Basic Criteria for Award of the Environmental Label

Low-Emission Wood Products and Wood-Base Products

RAL-UZ 38

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RAL gGmbH

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Prolongation for 1 year without any change
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1 Preliminary Remarks

1.1 In cooperation with the Federal Minister for the Environment, Nature Conservation and Nuclear Safety, the Federal Environmental Agency and considering the results of the expert hearings conducted by RAL, the Environmental Label Jury has set up these Basic Criteria for the Award of the Environmental Label.

RAL, reg. assoc., has been entrusted with the award of the Environmental Label.

Upon application to RAL and on the basis of a Contract on the Use of the Environmental Label to be concluded with RAL the permission to use the Environmental Label may be granted for all products, provided that they comply with the requirements as specified hereinafter.

1.2 Wood products and wood-base products (e.g. furniture, panels and prefabricated parquet) may cause environmental burden during manufacture, use and disposal. That is why the requirements for award of the environmental label refer to the overall life of wood products and wood-base products. They refer to the manufacture of the products and their materials, the period of actual use as well as to the disposal of used wood products, wood-base products, old furniture and packaging material used for the transport of new wood products and furniture.

The Environmental Label for Wood Products and Wood-Base Products may be awarded to furniture and other wood products which

- mainly consist of the renewable raw material „wood“
- distinguish themselves by an environmentally compatible manufacture - this particularly applies to the coating,
- are no risk to health in the living environment,
- do not contain any hazardous substances aggravating recycling.

The use of wood from sustainable forestry and low-emission wood-based material will be supported.

2 Scope

These Basic Criteria apply to ready-to-use final products for indoor use (e.g. furniture, interior doors, panels, floorings with painted surfaces, laminate floorings, prefabricated parquet/linoleum) which are mainly made, i.e. for more than 50 per cent, from wood/flower wood powder and/or wood-based materials (chipboards, coreboards, fibreboards, veneer panels, each non-coated or coated). Window frames and semi-finished products do not fall within the scope of these Basic Criteria.

3 Requirements

The Environmental Label shown on page 1 may be used for the marking of products under para. 2 provided that they comply with the following requirements:

3.1 Manufacture

3.1.1 Origin of the Wood

Solid wood, laminated wood, veneer and the wood used for the production of plywood shall not be taken from primeval forests (boreal and tropical primary forests). When buying timber the applicant undertakes to take wood from sustainable forestry into account.

Compliance Verification:

The applicant shall name the type of wood and indicate the origin of the wood or submit certificates according to the FSC Criteria or equivalent certification systems (FSC: Forest Stewardship Council).

3.1.2 Formaldehyde in Wood-Based Materials

Wood-based materials marked with the Environmental Label RAL-UZ 76 may be used for the production of products under para. 2. Wood-based materials not marked with that Environmental Label according to RAL-UZ 76 must not exceed in their raw state, i.e. prior to machining or coating, a formaldehyde steady state concentration of 0.1 ppm in the test chamber.

Compliance Verification:

The applicant shall name the manufacturer and the product name of wood-based materials labelled with the Environmental Label according to RAL-UZ 76. For wood-based materials not yet labelled with the RAL-UZ 76 Environmental Label the applicant shall present a test certificate according to the test method for wood-based materials [1].

3.1.3 Coating Systems

Coating systems are usually used for the protection and design of surfaces of pro-ducts under para. 2. Such coating systems/methods include staining, primer coatings, clear varnishes, topcoats, foils, decorative papers, adhesives etc..

3.1.3.1 General Substance Requirements

– The coating systems must not include any substances[2] as constituent parts which are classified in Annex I to Directive 67/548/EEC[3] or in the Publication of the List of

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1 Test Methods for Wood-Based Materials, Federal Health Bulletin 10/91 p. 487-483
Compliance may also be demonstrated by submitting a certificate confirming the classification into emission class E1.

2 Term as defined in Section 3, No. 1, Publication of the revised Chemicals Act, dated July 25, 1994.

3 Official Journal of the European Communities published by the Federal Minister of Labour and Social Affairs in the Federal Gazette (continuous publication).

Hazardous Substances and Preparations[4] according to Section 4a, Gefahrstoffverordnung (Ordinance on Hazardous Substances)[5], as "very toxic" (T+), "toxic" (T), "carcinogenic", "mutagenic" or "teratogenic", resp.; and

– are classified in TRGS 905[6] or in the MAK-Value-List[7], as amended, as

a) carcinogenic according to EC Category Carc.Cat. 1 or Carc.Cat. 2 or K1 or K2, resp. or according to the MAK classification III1 or III2;

b) mutagenic according to EC Category Mut. Cat. 1 or Mut.Cat. 2 or M1 or M2 resp.;

c) teratogenic according to EC Category Repr.Cat 1 or Repr.Cat 2 or $R_{E/F}1$ or $R_{E/F}2$ resp..

3.1.3.2 Liquid Coating Systems

In liquid coating systems the coating materials used must not exceed

a) 250 g/l VOC for plane two-dimensional products/materials (e.g. interior doors, panels, floorings with painted surfaces, prefabricated parquet) and

b) 420 g/l VOC for furniture and other materials/products with three-dimensional surfaces (VOC: volatile organic compound).

This requirement shall be considered fulfilled irrespective of the VOC content of the individual coating material if it is proved that - considering the quantity of the coating material used - the VOC content for the entire coating system of the product under para. 2 does not exceed as a total

250 g/l VOC for products/materials under a)

and

420g/l VOC for products/materials under b).

Exempted are painting plants equipped with a waste gas purification plant complying with the requirements of TA Luft[8] or EU Directive on Solvents[9].

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4 Publication of the list of hazardous substances and preparations pursuant to Section 4, Gefahrstoffverordnung (Ordinance on Hazardous Substances), dated September 16, 1993, as well as publication of amendment (continuous publication in the Federal Gazette.

5 Ordinance for Amendment of the Ordinance on Hazardous Substances, for Abolition of the Gefährlichkeitsmerkmaleverordnung (Ordinance on Danger Criteria) and for Amendment of the First Regulation relating to the Sprengstoffgesetz (Law on Explosive Material), dated October 26, 1993.

6 Revised version of TRGS 905 - List of carcinogenic, mutagenic or teratogenic substances (Edition June 1997).

7 MAK and BAT Value List 1999, Senate Commission for the Examination of Health-Endangering Working Materials, 36th Communication (2000).
(MAK-value = Maximaler Arbeitsplatzkonzentrationswert = industrial threshold limit value - lower toxic value)
(BAT-value = Biologischer Arbeitsstofftoleranzwert = biological limit threshold value (BLTV)

8 Technische Anleitung zur Reinhaltung der Luft -TA Luft-, (Technical Instructions on Air Quality Control) dated February 27, 1998.

9 EU Directive on Solvents (Official Journal of the European Communities 98 C 248, p.1)

3.1.3.3 Special Substance Requirements for Liquid Coating Systems

The liquid coating systems must comply with the requirements under para. 3 of the VdL Directive on Wood Paint Systems.[10]

Compliance Verification:

The applicant shall prove compliance with the requirements under paras. 3.1.3.1 - 3.1.3.3 by presenting a statement of the manufacturer of coating materials (Annex 2 to the Contract pursuant to RAL-UZ 38) and by submitting Technical Data Sheets and Safety Data Sheets according to EC Directive 91/155/EEC[11], both in German and in English.

3.2 Use

3.2.1 Indoor Air Quality

The products under para. 2 must not exceed the emission values listed below:

a) for plane two-dimensional products (e.g. interior doors, panels, laminated floorings, prefabricated parquet)

Substance	**Initial Value (24 ± 2h)**	**Final Value (28th day)**
Formaldehyde	-	0.05 ppm
Organic compounds Boiling point 50-250°C	-	300 µg/m³
Organic compounds Boiling point > 250° C	-	100 µg/m³
CMT Substances [12]	< 1 µg/m³	< 1 µg/m³

b) for furniture and other products with a three-dimensional surface

Substance	**Initial Value (24 ± 2h)**	**Final Value (28th day)**
Formaldehyde	-	0.05 ppm
Organic compounds Boiling point 50-250°C	-	600 µg/m³
Organic compounds Boiling point > 250° C	-	100 µg/m³
CMT Substances [12]	< 1µg/m³	< 1 µg/m³

[10] Directive on the Declaration on Wood Paint Systems, VdL-RL 02, Association of the Paint Industry, reg. assoc., May 2001 (Appendix 1 to the Basic Criteria of RAL-UZ 38).

[11] Commission Directive 91/155/EEC, dated March 5, 1991, relating to the determination of the details of a special information system for dangerous preparations according to Article 10 of Council Directive 88/379/EEC.

[12] CMT Substances = carcinogenic, mutagenic and teratogenic substances, cf. para. 3.1.3.1, second dash.

Compliance Verification:

The applicant shall present a test certificate according to the emission test method for formaldehyde and other volatile compounds[13] issued by a testing institute recognised for these tests by BAM - Bundesanstalt für Materialforschung und Prüfung (Federal Institute for Materials Research and Testing) (Appendix 3 to the Basic Criteria RAL-UZ 38) confirming compliance with this requirement.

3.2.2 Packaging

If possible, products under para. 2 are to be packed in a way allowing post-manufacture outgasing of volatile components.

Compliance Verification:

The applicant shall present a description of the packaging system and state that the packaging design allows the outgassing of volatile components or give the reason why

3.2.3 Wearing Parts

For those parts of a product under para. 2 which are subject to wear, e.g. hinges, locks, table leaves, functionally compatible replacements shall be guaranteed for a period of at least five years. This shall not apply to lighting and lighting fixtures.

Compliance Verification:

The applicant shall declare compliance with this requirement.

3.3 Recycling and Disposal

With regard to recycling and disposal neither material protection agents (fungicides, insecticides, flame-retardants) nor halogenated organic compounds must be added to the products under para. 2, including the materials used for their production (wood-based materials, adhesives, coatings etc.). Excluded are fungicides exclusively used for pot preservation of aqueous coatings and adhesives or flame retardants using inorganic ammonium phosphates (ammonium hydrogen phosphate, ammonium polyphosphate etc.), boron compounds (boric acid, borates) or other dehydrating minerals (aluminium trihydrate or the like) for flame retarding purposes.

Compliance Verification:

The applicant shall declare compliance with the above requirement and present corresponding statements of his suppliers.

3.4 Consumer Information

The product under para. 2 shall be accompanied by consumer information providing at least the following basic information - if applicable, together with other information:

- Information about wearing parts and their repair or exchange, and, if applicable, about a repair service, stating that functionally compatible replacement parts will be available for a period of at least 5 year.
- Information about type and origin of the predominant wood in accordance with para. 3.1.1;
- Information about other materials (> 3 weight per cent);
- Information about assembly or laying of the products;
- Information about disassembly for moving or later recycling purposes;
- Information about the product's wearing resistance (fields of use and, if applicable, material test results.

Compliance Verification:

The applicant shall present the consumer information.

3.5 Advertising Statements

3.5.1 Advertising statements must not include any notes, such as „tested for biological living" or those which would belittle risks in accordance with Section 9, para. 8, Ordinance on Hazardous Substances (e.g. „non-toxic", „not injurious to health", free from .....).

3.5.2 Product names including terms like „bio", „eco" or the like shall not be admissible.

Compliance Verification:

The applicant shall declare compliance with the requirement.

4 Applicants and the Parties Involved

4.1 Manufacturers of products pursuant to paragraph 2 shall be eligible for application.

4.2 Parties involved in the award process

- RAL to award the Blue Angel Eco-Label,
- the federal state where applicant's production site is located,
- Umweltbundesamt (Federal Environmental Agency) which, after signing of the contract, receives all data and documents submitted in application for the Blue Angel in order to be able to proceed with the development of the Basic Award Criteria.

4.3 The compliance verifications submitted by the applicant will be treated confidentially.

[13] Official Journal of BAM Bundesanstalt für Materialforschung und -prüfung (Federal Institute for Materials Research and Testing), vol. 29, 1999, p. 234-250 (see also Appendix 2 to the Basic Criteria RAL-UZ 38).

5 Use of the Environmental Label

5.1 The terms governing the use of the Environmental Label by the applicant are stipulated by a Contract on the Use of the Environmental Label to be concluded with RAL.

5.2 Within the scope of such contract the applicant undertakes to comply with the requirements under paragraph 3 as long as he makes use of the Environmental Label. Considerable changes of the materials used (e.g. adhesive of the carrier materials, other adhesives, coating systems) are to be communicated to RAL. Such changes may require a renewed submission of compliance verifications according to paras. 3.1.2 and 3.1.3.

5.3 For the marking of products according to para. 2 Contracts on the Use of the Environmental Label are concluded. These contracts run until December 31, 2013. They shall be extended by periods of one year each, unless the contract is terminated in writing by March 31, 2013 or by March 31 of the respective year of extension.

After the expiry of the contract the Environmental Label may neither be used for labelling nor for advertising purposes. This regulation shall not affect products being still in the market.

5.4 The applicant (manufacturer) shall be entitled to apply to RAL for an extension of the right to use the label to the product entitled to the label if it is to be marketed under another brand/trade name and/or under other marketing organizations.

5.5 The Contract on the Use of the Environmental Label shall give the following particulars:

5.5.1 Applicant (Manufacturer)

5.5.2 Brand/trade name, product designation.

5.5.3 Distributor (label user), i.e. the marketing organization according to para. 5.4.

Appendix 1 to the Basic Criteria for Award of the Environmental Label according to RAL-UZ 38

Association of the German Paint Industry, reg. assoc.

VdL-RL 02
(2nd revision)

Directive
for
Declaration of Wood Paint Systems

„VdL Directive on Wood Paint Systems“
pursuant to VdL Guidelines
„Environment, Health Protection and Safety“
for Responsible Care in the Paint Industry.

Revised Edition: May 2001

Verband der Lackindustrie e.V. (Association of the German Paint Industry) •
Karlstraße 21 • 60329 Frankfurt/Main

Preamble

The manufacturers of Wood Paint Systems united in the Association of the German Paint Industry declare themselves followers of Responsible Care in all matters of environmental and health protection. As supporters of the association’s aims the manufacturers wish to implement these guidelines by subjecting their products to a directive for declaration of wood paint systems to guarantee their compliance with certain requirements. The purpose of this project is to distinguish such coating materials which - as far as we know today - as a result of their composition and when properly used do not cause any health-endangering emissions or odour nuisance in indoor areas. Doing without certain ingredients knowingly is also to protect the user of the paint.

1. Scope

This directive applies to wood and furniture paints designed for coating wood and wood-based materials for indoor use.

2. References to Technical Rules

- DIN 55 683 (November 1994) Determination of solvents in coating compounds containing organic solvents only
- DIN 55 943 (November 1993) Colouring agents; Terms
- DIN 55 945 (September 1996) Coating compounds; (paints, varnishes and similar materials); Terms
- DIN 55 958 (December 1988) Resins, Terms
- DIN 68 861 „Furniture surfaces“, Parts 1-2-4-6-7-8, Behaviour in different situations of stress
- DIN 68 871 „Furniture Designations“
- DIN EN 71 - „Toy Safety“
- DIN EN 717-2 - „Determination of formaldehyde emissions“ - Part 2: Formaldehyde emission determined by means of the gas analysis method
- DIN EN 927-1 (October 1996) „Paints and varnishes, coating compounds and coating systems for wood for outdoor use“ - Part 1: Classification and Selection
- DIN EN 971-1 (September 1996) „Paints and varnishes; Technical terms and definitions of coating compounds“ - Part 1: General Terms
- Furniture - Assessment of surface resistance to
  DIN EN 12 720 cold liquids
  DIN EN 12 721 humid heat
  DIN EN 12 722 dry heat
- TRGS 404 (September 1992) Evaluation of hydrocarbon vapours in workplace air
- Internal Regulation DGM „Deutsche Gütegemeinschaft Möbel“ (German Quality Assurance Body „Furniture“), Nuremberg
- Technical Rules for Hazardous Substances TRGS 900 - TRGS 907 and subsequent regulations, each as amended.
- MAK Value List - Maximum concentration at the place of work, as amended
- VDI Directive 3462, page 3, October 1996, „Emissionsminderung Holzbearbeitung und -verarbeitung - Bearbeitung und Veredelung des Holzes und der Holzwerkstof-fe“ (Reduction of emissions - Wood treatment and processing - Treatment and finishing of wood and wood-based materials)

3. Self-Commitment

The manufacturers of wood paints observing the Directive for Declaration of Wood Paint Systems undertake with regard to the distinguished products:

a) to do without the following ingredients:
   - asbestos
   - lead, cadmium and mercury compounds
   - phenols and cresols
   - pentachlorophenol (PCP)
   - polychlorinated biphenyls (PCP) and terphenyls (PCT)
   - lindane (HCH)
   - fungicidal, bactericidal and insecticidal agents except for preservatives required for water-based products
   - other components which from what we know for sure today are classified as carcinogenic, mutagenic and teratogenic;

b) not to use any of the solvents listed below being classified as harmful:
   - benzene
   - methyl glycol
   - ethyl glycol
   - methyl glycol acetate
   - ethyl glycol acetate;

c) not to use any volatile chlorofluorocarbons (CFC) or chlorinated hydrocarbons;

d) not to use any uncontrolled redistillates;

e) to use solvents in a certified and/or controlled purity only;

f) to do without any formaldehyde-containing base materials or - if this is impossible for technical reasons - to make sure that painted furniture surfaces do not exceed the limit as specified in the E1 Standard;

g) to use only those colouring agents - especially colorants and pigments, making sure that the limit given in DIN EN 71, Part 3 (Toy Safety, migration of certain elements) won't be exceeded in the coating;

h) not to use any azo pigments prohibited in articles of daily use under the 2nd Ordinance for Amendment of the Regulation relating to Articles of Daily Use;

i) not to put any preparations on the market which according to the Ordinance on Hazardous Substances or EC Directive must be marked as toxic or healthendangering, except for UV-curing paints which must be marked as healthendangering because of their reactive components.

4. Self-Control

The products subject to the directive are very carefully monitored by the manufacturer. This includes a check of recipes, raw materials, semi-finished products and finished products.

The evaluation of the ingredients is done according to the present state of the art and the latest scientific and medical findings. New findings about possible hazards of paint ingredients are considered by the manufacturers and will lead to a change of the product composition, if applicable.

5. External Checks

The users of the directive undertake to have their products checked in cases of justified complaints. During those checks the paint and pickling materials marked with the directive are checked for their compliance with the requirements under point 3. In case the directive requirements are not complied with the VdL shall be entitled to prohibit reference to the VdL Directive and take legal action against misleading declarations.

6. Customer Information

The manufacturers of wood paints undertake to provide their customers with comprehensive information about the handling and proper use of the materials and about possible defects and problems.

7. Research Project

In the interest of buyers and manufacturers of furniture, other wood-processing companies and paint producers scientific institutes have launched testing programmes to gather detailed information about solvent emissions and other possible causes of odour nuisances emanating from furniture. The results shall serve as a scientific and practical contribution to the research work on „Indoor Air Quality“. They shall be made available to authorities and wood paint processing companies.

In addition to this, joint projects have been launched in co-operation with manufacturers of raw materials. They are aimed at a reduction of pollutants, greater purity of basic materials and the search for technologically feasible alternatives.

8. Members of the VdL Expert Group on Wood Paints:

ARTI Holzlacke & Beizen GmbH, Wuppertal

BASF Coatings AG, Münster

Bergolin GmbH & Co., Ritterhude

Alfred Clouth Lackfabrik GmbH & Co., Offenbach

Herberts Möbellacke Coswig GmbH & Co. KG, Coswig

ICI Packaging Coatings GmbH, Hilden

Friedrich Klumpp GmbH Beizen und Lackfabrik, Stuttgart

KNEHO-Lacke GmbH, Horn-Bad Meinberg

Landshuter Lackfabrik Eduard Leiss KG, Landshut

LOBA GmbH & Co. KG, Ditzingen

H.Müller & Co. Kristall-Lackfabrik, Wuppertal

Peter-Lacke GmbH, Hiddenhausen/Herford

Ludwig Rosner KG Lackfabrik, Geretsried

Teknos Deutschland GmbH, Fulda

Treffert GmbH, Alzenau

Votteler Lackfabrik GmbH & Co. KG, Korntal-Münchingen

Weilburger Coatings GmbH, Weilburg

Zimmermann & Fechter GmbH Lackfabrik, Frankfurt

Zobel Chemie GmbH, Worms

Zuelch Industrial Coatings GmbH, Osterode

Appendix 2 to the Basic Criteria for Award of the Environmental Label according to RAL-UZ 38

Test Method to Determine Emissions of Formaldehyde and other VolatileOrganic Compounds [1]

Contents

1. Definitions

Component Test

Examination of a part of an entire piece of furniture (e.g. door, shelf board, side board, backing, drawer) or of another ready-for-delivery product made from wood and wood-based materials which does not undergo any further changes (painting, gluing, boring, milling etc.).

[1] Official Journal of BAM - Bundesanstalt für Materialforschung und Prüfung (Federal Institute for Materials Research and Testing), vol. 29, 1999, p. 234-250

Emission Surface

A surface of a test piece that can emit and has contact with the surrounding air inside an emission test chamber or emission measuring cell. Apart from the actual surfaces, such examination in the emission test chamber must also consider the edges (narrow faces) for the emision surface calculation.

Emission Test Chamber

Equipment for the determination of emissions of volatile organic compounds from products under controlled environmental conditions which receives the piece to be tested.

Emission Measuring Cell

Equipment for the determination of emissions of volatile organic compounds from test pieces under controlled environmental conditions which is mounted directly on the surface of a test piece.

Volatile Organic Compound

Organic compound which as a result of its vapour pressure is released from an emission source into the air.

Whole-Piece Test

Examination of an entire product (e.g. piece of furniture).

Air Volume Flow Rate

Air volume conducted through the emission test chamber or emission measuring cell per unit of time.

Air Change

Quotient of the air volume running through the emission test chamber or the emission measuring cell and the chamber/cell volume.

Sample Material

Furniture or component taken from the production for test purposes.

Test Piece

Samples selected for the emission test (furniture, components or parts of them brought to size).

Loading of the Chamber

Quotient of the emission surface and the chamber/cell volume.

Narrow faces

Side faces of a three-dimensional test piece not belonging to the actual surfaces.

Surface-Specific Air Flow Rate

Quotient of air change and chamber loading or of air volume flow rate and emission surface, resp..

2. Test Material

The finished products falling within the scope of the basic criteria (e.g. furniture, doors, panels, laminate floorings, prefabricated parquet) differ with regard to shape, materials and the number of materials used. That is why the test procedure and the selection of test material are to be determined in each particular case in agreement with the manufacturer.

There are two test methods for furniture and other wood and wood-base products with three-dimensional surfaces:

a) *Whole-Piece Test,*
especially for small furniture, chairs etc.

b) Component Test

Especially for unit furniture and furniture programmes with identical components.

Especially plane two-dimensional products (e.g. doors, panels, laminate floorings, prefabricated parquet) are to be examined as components.

2.1 Whole-Piece Test

The product to be examined is to be taken from the current production. Supplied parts must not be older than 10 days. Deviation from this rule shall be possible if the manufacturer proves that during normal production some supplied parts are usually older.

The product is to be packed air-tight immediately after being taken from the production. A *cabinet furniture* is to be packed in a closed condition.

2.2 Component Test

For a component test, e.g. for furniture programmes, the components to be tested are selected by the testing institutes in agreement with the manufacturer. In doing so, the different materials used, especially different coating systems, are to be taken into consideration. Such selection shall guarantee compliance with the Basic Criteria's requirements for the product to be examined (see point 6.). No sampling and emission test shall be required for components with a total surface share of 5% of the product at the most.

The components to be examined are to be taken in sufficient quantities from the current production. Supplied parts must not be older than 10 days. Deviation from this rule shall be possible if the manufacturer proves that during normal production some of the components used are usually older. At least 3 pieces must be taken for a test of two-dimensional components.
The exact sample quantity considering the size of the component and that of the emission test chamber to be used is to be co-ordinated with the testing institute. Samples taken from identical components are be packed together in one airtight container immediately . For this purpose, the individual samples should be packed as tightly as possible in order to keep the unavoidable emissions during the samples' transport to the testing institute as low as possible.

2.3 Transport

The packed sample material is to be delivered to the testing institute as quickly as possible. Not more than 4 days shall be between packaging and arrival at the testing institute.

3. Preparation of the Sample Material

The sample material is to be stored in an airtight condition at the testing institute until the actual test pieces are taken.

Only those components in the middle of the pile shall be used for the preparation of the test pieces for the emission measurement of two-dimensional components, leaving the outside components unconsidered.
Components and entire products can be tested in their original state provided that the test chamber is big enough. In doing so, attention must be paid to possible lower results for low-volatile compounds (cf. para. 5.1). Usually, test pieces are to be taken from the sample material which may be examined in a test chamber suited for volatile organic compounds. The test pieces shall represent the materials used and the attached surfaces of the component. That is why narrow faces exposed as a result of sampling are to be sealed by means of an adequate sealing.

Self-adhesive aluminium foil (e.g. TESA 4500) has proved to be a proper sealing. Possible emissions inherent in the aluminium foil are to be determined during a pre-test.

Self-adhesive aluminium foil (e.g. TESA 4500) has proved to be a proper sealing. Possible emissions inherent in the aluminium foil are to be determined during a pre-test.

The two surfaces as well as the narrow faces (without those surfaces sealed after test piece cutting) shall be considered for the calculation of the emission surface.
Following their preparation the test pieces are to be put into the test chamber immediately or kept in their packaging until test chamber loading.
The period between sample packaging at the production plant and loading of the test chambers shall be as short as possible (7 days at the most).

4. Test Chamber Measurement

The test chambers must fulfill the requirements listed under /2/, /3/ and /5/.

This particularly applies to:

- Pure air supply
  (free from VOC and dust)
- Ultra-pure water supply
- Chamber walls of glass or special steel
- if possible, without the use of any sealing materials
- Chamber wall tempering recommended

The following test conditions must be observed:

Temperature (T)	23°C	±	1 K
Relative air humidity (r.F.)	45	±	5% *1)
Air change (n)	1	±	0.05 h^{-1})
Loading of the chamber (a)	1	±	0.05 m^2/m^3
or area-specific air flow rate n/a	1	±	0.1 m/h
Air flow speed (v) equally surrounded by room air (cf. /6/)	0.1 - 0.3 m/s		

*1) Note: The relative humidity of 45% has been fixed with regard to the requirements applying to formaldehyde (/1/ and /6/). Since the relative humidity is usually of less importance to VOC emissions the value of 45% is also used as a basis for VOC emission measurements.

A blank value determination is to be done before loading of the test chamber. The blank value of the individual substances must not exceed 2µg/m³ in general and 0.5µg/m³ for carcinogenic substances. The total of all blank values of the individual substances must not exceed 10 µg/m³. The adsorbent blank value is to be determined and deducted for the blank value determination of the test chamber

Joint testing of different individual components shall be inadmissible.

If possible, an entire product (e.g. cabinet furniture) shall be examined in an open condition.

If loading of the test chamber differs from standard loading (1 m^2/m^3) the air change is to be adjusted to ensure a area-specific air flow rate (n/a) of 1 m/h.

5. Methods of Sampling and Analysis

Sampling and analysing in the emission test chambers for formaldehyde shall be done in accordance with /1/. In addition to this, measurements in smaller test chambers shall be admissible.

With regard to other organic compounds sampling shall be done by means of Tenax followed by a thermodesorption by analogy with /4/ and evaluation by means of GC/MSD. Other methods shall be admissible if comparable results can be proved. Such proof shall be furnished to the Bundesanstalt für Materialforschung und - prüfung, Fachgruppe Emissionen aus Materialien (Federal Institute for Materials Research and Testing - Division for Emissions from Materials).

Sampling for volatile organic compounds shall at least be done at the following times after test chamber loading:

24 h ± 2 h after loading
28th day after loading (at least as a double determination).

It is recommended to do intermediate sampling on at least three additional days in between as this will furnish additional information on emission dynamics or ageing behaviour which again may serve as important information for manufacturer's future product development. Moreover, analytical results achieved as a result of additional sampling may help to reduce uncertainty of measurement because one receives supplementary data for extended substance identification and quantification. Apart from that, this allows a premature stopping of the test if the criteria under para. 6, Evaluation, are complied with.

The method of sampling and analysis must be suited for a wide range of emissive compounds. A list of substances to be considered for emission measurements of coated wood-based materials and furniture can be seen on page 14. The method of sampling and analysis must at least be able to prove the substances listed on page 14. The conditions mentioned in para.10 according to /5/ and /12/ have proved to be suited for the detection of these substance.

All substances must be identified and quantified by means of the relative response factors of the internal standard (cyclodecane) resulting from calibration. The sum (total VOC) of all identified and quantified values > 1 µg/m³ shall be determined for each measurement day.

If substances cannot be identified or if the relative response factor cannot be determined quantification shall be done by assuming the response factor (RF) of the internal standard (RF = 1). No Environmental Label may be awarded if - at the end of the test - the share of non-identifiable and/or non-exactly-quantifiable substances amounts to more than 10% of the total VOC concentration or more than 30 µg/m³ (calculated by means of the response factor of the internal standard cyclodecane).

Exempted are ≥ C_3 benzenes and iso-aliphatic mixtures if they contribute by more than 10% to the overall concentration of volatile organic compounds. In this case ≥ C_3-benzenes are to be quantified on the basis of the response factor of mesitylene (1,3,5-trimethylbenzene) and iso-aliphates on the basis of the response factor of cyclodecane.

5.1 Limitations

Depending on its design and shape the big test chamber (> 12 m³ according to /1/) may be suited only to a limited extent for low-volatile compounds, e.g. UV initiators, such as benzophenone or plasticizers because sink effects of chamber materials (e.g. air distribution mats, heat exchangers when doing without chamber wall tempering) may play a decisive role.

There is indication of sink effects if an emission test chamber examination of several days shows rising concentrations of the individual substances instead of declining ones.

If measurements in the big test chamber show such unwanted sink effects the relevant furniture components must be examined in smaller test chambers in order to quantify these effects. Here, reduced wall effects are to be expected if the chambers are properly designed. If there is no appropriate manufacturer information available the relevant components may be identified by determining the surface emission by means of so-called emission measurement cells (e.g. according to /9/).

6. Evaluation and Test Report

The formaldehyde steady state concentration is to be calculated in accordance with /1/.
For the determination of the overall concentration of volatile organic compounds all individual substances which have been identified and quantified ≥ 1 µg/m³ must be added. In addition, the individual substances (≥ 1 µg/m³) must be given with their concentration values. In order to simplify procedures the blank concentration is to be deducted from the determined concentration value of the test piece if the emitted substances are detected in the chamber blank too (max. 2 µg/m³).

The concentration values determined on the 1st and on the 28th day must at least be indicated for the overall concentration and the concentration of the individual substances.

Testing for formaldehyde as well as for other volatile organic compounds may be stopped prematurely (on the 7th day after loading at the earliest) if on four consecutive measurement days the admissible emission values are not exceeded and if during this period none of the substances to be detected shows rising values.

For the purpose of component tests, the overall concentrations of volatile organic compounds detected for the individual components may be extrapolated by application of the following calculation formula to determine the overall concentration of entire products which consist of known surface portions of the examined components. For this purpose, the surface share in the overall product is to be determined for each component and to be entered into the formula along with the emission values determined:

$$C_{Kalk.} = \frac{\sum_{i=1}^{N} A_{i(\%)} * C_i}{\sum_{i=1}^{N} A_{i(\%)}}$$

$C_{Kalk.}$	Calculated overall concentration for the entire product in µg/m³
N	Number of components examined
i	Component index
$A_{i(\%)}$	Surface share in the i^{th} component in %
C_i	Concentration of i^{th} component in µg/m³

One can do without this procedure if none of the components examined exceeds the admissible emission values or if entire products are examined.

The test report must document the entire test including preparation of sample material (especially selection of components) and test pieces as well as the complete evaluation for the product.

For this purpose, the following data must be indicated in particular:

- Manufacturer
- Exact product designation
- Date of Manufacture
- Date of sampling
- Date of sample packaging
- Type of packaging
- Date/period of examination
- Production of test pieces
- Test conditions
- Overall VOC concentration at least of day 1 and day 28
- Identified and quantified substances together with concentrations and
- Non-identified or not individually quantified substances taking the response factor of the corresponding reference substance as a basis.

7. Testing Institutes

The emission test may be made by appropriate testing institutes only.

Testing institutes shall be considered appropriate if their equipment includes the necessary appliances and a quality management system ist established or if they are accredited for these tests and have proved their capability to do such testing by successfully participating in corresponding ring tests. Compliance with these requirements must be proven to the Bundesanstalt für Materialforschung und -prüfung (Federal Institute for Materials Research and Testing), Division for Emissions from Materials).

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List of volatile organic compounds to be considered as a minimum during the emission measurement of wood and wood-based materials

Aldehydes	
Name	**CAS-No.**
Benzaldehyde	100-52-7
Butanal	123-72-8
Butanal, 3-methyl	590-86-3
Dekanal	112-31-2
2-furancarboxaldehyde	98-01-1
2-heptenal	18829-55-5
Heptanal	111-71-7
Hexanal	66-25-1
Nonanal	124-19-6
2-octenal	2548-87-0
Octanal	124-13-0
Pentanal	110-62-3
Propanal	123-38-6
2,4,6-trimethyl-benzaldehyde	487-68-3
Esters	
Name	**CAS-No.**
1-butanol-3-methoxyacetate	4435-53-4
2-butoxyethyl acetate	112-07-2
n-butyl acetate	123-86-4
Dibutyl phthalate	84-74-2
Diethyl phthalate	84-66-2
Diisobutyl phthalate	84-69-5
Diethoxy ethyl acetate	6065-82-3
Ethanol, 2-(2-butoxyethoxy)acetate	124-17-4
2-ethoxyethyl acetate	111-15-9
1-ethoxy-2-propylacetate	54839-24-6
Ethyl acetate	141-78-6
2-ethylhexyl acetate	103-09-3
Isobutyl acetate	110-19-0
Isopropyl acetate	108-21-4
Isopropyl myristate	110-27-0
Linalyl propanoate	144-39-8
1-methoxy-2-propyl acetate	108-65-6
n-propyl acetate	109-60-4
2-propenoic acid, 2-ethylhexylester	103-11-7
TXIB	6846-50-0
Texanol	25265-77-4
Ketones	
Name	**CAS-No.**
Acetone	67-64-1
Acetophenone	98-86-2
Benzophenone	119-61-9
2-butanone	78-93-3
2-cyclohexen-1-one, 3,5,5-trimethyl	78-59-1
Cylcohexanone	108-94-1
2-heptanone	110-43-0
2-heptanone, 4,6-dimethyl	19549-80-5
2-pentanone	107-87-9
4-heptanone, 2,6-dimethyl	108-83-8
4-methyl-2-pentanone	108-10-1
3-methyl-2-butanone	563-80-4
2-pyrrolidone, 1-methyl	872-50-4

Aliphatic hydrocarbons	
Name	**CAS-No.**
Cyclohexane	110-54-3
n-decane	124-18-5
n-dodecane	112-40-3
n-docosane	629-97-0
necosane	112-95-8
n-henecosane	629-94-7
n-heptane	142-82-5
n-heptadecane	629-78-7
Hepatdecane, 2,6,10,15-tetramethyl	54833-48-6
Heptane, 2,2,4,6,6-pentamethyl	13475-82-6
1-heptene	592-76-7
n-hexane	110-54-3
n-hexadecane	544-76-3
3-hexene	13269-52-8
Indane	496-11-7
n-nonane	111-84-2
n-nonadecane	629-92-5
n-octane	111-65-9
n-octadecane	593-45-3
n-pentadecane	629-62-9
n-pentacosane	629-99-2
n-tetradecane	629-59-4
n-tetracosane	646-31-1
n-tridecane	629-50-5
n-tricosane	638-67-5
n-undecane	1120-21-4
Aromatic Hydrocarbons	
Name	**CAS-No.**
Benzene	71-43-2
Diethylbenzene	25340-17-4
1,2-diethylbenzene	135-01-3
Ethylbenzene	100-41-4
1-ethyl-2-methylbenzene	611-14-3
1-ethyl-3-methylbenzene	620-14-4
1-ethyl-4-methylbenzene	622-96-8
Isopropylbenzene	98-82-8
1-methyl-2-(1-methylethyl)benzene	527-84-4
1-methyl-3-(1-methylethyl)benzene	535-77-3
1-methyl-3-propylbenzene	1074-43-7
1-methyl-4-(1-methylethyl)benzene	99-87-6
Naphthalene	91-20-3
Naphthalene, 1-methyl	90-12-0
Propylbenzene	103-65-1
1,2,3-trimethylbenzene	526-73-8
1,2,4-trimethylbenzene	95-63-6
1,3,5-trimethylbenzene (mesitylene)	108-67-8
Toluene	108-88-3
Styrene	100-42-5
m-xylene	108-38-3
o-xylene	95-47-6
p-xylene	106-42-3
∑ C3 - C6 -benzene	

Alcohols	
Name	**CAS-No.**
1-butanol	71-36-3
2-butanol	78-92-2
2-ethyl-1-hexanol	104-76-7
4-hydroxy-4-methyl-2-pentanone	123-42-2
1-nonanol	143-08-8
1,6-octadien-3-ol,3,3´7-dimethyl	78-70-6
1-octanol	111-87-5
1-pentanol	71-41-0
2-propanol	67-63-0
1-propanol	71-23-8
2,4,7,9-tetramethyl-5-decin-4,7-diol	126-86-3
Phenol	108-95-2

Terpenes	
Name	**CAS-No.**
(+)-2-carene	554-61-0
3-thujene-2-ol,	3310-03-0
α-pinene	80-56-8
β-phellandrene	555-10-2
β-pinene	127-91-3
β-myrcene	123-35-3
Borneol	507-70-0
Camphene	79-92-5
D-verbenone	18309-32-5
Δ-3-carene	13466-78-9
Limonen	138-86-3

Others	
Name	**CAS-No.**
1,2,3,4,5,8-hexahydronaphthalene	36231-13-7
4-methoxyphenol	150-76-5
Acetic acid	64-19-7
BHT (butylated hydroxytoluene)	128-37-0
Hexanoic acid	142-62-0
2-ethylhexanoic acid	149-57-5
Hexamethylene tetramine	100-97-0

Glycols	
Name	**CAS-No.**
2-butoxyethanol	111-76-2
2-(2-butoxyethoxy)ethanol	112-34-5
Butoxypropanol	5131-66-8
Dipropylene glycol	110-98-5
Dipropylene glycol monomethyl ether	34590-94-8
Dipropylene glycol dimethyl ether	11109-77-4
Ethoxyethanol	110-80-5
Ethylene glycol	107-21-1
3-methoxy-1-butanol	2517-43-3
1-methoxy-2-propanol	107-98-2
2-methoxy-1-propanol	1598-47-5
Methyldiglycol	111-77-3
2-phenoxy ethanol	122-99-6

10. Example of a well established test method for the determination of the substances listed in para.9 contained in the air of emission test chambers.

Sampling tubes:

Tenax TA (length of the tube: 178 mm, outside diameter: 6 mm, inside diameter: 4 mm, 130 mg Tenax TA (60-80 mesh) with glass wool plugs); sampling volume 1 l (100 ml/min). Before sampling, the Tenax tubes must be spiked with cyclodecane as internal standard - dissolved in methanol.

Analysis system:

Thermal desorption/cold injection system Gerstel TDS-2/CIS-3 (Programme 40-280°C, by 40° C/min, hold for 5 minutes at 280° C / cryofocussing at 150° C, heating by 12°C/s to 280° C - He-flow 35ml/min.)

HP GC 5890 II + / HP-MSD 5972 (column RTX 200; 30 m; 0.25 mm; 1 µm; temperature programme 40° C for 4 min., 5° C/min. to 140°C, 10°C/min. to 240°C, 25°C/min. to 290° C/min. to 290° C, hold for 3 min. /MSD: scan 25-400; 1.9 scans/sec; 300° C; NBS-75K - data base).

The above-described method can also be used for the detection of low-volatile compounds, such as, for example, benzophenone, which is often used as photoinitiator, and plasticizers, such as diisobutyl phthalate, or glycol esters, such as butyl diglycol acetate.

CONTRACT

No.
on the Award of the Environmental Label

RAL gGmbH, as label awarding agency, and the firm of

(Distributor/Manufacturer)

as applicant, conclude the following Contract on the Use of the Environmental Label:

SPECIMEN

1. Under the following conditions the applicant shall be entitled to use the Environmental Label for the labelling of the product/product group/project: **Low-Emission Wood Products and Wood-Base Products** for

   "(Brand/Trade Name - Product Designation)"

   This shall not include the right to use the Environmental Label as part of a brand. Unless otherwise agreed, the Environmental Label shall only be used in the above given shape and colour. The entire inner surrounding text shall always be identical as regards size, form, thickness and colour of the letters and it shall be easy to read.
2. The Environmental Label according to para. 1 shall only be used for the above-mentioned product/product group/ project.
3. If the Environmental Label is used for advertising purposes the applicant shall make sure that it is exclusively used in connection with the above-named product/product group/ project for which the use of the Environmental Label has been granted and settled under this contract. The applicant shall be solely responsible for the way the label is used, above all, in advertising.
4. During the entire period of label use the product/product group/project to be labelled shall comply with all requirements and conditions for the use of the label as specified in the "Vergabegrundlage für Umweltzeichen RAL-UZ **38**" (Basic Criteria for Award of the Environmental Label RAL-UZ **38**), as amended. This shall also apply to the reproduction of the Environmental Label (including the surrounding text). Claims for damages against RAL, especially on the grounds of third party objections to the applicant's use of the label and the accompanying advertising shall be ruled out.
5. If the "Basic Criteria for Award of the Environmental Label" provide for checks by third parties the applicant shall bear the costs accruing in connection therewith.
6. Should the applicant himself or third parties find out that the applicant does not comply with the conditions as stipulated in paras. 2-5 he shall be liable to inform RAL and stop the use of the Environmental Label until the conditions are complied with again. Should the applicant be incapable of restoring the state required for the use of the label immediately or should the applicant seriously offend against this contract RAL may, if necessary, withdraw the Environmental Label and prohibit the applicant from using the label any longer. Claims for damages against RAL because of the withdrawal of the label shall be ruled out.
7. The Contract on the Use of the Environmental Label may be terminated for good reason.
   Examples of good reasons are:
   - unpaid contributions
   - substantiated risk of injury and death.

   In such case, applicant's continued use of the Environmental Label shall be prohibited.
   The applicant shall not be entitled to bring a claim for damages against RAL (see above: paragraph 6, sentence 3).
8. The applicant undertakes to pay RAL an amount according to the "Beitragsordnung für das Umweltzeichen" (Schedule of Contributions for the Environmental Label), as amended, for the period of use.
9. According to the Basic Criteria for Award of the Environmental Label RAL-UZ **38** this contract will run until December 31,**2013**. It shall be extended by periods of one year each, unless terminated in writing by March 31, **2013** or by March 31 of the respective year of extension. After the expiry of the contract the Environmental Label may neither be used for labelling nor for advertising purposes. This regulation shall not affect the products being still in the market.
10. Products/projects marked with the Environmental Label and the advertising for these products/projects may reach the consumer only when naming the firm of the

    (Applicant/Distributor)

Sankt Augustin, this day of

Date, Place

RAL gGmbH
Management

(Signature of authorized representative
and corporate seal)