ESIG/ESVOC SpERC Background Document

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Specific Environmental Release Categories (SpERCs) for the professional use of petrochemicals and petrochemical-borne substances as binding agents, coatings, cleaning agents, and functional fluids

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Introduction

Many petrochemical-containing products are suitable for routine use in a wide variety of professional applications. The professional use of these products requires the employment of trained personnel with the requisite knowledge and expertise needed to safely and sensibly operate under a range of work conditions. In this context, professional product applications are generally carried out by seasoned personnel who have undergone an apprenticeship or other similar intensive training program to acquaint them with functional skills and situational knowledge needed to perform a particular task safely. Automotive mechanics, painters, machinists, and construction/maintenance specialists are all examples of professional occupations that may use petrochemical-containing products on a regular basis.

The use of many professionally formulated products may result in the widespread release of substances into the environment (ECHA, 2016). Widespread uses of a product may either be indoors or outdoors and are characterized by small point-source releases at many different locations spread over a large area. Engineering controls to prevent or reduce the environmental release of product components are generally absent or ineffective when the uses are widespread. Administrative and procedural controls may be in place to minimize releases in professional operations where the task is repetitively performed on a regular schedule. These measures include rigorous training and adherence to operational guidelines that reduce the potential for environmental release by guarding against overuse and unabated emissions to air, water, and soil.

Professional product users are accustomed to the routine handling of a wide variety of petrochemical-containing coatings, cleaners, lubricants, and treatment solutions. Specific techniques and practices for minimizing environmental release and reducing waste generation are routinely implemented by professional applicators who are accustomed to working with a product under a variety of circumstances. These include measures for the proper storage, cautious dispensing, and conscientious disposal of the product regardless of the task or work conditions.

The following guidance document provides a description of the logic and reasoning used to create four Specific Environmental Release Categories (SpERCs) covering the professional use of petrochemical-containing products. The air, water, and soil release factors associated with these SpERCs and sub-SpERCs provide an alternative to the default release factors associated with the environmental release categories (ERCs) promulgated by ECHA. The following sections of this background document have been aligned with those of the SpERC

Factsheet and provide additional descriptive details on the genesis and informational resources used to generate each SpERC.

1. Title

The enclosed background information corresponds with the information provided in the following four factsheets:

1. ESVOC SPERC 8.10b.v2 – Binders and release agent
2. ESVOC SPERC 8.3b.v2 – Coatings
3. ESVOC SPERC 8.4b.v2 – Cleaning agents
4. ESVOC SPERC 9.13b.v3 – Functional fluids

Since these newly released SpERC factsheets include some corrections and or modifications, the version number has been changed to reflect the updates.

2. Scope

The applicability domain for a particular SpERC includes an initial determination of the life cycle stage (LCS) that best describes the industrial operation involved and the intended use of the substance being evaluated. The relevant life cycle stages and their interrelationships are depicted in Figure 1 (ECHA, 2015). The four SpERCs highlighted in this guidance document are all associated with a single life cycle stage: widespread use by professional workers. This assignment is consistent with ECHA guidelines for distinguishing chemical uses in industrial applications versus their widespread use in professional or consumer applications.

Other use descriptors such as the sector of use (SU) and the chemical product category (PC) have been assigned in accordance with the naming conventions outlined by ECHA (ECHA, 2015). These have been summarized in Table 1 along with the use descriptions characterizing the four SpERCs. The terminology used to describe the individual applications is consistent with the list of standard phrases associated with the Generic Exposure Scenarios (GESs) that have been created to describe the exposures associated with the industrial production and use of chemical substances (ESIG/ESVOC, 2017). Use of standard phrases in these SpERC descriptions provides consistency and harmonization, and avoids confusion among potential SpERC users.

Figure 1. ECHA identified life cycle stages and their interrelationship

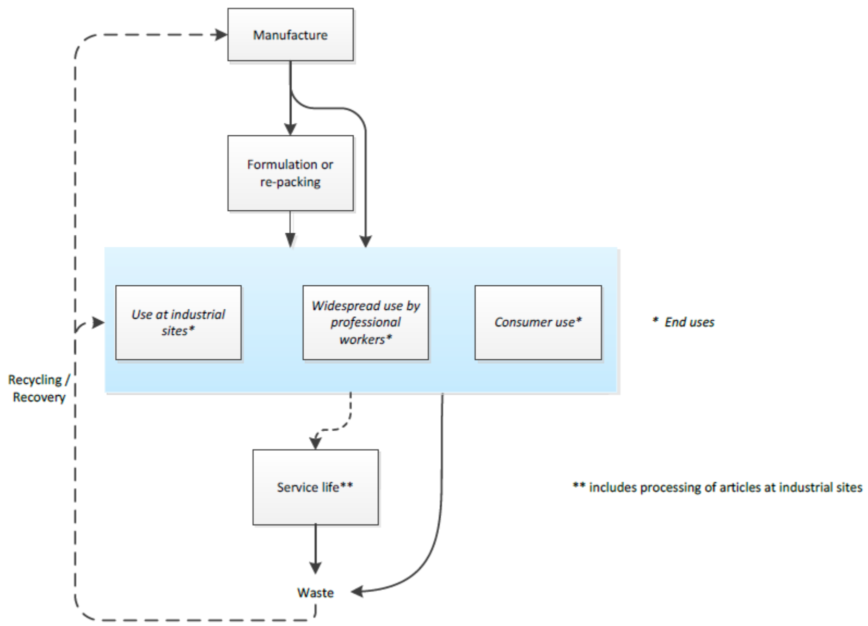

Table 1. SpERC background information

SpERC Code	Title	Life Cycle Stage (LCS)	Sector of Use (SU)	Chemical Products Category (PC)	Use Description
ESVOC SPERC 8.10b.v2	Binders and release agents	Widespread use by professional workers	SU0 Other	PC24 Lubricants, greases, release products	Covers the use as binders and release agents including material transfers, mixing, application by spraying, brushing, and handling of waste.
ESVOC SPERC 8.3b.v2	Coating agents	Widespread use by professional workers	SU0 Other	PC9a Coatings and paints, thinners, paint removers	Covers the use in coatings (paints, inks, and adhesives) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, brush, spreader by hand or similar methods, and film formation) and equipment cleaning, maintenance and associated laboratory activities.
ESVOC SPERC 8.4b.v2	Cleaning agents	Widespread use by professional workers	SU0 Other	PC35 Washing and cleaning products	Covers general exposures to consumers arising from the use of household products sold as washing and cleaning products, aerosols, coatings, deicers, lubricants and air care products.
ESVOC SPERC 9.13b.v3	Functional fluids	Widespread use by professional workers	SU0 Other	PC16 Heat transfer fluids	Use as functional fluids (e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids (in professional equipment including maintenance and related material transfers and use of similar sealed items containing functional fluids for consumers.

3. Operational conditions

The operating conditions for a particular professional application define a set of procedures and use conditions that limit the potential for environmental release. The professional use of petrochemical-containing products in small businesses are not associated with a specific group of mandatory requirements or constraints to minimize the likelihood of an environmental release. There are, however, recommended procedures that are typically implemented as standards of practice to reduce the potential for air, water, and soil release.**Conditions of use**

The four SpERCs described in this background document are associated with indoor and outdoor professional operations typically undertaken by experts with detailed knowledge of the best handling practices for the products in use. The widespread use of these products can occur at various locations employing skilled and appropriately trained personnel. Construction, agriculture, custodial cleaning, wastewater treatment, and trucking/transport operations exemplify the types of small businesses where professional product use may occur (ECHA, 2015).

Several use conditions characterize the professional use of a product in a widespread manner. These include i) the potential use and handling at a large number of broadly found sites whose distribution density is roughly proportional to the number of local inhabitants; ii) unimpeded usage that does not need to conform with local, regional, or national permitting requirements; iii) basic and simplified pollution control equipment for controlling environmental release; iv) tasks and workflows that limit the product use volumes and the overall emissions potential; and v) access to a municipal sanitary sewer system capable of handling any extraneous waste streams from the site.

A sanitary drainage system connected to a standard municipal wastewater treatment facility (WWTP) is presumed to exist when these petrochemical-containing products are used in widespread applications. A standard municipal facility uses both mechanical and biological treatment stages and has an effluent discharge rate of 2,000 m^3/day, which is equivalent to a wastewater generation rate of 200 L/person/day for a community with 10,000 inhabitants (ECHA, 2016). At the regional scale, ECHA assumes that 80% of the generated wastewater is funnelled through a standard municipal WWTP, with the remaining 20% released directly to surface waters. Further, stormwater drainage systems are not connected to a standard WWTP and the effluents are discharge untreated to local surface waters. The sludge resulting from the municipal wastewater treatment is also recognized to be suitable for direct application to agricultural soil.

Rigorous containment is not a necessary prerequisite for the application of these SpERCs to an environmental exposure analysis. The European Chemical Agency (ECHA) has outlined the technical and operational requirements necessary to demonstrate that a volatile organic compound (VOC) has been rigorously contained and these conditions are not applicable to the regional widespread use of a product in a professional setting (ECHA, 2010).

3.2. Waste handling and disposal

Every effort should be made to minimize the generation of waste at every point in a products' life cycle including professional uses. This necessitates the implementation of sensible waste minimization practices that stress the importance of recycling and/or reuse at the professional level. Many professional operations institute waste avoidance and minimization practices that are aimed at reducing the environmental impact of the products being handled. These include regular training sessions that focus on a range of topics such as waste reduction, recycling, and reuse. In addition to training, other management practices include the creation of standard operating procedures for the labelling, collection, storage and disposal of unused or spent products.

Under most circumstances, the residual waste generated during the professional use of a petrochemical-containing product is handled as a liquid or solid hazardous waste (EEA, 2016). Small and medium sized enterprises often put into place environmental management plans that describe an employee's responsibilities for ensuring the conscientious processing of both hazardous and non-hazardous wastes (EC, 2012). Available guidance for small businesses provide a detailed blueprint for storing, transporting, and disposing the hazardous waste generated by professional users (CIPS, 2007, Editions Ruffec, 2003). An important aspect of these plans is the need to reduce, recycle, and reuse any accumulated hazardous to the extent possible. Regardless of their degree of implementation, all waste handling practices must conform with the provisions cited in all applicable waste directives issued by local, regional, and national authorities.

4. Obligatory risk management measures onsite

There are few obligatory risk management measures associated with the widespread professional use of a petrochemical-containing product. All discharges to a local sanitary sewer system need to be treated at a municipal WWTP capable biologically degrading wastewater contaminants before surface water release. The operating conditions for this facility are expected to conform with the standard default specifications outlined by ECHA (ECHA, 2016). This includes meeting or exceeding effluent discharge rate for a standard municipal WWTP and the creation of sludge that is suitable for release onto agricultural land.

There are, however, a number of voluntary initiatives that may be undertaken to control environmental releases during the professional use of a product. These include the institution of several different types of technical and administrative programs that are described in more detail below.**Optional risk management measures limiting release to air**

Pollution prevention initiatives provide a reasonable and cost-effective means of reducing the atmospheric release of volatile substances during the use or application of professional products. These initiatives usually take the form of chemical management plans that describe a set of standard operating procedures (SOPs) to be used when a product is being handled in a professional setting (EEA, 1998). These SOPs can cover a range of topics from product procurement to disposal and contain a precise description of the procedures to be followed when handling a product under actual field conditions.

Sound practices for reducing the widespread atmospheric release of a substance include specific storage, handling, and spill containment strategies (USEPA, 2016). Storage examples include the correct handling of damaged containers susceptible to spillage, the proper closure and sealing of containers following use, and the use of drip pans or trays to contain any spills that may occur during storage. Similar examples describe basic handling procedures to circumvent the unintended release of volatile constituents. These include procedures for the onsite transport, transfer, and container storage of products and wastes. SOPs may also be created that govern spill prevention and remediation. These are particularly effective at minimizing the impact of an accidental release on the levels of air, water, and soil contamination that may ensue.**Optional risk management measures limiting release to water**

Wastewaters generated in the course of products' professional use need to be treated in a biological wastewater treatment plant that is capable of biodegrading any water-soluble substances discharged to the local sanitary sewer system. The primary source of treatable wastewater results from the cleaning of containers, tanks, and transfer equipment. Small releases may also result from unintentional spills and leaks, which need to be guarded against at all junctures.

Special attention should be given to the professional use and application of products that may come into contact with local water sources. Contaminated water should not be released to the storm sewers used to collect rainwater for direct release to local surface waters. Other cleanup practices that may reduce the generation of wastewater include the recovery of any unused material in transfer lines rather than washing it down the drain, the application of dry cleaning practices for leaks and spills rather than area hosing with water, and the washing of floors, equipment, and surfaces only when needed rather than on a regular schedule (NSEL, 2003).

4.3. Optional risk management measures limiting release to soil

Many of the same pollution prevention practices exercised to reduce releases to air and water will also be effective in containing emissions to soil. Procedures and protocols for housekeeping and spill removal are perhaps the most effective at reducing any releases to soil (GTZ, 2008). The creation and wide dissemination of a spill plan is a highly effective pollution prevention initiative. Ideally, the plan would include a detailed description for handling accidental releases rapidly and in an efficient manner. The location and correct use of spill kits can also provide an added benefit as does the storage of products in dedicated spaces that have a floor made of impervious concrete. Aside from these discretionary measures, there are no mandatory risk management measures for controlling the soil release potential.

5. Exposure assessment input

The SpERCs described in this background document are associated with a specific set of use conditions that have been directly adopted from ECHAs appraisal of the factors influencing the widespread dispersive use of a substance on a professional scale (ECHA, 2016). The derived default values are associated with the conditions that presumably exist within a "standard town" occupied by 10,000 inhabitants and serviced by a municipal WWTP with an effluent flow rate of 2000 m^3/day, which corresponds to a wastewater generation rate of 200 L/day/person for those residing in the "standard town". The number of individuals living in the "standard town" assumes that it is positioned within a densely populated "standard region" of Western Europe with 20 million inhabitants living within a land area measuring 200 km x 200 km (10% of the European land mass). The following paragraphs describe the underlying reasoning used to assign a numerical value to the parameters affecting the emissions resulting from the widespread professional use of petrochemical-containing products.

5.1. Substance use rate

The regional use tonnage for a professionally used substance contained in a product formulation is dependent on several key parameters that dictate the extent and magnitude of a product's use at the regional scale. Since product formulations may vary widely in composition, the use tonnage will be highly dependent on the product formulation and regional sales distribution. Registrants using these professional SpERCs are, therefore, in the best position to define the regional use rate based on detailed knowledge of their product portfolio, product compositions, and penetration. Specification of multiple putative regional tonnages based on available knowledge of the product types available to professional users is not a tenable option given the ambiguities it creates (OKOPOL, 2014).

The following equation describes the default calculation of a daily use rate of substance in a "standard town" using ECHA recognized default parameters. This calculation is applicable once an annual use rate is supplied by the registrant.

$$Daily\ use\left(\frac{tonnes}{day}\right) = \frac{annual\ use\left(\frac{tonnes}{year}\right) x\ adjustment\ factor\ x\ regional\ fraction\ used\ locally\ x\ annual\ fraction\ used\ regionally}{emission\ days\ (\frac{days}{year})} \quad (1)$$

The assessment factor of 4 used in this calculation adjusts for any spatial and temporal variability in the professional use of a substance within a region. The application of this factor accounts for any localized spikes in the usage rate within a confined geographical area or narrow span of time. The regional fraction used locally is proportional to the ratio of the number of inhabitants living in the "standard town" and the "standard region". This equates to a default value of 0.0005 or 0.05% assuming a "standard town" population of 10,000 and a "standard region" with 20 million residents. According to convention, the fraction of the annual EU tonnage used regionally has been assigned a default value of 0.1 or 10%. The preceding derivation outlined above describes the standard approach for determining the daily use rate using available default parameters along with the registrants' estimate of the annual tonnage associated with the production of particular professional product.

5.2. Days emitting

The number of emission days for each of the SpERCs described in this guidance document has been set at the ECHA default value of 365 days/year (ECHA, 2016). Since the substances described in these SpERCs may see widespread continuous use over a large geographical domain, the use frequency has been maximized to reflect the broad regional usage of these professional products.

5.3. Release factors

Although vapor pressure and water solubility may be important considerations when examining the environmental emission magnitudes from professional products, their impact is minimized in materials that are not formulated using a wide range of volatile substances. A majority of the SpERC release factors highlighted in this background document have not been assigned to specific vapor pressure or water solubility categories. As such, the stated values apply to the entire range professional products included in the SpERC description.

When suitable information is unavailable, the most reasonable option is to cite the default release factors cited by ECHA (ECHA, 2016). The ECHA default values have been conservatively estimated and assume that air, water, and soil releases will occur as a result of the spillage during the transfer or delivery of materials and leaks in pumps, pipes, reactors, and storage tanks. The default factors provide a reasonable and practical alternative that have been fully vetted for products that see widespread professional use. The ERC 9a and 9b ERCs have been specifically aligned with the indoor and outdoor use of functional fluids in a professional setting. The default value for air, water, and soil has been set at 5% for each scenario except indoor soil release, which is not a recognized condition. The assigned SpERC values were therefore equated with the factor obtained when the ERC 9a and 9b releases were averaged for the individual environmental compartments.

1. *Release factors to air, water, and soil*

Several different approaches were used to establish the release factors for the four SpERCs highlighted below. They include using a worst-case default approach to ensure an adequate degree of precaution when suitably vetted information was unavailable; the use of a material balance supposition that takes advantage of sector knowledge on a product; and the use of authoritative published data once the information was appropriately vetted. Table 2 provides a listing of the air, water, and soil emission factors applicable to three of the four SpERC product categories. The assigned release factors were reviewed and agreed upon by a broad group of knowledgeable specialists within the sector organization (CEFIC, 2012). All relevant Emissions Scenario Documents (ESDs) and Best Available Technology Reference Documents (BREF) were examined prior to assigning a release factor. In addition, a secondary literature search was performed to locate any complimentary qualitative information that could be beneficial. This included an examination of emission factors located in PRTR (Pollutant Release and Transfer Register) reports as well as life cycle inventories for relevant products and processes (Concawe, 2017, Frischknecht, et al., 2005).

A. Binders and release agents

The values were assigned using a mass balance approach that takes advantage of the sector knowledge and professional judgement possessed by members the expert group responsible for creating the SpERC factsheets. The determination employs an informed decision-making process that assumed complete release of the chemical substances to the environment. Partitioning of the release to air, water, and soil takes into consideration the default release factors associated with ERC 8a and 8d (ECHA, 2016). The ERC (Environmental Release Category) release factor of 100% was adjusted downward based on a consideration of the intended use and the manner of application. Adjustments to the primary release compartment were offset by changes in the release magnitude for the remaining environmental compartments such that a material balance was always maintained. These adjustments provided more realism to the default ERC values for the widespread indoor and outdoor use of a product. Better accounting of the relative release proportions to the air, water, and soil compartments ensured that a mass balance was maintained while preserving the conservatism that is built into the generically-defined ERCs.

B. Coatings

Releases to air, water, and soil were derived from an evaluation of the emissions associated with the application of five different solvent-based coatings (OECD, 2009). The air releases attributed to the use of application of furniture, automotive, metal packaging, decorative, metal packaging, marine, and aerospace coatings ranged from about 93 to 100%. The most reasonable and relevant value for the various product types and application methods was judged to be associated with the professional interior or exterior application of decorative coatings using a brush or roller. This value of 98% was paired with a water emission value of 1% that was associated with the use of decorative coatings by the general public. The remaining of 1% of the total emissions was assigned to the soil compartment to preserve the mass balance.

C. Cleaning agents

The compartmental releases of cleaning agents were established using available information on the air, water, and soil emissions that accompany the use of dry-cleaning solvents. The European Solvent Emissions Directive established an air emission limit value of 20 grams of solvent per kilogram of garments or furnishings cleaned (EU, 1999). This value is equivalent to an air release factor of 2%, which provides a reasonable approximation of the air releases that can be expected for other types of professional cleaning products. The water release factor of a dry-cleaning solvent was calculated using information supplied in a USEPA report on wastewater releases associated with machines without any emission control attachments (USEPA, 1998). The estimated emission of perchloroethylene to wastewater was 0.007 gal/yr and the estimated clothing throughput for a facility was determined to be 53,333 lbs/yr on average. The density of perchloroethylene at 70 °C which yields a water release factor of 0.000001 kilograms of solvent per kilogram of laundered clothing. This value is equal to a water release factor of 0.0001%. The same publication did not note any appreciable release of dry-cleaning solvents to soil so this factor was set at zero.

D. Functional fluid use

The functional fluids SpERC covers a diverse set of products including a wide variety of hydraulic, transmission, brake, power steering, and heat transfer fluids as well as all types of cable, transfer, and processing oils (SMRC, 2021). The EUTGD industrial category entitled "Mineral Oil and Fuel" (IC=9) includes these types of products and provides industrial air release factors for five different vapor pressure groups. Since EUTGD has equated the industrial and professional life cycle stages, the industrial values contained in Table A3.8 are applicable to the widely dispersed professional use of hydraulic fluids and associated additives. The proposed values shown below in Table 2 are applicable to the entire range of functional fluids used in a professional setting.

Table 2 Air release factors for functional fluids

Vapour pressure (Pa)	SpERC air release factor (%)
≥1000	1.0
100-1000	0.5
10-100	0.1
1-10	0.05
<1	0.01

An OECD Emission Scenario Document (ESD) for lubricants and additives has identified water release factors for eight different types of hydraulic fluids used in off-road and agricultural equipment (OECD, 2004). The factors ranged from a low of 0.3% for to a high of 45% with all but two of the values below 5%. The average value of about 9% for all eight products provides a water release factor that can be applied to all types of functional fluids. A soil release factor can also be derived using the information contained in the OECD ESD for lubricants and lubricant additives (OECD, 2004). The document lists soil emission factors for six different types of hydraulic fluid used in professional off road and agricultural applications. The values range from a low of about 3% to a high as 16% with a majority of the values below 8%. The average soil release factor of 8% for the six fluid types is recommended for use for the entire range of functional fluids.

Table 3. SpERC release factors

Assignments	SpERC title			
	binders/release agents	coatings	cleaning agents	functional fluids
ERC	8a 8d	8a 8d	8a 8d	9a 9b
Air release factor (%)	95	98	2	See above table
Water release factor (%)	2.5	1	0.0001	9
Soil release factor (%)	2.5	1	0	8

2. *Release factors to waste*

A thorough and detailed analysis accompanied the assignment of waste release factors for the four SpERCs outlined in this background document. Although a substantial amount of information is available documenting the total amount of different waste types associated with the various different professional operations, these data are often in a form that prevents the determination of a normalized release fraction as a function of the use volume. Life cycle studies often provide useful statistics on waste generation in different professional use sectors; however, these studies need to be individually examined to determine their relevance to a particular SpERC code.

In this context, waste refers to chemical-containing substances and materials that have no further use and need to be disposed of in a conscientious manner (Inglezakis and Zorpas, 2011). Professional operations are capable of generating hazardous wastes as a result of spill clean-up, routine maintenance, and equipment repairs. Waste volumes are dramatically affected by recovery and reuse practices that take advantage of any residual value following recycling. In many cases, the amount of waste generated is directly related to the degree of compliance with any agreed upon recovery and reuse programs.

All of the waste release factors cited in Table 3 have been derived from published life cycle assessments (LCAs) or surveys that inventoried the emissions and wastes generated during the use of a formulated professional product. The cited values may be supplanted if the actual hazardous waste generation factor is known for the operation described by the SpERC. To guarantee that an adequate margin of protection has been built into the determination, an adjustment factor has occasionally been applied when the reported value was judged to be unrepresentative of the entire range of potential use conditions within a particular operation.

Table 3. SpERC waste release factors and their literature source

Assignments	SpERC title			
	release agents	coatings	cleaning agents	functional fluids
Waste release factor (%)	3	2	4	30
Source	(PCA, 2007)	(OECD, 2009)	(Curran, 2003)	(OECD, 2004)

A. Binders and release agents

The waste factor was cited in a life cycle assessment for the production of concrete masonry from Portland cement (PCA, 2007). The production process requires the application of a releasing agent to the concrete forms to facilitate separation of the masonry block from the mold. A survey of eight concrete masonry plants found that the solid waste resulting from the production 100 Concrete Masonry Units (CMUSs) averaged 51 kg and included waste concrete and a small amount of form releasing oils and solvents. A single CMU measures 200 x 200 x 400 mm and weighs at least 17 kg (Kishore, 2019). This yields a factor of 3.0% that has not been adjusted since it provides an upper limit for the amount of binder or releasing agent that would be disposed of as waste during widescale professional use of these products.

B. Coatings

The professional application of interior or exterior decorative coatings and varnishes including wall and ceiling paint, trim and cladding paint, and wood stains has been associated with a solvent waste generation factor of 2% (OECD, 2009). The waste stream consisted of brush and roller residues and unused paint remaining in the can. The analysis assumes that a portion of the total unused and residual coating will be lost via evaporation with the remainder being disposed of as waste. This value provides a reliable estimate of the waste production from a wide array of professional coating products and has not been adjusted or otherwise modified to account for unusual work practices, application techniques, or product formulations.

C. Cleaning agents

The waste generation factor was taken from a life cycle assessment for the use of a solvent-containing general purpose cleaner (Curran, 2003). The reported value represents the amount of hazardous waste that is generated when 0.7 L (3 cups) are used to clean 1000 ft^2 of a hard surface such as a kitchen counter. This scenario resulted in the production of 0.02 mg of hazardous waste and 27 mg of non-hazardous waste. Since the density of liquid surface cleaners is not appreciably different from water (1 kg/L), the overall total waste factor for the amount of applied cleaner (0.7 kg) was 3.9 %, which was rounded upward to 4%. An adjustment factor has not been applied to this value since the assessment is representative of use conditions associated with a wide range of professional cleaning products.

D. Functional fluid use

This value is equivalent to the waste factor for a mineral oil-based hydraulic fluid finding general use in hydraulic equipment due its low cost and lack of performance enhancing additives (OECD, 2004). The waste fraction of 30% represents the portion that is not reused or recycled and is collected for disposed for in a landfill. Since the conditions of use for this functional fluid provide a worst-case scenario for waste generation, the value has not been adjusted to account for other professional applications.

6. Scaling Principles

Scaling provides a means for downstream users (DUs) to confirm whether their combination of OCs and RMMs yield use conditions that are in overall agreement with those specified in a SpERC (ECHA, 2014). These adjustments are only applicable to industrial uses and cannot be employed with other life cycle stages where widespread uses take place.

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