüller	500	0.92	acrylate, xylol 25-50%, butane 12,5-20%, propane 20-25%, isobutane 5-10%, ethylbenzene 2.5%	150 ml, 400 ml	http://www.motipdupli.com/de/INT/produkte/presto/spezial-spruehlacke/ipg-1123/tm-1123.html http://www.ezentrumbilder.de/rg/pdf/si_de_160126.pdf	08.04.2022
OBI Spritzspachtel	375	0.8	acetone 25-50%, propane 5-10%, butane 10-25%, n-butyl acetate 5-10%, nitrocellulose 2.5-5%, 2-methoxy-1-methylethylacetat 2.5-5%, xylole 2.5-5%, ethyl acetate 2.5-5%, ethanol 1-2.5%	150 ml	https://images.obi.de/PROD/AT/document/792/792467_datasheet_1.pdf https://images.obi.de/PROD/DE/document/145/145566_safety_1.pdf	08.04.2022
Auto K Spritzspachtel Spray		0.8	acetone 25-50%, propane 10-25%, butane 5-10%, n-butyl acetate 5-10%, isobutane 2.5-5%, nitrocellulose 2.5-5%, 2-methoxy-1-methylethylacetate 2.5-5%, xylol 1-2.5%, ethanol 1-2.5%	150 ml, 400 ml	http://typo3.p266885.mittwaldserver.info/fileadmin/download/rez_2/DE/SDBREZ05_-_Aerosol_Spritzspachtel_DE.pdf	08.04.2022
Dupli-Color Lackspray Spritzspachtel	500	0.93	xylol 25-50%, propane 20-25%, butane 12.5–20%, isobutane 5-10%, ethylbenzene 2,5%	150 ml, 400 ml	https://images.obi.de/PROD/DE/document/681/681748_safety_1.pdf	08.04.2022

Product name	Product amount [ml/m²] 20 µm layer thickness	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
ColorMatic Spritzspachtel	320	0.795	xylol 20-25%, propane 12.5-20%, butane 10-12.5%, isobutane 5-10%, naphtha 5-10%, acetone 5-10%, butane-1-ol 1-2.5%	400 ml	http://www.motipdupli.com/de/INT/produkte/colormatic/aerosole-spachtel/fuellern/ipg-1224/tm-1224.html https://cdn.oavg.at/SDB/Motip%20Dupli/856570_-_COLORMATIC_1K_SPRITZSPACHTEL_400_ML_(DE).pdf	08.04.2022
Kwasny Spraymax		0.93	dimethyl ether 25-50%, ethyl acetate 25-50%, n-butyl acetate 5-10%, barium sulfate 5-10%		https://download.kwasny.com/datasheets/TMB-3680058_(US)EN.pdf http://download.kwasny.com/datasheets/SDBREZ312_-_Aerosol_%28SM%29_1K_Spritzspachtel_DE.pdf	08.04.2022
75^{th} percentile	500	0.93				
Mean	423.75					

Table 102 Product information on floor equaliser

Product name	Product amount [kg/m² and mm layer thickness]	Ingredients	Water consumption [l/kg powder]	Package Size	Link	Last visit
Baumit Ausgleichsmasse extrem	1.7	Portland cement 10-20%	0.22	25-kg bag	https://www.hornbach.de/data/shop/D04/001/780/493/795/03/7700178_Doc_01_DE_20171212120200.pdf https://www.hornbach.de/data/shop/D04/001/780/491/284/779/7700178_Doc_08_DE_20171208212625.pdf	08.04.2022
Akkit Ausgleichsmasse	1.6	Portland cement 2.5-5%, calcium sulfate 2.5-5%	0.2	25-kg bag	https://www.hornbach.de/data/shop/D04/001/780/491/824/96/8582240_Doc_02_DE_20140129140419.pdf https://www.hornbach.de/data/shop/D04/001/780/491/787/77/8582240_Doc_01_DE_20160411141437.pdf	08.04.2022
Lugatu Neu auf Alt	1.5	cement, quartz sand, defoamer	0.225	20-kg bag	https://www.lugato.de/fileadmin/user_upload/naa_tm_EN_rz_20200214.pdf https://www.lugato.de/fileadmin/user_upload/N-	08.04.2022

Product name	Product amount [kg/m² and mm layer thickness]	Ingredients	Water consumption [l/kg powder]	Package Size	Link	Last visit
					ZP__FFM_NAA_F_FS_UA-A_08.14_1_.pdf	
Knauf Bodenausgleichsmasse	1.6	Portland cement 20%, quartz and limestone, polyvinyl acetate, cellulose ether	0.17	20-kg bag	https://media.bahag.cloud/m/53617/1.pdf https://images.obi.de/PROD/DE/document/925/925209_safety_1.pdf	08.04.2022
Quick-Mix Nivellierspachtel Schnell	1.7	Portland cement 10-25%, calcium hydroxide 2.5%	0.25	20-kg bag	https://images.obi.de/PROD/DE/document/672/672806_datasheet_1.pdf https://media.bahag.com/assets/39/95/399576_19516705.pdf	08.04.2022
Probau Nivellierspachtel	1.3	Portland cement 25-50%, quartz 25-50%	0.3	20-kg bag	https://www.bauhaus.info/ausgleichsmasse/probau-nivellierspachtel-schnell/p/13911062 https://media.bahag.com/assets/76/35/763597_21349194.pdf https://media.bahag.com/	08.04.2022

Product name	Product amount [kg/m^2 and mm layer thickness]	Ingredients	Water consumption [l/kg powder]	Package Size	Link	Last visit
					assets/78/99/789992_21271535.pdf	
Quick-Mix Bodenausgleichsmasse	1.6	Portland cement 25-50%			https://images.obi.de/PROD/DE/document/707/707619_datasheet_1.pdf https://media.bahag.com/assets/43/87/438769_19602362.pdf	08.04.2022
75th percentile	1.7		0.2625			

Table 103 Product information on wall plaster (ready-to-use)

Product name	**Product amount [kg/m²] and 2 mm layer thickness**	**Density [g/cm³]**	**Grain size [mm]**	**Ingredients**	**Package Size**	**Link**	**Last visit**
Knauf Easyputz	1.9	1.45	1	calcium aluminate sulfate, synthetic resin, limestone, titanium dioxide, methyl cellulose	10-kg bucket	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwia456p44P3AhW6Q_EDHZkjBHgQFnoECA8QAQ&url=https%3A%2F%2Fwww.knauf.de%2Fwmv%2F%3Fid%3D13333&usg=AOvVaw0gkwa5BN-H8TpqsSdoyh7B https://media.bahag.com/assets/58/29/582905_20280484.pdf	08.04.2022
Schöner Wohnen Trendstruktur Feinputzoptik	1.9	1.85	0.5	BIT, MIT, Vinyl acetate-Ethylene-Copolymer Dispersion, titanium dioxide, calcium carbonate, water	8-kg bucket	https://media.bahag.cloud/m/740954/1.pdf https://media.bahag.com/assets/98/43/984348_21948225.pdf	08.04.2022

Product name	Product amount [kg/m²] and 2 mm layer thickness	Density [g/cm³]	Grain size [mm]	Ingredients	Package Size	Link	Last visit
Hornbach StyleColor Effect White	1.4	1.5		styrene-acrylate dispersion, calcium carbonate, titanium dioxide, MIT, BIT, water	10-kg bucket	https://www.hornbach.de/data/shop/D04/001/780/491/696/50/8539484_Doc_02_DE_20150810113851.pdf https://www.hornbach.de/data/shop/D04/001/780/491/696/48/8539484_Doc_01_DE_20171211153755.pdf	08.04.2022
HORNBACH StyleColor HOLZ-EFFEKT	1	1.62		acrylate dispersion, calcium carbonate, BIT 0.1%, MIT 0.1%, water	10-kg bucket	https://www.hornbach.de/data/shop/D04/001/780/491/108/304/6280268_Doc_01_DE_20170218011650.pdf https://www.hornbach.de/data/shop/D04/001/780/491/110/676/6280268_Doc_02_DE_20171211160128.pdf	08.04.2022
Alpina Kreativputz	1.3	1.3		styrene-acrylate, polystyrene-acrylate, titanium dioxide, calcium carbonate, silicate, MIT, BIT	10-kg bucket	https://www.hornbach.de/data/shop/D04/001/780/494/390/97/8266211_Doc_04_DE_20170213063757.pdf https://www.hornbach.de/data/shop/D04/001/780/4	08.04.2022

Product name	Product amount [kg/m²] and 2 mm layer thickness	Density [g/cm³]	Grain size [mm]	Ingredients	Package Size	Link	Last visit
						94/390/38/8266211_Doc_03_DE_20160922082927.pdf	
Swingcolor Roll-und Streichputz	3.5	1.65	1	Dispersion of acrylate copolymers, titanium dioxide, MIT, BIT	20-kg bucket	https://media.bahag.com/assets/11/24/1124312_22135880.pdf https://media.bahag.com/assets/11/61/1161624_22186760.pdf	08.04.2022
Lugato Feiner Flächenspachtel	4		1	BIT, synthetic resin dispersion	5-kg bucket	https://www.lugato.de/fileadmin/user_upload/DE/Produkte/FFSP/FFSP_TM_2017_04.pdf https://www.lugato.de/fileadmin/user_upload/FFSP_12.14.pdf	08.04.2022
75th Percentile	3.5	1.7					

Table 104 Product information on wall plaster (powder)

Product name	Product amount [kg/m^2] and 2 mm layer thickness	Density [g/cm^3]	Grain size [mm]	Ingredients	Water consumption [l/kg powder]	Remarks	Link	Last visit
Knauf Mineralputz (2 mm grain size)	2.5		2	lime hydrate, Portland cement, limestone meal, quartz sand, white pigment, methyl cellulose, vinyl acetate copolymers	0.2		https://images.obi.de/PROD/AT/document/713/713004_datasheet_1.pdf https://images.obi.de/PROD/DE/document/322/322459_safety_1.pdf	08.04.2022
Baumit Münchner Rauputz	1.6		0-3	quartz sand, lime, white cement, pigments	0.26		https://baumit.de/files/de/pdf_files/pds_22693_classico_mrp__mnchner_rauputz_mrp_de.pdf https://baumit.de/files/de/pdf_files/sdbl_muenchner_rauputz_mrp.pdf	08.04.2022
Knauf Haftputzgips	1.6			calcium hydroxide, calcium sulfate	0.66		https://images.obi.de/PROD/AT/document/174/174162_datasheet_1.pdf https://images.obi.de/PROD/DE/document/671/671751_safety_1.pdf	08.04.2022
Knauf Fertigputzgips	1.6			calcium hydroxide, calcium sulfate	0.63		https://images.obi.de/PROD/DE/document/671/671752_datasheet_1.pdf	08.04.2022

Product name	**Product amount [kg/m²] and 2 mm layer thickness**	**Density [g/cm³]**	**Grain size [mm]**	**Ingredients**	**Water consumption [l/kg powder]**	**Remarks**	**Link**	**Last visit**
							https://images.obi.de/PROD/DE/document/671/671752_safety_1.pdf	
quickmix Kalkputz	2.8			Portland cement 2.5 – 10%, calcium hydroxide 2.5 – 10%	0.23		https://diy.quick-mix.de/uploads/downloads/TM/Technisches-Merkblatt-quick-mix-KAPU-Kalkputz.pdf https://diy.quick-mix.de/uploads/downloads/SDB/Sicherheitsdatenblatt-quick-mix-KAPU-Kalkputz.pdf	08.04.2022
quickmix Feuchtwandrenovierputz	2.4		0-1	Portland cement 10 – 25%, calcium hydroxide 2.5 – 10%	0.266		https://www.schroeder-bauzentrum.de/quick-mix-FWR-Feuchtwand-Renovierputz-30-kg/p/10090387 https://www.raiffeisen.com/agrar_sdb/15254/2dbadffc19d2165b72a538e75bd50b54?variante=	08.04.2022

Product name	Product amount [kg/m²] and 2 mm layer thickness	Density [g/cm³]	Grain size [mm]	Ingredients	Water consumption [l/kg powder]	Remarks	Link	Last visit
Sakret Sanierungsputz	2.4		0-2	Portland cement 20–50%, calcium hydroxide 3-10%, flue dust 0.05–.5%	0.31		https://images.obi.de/PROD/DE/document/424/424620_datasheet_1.pdf https://images.obi.de/PROD/DE/document/424/424620_safety_1.pdf	08.04.2022
Sakret Unterputz	3.2			Portland cement 10-20%; calcium hydroxide 3-10%	0.25		https://images.obi.de/PROD/DE/document/466/466762_datasheet_1.pdf https://images.obi.de/PROD/DE/document/466/466762_safety_1.pdf	08.04.2022
British Gypsum Thistle Multi-Finish	2.5			calcium sulfate hemihydrate, clay, limestone, quartz, hydrated lime (< 1%)	0.46		https://www.saimaxx.com/media/wysiwyg/product_links/111235/Thistle%20Multi-Finish%20TDS.pdf https://www.british-gypsum.com/documents/safety-data-sheet-sds/british-gypsum-sds-thistle-multifinish.pdf	08.04.2022

Product name	Product amount [kg/m^2] and 2 mm layer thickness	Density [g/cm^3]	Grain size [mm]	Ingredients	Water consumption [l/kg powder]	Remarks	Link	Last visit
British Gypsum Thistle PureFinish	2.5			calcium sulfate hemihydrate, clay, limestone, quartz, hydrated lime (< 1%)	0.46	Not included in 75th percentile calculation because of similarity (defined use, application, amount etc.) to British Gypsum Thistle Multi-Finish	https://www.british-gypsum.com/products/plaster-products/thistlepro-purefinish#documents	08.04.2022
British Gypsum Thistle UniFinish	2.5			calcium sulfate hemihydrate, clay, limestone, quartz, hydrated lime (< 1%)		Not included in 75th percentile calculation because of similarity (defined use, application, amount etc.) to British Gypsum Thistle Multi-Finish	https://www.selcobw.com/media/files/CS507460125%20MSDS%20Information.pdf https://www.buildbase.co.uk/assets/coshh/SDS-Thistle-UniFinish.pdf	08.04.2022
75th percentile	2.8				0.5025			

Table 105 Product information on plaster products suitable for spray application

Product name	**Product amount [kg] for a layer thickness of 1 mm**	**Product density [g/cm^3]**	**Ingredients**	**Water consumption [l/kg powder]**	**Link**	**Last visit**
Powder						
Knauf Mineralputz Diamant	2		lime hydrate, Portland cement, limestone meal, quartz sand, white pigment, methyl cellulose, vinyl acetate-copolymers	0.2	https://www.knauf.de/wmv/?id=13382 https://www.knauf.de/bilder/katalog/33769/Doku_011/mp_75_diamant_de.pdf	08.04.2022
Baumit Münchner Rauputz	1.6		quartz sand, lime, white cement, pigments	0.26	https://baumit.de/files/de/pdf_files/pds_22693_classico_mrp__mnchner_rauputz_mrp_de.pdf https://baumit.de/files/de/pdf_files/sdbl_muenchner_rauputz_mrp.pdf	08.04.2022
quickmix Feuchtwandrenovierputz	2.4		lime, Portland cement	0.266	https://www.schroeder-bauzentrum.de/quick-mix-FWR-Feuchtwand-Renovierputz-30-kg/p/10090387 https://www.raiffeisen.com/agrar_sdb/15254/2dbadffc19d2165b72a538e75bd50b54?variante=	08.04.2022

Product name	Product amount [kg] for a layer thickness of 1 mm	Product density [g/cm^3]	Ingredients	Water consumption [l/kg powder]	Link	Last visit
Sakret Sanierungsputz	2.4		Portland cement 10–50%, flue dust 0.5–2.5%, calcium hydroxide 3–10%	0.31	https://images.obi.de/PROD/DE/document/424/424620_datasheet_1.pdf https://images.obi.de/PROD/DE/document/424/424620_safety_1.pdf	08.04.2022
Ready to use						
Knauf Easyputz	1		calcium aluminate sulfate, synthetic resin dispersion, limestone meal, titanium dioxide, marble grains, methylcellulose		https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwilj_7Y74P3AhWTS_EDHZLeDOUQFnoECBAQAQ&url=https%3A%2F%2Fwww.knauf.de%2Fwmv%2F%3Fid%3D13333&usg=AOvVaw0gkwa5BN-H8TpqsSdoyh7B https://media.bahag.com/assets/58/29/582905_20280484.pdf	08.04.2022
Sakret Dekor Modellierputz	1.5		Portland cement 10–20%; calcium hydroxide 3–10%		https://images.obi.de/PROD/DE/document/661/661548_datasheet_1.pdf https://images.obi.de/PROD	08.04.2022

Product name	Product amount [kg] for a layer thickness of 1 mm	Product density [g/cm^3]	Ingredients	Water consumption [l/kg powder]	Link	Last visit
					/DE/document/661/661548_safety_1.pdf	
Knauf Royal Fertigputz	1.8		lime hydrate, calcium aluminate sulfate, limestone meal, quartz sand, marble grains, methylcellulose		https://images.obi.de/PROD/DE/document/134/134235_specification_1.pdf https://images.obi.de/PROD/DE/document/134/134235_safety_1.pdf	08.04.2022
Toom Roll- und Streichputz	3		synthetic dispersion, pigments, water, isothiazolinone		https://static.toom.de/produkte/docs/TM_T320111.pdf https://static.toom.de/produkte/docs/SDB_T320111.pdf	08.04.2022
Swingcolor Roll- und Streichputz	3.5	1.65	Acrylate copolymer-dispersion, titanium dioxide, calcium carbonate, water, methyl- and benzisothiazolinone (preserving agent)		https://media.bahag.com/assets/11/24/1124312_22135880.pdf https://media.bahag.com/assets/11/61/1161624_22186760.pdf	08.04.2022
Swingcolor Roll- und Kellenputz	3.5	1.65	synthetic dispersion, titanium dioxide, water, methyl- and benzisothiazolinone (preserving agent)		https://media.bahag.com/assets/51/51/515138_20158621.pdf https://media.bahag.com/a	08.04.2022

Product name	Product amount [kg] for a layer thickness of 1 mm	Product density [g/cm^3]	Ingredients	Water consumption [l/kg powder]	Link	Last visit
					ssets/39/76/397673_19515733.pdf	
75th percentile	2.4			0.299		

Table 106 Product information on general coatings

Product name	Product amount [g/m^2]	Density [g/cm^3]	Ingredients	Package Size	Link	Last visit
HORNBACH PU-Bodensiegel	160	1.6	BIT, MIT, polyurethane dispersion, glycol ethers, water, methyl- and benzisothiazolinone (preserving agent)	2.5 l	https://www.hornbach.de/data/shop/D04/001/780/499/377/12/6102433_Doc_01_DE_20160721123313.pdf https://www.hornbach.de/data/shop/D04/001/780/499/535/85/6102433_Doc_02_DE_20170502082105.pdf	08.04.2022
HORNBACH Acryl-Bodenbeschichtung	140		Acrylate dispersion, MIT <0.1%, BIT <0.1%, 3-butoxy-2-propanol 1-5%	2.5 l	https://www.hornbach.de/data/shop/D04/001/780/499/377/18/6102412_Doc_01_DE_20160721123529.pdf https://www.hornbach.de/data/shop/D04/001/780/491/161/570/6102414_Doc_01_DE_20170503214652.pdf	08.04.2022

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
Albrecht Beton- und Garagen-Siegel	120	1.22	polyacrylate, glycol ethers, calcite, talcum, C9 aromatic hydrocarbons 15-20%, 1-methoxy-2-propanol 5-10%, xylenes 5-10%, ethylbenzene 1-5%	2.5 l, 5 l, 10 l	http://www.meffert.com/datenblaetter/Technische-Merkblaetter/TM__Meffert-Marken/ALBRECHT/Albrecht/Bautenlack/TM__ALB_BetonundGaragensiegel.pdf http://www.meffert.com/datenblaetter/Sicherheits-Datenblaetter/SDB__Meffert-Marken_und_Toechter/Sdb-ALBRECHT/Albrecht/SDB_Albrecht_Beton-und_Garagen-Siegel.pdf	08.04.2022
swingcolor 2in1 Flüssigkunststoff	260	1.3	Polyacrylate-dispersion, polyurethane-dispersion, titanium dioxide, silicate, barium sulfate, MIT, BIT		https://media.bahag.com/assets/88/73/887348_21724436.pdf https://media.bahag.com/assets/43/23/432385_19600613.pdf	08.04.2022
OBI Zementbodenbeschichtung	130	1.4	Alkyd resin, acrylic resin, titanium dioxide, naphthenic hydrocarbons 10-15%, C10-C13 hydrocarbons 1-5%, C9-C11 hydrocarbons 1-5%, C15-C20 hydrocarbons, 1-methoxy-2-propanol 1-5%	0.75 l, 2.5 l	https://images.obi.de/PROD/DE/document/603/603418_datasheet_1.pdf https://images.obi.de/PROD/DE/document/602/602622_safety_1.pdf	08.04.2022

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
Renovo Acyrl Bodenbeschichtung	280	1.4	Polyacrylate dispersion, polyurethane dispersion, titanium dioxide, pigments, silicate, barium sulfate, water, MIT,		https://www.hagebau.com/content/produktdatenblaetter/farbe/tm_2833_acryl_bodenbeschichtung_fms.pdf https://www.baumarkt-onlinehandel.de/media/pdf/f6/4c/94/sdb_bril049138_3046.pdf	08.04.2022
Mega Acryl Bodenbeschichtung	260	1.3	Acrylic dispersion, titanium dioxide, silicates, calcium carbonate, water, 2-(2-butoxyethoxy)ethanol 1-10%	5 l, 12.5 l	https://shop.mega.de/medias/2070805-original.pdf?context=bWFzdGVyfHBkZi1kYXRhc2hlZXRzfDM3OTMxOXxhcHBsaWNhdGlvbi9wZGZ8cGRmLWRhdGFzaGVldHMvaGQ3L2g3ZS85MDQ1ODQyMzYyMzk4LnBkZnwzZjhjZDcyODdjNDViMmUyMjJlZDI5MWM1NzdmNjY3NzllMWE5OTMyYjQyMzVjOTI1YjJkMDI5ZWFlNTQxYjQ0 https://shop.mega.de/medias/2883175-original.pdf?context=bWFzdGVyfHBkZi1kYXRhc2hlZXRzfDM3NTE0NnxhcHBsaWNhdGlvbi9wZGZ8cGRmLWRhdGFzaGVldHMvaDZhL2g4ZC85MDg1OTkxOTQ0MjIyLnBkZnw3ZTkyZjRkZDAyMjliMmJmOTE3NTEwZTQzMWQ0ODdhNDAzNzA4MjYy	08.04.2022

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
					OGYwMjAwMWZjZGFiYjEyOWM3NWMzMTdi	
Toom 2 in 1 Garagenbeschichtung	220		epoxy resin, polyamine, pigments, water		https://static.toom.de/produkte/bilder/8210509/technisches_datenblatt_8210509.pdf https://static.toom.de/produkte/bilder/8210509/sicherheitsdatenblatt_8210509.pdf	08.04.2022
Albrecht 2K-Garagen-Siegel	300	1.4	epoxy resin, pigments, polyamines		https://www.meffert.com/datenblaetter/Technische-Merkblaetter/TM__Meffert-Marken/ALBRECHT/Albrecht/Bautenlack/TM_ALB-2K-Garagen-Siegel.pdf https://www.meffert.com/datenblaetter/Sicherheits-Datenblaetter/SDB__Meffert-Marken_und_Toechter/Sdb-ALBRECHT/Albrecht/SDB_Albrecht_2K_Garagensiegel.pdf https://www.meffert.com/datenblaetter/Sicherheits-Datenblaetter/SDB__Meffert-Marken_und_Toechter/Sdb-	08.04.2022

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
					ALBRECHT/Albrecht/SDB_Albrecht_2K_Garagensiegel_HAERTER.pdf	
Mipa 2K WBS Epoxidharz Garagenbodenbeschichtung	250		epoxy resin		https://www.lackundfarbe24.de/s/ti/anleitungen/Anleitung_Bodenbeschichtung_Garage_mit%20_EP_WBS.pdf https://www.mipa-paints.com/d/pi/wbs/WBS2K-EP-Fussbodenfarbe.pdf	08.04.2022
Remmers Epoxy BS 3000 M New	250	1.4	Component A: polyamine adducts 20-40%, titanium dioxide 10-20%; Component B: bisphenol A-epichlorohydrin resin 40-60%, bisphenol F-epichlorohydrin resin 10-20%, 1,6-bis(2,3-epoxypropoxy)hexane 10-20%		http://www.remmers.de/html/doc/sida/SIDA2_6370_DE.pdf http://www.remmers.de/html/doc/sida/SIDA3_6370_DE.pdf	08.04.2022
swingcolor Fußbodenversiegelung RAL 7030	190	1.3	polyaminoamide, titanium dioxide, iron dioxide, grime, barium sulfate, talc, water		https://media.bahag.com/assets/51/48/514852_20154795.pdf https://media.bahag.com/assets/43/40/434073_19601308.pdf	08.04.2022

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
swingcolor Klarversiegelung	100	11.1	epoxy resin, polyamine, water		https://media.bahag.com/assets/51/50/515006_20155838.pdf https://media.bahag.com/assets/39/77/397785_19515790.pdf	08.04.2022
75th percentile	260					

Table 107 Product information on spray coatings

Product name	Product amount [ml/m²]	Curing time [h]	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
Herculiner Spray Beschichtung	380	3	0.97	Acetone, n-Hexane, Xylene	440 ml (425 g)	https://w.grube.de/herculiner-spray-beschichtung-16-272/?number=16-272&gclid=EAIaIQobChMIyvbS_tas7QIVUOJ3Ch0kiABTEAQYCSABEgJSbfD_BwE https://cdn.grube.de/sw/media/pdf/71/36/ce/BA_Herculiner_Ladeflaechenschutz-Spray_16-272_DE_j20.pdf https://cdn.grube.de/sw/media/pdf/c0/e4/70/SD_16-272_entd9UCDf8ZNjfE.pdf	08.04.2022

Product name	Product amount [ml/m²]	Curing time [h]	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
RAPTOR 2K-Spray – weiß	310	1	0.94	Dimethyl ether, 2-Methoxy-1-methyl ethyl acetate; 1-Methoxypropyl acetate-2, Acetone, hexamethylene diisocyanate, oligomers, n-Butyl acetate	400 ml (375 g)	https://www.toplac.de/shop/upol-raptor-2k-spray-weiss https://www.toplac.de/shop/media/pdf/RLBAL-RLWAL%20TDS-DE.pdf https://www.toplac.de/shop/media/pdf/RLWAL-SDS-DE.pdf	08.04.2022
WEICON Kupfer-Spray	120	4-6	1	Acetone, Butane, Ethyl acetate, Naphtha, Propane	400 ml	https://www.hytec-hydraulik.de/werkstatt/weicon-kupfer-spray.html?gclid=EAIaIQobChMIrbWotPOu7QIVk2DmCh0jaQiFEAQYCiABEgJSmvD_BwE https://cdn02.plentymarkets.com/3v3zu571blbu/frontend/Bilder_Weicon/tds_11101400_de_kupfer-spray.pdf https://www.hytec-hydraulik.de/downloads/SHDB_WE_KUPFER.pdf	08.04.2022

Product name	Product amount [ml/m²]	Curing time [h]	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
Rebcon Stainless steel coating spray			1.13	Acetone, Isobutane, Propane, Hydrocarbons C9 aromatics, 2-Methoxy-1-methylethylacetate, Xylole, Butane, Ethyl acetate, Aluminium powder	400 ml (450 g)	https://www.rebshop.de/en/rebcon_edelstahlspray_400ml_spruehdose-wap-el_edelspray0400.html?gclid=EAIaIQobChMIrbWotPOu7QIVk2DmCh0jaQiFEAQYEiABEgLU7PD_BwE https://www.rebshop.de/assets/downloads/WAP-EL-EDELSPRAY0400EDELSTAHLSPRAY-REBCON-75SDB-PDF.pdf	08.04.2022
75^{th} percentile	380		1.1				

Table 108 Product information on paint remover (liquid)

Product name	Product amount [l/m²]	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
Molto Power-Abbeizer	0.33	0.97	n-Butyl acetate, Butanon, Hydrocarbons, C10-C12, isoalkanes, < 2% aromatics, Tridecylethoxylate, 2-Aminoethanol Methanol	500 ml, 1 l, 2.5 l	http://assets.an-platform.com/public/clp_msds/mo/de/de/mo_de_de_power_abbeizer.pdf http://www.molto.at/files/2015/03/Power-Abbeizer-M%C3%A4rz-2015.pdf	08.04.2022

Product name	Product amount [l/m^2]	Density [g/cm^3]	Ingredients	Package Size	Link	Last visit
Hornbach Universal Abbeizer	0.3-0.5	0.986	butyl acetate, dimethyl sulfoxide, naphtha, butanone, Isotridecanol, ethoxylated	750 ml, 2.5 l	https://www.hornbach.de/data/shop/D04/001/780/493/245/94/7002853_Doc_02_DE_20130906180250.pdf https://www.hornbach.de/data/shop/D04/001/707/919/5/7002853_Doc_01_DE_20160921164907.pdf	08.04.2022
Abbeizer 2545	0.3-0.8	0.95-0.99	reaction mass from dimethyl adipate, dimethyl glutarate, dimethyl succinate , hydrocarbons, 2-(2-butoxyethoxy)ethanol, Docusate sodium, Bis(2-ethylhexyl) maleate	750 ml, 2.5 l	http://www.fhg-info.com/produkte/kat17/tm/de/tm_2545_abbeizer.pdf http://www.fhg-info.com/produkte/kat17/sdb-pdfs/de/s2545.pdf	08.04.2022
Abbeizer rasant	0.3-0.6	0.92	n-butyl acetate, dimethyl sulfoxide	375 ml, 750 ml, 2.5 l, 5 l	https://pufas.de/site/assets/files/1415/tip_abbeizer_rasant_r60.pdf https://pufas.de/site/assets/files/1415/sdp_abbeizer_rasant_r60.pdf	08.04.2022

Product name	Product amount [l/m^2]	Density [g/cm^3]	Ingredients	Package Size	Link	Last visit
Bondex Abbeizer	0.33	<1	acetone, 1,3-dioxolane, cyclohexanone, butanone, dimethoxymethane, methanol, Dimethyl glutarate	500 ml	https://www.ppg-media.com/getmedia/9055597e-972d-4a2a-b6ed-d6786e3da986/TM-BONDEX-ABBEIZER.pdf.aspx https://buyat.ppg.com/EHSDocumentManagerPublic/documentSearchInnerFrame.aspx?CodeCondition=IsEqualTo&CodeValue=10140DN00136&Form=4ad72a282a2901960000,4c7ab49eb3d2b13c0000&Language=de-DE&SuppressSearchControls=True&FolderID1=572&SearchAllPublicFolders=False	08.04.2022
Rico Farb- und Graffiti-Entferner	0.4	0.92	n- butyl acetate, dimethyl sulfoxide	750 ml, 2.5 l	https://pufas.de/site/assets/files/1645/ti_rico_farb-und_graffiti_entferner.pdf https://media.bahag.com/assets/39/54/395441_19514575.pdf	08.04.2022
Beko Speed Ex Der Abbeizer	0.3-0.5	0.98	1,3-dioxolane, dimethoxymethane, hydrocarbon C11-C14, methanol, dimethylethanolamine	can: 750-ml bucket: 2.5 l, 5 l	https://www.beko-group.de/beko-group-de/media-web/downloads/de/speed-ex_info_de.pdf https://www.beko-group.de/beko-group-de/media-web/downloads/de/sdb_speed-ex_de.pdf	08.04.2022

Product name	Product amount [l/m^2]	Density [g/cm^3]	Ingredients	Package Size	Link	Last visit
Renovo Abbeizer	0.3-0.8	0.98	reaction mass from dimethyl adipate, dimethyl glutarate, dimethyl succinate, hydrocarbons, 2-(2-butoxyethoxy)ethanol, Docusate sodium, Bis(2-ethylhexyl) maleate	375 ml, 750 ml, 2.5 l	https://www.hagebau.com/content/produktdatenblaetter/farbe/tm_2885_abbeizer.pdf	08.04.2022
PUFAS Abbeizer intensiv	0.3-0.6	1	n-butyl acetate, butanone, dimethyl sulfoxide, Reaction mass of dimethyl adipate and dimethyl glutarate and dimethyl succinate, Isotridecanol, ethoxylated hydrocarbons	750 ml, 2.5 l, 5 l	https://pufas.de/site/assets/files/1411/ti_p_abbeizer_intensiv_p15.pdf https://pufas.de/site/assets/files/1411/sd_p_abbeizer_intensiv_p15.pdf	08.04.2022
Barend Palm Abbeizer	n.a.	0.97	n- butyl acetate, methyl sulfoxide, reaction mass from dimethyl adipate, dimethyl glutarate, dimethyl succinate, naphtha, oxo alcohol	750 ml	https://www.hornbach.de/data/shop/D04/001/780/491/503/199/5816996_Doc_02_DE_20190111051754.pdf	08.04.2022
75^{th} percentile	0.7					

Table 109 Product information on paint remover (powder)

Product name	Product amount [g/m²]	Density [g/cm³]	pH-value	Ingredients	Water consumption [l/kg powder]	Reaction time [min]	Link	Last visit
Molto Abbeizer Pulver (Moltostrip)	1250	0.75	12	sodium carbonate, calcium hydroxide	1.5	10	https://images.obi.de/PROD/DE/document/183/183325_datasheet_1.pdf https://images.obi.de/PROD/AT/document/166/166588_safety_1.pdf	08.04.2022
Pufas Strip Abbeizpulver	500	0.385	13–14	sodium carbonate, calcium hydroxide, calcium oxide, cellulose ether	2	30	https://pufas.de/site/assets/files/1608/ti_p_strip_abbeizpulver.pdf https://pufas.de/site/assets/files/1608/sd_p_strip_abbeizpulver.pdf	08.04.2022
Decotric Strip Abbeizpulver	500	0.4	13	calcium carbonate 40-50%, natrium carbonate 15-20%, calcium oxide 15-20%, cellulose ether	2	30	https://decotric.de/site/assets/files/2063/ti_strip_abbeizpulver.pdf https://decotric.de/site/assets/files/2063/sd_d_strip_abbeizpulver.pdf	08.04.2022
75th percentile	1250	0.75			2	30		

Table 110 Product information on lacquer remover

Product name	**Product amount [g/m²]**	**Density [g/cm³]**	**Ingredients**	**Reaction time [h]**	**Link**	**Last visit**
Molto Power Abbeizer	333	0.97	n-butyl acetate 35-50%, 1-methoxy-2-propanole < 15%, fatty alcohol 1-5%	4	http://www.molto.at/files/2015/03/Power-Abbeizer-M%C3%A4rz-2015.pdf https://www.hornbach.de/data/shop/D04/001/707/917/7/7116598_Doc_01_DE_20170603011659.pdf	08.04.2022
FLT Abbeizer	375	0.98	n-butyl acetate 25-50%, methyl sulfoxide 25-50%, naphtha 3 -< 10%, isotridecanol 2.5%, non-ionic tensides < 5%	3	http://flt-farben.de/media/de/downloads/TM_FLT_Abbeizer_CKW_frei.pdf http://flt-farben.de/media/de/downloads/SDB_FLT_Abbeizer_F300561_20120625_DE.pdf	08.04.2022
Hornbach Universal Abbeizer	500	0.986	n-butyl acetate 50-100%, methyl sulfoxide 25-50%, naphtha 2.5-3%, 2-butanon <2.5%, isotridecanol 2.5%, non-ionic tensides <5%		https://www.hornbach.de/data/shop/D04/001/780/493/245/94/7002853_Doc_02_DE_20130906180250.pdf https://www.hornbach.de/data/shop/D04/001/707/919/5/7002853_Doc_01_DE_20160921164907.pdf	08.04.2022

Product name	Product amount [g/m²]	Density [g/cm³]	Ingredients	Reaction time [h]	Link	Last visit
Clou Lackabbeizer		1.001	dimethyl sulfoxide 30-60%, n-butyl acetate 25-50%,	2 (maximum for wood)	https://www.clou-shop.eu/files/1496402333_510_tm-lack-abbeizer.pdf https://www.hornbach.de/data/shop/D04/001/780/492/146/21/3885136_Doc_01_DE_20120914135519.pdf	08.04.2022
Brennofix Power Abbeizpaste	600	1	non-ionic tensides, benzyl alcohol <25%, 2-(2-butoxyethoxy)ethanol <1%, 1-methoxy-2-propanole <1%, formic acid 10%, fatty alcohol <5%		https://www.lackundfarbe24.de/s/ti/becu/TM_BRENNOFIX_Power.pdf https://www.lackundfarbe24.de/s/ti/becu/SDB_BRENNOFIX_Power.pdf	08.04.2022
Adler Abbeizer "Rote Krähe"	250			4	https://www.adler-lacke.com/Canto/tmb/abbeizer-rote-kraehe_tmb_8310_en.pdf	08.04.2022
75th percentile	550	1.0005				

Table 111 Product information on paint remover spray

Product name	Product amount [l/m²]	Density [kg/m³]	Ingredients	Reaction time [min]	Link	Last visit
Adler Abbeizer Spray	0.5			10	https://img.adler-lacke.com.ua/docs/de/pdf/abbeizer-spray-04-16.pdf https://malerprofi-shop.de/WebRoot/Store23/Shops/e1b25f43-a5c1-458f-8603-355a3f7476aa/MediaGallery/PDF-Dateien/Adler/Sicherheitsdatenblatt/A/Abbeizer_Spray_SDB_8311a_DE.pdf	08.04.2022
Innotec Gasket remover		1210	methylene chloride 75-100%, propane 10-25%, ethanol 3-10%, naphtha 3-10%	10	http://innotec.info/datenblaetter/technik/gasket_remover_technicalinfo.pdf https://www.google.de/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0ahUKEwjjp6TAzKLZAhVCbVAKHeMaD78QFggsMAE&url=http%3A%2F%2Fwww.techno-ag.ch%2Fmedia%2FNTE0Z05D%2F1QMGC5R4_SDB01304000117InnotecGasketRemoverD.pdf&usg=AOvVaw1kLDHUOxATi8RD-30Rt1DJ	08.04.2022
Rico Farbentferner			dimethyl ether 20-40%, n-butyl acetate < 25%, monopropylene glycol methyl ether < 20%, 1-methoxy-2-propanol, dimethyl sulfoxide	10-40	https://www.hornbach.ch/data/shop/D04/001/780/491/015/97/5212946_Doc_02_DE_20120801170445.pdf https://media.bahag.com/assets/78/77/787747_21247246.pdf	08.04.2022

Product name	Product amount [l/m²]	Density [kg/m³]	Ingredients	Reaction time [min]	Link	Last visit
Citristrip Safer Paint and Varnish Stripper			dimethyl glutarate 15-30%, N-Methyl-2-pyrrolidone (2-Pyrrolidinone, 1-Methyl-; 1-Methylazacyclopentan-2-one) 20-40%, dimethyl adipate 15-0%, petroleum gases, Liquefied (propane mixtures) <15%, silica < 5.0%, alcohol ethoxylate (alcohols, C9-11, ethoxylated) < 5.0%		https://cdn.littlehardware.com/items/docs/Klean_Strip_100044834_SDS.pdf	08.04.2022
Cleanstrip Premium Stripper			dichloromethane (methylene chloride; R-30;Freon 30) 60-100%, methanol 15-25%		https://www.whatsinproducts.com/files/brands_pdf/1470584238.pdf	08.04.2022
Jasco-Bix Premium Paint & Epoxy Remover			dichloromethane (methylene chloride; R-30; Freon 30) 60-100%, methanol 10-30%, Stoddard solvent (mineral spirits; aliphatic petroleum distillates; white spirits) 1.0-5.0%		https://www.servicesolutions.mahle.com/media/service-solutions-us/msds/firstspirit_1441892529485jasco-premium-paint-&-epoxy-remover.pdf	08.04.2022
Montana remover			propane 5-10%, butane 5-10%, isobutane <2.5%		https://hlstore.com/produktfiler/sd12269_-_montana_remover_eng.pdf	08.04.2022
Technolit Abbeizspray			dimethoxymethane 50-75%, propane 10-25%, 1,3 dioxolane 10-25%, 2-propanol 3-10%, ethanol 3-10%, 2-aminoethanol 1-2.5%, butanone 1-2.5%, naphtha 1-2.5%		https://eshop.technolit.de/pub/media/documents/TECHNO_001/doc_860010_4361111_Abbeiz_Spray_D-de_sdb.pdf	08.04.2022

Table 112 Product information on wallpaper remover (liquid)

Product name	Product amount [ml/m²] (mixed product)	Density [g/cm³]	Soak in time [min]	Ingredients	Package Size	Remarks	Link	Last visit
Hornbach Raufaser Tapetenablöser		1,03	15	CIT 0.1%, MIT (3:1) 0.1%,	1l		https://www.hornbach.de/data/shop/D04/001/780/497/650/3/2513668_Doc_01_DE_20170704085641.pdf https://www.hornbach.de/data/shop/D04/001/780/491/161/630/2513668_Doc_06_DE_20170502112613.pdf	08.04.2022
Hornbach Tapetenlöser		1.01	15	Isotridecanol 10-25%, Ethanol 3-10%, Tetrapotassium diphosphate 2.5%, Natriumcumolsulfonate 2.5%	250ml, 1l, 2.5l		https://www.hornbach.de/data/shop/D04/001/780/491/234/967/2510078_Doc_03_CH_20170919221656.pdf https://www.hornbach.de/data/shop/D04/001/780/492/022/81/2510067_Doc_04_DE_20160624104653.pdf	08.04.2022
Metylan Aktiv Tapeten Ablöser	102.5	1		fatty alcohol (C12-C14) 5-10%, fatty alcohol (C10-C16) 1-3%, Didecyldimethylammonium chloride 0.01-0.25%, bronopol 0.01-0.25%	500ml, 1l, 5l	10 l water mixed with 250 ml product; sufficient for 100 m^2 (normal wallpaper)	https://epos.henkel.com/media/8b13aa11dbbae77e339ea64fb145af62/Metylan_Aktiv_Tapetenabloeser/tds_metylan_abloeser_mal05_673728_de.pdf https://dm.henkel-dam.com/is/content/henkel/s	08.04.2022

Product name	Product amount [ml/m²] (mixed product)	Density [g/cm³]	Soak in time [min]	Ingredients	Package Size	Remarks	Link	Last visit
							ds-de-metylan-aktiv-tapetenabloeser-konzentrat	
Swing Decor Tapetenablöser		1	15				https://www.bauhaus.info/tapetenabloeser/swing-decor-tapetenabloeser/p/15173437 https://media.bahag.com/assets/39/55/395509_19514611.pdf	08.04.2022
Decotric Tapetenlöser	102.5	1	15	non-ionic tensides, alcohol 20-25%	250 ml, 1l, 5l	10 l water mixed with 250 ml product; sufficient for 100 m^2 (normal wallpaper)	https://images-eu.ssl-images-amazon.com/images/I/61qLpaQXvcS.pdf https://www.raiffeisen.com/agrar_sdb/23097/6c30b90e47a1ad8433df03b8db30a3f4?variante=	08.04.2022
Meyer Tapetenablöser	205	1	15	non-ionic tensides 15-30%, phosphate <5%, isotridecanol 10-25%, ethanole 3-10%, tetrapotassium diphosphate <2.5%, natriumcumolsulfate <2.5%	250ml, 1l, 5l	10 l water mixed with 250 ml product; sufficient for 50 m^2 (normal wallpaper)	https://www.meyer-chemie.de/wp-content/uploads/2019/03/TiMEYERTapetenablser.pdf https://www.meyer-chemie.de/wp-content/uploads/2019/03/sd	08.04.2022

Product name	Product amount [ml/m²] (mixed product)	Density [g/cm³]	Soak in time [min]	Ingredients	Package Size	Remarks	Link	Last visit
							bMEYERTapetenabloeserDE.pdf	
Sycofix Tapetenablöser extra stark	128.125	1	10	non-ionic tensides 15-30%, isotridecanol 10-25%	250ml, 1l	10 l water mixed with 250 ml product; sufficient for 80 m^2 (normal wallpaper)	https://www.bauchemie24.de/WebRoot/Store/Shops/61179455/MediaGallery/TDM/Sieder/tm_sycofix_tapetenabloeser.pdf https://www.bauchemie24.de/WebRoot/Store/Shops/61179455/MediaGallery/SDB/Sieder/sdb_sycofix_tapetenabloeser.pdf	08.04.2022
75th percentile	185.78125					Final Consumption: 185 ml/m^2 *40 m^2 = 7.4 l 7.4 l + 185 ml (Product) = 7.6 l		

Table 113 Product information on wallpaper remover (powder)

Product name	Product amount [ml/m^2] (mixed product)	Soak in time [min]	Ingredients	Package Size	Link	Last visit
Metylan Power Tapetenlöser	300	60	fatty alcohol (C12-C14) 10-20%, fatty alcohol (C10-C16) 1-3%	320 g	https://epos.henkel.com/media/75532a60b5d61e598abc139640f9680c/Metylan_Power_Tapetenabloeser/tds_metylan_abloeser_mal03_1962241_de.pdf https://www.birtelkg.de/SDB/Henkel/MPA40Tapetenabloeser.pdf	08.04.2022

Table 114 Product information on sealant/foam remover

Product name	Product amount [ml/serial meter]	Density [g/cm^3]	Soak in time [min]	Ingredients	Package Size	Link	Last visit
Molto Silikonentferner	30	0.925		Cyclohexanone 35-50%, Dipentene 35-50%	125 ml	http://www.molto.at/files/2015/03/Silikon-Entferner-M%C3%A4rz-2015.pdf http://www.molto.at/files/2016/07/MO_AT_DE_SILIKON_ENTFERNER_TUBE.pdf	08.04.2022

Product name	Product amount [ml/serial meter]	Density [g/cm^3]	Soak in time [min]	Ingredients	Package Size	Link	Last visit
Kluthe Silikonentferner		0.778		[C9-C10, N-Alkane, Iso-Alkane] 75-100%, 2-Methoxy-1-Methylethyl acetate 10-25%	0.5 l, 1 l, 3 l, 6 l, 12 l, 30 l, 58 l, 200 l	https://assets.eshop-live.com/T_4000355824_DE_20140701_de.pdf https://www.hornbach.de/data/shop/D04/001/780/491/199/77/3079434_Doc_01_DE_20160201144430.pdf	08.04.2022
Soudal PU remover		1.5	30-120	2-Amino-ethanol 1-5%	100 ml	https://images.obi.de/PROD/DE/document/921/921335_datasheet_1.pdf https://northe.de/wp-content/uploads/2018/11/SI_PU-Remover_02-2017.pdf	08.04.2022
Lugato Silikonentferner	40	0.9	60-300	[C14-C18, n-Alkane, iso-Alkane] 25-50%, [C11-C14, n-Alkane, Isoalkane] 25-50%, Benzolsulfonacid 10-25%	80 ml	https://www.lugato.de/fileadmin/user_upload/SE_TM_2010_07__korr_.pdf https://www.google.de/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwiK2oPfm5bZAhVS56QKHaWEBL8QFggxMAI&url=https%3A%2F%2Fwww.lugato.de%2Fprodukte%2Fdownload%2Fsicherheitsdatenblatt%2Fse%2F	08.04.2022

Product name	Product amount [ml/serial meter]	Density [g/cm^3]	Soak in time [min]	Ingredients	Package Size	Link	Last visit
						1672%2F&usg=AOvVaw1BTRTrz5nKd4SEQXFR0GgZ	
Akkit Silikonentferner	25	0.875	15	[C11-C14, n-Alkane, Isoalkane] >25%, alcohols C9-11 1-3%		https://cdn.hornbach.de/data/shop/D04/001/780/491/836/080/10313770_Doc_01_DE_20210504151653.pdf https://www.hornbach.de/data/shop/D04/001/780/496/229/01/8638989_Doc_01_DE_20160201145251.pdf	08.04.2022
Mellerud Silikonentferner		0.78		[C9-C11, n-Alkane, Isoalkane] 50-100%, ethyl phosphoric acid ester 5-10%, Isotridecanol 1-2.5%		https://images.obi.de/PROD/DE/document/873/873974_safety_1.pdf	08.04.2022

Product name	Product amount [ml/serial meter]	Density [g/cm^3]	Soak in time [min]	Ingredients	Package Size	Link	Last visit
OBI Silikonentferner	25	0.875	15	orange extract 60-100%, alcohols C9-11 1-5%	100 ml	https://images.obi.de/PROD/DE/document/821/821626_datasheet_1.pdf https://images.obi.de/PROD/DE/document/347/347918_safety_1.pdf	08.04.2022
CRC gasket remover		0.87		acetone 50-60%, petroleum gas 20-30%, N-methyl-2-pyrrolidone 10-20%	300 ml	https://www.motoelectrical.co.uk/uploads/documents/TCA3_GASKETREM.pdf http://docs.crcindustries.com/msds/1003638E.pdf	08.04.2022
75th percentile	37.5	0.91875					
Mean	30	0.94757143					

Table 115 Product information on sealant/foam remover spray

Product name	Density [g/cm^3]	Ingredients	Reaction time [min]	Remarks	Link	Last visit
Holdfast Gorilla sealant remover spray	0.875	petroleum gas > 70-80%, alcohols C9-11 ethoxylated 1-< 10%, butane 20–30%, propane1–10%	10		https://soudal.co.nz/wp-content/uploads/75133-Gorilla-Sealant-Remover-Spray-TDS.pdf https://soudal.co.nz/wp-	11.04.2022

Product name	Density [g/cm^3]	Ingredients	Reaction time [min]	Remarks	Link	Last visit
					content/uploads/75133-Gorilla-Sealant-Remover-Spray-SDS.pdf	
Soudal Sealant remover	0.87	petroleum >25%, alcohols (C9-11) ethoxylated 1–5%, orange juice oil >60%	10		https://www.soudal.de/sites/default/files/soudal_api/document/F0024125_0001.pdf http://www.soudal.com.au/pdf/SDS%20-%20Soudal%20Sealant%20Remover.PDF	11.04.2022
Weicon Gasket remover		Acetone 2550%, Cyclohexanone 2.5–10%, 2-(2-Butoxyethoxy) ethanol 2.5–10%, Dimethyl ether 25–50%, n-Butyl acetate 10–20%, 1-Methoxy-2-propanole 2.5–10%			https://www.weicon.ca/static/downloads/ca/TechnicalDataSheet/TDS_11202400_EN_EN_Gasket-remover.pdf http://www.weicon.com/datasheets/caen/112024_Sealant-and-Adhesive-Remover-Spray.pdf	11.04.2022

Product name	Density [g/cm^3]	Ingredients	Reaction time [min]	Remarks	Link	Last visit
Liqui Moly Sealant remover spray	0.74	Hydrocarbon, Methylal, Butane, Isobutane, Propane, Paraffin, Ethanolamine	5–10		https://pim.liqui-moly.de/pdf/en_GB/liqui/19/P000536 https://sichdatonline.chemical-check.de/Dokumente/566/3623_0011_06-02-2018_EN.pdf	11.04.2022
Varybond Dichtungsentferner	1	1,3-dioxolane 25-50%, butane 25-50%, propane 10-25%, ®-p-mentha-1,8-diene, d-limonene 2.5-10%, white spirit 2.5-10%			https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiO3OLPlov3AhV7SPEDHc4IDM0QFnoECBAQAQ&url=https%3A%2F%2Fwww.itwcp.de%2Fproduct-170161VAR.html%3Ffile%3Dtl_files%2Fdownloads%2Fvarybond%2Freiniger_entfetter%2Fvb70-tech_datenblatt.pdf&usg=AOvVaw24a-g6QFOGSofFC8p46SdK https://www.google.com/url?sa=t&rct=j&q=&	11.04.2022

Product name	Density [g/cm³]	Ingredients	Reaction time [min]	Remarks	Link	Last visit
					esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwimlf_nlov3AhX0SfEDHbogCngQFnoECBAQAQ&url=https%3A%2F%2Fwww.itwcp.de%2Fproduct-170161VAR.html%3Ffile%3Dtl_files%2Fdownloads%2Fvarybond%2Freiniger_entfetter%2FVB_70%2520MSDS%2520%2528D%2529.pdf&usg=AOvVaw3FPOH37GFRtJ57w9KhNM28	
Presto Dichtungsentferner	0.71	formaldehyde dimethyl acetal 20-25%, propane 12.5-20%, naphtha 12.5-20%, butane 5-10%, isobutene 5-10%		VOC:95% solids: 5%	https://images.obi.de/PROD/DE/document/371/371303_safety_1.pdf	11.04.2022
75^{th} percentile	0.9375					

Table 116 Product information on rust remover (liquid)

Product name	Density [g/cm^3]	Ingredients	Reaction time [h]	Link	Last visit
Metal Rescue Rust remover bath		water-based		https://blasterproducts.com/wp-content/uploads/2021/07/MR-family-TDS-5-11-21.pdf https://images.homedepot-static.com/catalog/pdfImages/10/10ad313c-eaaa-4291-a8eb-552bb64699a6.pdf	11.04.2022
Nigrin Rostentferner (tauchbad)		phosphorus acid 15-25%, 1-propoxy-propanole-2 1-10%, etidron acid 1-< 3%		https://media.bahag.cloud/m/69694/1.pdf	11.04.2022
Hammerite Rost-Entferner Tauchbad-Konzentrat	1.08		12	https://media.bahag.com/assets/73/10/731061_21216964.pdf	11.04.2022
WD40 Specialist Rust remover soak	1.05	water-based	8	https://www.wd40specialist.com/pdf/specialist-rust-remover-soak2014.pdf https://files.wd40.com/pdf/sds/specialist/wd-40-specialist-rust-remover-soak-us-ghs.pdf	11.04.2022

Table 117 Product information on rust remover (gel)

Product name	Density [g/cm^3]	Ingredients	Reaction time [h]	Link	Last visit
Nigrin Rostentferner Gel	1.1	phosphorous acid 10-20%, 1-propoxy-propanole-2 1-10%		https://cdn.bueromarkt-ag.de/downloads/sicherheitsdatenblaetter/72923.pdf	11.04.2022
Hammerite Rostentferner Kraft-Gel	1.05	CMI, MIT, citric acid 10-20%	1	https://www.hammerite.de/files/2016/01/Rost-Entferner-Kraft-Gel-Dezember-2015.pdf https://media.bahag.com/assets/12/58/1258394_22297947.pdf	11.04.2022
Rustyco Rostentferner Gel				http://www.rustyco.de/2/11/Gel-Verfahren	11.04.2022
Rostio Gel				https://www.rostio.de/rostio-gel-1-l	11.04.2022

Table 118 Product information on rust remover (spray)

Product name	Density [g/cm^3]	pH-value	Mass generation rate [g/sec]	Ingredients	Reaction time [min]	Link	Last visit
Fertan Powerspray	0.84	5–7				https://fertan.de/wp-content/uploads/2017/01/Fertan_Powerspray_tds.pdf?_ga=2.21997752.264033790.1518595691-912039282.1518595691	11.04.2022
WD40 Rostlöser	0.75 – 0.77		0.8 – 1.4	Hydrocarbons C7 40-50%, Hydrocarbons C9-C11 20-40%, Hydrocarbons C7-C9 1-5%, carbon dioxide 1-5%		https://cdn.wd40company.eu/wd-40/de-DE/uploads/2016/05/TDS-WD40-MUP.pdf https://media.wd40.de/app/uploads/2021/04/09115952/EUF0053_DE-1.pdf	11.04.2022

Product name	Density [g/cm^3]	pH-value	Mass generation rate [g/sec]	Ingredients	Reaction time [min]	Link	Last visit
Würth Rost off	0.73			Hydrocarbons C9-C11 30-50%, Hydrocarbons C9-C10 30-50%, carbon dioxide <10%		https://www.hommel-hercules.com/uploads/datenblaetter/02698969_SDB.pdf	11.04.2022
Nigrin Hybrid Hochleistungs Rostlöser				Propane < 50%, Butane < 50%, Hydrocarbons C7-C9 2.5-<10%, Propane-1,2,3-triyl trisheptanoate 1-<5%		https://www.raiffeisen.com/agrar_sdb/9806/a199a95bf5ddc7783fa65df1bcec43e5?variante=	11.04.2022
Presto Rostlöser	0.86		2.33	Naphtha 25-50%, Pentane 12.5–20%, Propane 5–10%, Butane 5-10%, Isobutane 5–10%, graphite	5 - 10	https://www.hornbach.de/data/shop/D04/001/780/492/940/29/7538339_Doc_01_AT_20130619183626.pdf https://www.wm.de/downloads/5/5650042.pdf	11.04.2022
Profidepot Ice crack				Pentane 50-75%, Propane 12.5–20%, Butane 12.5-20%, Isobutane 12.5-20%		https://media.bahag.com/assets/50/99/509957_20041606.pdf	11.04.2022
Profidepot Schnellrostlöser				Butane 25-50%, Propane 25–50%, Hydrocarbons 10–25%, Naphtha 10–25%, Isobutane <2.5%		https://media.bahag.com/assets/39/94/399431_19516630.pdf	11.04.2022

Table 119 Product information on polyurethane foam

Product name	Density [g/cm^3]	Yield [l foam per l concentrate]	Joint distance per l foam concentrate [m^2]	Ingredients	Package Size	Link	Last visit
Illbruck Fensterschaum	0.025	45		PU, Diphenylmethane diisocyanate 30-50%, Tris (2-Chlor-1-methylethyl)-phosphate 10-20%, Dimethyl ether 5-10%, glycerol 5-10%, Isobutane 5-10%, Propane 1-5%, 2,2-dimethylpropane-1-ol 1-5%	500 ml, 750 ml	https://www.google.de/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwiQjOaPn5bZAhWOaFAKHQmMCqEQFggxMAI&url=https%3A%2F%2Fwww.illbruck.com%2Fhu_HU%2Fhome%2Fdownload%2F3706%2Fdownload.html&usg=AOvVaw2zQAVG3gfdsM9sf-_MTVro https://media.bahag.com/assets/11/08/1108411_22119780.pdf	11.04.2022
Soudal SMX Montageschaum Dämmen & Füllen	0.04	19		Tris(methylphenyl)phosphate 1-3%, Bis(methylphenyl)phenylphosphate 1-25%, Diphenyl tolyl phosphate 0.1-2.5%, Isobutane 1-20%, Propane 1-10%, Dimethyl ether 1-10%	300 ml, 500 ml	https://www.soudal.de/sites/default/files/soudal_api/document/F0030911_0001.pdf https://images.obi.de/PROD/DE/document/443/443870_safety_1.pdf	11.04.2022

Product name	Density [g/cm³]	Yield [l foam per l concentrate]	Joint distance per l foam concentrate [m²]	Ingredients	Package Size	Link	Last visit
Soudal Montageschaum	0.025	50		PU, Tris(2-chlor-1-methylethyl)phosphate 1-25%, polymethylene polyphenyl isocyanate >25%, Isobutane 1-10%, Propane 1-10%, Dimethyl ether 1-10%	500 ml	https://www.hornbach.de/data/shop/D04/001/780/498/597/2/5125626_Doc_01_DE_2012088154630.pdf https://www.hornbach.de/data/shop/D04/001/780/498/597/4/5125626_Doc_02_DE_20170530155503.pdf	11.04.2022
Soudal 2K Zargenschaum	0.037	25		PU, polymethylene polyphenyl isocyanate 25-50%, Isobutane 1-10%, Propane 1-10%, Dimethyl ether 1-10%	400 ml	http://www.soudal.com/soudalweb/images/products/3434/2K%20Zargenschaum%20B2.pdf https://www.hornbach.de/data/shop/D04/001/780/499/046/1/5125627_Doc_04_DE_20120717195728.pdf	11.04.2022
CMI Montageschaum	0.025	45		PU, Tris(2-chloro-1-methylethyl) phosphate 1-25%, polymethylene polyphenyl isocyanate >25%, Isobutane 1-10%, Propane 1-10%, Dimethyl ether 1-10%	500 ml	https://images.obi.de/PROD/DE/document/822/822754_datasheet_1.pdf https://images.obi.de/PROD/DE/document/822/822754_safety_1.pdf	11.04.2022

Product name	Density [g/cm^3]	Yield [l foam per l concentrate]	Joint distance per l foam concentrate [m^2]	Ingredients	Package Size	Link	Last visit
Lugato Bauschaum		53		PU, Tris(2-chloro-1-methylethyl) phosphate 10-20%, Isobutane 1-20%, Propane 1-20%, Dimethyl ether 1-20%, formaldehyde (CAS:32055-14-4 and 500-079-6) 10-15%	500 ml, 750 ml	https://www.lugato.de/fileadmin/user_upload/DE/Produkte/BS/BS_TM_2017_06.pdf https://www.lugato.de/fileadmin/user_upload/BS-1__BS_PIS_MS_01.15.pdf	11.04.2022
Lugato 2K Montage Schaum		25		PU, Tris(2-chloro-1-methylethyl) phosphate 10-15%, Isobutane 1-20%, Propane 1-20%, Dimethyl ether 1-20%, formaldehyde (CAS:32055-14-4 and 500-079-6) 10-15%, ethandiole 1-10%	400 ml	https://www.lugato.de/fileadmin/user_upload/DE/Produkte/BS2K/BS2K_TM_2017_04.pdf https://www.lugato.de/fileadmin/user_upload/BS-2__BS2K_03.15.pdf	11.04.2022
Ottopur OP 920		25		isobutane 25%, tris(2-chloroisopropyl) phosphate 25%, dimethyl ether 25%, propane 25%, diphenylmethane-4,4-diisocyanate 25%, ethandiol 10%	400 ml	www.otto-chemie.de/de/startseite-bau/ottopur-op-920.pdf www.otto-chemie.de/!product-download/1093/efc8f1f6455af792a4121163c5d57dbc	11.04.2022

Product name	**Density [g/cm^3]**	**Yield [l foam per l concentrate]**	**Joint distance per l foam concentrate [m^2]**	**Ingredients**	**Package Size**	**Link**	**Last visit**
Soudal Füllen und Dämmen SMX Adapterschaum B2		18	18		300 ml, 500 ml	https://www.soudal.de/sites/default/files/soudal_api/document/F0024052_0001.pdf	11.04.2022
Soudal Soudafoam Gun B2		60	40		750 ml	https://www.soudal.de/sites/default/files/soudal_api/document/F0024153_0001.pdf	11.04.2022
Soudal Flexifoam Gun		38	26		750 ml, 500 ml	https://www.soudal.de/sites/default/files/soudal_api/document/F0024097_0001.pdf	11.04.2022
Soudal Soudafoam 2K B2		25	20		400 ml	https://www.soudal.de/pro/produkte/pu-schaume/2k-pu-schaum/soudafoam-2k-b2/soudafoam-2k-b2-400ml-0	11.04.2022
Soudal Soudafoam Comfort B2		44	30		750 ml	https://www.soudal.de/pro/produkte/pu-schaume/1k-pu-schaum/soudafoam-comfort-b2/soudafoam-comfort-b2-750ml	11.04.2022
Soudal Soudafoam Gun B2 Winterschaum		60	40		750 ml	https://www.soudal.de/sites/default/files/soudal_api/document/F0024062_0001.pdf	11.04.2022

Product name	**Density [g/cm^3]**	**Yield [l foam per l concentrate]**	**Joint distance per l foam concentrate [m^2]**	**Ingredients**	**Package Size**	**Link**	**Last visit**
Soudal Soudafoam PURe		50	40		500 ml	https://www.soudal.de/sites/default/files/soudal_api/document/F0024154_0001.pdf	11.04.2022
75th percentile		50	40				
	Density is stated for the already spread out foam, not for the product in the tube; therefore, the product density from the 2007 DIY Fact Sheet is used (1.10g/cm^2)						

Table 120 Product information on polyurethane foam specifically for gluing

Product name	**Curing time [min]**	**Possible gluing area per l foam concentrate [m^2]**	**Package Size [ml]**	**Link**	**Last visit**
Formel-Pro Perimeter Klebeschaum	120	23	750	https://res.cloudinary.com/baywa-ag-p/raw/upload/A8802131.pdf https://res.cloudinary.com/baywa-ag-p/raw/upload/A9195449.pdf	11.04.2022
beko WDVS-Klebeschaum B1	90-300	12.5	800	https://www.bauchemie24.de/WebRoot/Store/Shops/61179455/MediaGallery/TDM/beko/Info-Blatt_WDVS_-_Klebeschaum_B1.pdf	11.04.2022
Baumit easytop Klebeschaum		5	750	https://cdn.hornbach.de/data/shop/D04/001/780/493/795/42/7434399_Doc_01_DE_20200318113228.pdf	11.04.2022
Probau WDVS-Kleberschaum		5	800	https://www.probau.eu/uploads/tx_probauprodukte/352_TI_de.pdf	11.04.2022
Soudal Perimeterkleber		19	750	https://www.soudal.de/sites/default/files/soudal_api/document/F0024907_0001.pdf	11.04.2022
Bostik Montage Pro Perimeter B2 P945		17	750	https://www.bostik.com/files/live/sites/shared_bostik/files/import-germany/globalassets/products/montage-pro-perimeter-b2-p945_germany_de/TM%20-%20P945%20Montage%20Pro%20PerimeterB2.pdf	11.04.2022
Formel-Pro Perimeter Klebeschaum		22	750	https://res.cloudinary.com/baywa-ag-p/raw/upload/f_auto/A16770892.pdf https://res.cloudinary.com/baywa-ag-p/raw/upload/f_auto/A9195449.pdf	11.04.2022

Product name	Curing time [min]	Possible gluing area per l foam concentrate [m^2]	Package Size [ml]	Link	Last visit
Beko PERI-Schaum		20	750	https://www.beko-group.de/beko-group-de/media-web/downloads/de/peri-schaum_info_de.pdf https://www.beko-group.de/beko-group-de/media-web/downloads/de/sdb_peri-schaum_de.pdf	11.04.2022
75th percentile		21.5			

Table 121 Product information on joint colour

Product name	Product amount [ml/m^2]	Density [g/cm^3]	Ingredients	Package Size	Link	Last visit
AlpinChemie Fugenfarbe	35	1.4	acrylate, BIT	350ml	https://www.hornbach.de/data/shop/D04/001/780/499/620/5/5212150_Doc_01_DE_20121207090909.pdf https://www.hornbach.de/data/shop/D04/001/780/498/702/1/5212150_Doc_02_DE_20170522114027.pdf	11.04.2022
Knauf Fugenfrisch	20	1.5	acrylate, titan oxide, BIT, CIT, MIT	250ml	https://images.obi.de/PROD/DE/document/912/912569_datasheet_1.pdf https://images.obi.de/PROD/DE/document/912/912570_safety_1.pdf	11.04.2022

Product name	Product amount [ml/m²]	Density [g/cm³]	Ingredients	Package Size	Link	Last visit
Lugato weisse Fugenfarbe		1.5		250ml	https://www.lugato.de/fileadmin/user_upload/FW_TM_2015_04.pdf https://www.lugato.de/produkte/download/sicherheitsdatenblatt/fw/2317/	11.04.2022
Probau Fugenfärber	25	1.59	acrylate		https://media.bahag.com/assets/76/35/763560_21349173.pdf https://media.bahag.com/assets/43/78/437867_19601911.pdf	11.04.2022
Molto Fugenfrisch	30	1.7	polyvinyl acetate dispersion, titan oxide, calcite, zinc sulfide, kaolin, ethylene glycol	250ml	https://images.obi.de/PROD/DE/document/852/852746_datasheet_1.pdf https://images.obi.de/PROD/DE/document/852/852746_safety_1.pdf	11.04.2022
PUFAS Frische Fuge	12.5	1.6	titan dioxide 20-25%, synthetic resin	250ml	https://pufas.de/site/assets/files/1551/ti_p_frische_fuge.pdf https://pufas.de/site/assets/files/1551/sd_p_frische_fuge.pdf	11.04.2022
75th percentile	33.75	1.645				
Mean	27.5	1.538				

Table 122 Product information on emergency leak sealant

Product name	Product consumption	Density [g/cm^3]	Link	Last visit
MEM Wasser-Stopp	1-3 kg per leakage	1.5	https://media.bahag.cloud/m/47341/1.pdf https://media.bahag.cloud/m/78512/1.pdf	11.04.2022

Table 123 Product information on adhesive tape

Product name	Holding strength [kg/m]	Advice	Width [mm]	Remarks	Link	Last visit
Tesa Montageband	20	6 kg/object	19	Object not thicker than 10 mm	http://www.tesa.de/buero-und-zuhause/tesa-montageband-fuer-transparente-oberflaechen-und-glas-20kg-m.html	11.04.2022
UHU DOPPELBAND STARK	33.3		19	Object not thicker than 10 mm	https://www.wasklebtwas.de/datasheets/tds/de_tds_4026700468557_uhu_doppelband_stark_doppelseitiges_montageklebeband.pdf https://www.wasklebtwas.de/datasheets/msds/en_msds_4026700468557_uhu_doppelband_stark_doppelseitiges_montageklebeband.pdf	11.04.2022
tesa Ultra starkes Montageband für Fliesen und Metall	100	6 kg/object	19	Object not thicker than 10 mm	http://www.tesa.de/buero-und-zuhause/tesa-ultra-starkes-montageband-fuer-fliesen-und-metall-100kg-m.html	11.04.2022

Table 124 Airless spray devices

Product name	Delivery Volume [l/min]	Max. Pressure [bar]	Continer capacity [ml]	Link	Last visit
Wagner Airless Sprayer Control 150 M	0.9	110	5500	https://www.wagner-group.com/de/heimwerker/produkte-zubehoer/produkt/airless-sprayer-control-150-m/	11.04.2022
Wagner Airless Sprayer Control Pro 250 M	1.25	110		https://www.wagner-group.com/de/heimwerker/produkte-zubehoer/produkt/airless-sprayer-control-pro-250-m/	11.04.2022
Wagner Airless Sprayer Control Pro 350 M	1.5	110		https://www.wagner-group.com/de/heimwerker/produkte-zubehoer/produkt/airless-sprayer-control-pro-350-m/	11.04.2022
Wagner Airless Sprayer Control Pro 250 R	1.25	110		https://www.wagner-group.com/de/heimwerker/produkte-zubehoer/produkt/airless-sprayer-control-pro-250-r/	11.04.2022
Wagner Airless Sprayer Control Pro 250 R	1.5	110		https://www.wagner-group.com/de/heimwerker/produkte-zubehoer/produkt/airless-sprayer-control-pro-350-r/	11.04.2022
75^{th} percentile	1.5				

Table 125 Sizes of mixing buckets 12-l capacity

Name	r [cm]	H [cm]	Release area [cm^2]	Source	Last visit
Probau Baueimer	14.5	23	660.5	https://www.bauhaus.info/moertelkuebel-baueimer/probau-baueimer/p/13940325	11.04.2022
KIS Exclusive Eimer	17.5	29	962.1	https://www.bauhaus.info/schrubber-eimer/kis-exclusive-eimer/p/10735007	11.04.2022
Jopa Baueimer	16	22.5	804.2	https://www.hornbach.de/shop/Baueimer-robust-und-kranbar-12-L/8845840/artikel.html	11.04.2022
Eimer Basic	15.75	23.5	779.3	https://www.hornbach.de/data/shop/D04/001/780/491/030/496/0274248_Doc_02_DE_20180216114514.pdf	11.04.2022
Eco Gripline	15.65	23.6	769.4	https://www.hornbach.de/data/shop/D04/001/780/491/030/496/0274248_Doc_02_DE_20180216114514.pdf	11.04.2022
Gripline	15.55	23.7	759.6	https://www.hornbach.de/data/shop/D04/001/780/491/030/496/0274248_Doc_02_DE_20180216114514.pdf	11.04.2022

Name	r [cm]	H [cm]	Release area [cm^2]	Source	Last visit
Verstärkt	16	23.7	804.2	https://www.hornbach.de/data/shop/D04/001/780/491/030/496/0274248_Doc_02_DE_20180216114514.pdf	11.04.2022
Akkit Portionseimer	16	27	804.2	https://www.hornbach.de/shop/Akkit-Portionseimer-12-5-l/8594556/artikel.html	11.04.2022
Lux Baueimer	15.5	31	754.7	https://www.obi.de/baueimer-moertelkuebel/baueimer-12-l/p/1382019	11.04.2022
OBI Kleister-Eimer	14.65	25.5	674.2	https://www.obi.de/eimer-abstreifgitter/obi-kleister-eimer-12-5-l/p/8967531	11.04.2022
75th percentile	16	27.5	804.2		

Table 126 Sizes of mixing buckets 20-l capacity

Name	r [cm]	H [cm]	Release area [cm^2]	Source	Last visit
Probau Baueimer	17		907.91951	https://www.bauhaus.info/moertelkuebel-baueimer/probau-baueimer/p/13940332	11.04.2022
Probau Baueimer	17.5	42	962.111938	https://www.bauhaus.info/moertelkuebel-baueimer/probau-baueimer/p/20159830	11.04.2022
Probau Baueimer	15.5	26.7	754.766998	https://www.bauhaus.info/moertelkuebel-baueimer/probau-baueimer/p/24806068	11.04.2022
Eimer Basic	19	25.9	1134.11399	https://www.hornbach.de/data/shop/D04/001/780/491/030/496/0274248_Doc_02_DE_20180216114514.pdf	11.04.2022
Eco Gripline	18.5	27.1	1075.20918	https://www.hornbach.de/data/shop/D04/001/780/491/030/496/0274248_Doc_02_DE_20180216114514.pdf	11.04.2022
Gripline	18.5	26.5	1075.20918	https://www.hornbach.de/data/shop/D04/001/780/491/030/496/0274248_Doc_02_DE_20180216114514.pdf	11.04.2022
Verstärkt	18.75	28.3	1104.46523	https://www.hornbach.de/data/shop/D04/001/780/491/030/496/0274248_Doc_02_DE_20180216114514.pdf	11.04.2022
Jopa Baueimer	18.75	27.5	1104.46523	https://www.hornbach.de/shop/Baueimer-robust-und-kranbar-20-L/8845841/artikel.html	11.04.2022
75th percentile	18.75	28.3	1104.46523		

A. Cieszynski | C. Jung | T. Schendel | W. ter Burg

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