



DOX-1

Date of issue: 20.01.2011 r.

EXPOSURE SCENARIO NO. 1

**GENERAL INFORMATION**

**Title of exposure scenario: Formulation of DAPD**

**Identified uses according to Use Descriptors**

Sector of use [SU]:  
SU3 Industrial uses

Process category [PROC]:

PROC1 Use in closed process, no likelihood of exposure  
PROC2 Use in closed, continuous process with occasional controlled exposure  
PROC3 Use in closed batch process (synthesis or formulation)  
PROC5 Mixing or blending in batch processes for formulation of preparations\* and ar-ticles (multistage and/or significant con-tact)  
PROC8b Transfer of substance or preparation (charging/discharging) from/to ves-sels/large containers at dedicated facili-ties  
PROC9 Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Environmental release category[ERC]:

ERC3 Formulation in materials  
+ spERCs defined in the ETRMA documents (ETRMA 2010c, 2010d)

**OPERATIONAL CONDITIONS**

**WORKERS**

**Characteristic of product**

Concentration of substance in product: up to 100% (unless stated differently)  
Physical form of product: Solid, low dustiness

**Frequency and duration of use**

Frequency and duration of use: Covers daily exposures up to 8 hours (unless stated differently)

**Other Operational Conditions of use**

General good hygiene and housekeeping. Personal hygiene.

**RISK MANAGEMENT MEASURES**

Used in contained systems - formulation -Conc. 100%– Gloves (CW29.01), {Captor hood (W17.01)}  
Product sampling (closed systems) -formulation - Conc. 100%- Gloves (CW29.01), {Captor hood (W17.01)}  
Mixing – formulation - Conc. 100% - Captor hood (W17.01), Gloves (CW29.01)  
Storage in closed, dust sealed cargo bins -formulation - Conc. 100%- Captor hood (W17.01), Gloves (CW29.01)



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EXPOSURE SCENARIO NO. 2

GENERAL INFORMATION

Title of exposure scenario: Anti-oxidant use for manufacturing of tyres and retreading

Identified uses according to Use Descriptors

Sector of use [SU]:  
SU3 Industrial uses  
SU11 Manufacture of rubber products

Process category [PROC]:  
PROC5 Mixing or blending in batch processes for formulation of preparations\* and articles (multistage and/or significant contact)  
PROC6 Calendering operations  
PROC8b Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  
PROC9 Transfer of substance or preparation into small containers (dedicated filling line, including weighing)  
PROC10 Roller application or brushing  
PROC14 Production of preparations\* or articles by tableting, compression, extrusion, pelletisation  
PROC21 Low energy manipulation of substances bound in materials and/or articles

Environmental release category[ERC]:  
ERC3 Formulation in materials  
+ spERCs defined in the ETRMA documents (ETRMA 2010c, 2010d)

Additional information: Use of DAPD (an antioxidant) for the manufacturing of tyres - including the retreading of tyres. This use covers the whole process of formulation (e.g. filling and weighing) and processing (e.g. extrusion) that occurs in the manufacture of tyres (and general rubber goods). The specific covered process includes storage, weighing, mixing, cement preparation, shaping, curing and final treatment.

OPERATIONAL CONDITIONS

WORKERS

Characteristic of product

Concentration of substance in product: up to 100% (unless stated differently)  
Physical form of product: Solid, low dustiness

Frequency and duration of use

Frequency and duration of use: Covers daily exposures up to 8 hours (unless stated differently)

Other Operational Conditions of use

General good hygiene and housekeeping. Personal hygiene.

ENVIRONMENT

Amounts used

Amount used EU for tyre manufacturing: 10 000 tone/year  
Small or moderate scale use (< 100t/y) with no pre-treatment  
Frequency and duration of use: 220 dni/year  
Emission fraction to water: 0,0002  
Emission fraction to soil: 0,0001  
Emission fraction to air: 0,0005  
Dilution factor: 10 for fresh water i 100 for marine water  
Small or moderate scale use (< 100t/y) with pre-treatment  
Frequency and duration of use: 220 dni/year  
Emission fraction to water: 0,00008  
Emission fraction to soil: 0,0001  
Emission fraction to air: 0,0005  
Dilution factor: 10 for fresh water i 100 for marine water



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### Large scale use (> 100t/y)

Frequency and duration of use:	300 dni/year
Emission fraction to water:	0,00008
Emission fraction to soil:	0,0001
Emission fraction to air:	0,0005
Dilution factor:	10 for fresh water i 100 for marine water

### **Conditions and measures related to municipal sewage treatment plant:**

STP (m <sup>3</sup> /day):	2 000 m <sup>3</sup> /day
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### **RISK MANAGEMENT MEASURES**

PROC 9 - Transferring substances into small containers Solids (typically indoors) – Conc. 100% - Avoid carrying out operation for more than 1 hour [OC11]Gloves (CW29.01), {Dilution ventilation (W20.01)},

PROC 9 – Storage in closed, dust sealed cargo bins Big bag (typically indoors) – Storage- Conc. 100% - Avoid carrying out operation for more than 1 hour [OC11]Gloves (CW29.01), {Dilution ventilation (W20.01)},

PROC 9 – Weighting substances by hand or automatically in a dose bin. Example: small container at balance containing plastic bags filling/weighting - Conc. 100% - Captor hood (W17.01), Gloves (CW29.01),

PROC 9 - Manual metering, weighting possible, mainly synthetic rubbers and mixtures- Mixing - Conc. 100% - Captor hood (W17.01), Gloves (CW29.01)

PROC 8b – Automatic substance metering ,feeding into mixing unit Solids Ex. CB, Si- Mixing- Conc. 100%- Captor hood (W17.01), Gloves (CW29.01), {Closed system (W8.01)}, {Avoid carrying out operation for more than 1 hour OC11}}.

PROC 5 – Mixing in closed mixing unit (i.e. Banbury mixer)- Mixing - Conc.2.5%- Limit the substance in product to 2,50%, Captor hood (W17.01), Gloves (CW29.01)

PROC 5 - Open mill mixing (typical for laboratory scale)- Mixing-Conc.2.5%- Limit the substance in product to 2,50%, Captor hood (W17.01), Gloves (CW29.01),

PROC 9 - treatment of the rubber sheet using antitack bath (water-based) and drying with cooling fans – Mixing- Conc. 2.5% - Limit the substance in product to 2,50%, Gloves (CW29.01),

PROC 9 – Intermediate compound storage-Mixing Conc. 2.5%- Limit the substance in product to 2,50%, Gloves (CW29.01),

PROC 9 – compound transfer into a vessel, mixing and transferring cement into portable drums cement preparation - Conc. 2.5% - Limit the substance in product to 2,50%, {Captor hood (W17.01)}, {Avoid carrying out operation for more than 4 hours [OC12]},{Gloves (CW29.01)},

PROC 9 – Transferring cement into portable drums cement preparation- Conc. 0.25% - Limit the substance in product to 0,25% , {Captor hood (W17.01)}, {Avoid carrying out operation for more than 4 hours [OC12]},{Gloves (CW29.01)}

PROC 10 – Cement and paint application Extrusion - Conc. 0.25%- Limit the substance in product to 0,25% , {Dilution ventilation (W20.01)},

PROC 14 – Compound processing; Cooling extruded compound Extrusion - Conc.2.5% - Limit the substance in product to 2,50%, {Control of physical form (CW2.01)}, {Dilution ventilation (W20.01)}, {Dilution by user (CW1.06)},

PROC 14 – Feeding from stock, milling, and feeding the calendar Milling - Conc. 2.5% - Limit the substance in product to 2,50%, {Control of physical form (CW2.01)}, {Dilution by user (CW1.06)}, {Dilution ventilation (W20.01)},

PROC 6 – Feeding from stock, milling, and feeding the calendar (typically at high temperatures – Milling - Conc. 2.5% - Limit the substance in product to 2,50%, Captor hood (W17.01), or: Gloves (CW29.01), {Control of physical form (CW2.01)}, {Dilution by user (CW1.06)}, {Dilution ventilation (W20.01)},

PROC 10 – Cement application - building and pre-curing preparations - Conc.0.25%- Limit the substance in product to 0,25% , {Dilution ventilation (W20.01)},

PROC 21 - Compound assembling from stocks - building and pre-curing preparations - Conc. 2.5% - Limit the substance in product to 2,50%, {Control of physical form (CW2.01)}, {Dilution by user (CW1.06)}, {Dilution ventilation (W20.01)},

PROC 14 – Vulcanization, evacuation of cured article and fumes, cooling (for continuous processes) - Curing - Conc. 2.5%- Limit the substance in product to 2,50%, {Control of physical form (CW2.01)}, {Dilution by user (CW1.06)}, {Dilution ventilation (W20.01)}, {Receptor hood (W18.01)},

PROC10 – Cement application - final treatment - Conc.0.25% - Limit the substance in product to 0,25% , {Dilution ventilation (W20.01)},

PROC 21 - Balance grinding and trimming - final treatment - Conc. 2.5% - Limit the substance in product to 2,50%, {Dilution ventilation (W20.01)},



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PROC 21 - Part of rubber and rusted cords are removed from casing. Casing cleaning.- retreading, buffing and grinding- Conc. 2.5% - Limit the substance in product to 2,50%, {Dilution ventilation (W20.01)}, {Gloves (CW29.01)},

PROC14 – Skived cavities are filled with extruded rubber – retreading, filling - Conc. 2.5% - Limit the substance in product to 2,50%, {Control of physical form (CW2.01)}, {Dilution ventilation (W20.01)}, {Dilution by user (CW1.06)}, {Gloves (CW29.01)},

PROC21 – Manual application of precured tread retreading - building- cold process - Conc. 2.5% - Limit the substance in product to 2,50%, {Dilution ventilation (W20.01)}, {Gloves (CW29.01)},

PROC14 – Direct extrusion on the prepared casings of cushion gum layer - retreading, building- hot process - Conc.2.5% - Limit the substance in product to 2,50%, {Control of physical form (CW2.01)}, {Dilution ventilation (W20.01)}, {Gloves (CW29.01)},

PROC14 – Vulcanisation of green cushion layer or green tyre and evacuation of cured article and fumes – retreading, curing - Conc. 2.5%- Limit the substance in product to 2,50%, {Control of physical form (CW2.01)}, {Dilution by user

(CW1.06)}, {Receptor hood (W18.01)}, {Push Pull Systems (W19.01)}, {Dilution ventilation (W20.01)}, {Gloves (CW29.01)},

PROC10 – Painting, cement application and tyre treatment with lubricants – retreading treatment (precured tread production & retreading) - Conc. 0.25%- Limit the substance in product to 0,25% , {Dilution ventilation (W20.01)}, {Gloves (CW29.01)}

PROC21 – Cutting, trimming, regrooving, abrading – retreading, treatment (precured tread production & retreading) - Conc. 2.5% - Limit the substance in product to 2,50%, {Control of physical form (CW2.01)}, {Dilution by user (CW1.06)}, {Dilution ventilation (W20.01)}, {Gloves (CW29.01)}



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EXPOSURE SCENARIO NO 3

GENERAL INFORMATION

Title of exposure scenario: Anti-oxidant use during end of life tyre and GRG waste processing.

Identified uses according to Use Descriptors

Sector of use [SU]:  
SU3 Industrial uses  
SU11 Manufacture of rubber products

Process category [PROC]:  
PROC5 Mixing or blending in batch processes for formulation of preparations\* and ar-ticles (multistage and/or significant con-tact)  
PROC6 Calendering operations  
PROC8b Transfer of substance or preparation (charging/discharging) from/to ves-sels/large containers at dedicated facili-ties  
PROC9 Transfer of substance or preparation into small containers (dedicated filling line, including weighing)  
PROC10 Roller application or brushing  
PROC13 Treatment of articles by dipping andpouring  
PROC14 Production of preparations\* or articles by tableting, compression, extrusion, pelletisation  
PROC21 Low energy manipulation of substances bound in materials and/or articles

Environmental release category[ERC]:  
ERC3 Formulation in materials  
+ spERCs defined in the ETRMA documents (ETRMA 2010c, 2010d)

Additional information: Use of DAPD (an antioxidant) for the manufacturing of GRG. This use covers the whole process of formulation (e.g. filling and weighing) and processing (e.g. extrusion) that occurs in the manufacture of tyres (and general rubber goods). The specific covered process includes storage, weighing, mixing, cement preparation, shaping, curing and final treatment.

OPERATIONAL CONDITIONS

WORKERS

Characteristic of product

Concentration of substance in product: up to 100% (unless stated differently)  
Physical form of product: Solid, low dustiness

Frequency and duration of use

Frequency and duration of use: Covers daily exposures up to 8 hours (unless stated differently)

Other Operational Conditions of use

General good hygiene and housekeeping. Personal hygiene.

ENVIRONMENT

Amounts used

Amount used EU for general rubber goods manufacturing: 720 tone/year

Small or moderate scale use (< 100t/y) with no pre-treatment

Frequency and duration of use: 220 dni/year  
Emission fraction to water: 0,0002  
Emission fraction to soil: 0,0001  
Emission fraction to air: 0,0005  
Dilution factor: 10 for fresh water i 100 for marine water

Small or moderate scale use (< 100t/y) with pre-treatment

Frequency and duration of use: 220 dni/year  
Emission fraction to water: 0,00008  
Emission fraction to soil: 0,0001  
Emission fraction to air: 0,0005  
Dilution factor: 10 for fresh water i 100 for marine water



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### Large scale use (> 100t/y)

Frequency and duration of use:	300 dni/year
Emission fraction to water:	0,00008
Emission fraction to soil:	0,0001
Emission fraction to air:	0,0005
Dilution factor:	10 for fresh water i 100 for marine water

### **Conditions and measures related to municipal sewage treatment plant:**

STP (m <sup>3</sup> /day):	2 000 m <sup>3</sup> /day
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### **RISK MANAGEMENT MEASURES**

PROC 9 - Transferring substances into small containers Solids (typically indoors) – Conc. 100% - Avoid carrying out operation for more than 1 hour [OC11]Gloves (CW29.01), {Dilution ventilation (W20.01)},  
PROC 9 – Storage in closed, dust sealed cargo bins Big bag (typically indoors) – Storage- Conc. 100% - Avoid carrying out operation for more than 1 hour [OC11]Gloves (CW29.01), {Dilution ventilation (W20.01)},  
PROC 9 – Weighting substances by hand or automatically in a dose bin. Example: small container at balance containing plastic bags filling/weighting - Conc. 100% - Captor hood (W17.01), Gloves (CW29.01),  
PROC 5 - Grinding in jars or other grinding machines. Ingredients added manually or automatically. Dispersion poured into  
containers. – mixing, latex ingredient preparation - Conc. 100%- Captor hood (W17.01), Avoid carrying out operation for more than 4 hours [OC12]Gloves (CW29.01), {Dilution ventilation (W20.01)},  
PROC 9 - Manual metering, weighting possible, mainly synthetic rubbers and mixtures- Mixing - Conc. 100% - Captor hood (W17.01), Gloves (CW29.01)  
PROC 8b – Automatic substance metering ,feeding into mixing unit Solids Ex. CB, Si- Mixing- Conc. 100%- Captor hood (W17.01), Gloves (CW29.01), {Closed system (W8.01)}, {Avoid carrying out operation for more than 1 hour OC11]}.  
PROC 5 – Mixing in closed mixing unit (i.e. Banbury mixer)- Mixing - Conc.2.5%- Limit the substance in product to 2,50%, Captor hood (W17.01), Gloves (CW29.01)  
PROC 5 - Open mill mixing (typical for laboratory scale)- Mixing-Conc.2.5%- Limit the substance in product to 2,50%, Captor hood (W17.01), Gloves (CW29.01),  
PROC5 - Steering mill dispersing - mixing latex ingredient, mixing in aqueous dispersion - Conc. 2% - Limit the substance in product to 2%, Captor hood (W17.01),  
PROC 9 - Evacuation of the warm compound, treatment of the rubber sheet using antitack bath (water-based) and drying with cooling fans - mixing - Conc. 2% Limit the substance in product to 2%, Gloves (CW29.01),  
PROC 9 – Intermediate compound storage-Mixing Conc. 2.5%- Limit the substance in product to 2,50%, Gloves (CW29.01),  
PROC 9 – compound transfer into a vessel, mixing and transferring cement into portable drums cement preparation - Conc. 2.5% - Limit the substance in product to 2,50%, {Captor hood (W17.01)}, {Avoid carrying out operation for more than 4 hours [OC12]}. {Gloves (CW29.01)},  
PROC 9 – Transferring cement into portable drums cement preparation- Conc. 0.25% - Limit the substance in product to 0,25% , {Captor hood (W17.01)}, {Avoid carrying out operation for more than 4 hours [OC12]}. {Gloves (CW29.01)}  
PROC 10 - Drying and/or solvents evaporation shaping coating GRG - Conc. 1% - Limit the substance in product to 1% ,  
PROC 13- Rubber latex and water dispersed ingredients deposit into a thin layer by coagulation – shaping, dipping latex foods - Conc. 1% - Limit the substance in product to 1% ,  
PROC 10 – Cement and paint application Extrusion - Conc. 0.25%- Limit the substance in product to 0,25% , {Dilution ventilation (W20.01)},  
PROC 14 – Compound processing; Cooling extruded compound Extrusion - Conc.2.5% - Limit the substance in product to 2,50%, {Control of physical form (CW2.01)}, {Dilution ventilation (W20.01)}, {Dilution by user (CW1.06)},  
PROC 14 – Feeding from stock, milling, and feeding the calendar Milling - Conc. 2.5% - Limit the substance in product to 2,50%, {Control of physical form (CW2.01)}, {Dilution by user (CW1.06)}, {Dilution ventilation (W20.01)},  
PROC 6 – Feeding from stock, milling, and feeding the calendar (typically at high temperatures – Milling - Conc. 2.5% - Limit the substance in product to 2,50%, Captor hood (W17.01), or: Gloves (CW29.01), {Control of physical form (CW2.01)}, {Dilution by user (CW1.06)}, {Dilution ventilation (W20.01)},  
PROC 10 – Cement application - building and pre-curing preparations - Conc.0.25%- Limit the substance in product to 0,25% , {Dilution ventilation (W20.01)},



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PROC 21 - Compound assembling from stocks - building and pre-curing preparations - Conc. 2.5% - Limit the substance in product to 2,50%, {Control of physical form (CW2.01)}, {Dilution by user (CW1.06)}, {Dilution ventilation (W20.01)},

PROC 14 – Vulcanization, evacuation of cured article and fumes, cooling (for continuous processes) - Curing - Conc. 2.5%- Limit the substance in product to 2,50%, {Control of physical form (CW2.01)}, {Dilution by user (CW1.06)}, {Dilution ventilation (W20.01)}, {Receptor hood (W18.01)},

PROC10 – Cement application - final treatment - Conc.0.25% - Limit the substance in product to 0,25% , {Dilution ventilation (W20.01)},





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EXPOSURE SCENARIO NO 4 and 6

**GENERAL INFORMATION**

**Title of exposure scenario: Anti-oxidant use during the service life of tyres -mounting and dismounting tyres**

**Identified uses according to Use Descriptors**

Sektor zastosowania [SU]:  
SU22 Professional uses

Chemical Product Category [PC]:  
PC32 Polymer preparations and compounds

Process category [PROC]:  
PROC21 Low energy manipulation of substances bound in materials and/or articles

**OPERATIONAL CONDITIONS**

**WORKERS**

**Characteristic of product**

Physical form of product: Solid, low dustiness, substance in matrix

**Frequency and duration of use**

Frequency and duration of use: Covers daily exposures up to 8 hours (unless stated differently)

**Other Operational Conditions of use**

General good hygiene and housekeeping. Personal hygiene.

**CONSUMENTS**

Concentration of substance in product: max. 0,5%  
Physical form of product: Solid, substance in matrix

**Frequency and duration of use/exposure from service life**

Duration of inhalation exposure: not relevant  
Duration of dermal exposure: Occasional to exceptional exposure  
Potentially exposed body parts: If exposure takes place, the hands are the most likely contact surface  
Potentially exposed population: adults

**Conditions and measures at level of article production process to prevent release during service life**

Substance is incorporated in a rubber matrix.

**ENVIRONMENT**

**Characteristic of product**

Concentration of substance in product: max. 0,5%  
Fraction of material loss: 11,5%  
Duration of service life: Not relevant since the fraction of material loss is calculated over the complete service life period of the article  
Transformation factor: 75%

**Amounts used**

Tonnage of DAPD put on the EU market by the 3 major DAPD manufacturers/importers: 5 000 ton/year  
Tonnage of DAPD taken into account in exposure assessment: 10 000 ton/year  
EU tonnage of DAPD potentially released: 862,5 ton/year

**Frequency and duration of use**

Frequency of use: Daily; 365 days/year  
Duration of use: Continuously





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### Environmental factors not influenced by risk management

Flow rate of the receiving surface water: 18 000 m<sup>3</sup>/d

### Other Operational Conditions of use affecting environmental exposure

Indoor/outdoor use of the substance: Primarily outdoor use

Emission Factor Water: 0,67

Emission Factor Soil: 0,33

Emission Factor Air: 0

### Conditions and measures related to municipal sewage treatment plant:

STP (m<sup>3</sup>/day): 2 000 m<sup>3</sup>/day

### RISK MANAGEMENT MEASURES

Tyres are mounted on the wheel by specialists in the course of their professional activities – Limit the substance in product to 0,5%

Tyres are separated from the wheel and sent to either retreading route or scrapped as waste - - Limit the substance in product to 0,5%



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EXPOSURE SCENARIO NO. 5 i 7

### GENERAL INFORMATION

**Title of exposure scenario: Anti-oxidant use during the service life of GRG**

#### Identified uses according to Use Descriptors

Sector of use [SU]:

SU22 Professional uses:

Chemical Product Category [PC]:

PC32 Polymer preparations and compounds

Process category [PROC]:

PROC21 Low energy manipulation of substances bound in materials and/or articles

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#### WORKERS

##### Characteristic of product

Physical form of product: Solid, low dustiness, substance in matrix

##### Frequency and duration of use

Frequency and duration of use: Covers daily exposures up to 8 hours (unless stated differently)

##### Other Operational Conditions of use

General good hygiene and housekeeping. Personal hygiene.

#### CONSUMENTS

Concentration of substance in product: max. 0,5%

Physical form of product: Solid, substance in matrix

##### Frequency and duration of use/exposure from service life

Duration of inhalation exposure: not relevant

Duration of dermal exposure: Occasional to exceptional exposure

Potentially exposed body parts: If exposure takes place, the hands are the most likely contact surface

Potentially exposed population: adults

##### Conditions and measures at level of article production process to prevent release during service life

Substance is incorporated in a rubber matrix.

#### ENVIRONMENT

##### Characteristic of product

Concentration of substance in product: max. 0,5%

Duration of service life: 5 years

Transformation factor: 75%

##### Amounts used

EU tonnage of DAPD used in articles (general rubber goods): 720 ton/year

EU tonnage of DAPD available for exposure: 540 ton/year

##### Frequency and duration of use

Frequency of use: Daily; 365 days/year

Duration of use: Continuously

##### Other Operational Conditions of use affecting environmental exposure

Indoor/outdoor use of the substance: Use can be both indoor and outdoor

Emission Factor Water: 0,8

Emission Factor Soil: 0,8

Emission Factor Air: 0,05



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<b>Conditions and measures related to municipal sewage treatment plant:</b>
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STP (m <sup>3</sup> /day):	2 000 m <sup>3</sup> /day
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<b>RISK MANAGEMENT MEASURES</b>
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PROC 21- Maintenance and manipulation of different types of materials such as conveyor belts- Limit the substance in product to 1% , {Dilution ventilation (W20.01)},
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