

Nitric acid, technical 68 %Identcode: 0113
Version: 5.1 (MSDS_DE/EN)Revision Date: 01.07.2024
Print Date: 01.07.2024**1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING****1.1 Product identifiers**

Commercial Product Name: **Nitric acid, technical 68 %**
 Substance name: **Nitric acid 68 %**
 Chemical Formula: HNO₃
 CAS-No.: 7697-37-2
 Index-No.: 007-004-00-1
 EC-No.: 231-714-2
 REACH Registration Number: 01-2119487297-23-0021

1.2 Use of the Substance/Mixture

For the production of fertilizers and inorganic or organic chemicals. As an oxidizing agent for chemical processes. Solvent and pickling agent for metals.

1.2 Identified uses

PROC 1 – 5, 7, 8a, 8b, 9 – 10, 13 – 15, 19

1.3 Details of the supplier of the safety data sheet

SKW Stickstoffwerke Piesteritz GmbH
 Möllendorfer Str. 13
 06886 Lutherstadt Wittenberg, Deutschland
 E-mail address:

Telephone: +49 3491 68 0
 Telefax: +49 3491 68 4300
 SDB@skwp.de

1.4 Emergency telephone number

SKW: +49 3491 68 2222
24-hour emergency number (European Union): <https://echa.europa.eu/de/support/helpdesks/>

2. HAZARDS IDENTIFICATION**2.1 Classification of the substance or mixture**

Classification according to Regulation (EC) No 1272/2008 [CLP]:

Hazard class / Hazard category	Hazard statements	Classification procedure
Ox. Liq. 3	H272	according to the Globally Harmonized System
Skin Corr. 1A	H314	according to the Globally Harmonized System
	EUH071	according to the Globally Harmonized System
Acute Tox. 3	H331	according to the Globally Harmonized System
Met. Corr. 1	H290	Information derived from practical experience.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 [CLP]:

Product identifier: Nitric acid, technical 68 %
Index-No.: 007-004-00-1
EINECS-No.: 231-714-2

Hazard pictograms:

Signal word:

Danger



GHS03



GHS05



GHS06

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H272	May intensify fire; oxidizer.
H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H331	Toxic if inhaled.
EUH071	Corrosive to the respiratory tract.

Precautionary statements:

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P220	Keep/ Store away from clothing/ combustible materials.
P221	Take any precaution to avoid mixing with combustibles.
P234	Keep only in original container.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash face, hands and any exposed skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER/ doctor.
P321	Specific treatment (see supplemental first aid instructions on this label).
P363	Wash contaminated clothing before reuse.
P370 + P378	In case of fire: Use carbon dioxide for extinction.
P390	Absorb spillage to prevent material damage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P406	Store in corrosive resistant stainless steel container with a resistant inner liner.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Other hazards

The substance does not meet the criteria for PBT or vPvB according to Regulation (EC) No 1907/2006. Annex XIII.

Adverse human health effects and symptoms:

Causes severe skin burns and eye damage. Corrosive to the respiratory tract. Nitrous gases.

Potential environmental effects:

Slightly hazardous to water.

Other hazards:

NOx vapours may develop in contact with oxygen or during heating. No other hazards identified.

3. COMPOSITION/INFORMATION ON INGREDIENTS**3.1 Substance related information**

Chemical identity:	Nitric acid 68 %
Index-No.:	007-004-00-1
EC-No.:	231-714-2
REACH Registration Number:	01-2119487297-23-0021
CAS-No.:	7697-37-2
Molecular formula:	HNO ₃
Molecular weight:	63,01 g/mol

Hazardous components:

Substance name	% [Mass]	Classification according to Regulation (EC) No 1272/2008 [CLP]
Nitric acid	68	CAS-No.: 7697-37-2 EC-No.: 231-714-2 Index-No.: 007-004-00-1 Ox. Liq. 2, H272 Skin Corr. 1A, H314 EUH071 Acute Tox. 1, H330

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**4. FIRST AID MEASURES****4.1 Description of first aid measures**

General Information:	A quick response is important. Call a physician immediately. Ensure that eye flushing systems and safety showers are located close to the working place. First aider needs to protect himself. (see section 8)
If inhaled:	Move victims to fresh air and do not leave them without supervision. Keep affected person warm and in semi-upright resting position. Give artificial respiration if necessary. Call a physician immediately.
In case of skin contact:	Take off contaminated clothing and shoes immediately. Wash off immediately with plenty of water for at least 15 minutes. If skin burns occur, call a doctor immediately. Cover wound with sterile dressing.
In case of eye contact:	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Consult an eye specialist immediately, even if there are no immediate symptoms.
If swallowed:	Solution with pH < 1,5 or unknown: Do not give anything to drink. Do NOT induce vomiting. If victim is conscious: Rinse mouth with water. Take victim immediately to hospital. Solution with pH > 1,5 and in small quantities: Give water to drink and consult a doctor immediately.

4.2 Most important symptoms and effects, both acute and delayed

Causes severe skin burns and eye damage. Nitric acid fumes may cause immediate irritation of the respiratory tract, pain, and dyspnea which are followed by a period of recovery that may last several weeks. After this time, a relapse may occur, which may be accompanied by death caused by bronchial pneumonia and/or pulmonary fibrosis.

4.3 Indication of any immediate medical attention and special treatment needed**Symptoms:**

Highly corrosive causes severe skin burns and eye damage. Nitric acid fumes may cause immediate irritation of the respiratory tract, pain, and dyspnea which are followed by a period of recovery that may last several weeks. After this time, a relapse may occur, which may be accompanied by death caused by bronchial pneumonia and/or pulmonary fibrosis.

Hazards:

Later control for pneumonia and lung oedema.

Treatment:

Control of circulatory system, shock therapy if needed. Oxygen, if needed. Early administration of cortisone spray. After inhalation of nitrous gas, medical supervision for at least 48 hours. After inhalation, symptoms usually only occur after several hours.

Follow the advises given in section 4.1. Following exposure to acid/NO_x fumes, the affected person should be kept under medical review for at least 48 hours, as delayed pulmonary edema may develop.

5. FIREFIGHTING MEASURES**5.1 Extinguishing media**

Suitable extinguishing media:	Water mist. Carbon dioxide (CO ₂). Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable extinguishing media:	Powders / chemical extinguishers/ foam. Do not attempt to smother the fire with steam or sand.

5.2. Special hazards arising from the substance or mixture

Not combustible. If involved in a fire, use the best means available to extinguish the fire. May accelerate the burning of other combustible materials (wood, cotton, straw, ...). Toxic gases are released (NO_x). On contact with ordinary metals (steel, galvanized, aluminum) corrosion may occur and generate highly flammable hydrogen gas. May explode in contact with a powerful reducing agent.

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Cool containers / equipment exposed to heat with water spray. Use water spray to disperse vapors and to protect personnel. Avoid disposal of contaminated fire fighting water to the environment.

Do not attempt to extinguish the fire without suitable protective equipment:

- Acid-resistant clothing
- Complete protective clothing
- Self-contained breathing apparatus

6. ACCIDENTAL RELEASE MEASURES**6.1 For non-emergency personnel & emergency responders**

Do not breathe vapours/dust. Suppress (knock down) gases/vapours/mists with a water spray jet. Do not attempt to intervene without suitable protective equipment (See section 8). Avoid any direct contact with the product.

6.2 Environmental precautions

Should not be released into the environment. Do not discharge into drains and / or rivers. Dilute with water and neutralize the acid with, for example soda or sodium carbonate, before discharging contaminated material into treatment plants or water courses.

6.3 Methods and materials for containment and cleaning up

Soak up with a liquid binder (e.g. sand, universal binder). Transfer into suitable containers and take for disposal. Dispose of recovered material according to the regulations. Do not direct water spray onto the leak. Use respiratory protection during cleaning up.

Recovery:

Stop the leak. Confine the product and direct it towards a watertight area. Pump up the product into a spare containers suitably labeled.

Neutralization:

Neutralize non-recoverable product with:

- slaked lime
- carbonates or bicarbonates

Cleaning/decontamination:

Wash dirty surfaces with water. Neutralize polluted soils with slaked lime, then wash. Never neutralize product whilst it is still inside closed packaging or in a closed emergency container.

Disposal:

Dispose of contaminated materials in accordance with current regulations.

6.4 Reference to other sections

For more details regarding exposure control / personal protection or disposal respectively, please refer to Sections 8 and 13 of this safety data sheet.

7. HANDLING AND STORAGE**7.1 Precautions for safe handling**

Ensure good ventilation of the work station. Only use materials resistant to acids. For preference use pumping techniques for unloading and discharging. Provide an adapted retention system. Avoid any direct contact with the product. Avoid breathing vapours, mist or gas. Never introduce water or any aqueous agent into tanks or containers containing acids. Dilutions or neutralizations are very highly exothermic, avoid spatters, carry out slowly. Always add acid to water. Do not mix with incompatible materials (See section 10.5).

Fire prevention measures: The product is not flammable.

Advice on general occupational hygiene:

Smoking, eating and drinking should be prohibited in the application area. Wash hands after use; and remove contaminated clothing and protective equipment before entering eating areas.

7.2 Conditions for safe storage, including any incompatibilities

Suitable material for containers: Packaging material recommended: Containers should be of stainless steel and preferably of low carbon content such as 304L (DIN/EN 1.4306) or plastic (e.g. PVC, PFTE).

Unsuitable material for containers: Common metals, Carbon steel or rubberized steel, Polypropylene

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Requirements for storage areas and containers: Acid resisting floor. Keep containers tightly closed in a cool, well-ventilated place. Avoid subsoil penetration.

Storage tanks must be: - earthed and equipped with an adequate safety valve
- linked to a desiccating column

Storage: Keep in a cool, well-ventilated place. Keep away from heat, ignition sources, direct sunlight and incompatible substances (see section 10). Protect containers from corrosion and physical damage.

German storage class: 8BL - Non combustible liquids, corrosive

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Exposure limit(s):

Components	CAS-No.	Control parameters	Ceiling Limit Value		Update	Basis
Nitric acid	7697-37-2	1 ml/m ³ 2.6 mg/m ³		AGW	12/2007	TRGS 900
Nitrogen dioxide	10102-44-0	0.2 ml/m ³		AGW	2008	

Short-term exposure limit (EU-STEL):	2.6 mg/m ³ (1 ppm)
DNEL - Workers:	
Acute	2.6 mg/m ³ (1 ppm)
Long term	1.3 mg/m ³ (0.5 ppm)
DNEL - Consumers:	
Acute	1.3 mg/m ³ (0.5 ppm)
Long term	0.65 mg/m ³ (0.25 ppm)
PNEC - aquatic:	
pH approach	- Safe pH to be between 6 and 9.

8.2 Exposure controls

Use closed systems or covering of open containers (e.g. screens). Transport over pipes, technical barrel filling/emptying of barrel with automatic systems (suction pumps etc.). Use of pliers, grip arms with long handles with manual use to avoid direct contact and exposure by splashes (no working over one's head). Local exhaust ventilation is required except for closed processes and outdoor processes. Handle product only in closed system or provide appropriate exhaust ventilation at machinery.

Exposure controls:

Ensure good ventilation of the work station. Monitor the atmosphere at regular intervals.

Personal protective equipment:

Eye/face protection:

Chemical safety goggles (EN 166) or full-face mask (EN 402).

Hand protection:

Glove material: Fluorinated rubber

Glove thickness: 0,4 mm

In case of potential dermal contact: use impervious chemical resistant protective gloves complying with EN 374. In case of contact through splashing.

Glove material: butyl-rubber

Glove thickness: 0,5 mm

For operations up to 2 hours.

Glove material: PVC

Glove thickness: 0,5 mm

For operations up to 2 hours.

Glove material: Polychloroprene

Glove thickness: 0,5 mm

For operations up to 2 hours.

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Acid-resistant boots. Acid-resistant clothing (EN 14605).

Respiratory protection:

Wear suitable apparatus if exposure level exceed or may exceed the DNEL, ex :

For short time exposure masks EN149 type FF P3, EN 14387 type B or Type E model P3, EN 1827 class FMP3 are recommended (Non exhaustive list). For longer time of exposure full masks or masks with an apparatus providing fresh air are recommended –Full mask EN 143, EN 14387, EN 12083 class P3 or class XP3, EN12941 class TH3, EN 12942 TM3, EN14593 or EN138. (Non exhaustive list).

Thermal hazards:

The substance does not represent a thermal hazard, thus special consideration is not required.

Environmental exposure controls:**Industrial uses:**

Avoid uncontrolled discharging nitric acid solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimized.

Professional uses:

Avoid uncontrolled discharging nitric acid solutions at high flow into municipal wastewater or to surface water.

General protective measures:

Avoid contact with eyes. Avoid contact with skin. Do not breathe gases / vapours.

9. PHYSICAL AND CHEMICAL PROPERTIES**9.1 Information on basic physical and chemical properties**

Physical state	liquid	
Colour	colourless, light yellow	
Odour	stinging	
Odour Threshold	0.75 mg/m ³ (0.29 ppm)	
pH	< 1	
Melting point/range	-41.6 °C	
Boiling point/boiling range	120.5 °C	
Flash point		Not applicable, inorganic substance
Evaporation rate		not known
Relative density (20 °C)	1.405 g/cm ³	
Water solubility	miscible	
Partition coefficient: n-octanol/water		Not applicable, inorganic substance
Viscosity, dynamic (25 °C)	0.75 mPas	
Oxidizing properties	non oxidising	
Flammability	Not combustible.	
Auto-ignition temperature		Not applicable
Upper explosion limit	Not explosive	

10. STABILITY AND REACTIVITY**10.1 Reactivity**

Stable under recommended storage and handling conditions (see section 7).

10.2. Chemical stability

Thermally stable in reaction term at designed storage conditions. Slightly decompose to nitrogen oxides when in contact with light or organic matter.

10.3 Possibility of hazardous reactions

May react violently with reducing agents, strong bases, organic material, chlorides and finely divided metals
Exothermic reaction with water

10.4. Conditions to avoid

Uncontrolled heating. Light. Containment.

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reducing materials, Alkalis, Corrosive Substances, Powdered metals, Hydrogen sulphide, Chlorates, carbides, non noble metals, Alcohols

10.6 Hazardous decomposition products

Nitrous gases.

11. TOXICOLOGICAL INFORMATION**11.1 Information on toxicological effects**

Absorption:	The primary health effect nitric acid is corrosion due to a pH shift. Therefore, absorption is not a relevant parameter for the effect.	
Acute oral toxicity:	No data available.	
Acute inhalation toxicity:	Dose LC50:	2500 mg/l
	Exposure time:	1 h
	Species:	Rat
	Method:	OECD Test Guideline 403
Acute dermal toxicity:	No data available.	
Skin irritation:	Result:	Corrosive
Eye irritation:	Acute eye irritation/corrosion.	
Sensitisation:	Corrosive substance – Not relevant.	
Mutagenicity:	Result:	Non mutagenic
	Method:	OECD Test Guideline 471
	From the results obtained on nitric acid (OECD 471), sodium (OECD 471, 473+ in vivo test) and potassium (OECD 471, 473 and 476) nitrate.	
Carcinogenicity:	Inconclusive data.	
Repeated dose toxicity:	Application Route:	oral
	NOAEL:	1500 mg/m ³
	Species:	Rat
	Method:	OECD Test Guideline 422
	Application Route:	Inhalation
	Test substance:	Nitrogen oxides (NOx)
	NOAEL:	2.15 ppm
	Species:	Rat
	Method:	OECD Test Guideline 413
Reproductive toxicity:	Application Route:	oral
	Test substance:	Potassium nitrate
	Species:	Rat
	NOAEL:	1500 mg/kg
	Method:	OECD Test Guideline 422
	Result:	no adverse effects
Other data:	The most likely route of exposure to nitric acid is via inhalation. If inhaled Nitric acid fumes may cause immediate irritation of t Via dermal contact, nitric acid causes skin and eye burns. Via ingestion, nitric acid causes burns of the digestive tract.	

12. ECOLOGICAL INFORMATION**12.1 Toxicity**

Toxicity to fish:	pH:	3 – 3.5
	Species:	Lepomis macrochirus (Bluegill sunfish)
	Exposure time:	96 h
	pH:	3.7
	Species:	Oncorhynchus mykiss (rainbow trout)
	Exposure time:	96 h

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Toxicity to daphnia and other aquatic invertebrates:	Species: pH: Method:	Ceriodaphnia dubia (Water flea) 4.6 US EPA
Toxicity to algae:	No data available.	
Toxicity to microorganisms:	No data available.	
Chronic toxicity to aquatic organisms:	No data available	
Toxicity to soil dwelling organisms:	No data available.	
Toxicity to terrestrial plants:	No data available	
General effects:	Impairment of the pH value. An increase in the nitrate concentrations has little effect only.	

12.2 Elimination information (persistence and degradability)

Persistence and degradability:	Not relevant to inorganic materials
Biological degradability:	Not relevant to inorganic materials.

12.3 Bioaccumulative potential

Not relevant to inorganic materials.

Partition coefficient: n-octanol/water	Not applicable inorganic substance
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12.4 Mobility in soil

No data available.

12.5 Results of PBT and vPvB assessment

Not relevant to inorganic materials.

12.6 Endocrine disrupting properties

No data available.

12.7 Other adverse effects

Additional ecological information:	The product can damage activated sludge in a water treatment plant by changing its pH value. Obtain the approval of the local authorities before discharging into water treatment plants. After neutralisation, no negative effects are expected on the degradability of activated sludge. Do not allow uncontrolled discharge of the product into the environment.
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13. DISPOSAL CONSIDERATIONS**13.1 Waste treatment methods****Waste from residues:**

In accordance with the waste recycling/disposal regulations, has to be taken to an approved waste disposal facility. The classification of the waste has to be made according to its source in accordance with the European waste code regulations.

Contaminated packaging:

Disposal according to the regulations, contaminated packaging has to be treated in the same way as the substance itself. Packaging should be completely emptied, and then taken to an approved recycler after appropriate cleaning.

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UN number:	2031
Proper technical name:	NITRIC ACID
Class:	8
Hazard Identification Number:	85
Classification Code:	CO1
Packing group	II
Labels:	8 + 5.1
Tunnel restriction code:	(E)

15. REGULATORY INFORMATION**National legislation (Germany):****Major Accident Hazard** not regulated**Legislation:****Water contaminating class (Germany):** WGK 1, slightly hazardous to water VwVwS app. 2**TA Luft List (Germany):** relative to HNO₃: No substance class nor emission limit according to the German TA Luft regulations. Use up to date technology.
Paragraph 5.2.4 class IV Nitrogen oxides**Other regulations:**Occupational restrictions for pregnant and breast feeding women
Work restrictions for young people.**16. OTHER INFORMATION****Relevant R-, H- and EUH-phrases (Number and full text):**

EUH071:	Corrosive to the respiratory tract.
H272:	May intensify fire; oxidizer.
H290:	May be corrosive to metals.
H314:	Causes severe skin burns and eye damage.
H330:	Fatal if inhaled.
H331:	Toxic if inhaled.

Modification notice:

This data sheet contains changes from the previous version in section(s): 2

Further information:

The data corresponds to our current knowledge and describes our product with regard to safety requirements. Therefore the data is not meant to warranty certain properties of the product. It is the responsibility of the receiver of our product to comply with current legislation and regulations.

Key or legend to abbreviations and acronyms used in the safety data sheet:

Ox. Liq.	Oxidising Liquid
Skin. Corr.	Skin corrosion
Met. Corr.	Corrosive to metals
CAS	Chemical Abstracts Service
CLP	Classification, Labelling and Packing of Chemicals
DIN	Deutsches Institut für Normung (German Institute for Standardization)
EC	European Community
EN	European Norm
EUH	European Hazard Statement
GHS	Globally Harmonized System
LCx	Lethal concentration
NOAEL	No observed adverse effect level
OECD	Organization for Economic Co-Operation and Development
PBT	Persistent, Bioaccumulative and Toxic
REACH	Registration, Evaluation and Authorisation and Restriction of Chemicals
US EPA	United States Environmental Protection Agency
vPvB	very Persistent and very Bioaccumulative

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17. ANNEX to extended Material Safety Data Sheet: EXPOSURE SCENARIO

1. Short title of exposure scenario 1

Manufacturing and industrial use of nitric acid – Concentration <75%

2. Description of activities and processes covered in the exposure scenario

Sector of use (SU)	SU 3, SU4, SU 8, SU 9, SU 10, SU12, SU14, SU 15, SU 16
Product category (PC)	PC0, PC7, PC12, PC14, PC15, PC19, PC20, PC33, PC35, PC37
Process category (PROC)	<p>PROC 1: Use in closed process, no likelihood of exposure.</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure.</p> <p>PROC 3: Use in closed batch process (synthesis or formulation).</p> <p>PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises.</p> <p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact).</p> <p>PROC 7: Industrial spraying.</p> <p>PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.</p> <p>PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing).</p> <p>PROC 10: Roller application or brushing.</p> <p>PROC 13: Treatment of articles by dipping and pouring.</p> <p>PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation.</p> <p>PROC 15: Use as laboratory reagent.</p>
Article category (AC)	Not applicable
Environmental release category (ERC)	<p>ERC 1 Manufacture of substances</p> <p>ERC 2 Formulation of preparations</p> <p>ERC 4: Industrial use of processing aids in processes and products, not becoming part of articles.</p> <p>ERC 6a: Industrial use resulting in manufacture of another substance (use of intermediates).</p> <p>ERC 6b Industrial use of reactive processing aid</p> <p>ERC 6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers.</p> <p>ERC 7 Industrial use of substances in closed systems</p>

3. Operational conditions

3.1 Operational conditions related with frequency and quantities of use

Duration of exposure at workplace:	8 hours/day
Frequency of exposure at workplace:	220 days/year for each worker
Annual amount used per site:	The daily and annual amount/emission per site is not considered to be the main determinant for environmental exposure.

3.2 Operational conditions related with substance/ product

Physical state	Liquid
Concentration of substance in mixture	Aqueous solutions contain more than 25% nitric acid up to a maximum of 75% nitric acid.

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3.3 Other relevant operational conditions	
Based on the information retrieved, the maximum duration considered for this exposure scenario is a working shift of above 4h/day. Concentration of nitric acid in industrial application range from 25 to 75% and worst case will be taken into account.	
4. Risk Management Measures	
4.1 RMMs related to workers	
Organisational measures	Workers in the identified risky process/areas should be trained a) to avoid to work without protection and b) to understand the corrosive properties and, especially, the respiratory inhalation effects of nitric acid and c) to follow the safer procedures instructed by the employer The employer has also to ascertain that the required PPE is available and used according to instructions.
Technical measures	<ul style="list-style-type: none"> • Use closed/ automated systems or covering of open containers (e.g. screens) to avoid irritating mists, sprayings and potential splashes. (Good practice) • Transport over pipes, technical barrel filling/emptying of barrel with automatic systems (suction pumps etc.) (Good practice) • Use of pliers, grip arms with long handles with manual use “to avoid direct contact and exposure by splashes (no working over one’s head)” (Good practice) • Store in cool, dry, clean, well ventilate areas away from alkaline products and metals. Do not store under direct sun light. Do not pile up the containers. Do not store at temperatures close to freezing point. (Good practice). • Compatible materials: stainless steel 316-L; high density polyethylene; glass • Local exhaust / general ventilation is not required but good practice
Respiratory protection	Respiratory protection: respiratory protection is not required to usual works. In foggy-vaporous situations like spraying, use of a spreading over all facemask with a suitable inorganic acid filler. In case of spraying a mask with an Assigned Protection Factor (APF) = 20 as given in BS EN 529:2005 are recommended. For short time exposure masks , EN149 type FF P3, EN 14387 type B or Type E model P3, EN 1827 class FMP3 are recommended (Non exhaustive list). For longer time of exposure full masks or masks with an apparatus providing fresh air are recommended – Full mask EN 143, EN 14387, EN 12083 class P3 or class XP3, EN12941 class TH3, EN 12942 TM3, EN14593 or EN138. (Non exhaustive list)
Hand protection	Hand protection is required: use impervious chemical resistant protective gloves complying with EN 374 (required): material: butyl rubber, PVC, PTFE fluoro elastomer.
Eye protection	Wearing of eye/face protection is required. Chemical goggles EN166 or face protection shield EN 402 or equivalent are required.
Skin and body protection	Wearing of suitable acid resistant protective clothing and rubber boots is required.
Hygiene measures	Keep away from foodstuffs, drinks and tobacco. Wash hands before breaks and at end of work. Keep work clothes separate.
4.2 RMMs related to the environment	
Organisational measures	Procedural and/or control technologies are required to minimize emissions and the resulting exposure during cleaning and maintenance procedures.
Abatement measures related with wastewater	Nitric acid wastewater should be reused or discharged to the industrial wastewater and further neutralized if needed
Abatement measures waste air and solid waste	Nitric acid is not expected to be found in the solid waste nor to reach the air compartment, due to its low vapour pressure and degradation in NOx.
4.3 Waste related measures	
Type of waste	Liquid waste. Packaging material

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Disposal technique	The neutralised liquid can be spilled in accordance to regulatory normative. The residue of the containers or the used container itself should be disposed in accordance with local requirements.
Fraction released to environment during waste treatment	The pH of wastewater released from manufacturing sites should be between pH 6-9.

5. Prediction of exposure resulting from the conditions described above and the substance properties.

5.1. Human exposure

Workers (oral)	No significant oral exposure due to good hygiene practice.	
Workers (inhalation) <i>DNEL = 1.3 mg/m³</i>	Liquid - Calculated with MEASE	RCR
PROC 1	0.001 mg/m ³	0.0008
PROC 2	0.001 mg/m ³	0.0008
PROC 3	0.01 mg/m ³	0.0077
PROC 4	0.05 mg/m ³	0.0385
PROC 5	0.05 mg/m ³	0.0385
PROC 8a	0.05 mg/m ³	0.0385
PROC 8b	0.01 mg/m ³	0.0077
PROC 9	0.01 mg/m ³	0.0077
PROC 10	0.05 mg/m ³	0.0385
PROC 13	0.01 mg/m ³	0.0077
PROC 14	0.01 mg/m ³	0.0077
PROC 15	0.01 mg/m ³	0.0077
PROC 7 – With mask APF 20	0.05 mg/m ³	0.0385
Workers (dermal)	As reported in the CLP Regulation No 1272/2008 Annex VI Table 3.1, nitric acid is corrosive above the 20% concentration limit. Therefore, effective control measures are in place to prevent dermal exposure. Furthermore, protective clothing and gloves are considered to be used consistently when handling corrosive substances. Production companies report the use of protective gloves and thus repeated daily dermal exposure to commercial product is considered negligible.	

5.2. Environmental exposure (qualitative assessment)

Environmental release	The production of nitric acid can potentially result in aquatic emissions and locally increase the nitrate concentration while decreasing the pH in the aquatic environment. However, the pH of industrial effluents is normally measured frequently and can be neutralized easily.
Waste water treatment plants (WWTP)	Not relevant. Nitric acid dissociates in H ⁺ and NO ³⁻ and will be neutralized before reaching WWTP.
Aquatic pelagic compartment	Due to its high water solubility, nitric acid is mainly found in soil (migrating towards the groundwater table) and water compartments: there, nitric acid progressively dissociates affecting the pH of the receiving compartment. The higher the buffer capacity of the water is, the lower the effect on pH will be.
Sediments	Not relevant. There will be no absorption on particulate matter or surfaces.
Soil and groundwater	Not relevant. Infiltration, partial neutralization, dispersion, dilution.
Atmospheric compartment	Nitric acid is highly soluble in air and will react into NO _x . These NO _x emissions in the troposphere are small compared to releases from combustion processes

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Secondary poisoning	Bioaccumulation in organisms is not relevant for nitric acid.
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1. Short title of exposure scenario 2	
Professional use of nitric acid – Concentration < 75%	
2. Description of activities and processes covered in the exposure scenario	
Sector of use (SU)	SU 1, SU 22
Product category (PC)	PC12, PC14, PC15, PC20, PC21, PC35
Process category (PROC)	<p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact).</p> <p>PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.</p> <p>PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing).</p> <p>PROC 10: Roller application or brushing.</p> <p>PROC 11: Non industrial spraying.</p> <p>PROC 13: Treatment of articles by dipping and pouring.</p> <p>PROC 15: Use as laboratory reagent</p> <p>PROC 19: Hand-mixing with intimate contact and only PPE available.</p>
Article category (AC)	Not applicable
Environmental release category (ERC)	<p>ERC 8a (Wide dispersive indoor use of processing aids in open systems)</p> <p>ERC 8b (Wide dispersive indoor use of reactive substances in open systems)</p> <p>ERC 8e (Wide dispersive outdoor use of reactive substances in open systems)</p>
3. Operational conditions	
3.1 Operational conditions related with frequency and quantities of use	
Duration of exposure at workplace:	8 hours/day
Frequency of exposure at workplace:	220 days/year for each worker
Annual amount used per site:	The daily and annual amount/emission per site is not considered to be the main determinant for environmental exposure.
3.2 Operational conditions related with substance/ product	
Physical state	Liquid
Concentration of substance in mixture	Nitric acid is used during the production phase of various cleaning products, although often the amount in the end products is limited due to its reactivity. Nevertheless in case of this scenario worst case scenario was considered with products containing more than 25% nitric acid but always less than 75%.
3.3 Other relevant operational conditions	
The amount used per professional workers varies from activity to activity. The maximum duration >4 h/day was considered as worst case assumption.	
4. Risk Management Measures	
4.1 RMMs related to workers	
Organisational measures	Because nitric acid is corrosive, the risk management measures for human health should focus on the prevention of direct contact with the substance. Since automated, closed systems and local exhaust ventilation may be less feasible to implement for professional settings, product related design measures should be taken (low concentration for example) as well as good practices that prevent direct eye/skin contact with nitric acid and prevent formation of aerosols and splashes are more important along with the personal protective equipment measures.

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	<i>HNO₃ concentration in product > 20%:</i>	<i>HNO₃ concentration in product between 5% and 20%:</i>	<i>HNO₃ concentration in product < 5%</i>
Respiratory protection	Compulsory	Recommended	Good practice
Hand protection	Compulsory	Recommended	Good practice
Eye protection	Compulsory	Recommended	Good practice
Skin and body protection	Compulsory	Recommended	Good practice
Hygiene measures	Keep away from foodstuffs, drinks and tobacco. Wash hands before breaks and at end of work. Keep work clothes separate..		

4.2 RMMs related to the environment

Organisational measures	Procedural and/or control technologies are required to minimise emissions and the resulting exposure during cleaning and maintenance procedures.
Abatement measures related to wastewater	Different rules apply to professional users regarding control of their effluents. It is required that the flow of release to municipal wastewater or to surface water do not cause significant in pH changes. It is then dependant whether or not discharging is done to municipal wastewater equipped with sewage treatment plant or not.
Abatement measures related to waste air	Nitric acid is not expected to be found in the solid waste nor to reach the air compartment, due to its low vapour pressure and degradation in NOx. Therefore, no specific risk management measures for air emissions are provided..
Abatement measures related to soil	For release to soil for fertilizer uses, the pH will be naturally neutralized by the medium before reaching the groundwater.

4.3 Waste related measures

Type of waste	Liquid waste – packaging material
Disposal technique	The neutralised liquid can be spilled in accordance to applicable normative. The residue of the containers or the used container itself should be disposed in accordance with local requirements.

5. Prediction of exposure resulting from the conditions described above and the substance properties.

5.1. Human exposure

Professionals (oral)	No significant oral exposure due to good hygiene practice.
Professionals (dermal)	As reported in the CLP Regulation No 1272/2008 Annex VI Table 3.1, nitric acid is corrosive above the 20% concentration limit. Therefore, effective control measures are in place to prevent dermal exposure. Furthermore, protective clothing and gloves are considered to be used consistently when handling corrosive substances. Production companies report the use of protective gloves and thus repeated daily dermal exposure to commercial product is considered negligible.

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Professional (inhalation) <i>DNEL = 1.3 mg/m³</i>	Calculated with MEASE	RCR
PROC 5,	0.1 mg/m ³	0.08
PROC8a	0.05 mg/m ³	0.04
PROC8b	0.05 mg/m ³	0.04
PROC9	0.05 mg/m ³	0.04
PROC10	0.05 mg/m ³	0.04
PROC 13	0.05 mg/m ³	0.04
PROC14	0.1 mg/m ³	0.08
PROC15	0.01 mg/m ³	0.01
PROC19	0.05 mg/m ³	0.04
PROC 11 with mask APF40	0.5 mg/m ³	0.38

5.2. Environmental exposure (qualitative assessment)

Environmental release	The production of nitric acid can potentially result in aquatic emissions and locally increase the nitrate concentration while decreasing the pH in the aquatic environment. However, the pH of industrial effluents is normally measured frequently and can be neutralized easily.
Waste water treatment plants (WWTP)	Not relevant. Nitric acid dissociates in H ⁺ and NO ³⁻ and will be neutralized before reaching WWTP.
Aquatic pelagic compartment	Due to its high water solubility, nitric acid is mainly found in soil (migrating towards the groundwater table) and water compartments: there, nitric acid progressively dissociates affecting the pH of the receiving compartment. The higher the buffer capacity of the water is, the lower the effect on pH will be.
Sediments	Not relevant. There will be no absorption on particulate matter or surfaces.
Soil and groundwater	Not relevant. Infiltration, partial neutralization, dispersion, dilution.
Atmospheric compartment	Not relevant. Nitric acid release is negligible, due to its low vapour pressure and degradation in NOx.
Secondary poisoning	Bioaccumulation in organisms is not relevant for nitric acid.