



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

Iso-BUTANOL

Revision: 0 Last up date:

Date issued: January, 2011 Page 1/77

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

1.1. Substance Identification

Trade name	Iso-Butanol
IUPAC name	2-Methyl-1-propanol
Synonym	Isobutyl Alcohol, Isopropylcarbinol
EC#	201-148-0
CAS #	78-83-1
Molecular Formula	$(\text{CH}_3)_2\text{CH}-\text{CH}_2\text{OH}$
Molecular weight	74.12
REACH Registration number	01-2119484609-23-0009
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
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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 2/77

Uses by consumers

- 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:	tehnic@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 (CLP/GHS)

Flam. Liquid 3: H226: Flammable liquid and vapour.

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.

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 3/77

2.1.2. Classification according to Directive 67/548/EEC

R10 Flammable.

R67 Vapours may cause drowsiness and dizziness.

Xi; R41 Irritant; Risk of serious damage to eyes.

Xi; R37/38 Irritant: Irritating to respiratory system and skin

2.2. Label elements

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

Signal word: Danger

Hazard pictogram:

GHS02: flame



GHS05: corrosion



GHS07: exclamation mark



Hazard statements:

H226: Flammable liquid and vapour.

H335: May cause respiratory irritation.

H315: Causes skin irritation.

H318: Causes serious eye damage.

H336: May cause drowsiness or dizziness.

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 4/77

Precautionary statements:

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.

P243: Take precautionary measures against static discharge.

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, dry extinguishing media, 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

Indication of danger:



Xi - irritant

R-phrases:

R10 - flammable

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

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 5/77

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

2.3. Other effects

The substance does not fulfil the PBT criteria (not PBT) and not the vPvB criteria (not vPvB).

iso-Butanol is a volatile, combustible and flammable liquid that should be stored in well-ventilated areas. Dangerous fire hazard when exposed to heat, flame and oxidizers. Vapor-air mixtures are explosive above flash point.

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	Concentra tion (%)
Iso-Butanol	No/No	78-83-1/201-148 01-2119484609-23- 0009	Flam. Liquid 3: H226 Skin Irritation 2: H315 Eye Damage 1 : H318 STOT Single Exp. 3: H335 STOT Single Exp. 3: H336	R10 R67 Xi; R37/38- R41	Min.99.5

Impurities

No impurities relevant for classification and labeling.

See section 16 for the full text of the R phrases and H-statement declared above

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 6/77

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 and rest in half upright position. 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.

In case of ingestion: Remove ingested material by gastric lavage or emesis. Give artificial respiration with oxygen if respiration is depressed. Get medical attention. **Administration of gastric lavage is permitted only by qualified medic personnel.**

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

By eye contact: Vapors concentration >100ppm may cause irritation, redness pain and blurred vision.

By skin contact: Irritant. Contact with vapors or liquid may cause mild to moderate irritation and redness. The substance caused slight erythema and hyperemia but without the formation of wheals.

By ingestion: May cause abdominal pain, headache, nausea and diarrhoea. Large doses affect liver and kidnees. May have narcotic effect. Ingestion may also lead to alcohol poisoning.

By inhalation: Iso-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 and unconsciousness.

Chronic effects: Prolonged inhalation has caused auditory nerve and vestibular injury resulting in severe vertigo and hearing loss in workers exposed to iso-Butanol. Repeated or prolonged contact may decrease the skin resulting in drying, cracking and eczematoid dermatitis. Person with pre-

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 7/77

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

Treat symptomatically and supportively.

5. FIRE - FIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media: Dry chemical powder extinguishers are recommended. These are particularly useful when fires involve "live" electrical equipment, because the powder is non-conducting. For a small fire, use carbon dioxide, dry chemical powder, alcohol-resistant foam, sand, earth, or water spray. Do not use water in a jet. For a large fire, use alcohol-resistant foam, or water fog.

Unsuitable extinguishing media: Do not use water streams, since the streams will scatter and spread the fire. For maintaining the tanks cool, use sprayed water.

5.2 Special hazards arising from the substance or mixture

Exposure hazards: iso-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. 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.

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 8/77

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 oxidizers, heat, sparks, electric equipment & open flame. Closed containers may explode if exposed to extreme heat. Empty container very hazardous!

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.

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: absorb the spilt liquid with sand, earth or other absorbent material(e.g.vermiculite) and place in a chemical waste container for subsequent disposal by burning. Flush the contaminated area with plenty of water.

For large spills: Prevent spilt liquid from spreading by the use of sand or earth. If possible, transfer the liquid to a salvage tank. Otherwise, treat as for a small spillage. Inform the local authorities

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 9/77

(particularly the fire service) at once, if the spilt liquid enters the surface drains, since a potential explosive hazard will be created.

Special precautions: Do not use combustible materials as absorbent, 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 iso-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. 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: alkali metals, inorganic acids, oxidizers, acetaldehyde, isocyanates, chlorine.

Incompatible materials for storage: aluminium, plastics, rubber are attacked.

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 10/77

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): 0.4 mg/L

PNEC aqua (marine water): 0.04 mg/L

PNEC aqua (intermittent releases): 11 mg/L

PNEC sediment (freshwater): 1.52 mg/kg sediment dw

PNEC sediment (marine water): 0.152 mg/kg sediment dw

PNEC STP: 10 mg/L

PNEC soil: 0.0699 mg/kg soil dw

Refer to section 11 and 12 of the SDS for information on PNEC and DNEL derivation. Guidance on how to comply with these DNELs and PNECs is given in the attached Exposure Scenarios, in the annex.

8.2 Exposure controls

Appropriate engineering controls: Apply technical measures to comply with the occupational exposure limits. 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.

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 11/77

Eye / Face protection : Use chemical safety goggles and/or a full face shield when is possible. Avoid using contact 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 taken out and washed. The contaminated equipment will not be stored near clean clothing and it will not be taken home because the family member must not be exposed.

Environmental Exposure Control: Please refer to the annex - exposure scenarios of this SDS for detailed information.

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

Important health, safety and environmental informations

pH 7 (for 85 g/l solution at 20°C)
Boiling point 108°C, at 1013 hPa
Flash point 31°C at 1013 hPa
Flammability Flammable upon ignition.
The substance has no pyrophoric properties and does not liberate flammable gases on contact with water
Explosive properties non explosive
Oxidizing properties No oxidizing properties
Vapor pressure < 16 hPa at 20°C
Specific gravity (water=1) at 20°C 0,802
Solubility - water 70 g/L at 20°C
-ethanol, ether freely soluble
Partition coefficient (log K_{ow}) 1 at 25°C
Dynamic viscosity at 20°C 4 mPas
Vapor relative density (air=1) 2,6
Evaporation rate (BuAc=1) 0.8

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 12/77

Other informations

Melting point < -90° C
Self-ignition temperature 400° C at 1007 hPa

10. STABILITY AND REACTIVITY

10.1. Reactivity: See section 10.5.

10.2. Chemical stability: Stable under ordinary conditions of use and storage.

10.3. Possibility of hazardous reactions:

- alkali metals: reacts with formation of flammable hydrogen gas;
- inorganic acids: hazardous of explosion;
- oxidizers (strong): reacts with formation of flammable hydrogen gas;
- acetaldehyde: violent condensation reaction;
- isocyanates: possible explosion in absence of solvent;
- chlorine: formation of highly explosion alkyl hypochlorites.

10.4. Conditions to avoid: Heat, sparks, electric equipment & open flame.

10.5. Incompatible materials: Oxidizing agents (such as chromium trioxide), reducing agents, acids and bases, amines.

Iso-butanol may react at high temperatures with aluminum (metallic). Also iso-butanol could attack plastics and rubber.

11. TOXICOLOGICAL INFORMATION

	Conclusions
Absorbtion	no bioaccumulation potential based on study results.
Acute toxicity	<u>Oral route:</u> Rat: LD50 = >2830 mg/kg bw (males) / 3350 mg/kg bw (females; GLP, OECD 401 Mouse: LD50 = 3500 mg/kg bw (Kushneva et al. 1983, Val. 4)

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 13/77

	<p><u>Inhalation route:</u></p> <p>Rat, 6 h: LC0 \geq 18.2 mg/L (GLP, neurotoxicity guideline, CMA 1994)</p> <p>Rat, 4 h: LC50 = 19.6 mg/L; irritation of the respiratory tract (Kushneva et al. 1983, Val. 4)</p> <p>Mouse, 4 h: LC50 = 15.5 mg/L (Kushneva et al. 1983, Val. 4)</p> <p>Guinea pig, 4 h: LC50 = 19.9 mg/L (Kushneva et al. 1983, Val. 4)</p> <p><u>Dermal route:</u></p> <p>Rabbit: LD50 = > 2000 mg/kg bw (males); 2460 mg/kg bw (females; GLP, OECD 402; Union Carbide Corporation 1993)</p> <p>The available data for isobutanol indicate a relative low potential for acute toxicity; the substance has not to be classified according to 67/548/EEC and 1272/2008/EC (CLP) requirements.</p>
Irritation/Corrosion	<p><u>Skin</u></p> <p>Results of the available studies led to the classification as skin irritant (R38) according to Annex I of 67/548/EEC, corresponding to skin irritation Cat. 2 following 1272/2008/EC (CLP) requirements.</p> <p><u>Eye</u></p> <p>Due to the irreversible irritation effects on rabbit eyes, isobutanol has to be classified as posing the risk of serious eye damage according to Annex I of 67/548/EEC (R41) and as eye irritant Cat. 1 according to 1272/2008/EC (CLP) criteria.</p> <p><u>Respiratory tract</u></p> <p>Due to the effects observed in an acute inhalation study, isobutanol has to be classified as irritant to the respiratory</p>
Sensitisation	<p>Due to the negative results of a QSAR calculation for isobutanol and of the analogous substance propan-1-ol in a guinea pig maximisation test, isobutanol has not to be classified as skin sensitiser according to 67/548/EEC and 1272/2008/EC (CLP) requirements.</p>

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 14/77

Repeated dose toxicity	<p><u>Oral route</u> 90 d, rat, drinking water: NOAEL \geq ca. 1450 mg/kg bw/ day (= 16000 ppm; no effects observed; OECD 408, GLP; BG Chemie 1990)</p> <p><u>Dermal route</u> 4-6 times 0.3 mL for 24 h within 7 d, rabbit, occlusive: no systemic toxicity studied; local: highly irritant (TSCATS OTS 0510692, 1986; Val. 4)</p> <p><u>Inhalation route</u> 90 d, rat, 6 h/d, 5 d/wk: NOAEL systemic \geq ca. 7.5 mg/L/day (2500 ppm); NOEL systemic = ca. 3.0 mg/L/day due to slight hematologic effects with questionable biological significance (GLP, neurotoxicity guideline, CMA 1996a)</p> <p>2-gen study/ca. 17 wks for the parental generation, 6 h/d, 7 d/wk: NOAEL systemic \geq ca. 7.5 mg/L/day (2500 ppm, no effects observed; GLP, EPA OPPTS 870.3800; ACC 2003)</p> <p>There is currently no need for classification of effects according to 67/548/EEC and 1272/2008/EC (CLP) requirements due to repeated exposure to the test substance.</p>
Mutagenity	<p>Iso-butanol was not genotoxic in vitro experiments using human, rodent, and bacterial cells or in vivo experiments in mice. For isobutanol, there is therefore no need for classification for mutagenic effects according to 67/548/EEC and 1272/2008/EC (CLP) requirements.</p>
Carcinogenity	<p>Due to the lack of a carcinogenic potential of isobutanol, there is currently no need for classification and labeling.</p>
Toxicity for reproduction	<p>Due to the lack of toxicity on fertility and development in definite studies with isobutanol, there is no need for classification according to reproductive toxicity according to 67/548/EEC and 1272/2008/EC (CLP) requirements.</p>

12. ECOLOGICAL INFORMATIONS

Aquatic Toxicity

Short-term toxicity to fish

Pimephales promelas/Fresh water/ flow-through LC50 (96 h)= 1430 mg/L

Iso-butanol is acutely not harmful to fish.

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 15/77

Long-term toxicity to fish

No data on long-term toxicity on fish are available.

Short-term toxicity to aquatic invertebrates

Daphnia pulex/freshwater/static EC50 (48 h) ≥ 1100 mg/L

Iso-butanol is acutely not harmful to aquatic invertebrates.

Long-term toxicity to aquatic invertebrates:

Daphnia magna/ freshwater NOEC (21 d): 20 mg/L test mat.

Algae and aquatic plants

Pseudokirchnerella subcapitata (algae)/freshwater/static EC50 (72 h): 1799 mg/L test mat. And the NOEC (72 h) = 53 mg/L (OECD 201)

Scenedesmus subspicatus (new name: *Desmodesmus subspicatus*) (algae)/freshwater/static

EC50 (48h) of 2300 mg/L and a NOEC of approximately 900 mg/L (EC10).

Iso-butanol is acutely not harmful to aquatic algae.

Toxicity to sediment

No data on sediment toxicity are available.

Toxicity to soil macro-organisms

The substance exhibits low potential for adsorption to soil, is not bioaccumulative and is readily biodegradable. This means that the substance will be rapidly mineralized by microorganisms in soil.

Toxicity to terrestrial plants:

Is not harmful to plants.

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: Regarding the 1-octanol/water partition coefficient, accumulation of the test substance in organisms is not to be expected.

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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

Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 16/77

Secondary poisoning: Due to the logPow, significant accumulation in organisms is not expected. Therefore, secondary poisoning is of no concern for this substance.

12.4. Mobility

Iso-butanol will preferentially distributed into the compartments water and air.

Air: After evaporation or exposure to the air, the product will be slowly degraded by photochemical processes with half-life (t1/2) of about 56 hours.

Water: Iso-butanol will slowly evaporate from the water surface into the atmosphere. iso-Butanol is readily biodegradable in water. In a simulation test according to OECD guideline 303A iso-butanol show a biodegradation degree of 90-100 % (DOC) after 35 days.

Soil and sediments: Based upon a calculated log Koc adsorption to solid soil phase is not expected.

12.5. Results of PBT and vPvB assessment:

Iso-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.

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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

Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 17/77

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.

14. TRANSPORT INFORMATION

Iso-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.	1212
Proper shipping name	iso-Butanol
Hazard class	3
UN Packing Group	III
Classification code	F1

Danger panel 30/1212 (*Hazard Identification No.* 30)
(UN Identification No 1212)

IMDG/IMO

UN No.	1212
Hazard class	3
UN Packing Group	III
Proper shipping name	iso-Butanol
EmS No.	F-E, S-D
Marine pollutant	No

IATA/IT-ICAO

Proper shipping name	iso-Butanols
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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 18/77

UN No.	1212
Hazard class	3
UN Packing Group	III
IATA Label	Flammable Liquid
Packaging Note Passenger	309
Packaging Note Cargo	310
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): iso-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: iso-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.

H335: May cause respiratory irritation.

H315: Causes skin irritation.

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 19/77

H318: Causes serious eye damage.

H336: May cause drowsiness or dizziness.

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

R10 Flammable

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.

P243: Take precautionary measures against static discharge.

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, dry extinguishing media, 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.

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 20/77

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.

16.6. Revision: Revision 0

This is the first version of the eSDS of iso-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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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 21/77

ANNEX I –EXPOSURE SCENARIO

1. ES1 - Manufacture of isobutanol (Industrial)

Section 1		Exposure Scenario Title
Title	Manufacture of i-Butanol; CAS: 78-83-1	
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]. (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}

This information only concerns the above mentioned product and does not need to be valid if used with other product(s) or in any process. The information is to our best present knowledge correct and complete and is given in good faith but without warranty. It remains the user's own responsibility to make sure that the information is appropriate and complete for his special use of this product.

SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 22/77

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

2. ES2 – Use as intermediate (Industrial)

Section 1	Exposure Scenario Title
Title	Use as intermediate; CAS: 78-83-1

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 23/77

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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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 24/77

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

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

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 25/77

Section 1		Exposure Scenario Title
Title	Formulation & (re)packing of substances and mixtures; CAS: 78-83-1	
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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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 26/77

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}

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 27/77

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

4. ES4 – Distribution of substance (Industrial)

Section 1	Exposure Scenario Title
Title	Distribution of substance; CAS: 78-83-1
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].

This information only concerns the above mentioned product and does not need to be valid if used with other product(s) or in any process. The information is to our best present knowledge correct and complete and is given in good faith but without warranty. It remains the user's own responsibility to make sure that the information is appropriate and complete for his special use of this product.

SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 28/77

		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	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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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 29/77

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. ES 4 – Distribution of substance (Professional)

Section 1	Exposure Scenario Title
Title	Distribution of substance; CAS: 78-83-1
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]
Human factors not influenced by risk management	<i>Not applicable</i>

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 30/77

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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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 31/77

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
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

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

Section 1	Exposure Scenario Title
Title	Use in coatings (paints, ink, toners, adhesives); CAS: 78-83-1
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

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 32/77

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 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

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 33/77

		[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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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 34/77

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

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 35/77

		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}
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

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

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 36/77

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

Section 1	Exposure Scenario Title
Title	Use in coatings (paints, ink, toners, adhesives); CAS: 78-83-1
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>

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 37/77

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	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}

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 38/77

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> <hr/> <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 4 hours [OC12] Use suitable eye protection and gloves [PPE14]. ^{#1}</p>

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 39/77

		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 2 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}
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)

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 40/77

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 isobutanol.

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.

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)		1600
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 58m3 [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 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}

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 41/77

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 20m3[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 53m3[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 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}
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}

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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 42/77

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];
	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 1.5% [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 20m3[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 4% [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 20m3[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 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}

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 43/77

		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 15% [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
PC15_n: Non-metal surface treatment products--Waterborne latex wall paint; Tier 2: ConsExpo estimates (waterborne wall paint)	OC	Covers concentrations up to 1.5% [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 20m3[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 4% [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 20m3[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 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

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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 44/77

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 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}
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 20m3[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 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}
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 58m3[ConsOC11]; for each use event, covers exposure up to 4hr/event[ConsOC14];

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 45/77

	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}
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: 78-83-1
Use Descriptor	Sector of Use: Industrial (SU3)

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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 46/77

		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].
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}

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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 47/77

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
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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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 48/77

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

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

10. ES6 – Use in cleaning agents (Professional)

Section 1	Exposure Scenario Title
Title	Use in cleaning agents; CAS: 78-83-1
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].

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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 49/77

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}
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}

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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 50/77

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
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 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 4 hours 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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 51/77

		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 2 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}

^{#1} refers to qualitative assessment

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

11.2. ES6 – Use in cleaning agents (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 isobutanol.

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.

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		

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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 52/77

Section 2		Operational conditions and risk management measures
Section 2.1		Control of consumer exposure
Product characteristics		
Physical form of product		liquid
Vapour pressure (Pa)		1600
Concentration of substance in product		Unless otherwise stated, covers concentration up to 50% [ConsOC1]
Amounts used		Unless otherwise stated, covers use amounts up to 3750g [ConsOC2];
Frequency and duration of use/exposure		Unless otherwise stated, covers use frequency up to 1 times per day [ConsOC4]; covers exposure up to 4 hours per event [ConsOC14]
Other Operational Conditions affecting exposure		Unless otherwise stated, assumes use at ambient temperature [ConsOC15]; assumes use in rooms up to 58m3 [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 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	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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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 53/77

	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 1.5% [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 20m3[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 4% [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 20m3[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 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. 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}

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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 54/77

PC9c:Finger paints	OC	Covers concentrations up to 15% [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 20m ³ [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 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. 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 6% [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}

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 55/77

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}
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}

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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 56/77

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.
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^{#1} RMMs refer to qualitative assessment

12. ES7 – Use in lubricants (Industrial)

Section 1	Exposure Scenario Title	
Title	Use in lubricants; CAS: 78-83-1	
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.	
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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Prepared in accordance with Annex II of REACH Regulation (EC) 1907/2006, Regulation (EC) 1272/2008 and regulation (EC) 453/2010

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 57/77

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}
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}

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 58/77

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
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

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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 59/77

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/higher vapor pressure (≥ 100 hPa); ECTOC TRA: high fugacity

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 60/77

9.13. ES7 – Use in lubricants (Professional)

Section 1		Exposure Scenario Title
Title		Use in lubricants; CAS: 78-83-1
Use Descriptor		Sector of Use: Professional (SU22)
		Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC10, PROC11, 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.
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		
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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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 61/77

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

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 62/77

		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} 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 4 hours [OC12] 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 respirator with an effectiveness of 80%. If no adequate respirator is available, avoid carrying out operation for more than 2 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

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 63/77

		[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}
		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%)
Greasing, high energy. General exposures [CS1].	18	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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 64/77

		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}
	18 ^{#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%)
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/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 isobutanol.

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.

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

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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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 65/77

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)		1600
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];
<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];

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 66/77

	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 53m3[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 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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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 67/77

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 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 6% [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];

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 68/77

	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

^{#2} covered by PC31 and PC35

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

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 69/77

Section 1		Exposure Scenario Title
Title	Metal working fluids / rolling oils; CAS: 78-83-1	
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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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 70/77

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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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 71/77

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/higher vapor pressure (>= 100 hPa); ECTOC TRA: high fugacity

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

Section 1	Exposure Scenario Title
Title	Metal working fluids / rolling oils; CAS: 78-83-1

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 72/77

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]. (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}

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 73/77

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 Use suitable eye protection and gloves [PPE14]. #1

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SAFETY DATA SHEET-extended

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 74/77

		<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 4 hours [OC12] 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 respirator is available, avoid carrying out operation for more than 2 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>

This information only concerns the above mentioned product and does not need to be valid if used with other product(s) or in any process. The information is to our best present knowledge correct and complete and is given in good faith but without warranty. It remains the user's own responsibility to make sure that the information is appropriate and complete for his special use of this product.

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

Iso-BUTANOL

Revision: 0 Last up date: Date issued: January, 2011 Page 75/77

	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/higher vapor pressure (>= 100 hPa); ECTOC TRA: high fugacity

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.

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 76/77

19.ES10 – Use in laboratories (Professional)

Section 1		Exposure Scenario Title
Title	Use in laboratories; CAS: 78-83-1	
Use Descriptor	Sector of Use: 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	
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}

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Iso-BUTANOL

Revision: 0

Last up date:

Date issued: January, 2011

Page 77/77

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

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