



SAFETY DATA SHEET

In accordance with the Global Harmonized System requirements

ZHT-4V

Aluminium-Magnesium-Zinc- Carbonate-Hydroxide-(Hydrate)

1. IDENTIFICATION OF THE MIXTURE AND OF THE COMPANY

1.1 Product identifier

Trade name: ZHT-4V
Chemical name of the main active ingredient: Aluminium-Magnesium-Zinc- Carbonate-Hydroxide-(Hydrate)
INDEX number of the main active ingredient as listed in annex VI of EU-CLP: 030-012-00-1
EC number of the main ingredient: 423-570-6
CAS number of the main active ingredient: 169314-88-9
EU-REACH/CLP reference number of the main/active ingredient: 01-0000017006-79-0001

1.2 Relevant identified uses of the mixture and uses advised against

Uses: Stabilizer in the polymer industry
Uses advised against: None identified

1.3 Details of the supplier of the safety data sheet

Manufacturer/supplier: -
Kisuma Chemicals B.V.
P.O. Box 400
9640 AK Veendam
The Netherlands
Tel no: +31(0)598 666766
e-mail: REACH@kisuma.com
Contact: reach@kisuma.com

1.4 Emergency telephone number

Kisuma Chemicals BV:
Tel: +31(0)598 666766 (09:00 – 17:00, C.E.T)
National Poisons Information Center, The Netherlands:
Tel: +31 (0)30 2748888 (24h)

2. HAZARD IDENTIFICATION

2.1 Classification of the mixture

According to the ECHA/RAC, the main active ingredient (EC 423-570-6) is classified in accordance with GHS/Regulation (EC) No 1272/2008 5th ATP on classification, labelling and packaging (CLP) of substances and mixtures amending and repealing Directives 67/548/ECC and 1999/45/EC. The mixture should have the classification Aquatic Chronic 4 (H413).

Hazard statements: H413 May cause long lasting harmful effects to aquatic life

2.2 Label elements

The mixture has classification/labeling requirements according to criteria GHS/ Regulation (EC) No 1272/2008 (CLP).

Hazard pictogram:

Signal word:

-

Hazard statements: H413 May cause long lasting harmful effects to aquatic life

Precautionary statements: P273 Avoid release to the environment.
P501 Dispose of contents/container to authorized waste handling in accordance to national regulations.

2.3 Other hazards

PBT/PvB criteria Not applicable since the main active ingredient is inorganic



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3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance/mixture:	According to the REACH Regulation the product is a mixture			
Information about components:	According to the ECHA/RAC, the main active ingredient (EC 423-570-6) should in accordance with GHS/Regulation (EC) No 1272/2008 (CLP) and have a classification.			
Chemical name:	EC No. Cas No.	GHS/CLP: Pictogram	GHS/CLP: Hazard statements	Concentration
Aluminium- Magnesium-Zinc- Carbonate-Hydroxide- hydrate	423-570-6 169314-88-9	-	H413	> 97%
Coating layer based on salts of saturated fatty acids	-	-	-	< 3%

4. FIRST-AID MEASURES

4.1 Description of first aid measures

Eye contact:	Immediately wash eyes with plenty of running water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Seek medical advice if irritation develops and persists.
Skin contact:	Wash affected skin area with plenty of water and soap thoroughly while removing contaminated clothing and shoes. Seek medical advice if irritation develops and persists.
Ingestion:	Seek medical advice if the victim feels unwell. Wash out mouth with plenty of water and give 2-4 cupfuls of water or milk to drink. Never give anything by mouth to an unconscious person. Induce vomiting.
Inhalation:	Remove the victim from exposure into fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical advice if cough or other symptoms appear.

4.2 Most important symptoms and effect

Acute effects	None identified
Delayed effects	None identified

4.3 Indication of any immediate medical attention and special treatment needed

None identified

5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media

Suitable:	Foam, dry powder, carbon dioxide, water mist.
Not suitable:	Not known

5.2 Special hazards arising from the mixture

Under fire situation, this material may generate COx

5.3 Advice for firefighter

In the event of fire, wear a self-contained breathing apparatus and a chemical protective suit.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel
Wear appropriate personal protective equipment (see section 8) during cleaning. Avoid contact with eyes and skin. Avoid inhalation.
Avoid dust formation.

6.2 Environmental precautions

Prevent the material from entering surface water or sanitary sewer system. Do not discharge directly to a water source. If accidental spillage or washings enter drains or watercourses contact local Environment Agency.

6.3 Methods and material for containment and cleaning up

Sweep up into suitable containers for recovery or disposal.

7. HANDLING AND STORAGE



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7.1 Precautions for safe handling

Technical measures/ Precautions: Good ventilation (local exhaust) of the working area, safety showers and eye wash station near the workplace. Wear personal protective equipment (see section 8).

General occupation hygiene: Do not eat, drink and smoke in work areas. Wash hands after use and remove contaminated clothing and protective equipment before entering eating areas.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures / storage conditions: Store under dry conditions.

Incompatible products: None known

Packaging material: Store the product in bags, car silos, container,.

7.3 Specific end use(s)

None known

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Exposure limit values: No Substance specific (inter)national regulations/recommendations
Japan.
Recommendation of Occupational Exposure Limits (OELs)(2007):
Respirable dust - 2mg/m3, Total - 8mg/m3 (JSOH)
USA
Particulates Not Otherwise Regulated (PNOR): 5 mg/m3 Respirable Dust Level (OSHA)
Particulates Not Otherwise Specified (PNOS): 3 mg/m3 Respirable Dust Level (ACGIH)
Germany
General Dust Limit (ASG)
Respirable fraction (A-dust): 3 mg/m3 (8 hr average)
Inhalable fraction (E-dust) : 4 mg/m3 (Yearly average)
Netherlands
Indicative values for non-specific dust:
T_{gg} (8h)= 5 mg/m3 (respirable fraction)
T_{gg} (8h)= 10 mg/m3 (inhalable fraction)
Consult your local authorities for general valid (non substance specific) acceptable exposure recommendations/limits.

Recommended occupational and consumer exposure limit values:

DNEL	Exposure pattern	Derived No Effect Level (DNEL)	
		Workers	General population
	<i>Long-term – dermal, systemic effects</i>	139 mg/kg bw/day	83 mg/kg bw/day
	<i>Long-term – inhalation, systemic effects</i>	245 mg/m3	72 mg/m3
	<i>Long-term – oral, systemic effects</i>	Not relevant	8.3 mg/kg bw/day
PNEC			

8.2 Exposure controls:

Appropriate engineering controls: Keep exposure to a minimum

Environmental exposure controls: Wear appropriate personal protective equipment. Avoid contact with eyes and skin. Avoid inhalation. Local exhaust ventilation of the working area.

Individual protection measures, such as personal protective equipment:

Respiratory protection: NIOSH approved.

Hand protection: Chemical-resistant gloves.
Suitable material: Neoprene/nitrile rubber/ rubber
Breakthrough time: not determined.

Eye protection: Safety goggles where splashing is possible.

Skin and body protection: Normal overall

Hygiene measures: Wash hands and face before breaks and immediately after handling the product. When using do not eat, drink, or smoke.

9. PHYSICAL AND CHEMICAL PROPERTIES



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9.1 Information on basic physical and chemical properties for the active ingredient in the mixture

*Information on basic physical and chemical properties from the read-across substance Aluminium-Magnesium-Carbonate-Hydroxide-Perchlorate (hydrate) (EC 422-150-1)

Appearance:	White Powder
Odour:	Not determined.
pH:	~ 8 (saturation concentration in water)
Melting/Boiling temperature:	Decomposition > 150°C (EC A.1) *(Read-Across)
Evaporation rate:	Not determined.
Flammability:	Not flammable (EC A.10) *(Read-Across)
Explosive properties:	Not explosive (EC A.14, based on structure).
Oxidizing properties:	Not oxidizing (EC A.17, based on structure)
Vapour pressure:	0.7 Pa at 20°C (EC A.4, static technique). *(Read-Across)
Relative Density (D4(20)):	2.42 (OECD 109, EC A.3; gas comparison pycnometer).
Water solubility:	<2.8 mg/l at 20°C (EC A.6). The water solubility based on Al, Mg and Zn separately was 0.13, 2.80 and <0.08 mg/l, respectively.
Particle size distribution:	
Partition coefficient n-octanol/water:	n-octanol solubility: < 0.47 mg/l. The n-octanol solubility based on Al, Mg and Zn separately was <0.47, < 0.11 and < 0.08 mg/l, resp. The log Kow could not be determined by test or calculated from the solubility's.
Decomposition temperature	Decomposition >150°C (EC A.1) *(Read-Across)
Self heating:	
Auto ignition temperature:	No self-ignition is expected up to 400°C (EC A.16). *(Read-Across)
Surface tension:	74.4 mN/m at 20.0°C (90% saturation concentration in water) (EC A.5: ring method). *(Read-Across)

9.2 Other information None known

10. STABILITY AND REACTIVITY

10.1 Reactivity:	Reactive with acids.
10.2 Chemical stability:	Stable under normal conditions.
10.3 Possibility of hazardous reaction:	None known
10.4 Conditions to avoid:	Temperatures > 300 °C.
10.5 Incompatible materials	Acids; pH < 1.
10.6 Hazardous decomposition products	Hazardous decomposition will not occur.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effect for the main, active ingredient in the mixture

ACUTE TOXICITY

Acute oral toxicity:	LD50 (rat): > 2000 mg/kg (EC B.1 tris)
Acute dermal toxicity:	Not available
Acute inhalation toxicity:	LC50 (rat): >5.17 mg/l (EC B.2)

LOCAL

Skin corrosion / Irritation	Not corrosive, not irritating (rabbit) (EC B.4).
Serious eye damage / eye irritation	Not irritating to the eyes (rabbit) (EC B.5).
Skin sensitization:	No sensitization by skin contact (guinea pig)(EC B.6).



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OTHER

Sub-acute toxicity:	28-day oral gavage (rat): NOAEL: 1000 mg/kg bw/day (effects on kidneys and overt toxicity) (EC B.7).
Germ cell mutagenicity:	Bacterial reverse mutation test (S. typhimurium): not mutagenic (EC B.13/14; Ames test). In vitro Mammalian Chromosome aberration (human lymphocytes): not clastogenic (EC B.10) In vitro Gene mutation (L5178Y/TK+ mouse lymphoma cells) not mutagenic (EC B.17).
Reproductive toxicity:	Fertility: NOAEL = 468.75 mg/kg bw/day (proposed NOAEL calculated from a NOAEL for Zn). Developmental toxicity: NOAEL = 122.64 mg/kg bw/day (proposed NOAEL calculated from a NOAEL for Al). Teratogenicity: NOAEL = 122.64 mg/kg bw/day (proposed NOAEL calculated from a NOAEL for Al).
Carcinogenicity:	Negative (based on Zn and Al).
STOT-single exposure:	None known
STOT-repeated exposure:	None known
OTHER INFORMATION	
Immunology:	Negative (based on Al and Mg).
Neurotoxicity:	NOAEL = 200 mg/kg bw/day (proposed NOAEL calculated from a NOAEL for Al).
Lung absorption:	Possible absorption in the lungs, however no adverse effects on lung capacity in workers have been observed.
Chronic toxicity:	NOAEL = 6.48 mg/kg bw/day (proposed NOAEL calculated from a NOAEL for Zn).

12. ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION GIVEN IS FOR THE MAIN, ACTIVE INGREDIENT IN THE MIXTURE

12.1 Toxicity

Fish:	LC50 fresh water (96h): ≥ 100 mg/l (EC C.1) LC50 marine water (96h): ≥ 100 mg/l (OECD 203)
Daphnia magna:	EC50 (48h): ≥ 100 mg/l (EC C.2).
Algae:	EC50 freshwater (72h): ≥ 100 mg/l (EC C.3) EC50 marine water (48h): ≥ 180 mg/l (ISO DP 10253)
Inhibition of microbial activity:	Not toxic to waste water (activated sludge) bacteria at a concentration of 100 mg/l (nominal). 3h-IC50 > 100 mg/l Not toxic to waste water (activated sludge) bacteria at a concentration of 100 mg/l (nominal). 3h-IC50 > 100 mg/l
Marine copepods:	EC50 (48h): ≥ 100 mg/l (ISO/DIS 14669)

12.2 Persistence and degradability

Biodegradation:	Considered not biodegradable, inorganic substance.
Hydrolysis:	Test is not performed due to the low water solubility.

12.3 Bioaccumulative potential

Octanol-water partition coefficient (Kow):	The partition coefficient can not be calculated.
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12.4 Mobility in soil

Adsorption coefficient	Not performed, inorganic substance.
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12.5 Results of PBT and vPvB assessment

No PBT and vPvB assessment was conducted since the active ingredient in the mixture is inorganic.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste from residues:	Disposal in accordance with local and national regulations. Do not allow material to contaminate ground water system. Do not contaminate surface water.
Container:	Containers should be cleaned by appropriate method and then re-used or disposed by



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landfill or incineration as appropriate, in accordance with local and national regulations. Do not remove label until container is thoroughly cleaned.

14. TRANSPORT INFORMATION

14.1 UN Number:	Not regulated for transport acc. ADR/DOT/IATA/IMDG
14.2 UN Proper shipping name:	Not regulated for transport acc. ADR/DOT/IATA/IMDG
14.3 Transport hazard classes:	Not regulated for transport acc. ADR/DOT/IATA/IMDG
14.4 Packing group:	Not regulated for transport acc. ADR/DOT/IATA/IMDG
14.5 Environmental hazards:	Not regulated for transport acc. ADR/DOT/IATA/IMDG
14.6 Special precautions for user:	Not regulated for transport acc. ADR/DOT/IATA/IMDG
14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC code:	Not regulated for transport acc. ADR/DOT/IATA/IMDG

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulation/legislation specific for the substance or mixture:	<p>The main active ingredient of this mixture is listed on: TSCA, DSL, ECL, AREC, TSCI, NZIoC, IECSC, SWISS and ELINCS/REACH.</p> <p>The coating agent of this mixture is listed on: TSCA, DSL, INSQ, AICS, SWISS, ECL, NZIoC, PICCS, AICS, ENCS, IECSC, TSCI, AREC and EINECS/REACH.</p> <p>EU: The main active ingredient (EC 423-570-6) is classified in accordance with GHS/Regulation (EC) No 1272/2008 5th ATP on classification, labelling and packaging (CLP) of substances and mixtures amending and repealing Directives 67/548/ECC and 1999/45/EC.</p> <p>USA: NO CERCLA/SARA/OSHA substance specific requirements. No California proposition 65 substance specific requirements. No USA state specific requirements for this mixture.</p> <p>EU: The coating agent is exempted from the obligation to register in accordance with Regulation (EC) No 1907/2006, Article 2(7). This mixture does not contain any substances that are under REACH listed as SVHC</p> <p>Germany WHC(WGK) classification: Slightly water polluting substance; WGK 1</p> <p>Germany TRGS 510 classification: storage class 13; Non-combustible solids</p>
15.2 Chemical safety assessment:	A risk assessment has been performed by the RIVM and TNO in The Netherlands.

16. OTHER INFORMATION

The information provided in this safety data sheet is correct to the best of our knowledge, information, and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal, and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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EXPOSURE SCENARIOS FOR COMMUNICATION

Substance Name: aluminium-magnesium-zinc-carbonate-hydroxide

EC Number: 423-570-6

CAS Number: 169314-88-9

Registration Number: 01-0000017006-79-0001

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1. ES 1: Formulation - Formulation into a matrix (including the polymer producer, the compounder and the producer of article)

1.1. Title section

ES name: Formulation into a matrix (including the polymer producer, the compounder and the producer of article)

Environment	
CS 1: Formulation into a matrix	ERC 3
Worker	
CS 2: Formulation (closed continuous process)	PROC 2
CS 3: Formulation (batch process – multistage and/or significant contact possible)	PROC 5
CS 4: Formulation (tableting)	PROC 14
CS 5: Blowing agent in manufacture of foam	PROC 12
CS 6: Treatment of articles by dipping and pouring	PROC 13
CS 7: Uploading	PROC 8b
CS 8: Repacking	PROC 9

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Formulation into a matrix (ERC 3)

Technical conditions and measures at process level (source) to prevent release
Process conditions: The substance is not released to the environment during use. Collect any waste containing the substance and transfer to an offsite waste contractor.
Spillage: Sweep up and re-use any spillage
Conditions and measures related to treatment of waste (including article waste)
Packaging (PE bags): Dispose the used packaging by providing it to a qualified professional waste treatment company.

1.2.2. Control of worker exposure: Formulation (closed continuous process) (PROC 2)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

1.2.3. Control of worker exposure: Formulation (batch process – multistage and/or significant contact possible) (PROC 5)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

1.2.4. Control of worker exposure: Formulation (tableting) (PROC 14)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

1.2.5. Control of worker exposure: Blowing agent in manufacture of foam (PROC 12)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

1.2.6. Control of worker exposure: Treatment of articles by dipping and pouring (PROC 13)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness

Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

1.2.7. Control of worker exposure: Uploading (PROC 8b)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

1.2.8. Control of worker exposure: Repacking (PROC 9)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

1.3. Exposure estimation and reference to its source

1.3.1. Environmental releases and risks: Formulation into a matrix (ERC 3)

Release route	Release rate
Water	0 kg/day
Air	0 kg/day
Soil	0 kg/day

As there is no emission of the substance to the environment, risks for the environment are considered to be negligible.

1.3.2. Worker exposure: Formulation (closed continuous process) (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.01 mg/m ³ (TRA Workers)	4.082E-5
Dermal, systemic, long-term	1.371 mg/kg bw/day (TRA Workers)	0.01
Combined routes, systemic, long-term		0.01

1.3.3. Worker exposure: Formulation (batch process – multistage and/or significant contact possible) (PROC 5)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Workers)	0.002
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Workers)	0.099
Combined routes, systemic, long-term		0.1

1.3.4. Worker exposure: Formulation (tableting) (PROC 14)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.1 mg/m ³ (TRA Workers)	4.082E-4
Dermal, systemic, long-term	3.429 mg/kg bw/day (TRA Workers)	0.025
Combined routes, systemic, long-term		0.025

1.3.5. Worker exposure: Blowing agent in manufacture of foam (PROC 12) and Treatment of articles by dipping and pouring (PROC 13)

As incidental exposure to aerosol as a consequence of blowing of a solid substance should be assessed under PROC 13, the exposure estimates for these 2 contributing scenarios is reported in 1 table (showing the worst-case estimates related to PROC 13).

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	1 mg/m ³ (TRA Workers)	0.004
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Workers)	0.099
Combined routes, systemic, long-term		0.1

1.3.6. Worker exposure: Uploading (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.1 mg/m ³ (TRA Workers)	4.082E-4
Dermal, systemic, long-term	6.857 mg/kg bw/day (TRA Workers)	0.049
Combined routes, systemic, long-term		0.05

1.3.7. Worker exposure: Repacking (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.1 mg/m ³ (TRA Workers)	4.082E-4
Dermal, systemic, long-term	6.857 mg/kg bw/day (TRA Workers)	0.049
Combined routes, systemic, long-term		0.05

1.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

For calculating worker exposure estimates, the tool ECETOC TRA was used. Some input parameters are scalable, like exposure duration and the concentration of the substance.

2. ES 2: Use at industrial site - Industrial uses of the substance

2.1. Title section

ES name: Industrial uses of the substance

Environment	
CS 1: Industrial uses of the substance	ERC 4; ERC 5
Worker	
CS 2: Formulation (closed continuous process)	PROC 2
CS 3: Formulation (batch process – multistage and/or significant contact possible)	PROC 5
CS 4: Calendering operations	PROC 6
CS 5: Formulation (tableting)	PROC 14
CS 6: Blowing agent in manufacture of foam	PROC 12
CS 7: Treatment of articles by dipping and pouring	PROC 13
CS 8: Roller application of brushing	PROC 10
CS 9: Uploading	PROC 8b
CS 10: Repacking	PROC 9

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Industrial uses of the substance (ERC 4; ERC 5)

Technical conditions and measures at process level (source) to prevent release
Process conditions: The substance is not released to the environment during use. Collect any waste containing the substance and transfer to an offsite waste contractor.
Spillage: Sweep up and re-use any spillage
Conditions and measures related to treatment of waste (including article waste)
Packaging (PE bags): Dispose the used packaging by providing it to a qualified professional waste treatment company.

2.2.2. Control of worker exposure: Formulation (closed continuous process) (PROC 2)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

2.2.3. Control of worker exposure: Formulation (batch process – multistage and/or significant contact possible) (PROC 5)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

2.2.4. Control of worker exposure: Calendering operations (PROC 6)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

2.2.5. Control of worker exposure: Formulation (tableting) (PROC 14)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

2.2.6. Control of worker exposure: Blowing agent in manufacture of foam (PROC 12)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure

Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

2.2.7. Control of worker exposure: Treatment of articles by dipping and pouring (PROC 13)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

2.2.8. Control of worker exposure: Roller application of brushing (PROC 10)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

2.2.9. Control of worker exposure: Uploading (PROC 8b)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.

Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

2.2.10. Control of worker exposure: Repacking (PROC 9)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

2.3. Exposure estimation and reference to its source

2.3.1. Environmental releases and risks: Industrial uses of the substance (ERC 4; ERC 5)

Release route	Release rate
Water	0 kg/day
Air	0 kg/day
Soil	0 kg/day

As there is no emission of the substance to the environment, risks for the environment are considered to be negligible.

2.3.2. Worker exposure: Formulation (closed continuous process) (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.01 mg/m ³ (TRA Workers)	4.082E-5
Dermal, systemic, long-term	1.371 mg/kg bw/day (TRA Workers)	0.01
Combined routes, systemic, long-term		0.01

2.3.3. Worker exposure: Formulation (batch process – multistage and/or significant contact possible) (PROC 5)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Workers)	0.002
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Workers)	0.099
Combined routes, systemic, long-term		0.1

2.3.4. Worker exposure: Calendering operations (PROC 6)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.1 mg/m ³ (TRA Workers)	0.0004
Dermal, systemic, long-term	27.43 mg/kg bw/day (TRA Workers)	0.197

Combined routes, systemic, long-term		0.197
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2.3.5. Worker exposure: Formulation (tableting) (PROC 14)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.1 mg/m ³ (TRA Workers)	4.082E-4
Dermal, systemic, long-term	3.429 mg/kg bw/day (TRA Workers)	0.025
Combined routes, systemic, long-term		0.025

2.3.6. Worker exposure: Blowing agent in manufacture of foam (PROC 12) and Treatment of articles by dipping and pouring (PROC 13)

As incidental exposure to aerosol as a consequence of blowing of a solid substance should be assessed under PROC 13, the exposure estimates for these 2 contributing scenarios is reported in 1 table (showing the worst-case estimates related to PROC 13).

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	1 mg/m ³ (TRA Workers)	0.004
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Workers)	0.099
Combined routes, systemic, long-term		0.1

2.3.7. Worker exposure: Roller application of brushing (PROC 10)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	5 mg/m ³ (TRA Workers)	0.02
Dermal, systemic, long-term	27.43 mg/kg bw/day (TRA Workers)	0.197
Combined routes, systemic, long-term		0.2

2.3.8. Worker exposure: Uploading (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.1 mg/m ³ (TRA Workers)	4.082E-4
Dermal, systemic, long-term	6.857 mg/kg bw/day (TRA Workers)	0.049
Combined routes, systemic, long-term		0.049

2.3.9. Worker exposure: Repacking (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.1 mg/m ³ (TRA Workers)	4.082E-4
Dermal, systemic, long-term	6.857 mg/kg bw/day (TRA Workers)	0.049
Combined routes, systemic, long-term		0.049

2.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

For calculating worker exposure estimates, the tool ECETOC TRA was used. Some input parameters are scalable, like exposure duration and the concentration of the substance.

3. ES 3: Service life - Service life of articles containing the substance

3.1. Title section

ES name: Service life of articles containing the substance

Environment	
CS 1: Service life of articles containing the substance	ERC 10a; ERC 11a
Worker	
CS 2: Calendering operations	PROC 6
CS 3: Roller application or brushing	PROC 10
CS 4: Use of blowing agents in manufacture of foam	PROC 12
CS 5: Treatment of articles by dipping and pouring	PROC 13
CS 6: Industrial use (cables in automotive industry – recycling step)	PROC 21
CS 7: Industrial use (cables in automotive industry – recycling step)	PROC 24

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: Service life of articles containing the substance (ERC 10a; ERC 11a)

Technical conditions and measures at process level (source) to prevent release
Process conditions: The substance is not released to the environment during use. Collect any waste containing the substance and transfer to an offsite waste contractor.
Spillage: Sweep up and re-use any spillage
Conditions and measures related to treatment of waste (including article waste)
Packaging (PE bags): Dispose the used packaging by providing it to a qualified professional waste treatment company.

3.2.2. Control of worker exposure: Calendering operations (PROC 6)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

3.2.3. Control of worker exposure: Roller application or brushing (PROC 10)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness

Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

3.2.4. Control of worker exposure: Use of blowing agents in manufacture of foam (PROC 12)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

3.2.5. Control of worker exposure: Treatment of articles by dipping and pouring (PROC 13)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

3.2.6. Control of worker exposure: Industrial use (cables in automotive industry – recycling step) (PROC 21)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.

Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

3.2.7. Control of worker exposure: Industrial use (cables in automotive industry – recycling step) (PROC 24)

Product (article) characteristics
Covers concentrations up to 100 %.
Solid, low dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 hours/day.
Technical and organisational conditions and measures
Train employees how to safely work with the substance, incl. how to use the necessary personal protection equipment.
Provide good general ventilation.
Other conditions affecting workers exposure
Covers use at room temperature.
Indoor use.

3.3. Exposure estimation and reference to its source

3.3.1. Environmental releases and risks: Service life of articles containing the substance (ERC 10a; ERC 11a)

Release route	Release rate
Water	0 kg/day
Air	0 kg/day
Soil	0 kg/day

As there is no emission of the substance to the environment, risks for the environment are considered to be negligible.

3.3.2. Worker exposure: Calendering operations (PROC 6)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.1 mg/m ³ (TRA Workers)	0.0004
Dermal, systemic, long-term	27.43 mg/kg bw/day (TRA Workers)	0.197
Combined routes, systemic, long-term		0.2

3.3.3. Worker exposure: Roller application or brushing (PROC 10)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Workers)	0.002
Dermal, systemic, long-term	27.43 mg/kg bw/day (TRA Workers)	0.197
Combined routes, systemic, long-term		0.2

3.3.4. Worker exposure: Use of blowing agents in manufacture of foam (PROC 12) and Treatment of articles by dipping and pouring (PROC 13)

As incidental exposure to aerosol as a consequence of blowing of a solid substance should be assessed under PROC 13, the exposure estimates for these 2 contributing scenarios is reported in 1 table (showing the worst-case estimates related to PROC 13).

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.1 mg/m ³ (TRA Workers)	0.0004
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Workers)	0.099
Combined routes, systemic, long-term		0.1

3.3.5. Worker exposure: Industrial use (cables in automotive industry – recycling step) (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	1 mg/m ³ (TRA Workers)	0.004
Dermal, systemic, long-term	2.829 mg/kg bw/day (TRA Workers)	0.02
Combined routes, systemic, long-term		0.02

3.3.6. Worker exposure: Industrial use (cables in automotive industry – recycling step) (PROC 24)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	1 mg/m ³ (TRA Workers)	0.004
Dermal, systemic, long-term	2.829 mg/kg bw/day (TRA Workers)	0.02
Combined routes, systemic, long-term		0.02

3.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

For calculating worker exposure estimates, the tool ECETOC TRA was used. Some input parameters are scalable, like exposure duration and the concentration of the substance.