

## Sustainable Public Procurement-fiche

Product / service	Version	Date
Wooden floors	Advanced	December 2010

### Scope

These criteria apply to ready-to-use wood and wood based flooring mainly made for more than 50 %, from wood/flower wood powder and/or wood-based materials (including cork and bamboo).

This includes solid wood parquet products (with or without tongue and groove or with other connecting systems), mosaic or multi-layer/laminated parquet and wood based veneered flooring.

This guideline does not apply to composite materials, i.e. wood and wood based flooring in combination with other materials (e.g. linoleum).  
It does not apply to wall coverings, where properly indicated, or coverings for external use or for coverings with a structural function.

This sheet also contains separate criteria specific to the coating and the surface treatment and adhesives.

### 1) *Subject matter*

Wooden floors produced with environmentally friendly materials and processes and produced in a socially responsible way.

#### 1.1. *The subject matter in the framework of the organizations policy.*

“For <.....> (name of the public authority), the care for the environment and social aspects is important. It is stated in her <strategic policies>, <mission>, <vision>, <procurement policy>, ...”

#### 1.2. *“Reserved contracts”*

*This category of contract is handled separately in Article 19 of Directive 2004/18/EC. This article permits the member states to “reserve” the right to participate in public*

*contract award procedures. It includes contracts awarded to sheltered workshops or awarded in the context of sheltered employment programmes restricted to handicapped persons who cannot conduct professional activities under normal conditions. Paragraph 2 of Article 18a of the Law of 24 December 1993 has already taken a step in this direction by enabling, within the European thresholds, an identical strategy.*

## 2) Exclusion criteria

### 2.1. Social aspects:

Buyers can take account of social aspects in their procurement. For more information about the different possibilities see:

<http://www.gidsvoorduurzameaankopen.be/en/node/108>

### 3) Technical capacity

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### 4) Market information

/

### 5) Technical specifications

## 5.1 GENERAL CRITERIA FOR ALL WOODEN FLOURS

### a) **Virgin wood origin** (Blue Engel, EU Ecolabel, Nature Plus, Austrian Ecolabel, PEFC, FSC)

For detailed information on this criterion, see validated document on furniture (technical specifications, criterion 1 (available in Dutch or in French))

For Dutch version:

<http://www.gidsvoorduurzameaankopen.be/?q=nl/node/34&cid=25&pid=1205>

For French version:

<http://www.gidsvoorduurzameaankopen.be/?q=fr/node/35&cid=99&pid=1206>

### b) **Chemical hazards** (EU Ecolabel, Blue Engel, Austrian Ecolabel, Nature Plus)

(see Annex 1 for R-phrases meaning)

As laid down in the Council Directive 67/548/EEC<sup>(1)</sup>, 1999/45/EC<sup>(2)</sup> and their amendments, the bidder must not use materials containing substances or preparation that are assigned, or may be assigned at the time of application, any of the following risk phrases or combinations thereof:

R23, R24, R25, R26, R27, R28, R45, R46, R49, R60, R61, R62, R63.

Possible further and future modifications introduced by the CE Regulation n.1907/2006 – REACH must also be taken into account.

An alternative classification may be considered according to Regulation (EC) No 1272/2008<sup>(3)</sup> of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing directives 67/548/EEC<sup>(1)</sup> and 1999/45/EC<sup>(2)</sup>, and amending Regulation (EC) No 1907/2006 (see Annex 2 for translation from Directive 67/548/EEC to CLP Directive 1272/2008/EEC).

A declaration of compliance shall be provided by the applicant together with chemicals analysis, material typology and formulation.

- (1) Dangerous Substances Directive: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31967L0548:en:NOT>  
(2) Dangerous Preparations Directive: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31999L0045:en:NOT>  
(3) <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008R1272:EN:NOT>

**c) Pesticides** (Nature Plus, EU Ecolabel, Blaue Engel, Austrian Ecolabel)

- Solid wood, after logging, shall not be treated with the following pesticides: Adrin, chlordane, DDT, endrin, alpha-HCH, beta-HCH, delta-HCH, heptachlor, hexachlorobenzene, pentachlorophenol, cyfluthrin.

**d) Formaldehyde emissions** (EU Ecolabel, Blaue Engel, Austrian Ecolabel, Nature Plus)

- Formaldehyde emissions specifications:
  - The release of formaldehyde from the wood panels shall not exceed 0.05 ppm (parts per million) 28 days after loading.
  - The applicant shall provide a test report based on the chamber method (EN 717-1 method or similar).

**e) Volatile organic compounds emissions** (Austrian Ecolabel, Blaue Engel, Nature Plus, EU Ecolabel)

- The products may not exceed the volatile organic compounds (VOC) emission values set out in the table below, based upon the standards EN 13419-1/3 and ISO 16000-6/9.

The test can be aborted as from the 7th day after loading, if the required end values for the 28th day are attained ahead of time and in the comparison with the measurement taken on the 3rd day no increase in the concentration of one of the detected substances can be established

Substance	Limit value (28 days)
Total of organic compounds in the retention range C6 – C16 (TVOC)	< 300 µg/m <sup>3</sup>
Total organic compounds in the retention range > C16 – C22 (TSVOC)	< 100 µg/m <sup>3</sup>
<sup>(1)</sup> C substances <sup>(1)</sup>	< 1 µg/m <sup>3</sup> per single value

substances = carcinogenic substances according to EU classification categories 1 and 2.

**Evidence:**

The compliance with all the criteria mentioned above can be proved with the following label:



AUSTRIAN ECOLABEL,



BLAUE ENGEL,



EU ECOLABEL



NATURE PLUS



(Only for the criterium 'wood origin': FSC PEFC or equivalent))

In case that the tendering company can present this label, any further proof is not necessary. Any other suitable evidence from a recognized body can also be used.

**6) Awarding the contract:**

	Criteria --- For example ---	Weight
1	Price	e.g. 60%

	<i>Calculation (e.g.):</i> Lowest offered price/ stated price x 0,60	
2	<p><b>Environmental criteria</b> (The public authority formulates the points it wants to assign to the below mentioned criteria )</p> <p><i>Calculation (e.g.):</i> Total scored points / maximum number of points x 0,35</p>	e.g. 35%
3	...	e.g. 5 %
4	...	e.g. ....

***In above mentioned table, the weight of the environmental criteria shall be stated by the buyer in function of its particular procurement. Representatives of several sectors federations mention often to not underestimate this weight to give sustainability in the awarding phase a chance at all.***

## 6.1 GENERAL CRITERIA FOR ALL WOODEN FLOURS

### a) Wood origin

- The proposition of renewable raw materials (including fluids) in the wood and wood based floor covering products must be at least 98% of the mass of the end product (Nature Plus)
- Transition to increased % of sustainable wood (EU Ecolabel):  
For wooden products placed on the market
  - Until 30 June 2011: at least 50% of any solid wood and 20% wood-based materials
  - From 1 July 2011, until 31 December 2012: at least 60% of any solid wood and 30% wood-based materials
  - From 1 January 2013: at least 70% of any solid wood and 40% wood-based materials

must originate either from sustainably managed forests which have been certified by independent third party schemes fulfilling the criteria listed in paragraph 15 of the Council Resolution of 15 December 1998 on a Forestry Strategy for the EU and further development thereof, or from recycled materials.
- The product shall not contain GMO (Genetically Modified Wood) wood (EU Ecolabel)

### b) Chemical hazards

*(See Annex 1 for R-phrases meaning)*

- Additional points will be awarded if usage of the products, classified with the following R-phrases, is avoided or reduced:

- R39, R40, R50 (Austrian Ecolabel, EU Ecolabel)
- R42, R43, R52, R68 (EU Ecolabel)
- R48, R51, R53 (Austrian Ecolabel, EU Ecolabel, Nature Plus)
- R59 (Austrian Ecolabel)
- R65 (Nature Plus)

**c) Dangerous substances for the raw wood and plant treatment** (EU Ecolabel)

- The product must not contain azidirin and polyaziridins as well as pigments and additives based on:
  - lead, cadmium, chrome (VI), mercury and their compounds;
  - arsenic, boron and copper;
  - organic tin.

**d) Halogenated organic compounds** (Nature Plus, EU Ecolabel)

- The product, including all preliminary/intermediate products must not contain halogen-organic compounds.

**e) Impregnating substances and preservatives** (EU Ecolabel)

- Impregnating substances and preservatives specifications:
  - The solid wood, after logging, shall not be treated with substances or preparations containing substances that are included in any of the WHO recommended classification of pesticides by hazard<sup>(1)</sup> classified as class 1a (extremely hazardous) and 1b (highly hazardous).
  - The treatment of wood shall be in accordance with the provisions of the following Council Directives:
    - o Directives 79/117/EEC<sup>(2)</sup> prohibiting the placing on the market and use of plant protection products containing certain active substances.
    - o Directives 76/769/EEC<sup>(3)</sup> provisions of the Member States relating to restrictions on the marketing and use of certain<sup>2</sup> dangerous substances and preparations.

(1) [http://www.who.int/ipcs/publications/pesticides\\_hazard/en/index.html](http://www.who.int/ipcs/publications/pesticides_hazard/en/index.html)

(2) <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31979L0117:EN:HTML>

(3) <http://www.reach-compliance.eu/english/legislation/docs/launchers/launch-76-769-EEC.html>

**f) Wood treatment**

- With regard to recycling and disposal, no material protection agents (fungicides, insecticides, flame-retardants) must be added to the products, including the materials used for their production (wood-based materials, adhesives, coatings etc.). (Blaue Engel, Nature Plus)
- The use of the biocides triclosan is prohibited. (Nature Plus)

**g) Heavy metals in recycled wood** (EU Ecolabel)

- The concentration of heavy metals in the recycled material (post-consumer wood, chips or fibres) applied in the production of wood-based materials (input), shall at least comply with the provisions in the EPF<sup>(1)</sup> industry standard, as reported in paragraph 6 of document 'EPF standard for delivery conditions of recycled wood' of 24 October 2002 and more particularly with the limits indicated in the table below:

Heavy metals	Limit values (mg/kg of total dry panel)
Arsenic	25
Cadmium	50
Chromium	25
Copper	40
Lead	90
Mercury	25

<sup>(1)</sup> EPF: European Panel Federation:  
[http://www.europanel.org/pdf/Environment\\_WoodRecycling\\_Standard1.pdf](http://www.europanel.org/pdf/Environment_WoodRecycling_Standard1.pdf)

**h) Pesticides** (Nature Plus)

- The following pesticides should be tested in the final and substrate wood products and found below the corresponding limit values:

Pesticide	Limit value (mg/kg)
<b>Organochloride pesticides</b>	
Chlorothalonil	0,5
DDD	0,5
DDE	0,5
Dichofluanid	0,5
Dieldrin	0,5
Endosulfan	0,5
Heptachlor	0,5
Hexachlorobenzene	0,5
Lindane	0,5

Mirex	0,5
<b>Pyrethroids</b>	
Cyhalothrin	0,5
Cypermethrin	0,5
Deltamethrin	0,5
Fenvalerate	0,5
Lambda-Cyhalothrin	0,5
Permethrin	0,5
<b>Others</b>	
Imazalil	0,5
Isoxaben	0,5
Simazine	0,5

**i) Formaldehyde emissions** (Nature Plus)

- Formaldehydes emissions should not exceed the limits listed below:

Emissions	Limit value	Testing method
Formaldehyde	$\mu\text{g}/\text{m}^3$	ÖN or DINV ENV 717-1
Solid products not containing adhesives	36	28 days after loading the testing chamber
Adhesive bonded products	48	28 days after loading the testing chamber

**j) Volatile organic compounds emissions** (Nature Plus)

- Additional points will be awarded if the products do not exceed the emission values listed below:

Measured factor	Limit value	Testing method
<b>Monomer Isocyanate</b>	n.m. <sup>(1)</sup>	EN13419-3, 24 h after loading the testing chamber
<b>Odour/Smell</b>	Odour intensity $\leq 3$	natureplus-Implementation regulation "Odour/Smell est", 6-stage marking scale, 24 h after loading the testing chamber

<sup>(1)</sup> Measurement threshold Isocyanate: TDI, HDI  $1 \mu\text{g}/\text{m}^3$ ; MDI  $0.1 \mu\text{g}/\text{m}^3$ .



## 6.2 ADDITIONAL CRITERIA SPECIFIC TO THE COATING AND THE SURFACE TREATMENT

- a) Dangerous substances in the coating and surface treatments** (EU Ecolabel)
- The technical specifications on Dangerous substances for the raw wood and plant treatments shall also apply for coating and surface treatments.
- b) Coating material** (Nature Plus)
- The surface sealing material must be from renewable raw materials.
- c) Biocides**
- Only biocidal products containing biocidal active substances included in Annex IA of the Directive 98/8/EC<sup>(1)</sup> of the European Parliament and of the Council, and authorised for use in floor coverings, shall be allowed for use. (EU Ecolabel)
- <sup>(1)</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31998L0008:en:NOT>
- Treatments or coating substances whose biocide finish goes beyond their in-can preservation (film or object preservation) and contain the particular active substances to counteract wood pests are not permitted. (Austrian Ecolabel, Blaue Engel)
- d) Aromatic hydrocarbons** (Austrian Ecolabel, Blaue Engel)
- Aromatic hydrocarbons used for treatments or coating substances are not permitted (impurities up to a maximum of 0.1 % are tolerated).
- e) Toxic heavy metals** (Austrian Ecolabel, Blaue Engel, EU Ecolabel)
- Lead-, cadmium-, chrome-based (VI) and other toxic heavy metal compounds added to treatments or coating substances are not permitted. Any impurities that may occur may amount to a maximum of 50 ppm.
- f) Cobalt and manganese** (Austrian Ecolabel)
- Cobalt compounds should be limited to 0.1 % (like Co) and manganese compounds to 0.5 % (like Mn).
- g) Dangerous substances in the coating and surface treatments** (EU Ecolabel)
- Chemical substances classified as harmful for the environment by the chemical manufacturer/supplier in accordance with EU classification system (28th Amendment to Directive 67/548/EEC<sup>(1)</sup> and with the Directive 1999/45/EC<sup>(2)</sup>) are not permitted.

<sup>(1)</sup> Dangerous Substances Directive: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31967L0548:en:NOT>

(2) Dangerous Preparation Directive <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31999L0045:en:NOT>

- h) Formaldehyde emissions** (EU Ecolabel)
- The content of free formaldehyde in products or preparations used in the panels shall not exceed 0.3% by weight.
- i) Halogenated organic solvents** (EU Ecolabel, Austrian Ecolabel, Nature Plus)
- Halogenated organic solvents are not permitted in the coating.
- j) Formaldehyde** (EU Ecolabel)
- Formaldehyde emissions from substances and preparations for surface treatment liberating formaldehyde shall be less than 0.05 ppm.
- k) Plasticizers** (EU Ecolabel)
- Phthalates DNOP (di-n-octyl phthalate), DINP (di-isononyl phthalate), DIDP (di-isodecyl phthalate) are not permitted in the product.
- l) UV-curing systems** (Nature Plus)
- The use of UV-curing systems is forbidden.
- m) Synthetic resin varnishes/lacquers** (Nature Plus)
- Synthetic resin varnishes/lacquers (also water-based) are not permitted.

### 6.3 SPECIFIC CRITERIA FOR ADHESIVES

- a) Dangerous substances** (EU Ecolabel)
- The requirements on Dangerous substances for the raw wood and plant treatments shall also apply for adhesives.  
Additional points will be awarded if:
    - The content of free formaldehyde in binding agents, adhesives, and glues for plywood panels or laminated wood panels does not exceed 0.5% by weight.
    - The VOC content of adhesives used in the assembly of the product does not exceed 10% by weight (w/w).
- b) Adhesive content** (Nature Plus)
- Specifications for adhesive content :
    - The adhesive proportion should be kept to minimum. It must not exceed a content level of 5 M-% of the absolute dry weight of the wood/wood based material.

- Polyurethane/Polyurea adhesives based upon Isocyanates may only be used where they do not exceed 2 M-% of the absolute dry weight of the wood/wood based material.

## **7) Performance clauses:**

### **7.1. Environmental aspects:**

#### **7.1.1 For all wooden flours**

##### **a) Packaging** (EU Ecolabel)

- Packaging must be made out of one of the following:
  - easily recyclable material;
  - materials taken from renewable resources;
  - materials intended to be reusable.
- Wood products must be packed in a way allowing post-manufacture outgassing of volatile components.

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.

##### **b) Product information** (Nature Plus, Blaue Engel, EU Ecolabel)

- The following information is to be provided with the product in a form which is suitable for the consumer and/or user:
  - General data (labelling/designation, type, name, etc.)
  - Wood type and grade indicator
  - A full declaration of the ingredients
  - Mass per unit area in kg/m<sup>2</sup>
  - Thickness, length and width in mm or the total length where the included lengths vary.
  - The total surface area in m<sup>2</sup>
  - The surface layer thickness in mm
  - The packet weight
  - Storage instructions
  - Laying instructions (a minimum of one in every 2nd packet)
  - A recommendation for a low emission adhesive complying with EMICODE EC1 (< 500 µg/m<sup>3</sup>, see <http://www.emicode.de>) or comparable.

- Cleaning and maintenance instructions (ecological and safe cleaning/maintenance products).
- Disposal and recycling instructions
- Product life expectancy / wearing resistance

### **7.2. Social aspects:**

Buyers can take account of social aspects in their procurement. For more information about the different possibilities see:

<http://www.gidsvoorduurzameaankopen.be/en/node/108>

### **7.3. Ethical aspects:**

“The tenderer undertakes, until the contract has been executed in full, to respect the 8 Basic Conventions of the ILO:

1. The prohibition of forced labour (C29 Forced Labour Convention, 1930, and C105 Abolition of Forced Labour Convention, 1957);
2. The right to freedom of association (C87 Freedom of Association and Protection of the Right to Organise, 1948);
3. The right to organise and collective bargaining (C98 Right to Organise and Collective bargaining, 1949);
4. The prohibition of any discrimination in terms of labour and remuneration (C100 Equal Remuneration, 1951 and C111 Discrimination (Employment and Occupation), 1958);
5. The minimum age for child labour (C138 Minimum Age Convention, 1973), together with the prohibition of the worst forms of child labour (C182 Worst Forms of Child Labour Convention, 1999).

The non-respect of this undertaking may, by virtue of Article 20, §1, 4° of the general specifications annexed to the Royal Decree of 26 September 1996, give rise to the application of the official measures described in § 6 of the same article, including unilateral termination of the contract.”

## References

[Information of the public authority that used these clauses in a procurement case]

## Annex 1: R-PHRASES:

**(R-phrases are mentioned on product labels and in product safety datasheets. It can be a useful tool for verification-procedures.)**

<u>R1:</u>	Explosive when dry.
<u>R2:</u>	Risk of explosion by shock, friction, fire or other sources of ignition.
<u>R3:</u>	Extreme risk of explosion by shock, friction, fire or other sources of ignition.
<u>R4:</u>	Forms very sensitive explosive metallic compounds.
<u>R5:</u>	Heating may cause an explosion.
<u>R6:</u>	Explosive with or without contact with air.
<u>R7:</u>	May cause fire.
<u>R8:</u>	Contact with combustible material may cause fire.
<u>R9:</u>	Explosive when mixed with combustible material.
<u>R10:</u>	Flammable
<u>R11:</u>	Highly flammable
<u>R12:</u>	Extremely flammable
<u>R13 (obsolete):</u>	<i>Extremely flammable liquid gas (This R-phrase is no longer designated by the version of the GefStoffV published on 26.10.93.)</i>
<u>R14:</u>	Reacts violently with water.
<u>R15:</u>	Contact with water liberates extremely flammable gases.
<i>Merck R15.1</i>	<i>Contact with acid liberates extremely flammable gases.</i>
<u>R16:</u>	Explosive when mixed with oxidizing substances.
<u>R17:</u>	Spontaneously flammable in air.
<u>R18:</u>	In use, may form flammable/explosive vapour-air mixture.
<u>R19:</u>	May form explosive peroxides.
<u>R20:</u>	Harmful by inhalation.
<u>R21:</u>	Harmful in contact with skin.
<u>R22:</u>	Harmful if swallowed.
<u>R23:</u>	Toxic by inhalation.
<i>Riedel-de Haen R23K:</i>	<i>Also toxic by inhalation.</i>
<u>R24:</u>	Toxic in contact with skin.
<i>Riedel-de Haen R24K:</i>	<i>Also toxic in contact with skin.</i>
<u>R25:</u>	Toxic if swallowed.
<i>Riedel-de Haen R25K:</i>	<i>Also toxic if swallowed.</i>
<u>R26:</u>	Very toxic by inhalation.
<i>Riedel-de Haen R26K:</i>	<i>Also very toxic by inhalation.</i>
<u>R27:</u>	Very toxic in contact with skin
<i>Riedel-de Haen R27A:</i>	<i>Very toxic in contact with eyes.</i>
<i>Riedel-de Haen R27K:</i>	<i>Also very toxic in contact with skin.</i>
<i>Riedel-de Haen R27AK:</i>	<i>Also very toxic in contact with eyes.</i>
<u>R28:</u>	Very toxic if swallowed.
<i>Riedel-de Haen R28K:</i>	<i>Also very toxic if swallowed.</i>
<u>R29:</u>	Contact with water liberates toxic gas.
<u>R30:</u>	Can become highly flammable in use.
<u>R31:</u>	Contact with acids liberates toxic gas.
<i>Merck R31.1</i>	<i>Contact with alkalis liberates toxic gas.</i>
<u>R32:</u>	Contact with acids liberates very toxic gas.

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<u>R33:</u>	Danger of cumulative effects.
<u>R34:</u>	Causes burns.
<u>R35:</u>	Causes severe burns.
<u>R36:</u>	Irritating to eyes.
<i>Riedel-de Haen R36A: Lacrimating</i>	
<u>R37:</u>	Irritating to respiratory system.
<u>R38:</u>	Irritating to skin.
<u>R39:</u>	Danger of very serious irreversible effects.
<u>R40:</u>	Possible risk of cancer. <i>CAUTION: Until 2001 this R-phrase was used for possible mutagenic or teratogenic risks as well. These risks are now labelled with R68!</i>
<u>R41:</u>	Risk of serious damage to eyes.
<u>R42:</u>	May cause sensitization by inhalation.
<u>R43:</u>	May cause sensitization by skin contact.
<u>R44:</u>	Risk of explosion if heated under confinement.
<u>R45:</u>	May cause cancer.
<u>R46:</u>	May cause heritable genetic damage.
<u>R47(obsolete):</u>	<i>May cause deformities. (This R-phrase is no longer designated by the version of the GefStoffV published on 26.10.93.)</i>
<u>R48:</u>	Danger of serious damage to health by prolonged exposure.
<u>R49:</u>	May cause cancer by inhalation.
<u>R50:</u>	Very toxic to aquatic organisms.
<u>R51:</u>	Toxic to aquatic organisms.
<u>R52:</u>	Harmful to aquatic organisms.
<u>R53:</u>	May cause long-term adverse effects in the aquatic environment.
<u>R54:</u>	Toxic to flora.
<u>R55:</u>	Toxic to fauna.
<u>R56:</u>	Toxic to soil organisms.
<u>R57:</u>	Toxic to bees.
<u>R58:</u>	May cause long-term adverse effects in the environment.
<u>R59:</u>	Dangerous for the ozone layer.
<u>R60:</u>	May impair fertility.
<u>R61:</u>	May cause harm to the unborn child.
<u>R62:</u>	Possible risk of impaired fertility.
<u>R63:</u>	Possible risk of harm to the unborn child.
<u>R64:</u>	May cause harm to breastfed babies.
<u>R65:</u>	Harmful: may cause lung damage if swallowed.
<u>R66:</u>	Repeated exposure may cause skin dryness or cracking.
<u>R67:</u>	Vapours may cause drowsiness and dizziness.
<u>R68:</u>	Possible risks of irreversible effects.

## COMBINATIONS OF R-PHRASES:

R14/15:	Reacts violently with water, liberating extremely flammable gases.
R15/29:	Contact with water liberates toxic, extremely flammable gas.
R20/21:	Harmful by inhalation and in contact with skin.
R21/22:	Harmful in contact with skin and if swallowed.
R20/22:	Harmful by inhalation and if swallowed.
R20/21/22:	Harmful by inhalation, in contact with skin and if swallowed.
R21/22:	Harmful in contact with skin and if swallowed.
R23/24:	Toxic by inhalation and in contact with skin.
R24/25:	Toxic in contact with skin and if swallowed.
R23/25:	Toxic by inhalation and if swallowed.
R23/24/25:	Toxic by inhalation, in contact with skin and if swallowed.

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- R24/25: Toxic in contact with skin and if swallowed.
- R26/27: Very toxic by inhalation and in contact with skin.
- R27/28: Very toxic in contact with skin and if swallowed.
- R26/28: Very toxic by inhalation and if swallowed.
- R26/27/28: Very toxic by inhalation, in contact with skin and if swallowed.
- R36/37: Irritating to eyes and respiratory system.
- R37/38: Irritating to respiratory system and skin.
- R36/38: Irritating to eyes and skin.
- R36/37/38: Irritating to eyes, respiratory system and skin.
- R39/23: Toxic: danger of very serious irreversible effects through inhalation.
- R39/24: Toxic: danger of very serious irreversible effects in contact with skin.
- R39/25: Toxic: danger of very serious irreversible effects if swallowed.
- R39/23/24: Toxic: danger of very serious irreversible effects through inhalation and in contact with skin.
- R39/23/25: Toxic: danger of very serious irreversible effects through inhalation and if swallowed.
- R39/24/25: Toxic: danger of very serious irreversible effects in contact with skin and if swallowed.
- R39/23/24/25: Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.
- R39/26: Very toxic: danger of very serious irreversible effects through inhalation.
- R39/27: Very toxic: danger of very serious irreversible effects in contact with skin.
- R39/28: Very toxic: danger of very serious irreversible effects if swallowed.
- R39/26/27: Very toxic: danger of very serious irreversible effects through inhalation and in contact with skin.
- R39/26/28: Very toxic: danger of very serious irreversible effects through inhalation and if swallowed.
- R39/27/28: Very toxic: danger of very serious irreversible effects in contact with skin and if swallowed.
- R39/26/27/28: Very toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.
- R42/43: May cause sensitization by inhalation and skin contact.
- R48/20: Harmful: danger of serious damage to health by prolonged exposure through inhalation.
- R48/21: Harmful: danger of serious damage to health by prolonged exposure in contact with skin.
- R48/22: Harmful: danger of serious damage to health by prolonged exposure if swallowed.
- R48/20/21: Harmful: danger of serious damage to health by prolonged exposure through inhalation and in contact with skin.
- R48/20/22: Harmful: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
- R48/21/22: Harmful: danger of serious damage to health by prolonged exposure in contact with skin and if swallowed.
- R48/20/21/22: Harmful: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.
- R48/23: Toxic: danger of serious damage to health by prolonged exposure through inhalation.
- R48/24: Toxic: danger of serious damage to health by prolonged exposure in contact with skin.
- R48/25: Toxic: danger of serious damage to health by prolonged exposure if swallowed.
- R48/23/24: Toxic: danger of serious damage to health by prolonged exposure through inhalation and in contact with skin.
- R48/23/25: Toxic: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
- R48/24/25: Toxic: danger of serious damage to health by prolonged exposure in contact with skin and if swallowed.
- R48/23/24/25: Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.
- R50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- R51/53: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- R52/53: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- R68/20: Harmful: possible risk of irreversible effects through inhalation.
- R68/21: Harmful: possible risk of irreversible effects in contact with skin.
- R68/22: Harmful: possible risk of irreversible effects if swallowed.
- R68/20/21: Harmful: possible risk of irreversible effects through inhalation and in contact with skin.
- R68/20/22: Harmful: possible risk of irreversible effects through inhalation and if swallowed.
- R68/21/22: Harmful: possible risk of irreversible effects in contact with skin and if swallowed.
- R68/20/21/22: Harmful: possible risk of irreversible effects through inhalation, in contact with skin and if swallowed.