

Expert opinion on Risks related to hazardous substances and the basic criteria for the award of the „Blue Angel“ (German: „Blauer Engel“)

Report within the framework of the UFOPLAN Project „feasibility studies, expert opinions and market surveys for the development of existing eco-labels in selected product groups as recall service“, FKZ 202 95 382

Policy Guidance



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Expert opinion on Risks related to hazardous substances and the basic criteria for the award of the “Blue Angel”

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1 Persistent, bioaccumulative and toxic chemicals.

2 Wassergefährdungsklassen (water hazard classes – defined by the German water legislation)

3 Board for the health assessment of construction material (*German: Ausschuss zur gesundheitlichen Bewertung von Bauprodukten (AgBB)*):

4 German Institute for construction technology -> Deutsches Institut für Bautechnik

1 Background and objectives

The first 6 basic criteria for the German *Blue Angel* were adopted in 1987. Today, the eco-label is allocated in 80 product groups. Currently there are some 800 recipients for the label with ca. 3,600 products.

The systematics of the basic criteria for the *Blue Angel* has changed within the 25 years of its history. Parallel to this, (eco)toxicological knowledge and the legislation of hazardous substances have become further developed (in particular by the EU Preparation Directive 1999). In addition, the harmonisation of procedures for the assessment and communication of (eco)toxicological risks within the framework of the European integration process and the universal programmes for the improvement of chemicals safety are of considerable significance. Two years ago, at EU level, the discussion on a New Chemicals Policy started and the practical implementation of the “New Approach” (e.g.: the Construction Product Directive) as well as the Integrated Product Policy (IPP) are taking on concrete form. Within this process inconsistencies result inevitably, which leads to a demand for a new strategy for basic criteria (common umbrella) for the award of the *Blue Angel*.

The value of the general policy guideline results from the following considerations:

- Efficiency of the process: The single steps and assessment tools for the development of basic criteria need not to be discussed repeatedly for every single award.
- Transparency: The basic criteria for the award and the underlying philosophy become transparent and comprehensible for all participants.
- Consistency: It will be possible to establish gradually an uniform and holistic approach for the assessment of chemicals related risks (consideration of the whole product life cycle) for all product groups.

The policy guidance can serve the completion and definition of the general process for the eco-label Type 1 (ISO 14024) and define product requirements with regard to toxic and ecotoxic effects (supplementing purely LCA-considerations). Therefore the policy guidance is a kind of “cookery book” for a fair, comprehensible and holistic assessment: It contains the philosophy of assessment (“good assessment practice”), its standard “ingredients” as well as the necessary steps to make a comprehensible assessment from these “ingredients”.

The ISO standard 14024 provides the assessment tools forming the basis of labelling. These include:

- Justification, if only single environmental aspects of the product life cycle have been considered,
- Comparison of products only by criteria that really represent a difference in the environmental performance,
- Consideration of the product performance,

- Transparency,
- Open, well structured procedure
 - **Consultation**
 - Selection of product categories, feasibility study
 - **Selection and development of environmental criteria**
 - Selection of features for the product function
 - **Publication**
- Certification

The policy guidance should also be understood as a contribution to an open and well structured approach in the development of basic criteria for awards.

The pollutant related requirements for the *Blue Angel* should be comparable to the requirements for construction products: To assessment criteria and product quality required in the AgBB-Scheme (concerning the indoor air) and in the DIBt-Scheme (concerning the groundwater).

2 Policy guidance for the prevention of (eco)toxic risks

2.1 General principles for all basic criteria

The team of experts recommends the following principles for all product groups, independent of the actual user circle or the technical form of the product:

- The technical efficiency of the labelled product must correspond at least with the technical efficiency of non-labelled products, however, if possible, exceed these.
- The minimisation of the risk of eco- and human-toxic effects can be achieved through the elimination of hazardous substances in the product itself and/or through the avoidance of emissions. Depending on the product type and the field of application, both strategies can be applied alternatively or additively.
- In principle, the risks over the whole service life cycle are taken into account. However, for reasons of practicability, a transparent setting of a priority is necessary. This priority is predominantly on the application phase. However, it can be shifted in certain cases to the phase of production or to the disposal phase.

- Very hazardous substances⁵, non-essential heavy metals⁶ and significant allergens⁷ should be excluded in *Blue Angel* products. Concentration limits are to be defined for unintentional impurities in the raw materials. Deviation from these basic rules can take place only in justified individual cases.
- Even for labelled products there will remain unavoidable uncertainties regarding potential eco- and human-toxic effects as well as regarding the possible level of exposure. These include data gaps for product components and uncertainties in predicting the actual level of exposure. Therefore considerably accepted assessment uncertainties and data gaps must be explicitly indicated in the basic criteria. This includes an explanation why these assessment uncertainties are considered as acceptable (for a certain period of time). The release of unratable organic substances from articles or cured preparations⁸ (e.g.: coatings, adhesives, sealing compounds) should be limited by a maximum acceptable emission rate for standard conditions (VOC⁹ or TOC¹⁰).
- Generally, substances should be excluded or limited due to general criteria. Otherwise substitution chemicals might be applied which have not been sufficiently analysed. Nevertheless, the exclusion or limitation of certain individual substances can be reasonable, if a) the concerning substance is highly publicly criticised or b) has an extraordinary technical importance.
- Labelled products have to be, as far as possible, safe-to-apply¹¹. This means that no special precautions or qualification is necessary for safe application. If this cannot be guaranteed because
 - a) The technical performance of a product is inevitably connected with certain hazardous properties and
 - b) The environmental and health benefits of the labelled products are well noticeable in comparison to the non-labelled products.

The risks are to be limited through instructions in application. These instructions should be clearly visible and understandable for the relevant group of users. Moreover, they must be applicable under normal use conditions¹².

⁵ “Substances of very high concern” in accordance with the proposal of the EU Commission: carcinogenic, mutagenic and toxic to reproduction substances of Categories I and II (CMR); persistent, bio-accumulative and toxic substances (PBT); very persistent and very bio-accumulative substances (vPvB).

⁶ Lead, cadmium, mercury.

⁷ List of allergens by the BfR: to be found under www.bfr.bund.de: -> data bases for “Chemikalien und Kontaktallergie”.

⁸ According to the regulations for hazardous substances, preparations are products, which are man-made mixtures of at least two chemical substances. Any physical form is possible (liquid, powdery, granulated...) For the term “articles”, the physical-mechanical form of the material is more important than the chemical composition.

⁹ = Volatile Organic Compounds

¹⁰ = Total Organic Carbon (Overall concentration of organic substances in a water sample).

¹¹ A product is considered safe-to-apply if it can be handled without special safety measures by the user.

¹² This could be proved possible within a consumers panel (e.g. 10 persons).

- Basic criteria for products for which other environmental and health-related assessment systems already exist (e.g. construction products), which are accepted by the (European) market protagonists should, as far as possible, be oriented to these assessment systems. Thereby the marketing potential of these products and the efficiency of the assessment processes can be optimised. Derivations from or supplements to these standards should be explained.
- The communication about the basic criteria should be ensured by three different information paths:
 - (a) **A product information sheet** should inform the user about the general technical benefit of the product, the advantages concerning health and environment and about the remaining uncertainties in assessment. Moreover, it should contain an instruction for proper application if needed. The product information sheet should be available at the time of purchase.
 - (b) The basic criteria for the award should be available in a contract-like format for licensing the label application (for RAL¹³ and label users).
 - (c) The motivation for the awarding with the label in the selected product group must be clear. These contain considerations concerning the market significance of the product; the relevance for health and environment; potential effects on product innovation as well as the technical reasons of the basic criteria (UBA). Whenever one has abandoned certain proofs (e.g. in order to support the innovation of smaller companies), this should be explained.
 - Information about current awarding processes, the rules and time frames of the public participation as well as the documentation of the incoming comments should be spread via internet. That would improve the transparency of the process. However, also internal discussions and exchange of confidential information can be supported this way. The establishment of a forum with limited public access (e.g. a special internet forum) can also contribute to an improved transparency.

2.2 Development of technical requirements for awarding

The following scheme represents a common structure for the formulation of basic criteria and its appropriate proof procedure. It can and should be modified in individual cases.

Step 1: Definition of the technical product performance

The desired features of the product to be labelled should be defined with the help of existing norms if available and relevant, as the “better product” should be at least equal regarding its technical quality to the non-labelled products. In some cases it can be claimed that certain chemical effects must be abandoned completely (e.g. biocide-free ship coatings). For these

¹³ RAL-Deutsches Institut für Gütesicherung und Kennzeichnung

examples it is of particular importance that equal serviceability compared to non awarded products can be guaranteed.

Step 2: Definition of the exposure scenario

The relevant exposure that may reveal throughout production, application and disposal should be identified with the help of a questionnaire. The predominant aim of this procedure is to assign an investigated product to a certain type of exposure and to continue afterwards product by product (questionnaire, see annex 1). This assignment serves the comprehensible priority setting in formulating the product requirements regarding the crucial life cycle stages and the critical exposure paths ways (compare table 2).

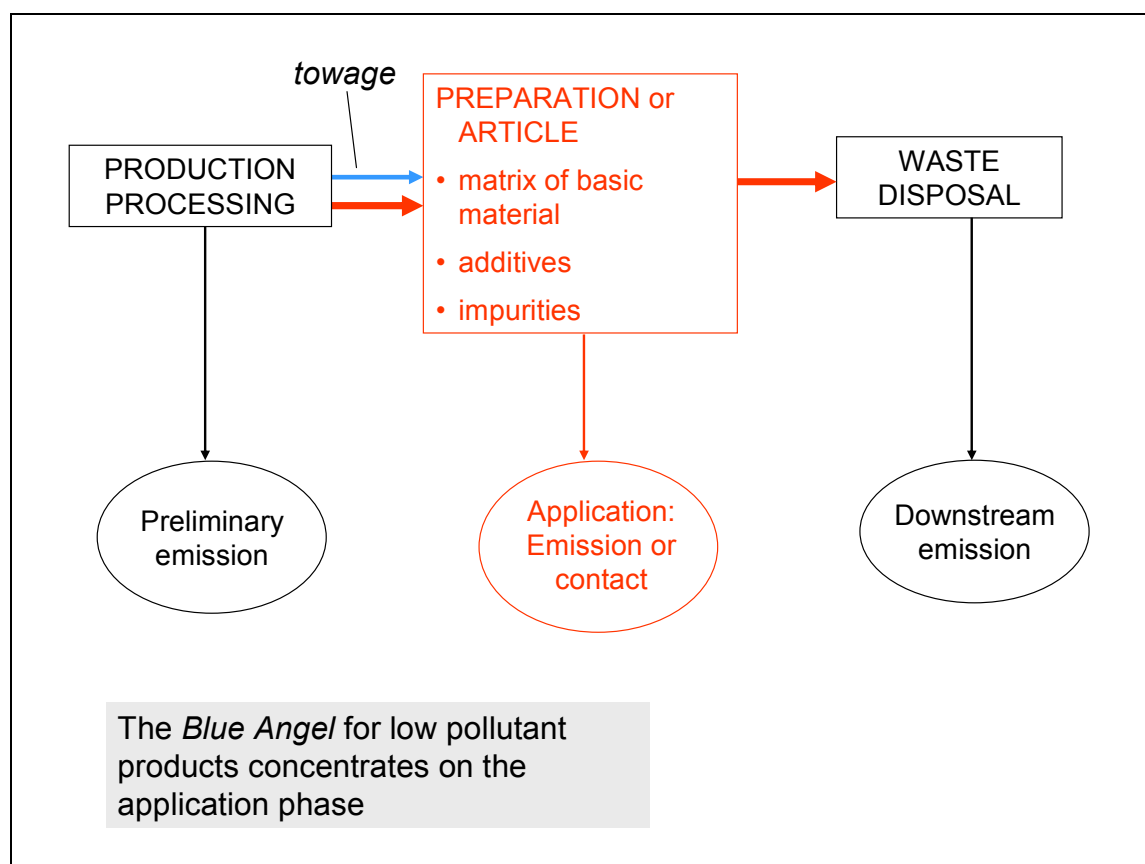


Figure 1: Feasible assessment priorities in the product life cycle

	Preparation	Preparation	Preparation	Article	Article	Article
	Not cured matrix	Cured matrix	As operating material in equipment	Mono-materials	Furniture, textiles	Equipment, machines
Use in the environment (soil and surface waters)						
Use in the environment (air)						
Discharge into wastewater treatment plants						
Interior use						
Use with skin and mouth contact						

Table 1: Exposure scenarios for *Blue Angel*-products

	Preparation	Article
Relevant components	Chemicals, including impurities caused by the synthesis process	Matrix of basic-material including impurities Additives including impurities Coatings (= cured or adsorbed preparation) Operating material
Emission potential	High, partly intended cured matrix (behaves like an article)	Middle to low; generally technically not intended
Time of exposure	Short term, short product life time	Long term
Path way of exposure	Indoor air, environment	Indoor air, skin contact, mouth contact
Importance of pre-production process	Generally limited	Generation of basic-material-Matrix and application of certain processing chemicals is partly significant
Waste disposal	undiluted in specific disposal or without disposal due to intended complete release to the environment	Substances relatively diluted, disposal by unspecific technology

Table 2: Current assessment priorities for preparations and articles**Step 3: Definition of the desired product attributes (environment and health)**

In this phase the desired product attributes regarding environment and health are defined depending on their exposure scenario. The accordant design strategy may include:

- Designing the chemical-physical properties that way that diffuse emissions of substances are minimised and for

- Designing the composition of the products that way that
- a) the share of components with demonstrable low (eco)toxic impacts is as high as possible¹⁴ and
- b) very hazardous substances are excluded from application and/or
- Designing the composition of products with an intended release in the environment that way that the share of verifiable biodegradable organic chemicals¹⁵ is as high as possible.

Step 3.1: Dangerous Components

The properties “dangerous” and “toxic” are defined by the criteria and the testing methods given in the EU directive 67/458 (Annex V and VI).

The criteria are considered to be fulfilled, if a substance is listed in Annex I, DIR 67/548 or in TRGS¹⁶ 905 or is to be classified as dangerous by the currently available scientific knowledge. Moreover the classification according to the German water hazard classes (WGK) may be applied. However, it should always be declared which tests have lead to a certain classification. Particularly, the WGK 2 classification is too diffuse regarding the long term environmental hazardousness (compare Annex 2).

Step 3.2: Very hazardous components

Very hazardous substances should be completely excluded from preparations and articles, as one can hardly define by normal efforts a “safe and acceptable exposure level”. This is valid for chemicals and chemical properties as given in Figure 2. Here we find a) carcinogenic, mutagenic and toxic for reproduction chemicals (CMRs) and b) substances, which are not degradable in the environment and tend to bioaccumulate in living organisms (PBTs and vPvBs)¹⁷. In general, impurities of concentrations less than 0.1% are acceptable, but there are the following exceptions:

- a) The threshold for declaration is lower than 0,1% for the anent substance according to DIR 67/548 (Annex I) (esp. for carcinogenic chemicals)
- b) The substance is extremely (eco)toxic (e.g. certain biocides).
- c) The substance is a PBT/vPvB-substance and the preparation is applied in amounts larger than 10.000 t/a.

¹⁴ The concrete requirements depend on what is applicable in the product group. The labelled products should belong to the upper 30% within their product group with the lowest content of (eco)toxic or persistent substances, see also step 4.

¹⁵ “*Ready biodegradability*” of the single components muss be proved in a standard test. It refers to the mineralization to water and carbon dioxide.

¹⁶ Technical Rules for Dangerous Substances -> (German: technische Regeln für Gefahrstoffe)

¹⁷ EU-criteria for the identification of PBTs see Annex 3.

Beyond this, further requirements might be determined for certain substances or substances having special technical functions (e.g. biocides). All basic criteria must be chosen that way that labelling duty of the product according to *hazardous substance legislation* can be excluded. Especially, any labelling of “*dangerous to the environment N*”, “*carcinogenic*”, “*mutagenic*”, “*toxic for reproduction*”, “*sensitizing*”, “*very toxic*”, or “*toxic*” must be excluded. For other impacts one could differ from the rule for justified single cases (e.g. concerning Xi or Xn labelling).

These rules must be applied a) for substances listed in Annex I, DIR 67/548; b) for substances listed in the German TRGS 905 or c) for substances that must be classified as *dangerous* by the producers according to the available scientific knowledge (e.g. MAK classification).

Exclusion of very hazardous substances

Exclusion of ¹⁸

- Carcinogenic and mutagenic chemicals of EU-category 1 & 2 (R45, R46, R49)
- Substances of reproductive toxicity of category 1 & 2 (R 60, R61) chronic toxic substances (R48 with T)
- CMRs of Category 3 [suspect substances¹⁹] (R40, R62, R63, R68)
- PBTs incl: PB + *CMR* 1/2 or PB + *Repro3* or PB + R48 or vPvB

Reasons for exclusion independent of the exposure

- substance causes irreversible serious damages,
- retarded effects and very low effect threshold or effect threshold not identifiable or
- long term accumulation processes and potential for toxic effects.

Substances of reproductive toxicity of cat. 3 (*Repro3*) that are also persistent and bioaccumulating may cause long term damages, if they are released into the environment (independent whether the effects are proved to be relevant for humans)

With regard to the exposure exceptions can be made in individual cases for CMR-substances of category 3, if

- there exists a well documented effect threshold with low impact intensity, which will not be exceeded during the product application (limited exposure) or:
- the described effect is not relevant for a certain exposure (e.g. if the substance which is carcinogenic to the respiration tract is applied in others than dispersed fluids).

Figure 2: Criteria for the exceptions of very hazardous substances

¹⁸ PBT = persistent, bioaccumulative and toxic substances; vPvB = very persistent and very bioaccumulative substances; *CMR* = carcinogenic (C), mutagenic (M) and toxic for reproduction (R) substances.

¹⁹ Category 3 is for CMR-substances, which are suspected to have CMR effects resulting from animal tests. However, the information is not sufficient for a classification in CMR 2

Step 3.3: Important contact allergens and sensitizers to the respiratory tract

Substances which are classified as respiratory sensitiser (R42) by Annex I, DIR 67/548 or are listed as important contact allergens by the BfR²⁰ must be explicitly declared. In how far they can be accepted in products labelled with the *Blue Angel*, depends on the individual assessment (e.g. skin contact or inhalation expected during the use; safety warning for certain groups of persons...)

Step 3.4: Properties determining the exposure

Besides the toxic properties of chemicals, the properties determining the exposure are of special interest as: the vapour pressure, the water solubility, the biodegradability or the n-octanol-water partition coefficient (log Pow).

Step 3.5: Options to define desired product attributes

In general, desired or undesired product attributes may be defined by different methods:

- the dangerous properties of a preparation or an article can be determined based on the dangerous properties of the individual components (conventional method);
- the aquatic toxicity of preparations in environmentally relevant applications (release into surface water, sewage water system or soils) can be determined using biological tests on the final preparation;
- the concentration of organic chemicals, the aquatic toxicity, the biodegradability and the potential for bioaccumulation (for cured and adsorbed preparations as well as articles with water contact) can be determined using standard tests on the eluate;
- the migration ability of substances to the surface of a material with skin contact leading to dermal exposure can be determined based on the chemical-physical properties and the molecular weight of the substance or using migration tests;
- release of volatile substances from articles by using emission tests including identification of emitted components.

The basic criteria for the *Blue-Angel* award concerning construction material should refer to existing assessment criteria. Occurring differences should be explained. Annex 3 and 4 illustrate the assessment requirements for construction material in a) groundwater areas and b) indoor areas compared to the current *Blue Angel* criteria.

²⁰ Federal agency for risk assessment -> (German: Bundesagentur für Risikobewertung): www.bfr.bund.de; -> data bases -> Chemikalien und Kontaktallergien

Step 4: Definition of required minimum data

The minimum demand for data in order to assess a product can be determined by the following rule: The lower the predicted and measured emissions (material losses during a life cycle of a product) – the more limited are the requirements to the itemization and to the data about the single chemical components of a product. The same is valid for the testing requirements regarding the final preparations or eluate. The general system for determination of data requirements is illustrated in Figure 3 on the example of *coatings, paints and adhesives*²¹. However, the priority can be set a) to the itemisation and assessment of the single components or b) to the determination of emission rates in standard-test (or model). Which of both strategies is pursued depends a) on the willingness of producers for itemisation; b) on the data availability for the single components and c) on the availability of standard tests for the emission determination.

Control parameter Critical substance	Concentration in the product	emission test for standard conditions	Ecotoxicological effect test
Substances which have not been identified by general criteria			
Substances or groups of substances that fulfil certain hazardousness criteria			
Unknown or toxicologically not assessable substance; sum parameter;			

Table 3: Testing methods for the “measurement“ of the chemical product attributes

In order to identify undesired material losses, eluate tests or emission chamber test may be applicable. It might be necessary to know the overall recipe to conduct a sensibly organised emission test.

For preparations that are deliberately released into the environment there are obligatory: a) a detailed itemisation of the components and b) an assessment of their biodegradability and their potential to bioaccumulate.

Yet another consideration must be taken into account in order to decide about the testing methods: The costs must be in a reasonable relation to the marketing potential of the labelled product. It is not that the requirements should be diluted. However, the cost-benefit relation influences the potential to change the market structure, which is a fundamental target of the award.

The product assessment for the *Blue Angel* can refer

- a) to the recipe and/or
- b) to the emission rate of substances or total parameters in the standard test and/or
- c) to the conduction of effect tests (compare Figure 3).

²¹ e.g. RAL UZ 12, 34, 113

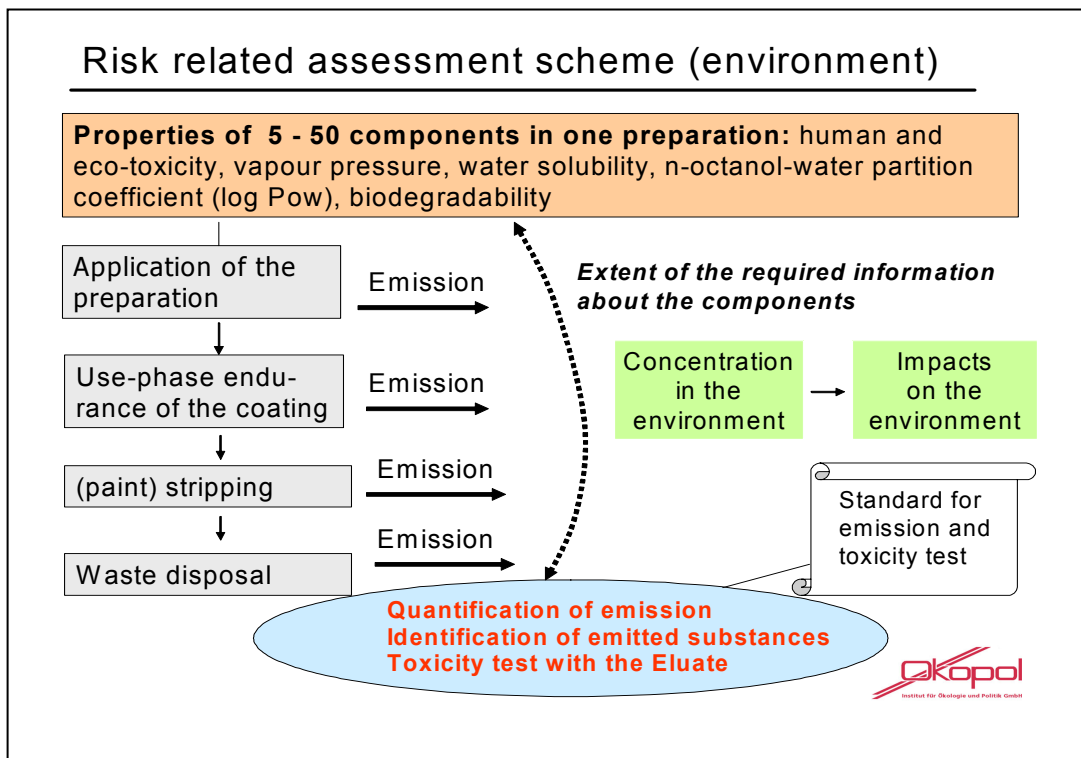


Figure 3: Model for the interaction of potential strategies for the product assessment

The three methods refer to the product itself on a certain life cycle stage. They are neither a prediction for the environmental concentrations (exposures assessment) nor for a certain environmental risk. When data about the single components are not available, further tests might be required as: emission tests, substance identification and/or toxicity tests with the eluate.

Rules for the minimum data requirements

In general the recipe for the labelled preparation must be itemised:

- At least all dangerous components of the preparation (not impurities) must be declared according to the information rules of the EU Preparation Directive
- All components > 1% must be identified. The following minimum data must be provided: acute Daphnia toxicity; vapour pressure, water solubility, Log Pow, biodegradability. For high volume products (> 1000 t/a) like dispersion varnish this threshold must be lowered to 0.1%.
- Biocides must always be identified (even below 0.1 % share of the recipe).

Deviation from the itemisation and component assessment is acceptable if:

- Chamber testing according to the AgBB-Scheme prove that the emissions of non-assessed components are negligible. (e.g. sum of VOC < **100 µg/m³**)* or
- Tests on the eluate prove that the emissions of non-identifiable components are negligible (e.g.: sum of TOC < 100 mg/).
- Biological tests with the released substance mixture prove that chronic toxic effects are not expected.

*: resp. sum of VOC < 20 µg/m³ (criteria for “recommended” products)

Step 5: Communication of risks and benefits for the user

The good technical performance of the product should be particularly illustrated in a comprehensible way and along with precise performance criteria.

The same is valid for the environmental- and health-related benefits of the product. However, the documentation should focus on the following effect categories:

- Long term, direct health disturbances for the user should be less probable as with other products of comparable technical performance.
- Indirect health disturbances due to the formation of summer smog or due to the accumulation of dangerous substances in comestibles are less probable as with other products of comparable technical performance.
- The biodiversity of the ecosystems and species is less impaired as for products with comparable technical performance.

If products are awarded, although they can not be regarded as safe-to-apply, the remaining application risks should always be explicitly declared (risk honesty). Appropriate safety instructions should be provided²².

The existing information gaps for the assessment of a product should be named and explained in the basic criteria for the awarding (or in the product description). If necessary a stepwise improvement of available information should be formulated.

²² This paragraph is not accepted by the "Jury Umweltzeichen" (jury for the award). According to the Jury the consumer expects a clear and unambiguous decision for the labelling of a product. He expects that the Jury Umweltzeichen delivers him from forming his own opinion about the environmental performance of a product. There is a need for further discussions.

Annex 1 – Questionnaire for the determination of the exposure scenario

- What is it - a preparation or an article?
- Who applies the product: - trained professionals, untrained professionals, amateurs, other adult users or children?
- Which life cycle stages should be considered? Which are especially relevant for health or environment? How is the preparations applied? What is the life expectancy of cured coatings/adhesives/sealing compounds? Paint stripping or disassembling of articles envisaged? Disposal or recovery?
- When will the product be applied? With which frequency and for which period of time?
- Will the substance/the chemical product (the preparation)
 - be deliberately released into the environment?
 - with predictable relevant material losses?
 - be discharged into sewage water systems?
- Will the substance/the product be released as preparation in indoor areas?
- Will the substance/the product be applied in technical equipment as operating material?
- Will the article be applied
 - in outdoor areas?
 - in contact with mouth or skin?
 - in outdoor areas?

Annex 2: PBT identification by WGK classification

- The PBT-concept considers the long term effects of chronic release. The WGK-concept refers to accidental releases.
- But: WGK-concept classifies if there are gaps in data.
- WGK 2 is not suitable for the illustration of PBT-concern.

	Overestimation of risks	Underestimation of risks
R 23-28 (+ 39,48) R 50 Without R 53	WGK 2	
R 50 R 60, 61 with R 53		WGK 2

Annex 3: Identification of substances with PBT-properties (EU concept)

Property	Test results	Screening information => evidence for <u>potential</u> PBT properties	Critical threshold value for PBT properties in further tests
P	Biodegradability	Degradation rate in OECD Test for ready biodegradability (OECD 301 A-F or comparable); Critical: ≤ 60% of the theoretical CO ₂ -amounts in 28 days ²³	Half life (DT ₅₀) ²⁴ in OECD simulation test 308 or ISO/DIN 14592-1/2; critical: > 40 (60) days ²⁵
		Degradation rate in OECD screening Test for inherent biodegradability (202 B-C); critical: ≤ 60% CO ₂ ²⁶	
B	Octanol-water – partition-coefficient	Octanol-water –partition-coefficient ²⁷ OECD 107/117 Critical: log K _{ow} > 4.5	
	Bio-concentration		Bio-concentrations in fish test (OECD 305 A-E or comparable); Critical: BCF > 2000 [500] ²⁸
T	acute aquatic toxicity ²⁹		critical: LC ₅₀ ³⁰ < 0.1 [1] ³¹ mg/l If BCF > 5000 and degradation half life is above 60 days, the measured toxicity is not relevant
	chronic aquatic toxicity		critical: NOEC ³² < 0.01 [0.1] ³³ mg/l If BCF > 5000 and degradation half life is above 60 days, the measured toxicity is not relevant

²³ or a comparable test, e.g. dissolved carbon (DOC) ≤ 70% in 28 days, the degradation rate must be reached within 10 days (10-day-window), as far as it is not a surface active substance like tensides or emulsifiers.

²⁴ DT50 is the required time period until 50% of the substance is degraded (half life).

²⁵ 60 day refers to degradation conditions in marine environment, 40 days for fresh water conditions

²⁶ or a comparable test; if more than 20% of a substance is degraded within 28 days, but the degraded share is below 60%, the substance is considered to be primarily degradable, but persistent decomposition products may generate

²⁷ Log K_{ow} is the partition in water and octanol on a logarithmic scale

²⁸ In the framework of marine protection strategies the critical threshold is BCF ≥ 500 (=> compare www.ospar.org)

²⁹ For the interpretation of test results it is important to know that only the effect concentrations in the range of water solubility are significant

³⁰ LC₅₀ stands for the concentration which is lethal for 50% of the test organisms. Other damages are indicated as effect concentrations (EC₅₀).

³¹ In the framework of marine protection strategies the critical threshold is LC₅₀ ≤ 1 mg/l

³² NOEC = No Observed Effect Concentration = lowest tested concentration, for which no effect has been observable

³³ In the framework of marine protection strategies the critical threshold is NOEC ≤ 0.1 mg/l

Annex 4:	AgBB 2000 ³⁴ "recommended"	AgBB 2000 "feasible"	UZ 102 Wall paints	UZ 12a Varnishes	UZ 113 floor covering adhesives
Recipe analyses	Yes	Yes	No	yes	Yes
Exclusion of substances in the Recipe	CMR	CMR	CMR Biocides	CMR WGK 2+3	CMR Oxidisable fatty acids APEOs Biocides ³⁵
Limitations in the recipe	No	no	VOC ≤ 700 plasticisers <0.1%	VOC 2-10% biocides <0,5% Xn, Xi < 40%	No
Concentration tested in indoor air (mg/m ³) after 3 days	TVOC < 1	TVOC < 10			TVOC < 1 Σ Carc < 0.01 Σ Formaldehyd + Acetaldehyd <0.05 ppm
Concentration tested in indoor air (mg/m ³) after 28 days	TVOC < 0.2 SVOC < 0.02 Σ C _i /NIK _i < 1 Σ Carc < 0.001 Σ VOC _{NIK?} < 0.02	TVOC < 1 SVOC < 0.1 Σ C _i /NIK _i < 1 Σ Carc < 0.001 Σ VOC _{NIK?} < 0.1			TVOC < 0.1 SVOC < 0.05 Σ C _i /NIK _i < 1 Carc < 0.001/substance Σ VOC _{NIK?} < 0.04

Annex 5: DIBt	Product tests according to DIBt ³⁶ "feasible" product	UZ 64 mould release agents
Analysing the recipe	Existing recipe may shorten the procedure	yes
Exclusion of substances in the recipe	CMR	CMR WGK 2+3
Limitations in the recipe	No	Max 5 % on non readily biodegradable substances
Eluable substances: Requirements to the eluat (tier 1: substance identification)	(a) General parameters of the eluats (pH, conductivity) (b) No exceeding of negligibility threshold by the test values for the single substances (according the German law (Bundes-Bodenschutz- und Altlastenverordnung) <u>and</u> (c) For all identifiable substances ecological harmlessness is detectable <u>and</u> (d) TOC < 20 mg/l	No requirements
Eluable substances: Requirements to the eluate (tier 2: biological tests, if tier 1 does not show harmlessness)	If criteria (c) not fulfilled, but (b) and (d): • ecotoxicological investigation of the eluate (Test) • Biodegradability test with the eluate	No requirements

³⁴ Board for the health assessment of construction material (*Ausschuss zur gesundheitlichen Bewertung von Bauprodukten (AgBB)*): Procedures (that are still in testing) for the assessment of health impacts caused by VOC from construction material, October 2000; SVOC = low volatile organic compounds; NIK = lowest concentration of interest (niedrigste interessierende Konzentration); Ci = Concentration of Substances in chamber air, Criteria declared for "recommended" and for "feasible" products. The current version of the AgBB-assessment scheme is available at: www.umweltdaten.de/daten/bauprodukte/agbb-bewertungsschema2003.pdf.

³⁵ so far not licensed as preservative.

³⁶ German Institute for Construction technology (Deutsches Institut für Bautechnik): Information about the new DIBt-leaflet for the impact assessment of construction products concerning groundwater and soil, 11/2000.