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Prepared By: Brooke DiDomenico Administrative Control: Administrative Controller	Instruction No. SDS-012 PANA	Issue No: 4 Issue Date: 11/27/18 Page 1 of 30

SECTION 1 – IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 PRODUCT IDENTIFIER

TRADE NAME: PANA

SUBSTANCE NAME: N-Phenyl-1-naphthylamine

EINECS NUMBER: 201-983-0

REACH REGISTRATION NUMBER: 01-2119488704-27-0003

CAS NUMBER: 90-30-2

1.2 RELEVANT IDENTIFIED USES OF THE SUBSTANCE OR MIXTURE AND USES ADVISED AGAINST

MAIN USE: Industrial use, Professional use, Consumer use

SPECIFIC USES: See exposure scenarios in Annex.

1.3 DETAILS OF THE SUPPLIER OF SAFETY DATA SHEET

MANUFACTURER: NATION FORD CHEMICAL COMPANY
2300 Banks Street
Fort Mill, South Carolina 29715
United States of America

EMAIL: INFO@NATIONFORDCHEM.COM

PRODUCT INFO TELEPHONE: +1-803-548-3210

ONLY REPRESENTATIVE: Chemservice GmbH
Herrnsheimer Hauptstr. 1b
67550 Worms, Germany

EMAIL: germany@chemservice-group.com

PHONE: +49-6241-95480-0

FAX: +49 (0)6241-95480-25

1.4 EMERGENCY TELEPHONE NUMBER

CHEMTREC: +1-800-424-9300



SECTION 2 - HAZARDS IDENTIFICATION

2.1 CLASSIFICATION OF A SUBSTANCE OR MIXTURE

Classification in accordance with Regulation (EC) No 1272/2008 and 29CFR 1910.1200 (OSHA).

Acute Toxicity: Category 4
H302 Harmful if swallowed.

Skin Sensitizer: Category 1
H317 May cause an allergic skin reaction

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Specific Target Organ Toxicity – Repeat Exposure: Category 2
H373 May cause damage to blood system through prolonged or repeated exposure
Aquatic Acute Toxicity – Category 1
H400 Very toxic to aquatic life
Aquatic Chronic Toxicity – Category 1
H410 Very toxic to aquatic life with long lasting effects

2.2 LABEL ELEMENTS

Labelling in accordance to Regulation (EC) No 1272/2008 and 29CFR 1910 (OSHA).

HAZARD PICTOGRAMS



SIGNAL WORD: Danger

HAZARD STATEMENTS:

H302 Harmful if swallowed.
H317 May cause an allergic skin reaction.
H373 May cause damage to blood system through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

PRECAUTIONARY STATEMENTS:

P261 Avoid breathing mist, vapors, or spray.
P264 Wash thoroughly after handling
P270 Do not eat, drink or smoke when using this product
P272 Contaminated work clothing should not be allowed out of the workplace.
P273 Avoid release to the environment.
P280 Wear protective clothing.
P301 + P312 IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell.
P330 Rinse mouth.
P302 + P352 IF ON SKIN: Wash with plenty of water.
P333 + P313 If skin irritation or rash occurs: Get medical advice.
P362 + P364 Take off contaminated clothing and wash it before reuse.
P314 Get medical advice if you feel unwell.
P391 Collect spillage.
P501 Dispose of contents/container in accordance with local, regional, national, and international regulations.



Other hazards

RESULTS OF PBT AND vPvB ASSESSMENT:

PBT Not applicable
vPvB Not applicable

SECTION 3 – COMPOSITION/INFORMATION ON INGREDIENTS

3.1 SUBSTANCE

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SUBSTANCE NAME: N-Phenyl-1-naphthylamine

EINECS NUMBER: 201-983-0
REACH REGISTRATION NUMBER: 01-2119488704-27-0003
CAS NUMBER: 90-30-2

PURITY: >99.6%
SYNONYMES: PANA
Phenylnaphthylamine

SECTION 4 - FIRST AID MEASURES

4.1 DESCRIPTION OF FIRST AID MEASURES

GENERAL INFORMATION Symptoms of poisoning may only appear several hours later. When symptoms persist or in all cases of doubt seek medical advice. Remove from exposure, lie down. Never give anything by mouth to an unconscious person.

INHALATION After inhalation of vapors during processing, remove the patient to fresh air at once.

SKIN CONTACT Take off all contaminated clothing immediately. If symptoms persist, call a physician. Wash off immediately with soap and plenty of water.

EYE CONTACT In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

INGESTION Should the product be swallowed seek medical advice.

NOTE TO PHYSICIAN Symptomatic treatment and if possible contact poison specialist.

4.2 MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED

May cause eye and skin irritation. May cause allergic skin reaction (sensitization). May be harmful if swallowed. Prolonged or repeated contact may cause damage to the blood system.

4.3 INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED

Immediate medical attention should not be necessary.



SECTION 5 – FIRE-FIGHTING MEASURES

5.1 EXTINGUISHING MEDIA

SUITABLE EXTINGUISHING MEDIA Carbon Dioxide (CO₂), Foam, Dry Chemical

5.2 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE

Do not allow run-off from firefighting to enter drains or water courses.

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5.3 ADVICE FOR FIRE FIGHTERS

Firemen must wear self-contained breathing apparatus.

5.4 ADDITIONAL INFORMATION

Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

6.1 PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

Use personal protective equipment.

6.2 ENVIRONMENTAL PRECAUTIONS

Prevent entry into drains, waters or soil. Prevent further leakage or spillage if safe to do so.

6.3 METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP

Take up avoiding formulation of dust. Fill into labelled, sealable containers.

6.4 REFERENCE TO OTHER SECTIONS

See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7 – HANDLING AND STORAGE

7.1 PRECAUTIONS FOR SAFE HANDLING

Provide adequate ventilation and, if necessary, exhaust ventilation during handling or transferring of the product. Avoid contact with skin and eyes. Dispose of rinse water in accordance with local and national regulations. Persons with a history of skin sensitization problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.

7.2 CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES

REQUIREMENTS TO BE MET BY
STORAGE AREAS AND
CONTAINERS

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. No special storage conditions required.

INFORMATION ABOUT STORAGE
IN ONE COMMON STORAGE
FACILITY

Keep away from foodstuffs, drinks and tobacco.
No decomposition if stored and applied as directed.



GERMAN STORAGE CLASS

11 Combustible Solids

7.3 SPECIFIC END USE(S)

SU 3

Industrial Use

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SU 10
SU 22

Formulation [mixing] of preparations and/or re-packaging
Public Domain

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 CONTROL PARAMETERS

DNEL VALUES

DERMAL (LONG TERM EXPOSURE) 0.050 mg/kg bw/day

INHALATION (LONG TERM EXPOSURE) 0.18 mg/kg bw/day

PNEC VALUES

PNEC_{aqua} (freshwater) 0.0002 mg/L; Assessment factor 100
PNEC_{aqua} (marine water) 0.00002 mg/L; Assessment factor 1000
PNEC_{aqua} (intermittent releases) 0.002 mg/L; Assessment factor 100
PNEC_{STP} 100 mg/L

8.2 EXPOSURE CONTROLS:

PERSONAL PROTECTIVE EQUIPMENT GENERAL PROTECTIVE AND HYGIENIC MEASURES: Keep away from foodstuffs, beverages and feed. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Avoid contact with the eyes and skin.

RESPIRATORY PROTECTION NIOSH/MSHA approved respirator.



Dust - It is recommended to wear respiratory protection such as particle filter P2 or P3.

Vapor – It is recommended to wear respiratory protection such as a full maks with ABEK filter.

VENTILATION: Normal criterion for workplace air changes. A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area.

HAND PROTECTION Protective gloves
The glove material has to be impermeable and resistant to the substance.

Fabric	Thickness	Breakthrough Time
Natural Latex	1.4 mm	≤ 480 min



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Polychloroprene	0.65 mm	≤ 480 min
Nitrile	0.1 mm	≤ 480 min

EYE/FACE PROTECTION	In cases where there is likelihood of eye contact, wear chemical goggles.
SKIN AND BODY PROTECTION	Protective work clothing.
ENVIRONMENTAL EXPOSURE	Do not release into the environment. Dispose of as hazardous waste in accordance with local regulations.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Color	Yellow to tan crystalline flakes or pellets
Form	Solid
Odour	Pungent odour
Odour threshold	Not determined
pH	Not applicable
Melting / Freezing Point	62°C (143.6°F)
Boiling point	363°C (685.4°F) (estimated)
Flash Point	202°C (396°F)
Evaporation Rate	Not applicable
Flammability (solid, gaseous)	Product is classified.
Upper Explosion Limit	Not applicable
Lower Explosion Limit	Not applicable
Vapour Pressure	0.0011 Pa @ 25°C
Density	1.16 g/cm ³
Solubility in / Miscibility with Water (20°C)	3mg/L
Segregation coefficient (n-octanol/ water) at 25°C	4.47 log POW (estimated)
Ignition Temperature Decomposition Temperature	Not available
Self-igniting	Not available

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Danger of Explosion

As with most organic compounds, fine dust dispersed in air in the presence of an ignition source is a potential dust explosion hazard.

Dynamic Viscosity

Not applicable

Kinematic Viscosity

Not applicable

SECTION 10 - STABILITY AND REACTIVITY

10.1 REACTIVITY

Product is not reactive under normal conditions of storage and use.

10.2 CHEMICAL STABILITY

Product is stable under normal conditions of storage and use.

10.3 POSSIBILITY OF HAZARDOUS REACTIONS

Can react with acids

10.4 CONDITIONS TO AVOID

Extremes of temperature and direct sunlight.

10.5 INCOMPATIBLE MATERIALS



Keep away from reducing agents, oxidizing agents, acids and bases.

10.6 HAZARDOUS DECOMPOSITION PRODUCTS

Thermal decomposition does not occur until flash point is reached. No hazardous decomposition products when stored and handled correctly. Formation of carbon monoxide, carbon dioxide, nitrogen oxides and other toxic gases in the event of a fire or during thermal decomposition.

SECTION 11 - TOXICOLOGICAL INFORMATION

Acute Oral Toxicity	LD ₅₀ : 1625 mg/kg bw (rat)
Acute Dermal Toxicity	LD ₅₀ : >5000 mg/kg bw (rabbit)
Acute Inhalation Toxicity	No study performed as exposure is highly unlikely due to low vapor pressure.
Acute Intraperitoneal Toxicity	LD ₅₀ : 219 mg/kg bw (mouse)
Systemic Oral Toxicity	NOAEL: male - 5 mg/kg; female - 25 mg/kg (rat)
Skin Irritation/Corrosion	No adverse effect observed (not irritating)
Eye Irritation/Corrosion	No adverse effect observed (not irritating)
Skin Sensitization	Category 1B using OECD Guideline 406



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Germ Cell Mutagenicity	
<i>in vitro:</i>	No adverse effects observed
<i>in vivo:</i>	No adverse effects observed
Carcinogenicity	This product is not classified as a carcinogen by IARC, NPT, OSHA, or the EU CLP.
Reproductive toxicity oral	No adverse effects observed
STOT: Single Exposure	No Information Available
STOT: Repeated Exposure	Product may cause damage to the kidneys through repeated or prolonged exposure.
Aspiration Hazard	No Information Available
Neurotoxicity	No adverse effects observed

SECTION 12 - ECOLOGICAL INFORMATION

12.1 TOXICITY

Toxicity to Fish	Fish (low toxicity to fish) LC50: 0.44 mg/L Exposure time: 96 h
Toxicity to Aquatic Invertebrates	Daphnia (Harmful to aquatic invertebrates) EC50: 0.3 mg/L Exposure time: 48 h
	Daphnia EC10, LC10: 0.02 mg/L Exposure time: 21 d
Toxicity to Aquatic Algae and Cyanobacteria	Pseudokirchneriella subcapitata EC50: 0.93 mg/L Exposure time: 96 h
Toxicity to Microorganisms	Activated sludge EC50: >10.000 mg/L Exposure time: 3 h
Sediment Toxicity	LC50: 2.81 mg/L Exposure time: 48h
Toxicity to Soil Macroorganisms Except Arthropods	Enchytraeus crypticus NOEC: 220 µmol/kg soil dw Exposure time: 28 d

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Toxicity to Terrestrial Arthropods Folsomia candida
NOEC: 88 µmol/kg soil dw
Exposure time: 28 d

12.2 PERSISTENCE AND DEGRADABILITY

Not persistent.

12.3 BIOACCUMULATIVE POTENTIAL

No bioaccumulation potential.

12.4 MOBILITY IN SOIL

No further relative information available

12.5 RESULTS OF PBT AND VPVB ASSESSMENT

PBT	Substance is not a PBT
vPvB	Substance is not vPvB



12.6 OTHER ADVERSE EFFECTS

No further relevant information available

SECTION 13 - DISPOSAL CONSIDERATIONS

13.1 WASTE TREATMENT METHODS

Must not be disposed together with household garbage. Do not allow product to reach sewage system. Dispose of in accordance with local, regional, national, and international regulations.

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SECTION 14 - TRANSPORT INFORMATION

	14.1 UN Number	14.2 UN Proper Shipping Name	14.3 Hazard Class(s)	14.4 Packing Group	14.5 Environmental Hazards	Other
DOT	None	Not Regulated	None	None	Not applicable	None
ADR/RID AND(R)	UN3077	Environmentally hazardous substance, solid, n.o.s. (Phenyl-1-naphthylamine)	9	III	Yes	Classification Code – 90 Labels - 9
IMDG	UN3077	Environmentally hazardous substance, solid, n.o.s. (Phenyl-1-naphthylamine)	9	III	Yes (PP) Marine Polutant	EmS number – F-A (S_F) MPO: Marine Polutant Labels - 9
IATA/ICAO	UN3077	Environmentally hazardous substance, solid, n.o.s. (Phenyl-1-naphthylamine)	9	III	Marine Pollutant	Labels - 9

14.6 Special Precautions for User: Environmentally hazardous substance. Marine pollutants. Keep dry. Avoid heat above +40 °C. Keep separated from foodstuffs.

14.7 Transport in Bulk According to Annex II of MARPOL 73/78 and the IBC Code: Not applicable.

SECTION 15 – REGULATORY INFORMATION

15.1 Safety, Health and Environmental Regulations/Legislation Specific for the Substance or Mixture:

U.S. Federal Regulations



Comprehensive Environmental Response and Liability Act of 1980 (CERCLA): This product is not subject to CERCLA reporting requirements. Many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.

Toxic Substances Control Act (TSCA): All of the components of this product are listed on the TSCA inventory.

Clean Water Act (CWA): This material is not regulated under the Clean Water Act.

Clean Air Act (CAA): This material is not regulated under the Clean Air Act.

Superfund Amendments and Reauthorization Act (SARA) Title III Information:

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SARA Section 311/312 (40 CFR 370) Hazard Categories:

Immediate Hazard:	Yes	Pressure Hazard:	No
Delayed Hazard:	No	Reactivity Hazard:	No
Fire Hazard:	No		

This product contains the following toxic chemical(s) subject to reporting requirements of SARA Section 313 (40 CFR 372):

Components	C.A.S. #	WT %
None		

State Regulations

California: This product contains the following substances known to the state of California to cause cancer and/or reproductive toxicity:

Components	C.A.S. #	WT %
None		

International Regulations



Canadian Workplace Hazardous Materials Information System (WHMIS): Not a controlled product.

Canadian Environmental Protection Act: All of the components in this product are listed on the Domestic Substances list (DSL).

This SDS has been prepared according to the criteria of the Controlled Products Regulation (CPR) and the SDS contains all of the information required by the CPR.

European Inventory of Existing Chemicals (EINECS): All of the components in this product are listed on the EINECS inventory.

15.2 Chemical Safety Assessment: A Chemical Safety Assessment has been carried out

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SECTION 16 - OTHER INFORMATION

Date of Latest Revision: November 27, 2018

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Training



All the information mentioned in this MSDS are compliant with the COMMISSION REGULATION (EU) No 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

Abbreviations and Acronyms

EC50:	Effective concentration, 50 percent
GHS:	Globally Harmonized System of Classification and Labelling of Chemicals
EINECS:	European Inventory of Existing Commercial Chemical Substances
CAS:	Chemical Abstracts Service (division of the American Chemical Society)
LC50:	Lethal concentration, 50 percent
LD50:	Lethal dose, 50 percent

Annexes

Annex A: Exposure Scenarios

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Annex A.

Substance Name: N-1-naphthylamine
EC Number: 201-983-0
CAS Number: 90-30-2



Scenario 1: Industrial formulation of lubricant additives, lubricants and greases. Includes material transfers, mixing, large and small scale packing, sampling, maintenance and associated laboratory activities. (ATIEL-ATC Group A [i])

This scenario is described by the following combinations of use descriptors. The corresponding contributing scenarios are described in the respective subchapters.

An overall exposure scenario may be described by a number of contributing scenarios which may be subdivided into environmental exposure, worker exposure and consumer exposure.



The following scenarios contribute to the scenario *Industrial formulation of lubricant additives, lubricants and greases. Includes material transfers, mixing, large and small scale packing, sampling, maintenance and associated laboratory activities..*

The corresponding release to the environment, exposure of workers and consumers resulting from these contributing scenarios is summarized in chapter 10.1 ff.

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Description of ES 1

Free short title	Industrial formulation of lubricant additives, lubricants and greases. Includes material transfers, mixing, large and small scale packing, sampling, maintenance and associated laboratory activities. (ATIEL-ATC Group A [i])
Systematic title based on use descriptor	ERC 2; PROC 1, 2, 3, 4, 5, 8A, 8B, 9, 15
Name of contributing environmental scenario and corresponding ERC	ERC 2 Formulation of preparations ERC 2 Formulation of preparations
Name(s) of contributing worker scenarios and corresponding PROCs	PROC 1 - Use in closed process, no likelihood of exposure PROC 2 - Use in closed, continuous process with occasional controlled exposure PROC 3 - Use in closed batch process (synthesis or formulation) PROC 4 - Use in batch and other process (synthesis) where opportunity for exposure arises PROC 4 - Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5 - Mixing or blending in batch processes (multistage and/or significant contact) PROC 8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities PROC 8b - Transfer of chemicals from/to vessels/ large containers at dedicated facilities PROC 9 - Transfer of chemicals into small containers (dedicated filling line) PROC 15 - Use of laboratory reagents in small scale laboratories

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Contributing Scenario (1) controlling environmental exposure for ERC 2

Operational conditions	
Annual site tonnage	70 to/year
Daily amount used at site	233.333 kg/day
Release times per year	300 days/year
Local freshwater dilution factor	10
Local marine water dilution factor	100
Release fraction to air from process	0.01%
Release fraction to wastewater from process	2.00E-11
Release fraction to soil from process	0%
Fraction tonnage to region	100%
Fraction used at main source	100%
STP	yes (municipal)
River flow rate	18000 m ³ /day
Municipal sewage treatment plant discharge	2000000 L/day
Risk management measures	
SpERC	<p>ATIEL ATC SPERC 2.A(i)- PANA (release time: 300d) (The spERC is taken from the SPERC factsheet Ai-lubes released by ATIEL on 05 Oct 2012.</p> <p>The emission fraction to municipal wastewater is after application of assumed Risk Management Measures based on sector practices and other regulatory requirements for risk determining substances in base oil, consistent with OECD Emission Scenario Document on Lubricants and Lubricant Additives, No 10, November 2004.</p> <p>The substance was assigned to RDS code 2.2 based on the following substance characteristics:</p> <p style="text-align: center;">log Pow < 5 vp < 1 Pa not readily biodegradable PNEC: 0.0001 ≤ - <0.001 mg/L)</p>

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Contributing Scenario (2) controlling environmental exposure for ERC 2



Operational conditions	
Annual site tonnage	20 to/year
Daily amount used at site	1,000 kg/day
Release times per year	20 days/year
Local freshwater dilution factor	10
Local marine water dilution factor	100
Release fraction to air from process	0.01%
Release fraction to wastewater from process	2.00E-11
Release fraction to soil from process	0%
Fraction tonnage to region	100%
Fraction used at main source	100%
STP	yes (municipal)
River flow rate	18000 m ³ /day
Municipal sewage treatment plant discharge	2000000 L/day
Risk management measures	
SpERC	<p>ATIEL ATC SPERC 2.A(i)- PANA (release time: 20d) (The spERC is taken from the SPERC factsheet Ai-lubes released by ATIEL on 05 Oct 2012.</p> <p>The emission fraction to municipal wastewater is after application of assumed Risk Management Measures based on sector practices and other regulatory requirements for risk determining substances in base oil, consistent with OECD Emission Scenario Document on Lubricants and Lubricant Additives, No 10, November 2004.</p> <p>The substance was assigned to RDS code 2.2 based on the following substance characteristics:</p> <p style="text-align: center;">log Pow < 5 vp < 1 Pa not readily biodegradable</p>

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PNEC: 0.0001 ≤ - <0.001 mg/L)



Contributing Scenario (3) controlling industrial worker exposure for PROC 1

Name of contributing scenario	1 - Use in closed process, no likelihood of exposure
Scenario subtitle	Material storage
Exposure type	Inhalation: Long-term systemic, Short-term systemic Dermal: Long-term systemic, Short-term systemic
Qualitative Risk Assessment	
General	Handle substance within closed system.
Product characteristics	
Physical state	liquid
Concentration in substance	>25%
Fugacity / Dustiness	negligible
Frequency and duration of use	
Duration of activity	>4 hours (default) [LONG TERM] < 15 mins [SHORT TERM]
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	240 cm ²
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 0 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 20 95 %
Respiratory protection	no

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Contributing Scenario (4) controlling industrial worker exposure for PROC 2

Name of contributing scenario	2 - Use in closed, continuous process with occasional controlled exposure
Scenario subtitle	Material storage; Closed continuous processes at elevated temperature with sampling, including grease manufacture.
Exposure type	Inhalation: Long-term systemic, Short-term systemic Dermal: Long-term systemic, Short-term systemic
Qualitative Risk Assessment	
General	<p style="text-align: center;"> Avoid skin contact. Avoid contact with contaminated tools. Wash off any skin contamination immediately. Avoid splashing. Clean up contamination as soon as they occur. Ensure minimization of manual phases. Minimise number of staff exposed. Ensure good work practices are implemented Provide specific employee training to prevent/minimize exposures. In case of potential exposure: Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin. </p>
Product characteristics	
Physical state	liquid
Concentration in substance	>25%
Fugacity / Dustiness	negligible
Frequency and duration of use	
Duration of activity	>4 hours (default) [LONG TERM] > 15 minutes [SHORT TERM]
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	480 cm ²
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial

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Air concentration is limited to saturated vapour concentration (0.097359 mg/m³) (*justification: The formation of aerosols is not expected during this process. The concentration of the test substance in the air is therefore limited to the saturated concentration.*) [LONG TERM]

Technical conditions and measures to control dispersion and exposure

Local exhaust ventilation	yes (inhalation 90 %)
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Conditions and measures related to personal protection, hygiene and health evaluation

Protective gloves	Gloves APF 20 95 %
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Respiratory protection	no
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Use of external/measured value dermal	Dermal exposure was estimated using ECETOC 3. As an additional Tier 2 modification, the maximum concentration of the test substance during that process (27%) was taken into account following a linear approach. [LONG TERM]
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Contributing Scenario (5) controlling industrial worker exposure for PROC 3

Name of contributing scenario	3 - Use in closed batch process (synthesis or formulation)
Scenario subtitle	Batch closed process with sampling. Blending and Filling processes (closed / dedicated). Includes both bulk and small quantity additions. May be at elevated temperature, e.g. grease manufacture.
Exposure type	Inhalation: Long-term systemic, Short-term systemic Dermal: Long-term systemic, Short-term systemic



Qualitative Risk Assessment

General	Avoid skin contact. Avoid contact with contaminated tools. Wash off any skin contamination immediately. Avoid splashing. Clean up contamination as soon as they occur. Ensure minimization of manual phases. Minimise number of staff exposed. Ensure good work practices are implemented Provide specific employee training to prevent/minimize exposures.
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	<p style="text-align: center;">In case of potential exposure: Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin.</p>
Product characteristics	
Physical state	liquid
Concentration in substance	>25%
Fugacity / Dustiness	negligible
Frequency and duration of use	
Duration of activity	>4 hours (default) [LONG TERM] < 15 minutes [SHORT TERM]
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	240 cm ²
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 20 95 %
Respiratory protection	no
Use of external/measured value dermal	Dermal exposure was estimated using ECETOC 3. As an additional Tier 2 modification, the maximum concentration of the test substance during that process (27%) was taken into account following a linear approach. [LONG TERM]

Contributing Scenario (6) controlling industrial worker exposure for PROC 4

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Name of contributing scenario	4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Scenario subtitle	Batch open process. Blending and Filling processes (open / non dedicated). Includes addition of both bulk and small quantity additions, mixing operations. May be at elevated temperature, e.g. Grease manufacture.
Exposure type	Inhalation: Long-term systemic, Short-term systemic Dermal: Long-term systemic, Short-term systemic
Qualitative Risk Assessment	
General	<p style="text-align: center;"> Avoid skin contact. Avoid contact with contaminated tools. Wash off any skin contamination immediately. Avoid splashing. Clean up contamination as soon as they occur. Ensure minimization of manual phases. Minimise number of staff exposed. Ensure good work practices are implemented Provide specific employee training to prevent/minimize exposures. In case of potential exposure: Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin. </p>
Product characteristics	
Physical state	liquid
Concentration in substance	>25%
Fugacity / Dustiness	negligible
Frequency and duration of use	
Duration of activity	1 - 4 hours [LONG TERM] <15 minutes [SHORT TERM]
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	480 cm ²
Other given operational conditions affecting workers exposure	

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Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	98 %, burst-time: >4 hours (default) <i>(justification: For this process, gloves with an effectiveness of 98% are recommended. The 98% effectiveness is achieved and justified by specific activity training of workers in combination with intensive management supervision controls.)</i> [LONG TERM] Gloves APF 20 95 % [SHORT TERM]
Respiratory protection	no
Use of external/measured value dermal [LONG TERM]	Dermal exposure was estimated using ECETOC 3. As an additional Tier 2 modification, the maximum concentration of the test substance during that process (27%) was taken into account following a linear approach. In addition, the reduced duration of activity was taken into account following the banded approach (i.e. a factor of 0.6 was applied)

Contributing Scenario (7) controlling industrial worker exposure for PROC 4



Name of contributing scenario	4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Scenario subtitle	Sample collection of formulation
Exposure type	Inhalation: Long-term systemic, Short-term systemic Dermal: Long-term systemic, Short-term systemic
Qualitative Risk Assessment	
General	Avoid skin contact. Avoid contact with contaminated tools. Wash off any skin contamination immediately. Avoid splashing. Clean up contamination as soon as they occur. Ensure minimization of manual phases. Minimise number of staff exposed.

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	<p>Ensure good work practices are implemented</p> <p>Provide specific employee training to prevent/minimize exposures.</p> <p>In case of potential exposure:</p> <p>Use suitable chemically resistant gloves.</p> <p>Wear suitable coveralls to prevent exposure to the skin.</p>
Product characteristics	
Physical state	liquid
Concentration in substance	>25%
Fugacity / Dustiness	negligible
Frequency and duration of use	
Duration of activity	less than 15 mins
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	480 cm ²
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 20 95 %
Respiratory protection	no
Use of external/measured value dermal [LONG TERM]	Dermal exposure was estimated using ECETOC 3. As an additional Tier 2 modification, the maximum concentration of the test substance during that process (27%) was taken into account following a linear approach. In addition, the reduced duration of activity was taken into account following the banded approach (i.e. a factor of 0.1 was applied)

Contributing Scenario (8) controlling industrial worker exposure for PROC 5

Name of contributing scenario	4 - Use in batch and other process (synthesis) where opportunity for exposure arises
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Scenario subtitle	Batch open process. Blending and Filling processes (open / non dedicated). Includes addition of both bulk and small quantity additions, mixing operations. May be at elevated temperature, e.g. Grease manufacture.
Exposure type	Inhalation: Long-term systemic, Short-term systemic Dermal: Long-term systemic, Short-term systemic
Qualitative Risk Assessment	
General	<p style="text-align: center;">Avoid skin contact.</p> <p style="text-align: center;">Avoid contact with contaminated tools.</p> <p style="text-align: center;">Wash off any skin contamination immediately.</p> <p style="text-align: center;">Avoid splashing.</p> <p style="text-align: center;">Clean up contamination as soon as they occur.</p> <p style="text-align: center;">Ensure minimization of manual phases.</p> <p style="text-align: center;">Minimise number of staff exposed.</p> <p style="text-align: center;">Ensure good work practices are implemented</p> <p style="text-align: center;">Provide specific employee training to prevent/minimize exposures.</p> <p style="text-align: center;">In case of potential exposure:</p> <p style="text-align: center;">Use suitable chemically resistant gloves.</p> <p style="text-align: center;">Wear suitable coveralls to prevent exposure to the skin.</p>
Product characteristics	
Physical state	liquid
Concentration in substance	>25%
Fugacity / Dustiness	negligible
Frequency and duration of use	
Duration of activity	1 - 4 hours [LONG TERM] <15 minutes [SHORT TERM]
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	480 cm ²
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial

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Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	98 %, burst-time: >4 hours (default) <i>(justification: For this process, gloves with an effectiveness of 98% are recommended. The 98% effectiveness is achieved and justified by specific activity training of workers in combination with intensive management supervision controls.)</i> [LONG TERM] Gloves APF 20 95 % [SHORT TERM]
Respiratory protection	no
Use of external/measured value dermal [LONG TERM]	Dermal exposure was estimated using ECETOC 3. As an additional Tier 2 modification, the maximum concentration of the test substance during that process (27%) was taken into account following a linear approach. In addition, the reduced duration of activity was taken into account following the banded approach (i.e. a factor of 0.6 was applied)



Contributing Scenario (9) controlling industrial worker exposure for PROC 8A & 8B

Name of contributing scenario	8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
Scenario subtitle	Small pack (drum/bag) transfers - non dedicated facility.
Exposure type	Inhalation: Long-term systemic, Short-term systemic Dermal: Long-term systemic, Short-term systemic
Qualitative Risk Assessment	
General	Avoid skin contact. Avoid contact with contaminated tools. Wash off any skin contamination immediately. Avoid splashing. Clean up contamination as soon as they occur. Ensure minimization of manual phases. Minimise number of staff exposed. Ensure good work practices are implemented

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	Provide specific employee training to prevent/minimize exposures. In case of potential exposure: Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin.
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Product characteristics	
Physical state	solid
Concentration in substance	100%
Fugacity / Dustiness	low
Frequency and duration of use	
Duration of activity	15 mins to 1 hour [LONG TERM] < 15 minutes [SHORT TERM]
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	960 cm ²
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	98 %, burst-time: >4 hours (default) (<i>justification: For this process, gloves with an effectiveness of 98% are recommended. The 98% effectiveness is achieved and justified by specific activity training of workers in combination with intensive management supervision controls.</i>) [LONG TERM] Gloves APF 20 95 % [SHORT TERM]
Respiratory protection	no
Use of external/measured value dermal [LONG TERM]	Dermal exposure was calculated using "Risk of Derm 2.1" The following settings were applied: - Scenario: Filling, mixing or loading - ventilation rate: normal or good ventilation

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	<ul style="list-style-type: none"> - frequency of skin contact: rare contact - kind of contact: light contact - what type of product is handled: low or moderately dusty solid - are significant amounts of aerosols generated: no - what is the level of automation: Manual Task - use rate of the product: 50 kg/min - cumulative duration per shift: 45 min <p>Result: Estimated loading per shift hands = 58.9 mg</p> <p>Exposure in mg/kg bw is calculated as follows: 58.9 / 70 kg bw = 0.84 mg/kg bw</p> <p>This exposure is further reduced by the mandatory use of gloves with 98% effectiveness:</p> <p>$0.84 \text{ mg/kg} * 0.02 = 0.0168 \text{ mg/kg}$</p>
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Contributing Scenario (10) controlling industrial worker exposure for PROC 9

Name of contributing scenario	4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Scenario subtitle	Batch open process. Blending and Filling processes (open / non dedicated). Includes addition of both bulk and small quantity additions, mixing operations. May be at elevated temperature, e.g. Grease manufacture.
Exposure type	Inhalation: Long-term systemic, Short-term systemic Dermal: Long-term systemic, Short-term systemic
Qualitative Risk Assessment	
General	<p style="text-align: center;">Avoid skin contact.</p> <p style="text-align: center;">Avoid contact with contaminated tools.</p> <p style="text-align: center;">Wash off any skin contamination immediately.</p> <p style="text-align: center;">Avoid splashing.</p> <p style="text-align: center;">Clean up contamination as soon as they occur.</p> <p style="text-align: center;">Ensure minimization of manual phases.</p>

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	<p>Minimise number of staff exposed.</p> <p>Ensure good work practices are implemented</p> <p>Provide specific employee training to prevent/minimize exposures.</p> <p>In case of potential exposure:</p> <p>Use suitable chemically resistant gloves.</p> <p>Wear suitable coveralls to prevent exposure to the skin.</p>
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Product characteristics	
Physical state	liquid
Concentration in substance	>25%
Fugacity / Dustiness	negligible
Frequency and duration of use	
Duration of activity	1 - 4 hours [LONG TERM] <15 minutes [SHORT TERM]
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	480 cm ²
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	98 %, burst-time: >4 hours (default) (<i>justification: For this process, gloves with an effectiveness of 98% are recommended. The 98% effectiveness is achieved and justified by specific activity training of workers in combination with intensive management supervision controls.</i>) [LONG TERM] Gloves APF 20 95 % [SHORT TERM]
Respiratory protection	no

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Use of external/measured value dermal [LONG TERM]	Dermal exposure was estimated using ECETOC 3. As an additional Tier 2 modification, the maximum concentration of the test substance during that process (27%) was taken into account following a linear approach. In addition, the reduced duration of activity was taken into account following the banded approach (i.e. a factor of 0.6 was applied)
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Contributing Scenario (11) controlling industrial worker exposure for PROC 15

Name of contributing scenario	15 - Use of laboratory reagents in small scale laboratories
Scenario subtitle	QC & Laboratory
Exposure type	Inhalation: Long-term systemic, Short-term systemic Dermal: Long-term systemic, Short-term systemic
Qualitative Risk Assessment	
General	<p style="text-align: center;"> Avoid skin contact. Avoid contact with contaminated tools. Wash off any skin contamination immediately. Avoid splashing. Clean up contamination as soon as they occur. Ensure minimization of manual phases. Minimise number of staff exposed. Ensure good work practices are implemented Provide specific employee training to prevent/minimize exposures. In case of potential exposure: Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin. </p>
Product characteristics	
Physical state	solid
Concentration in substance	100%
Fugacity / Dustiness	low
Frequency and duration of use	
Duration of activity	1 - 4 hours [LONG TERM] < 15 minutes [SHORT TERM]

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Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	240 cm ²
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 20 95 %
Respiratory protection	no