



SAFETY DATA SHEET-extended

Prepared in accordance with Annex II of REACH Regulation (EC) 1907/2006, Regulation (EC) 1272/2008 and regulation (EC) 453/2010

n-BUTANOL

Revision: 0 Last up date:

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1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1. Substance Identification

Trade name	n-Butanol
IUPAC name	Butan-1-ol
Synonym	1-Butanol, propyl carbinol
EC#	200-751-6
CAS #	71-36-3
Molecular Formula	C ₄ H ₁₀ O
Molecular weight	74.12
REACH Registration number	01-2119484630-38-0014
Chemical characterization	Organic Mono-constituent substance

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use in industrial settings:

- Manufacture of iso-butanol
- Distribution of substance loading and repacking
- Formulation & (re) packing of substances and mixtures
- Uses in Coatings (paints, ink, toners, adhesives)
- Use in cleaning Agents
- Use in lubricants
- Metal working fluids /rolling oils

Use in professional settings:

- Distribution of substance;
- Uses in Coatings (paints, ink, toners, adhesives)
- Use in cleaning Agents
- Use in lubricants;
- Metal working fluids/rolling oils;
- Use in laboratories

Uses by consumers

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- Use in coatings (paints, inks, toners, adhesive)
- Use in cleaning agents
- Use in lubricants
- Use as consumer care product or disinfectant

Uses advised against: No uses advised against.

1.3. Details of the supplier of the safety data sheet

Name	S.C. OLTCHIM S.A
Address	1 Uzinei Street, 240050 Ramnicu Valcea, Romania
Phone N°	+40 250 701 200
FAX N°	+40 250 735 030
E-mail of competent person responsible for SDS in the MS or in the EU:	tehnich@oltchim.ro

1.4. Emergency telephone

European Emergency N°:	112
Emergency telephone at the company:	+40/250/738141
Available outside office hours:	24h/day/365days

2. HAZARD IDENTIFICATION

2.1. Classification of the substance

2.1.1. Classification according to Regulation (EC) 1272/2008

Flam. Liquid 3- H226: Flammable liquid and vapour.
Acute Tox. 4- H302: Harmful if swallowed.
Skin Irritation 2 -H315: Causes skin irritation.
Eye Damage 1 - H318: Causes serious eye damage.
STOT Single Exp. 3 - H335: May cause respiratory irritation.
STOT Single Exp. 3 -H336: May cause drowsiness or dizziness.

2.1.2. Classification according to Directive 67/548/EEC

R10 Flammable.
Xn; R22 Harmful;



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R 67 Vapours may cause drowsiness and dizziness.
Xi; R37/38-41

2.2. Label elements

2.2.1. Labeling according to Regulation (EC) 1272/2008

Labelling

Signal word: Danger

Hazard pictogram:

GHS02: flame



GHS05: corrosion



GHS07: exclamation mark



Hazard statements:

H226: Flammable liquid and vapour.
H302: Harmful if swallowed.
H335: May cause respiratory irritation.
H315: Causes skin irritation.
H318: Causes serious eye damage.
H336: May cause drowsiness or dizziness.

Precautionary statements:



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P210: Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233: Keep container tightly closed.
P240: Ground/bond container and receiving equipment.
P241: Use explosion-proof electrical/ventilating/lighting equipment.
P242: Use only non-sparking tools.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P370+P378: In case of fire: Use water spray, alcohol-resistant foam, carbon dioxide for extinction.
P403+P235: Store in a well-ventilated place. Keep cool.
P501: Dispose of absorbed material in accordance with regulations.

2.2.2. Labeling according to Directive 67/548/EEC

Labelling

Indication of danger:



Xn – harmful

R-phrases:

R10 - flammable
R22 - harmful if swallowed
R37/38 - irritating to respiratory system and skin
R41 - risk of serious damage to eyes
R67 - vapours may cause drowsiness and dizziness

S-phrases:

S2 - keep out of the reach of children
S7/9 - keep container tightly closed and in a well-ventilated place
S13 - keep away from food, drink and animal feedingstuffs
S26 - in case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S37/39 - wear suitable gloves and eye/face protection
S46 - if swallowed, seek medical advice immediately and show this container or label



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2.3. Other effects: The substance does not fulfil the PBT criteria (not PBT) and not the vPvB criteria (not vPvBn-Butanol is a combustible and flammable liquid, sensible to static discharges. Both vapours and liquid are flammable.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	PBT/vPvB	CAS no/EC No/REACH No.	Classification according to Reg (EC) No. 1272/2008	Classification according to D 67/548/EC	Concentration (%)
n-Butanol	No/No	71-36-3/200-751-6/01-2119484630-38-0014	Flam.Liquid3 :H226 Acute Tox. 4 : H302 Skin Irritation 2 :H315 Eye Damage 1:H318 STOT Single Exp. 3 : H335 STOT Single Exp. 3 : :H336	R10 Xn; R22 R 67 Xi; R37/38-41	Min.99.5

4. FIRST - AID MEASURES

4.1 Description of first aid measures

General Advice: IF exposed or if you feel unwell: Call a Poison Center or doctor/physician. Show this safety data sheet to the doctor in attendance.

If inhaled: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult give oxygen. Keep person warm and at rest. Call a physician.

In case of skin contact: Wash the contaminated skin with plenty of soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. If irritation persists after washing, get medical attention.

In case of eye contact: Wash the eyes immediately with large amount of water lifting the upper and lower lids, until no evidence of chemical remains at least 15-20 minutes. If irritation persists after washing get medical attention. Contact lenses should not worn with this product.



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In case of ingestion: Remove ingested material by gastric lavage or emesis. Get medical attention. Administration of gastric lavage is permitted by qualified medic personnel. Nothing will be orally administrated to person unconscious or in convulsions.

4.2. Most important symptoms and effects, both acute and delayed

By inhalation: n-Butanol is irritant/narcotic. Inhalation of high concentrations of vapors may cause irritation of the respiratory tract with sore throat, coughing, shortness of breath, headaches, nausea, dizziness, dullness, narcosis. It is absorbed into the sanguine system with symptoms like those of ingestion.

By skin contact: n-Butanol has an irritating and degreasing effect. May cause skin sensitization and allergic reactions.

By eye contact: Vapors are irritating for the eyes, causing tears and aches. Splashing causes eyes inflammation and visual rabblement

By ingestion: May cause abdominal pain, headache, nausea and diarrhoea. Large doses affect liver and kidneys. May have narcotic effect.

Chronic effects: Prolonged inhalation has caused auditory nerve and vestibular injury resulting in severe vertigo and hearing loss in workers exposed to 1-butanol. Repeated or prolonged contact may degrease the skin resulting in drying, cracking and eczematoid dermatitis. Person with pre-existing skin disorders or eye problems or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

4.3 Indication of immediate medical attention and special treatment needed

Keep the victim warmed. Treat symptomatically and supportively. ymptomatic treatment should include, above all, measured of support as correction of hydro electrolytic and metabolic disturbances and respiratory failure.

5. FIRE - FIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media: Large fire: foam.

Small fire: Dry chemical, carbon dioxide, sand, earth

Dry chemical powder extinguishers are recommended particularly when fires involve "live" electrical equipment, because the powder is non-conducting.

For maintaining the tanks cool, use sprayed water.



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Unsuitable extinguishing media: Do not use water streams, since the streams will scatter and spread the fire.

Exposure hazards: n-Butanol is a combustible and flammable liquid, sensible to static discharges. Dangerous fire hazard when exposed to heat and flame. Vapor-air mixtures are explosive above flash point. Vapours may travel considerable far distances.

In the event of a fire, move the containers from fire area, if you can do it without risks. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from the area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to.

Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire.

Hazardous combustion products: Carbon monoxide and carbon dioxide.

5.3 Advice for firefighters

Protection of fire-fighters: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for firefighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

Remarks: FLAMMABLE!! VAPORS CAN CAUSE FLASH FIRE.

Isolate from inorganic acids (hazardous of explosion), heat, sparks, electric equipment & open flame. Closed containers may explode if exposed to extreme heat.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: Keep unnecessary and unprotected personnel away from entering. Avoid contact with skin, eyes, and clothing – wear suitable protective equipment (see section 8). Do not touch or walk through spill material. Shut off all ignition sources.



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For emergency responders: Ventilate area of leak or spill. Persons performing clean-up work should wear adequate personal protective equipment and a self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Remove all sources of ignition.

6.2. Environmental precautions

Environmental precautions: Stop leak and use water spray to reduce vapors. Prevent from contamination the ground and the surface waters by isolating the hazard area. Contain and recover liquid when possible. Keep closed containers and dispose according to all applicable federal, state or local environment regulations

6.3. Methods and materials for containment and cleaning up

Methods of cleaning up: Contain and recover liquid when possible. Use water spray to reduce vapors. For small spills, take up with sand or other absorbent material (e.g. vermiculite, earth) and place in a chemical waste container. For large spills, dike for ahead of spill for later disposal.

Special precautions: Do not use combustible materials, such as saw dust. Do not flush to sewer! Use only non sparking tools and equipment.

6.4 Reference to other sections

Additional advice: Refer to section 8, 13.

7. HANDLING AND STORAGE

7.1. Precautions for safe handling

Protective measures: Protect against physical damage. Sources of ignition such as smoking and open flames are prohibited where n-butanol is used, handled or stored in a manner that could create a potential fire or explosion hazard. Metal containers should be bonded and grounded for transfers to avoid static sparks. When handling this product use non-sparking type tools and equipment, including proof ventilation. Do not use compressed air or oxygen for filling, discharging or handling. The personnel which handling the product must wear protective equipment.

Advice on general occupational hygiene: Avoid inhalation or ingestion and contact with skin and eyes. General occupational hygiene measures are required to ensure safe handling of the substance.



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These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no drinking, eating and smoking at the workplace. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home.

7.2. Conditions for safe storage, including any incompatibilities

Storage: Store in a cool, dry well-ventilated location, away from any area where fire may be acute. Outside or detached storage is preferred. Separate from incompatibles. Storage and use area should be No Smoking areas. Drums must be equipped with self-closing valves, nitrogen blanket. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

Incompatible materials: inorganic acids, oxidizers, easily dehydrate in the presence of catalyzers (aluminium, magnesium chloride).

Incompatible materials for storage: metals are insensible to 1-butanol action.

7.3. Specific end use(s)

Please check the identified uses from Section 1.2.

For more information please see the relevant exposure scenario, available via your supplier/given in the Annex I.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

PNEC aqua (freshwater): 0.082 mg/L

PNEC aqua (marine water): 0.0082 mg/L

PNEC aqua (intermittent releases): 2.25 mg/L

PNEC sediment (freshwater): 0.178 mg/kg sediment dw

PNEC sediment (marine water): 0.0178 mg/kg sediment dw

PNEC STP: 2476 mg/L

PNEC soil: 0.015 mg/kg soil dw

Exposure limit values

STEL: 150 ppm (450 mg/m³)

OEL AUSTRIA: TWA 100 ppm (300 mg/m³)

OEL BELGIUM: TWA 50ppm (150 mg/ m³)

OEL DENMARK: TWA 50 ppm (150 mg/m³)

SKIN OEL FRANCE: TWA 100 ppm (300mg/ m³)

OEL GERMANY: TWA 100 ppm (300mg/ m³)

OEL THE NETHERLANDS: TWA 100 ppm (300mg/ m³)



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8.2 Exposure controls

Appropriate engineering controls: A system of local and/or general exhaust is recommended to keep employee exposure as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its sources, preventing dispersions of it into the general work area. Ventilation equipment should be explosion- proof if explosive concentration of vapors or fume are present.

Respiratory protection: If the exposure limit is exceeded, a full face piece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulator agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full face piece positive pressure, air-supplied respirator. *WARNING! Air purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Hand protection : Wear nitrilic rubber gloves.

Eye / Face protection : Use chemical safety goggles and/or a full face shield when is possible. Avoid using contacy lenses at work. The working area will be equipped with eyewash fountains.

Skin protection: Wear impervious protective clothing (full suit), including boots, lab coat, apron or coveralls, as appropriate, to prevent skin contact. The protective equipment contaminated with 1-butanol will be immediately took out and washed. The contaminated equipment will not be stored near clean clothings and in will not be took home because the family member must not be exposed.

Environmental Exposure Control: It is recommendable to develop a monitoring plan in order to maintain the releases in the environment below the maximum allowed concentrations, complying with local, regional, regional and national legislation.

Other precautions: Maintain shower, eye wash fountain and quick-drench facilities in work area.

9. PHYSICAL AND CHEMICAL PROPERTIES

General informations

Appearance

Clear colorless liquid

Odor

Alcohol like



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Important health, safety and environmental informations

pH	7 (for 70 g/l solution at 1a 20 ⁰ C)
Boiling point	119° C, at 1013.25 hPa
Flash point	35° C (c.c.), at 1013 hPa
Flammability	Flammable upon ignition. The substance has no pyrophoric properties and does not liberate flammable gases on contact with water. Upper/lower flammability or explosive limits: 1.4 – 11.2% (LEL, UEL)
Explosive properties	non explosive
Oxidizing properties	No oxidizing properties
Vapor pressure at 20 °C	< 10 hPa at 20 °C
Specific gravity (water=1) at 20° C	0,8098
Solubility - water	66 g/l, at 20° C
-ethanol, ether	freely soluble
Partition coefficient (log K _{ow})	11a 25° C
Dynamic viscosity	2.947 mPa/s at 20° C
Vapor relative density (air=1)	2,55
Evaporation rate (BuAc=1)	0.01

Other informations

Melting/freezing point	< -90° C
Self-ignition temperature	355° C at 1013 hPa

10. STABILITY AND REACTIVITY

10.1. Reactivity: See section 10.5.

10.2. Chemical stability: Stable under normal conditions of use and storage. It easily dehydrate at temperatures of 175-400°C in the presence of catalyzers (aluminum, magnesium chloride) forming butenes.

10.3. Possibility of hazardous reactions:

- oxidizers (strong): transforms 1-butanol in butyric acid;
- easily dehydrate in the presence of catalyzers (aluminium, magnesium chloride)
- inorganic acids: hazardous of explosion;



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10.4. Conditions to avoid: Heat, flame, sources of ignition and incompatibles.

10.5. Incompatible materials: Strong oxidizers, catalyst such as aluminum, magnesium chloride, inorganic acids, halogens, aluminum, alkali metals, chromium trioxide.

11. TOXICOLOGICAL INFORMATION

	Conclusions
Absorbtion	Ready absorption through the skin, intestinal tract and lungs dermal: dog: 8.8 mg/min*cm ² over 60 min
Acute toxicity	<u>Oral route:</u> Rat: LD50=2290 mg/kg bw (similar OECD 401) n-Butanol is classified according to the Annex I of 67/548/EEC as "harmful if swallowed" (R22), corresponding to Cat. 4 following 1272/2008/EC (CLP) requirements. <u>Inhalation route:</u> rats LC0 >= 17.76 mg/l/ 4 h (similar OECD 403) Due to very low inhalative toxicity, butan-1-ol has not to be classified according to 67/548/EEC and 1272/2008/EC (CLP) requirements. <u>Dermal route:</u> Rabbits: LD50= 3430 mg/kg bw (similar OECD 402) Due to the slight dermal toxicity of butan-1-ol (rabbit LD50 ca. 3430 mg/kg bw), the substance has not to be classified according to 67/548/EEC and 1272/2008/EC (CLP) requirements.
Irritation/Corrosion	<u>Skin</u> rabbit, 24 h, occlusive: irritating rabbit, 4 h, semioclusive: not irritating (pure substance; GLP, OECD 404) n-Butanol is classified as skin irritant (R 38 according to Annex I of 67/548/EEC and Cat. 2 according to 1272/2008/EC (CLP) criteria, respectively. <u>Eye</u> rabbit, 24 h, 0.1 mL: risk of serious eye damage due to irreversible effects after 7 d observation period (OECD 405, GLP) rabbit, 24 h, 0.1 mL: irritating due to reversible effects within 21 d (OECD 405, GLP) human, 10 a study on workers: No effects on human eyes in concentrations <= 310 mg/m ³ (= 100 ppm; Sterner et. al. 1949; see chapter 7.10.5) butan-1-ol is classified as risk for serious eye damage (R41) according to Annex I of 67/548/EEC and has to be classified as Cat. 1 according to 1272/2008/EC (CLP) requirements



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	<p><u>Respiratory tract</u></p> <p>Human, 3-5 min: irritating effects on nose and throat (Nelson et al. 1943) Rat, inhalation hazard test, 7 h: irritating effects on the respiratory system (BASF 1980) n-Butanol is classified as irritant to the respiratory system (R37, according to Annex I of 67/548/EEC) and has to be classified as STOT Single Exposure Cat. 3 according to 1272/2008/EC (CLP) requirements.</p>
Sensitisation	<p>Butan-1-ol has not to be classified as skin sensitiser according to according to 67/548/EEC and 1272/2008/EC (CLP) requirements..</p>
Repeated dose toxicity	<p><u>Oral route</u> rat, 90d: NOAEL = 125 mg/kg bw (based on CNS effects; US EPA 1986)</p> <p><u>Dermal route</u> rabbit, 12*5h, occlusive: drying of the skin (no systemic toxicity observed; Omie et al. 1949)</p> <p><u>Inhalation route</u> rat, 90 d, vapour: NOAEL systemic = 2.35 mg/L, corresponding to 500 ppm No need for classification of butan-1 -ol for repeated dose systemic toxicity. Repeated dermal application can cause skin dryness.</p>
Mutagenity	<p>The available data demonstrate that butan-1 -ol has no genotoxic potential neither in vitro nor in vivo, therefore no classification is required according to 67/548/EEC and 1272/2008/EC (CLP) requiremen</p>
Carcinogenity	<p>No cancerogenic potential of butan-1-ol.</p>
Toxicity for reproduction	<p>Butan-1-ol caused no fetotoxic or teratogenic effects.</p>

12. ECOLOGICAL INFORMATIONS

Aquatic Toxicity

Short-term toxicity to fish

Pimephales promelas/Fresh water/static
n-Butanol is acutely not harmful to fish.

LC50 (96 h)= 1376 mg/L

Long-term toxicity to fish

Data waiving: a long-term toxicity study in fish is not provided.



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Short-term toxicity to aquatic invertebrates

Daphnia magna//Fresh water/static

EC50 (48 h): 1328 mg/L

Long-term toxicity to aquatic invertebrates:

Daphnia magna//Fresh water/semi-static

NOEC (21 d): 4.1 mg/L

Algae and aquatic plants

Selenastrum capricornutum (new name: *Pseudokirchnerella subcapitata*) /fresh water/static

EC50 (96 h): 225 mg/L

n-Butanol is acutely not harmful to aquatic algae.

Toxicity to sediment

Substance is not persistent in sediment. No requirement under REACH.

Toxicity to soil macro-organisms

The substance however, exhibits little potential for adsorption, is not bioaccumulative and readily biodegradable.

Toxicity to terrestrial plants

Lactuca sativa: EC50 (3 d): ca. 390 mg/l

The substance has no potential for adsorption to soils, is not bioaccumulative and readily biodegradable.

12.2. Persistence and degradability:

Abiotic degradation: substance is readily biodegradable.

Biodegradation: The test substance is readily biodegradable according to OECD criteria.

12.3. Bioaccumulative potential:

Due to the low log Pow (0.81), accumulation in organisms is not to be expected.

12.4. Mobility

Air: After evaporation or exposure to the air, the product will be slowly degraded by photochemical processes. Half-life (DT50):46 — 53.5 h



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Water: When dissolved in water the substance will not significantly evaporate into air (Henry's Law constant < 1 Pa m³/mol). In general, the main target for environmental distribution will be water.

Soil and sediments: Based upon a calculated log K_{oc} adsorption to solid soil phase is not expected.

12.5. Results of PBT and vPvB assessment:

n-Butanol does not fulfil the PBT criteria (not PBT) and not the vPvB criteria (not vPvB).

PBT : No.

P: No. B: No. T: Yes.

vPvB : No.

vP: No. vB: No

13. DISPOSAL CONSIDERATIONS

This section contains generic advice and guidance.

13.1 Waste treatment methods

13.1.1 Product

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spill material and runoff and contact with soil, waterways, drains and sewers.

Hazardous waste : The classification of the product may meet the criteria for a hazardous waste.

13.1.2. Packaging

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.



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14. TRANSPORT INFORMATION

n-Butanol can be shipped according to transport regulations for dangerous goods, hazard class 3, Flammable Liquids.

Transport Labeling



Label no.3
Flammable liquids

RID/ADR

UN No.	1120
Proper shipping name	Butanols, N.S.A, n-Butanol
Hazard class	3
UN Packing Group	III
Classification code	F1

Danger panel **30/1120** (**Hazard Identification No.** **30**)
(**UN Identification No** **1120**)

IMDG/IMO

UN No.	1120
Hazard class	3
UN Packing Group	III
Proper shipping name	Butanols,NSA, n-Butanol
EmS No.	F-E, S-D
Marine pollutant	No

IATA/IT-ICAO

Proper shipping name	Butanols,N.S.A, n-Butanol
UN No.	1120
Hazard class	3
UN Packing Group	III
IATA Label	Flammable Liquid
Packaging Note Passenger	309
Packaging Note Cargo	310



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Max. Quantity Passenger 60 l
Max. Quantity Cargo 220 l

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XIV - List of substances subject to authorisation

Substances of very high concern (Authorizations): n-Butanol is not listed

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

Restrictions on use: see Restriction 40 from Anex XVII.

Other EU regulations: n-Butanol is a SEVESO substance, not ozone depleting substance and not a persistent organic pollutant.

15.2 Chemical safety Assessment

A chemical safety assessment has been carried out for this substance.

16. OTHER INFORMATION

16.1. Full text of H-Statements referred to under sections 2 and 3

H226: Flammable liquid and vapour.
H302: Harmful if swallowed.
H315: Causes skin irritation.
H318: Causes serious eye damage.
H335: May cause respiratory irritation.
H336: May cause drowsiness or dizziness.

16.2 Full text of R-phrases referred to under sections 2 and 3

R10 Flammable
R22 Harmful if swallowed.



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R37/38 Irritating to respiratory system and skin.

R41 Risk of serious damage to eyes.

R67 Vapors may cause drowsiness and dizziness.

16.3. Full text of P-Statements referred to under sections 2 and 3.

P210: Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P233: Keep container tightly closed.

P240: Ground/bond container and receiving equipment.

P241: Use explosion-proof electrical/ventilating/lighting equipment.

P242: Use only non-sparking tools.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P370+P378: In case of fire: Use water spray, alcohol-resistant foam, carbon dioxide for extinction.

P403+P235: Store in a well-ventilated place. Keep cool.

P501: Dispose of absorbed material in accordance with regulations.

16.4. Full text of S-Statements referred to under sections 2 and 3.

S2 - keep out of the reach of children

S7/9 - keep container tightly closed and in a well-ventilated place

S13 - keep away from food, drink and animal feedingstuffs

S26 - in case of contact with eyes, rinse immediately with plenty of water and seek medical advice

S37/39 - wear suitable gloves and eye/face protection

S46 - if swallowed, seek medical advice immediately and show this container or label

16.5. Explanations for possible abbreviations mentioned in above sections

PBT: Persistent, bioaccumulative and toxic.

vPvB: Very persistent and very bioaccumulative.

ES: Exposure Scenario

WGK: Wassergefährdungsklasse (Water hazard class)

PNEC: Predicted No-Effect Concentration

NOAEC: No Observed Adverse Effect Concentration

ADR: European **Agreement** concerning the International Carriage of **Dangerous** Goods by **Road**

RID: **International** Carriage of **Dangerous** Goods by **Road**

IMDG Code: International Maritime Dangerous Goods Code

ICAO/IATA: International Civil Aviation Organization/ International Air Transport Association.



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16.6. Revision: Revision 0

This is the first version of the eSDS of n-Butanol. Hence, no revision information should be mentioned here.

Annex I to SDS- Exposure Scenario

Disclaimer:

Oltchim provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. The information is intended to aid the user in controlling the handling risks; it is not to be construed as a warranty or specification of the product quality. The information may not be or may not altogether be applicable to combinations of the product with other substances or to particular applications. The user is responsible for ensuring that appropriate precautions are taken and for satisfying themselves that the data are suitable and sufficient for the product's intended purpose. In case of any unclarity we advise consulting the supplier or an expert.



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ANNEX I- EXPOSURE SCENARIO

1.ES1- Manufacture of butan-1-ol (Industrial)

Section 1		Exposure Scenario Title
Title	Manufacture of butan-1-ol; CAS: 71-36-3	
Use Descriptor	Sector of Use: Industrial (SU8, SU9)	
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15	
	Environmental Release Categories: ERC1, ERC4, ERC6a	
Processes, tasks, activities covered	Use as process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	<i>Not applicable</i>	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]	
Human factors not influenced by risk management	<i>Not applicable</i>	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC 17, PROC18)	
Contributing Scenarios	PROCs	Risk Management Measures



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General exposures (closed systems) [CS15]. Continuous process [CS54].	1	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Continuous process [CS54]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	2	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Batch process [CS55]. With sample collection [CS56].	3	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	4	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82]	8a	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81]	8b	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 97%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Laboratory activities [CS36]. Small scale [CS61].	15	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}

^{#1} refers to qualitative assessment



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2. ES2 – Use as intermediate (Industrial)

Section 1		Exposure Scenario Title
Title	Use as intermediate; CAS: 71-36-3	
Use Descriptor	Sector of Use: Industrial (SU8, SU9)	
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9	
	Environmental Release Categories: ERC6a	
Processes, tasks, activities covered	Use as intermediate. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	<i>Not applicable</i>	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]	
Human factors not influenced by risk management	<i>Not applicable</i>	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC17, PROC18)	
Contributing Scenarios	PROCs	Risk Management Measures
General exposures (closed systems) [CS15]. Continuous process [CS54].	1	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}



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General exposures (closed systems) [CS15]. Continuous process [CS54]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	2	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Batch process [CS55]. With sample collection [CS56].	3	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	4	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82].	8a	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81].	8b	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 97%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Pouring from small containers [CS9]. Dedicated facility [CS81].	9	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}

^{#1} refers to qualitative assessment



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3. ES3 – Formulation & (re)packing of substances and mixtures (Industrial)

Section 1		Exposure Scenario Title
Title	Formulation & (re)packing of substances and mixtures; CAS: 71-36-3	
Use Descriptor	Sector of Use: Industrial (SU10)	
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15	
	Environmental Release Categories: ERC 2	
Processes, tasks, activities covered	Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, large and small scale packing, maintenance and associated laboratory activities	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	<i>Not applicable</i>	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]	
Human factors not influenced by risk management	<i>Not applicable</i>	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC17, PROC18)	
Contributing Scenarios	PROCs	Risk Management Measures
General exposures (closed systems) [CS15]. Continuous process [CS54].	1	Minimization of manual phases ^{.#1} Avoid frequent and direct contact with substance. ^{.#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{.#1} Use suitable eye protection and gloves [PPE14]. ^{.#1}



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General exposures (closed systems) [CS15]. Continuous process [CS54]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	2	Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
General exposures (closed systems) [CS15]. Batch process [CS55]. With sample collection [CS56].	3	Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	4	Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
Batch process [CS55]. Mixing operations (open systems) [CS30].	5	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82].	8a	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81].	8b	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 97%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
Pouring from small containers [CS9]. Dedicated facility [CS81].	9	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1



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Laboratory activities [CS36]. Small scale [CS61].	15	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
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^{#1} refers to qualitative assessment

4. ES4 – Distribution of butan-1-ol (Industrial)

Section 1	Exposure Scenario Title	
Title	Distribution of substance; CAS: 71-36-3	
Use Descriptor	Sector of Use: Industrial (SU8, SU9)	
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15	
	Environmental Release Categories: ERC1, ERC2	
Processes, tasks, activities covered	Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its distribution and associated laboratory activities	
Section 2	Operational conditions and risk management measures	
Section 2.1	Control of worker exposure	
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	<i>Not applicable</i>	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]	
Human factors not influenced by risk management	<i>Not applicable</i>	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC17, PROC18)	
Contributing Scenarios	PROCs	Risk Management Measures



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General exposures (closed systems) [CS15]. Continuous process [CS54].	1	<p>Minimization of manual phases. #1</p> <p>Avoid frequent and direct contact with substance. #1</p> <p>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1</p> <p>Use suitable eye protection and gloves [PPE14]. #1</p>
General exposures (closed systems) [CS15]. ; Continuous process [CS54]. With sample collection [CS56]. ; Equipment cleaning and maintenance [CS39].	2	<p>Minimization of manual phases.#1</p> <p>Avoid frequent and direct contact with substance. #1</p> <p>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1</p> <p>Use suitable eye protection and gloves [PPE14].#1</p>
General exposures (closed systems) [CS15]. Batch process [CS55]. ; With sample collection [CS56].	3	<p>Minimization of manual phases. #1</p> <p>Avoid frequent and direct contact with substance. #1</p> <p>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1</p> <p>Use suitable eye protection and gloves [PPE14]. #1</p>
General exposures (open systems) [CS16]. Batch process [CS55]. ; With sample collection [CS56].	4	<p>Minimization of manual phases. #1</p> <p>Avoid frequent and direct contact with substance. #1</p> <p>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1</p> <p>Use suitable eye protection and gloves [PPE14]. #1</p>
Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82]	8a	<p>Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%)</p> <p>Minimization of manual phases. #1</p> <p>Avoid frequent and direct contact with substance. #1</p> <p>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1</p> <p>Use suitable eye protection and gloves [PPE14]. #1</p>
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81]	8b	<p>Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 97%)</p> <p>Minimization of manual phases. #1</p> <p>Avoid frequent and direct contact with substance. #1</p> <p>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1</p> <p>Use suitable eye protection and gloves [PPE14]. #1</p>



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Pouring from small containers [CS9]. Dedicated facility [CS81]	9	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
Laboratory activities [CS36]. Small scale [CS61].	15	Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1

#1 refers to qualitative assessment

5. ES4 – Distribution of butan-1-ol (Professional)

Section 1		Exposure Scenario Title
Title	Distribution of substance; CAS: 71-36-3	
Use Descriptor	Sector of Use: Professional (SU22)	
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15	
	Environmental Release Categories: ERC1, ERC2	
Processes, tasks, activities covered	Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its distribution and associated laboratory activities	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	<i>Not applicable</i>	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]	



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Human factors not influenced by risk management		<i>Not applicable</i>
Other Operational Conditions affecting worker exposure		Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC17, PROC18)
Contributing Scenarios	PROCs	Risk Management Measures
General exposures (closed systems) [CS15]. Continuous process [CS54].	1	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Continuous process [CS54]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	2	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Batch process [CS55]. With sample collection [CS56].	3	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	4	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82].	8a	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81].	8b	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}



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Pouring from small containers [CS9]. Dedicated facility [CS81].	9	<p>Minimization of manual phases. ^{#1}</p> <p>Avoid frequent and direct contact with substance. ^{#1}</p> <p>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1}</p> <p>Avoid carrying out operation for more than 4 hours [OC12]</p> <p>Use suitable eye protection and gloves [PPE14]. ^{#1}</p>
Laboratory activities [CS36]. Small scale [CS61].	15	<p>Minimization of manual phases. ^{#1}</p> <p>Avoid frequent and direct contact with substance. ^{#1}</p> <p>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1}</p> <p>Use suitable eye protection and gloves [PPE14]. ^{#1}</p>

^{#1} refers to qualitative assessment

6. ES5 – Use in coatings (paints, ink, toners, adhesives; Industrial)

Section 1	Exposure Scenario Title
Title	Use in coatings (paints, ink, toners, adhesives); CAS: 71-36-3
Use Descriptor	Sector of Use: Industrial (SU3)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC15;
	Environmental Release Categories: ERC4
Processes, tasks, activities covered	Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, spreader, dip, flow, fluidised bed on production lines and film formation) and equipment cleaning, maintenance and associated laboratory activities.
Section 2	Operational conditions and risk management measures
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used	<i>Not applicable</i>
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]



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Human factors not influenced by risk management		<i>Not applicable</i>
Other Operational Conditions affecting worker exposure		Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC17, PROC18)
Contributing Scenarios	PROCs	Risk Management Measures
General exposures (closed systems) [CS15]. Continuous process [CS54].	1	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Continuous process [CS54]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	2	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Batch process [CS55]. With sample collection [CS56].	3	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	4	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Batch process [CS55]. Mixing operations (open systems) [CS30].	5	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}



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Spraying [CS10].	7 ^{#2}	Use in a spraying booth. Minimization of manual phases. ^{#1} Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Ensure that the task is being carried out outside the breathing zone of a worker. Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82].	8a	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81].	8b	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 97%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Pouring from small containers [CS9]. Dedicated facility [CS81].	9	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Rolling, Brushing [CS51].	10	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Dipping, immersion and pouring [CS4].	13	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}



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Laboratory activities [CS36]. Small scale [CS61].	15	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
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^{#1} refers to qualitative assessment

^{#2} other Tool used: Stoffenmanager (v. 4.0; 75th percentile for long term assessment)

7. ES5 – Use in coatings (paints, ink, toners, adhesives; (Professional)

Section 1		Exposure Scenario Title
Title	Use in coatings (paints, ink, toners, adhesives); CAS: 71-36-3	
Use Descriptor	Sector of Use: Professional (SU22)	
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC 9, PROC10, PROC11, PROC13, PROC15, PROC19;	
	Environmental Release Categories: ERC8a, ERC8c, ERC8d, ERC8f	
Processes, tasks, activities covered	Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, spreader, dip, flow, fluidised bed on production lines and film formation) and equipment cleaning, maintenance and associated laboratory activities.	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	<i>Not applicable</i>	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]	
Human factors not influenced by risk management	<i>Not applicable</i>	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above	



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Contributing Scenarios	PROCs	Risk Management Measures
		ambient temperature) [OC7]. (PROC17, PROC18)
General exposures (closed systems) [CS15]. Continuous process [CS54].	1	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Continuous process [CS54]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	2	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Batch process [CS55]. With sample collection [CS56].	3	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	4	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Batch process [CS55]. Mixing operations (open systems) [CS30].	5	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82].	8a	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81].	8b	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}



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<p>Pouring from small containers [CS9]. Dedicated facility [CS81].</p>	<p>9</p>	<p>Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. #1</p>
<p>Rolling, Brushing [CS51].</p>	<p>10</p>	<p>Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. #1</p>
<p>Spraying [CS10].</p>	<p>11^{#2}</p>	<p>Use in a spraying booth. Minimization of manual phases. #1 Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Ensure that the task is being carried out outside the breathing zone of a worker. Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1</p> <p>Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 47%) Minimization of manual phases. #1 Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Avoid carrying out operation for more than 6 hours. Use suitable eye protection and gloves [PPE14]. #1</p> <p>Provide enhanced mechanical ventilation by mechanical means [E48].(effectiveness general ventilation: 47%) Minimization of manual phases. #1 Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1 Wear a suitable respiratory protection (effectiveness: 80%). If no adequate respiratory protection is available, avoid carrying out operation for more than 5 hours.</p>



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Dipping, immersion and pouring [CS4].	13	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}
Laboratory activities [CS36]. Small scale [CS61].	15	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Hand-mixing with intimate contact. Only PPE.	19	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}

^{#1} refers to qualitative assessment

^{#2} other Tool used: Stoffenmanager (v. 4.0; 75th percentile for long term assessment)

8. ES5 – Use in coatings (paints, ink, toners, adhesives; Consumer)

Section 1		Exposure Scenario Title
Title		Use in coatings (paints, ink, toners, adhesives)
Sector of Use (SU code)		21
Use Descriptor (PC codes)		PC1, PC4, PC9, PC15, PC18, PC23, PC24, PC31
Processes, tasks, activities covered		Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including product transfer and preparation, application by brush, spray by hand or similar methods) and equipment cleaning.
Environmental Release Category		ERC8a, ERC8c, ERC8d, ERC8f
Specific Environmental Release Category		
Section 2		Operational conditions and risk management measures
Section 2.1		Control of consumer exposure
<i>Product characteristics</i>		
Physical form of product		liquid
Vapour pressure (Pa)		1000



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Concentration of substance in product		Unless otherwise stated, covers concentration up to 50% [ConsOC1]
<i>Amounts used</i>		Unless otherwise stated, covers use amounts up to 9000g [ConsOC2];
<i>Frequency and duration of use/exposure</i>		Unless otherwise stated, covers use frequency up to 1 times per day [ConsOC4]; covers exposure up to 6 hours per event [ConsOC14]
<i>Other Operational Conditions affecting exposure</i>		Unless otherwise stated, assumes use at ambient temperature [ConsOC15]; assumes use in rooms up to 58m ³ [ConsOC11]; assumes use with typical ventilation [ConsOC8];
Section 2.1.1		Product categories
PC1:Adhesives, sealants--Glues, hobby use	OC	Covers concentrations up to 30% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 9g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC1:Adhesives, sealants--Glues DIY-use (carpet glue, tile glue, wood parquet glue)	OC	Covers concentrations up to 0.2% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 6390g [ConsOC2]; covers use only in sufficiently ventilated rooms; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 6.00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC1:Adhesives, sealants--Glues DIY-use (carpet glue, tile glue, wood parquet glue); Tier 2: ConsExpo estimates (carpet glue as representative example)	OC	Covers concentrations up to 2% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 9000g [ConsOC2]; covers use only in sufficiently ventilated rooms; covers use in room size of 53m ³ [ConsOC11]; for each use event, covers exposure up to 1.25hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC1:Adhesives, sealants--Glue from spray; Tier 2: ConsExpo estimates (spray glue)	OC	Covers concentrations up to 30% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to



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		4.00hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC1:Adhesives, sealants--Sealants; Tier 2: ConsExpo estimates (assembly sealant as representative worst case)	OC	Covers concentrations up to 12% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 390g [ConsOC2]; covers use only in sufficiently ventilated rooms; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC4_n:Anti-freeze and de-icing products-- Washing car window	OC	Covers concentrations up to 1% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 0.5g [ConsOC2]; covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.02hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC4_n:Anti-freeze and de-icing products-- Pouring into radiator; Tier 2: ConsExpo estimates (all purpose cleaner (liquid), mixing and loading)	OC	Covers concentrations up to 10% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 2000g [ConsOC2]; covers use with open windows; for each use event, covers exposure up to 0.17 hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC4_n:Anti-freeze and de-icing products-- Lock de-icer	OC	Covers concentrations up to 50% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 4g [ConsOC2]; covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.25hr/event[ConsOC14];



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	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC9a:Coatings, paints, thinners,paint removers--Waterborne latex wall paint; Tier 2: ConsExpo estimates (waterborne wall paint)	OC	Covers concentrations up to 2% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 3750g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC9a:Coatings, paints, thinners,paint removers--Solvent rich, high solid, water borne paint; Tier 2: ConsExpo estimates (high solid paint as a representative worst case)	OC	Covers concentrations up to 5% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 1300g [ConsOC2]; covers use only in sufficiently ventilated rooms; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC9a:Coatings, paints, thinners,paint removers--Aerosol spray can; Tier 2: ConsExpo estimates (spray can)	OC	Covers concentrations up to 25% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 0.33hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC9a:Coatings, paints, thinners,paint removers--Removers (paint-, glue-, wall paper-, sealant-remover); Tier 2: ConsExpo estimates (glue remover as a representative worst case)	OC	Covers concentrations up to 4% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 2000g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 30m ³ [ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC9c:Finger paints	OC	Covers concentrations up to 1% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each



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		use event, assumes swallowed amount of 1.35g [ConsOC13];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC15_n: Non-metal surface treatment products--Waterborne latex wall paint; Tier 2: ConsExpo estimates (waterborne wall paint)	OC	Covers concentrations up to 2% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 3750g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC15_n: Non-metal surface treatment products--Solvent rich, high solid, water borne paint; Tier 2: ConsExpo estimates (high solid paint as a representative worst case)	OC	Covers concentrations up to 5% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 1300g [ConsOC2]; covers use only in sufficiently ventilated rooms; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC15_n: Non-metal surface treatment products--Aerosol spray can; Tier 2: ConsExpo estimates (spray can)	OC	Covers concentrations up to 25% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 0.33hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC15_n: Non-metal surface treatment products--Removers (paint-, glue-, wall paper-, sealant-remover); Tier 2: ConsExpo estimates (glue remover as a representative worst case)	OC	Covers concentrations up to 4% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 2000g [ConsOC2]; covers use only in sufficiently ventilated rooms; covers use in room size of 30m ³ [ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}



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PC18_n: Ink and toners--Inks and toners.	OC	Unless otherwise stated, covers concentrations up to 4% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 40g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC23_n: Leather tanning, dye, finishing, impregnation and care products--Polishes, wax / cream (floor, furniture, shoes); Tier 2: ConsExpo estimates (furniture polish as representative example)	OC	Covers concentrations up to 50% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 56g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 58m ³ [ConsOC11]; for each use event, covers exposure up to 4hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC23_n: Leather tanning, dye, finishing, impregnation and care products--Polishes, spray (furniture, shoes); Tier 2: ConsExpo estimates (furniture leather spray as representative worst case)	OC	Covers concentrations up to 50% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 56g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 58m ³ [ConsOC11]; for each use event, covers exposure up to 4hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC31:Polishes and wax blends--Polishes, wax / cream (floor, furniture, shoes); Tier 2: ConsExpo estimates (furniture polish as representative worst case)	OC	Unless otherwise stated, covers concentrations up to 20% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 550g [ConsOC2]; covers use in rooms with open windows; covers use in room size of 58m ³ [ConsOC11]; for each use event, covers exposure up to 4hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}



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PC31:Polishes and wax blends--Polishes, spray (furniture, shoes); Tier 2: ConsExpo estimates (furniture leather spray as representative worst case)	OC	Covers concentrations up to 50% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 58m ³ [ConsOC11]; for each use event, covers exposure up to 4hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC24:Lubricants, greases, release products		A use by consumers which is related with intensive and direct handling of lubricants, greases (PC24) containing butan-1-ol has not been assumed.

^{#1} RMMs refer to qualitative assessment

9. ES6 – Use in cleaning agents (Industrial)

Section 1	Exposure Scenario Title
Title	Use in cleaning agents; CAS: 71-36-3
Use Descriptor	Sector of Use: Industrial (SU3)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13
	Environmental Release Categories: ERC4
Processes, tasks, activities covered	Covers the use as a component of cleaning products including transfer from storage, pouring/unloading from drums or containers. Exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping, automated and by hand), related equipment cleaning and maintenance.
Section 2	Operational conditions and risk management measures
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].



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Concentration of substance in product		Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used		<i>Not applicable</i>
Frequency and duration of use		Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management		<i>Not applicable</i>
Other Operational Conditions affecting worker exposure		Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC 17, PROC18)
Contributing Scenarios	PROCs	Risk Management Measures
General exposures (closed systems) [CS15]. Continuous process [CS54].	1	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Continuous process [CS54]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	2	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Batch process [CS55]. With sample collection [CS56].	3	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	4	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}



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Spraying [CS10].	7 ^{#2}	Use in a spraying booth. Minimization of manual phases. ^{#1} Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Ensure that the task is being carried out outside the breathing zone of a worker. Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82]	8a	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81]	8b	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 97%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Pouring from small containers [CS9]. Dedicated facility [CS81]	9	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Rolling, Brushing [CS51].	10	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Dipping, immersion and pouring [CS4].	13	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}

^{#1} refers to qualitative assessment



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^{#2} other Tool used: Stoffenmanager (v. 4.0; 75th percentile for long term assessment)



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10. ES6 – Use in cleaning agents (Professional)

Section 1		Exposure Scenario Title
Title	Use in cleaning agents; CAS: 71-36-3	
Use Descriptor	Sector of Use: Professional (SU22)	
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13	
	Environmental Release Categories: ERC8a, ERC8d	
Processes, tasks, activities covered	Covers the use as a component of cleaning products including pouring/unloading from drums or containers; and exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping automated and by hand).	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	<i>Not applicable</i>	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]	
Human factors not influenced by risk management	<i>Not applicable</i>	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC17, PROC18)	
Contributing Scenarios	PROCs	Risk Management Measures
General exposures (closed systems) [CS15]. Continuous process [CS54].	1	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}



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General exposures (closed systems) [CS15]. Continuous process [CS54]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	2	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Batch process [CS55]. With sample collection [CS56].	3	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	4	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82].	8a	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81].	8b	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}
Pouring from small containers [CS9]. Dedicated facility [CS81].	9	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}
Rolling, Brushing [CS51].	10	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}



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Spraying [CS10].	11 ^{#2}	<p>Use in a spraying booth. Minimization of manual phases. ^{#1} Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Ensure that the task is being carried out outside the breathing zone of a worker. Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}</p> <p>Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 47%) Minimization of manual phases. ^{#1} Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 6 hours. Use suitable eye protection and gloves [PPE14]. ^{#1}</p> <p>Provide enhanced mechanical ventilation by mechanical means [E48].(effectiveness general ventilation: 47%) Minimization of manual phases. ^{#1} Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1} Wear a suitable respiratory protection (effectiveness: 80%). If no adequate respiratory protection is available, avoid carrying out operation for more than 5 hours.</p>
Dipping, immersion and pouring [CS4].	13	<p>Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}</p>

^{#1} refers to qualitative assessment

^{#2} other Tool used: Stoffenmanager (v. 4.0; 75th percentile for long term assessment)



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11. ES6 – Use in cleaning agents (Consumer)

Section 1		Exposure Scenario Title
Title		Use in Cleaning Agents
Sector of Use (SU code)		21
Use Descriptor (PC codes)		PC4, PC9, PC24, PC35, PC38
Processes, tasks, activities covered		Covers general exposures to consumers arising from the use of household products sold as washing and cleaning products, aerosols, coatings, de-icers, lubricants and air care products.
Environmental Release Category		ERC8a, ERC8d
Specific Environmental Release Category		
Section 2		Operational conditions and risk management measures
Section 2.1		Control of consumer exposure
<i>Product characteristics</i>		
Physical form of product		liquid
Vapour pressure (Pa)		1000
Concentration of substance in product		Unless otherwise stated, covers concentration up to 50% [ConsOC1]
<i>Amounts used</i>		Unless otherwise stated, covers use amounts up to 3750g [ConsOC2];
<i>Frequency and duration of use/exposure</i>		Unless otherwise stated, covers use frequency up to 1 times per day [ConsOC4]; covers exposure up to 4 hours per event [ConsOC14]
<i>Other Operational Conditions affecting exposure</i>		Unless otherwise stated, assumes use at ambient temperature [ConsOC15]; assumes use in rooms up to 58m ³ [ConsOC11]; assumes use with typical ventilation [ConsOC8];
Section 2.1.1		Product categories
PC4_n:Anti-freeze and de-icing products--Washing car window	OC	Covers concentrations up to 1% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 0.5g [ConsOC2]; covers use in a one car garage (34 m ³) under typical ventilation [ConsOC10]; covers use in room size of 34m ³ [ConsOC11]; for each use event, covers exposure up to 0.02hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}



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PC4_n:Anti-freeze and de-icing products--Pouring into radiator; Tier 2: ConsExpo estimates	OC	Covers concentrations up to 10% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 2000g [ConsOC2]; covers use with open windows; for each use event, covers exposure up to 0.17 hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC4_n:Anti-freeze and de-icing products--Lock de-icer	OC	Covers concentrations up to 50% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 4g [ConsOC2]; covers use in a one car garage (34 m ³) under typical ventilation [ConsOC10]; covers use in room size of 34m ³ [ConsOC11]; for each use event, covers exposure up to 0.25hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC9a:Coatings, paints, thinners,paint removers-- Waterborne latex wall paint; Tier 2: ConsExpo estimates (waterborne wall paint)	OC	Covers concentrations up to 2% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 3750g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC9a:Coatings, paints, thinners,paint removers--Solvent rich, high solid, water borne paint; Tier 2: ConsExpo estimates (high solid paint as a representative worst case)	OC	Covers concentrations up to 5% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 1300g [ConsOC2]; covers use only in sufficiently ventilated rooms; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}



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PC9a:Coatings, paints, thinners,paint removers--Aerosol spray can; Tier 2: ConsExpo estimates (spray can)	OC	Covers concentrations up to 25% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.33hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC9a:Coatings, paints, thinners,paint removers--Removers (paint-, glue-, wall paper-, sealant-remover); Tier 2: ConsExpo estimates (glue remover as a representative worst case)	OC	Covers concentrations up to 4% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 2000g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 30m3[ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC9c:Finger paints	OC	Covers concentrations up to 1% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, assumes swallowed amount of 1.35g [ConsOC13];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC35:Washing and cleaning products (including solvent based products)--Laundry and dish washing products	OC	Covers concentrations up to 5% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 15g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.50hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}



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PC35:Washing and cleaning products (including solvent based products)--Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners); Tier 2: ConsExpo estimates (floor cleaner (liquid) as a representative worst case; Mixing and Loading)	OC	Covers concentrations up to 50% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 500g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; for each use event, covers exposure up to 0.0125hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC35:Washing and cleaning products (including solvent based products)--Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners); Tier 2: ConsExpo estimates (floor cleaner (liquid) as a representative worst case; Application)	OC	Covers concentrations up to 8% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 880g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 58m ³ [ConsOC11]; for each use event, covers exposure up to 4hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC35:Washing and cleaning products (including solvent based products)--Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) Tier 2: ConsExpo estimates (bathroom cleaning spray as a representative worst case; Application (spraying))	OC	Covers concentrations up to 20% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; covers use in room size of 10m ³ [ConsOC11]; for each use event, covers exposure up to 0.42hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}



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PC35:Washing and cleaning products (including solvent based products)--Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) Tier 2: ConsExpo estimates (bathroom cleaning spray as a representative worst case; Application (leaving on and cleaning))	OC	Covers concentrations up to 20% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 30g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 10m3[ConsOC11]; for each use event, covers exposure up to 0.42hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC38_n: Welding and soldering products, flux products	OC	Unless otherwise stated, covers concentrations up to 10% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 12g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 1.00hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC24:Lubricants, greases, release products	A use by consumers which is related with intensive and direct handling of lubricants, greases (PC24) containing butan-1-ol has not been assumed.	

^{#1} RMMs refer to qualitative assessment

12. ES7 – Use in lubricants (Industrial)

Section 1	Exposure Scenario Title
Title	Use in lubricants; CAS: 71-36-3
Use Descriptor	Sector of Use: Industrial (SU3)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC17, PROC18
	Environmental Release Categories: ERC4, ERC7
Processes, tasks, activities covered	Covers the use of formulated lubricants in closed and open systems including transfer operations, operation of machinery/engines and similar articles, reworking on reject articles, equipment maintenance and disposal of wastes.



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Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product		Liquid, vapour pressure 0.5 - 10 kPa [OC4].
Concentration of substance in product		Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used		<i>Not applicable</i>
Frequency and duration of use		Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management		<i>Not applicable</i>
Other Operational Conditions affecting worker exposure		Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC17, PROC18)
Contributing Scenarios	PROCs	Risk Management Measures
General exposures (closed systems) [CS15]. Continuous process [CS54].	1	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Continuous process [CS54]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	2	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Batch process [CS55]. With sample collection [CS56].	3	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	4	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}



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Spraying [CS10].	7 ^{#2}	Use in a spraying booth. Minimization of manual phases. ^{#1} Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Ensure that the task is being carried out outside the breathing zone of a worker. Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82].	8a	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81].	8b	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 97%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Pouring from small containers [CS9]. Dedicated facility [CS81].	9	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Rolling, Brushing [CS51].	10	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Dipping, immersion and pouring [CS4].	13	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}



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Operation and lubrication of high energy open equipment [CS17].	17	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
	17 ^{#3}	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 95%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Greasing, high energy. General exposures [CS1].	18	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
	18 ^{#3}	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 95%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}

^{#1} refers to qualitative assessment

^{#2} other Tool used: Stoffenmanager (v. 4.0; 75th percentile for long term assessment)

^{#3} assessment at higher temperature (approx. 64 °C)/higher vapor pressure (>= 100 hPa); ECTOC TRA: high fugacity

13. ES7 – Use in lubricants (Professional)

Section 1	Exposure Scenario Title
Title	Use in lubricants; CAS: 71-36-3
Use Descriptor	Sector of Use: Professional (SU22)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC10, PROC 11, PROC13, PROC17, PROC18, PROC20
	Environmental Release Categories: ERC8a, ERC8d, ERC9a, ERC9b
Processes, tasks, activities covered	Covers the use of formulated lubricants in closed and open systems including transfer operations, operation of engines and similar articles, reworking on reject articles, equipment maintenance and disposal of waste oil.



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Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product		Liquid, vapour pressure 0.5 - 10 kPa [OC4].
Concentration of substance in product		Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used		<i>Not applicable</i>
Frequency and duration of use		Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management		<i>Not applicable</i>
Other Operational Conditions affecting worker exposure		Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC17, PROC18)
Contributing Scenarios	PROCs	Risk Management Measures
General exposures (closed systems) [CS15]. Continuous process [CS54].	1	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Continuous process [CS54]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	2	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Batch process [CS55]. With sample collection [CS56].	3	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	4	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}



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Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82]	8a	<p>Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}</p>
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81].	8b	<p>Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}</p>
Pouring from small containers [CS9]. Dedicated facility [CS81].	9	<p>Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}</p>
Rolling, Brushing [CS51].	10	<p>Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}</p>
Spraying [CS10].	11 ^{#2}	<p>Use in a spraying booth. Minimization of manual phases. ^{#1} Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Ensure that the task is being carried out outside the breathing zone of a worker. Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}</p>
		<p>Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 47%) Minimization of manual phases. ^{#1} Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 6 hours.</p>



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		<p>Use suitable eye protection and gloves [PPE14].^{#1}</p>
		<p>Provide enhanced mechanical ventilation by mechanical means [E48].(effectiveness general ventilation: 47%) Minimization of manual phases.^{#1} Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance.^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed.^{#1} Use suitable eye protection and gloves [PPE14].^{#1} Wear a suitable respiratory protection (effectiveness: 80%). If no adequate respiratory protection is available, avoid carrying out operation for more than 5 hours.</p>
Dipping, immersion and pouring [CS4].	13	<p>Minimization of manual phases.^{#1} Avoid frequent and direct contact with substance.^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed.^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14].^{#1}</p>
Operation and lubrication of high energy open equipment [CS17].	17	<p>Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases.^{#1} Avoid frequent and direct contact with substance.^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed.^{#1} Use suitable eye protection and gloves [PPE14].^{#1}</p>
		<p>Minimization of manual phases.^{#1} Avoid frequent and direct contact with substance.^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed.^{#1} Avoid carrying out operation for more than 1 hour [OC11] Use suitable eye protection and gloves [PPE14].^{#1}</p>



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	17 ^{#3}	<p>Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}</p> <p>Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1} Wear a suitable respiratory protection (Effectiveness:90%)</p>
Greasing, high energy. General exposures [CS1].	18	<p>Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}</p> <p>Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 1 hour [OC11] Use suitable eye protection and gloves [PPE14]. ^{#1}</p>
	18 ^{#3}	<p>Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}</p> <p>Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1} Wear a suitable respiratory protection (Effectiveness:90%)</p>



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Heat and pressure transfer
(dispersive, closed system).

20

Minimization of manual phases. ^{#1}
Avoid frequent and direct contact with substance. ^{#1}
Supervision in place to check that the RMMs in place are
being used correctly and OCs followed. ^{#1}
Use suitable eye protection and gloves [PPE14]. ^{#1}

^{#1} refers to qualitative assessment

^{#2} other Tool used: Stoffenmanager (v. 4.0; 75th percentile for long term assessment)

^{#3} assessment at higher temperature (approx. 64 °C)/higher vapor pressure (>= 100 hPa); ECTOC TRA: high fugacity

14. ES7 – Use in lubricants (Consumer)

In general, it is assumed that there is no use by consumers which is related with intensive and direct handling of lubricants, greases (PC24) containing butan-1-ol.

It is assumed that lubricants, greases usually are contained in closed systems in machines and other equipment. Exposure arising from the use of machines and other equipment and arising from short and only occasional periods of manual handling (e.g. pouring of lubricants, greases) is considered to be negligible.

9.14.1. Exposure scenario

Section 1		Exposure Scenario Title
Title		Use in Lubricants
Sector of Use (SU code)		21
Use Descriptor (PC codes)		PC1, (PC6) ^{#2} , PC24, PC31, PC35
Processes, tasks, activities covered		Covers the consumer use of formulated lubricants in closed and open systems including transfer operations, application, operation of engines and similar articles, equipment maintenance and disposal of waste oil.
Environmental Release Category		ERC8a, ERC8d ERC9a, ERC9b
Specific Environmental Release Category		
Section 2		Operational conditions and risk management measures
Section 2.1		Control of consumer exposure
<i>Product characteristics</i>		
Physical form of product		liquid
Vapour pressure (Pa)		1000
Concentration of substance in product		Unless otherwise stated, covers concentration up to 50% [ConsOC1]
<i>Amounts used</i>		Unless otherwise stated, covers use amounts up to 550g [ConsOC2];



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<i>Frequency and duration of use/exposure</i>		Unless otherwise stated, covers use frequency up to 1 times per day [ConsOC4]; covers exposure up to 4 hours per event [ConsOC14]
<i>Other Operational Conditions affecting exposure</i>		Unless otherwise stated, assumes use at ambient temperature [ConsOC15]; assumes use in rooms up to 58m ³ [ConsOC11]; assumes use with typical ventilation [ConsOC8];
Section 2.1.1		Product categories
PC1:Adhesives, sealants--Glues, hobby use	OC	Covers concentrations up to 30% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 9g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC1:Adhesives, sealants--Glues DIY-use (carpet glue, tile glue, wood parquet glue)	OC	Covers concentrations up to 0.2% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 6390g [ConsOC2]; covers use only in sufficiently ventilated rooms; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 6.00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC1:Adhesives, sealants--Glues DIY-use (carpet glue, tile glue, wood parquet glue); Tier 2: ConsExpo estimates (carpet glue as representative example)	OC	Covers concentrations up to 2% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 9000g [ConsOC2]; covers use only in sufficiently ventilated rooms; covers use in room size of 53m ³ [ConsOC11]; for each use event, covers exposure up to 1.25hr/event[ConsOC14];



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	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC1:Adhesives, sealants--Glue from spray; Tier 2: ConsExpo estimates (spray glue)	OC	Covers concentrations up to 30% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC1:Adhesives, sealants--Sealants; Tier 2: ConsExpo estimates (assembly sealant as representative worst case)	OC	Covers concentrations up to 12% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 390g [ConsOC2]; covers use only in sufficiently ventilated rooms; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC31:Polishes and wax blends-- Polishes, wax / cream (floor, furniture, shoes); Tier 2: ConsExpo estimates (furniture polish as representative worst case)	OC	Unless otherwise stated, covers concentrations up to 20% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 550g [ConsOC2]; covers use in rooms with open windows; covers use in room size of 58m3[ConsOC11]; for each use event, covers exposure up to 4hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}



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PC31:Polishes and wax blends-- Polishes, spray (furniture, shoes); Tier 2: ConsExpo estimates (furniture leather spray as representative worst case)	OC	Covers concentrations up to 50% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 58m3[ConsOC11]; for each use event, covers exposure up to 4hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC35:Washing and cleaning products (including solvent based products)-- Laundry and dish washing products	OC	Covers concentrations up to 5% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 15g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.50hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC35:Washing and cleaning products (including solvent based products)-- Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners); Tier 2: ConsExpo estimates (floor cleaner (liquid) as a representative worst case; Mixing and loading)	OC	Covers concentrations up to 5% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 15g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.50hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}



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PC35:Washing and cleaning products (including solvent based products)-- Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners); Tier 2: ConsExpo estimates (floor cleaner (liquid) as a representative worst case; Application)	OC	Covers concentrations up to 8% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 880g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 58m3[ConsOC11]; for each use event, covers exposure up to 4hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC35:Washing and cleaning products (including solvent based products)-- Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) Tier 2: ConsExpo estimates (bathroom cleaning spray as a representative worst case; Application (spraying))	OC	Covers concentrations up to 20% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; covers use in room size of 10m3[ConsOC11]; for each use event, covers exposure up to 0.42hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC35:Washing and cleaning products (including solvent based products)-- Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) Tier 2: ConsExpo estimates (bathroom cleaning spray as a representative worst case; Application (leaving on and cleaning))	OC	Covers concentrations up to 20% [ConsOC1]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 30g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 10m3[ConsOC11]; for each use event, covers exposure up to 0.42hr/event[ConsOC14];
	RMM ^{#1}	Avoid contact with skin. After contact with skin, wash immediately with plenty of water. ^{#1} Avoid contact with eyes. In case of contact with eyes, rinse immediately with plenty of water. ^{#1}
PC24:Lubricants, greases, release products	A use by consumers which is related with intensive and direct handling of lubricants, greases (PC24) containing butan-1-ol has not been assumed.	

^{#1} RMMs refer to qualitative assessment



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#2 covered by PC31 and PC35

15.ES8 – Metal working fluids / rolling oils (Industrial)

Section 1		Exposure Scenario Title
Title	Metal working fluids / rolling oils; CAS: 71-36-3	
Use Descriptor	Sector of Use: Industrial (SU3)	
	Process Categories: PROC1, PROC2, PROC3, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC17	
	Environmental Release Categories: ERC4	
Processes, tasks, activities covered	Covers the use in formulated MWFs/rolling oils including transfer operations, rolling and annealing activities, cutting/machining activities, automated and manual application of corrosion protections (including brushing, dipping and spraying), equipment maintenance, draining and disposal of waste oils.	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	<i>Not applicable</i>	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]	
Human factors not influenced by risk management	<i>Not applicable</i>	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC17, PROC18)	
Contributing Scenarios	PROCs	Risk Management Measures
General exposures (closed systems) [CS15]. Continuous process [CS54].	1	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}



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General exposures (closed systems) [CS15]. Continuous process [CS54]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	2	Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
General exposures (closed systems) [CS15]. Batch process [CS55]. With sample collection [CS56].	3	Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
Batch process [CS55]. Mixing operations (open systems) [CS30].	5	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
Spraying [CS10].	7#2	Use in a spraying booth. Minimization of manual phases. #1 Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Ensure that the task is being carried out outside the breathing zone of a worker. Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82].	8a	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81].	8b	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 97%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1



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Pouring from small containers [CS9]. Dedicated facility [CS81].	9	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
Rolling, Brushing [CS51].	10	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
Dipping, immersion and pouring [CS4].	13	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
Operation and lubrication of high energy open equipment [CS17].	17	Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1
	17 ^{#3}	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 95%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1

#1 refers to qualitative assessment

#2 other Tool used: Stoffenmanager (v. 4.0; 75th percentile for long term assessment)

#3 assessment at higher temperature (approx. 64 °C)/higher vapor pressure (>= 100 hPa); ECTOC TRA: high fugacity



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16. ES8 – Metal working fluids / rolling oils (Professional)

Section 1		Exposure Scenario Title
Title	Metal working fluids / rolling oils; CAS: 71-36-3	
Use Descriptor	Professional (SU22)	
	Process Categories: PROC1, PROC2, PROC3, PROC5, PROC8a, PROC8b, PROC10, PROC11, PROC13, PROC17	
	Environmental Release Categories: ERC8a	
Processes, tasks, activities covered	Covers the use in formulated MWFs including transfer operations, open and contained cutting/machining activities, automated and manual application of corrosion protections, draining and working on contaminated/ reject articles, and disposal of waste oils.	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	<i>Not applicable</i>	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]	
Human factors not influenced by risk management	<i>Not applicable</i>	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC17, PROC18)	
Contributing Scenarios	PROCs	Risk Management Measures
General exposures (closed systems) [CS15]. Continuous process [CS54].	1	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}



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General exposures (closed systems) [CS15]. ; Continuous process [CS54]. With sample collection [CS56]. ; Equipment cleaning and maintenance [CS39].	2	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
General exposures (closed systems) [CS15]. Batch process [CS55]. ; With sample collection [CS56].	3	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
Batch process [CS55]. Mixing operations (open systems) [CS30].	5	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82]	8a	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}
Transfer from/pouring from containers [CS22]. Dedicated facility [CS81]	8b	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}
Rolling, Brushing [CS51].	10	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}
Spraying [CS10].	11 ^{#2}	Use in a spraying booth. Minimization of manual phases. ^{#1} Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Ensure that the task is being carried out outside the breathing zone of a worker. Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1}



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		Use suitable eye protection and gloves [PPE14]. #1
		Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 47%) Minimization of manual phases. #1 Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Avoid carrying out operation for more than 6 hours Use suitable eye protection and gloves [PPE14]. #1
		Provide enhanced mechanical ventilation by mechanical means [E48].(effectiveness general ventilation: 47%) Minimization of manual phases. #1 Clean equipment and the work area every day [C&H3]. Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1 Wear a suitable respiratory protection (effectiveness: 80%). If no adequate respiratory protection is available, avoid carrying out operation for more than 5 hours.
Dipping, immersion and pouring [CS4].	13	Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. #1
Operation and lubrication of high energy open equipment [CS17].	17	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. #1 Avoid frequent and direct contact with substance. #1 Supervision in place to check that the RMMs in place are being used correctly and OCs followed. #1 Use suitable eye protection and gloves [PPE14]. #1



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SAFETY DATA SHEET-extended

Prepared in accordance with Annex II of REACH Regulation (EC) 1907/2006, Regulation (EC) 1272/2008 and regulation (EC) 453/2010

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		Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 1 hour [OC11] Use suitable eye protection and gloves [PPE14]. ^{#1}
	17 ^{#3}	Provide extract ventilation to points where emissions occur [E54]. (effectiveness LEV: 90%) Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}
		Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1} Wear a suitable respiratory protection (Effectiveness:90%)

^{#1} refers to qualitative assessment

^{#2} other Tool used: Stoffenmanager (v. 4.0; 75th percentile for long term assessment)

^{#3} assessment at higher temperature (approx. 64 °C)/higher vapor pressure (>= 100 hPa); ECTOC TRA: high fugacity

For dermal exposure and effects on the eyes, a qualitative assessment was conducted.

17. ES9 – Use as consumer care product or disinfectant (Consumer)

In general, the use of perfumes, fragrances (PC28) and cosmetics, personal care products (PC 39) are considered to be covered by other legislations.

Exposure scenario: see above

18. ES10 – Use in laboratories (Professional)

Section 1	Exposure Scenario Title
Title	Use in laboratories; CAS: 71-36-3
Use Descriptor	Professional (SU22)
	Process Categories: PROC10, PROC15
	Environmental Release Categories: ERC8a
Processes, tasks, activities covered	Use of small quantities within laboratory settings, including material transfers and equipment cleaning



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Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	<i>Not applicable</i>	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]	
Human factors not influenced by risk management	<i>Not applicable</i>	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes activities are at ambient temperature (unless stated differently) [G17]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]. (PROC17, PROC18)	
Contributing Scenarios	PROCs	Risk Management Measures
Rolling, Brushing [CS51].	10	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Avoid carrying out operation for more than 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}
Laboratory activities [CS36]. Small scale [CS61].	15	Minimization of manual phases. ^{#1} Avoid frequent and direct contact with substance. ^{#1} Supervision in place to check that the RMMs in place are being used correctly and OCs followed. ^{#1} Use suitable eye protection and gloves [PPE14]. ^{#1}

^{#1} refers to qualitative assessment



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