



**SAFETY DATA SHEET (1907/2006)**

**R0571344**

**Revision Date: 2017-07-12**

**Version: 1**

**Purerad MAES**

**Scenario 1: Exposure scenario 1: Formulation - Formulation of adhesives**

<b>Environment contributing scenario(s):</b>	
Formulation of adhesives	ERC 2
<b>Worker contributing scenario(s):</b>	
Formulation in closed batch process	PROC 3
Formulation in batch process with possible exposure during monitoring and sampling.	PROC 4
Use in laboratory	PROC 15

Description of the activities and technical processes covered in the exposure scenario:

The characterization of operational conditions during synthesis and formulation of adhesives is based on specific information provided by the importer of the substance, generic use descriptor lists and specific Environmental Release Categories published by the Association of European Adhesive and Sealant Industry (FEICA).

Description of the technical process covered by the SpERC: FEICA 2.1c.v2

The manufacture of construction chemicals is a multi-stage batch process. The process is arranged to maximise the efficiency of use of input raw materials, through the highest conversion into formulated products. Process losses are reduced to the absolute minimum, through use of general and manufacturing plant extraction to maintain workplace concentrations of airborne VOCs and particulates below respective OELs; and through use of closed or covered manufacturing equipment to minimise evaporative losses of VOCs. The composition of products and the overall process are such that there are no discharges of raw materials or products to wastewater or to soil from the manufacturing plant.

Unambiguous description of conditions regarding waste management and wastewater discharges (e.g. if there are no restrictions in scope, statement that any type of waste disposal is covered).

Explanation on the approach taken for the ES

- The total amount of substance used in the synthesis and formulation of adhesives is 100 tonnes per year. It was assumed in the present assessment that the total amount is imported to a single site, where the substance is used in the synthesis and formulation of adhesive products, i.e. the regional fraction and the fraction of the main local source are both 1 in the present assessment. The number of release days is given with 220 in the spERC published by FEICA. The amount of substance processed at a single day can be calculated from the annual tonnage and the number of release day: it may reach approximately 450 kg/day. This is clearly below the typical maximum tonnage given in the FEICA spERC.

## Environmental contributing scenario 1: Formulation of adhesives

### Conditions of use

The environmental exposure assessment is based on the fact that the substance is imported to a single site to synthesize and/or formulate adhesive mixtures in closed or open batch processes.

Amount used, frequency and duration of use (or from service life)
<ul style="list-style-type: none"> <li>Daily use at site: <math>\leq 6</math> tonnes/day</li> </ul> <p>The default daily use amount is the substance maximum use rate in a typical operation (MSPERC). It is a typical site tonnage, based on sector knowledge. 220 emission days per year are assumed.</p>
<ul style="list-style-type: none"> <li>Annual use at a site: <math>\leq 9.9</math> tonnes/year</li> </ul>
<ul style="list-style-type: none"> <li>Percentage of EU tonnage used at regional scale: = 100 %</li> </ul>
Technical and organisational conditions and measures
<ul style="list-style-type: none"> <li>Type of Process: Solvent based process</li> </ul>
<ul style="list-style-type: none"> <li>Indoor/outdoor use: Indoor use (Indoor)</li> </ul>
<ul style="list-style-type: none"> <li>Equipment cleaning: Equipment cleaned with organic solvent, washings are collected and disposed of as solvent waste.</li> </ul>
<ul style="list-style-type: none"> <li>Process efficiency: Process with efficient use of raw materials. (Typically implemented measures for reducing emissions to waste water may include: - Closed batch systems)</li> </ul>
Conditions and measures related to sewage treatment plant
<ul style="list-style-type: none"> <li>Municipal STP: Yes [Effectiveness Water: 100%]</li> </ul>
<ul style="list-style-type: none"> <li>Discharge rate of STP: <math>\geq 2E3</math> m<sup>3</sup>/d</li> </ul>
<ul style="list-style-type: none"> <li>Application of the STP sludge on agricultural soil: Yes</li> </ul>
Conditions and measures related to treatment of waste (including article waste)
<ul style="list-style-type: none"> <li>Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)</li> </ul>
Other conditions affecting environmental exposure
<ul style="list-style-type: none"> <li>Receiving surface water flow rate: <math>\geq 1.8E4</math> m<sup>3</sup>/d</li> </ul>

### Releases

The local releases to the environment are reported in the following table.

Table 1 Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based FEICA 2.1c.v2 - FEICA 2.1c.v2 Formulation of Solvent Borne Adhesives – Volatiles (Small Scale) - Formulation of Solvent Borne Adhesives – Volatiles (Small Scale)	Initial release factor: 0% Final release factor: 0% Local release rate: 0 kg/day <b>Explanation / Justification:</b> OECD Emission Scenario Document, Series No. 22 Coating Industry (Paints, Lacquers and Varnishes), July 2009. Regarding environmental emissions, the formulation of adhesives and sealants is very similar to that of

Release	Release factor estimation method	Explanation / Justification
		formulation of paints, lacquers and varnishes. For that reason, release fractions defined in the OECD Emission Scenario Document have been adopted for the SPERC Factsheet for the formulation of adhesives and sealants. Vapor pressure Threshold is 1000Pa.
Air	SpERC based same as above	Initial release factor: 3.6% Final release factor: 3.6% Local release rate: 216 kg/day <b>Explanation / Justification:</b> OECD Emission Scenario Document, Series No. 22 Coating Industry (Paints, Lacquers and Varnishes), July 2009. Regarding environmental emissions, the formulation of adhesives and sealants is very similar to that of formulation of paints, lacquers and varnishes. For that reason, release fractions defined in the OECD Emission Scenario Document have been adopted for the SPERC Factsheet for the formulation of adhesives and sealants. Vapor pressure Threshold is 1000Pa.
Soil	SpERC based same as above	Final release factor: 0% <b>Explanation / Justification:</b> OECD Emission Scenario Document, Series No. 22 Coating Industry (Paints, Lacquers and Varnishes), July 2009. Regarding environmental emissions, the formulation of adhesives and sealants is very similar to that of formulation of paints, lacquers and varnishes. For that reason, release fractions defined in the OECD Emission Scenario Document have been adopted for the SPERC Factsheet for the formulation of adhesives and sealants. Vapor pressure Threshold is 1000Pa.

#### Releases to waste

Release factor to waste from the process: 0%

OECD Emission Scenario Document, Series No. 22 Coating Industry (Paints, Lacquers and Varnishes), July 2009. Regarding environmental emissions, the formulation of adhesives and sealants is very similar to that of formulation of paints, lacquers and varnishes. For that reason, release fractions defined in the OECD Emission Scenario Document have been adopted for the SPERC Factsheet for the formulation of adhesives and sealants. Vapor pressure Threshold is 1000Pa.

#### **Worker contributing scenario 1: Formulation in closed batch process (PROC 3)**

##### **Conditions of use**

MAES is imported as a neat substance with a purity of more than 92% (w/w). A worker may handle amounts of the substance in the range of tens to hundreds of kilograms per working day. A worker in this industry may be exposed on 220 days a year. Direct exposure may occur during loading and discharging activities during a period of approximately 35 minutes per working day. It is anticipated that no exposure occurs during the remaining 445 minutes of a full working shift of 8 hours under regular conditions. The worker has a breathing

rate of 10 m<sup>3</sup> per 8-hour working shift. The exposed skin surface area is as described in ECETOC TRA (version 2010). The estimates are based on the skin surface areas given in the ECHA technical guidance document (R.14: Occupational exposure estimation, ECHA 2010). The bodyweight of the worker is 70 kg. The processes normally operate in contained systems preventing direct worker exposure.

<b>Product (article) characteristics</b>
• Concentration of substance in mixture: Substance as such
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>
• Duration of activity: < 8 hours
<b>Technical and organisational conditions and measures</b>
• General ventilation: Good general ventilation (3-5 air changes per hour)
• Containment: Closed batch process with occasional controlled exposure
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]
• Occupational Health and Safety Management System: Advanced
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>
• Respiratory Protection: No [Effectiveness Inhal: 0%]
<b>Other conditions affecting workers exposure</b>
• Place of use: Indoor
• Process temperature (for liquid): ≤ 40 °C

## Scenario 2: Formulation - Transfer of formulations containing the substance

<b>Environment contributing scenario(s):</b>	
Transfer of formulations containing the substance	ERC 2
<b>Worker contributing scenario(s):</b>	
Transfer at dedicated facilities	PROC 8b
Transfer to smaller containers	PROC 9

Description of the activities and technical processes covered in the exposure scenario:

Transfer of formulation of curable laminate adhesives at one site.

Description of the technical process covered by the SpERC: FEICA 2.1c.v2

- The manufacture of construction chemicals is a multi-stage batch process. The process is arranged to maximise the efficiency of use of input raw materials, through the highest conversion into formulated products. Process losses are reduced to the absolute minimum, through use of general and manufacturing plant extraction to maintain workplace concentrations of airborne VOCs and particulates below respective OELs; and through use of closed or covered manufacturing equipment to minimise evaporative losses of VOCs. The composition of products and the overall process are such that there are no discharges of raw materials or products to waste-water or to soil from the manufacturing plant.
- Unambiguous description of conditions regarding waste management and wastewater discharges (e.g. if there are no restrictions in scope, statement that any type of waste disposal is covered).

Explanation on the approach taken for the ES

The substance is contained in curable laminating adhesives at concentrations up to 90% and transferred to transportation containers or pails to be delivered to downstream users.

### Environmental contributing scenario 1: Transfer of formulations containing the substance

#### Conditions of use

The processes normally operate in contained systems reducing emissions of substance into the air. The processes operate without water contact leading to negligible waste water emissions. Concerning technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil, the following measures are incorporated: Exhaust air from the processes is collected and treated to provide a typical removal efficiency of 99%. The typical release fraction to waste water from the process prior to risk management measures is given as “zero” and specific waste water emission controls are not applicable as there is no direct release to waste water. It is assumed that synthesis and formulation of adhesives operate without water contact resulting in negligible emissions of substance into waste water. Contaminated containers or spillages of solutions mixed with inert material (e.g. clay) may be disposed of by incineration at an authorized tip in accordance with local regulations. As no external recovery of waste occurs, no specific conditions and measures related to external recovery of waste are applicable.

Amount used, frequency and duration of use (or from service life)
<ul style="list-style-type: none"> <li>Daily use at site: <math>\leq 6</math> tonnes/day</li> </ul> <p>The default daily use amount is the substance maximum use rate in a typical operation (M<sub>sperc</sub>). It is a typical site tonnage, based on sector knowledge. 220 emission days per year are assumed.</p>
<ul style="list-style-type: none"> <li>Annual use at a site: <math>\leq 9.9</math> tonnes/year</li> </ul>
<ul style="list-style-type: none"> <li>Percentage of EU tonnage used at regional scale: = 100 %</li> </ul>
Technical and organisational conditions and measures
<ul style="list-style-type: none"> <li>Type of Process: Solvent based process</li> </ul>
<ul style="list-style-type: none"> <li>Indoor/outdoor use: Indoor use (Indoor)</li> </ul>
<ul style="list-style-type: none"> <li>Equipment cleaning: Equipment cleaned with organic solvent, washings are collected and disposed of as solvent waste.</li> </ul>
<ul style="list-style-type: none"> <li>Process efficiency: Process with efficient use of raw materials. (Typically implemented measures for reducing emissions to waste water may include: - Closed batch systems )</li> </ul>
Conditions and measures related to sewage treatment plant
<ul style="list-style-type: none"> <li>Municipal STP: Yes [Effectiveness Water: 100%]</li> </ul>
<ul style="list-style-type: none"> <li>Discharge rate of STP: <math>\geq 2E3</math> m<sup>3</sup>/d</li> </ul>
<ul style="list-style-type: none"> <li>Application of the STP sludge on agricultural soil: Yes</li> </ul>
Conditions and measures related to treatment of waste (including article waste)
<ul style="list-style-type: none"> <li>Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)</li> </ul>
Other conditions affecting environmental exposure
<ul style="list-style-type: none"> <li>Receiving surface water flow rate: <math>\geq 1.8E4</math> m<sup>3</sup>/d</li> </ul>

#### Releases

The local releases to the environment are reported in the following table.

**Table 2. Local releases to the environment**

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based FEICA 2.1c.v2 - FEICA 2.1c.v2 Formulation of Solvent Borne Adhesives – Volatiles (Small Scale) - Formulation of Solvent Borne Adhesives – Volatiles (Small Scale)	Initial release factor: 0% Final release factor: 0% Local release rate: 0 kg/day <b>Explanation / Justification:</b> OECD Emission Scenario Document, Series No. 22 Coating Industry (Paints, Lacquers and Varnishes), July 2009. Regarding environmental emissions, the formulation of adhesives and sealants is very similar to that of formulation of paints, lacquers and varnishes. For that reason, release fractions defined in the OECD Emission Scenario Document have been adopted for the SPERC Factsheet for the formulation of adhesives and sealants. Vapor pressure Threshold is 1000Pa.
Air	SpERC based same as above	Initial release factor: 3.6% Final release factor: 3.6% Local release rate: 216 kg/day <b>Explanation / Justification:</b> OECD Emission Scenario Document, Series No. 22 Coating Industry (Paints, Lacquers and Varnishes), July 2009. Regarding environmental emissions, the formulation of adhesives and sealants is very similar to that of formulation of paints, lacquers and varnishes. For that reason, release fractions defined in the OECD Emission Scenario Document have been adopted for the SPERC Factsheet for the formulation of adhesives and sealants. Vapor pressure Threshold is 1000Pa.
Soil	SpERC based same as above	Final release factor: 0% <b>Explanation / Justification:</b> OECD Emission Scenario Document, Series No. 22 Coating Industry (Paints, Lacquers and Varnishes), July 2009. Regarding environmental emissions, the formulation of adhesives and sealants is very similar to that of formulation of paints, lacquers and varnishes. For that reason, release fractions defined in the OECD Emission Scenario Document have been adopted for the SPERC Factsheet for the formulation of adhesives and sealants. Vapor pressure Threshold is 1000Pa.

Releases to waste

Release factor to waste from the process: 0%

OECD Emission Scenario Document, Series No. 22 Coating Industry (Paints, Lacquers and Varnishes), July 2009. Regarding environmental emissions, the formulation of adhesives and sealants is very similar to that of formulation of paints, lacquers and varnishes. For that reason, release fractions defined in the OECD Emission Scenario Document have been adopted for the SPERC Factsheet for the formulation of adhesives and sealants.

Vapor pressure Threshold is 1000Pa.

### Worker contributing scenario 1: Transfer at dedicated facilities (PROC 8b)

#### Conditions of use

The main part of transfer at dedicated facilities include contained systems. According to information provided by the importer of the substance, occupational inhalation exposure to MAES during formulation may only occur when the raw material is loaded into the formulation vessel in the presence of local exhaust ventilation or when formulated products are discharged in the absence of localized controls.

<b>Product (article) characteristics</b>
• Concentration of substance in mixture: >25%
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>
• Duration of activity: < 8 hours
<b>Technical and organisational conditions and measures</b>
• General ventilation: Good general ventilation (3-5 air changes per hour)
• Containment: Semi-closed process with occasional controlled exposure
• Local exhaust ventilation: yes [Effectiveness Inhal: 95%]
• Occupational Health and Safety Management System: Advanced
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>
• Respiratory Protection: No [Effectiveness Inhal: 0%]
<b>Other conditions affecting workers exposure</b>
• Place of use: Indoor
• Process temperature (for liquid): ≤ 40 °C

### Scenario 3: Use at industrial site - Industrial use of adhesives

<b>Environment contributing scenario(s):</b>	
Use in adhesives at industrial site	ERC 5
<b>Worker contributing scenario(s):</b>	
Mixing in batch processes for formulation of adhesives.	PROC 5
Non-dedicated transfer.	PROC 8a
Dedicated transfer	PROC 8b
Transfer to smaller containers.	PROC 9
Application by roller or brush in an industrial environment.	PROC 10
Application including dipping and pouring in an industrial environment	PROC 13
Industrial use of substance containing adhesives preparing articles	PROC 14
Use in a laboratory	PROC 15
Manual mixing of formulated product	PROC 19

Description of the activities and technical processes covered in the exposure scenario:

The substance is contained in curable laminating adhesives used for bonding of substrates such as paper, board, aluminium foil and various plastic films. The formulated adhesives are delivered to downstream users in pails or intermediate bulk containers (IBCs). Transfer of adhesive from transportation containers to the printing stations is done with automated pumping systems in most cases. Manual pouring of products and filling of printing stations may occur in a few cases. The products are ready-to-use and addition of or blending with other materials is not required. The adhesive is applied using a coating or printing method in a dedicated device. Curing is accomplished by UV or electron beam (EB) irradiation using commercial self-shielded curing equipment. The curing converts the adhesive to a high molecular weight cross-linked polymer with only trace levels of free substance remaining in the polymer.

Description of the technical process covered by the SpERC: FEICA 5.1a.v2

Industrial applications of Paper, Board and related Products / Woodworking and joinery / Footwear and Leather, Textile and others adhesives. Adhesives used in the above-mentioned products; others include products like electricity, electronics, optics, hygienics, food, toys medical technics, sportswear etc. are normally rolled, sprayed or directly used from the cartridge due to the application purposes.

Explanation on the approach taken for the ES

The formulated adhesives are delivered to downstream users in pails or intermediate bulk containers (IBCs). Transfer of adhesive from transportation containers to the plants (e.g. printing stations) is generally done with automated pumping systems. The products are ready-to-use and addition of or blending with other materials is not required. The adhesive is applied using a coating or printing method in a dedicated device. Curing is accomplished by UV or electron beam (EB) irradiation using commercial self-shielded curing equipment. The curing converts the adhesive to a high molecular weight cross-linked polymer with only trace levels of free substance remaining in the polymer. Manual handling of the adhesives should be prevented as much as possible.

### **Environmental contributing scenario 1: Use in adhesives at industrial site**

#### **Conditions of use**

The following characterisation of operational conditions during industrial use of adhesives is based on specific information provided by the importer of the substance, generic use descriptor lists and specific Environmental Release Categories published by the Association of European Adhesive and Sealant Industry (FEICA).

<b>Amount used, frequency and duration of use (or from service life)</b>
<ul style="list-style-type: none"> <li>• Daily use at site: <math>\leq 0.1</math> tonnes/day</li> </ul> <p>The default daily use amount is the substance maximum use rate in a typical operation (M<sub>sp</sub>perc). It is a typical site tonnage, based on sector knowledge. 220 emission days per year are assumed.</p>
<ul style="list-style-type: none"> <li>• Annual use at a site: <math>\leq 9.9</math> tonnes/year</li> </ul>
<ul style="list-style-type: none"> <li>• Percentage of EU tonnage used at regional scale: = 100 %</li> </ul>
<b>Technical and organisational conditions and measures</b>
<ul style="list-style-type: none"> <li>• Type of Process: Dry process (no water used in process)</li> </ul>
<ul style="list-style-type: none"> <li>• Indoor/outdoor use: Covers Indoor and Outdoor use (Covers Indoor and Outdoor use)</li> </ul>
<ul style="list-style-type: none"> <li>• Equipment cleaning: Equipment cleaned with organic solvent, washings are collected and disposed of as solvent waste.</li> </ul>
<ul style="list-style-type: none"> <li>• Process efficiency: Process with efficient use of raw materials. (Typically implemented measures for reducing emissions to waste water may include: - Closed batch systems )</li> </ul>
<b>Conditions and measures related to sewage treatment plant</b>



• Municipal STP: Yes [Effectiveness Water: 100%]
• Discharge rate of STP: $\geq 2E3$ m <sup>3</sup> /d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: $\geq 1.8E4$ m <sup>3</sup> /d

## Releases

The local releases to the environment are reported in the following table.

**Table 3. Local releases to the environment**

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based FEICA 5.1a.v2 - FEICA 5.1a.v2 Industrial Use of Substances other than Solvents in Paper, Board and related Products / Woodworking and joinery / Footwear and Leather, Textile, Others Adhesives - Industrial Use of Substances other than Solvents in Paper, Board and related Products / Woodworking and joinery / Footwear and Leather, Textile, Others Adhesives	Initial release factor: 0% Final release factor: 0% Local release rate: 0 kg/day <b>Explanation / Justification:</b> Regarding environmental emissions, the industrial use of adhesives and sealants is very similar to related industrial uses of paints, lacquers and varnishes. For that reason, release fractions defined in the OECD Emission Scenario Document have been adopted for the SPERC Factsheet for the industrial uses of adhesives and sealants. OECD Emission Scenario Document, Series No. 22 Coating Industry (Paints, Lacquers and Varnishes), July 2009.
Air	SpERC based same as above	Initial release factor: 1.7% Final release factor: 1.7% Local release rate: 1.7 kg/day <b>Explanation / Justification:</b> Regarding environmental emissions, the industrial use of adhesives and sealants is very similar to related industrial uses of paints, lacquers and varnishes. For that reason, release fractions defined in the OECD Emission Scenario Document have been adopted for the SPERC Factsheet for the industrial uses of adhesives and sealants. OECD Emission Scenario Document, Series No. 22 Coating Industry (Paints, Lacquers and Varnishes), July 2009.
Soil	SpERC based same as above	Final release factor: 0% <b>Explanation / Justification:</b> Regarding environmental emissions, the industrial use of adhesives and sealants is very similar to

Release	Release factor estimation method	Explanation / Justification
		related industrial uses of paints, lacquers and varnishes. For that reason, release fractions defined in the OECD Emission Scenario Document have been adopted for the SPERC Factsheet for the industrial uses of adhesives and sealants. OECD Emission Scenario Document, Series No. 22 Coating Industry (Paints, Lacquers and Varnishes), July 2009.

Releases to waste

Release factor to waste from the process: 0%

Regarding environmental emissions, the industrial use of adhesives and sealants is very similar to related industrial uses of paints, lacquers and varnishes. For that reason, release fractions defined in the OECD Emission Scenario Document have been adopted for the SPERC Factsheet for the industrial uses of adhesives and sealants. OECD Emission Scenario Document, Series No. 22 Coating Industry (Paints, Lacquers and Varnishes), July 2009.

**Worker contributing scenario 1: Mixing in batch processes for formulation of adhesives. (PROC 5)**

#### Conditions of use

In case of mixing in batch processes, exhaust air from the processes should be collected by local exhaust ventilation (fixed capturing hoods). Due to the corrosive properties of the substance, workers have to follow good industrial practice and wear chemical resistant gloves, appropriate clothes and boots in the working area. Workers may also wear personal respiratory equipment. Optionally, workers wear chemical resistant safety goggles or use face shields in case of direct contact with the substance.

<b>Product (article) characteristics</b>
• Concentration of substance in mixture: >25%
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>
• Duration of activity: < 8 hours
<b>Technical and organisational conditions and measures</b>
• General ventilation: Good general ventilation (3-5 air changes per hour)
• Containment: No
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]
• Occupational Health and Safety Management System: Advanced
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>
• Respiratory Protection: No [Effectiveness Inhal: 0%]
<b>Other conditions affecting workers exposure</b>
• Place of use: Indoor
• Process temperature (for liquid): ≤ 40 °C