

Sustainable Public Procurement-fiche: advanced

1) Subject matter

Indoor furniture produced with environmentally friendly materials and processes.

“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>, ...”

2) Exclusion criteria

Non compliance with environmental and social legislation, which has been the subject of a final judgment or a decision having equivalent effect, may be considered an offence concerning the professional conduct of the economic operator concerned or grave misconduct, permitting to exclude the party concerned from competing for the contract

Ref:

Art. 53 and 54 of Directive 2004/17/EC and Art. 45 of Directive 2004/18/EC

3) Technical capacity

/

4) Technical specifications

Wood and wood-based materials

- All wood and wood-based materials come from legally sourced timber and is traceable. The wood material shall not come from forest environments that need protection for biological and/or social reasons. When the wood is certified as FSC, PEFC or any other equivalent means of proof, this will be accepted as proof of compliance. [EU toolkit core criteria]



- If wood based panels are used the emission class for formaldehyde is E1 determined according to EN 717-2 (the emission of formaldehyde is maximally 8mg/ 100g dry matter)
- Products for surface treatment of wood (enamel, coat or synthetic resin) do not contain more than these limit concentrations of cadmium and lead:
 - o cadmium: detection limit;
 - o lead: 50 mg/kg;

Plastic parts

All plastic parts $\geq 50g$ shall be marked for recycling according to ISO 11469 or equivalent and must not contain additions of other materials that may hinder their recycling. [EU toolkit core criteria]

Metal parts

Products used for surface treatments of metals don't contain chrome VI or their compounds. In exceptional cases, metal surfaces may be treated with chromium where this is necessary on the grounds of heavy physical wear or in the case of parts that require particularly tight connections (i.e gaslifters, table- and chair legs). [EU toolkit core criteria]

Padding materials

CFC's (chlorofluorocarbons) are not be used as blowing agent in the production of foam (as padding material) [EU toolkit core criteria]

Evidence:

The compliance with all the criteria mentioned above can be proved with one of the following labels:



Nordic Swan
Labeling



Milieukeur



NF Environnement

in case that the tendering company can present one of these labels, any further proof is not necessary. Any other suitable evidence from a recognized body can also be used.

For the criteria of wood, compliance can also be proved by these labels:





Blaue Engel



FSC-label



PEFC-label

5) Awarding the contract:

	<i>Criterion</i>	<i>Weight</i>
1	Price <i>Calculation (e.g.):</i> Lowest offered price/ stated price x 0,70	e.g. 70%
2	Environmental criteria (The public authority formulates the points it wants to assign to the below mentioned criteria) <i>Calculation (e.g.):</i> Total scored points / maximum number of points x 0,20	e.g. 20%
3	...	e.g. 5 %
4	...	e.g.

Environmental criteria

General

Maintenance of the tools is possible without the use of organic solvents.

Wood

Raw material

The proportion of the wood that comes from sustainable forestry has to be indicated by the supplier. The higher this proportion the more awarding points that product receives. [EU toolkit comprehensive criteria]

Wood preservation

- Wood must not have been treated after felling with pesticides classified by WHO as type 1A and type 1B (extremely and highly hazardous). The list, the WHO recommended classification of pesticides by hazard, can be found on <http://www.who.int/pcs/>



- The wood is not impregnated or treated with pesticides, bleaching products, sulphur compounds, kerosene, petrol, diesel oil, turpentine substitute, white spirit and other petrochemical products.

Wood based panels:

- The content of solvents in the glue used in the production process of wood-based panels is less than 10% by weight
- For wood based panels of more than 10% wood by weight:
 - o Halogenated organic binding agents, halogenated organic flame retardants, polychlorinated biphenyls, alkyl phenols, phthalates, azidirine and polyazidirines as well as pigments and additives based on lead, tin, cadmium, chromium VI, mercury or their compounds must not be added to the chemical product.
 - o The content of alkyl phenol etoxylates or other alkyl phenol derivatives in the chemical product must not exceed 0,6 % in weight.
 - o The content of aromatic solvents must not exceed 1% in weight.
 - o Chemical products classified as carcinogenic (R45, R49, R40), harmful to the reproductive system (R46, R40), genetically harmful (R60-R63), toxic (R23-R28) or allergens when inhaled (R42) in accordance with the in EU's classification system according to directive 1999/45/EC (with amendments and corrections) must not be used (see annex).
 - o Nevertheless, the content of free formaldehyde may be up to 0,3% by weight. The content of free formaldehyde in glues for plywood panels or laminated wood panels may be up to 0.5% w/w.
 - o The total amount of chemical substances classified as harmful to the environment (R50, R50/R53, R51/53, R52, R52/R53 or R53) by the chemicals manufacturer/supplier and in accordance with the EU classification system (18th Amendment to Directive 67/548/EEC) must not exceed 0,5 g/kg panel (see annex).
 - o For wood based panels that contain polymeric diphenylmethane-4,4-diisocyanate, there is no release of detectable monomeric MDI (Methylene Diisocyanate).

Surface treatment of wood

- Products for surface treatment of wood (enamel, coat or synthetic resin) do not contain more than those limit concentration of chromium III, copper and zinc:
 - o chromium III: 50 mg/kg;
 - o copper: 25 mg/kg;
 - o zinc: 50 mg/kg.
- Products for surface treatment of wood do not contain products based on cadmium, mercury, lead, chromium VI and compounds. [EU toolkit core criteria]
- Products for surface treatment of wood do not contain products based on tin, arsenic and compounds.



- The products used for surface coating of wood do not contain aziridine [EU toolkit core criteria]
- The products used for surface coating of wood do not contain halogenated organic binding agents, phthalates or polyaziridines.
- No halogenated organic fire retardants are used on the wood.
- Chemical products classified as carcinogenic (R45, R49, R40), harmful to the reproductive system (R46, R40), genetically harmful (R60-R63), toxic (R23-R28) or as allergenic when inhaled (R42) in accordance with the EU's classification system 1999/45/EC (with amendments and corrections) are not used for surface coating of wood (see annex).
- The products used for surface coating of wood do not contain hazardous substances that are classified according to Directive 1999/45/EC as carcinogenic (R40, R45, R49), harmful to the reproductive system (R60, R61, R62, R63), mutagenic (R46, R68), toxic (R23, R24, R25, R26, R27, R28) allergenic when inhaled (R42) or harmful to the environment (R50, R50/53, R51/53, R52, R52/53, R53) (see annex). [EU toolkit core criteria]
- The products used for surface coating of wood shall not contain more than 5% by weight of volatile organic compounds (VOCs). [EU toolkit core criteria]
- The content of aromatic solvents in products used for surface treatment of wood must not exceed 1% by weight.

Plastics

Raw materials

- Percentage by weight of the plastics that exist of postconsumer recycled material. The higher this percentage the more awarding point this product receives. [EU toolkit core criteria]
- Substances based on lead, cadmium, mercury and their compounds or tin organic compounds are not actively added to plastic materials.
- Auxiliaries, colorants and pigments who cause that the concentration of heavy metals in plastics exceed the following concentrations are not added:
 - o arsenic: 50mg/kg
 - o chrome VI: 100mg/kg
 - o tin: detection limit
 - o zinc: 20.000mg/kg.
- No halogenated organic compounds (this includes halogenated organic flame retardants) are actively added to the plastic materials.
- No phthalates are actively added to the plastic materials.

Surface treatment of plastics

The plastic parts are not surface treated.

Metals

Raw materials



Percentage by weight of the metals that exists of postconsumer recycled material. The higher this percentage the more awarding point this product receives. [EU toolkit core criteria]

Surface treatment of metals

- No more than 200cm² of the surface per functionally part of furniture may be galvanised.
- The products used for surface coating of metals do not contain more than 5% by weight of volatile organic compounds (VOCs). [EU toolkit core criteria]
- The content of aromatic solvents in products used for surface treatment of metal must not exceed 1% by weight.
- Metals must not be coated with chromium, nickel and their compounds. In exceptional cases, metal surfaces may be treated with chromium or nickel where this is necessary on the grounds of heavy physical wear or in the case of parts that require particularly tight connections (i.e gaslifters, table- and chair legs).
- The concentration of those heavy metals in products used for surface treatment of metals is limited as follows:
 - o cadmium: detection limit
 - o arsenic: 50mg/kg
 - o copper: 5.000 mg/kg
 - o lead: detection limit
 - o chromium (tot): detection limit
 - o chromium VI: detection limit
 - o nickel: detection limit
 - o tin: detection limit
 - o zinc: 20.000 mg/kg.
- Halogenated organic binding agents, phthalates, aziridine and polyaziridines as well as pigments and additives based on lead, tin, cadmium, chromium VI, arsenic and mercury and their compounds are not added to preparatory agents or agents for surface treatment of metals.
- Agents for preparatory treatment and surface treatment of metals classified as carcinogenic (R45, R49, R40), harmful to the reproductive system (R46, R40), genetically harmful (R60-R63), toxic (R23-R28) or allergens when inhaled (R42) in accordance the EU's classification system (directive 1999/45/EC with amendments and corrections) are not used (see annex).
- The products used for surface coating of metals do not contain hazardous substances that are classified according to Directive 1999/45/EC as carcinogenic (R40, R45, R49), harmful to the reproductive system (R60, R61, R62, R63), mutagenic (R46, R68), toxic (R23, R24, R25, R26, R27, R28, R51), allergenic when inhaled (R42) or harmful to the environment (R50, R50/53, R51/53, R52, R52/53, R53), cause heritable genetic damage (R46), danger of serious damage to health by prolonged exposure (R48), possible risks of irreversible effects (R68). [EU toolkit core criteria]



Textile (also synthetic fibers)

- Halogenated flame retardants are not present
- Azo dyes that may cleave to carcinogenic acrylamines are not used.
- Chrome mordant dyeing is not permitted
- Textile do not contain hazardous substances that are classified according to Directive 1999/45/EC as carcinogenic (R40, R45, R49), harmful to the reproductive system (R60, R61, R62, R63), mutagenic (R46, R68), toxic (R23, R24, R25, R26, R27, R28, R51), allergenic when inhaled (R42) or harmful to the environment (R50, R50/53, R51/53, R52, R52/53, R53), cause heritable genetic damage (R46), danger of serious damage to health by prolonged exposure (R48), possible risks of irreversible effects (R68) (see annex) [*EU toolkit core criteria*]
- Biocidal or biostatic products shall only be allowed if the active biocide component is approved by Directive 98/8/EC and the active biocide component is not classified by means of any of the following R-phrases (see annex): R23/24; R23/25; R23/24/R24/R26/27; R26/R26/27/28; R27/R39/23; R39/R39/R39/23/R39/R39/R39/26; R39/R39/R39/26/R39/R39/R39/R48/21; R48/22; R48/20/R48/R48/21/R48/R48/R48/R48/R48/R48/R48/R48/R50/53; R51/53 and R52/53 [*EU toolkit core criteria*]
- No use is allowed of phthalates that at the time of application fulfill the classification criteria of any of the following risk phrases (or combinations thereof): R60, R61, R62, in accordance with Directive 67/548/EEC and its amendments. [*EU toolkit core criteria*]
- The following dyes that are carcinogenic, mutagenic or toxic to reproduction (according to Commission Decision 2002/371/EC and Öko-Tex Standard 100) may not be used.
 - o C.I. Basic Red 9
 - o C.I. Disperse Blue 1
 - o C.I. Acid Red 26
 - o C.I. Basic Violet 14
 - o C.I. Disperse Orange 11
 - o C.I. Direct Black 38
 - o C.I. Direct Blue 6
 - o C.I. Direct Red 28
 - o C.I. Disperse Yellow 3
- The following dyes that are potentially sensitizing dyes (according to Commission Decision 2002/371/EC and Öko-Tex Standard 100) may not be used:
 - o C.I. Disperse Blue 3
 - o C.I. Disperse Blue 7
 - o C.I. Disperse Blue 26
 - o C.I. Disperse Blue 35
 - o C.I. Disperse Blue 102



- C.I. Disperse Blue 106
- C.I. Disperse Blue 124
- C.I. Disperse Brown
- C.I. Disperse Orange 1
- C.I. Disperse Orange 3
- C.I. Disperse Orange 37
- C.I. Disperse Orange 76 (formerly: Orange 37)
- C.I. Disperse Red 1
- C.I. Disperse Red 11
- C.I. Disperse Red 17
- C.I. Disperse Yellow 1
- C.I. Disperse Yellow 3
- C.I. Disperse Yellow 9
- C.I. Disperse Yellow 39
- C.I. Disperse Yellow 49
- Dyes and pigments that contain cadmium, mercury, lead or nickel may not be used.
- The concentration in the pigments, dyes and textile fibres of those heavy metals do not exceed the following limits
 - antimony: 300mg/kg for polyester, 50/250mg/kg for resp. dyes and pigments
 - arsenic: 50mg/kg for both: dyes and pigments
 - chrome totale: 100mg/kg for both dyes and pigments
 - copper: 250mg/kg for dyes
 - tin: 250mg/kg for dyes
 - zinc: 1000mg/kg for elastane, 1500/1000mg/kg for resp. dyes and pigments
- Chlorinated synthetic fibres may not be used.
- Alkylphenolethoxylates (APEO), linear alkylbenzene sulfonates (LAS), dimethylbis (hydrogenated tallow alkyl) ammonium chloride (DHTDMAC), distearyl dimethyl ammonium chloride (DSDMAC), ditalgalkyldimethylammoniumchlorid (DTDMAC), ethylene diamine tetra acetate (EDTA) and diethylene triamine penta acetate (DTPA) are not used and are no part of any preparations or formulations used.
- Formaldehyde emissions must be less than 30 ppm for textile used in mattresses for children (up to 2 years), and less than 100 ppm for other textile.
- For Textile of wool and other animal fibres: Concentrations of pyrethroids (Permethrin) between 3 mg/kg and 35 mg/kg and concentrations above 100mg/kg are inadmissible.
- For organically produced cotton or other natural fibres: The proportion by weight of cotton or other natural fibres used in the textiles deriving from organic production. To be considered as such, the fibre must be produced according to Regulation (EEC) No 2092/91 until 31 December 2008, and Regulation (EC) No 834/2007 as of 1 January 2009. The higher this percentage the more awarding points this product receives. [EU toolkit comprehensive criteria



- The proportion of the textile by weight made from recycled fibres, i.e. fibres originating only from cuttings from textile and clothing manufacturers or from post-consumer waste (textile or otherwise). The higher this percentage the more awarding points this product receives. [EU toolkit comprehensive criteria]

Leather

- Hexavalent chromium (CrVI) is not allowed in the leather (detection limit: 3 mg/kg).
- Chrome mordant dyeing is not permitted
- Halogenated flame retardants are not present
- Azo dyes that may cleave to carcinogenic acrylamines must not be used. The following dyes that are carcinogenic, mutagenic or toxic to reproduction (according to Commission Decision 2002/371/EC and Öko-Tex Standard 100) are not used.
 - o C.I. Basic Red 9
 - o C.I. Disperse Blue 1
 - o C.I. Acid Red 26
 - o C.I. Basic Violet 14
 - o C.I. Disperse Orange 11
 - o C.I. Direct Black 38
 - o C.I. Direct Blue 6
 - o C.I. Direct Red 28
 - o C.I. Disperse Yellow 3
- The following dyes that are potentially sensitising dyes (according to Commission Decision 2002/371/EC and Öko-Tex Standard 100) are not used:
 - o C.I. Disperse Blue 3
 - o C.I. Disperse Blue 7
 - o C.I. Disperse Blue 26
 - o C.I. Disperse Blue 35
 - o C.I. Disperse Blue 102
 - o C.I. Disperse Blue 106
 - o C.I. Disperse Blue 124
 - o C.I. Disperse Brown
 - o C.I. Disperse Orange 1
 - o C.I. Disperse Orange 3
 - o C.I. Disperse Orange 37
 - o C.I. Disperse Orange 76 (formerly: Orange 37)
 - o C.I. Disperse Red 1
 - o C.I. Disperse Red 11
 - o C.I. Disperse Red 17
 - o C.I. Disperse Yellow 1
 - o C.I. Disperse Yellow 3
 - o C.I. Disperse Yellow 9
 - o C.I. Disperse Yellow 39
 - o C.I. Disperse Yellow 49



- Dyes and pigments that contain cadmium, mercury, lead or nickel are not used.
- The concentration in the leather of those heavy metals do not exceed:
 - o antimone: 2,0mg/kg
 - o arsenic: 0,2mg/kg
 - o chrome VI: detection limit
 - o cobalt: 4,0mg/kg
 - o copper: 60,0mg/kg
 - o soluble mineral tanning agents: total concentration of soluble Al, Cr, Ti, Zr: 200mg/kg.
- Alkylphenolethoxylates (APEO), linear alkylbenzene sulfonates (LAS), dimethylbis (hydrogenated tallow alkyl) ammonium chloride (DHTDMAC), distearyl dimethyl ammonium chloride (DSDMAC), ditalgalkyldimethylammoniumchlorid (DTDMAC), ethylene diamine tetra acetate (EDTA) and diethylene triamine penta acetate (DTPA) are not used and shall not be part of any preparations or formulations used.
- Formaldehyde emissions are less than 30 ppm for leather used in mattresses for children (up to 2 years), and less than 100 ppm for other leather.
- The coating of the leather is waterbased
- If synthetic leather is used, this is based on PUR.

Padding materials

All padding materials

- The padding material do not contain halogenated flame retardants [*EU toolkit core criteria*]
- No chloro-organic bleaching agents must be used in the production of the padding material
- Dyes that are classified as carcinogenic according to Eu Directive 1999/45/EC may not be used [*EU toolkit core criteria*]
- The padding materials do not contain substances that are toxic or very toxic according to Directive 67/548/EC or classified as carcinogenic in accordance with EC category Carc. Cat1, Carc.Cat 2 or mutagenic according to EC Category Mut.Cat.1, Mut.Cat.2 or toxic to reproduction according to EC Category Repr. Cat.1, Repr. Cat. 2.
- Dyes may only be used for distinguishing between different qualities (e.g. hard and soft foam) within the same range of padding material. Azo dyes that may form carcinogenic aryl amines, as well as dyestuffs based on lead, tin, cadmium, chromium VI and mercury and their compounds must not be used.
- The content of the following metals must not exceed the given limits in the end padding material: [*EU toolkit core criteria*]
 - o antimony 0,5 ppm
 - o arsenic 0,5 ppm
 - o lead 0,5 ppm
 - o cadmium 0,1 ppm



- chromium (total) 1,0 ppm
- cobalt 0,5 ppm
- copper 2,0 ppm
- nickel 1,0 ppm
- mercury 0,02 ppm
- The amount of formaldehyde emitted from the padding material shall be less than 30 ppm for children's mattresses (up to 2 years), and less than 100 ppm for other mattresses. [EU toolkit core criteria]

Polyurethane

- Partially fluorinated hydrocarbons (HFCs), perfluorinated hydrocarbons (PFCs), partially halogenated chlorofluorocarbons (H-CFC), chlorofluorocarbons (CFCs) or methylene chloride are not used as physical blowing agents or auxiliary blowing agents in the production of polyurethane foam (PUR). [EU toolkit core criteria]
- Perfluorinated hydrocarbons (PFCs) is not used as physical blowing agents in the production of polyurethane foam (PUR).
- As synthetic foams only water blown polyurethane (PUR), vacuum pressure foaming PUR and recycled PUR may be used.
- Tin organic compounds are not used in the polyurethane foam. [EU toolkit core criteria]
- Aniline based amines, and pigments and catalysts based on mercury, lead, cadmium and chromium must not be added to the polyurethane. Pigments that are dispersed in alkyl phenols must not be used in polyurethane.

Latex foam

- Chlorophenols, butadienes, and nitrosamines and carbon disulphide must not be detectable in the latex foam or as an emission. Here, the following substance-specific limits apply: [EU toolkit core criteria]
 - Chlorophenols (including salts and esters) < 1 mg/kg
 - Butadienes < 1 mg/kg
 - N-nitrosamines (test chamber measurement) < 1 µg/m³
- Carbon disulphide is not detectable in the latex foam or as an emission. Here, the following substance-specific limit applies:
 - Carbon Disulphide (test chamber measurement) <20 µg/m³

Glass/mirror glass

- Lead glazing, crystal glass, wire reinforced glass and/or laminated glass are not used in the furniture.
- Mirror glass may be used in the furniture or fitment. The metal coating used for the mirror glass do not contain more than 0,2% by weight of lead and/of copper.



Adhesives used in the production of the finished furniture

- The adhesive is not classified as carcinogenic (R45, R49, R40), harmful to the reproduction system (R46, R40), genetically harmful (R60-R63) or toxic (R23-R28) in accordance with the EU's classification system (Directive 1999/45/EC with amendments and corrections).
- The VOC content of the adhesives used in the assembly of furniture do not contain more than 10% by weight. [EU toolkit core criteria]
- If there is more than 50 g (wet adhesive) in the finished furniture the following requirements have to be met:
 - o The adhesive is not classified as harmful to the environment (R50, R50/R53, R51/53, R52, R52/R53 or R53) in accordance in accordance with EU's classification system 1999/45/EC (with amendments and corrections).
 - o The adhesive contains maximum 5% organic compounds with boiling point < 260°C (VOC's)
 - o Halogenated organic binding agents, phtalates (ester of 1,2-benzendicarboxyl acid), alkylphenoethoxylates, alkylphenoles or halogenated solvents do not enter into the product.

Recyclability

- It is possible to separate 90% of the parts from metal, wood, plastic and inert materials from the other materials without the use of special tools. Panel materials with plastic or synthetical resin do not have to be separatable.
- For upholstered furniture:
 - o if the upholstery is fixed to the basic construction then it has to be easy to separate it from this construction. This means that glue surfaces that can not be easily detached are not allowed, joints with clips are allowed for joints that can be used in new parts.
 - o if the upholstery is integrated with a part of the seat and/or the back it has to be easy to separated both. Glue, screw and nail joints who can not be easily detached are not allowed, weld and melt joints are not allowed. Connections with clips are allowed for connections that can be used in new parts.

6) Performance clauses:

Packaging

- Packaging consists of readily recycled material, and/or materials taken from renewable resources, or be a multi-use system. [EU toolkit core criteria]
- All packaging materials are easily separable by hand into recyclable parts consisting of one material (e.g. cardboard, paper, plastic, textile). [EU toolkit core criteria]



- The packaging is composed of one recyclable material (cardboard, paper, polyethylene, polypropylene, polystyrene) or if it is composed of different materials these are separatable by hand in the different recyclable fractions (cardboard, paper, polyethylene, polypropylene, polystyrene).
- Upholstered furniture is packed in a way that allows post-manufacture outgassing of volatile materials.

Guarantee and spare parts:

- The supplier maintains separately access to spare parts of the furniture (as hinges and weels) for at least 10 years after the delivery of the tool.
- By normal use and maintenance a life time of 5 years has to be guaranteed.

References

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



Annex 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 (obsolet):</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</i>	<i>Also very toxic in contact with skin.</i>




<u>R27K:</u>	
<i>Riedel-de Haen</i>	<i>Also very toxic in contact with eyes.</i>
<u>R27AK:</u>	
<u>R28:</u>	Very toxic if swallowed.
<i>Riedel-de Haen</i>	<i>Also very toxic if swallowed.</i>
<u>R28K:</u>	
<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.
<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</i>	<i>Lacrimating</i>
<u>R36A:</u>	
<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.
<i>R47(obsolete):</i>	<i>May cause deformities.</i> <i>(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.
- 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.



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- 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.

