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FEICA's survey on Consumer Habits

Abstract

The Association of the European Adhesive & Sealant Industry (FEICA) has developed Specific Consumers Exposure Determinants (SCEDs) to facilitate consumer exposure assessments for a range of consumer products, in line with the guidance published by the DUCC/CONCAWE task force under the REACH CSR/ES Roadmap¹.

The SCEDs can be used to refine the exposure estimates under REACH, beyond the scenarios provided in the ECHA REACH guidance and yet at the level of generic consumer product categories. SCEDs are designed to provide detailed information about consumer habits and practices (i.e. typical conditions of use for the consumer product) in order to assist registrants in their exposure assessments, so that they can perform - and in turn communicate - realistic exposure assessments of the substances present in the consumer products.

By covering tile adhesives, universal glue, instant adhesives and joint sealants, the FEICA SCEDs cover a full range of consumer habits, in terms of use frequency, duration and amount of adhesive or sealant product used. They are based on information about the identification of habits and practices originally developed under the scope of the ConsExpo project (RIVM 2007) and further complemented with company data plus the recent FEICA survey on consumer habits. The present summary covers the results of the survey, conducted between November 2014 and January 2015 covering 3 countries in Western, Southern, and Northern Europe, with representative respondents). Given the circumstances of a survey questionnaire based on consumer habits, and the fact that the Tier 1 exposure assessment tools used under REACH work with broad exposure bands, the deviations from ConsExpo are ultimately not severe.

¹ The [CSR/ES roadmap](#) is a plan, developed by ECHA and several stakeholder organisations, for improving the content and use of exposure scenarios during the years 2013-2018.

1. Introduction / Objectives

Chapter R15 of the Guidance on Information Requirements and Chemical Safety Assessment aims to ensure that no unsafe consumer uses exist. Therefore, it is necessarily conservative (ECHA 2016)².

In order to perform a consumer exposure assessment under REACH, at least the following information is needed:

- a minimum amount of information on the substance properties (e.g. vapour pressure and molecular weight)
- a generic use description (in particular the Product Category [PC] or sub category)
- the operational conditions of use

These conditions of use are included in the Specific Consumers Exposure Determinants (SCEDs), and are expressed in a form that can be easily fed into the most widely used exposure assessment tool ECETOC TRA (ECETOC 2014) and models derived therefrom (e.g. the ECHA CHEMical Safety Assessment and Reporting tool, CHESAR). This correlation is also the reason, why the SCEDs are subject to the tool's underlying science, assumptions, and also inherent methodological limitations (DUCC/CONCAWE 2014).

SCEDs have been developed to transparently document the way the products are commonly used by consumers. Therefore, they describe typical habits and practices of consumer products (e.g. quantity of product used, frequency of use, place of use...) and are thus not substance-specific.

It is to be noted that only four FEICA SCEDs exist to represent the many different types of adhesives in the market (FEICA 2016). This is possible because each of the four main product categories (PC) corresponds to wider product sub-categories, and reflects the areas with the highest exposure conditions within these sub-categories. Thus, PC "Universal glues" represents all exposure situations that are characterized by low or medium amounts, small or moderate size surfaces, and a high frequency of use. This means that, for instance glue sticks or superglues - that are used in small quantities, are represented by wood glues or construction glues, that are applied in much higher amounts. Correspondingly, PC "Glues Do it Yourself-use" (DIY) represents all exposure situations that are characterized by high amounts, large surfaces, and low frequency of use (examples: carpet glue, tile glue, wood parquet glue). On the other hand, PC "Joint sealants" represents exposure during sealing off long small gaps to obtain an air- and water-tight joint (examples: joint sealants delivered in cartridges). The fourth PC "Spray Glues" represents exposure situations where aerosols are formed and so can be inhaled.

Currently, the default parameters for estimating consumer exposure are based on the ConsExpo 4.1 (Consumer Exposure) computer program that - amongst others - enables the estimation and assessment of exposure to substances from adhesives. The ConsExpo tool - developed by the Dutch National Institute for Public Health (RIVM) in collaboration with ANSES (France), BfR (Germany), BAG (Switzerland), as well as Health Canada - is recommended as Tier 2 tool for the assessment of chemicals (REACH) and biocides. Like the program itself, also the exposure parameters have been widely used - e.g. as input for the Tier 1 exposure tool ECETOC's Targeted Risk Assessment (hereafter TRA).

Exposure information is provided in the so-called factsheets (here: W. ter Burg, W., et al., 2007). However, the underlying data leading to the defaults (use frequency, application duration, amount used and skin contact) are estimates based on limited empirical data collected in the Netherlands. Therefore, it should be examined, for instance by means of an international survey, whether the assumptions relating to the use of adhesives are still justified.

As a consequence, further to the research literature (previously done and reviewed), FEICA conducted a survey to gather information from other countries aiming to obtain constructing quantitative data to support the assumptions for adhesives and sealants.

² The Guidance on IR&CSR chapter 15 (consumer exposure) has been recently updated – not at the time of the present work.

2. Methodological aspects of the survey

FEICA asked *InSites Consulting* to conduct a consumer survey on glues and sealants in 3 European countries, representing different well-known habits and uses:

- Spain (as example of Southern countries),
- Finland (as example of Nordic countries) and,
- Germany (as example of Central-Europe).

A minimum of 500 respondents took part per country (1516 in total – online questionnaire, recruitment via panel, men and woman, aged 18-65, and having used at least one type of adhesive or sealant during the last year)

For each country, the consulting firm interviewed a panel - representative of the national population in terms of age and gender - based on an online questionnaire. To get the most accurate answers as possible on the different exposure determinants to be analysed, thus providing adequate quantitative estimations, the questionnaire was specifically developed to minimise margin for error and to assist participants with pictures and illustrations (Fig 1).

From this gross sample, the final sample (target population) was selected based on the usage of different types of adhesives (*) in the past year – i.e. only those 500 respondents, from each country, who have used at least one type of the glues detailed below in the past year:

- Regular glues (universal glues for stationery, tinkering tasks, hobby or household purposes, spray glues)
- Wallpaper-, parquet-, and carpet glues (representative for DIY use)
- Tile glues (incl. glue for both floor-tiles and/or wall-tiles)
- Sealants (*): It is to be noted that in the case of sealants the usage was measured only amongst the final target group population (i.e. Europeans who have used glues in the past year). Therefore, the penetration rate for sealants can only be derived amongst such target group.

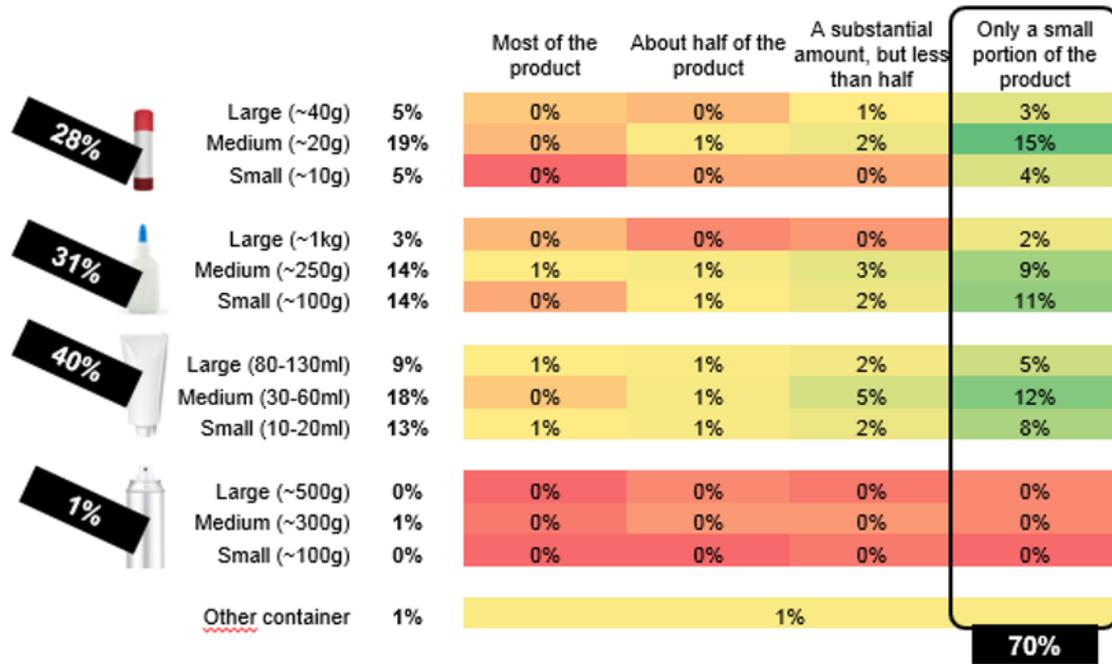
Figure 1 - Type of container used as an indicator for the amount used



To avoid false estimations on the amounts used the participants were not directly asked how much product they have exactly used, but which kind of package (and size) they bought, and which portion of the product they have approximately used during their last glue or sealant job. The questions were substantiated with suitable in-house information about the different packaging types and sizes. Fig. 2 shows an example of the spectrum of aggregated answers and their interpretation.

Fig. 2: Example regular glue. 4 of 10 users of regular glues used the tube container for their last glue job. The bottle is also quite popular with 31% of the consumers, and the stick with 28%. The majority of the users of regular glues (70%), have only used a small portion of the product during their last glue job (regardless of the type of container).

Figure 2 - Example regular glue



In the same way, participants were asked about which part(s) of the body came effectively in contact with the product, and the answers were subsequently substantiated according to the default values from the REACH Technical Guidance Documents (see Tab. 1).

Tab. 1: Answers regarding skin contact during the glue job and their interpretation

Answers to questions concerning skin contact	Affected skin area [cm ²]
No contact at all	0
Mainly fingertips (2 fingertips)	2
Mainly fingers	230
Mainly fingers and hand palms	430
Both hands	860
Both hands and forearms	1900

Another important feature to consider is the 'size of the sample'. Although at first view the sample-size is statistically sufficient for each country (≥ 500) it is important to note that in some cases, due to the low penetration rates (i.e. how often the respondents have used specific types of glue in the past year), the resulting low sample-size for a particular statistic at national level brings a high margin of error.

As an extreme example, while nearly all of the 501 respondents in Finland have, at least once, used a regular glue during the last year, apparently only ca. 2% have applied a parquet glue. Besides the aspect that the result is by far not consistent with the default REACH assumption that all kinds of consumer products are used on a daily basis, the margin of error for such a result would be $\pm 31\%$, and thus, too high for further statistical evaluations. In consequence, all evaluations were only performed on an aggregated European level.

For the product category "Spray Glues", even on European level, there were not enough responses (< 10) available to perform a reassessment (see also Fig. 2). Therefore, it was decided to leave this category unchanged.

3. Percentile values

Basic common TRA & ConsExpo assumptions for consumer exposure are:

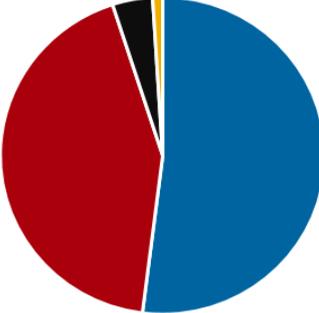
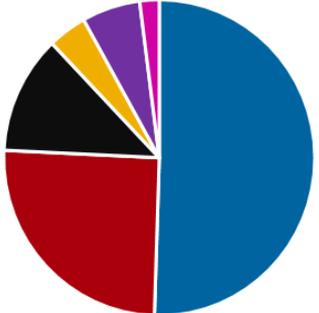
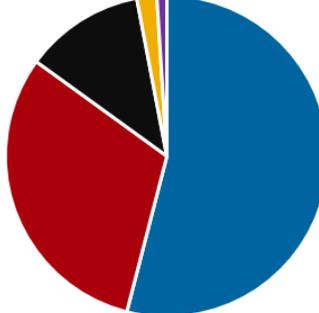
- frequent use
- application of a high concentration and large amount
- of a substance with overestimated fugacity
- in a small room with poor ventilation
- and a relatively long stay in that room.

As an example, the algorithm used within TRA for calculating inhalation consumer product exposure consists of 10 parameters that are multiplied by each other. If the value of each of these parameters is set e.g. at its 90th percentile value, then the probability of exceeding that value is, per parameter, 0.1. However, the probability to simultaneously exceed the 90 percentile values of two parameters is $0.1^2 = 0.01 = 1\%$ (assuming the parameters are uncorrelated). For n independent parameters, this probability is 0.1^n , a very small number if n is large ($10^{-8} \%$ in the case of 10 parameters).

Therefore, as is the case for ConsExpo, a "realistic worst case" estimate is chosen whereby the single determinants are set at the 75th percentile value. Under this assumption, the probability of two uncorrelated parameters simultaneously exceeding their 75th percentiles is $0.25^2 = 0.0625 (6.25 \%)$. Multiplication of two 75th percentile parameter values results in a 93.75th percentile ($100 - 6.25$). Still, 0.25^n results in a very small number if n is large ($0.25^{10} = 9.5 \times 10^{-5} \%$).

Given the number of parameters and their correlation it is expected that, in general, the calculated overall values for inhalational and dermal exposure will result at least in a 99th percentile.

4. Main survey results

PC "Regular glues"			Skin contact area	
	FEICA survey	ConsExpo 4.1		
Frequency of use	1 / month	1 / week *	 <ul style="list-style-type: none"> ■ No contact ■ Mainly fingertips ■ Mainly fingers ■ Mainly fingers and hand palms ■ Both hands ■ Both hands and forearms 	
Application duration	≤ 15 min	20 min *		
Product amount	≤ 25 g	10 g *		
Skin contact area	2 cm ²	2 cm ²		
PC "Glues DIY-use"			Skin contact area	
	FEICA survey	ConsExpo 4.1		
Frequency of use	> 1 / year	1/8 / year *	 <ul style="list-style-type: none"> ■ No contact ■ Mainly fingertips ■ Mainly fingers ■ Mainly fingers and hand palms ■ Both hands ■ Both hands and forearms 	
Application duration	≤ 240 min	480 min *		
Product amount	≤ 5 kg	22 kg *		
Skin contact area	10 cm ²	430 cm ²		
PC "Joint sealants"			Skin contact area	
	FEICA survey	ConsExpo 4.1		
Frequency of use	2 / year	3 / year *	 <ul style="list-style-type: none"> ■ No contact ■ Mainly fingertips ■ Mainly fingers ■ Mainly fingers and hand palms ■ Both hands ■ Both hands and forearms 	
Application duration	≤ 30 min	30 min *		
Product amount	≤ 300 g	75 g *		
Skin contact area	2 cm ²	2 cm ²		

(*) Estimates

5. Summary and conclusions

An initial evaluation of the algorithms and parameter inputs of ConsExpo and TRA identified a high impact on the exposure estimate of the following product-specific parameters: "use frequency", "skin contact area", "application duration" and "amount of product used".

Both ConsExpo and the SCEDs factsheets provide specific use frequencies for different product types. The results of the survey, for all the product-subcategories showed a lower empirical value than those from ConsExpo (albeit less significant for sealants, probably due to the target group).

With regard to the skin contact area, the critical step consists of assigning the body parts that are assumed to be in contact with the product. For sealants and regular glues, the survey and ConsExpo assume the same contact area (finger tips). However, the factsheet provides a skin contact area of 430 cm² for parquet glue and tile glue, reflecting the skin surface of one hand. This is not confirmed by the survey results, where, aside from a small minority, at most the fingers are affected.

At first glance the differences in product amounts used for all categories seem to be considerable. For sealants and regular glues the ConsExpo estimate is lower than the empirical values, whereas for DIY-use the reverse is true. The main explanation for this is that the amount used is case-specific and depends more than other parameters on the respective boundary conditions. As an example, per definition the TRA scenario-independent parameter "room volume" for all different tasks is set to 10 m³ (i.e. the size of a bathroom). On the other hand, according to the ConsExpo factsheet it is assumed that parquet glue is applied in a small living room of 58 m³. While the living room exposure scenario is realistic, it would be unrealistic to transfer the corresponding amount of 22.6 kg glue directly and without scaling to the bathroom scenario. A huge overestimation of the exposure would be the direct consequence. A consequence is, that the input parameters "product amount" can still only be calculated involving assumptions on additional parameters. Interestingly, although there is a strong correlation between the parameters 'amount used' and "application duration", in this case again the differences are not very pronounced.

The survey shows both positive and negative deviations from the original ConsExpo estimates within the expected range. Despite the questionnaire was developed to minimise margin for error, the possibilities of error of a consumer-survey needs to be considered when drawing conclusions, as they depend on factors such as the memory of participants - which can be estimated only imprecisely, but it would be certainly wrong to expect a precision in the range of positions after the decimal point. Bearing this in mind, nevertheless, the present results for exposure assumptions concerning DIY products seem to have been too conservative and, by contrast, slightly too low for the application of sealants. This results can be partly explained by the fact that users in the Netherlands apply glues and sealants differently compared to inhabitants of other countries. The example of the parameter "product amount" illustrates that especially survey answers that are coupled to specific boundary conditions are not directly comparable, and in the case of sealants and parquet glue cannot be interpreted based on the results of the survey alone.

In conclusion, the new information on the use of adhesives and sealants in Europe shows that deviations between survey results and ConsExpo input parameters are ultimately not severe.

6. References

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