



SC “Achema”

## Safety data sheet

In accordance with Regulation (EC) 1907/2006 (REACH), Annex II with all subsequent amendments and supplements and EC Regulation No. 830/2015

### Non concentrated nitric acid

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## SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

### 1.1 The product identifier

**The trade name of product:** Non concentrated nitric acid.

**Chemical name:** nitric acid, HNO<sub>3</sub>.

**Identification number in accordance with Regulation (EC) No. 1272/2008:** 007-004-001.

**EC Number:** 231-714-2.

**CAS Number:** 7697-37-2.

**REACH registration number:** 01-2119487297-23-xxxx.

### 1.2. Relevant identified uses of the mixture and uses advised against

#### 1.2.1 Uses:

##### Industrial use:

- Industrial use [SU3, SU4, SU8, SU9, SU10, SU12, SU14, SU15, SU16]: Nitric acid used in production and for industrial use – concentration <75% (PC0, PC7, PC12, PC14, PC15, PC19, PC20, PC33, PC35, PC37).

##### Professional uses:

- Professional uses [SU1, SU22]: Nitric acid professional/specialized use – concentration <75% (PC12, PC14, PC15, PC20, PC21, PC35).

##### Further customer use:

- None.

#### 1.2.2 Uses advised against:

Further usage: Usage of cleaning equipment which has more than 3% nitric acid (PC3, PC12, PC31, PC35).

### 1.3 Details of the supplier of the safety data sheet

**Manufacturer/Supplier:** AB Achema

**Full address:** Jonalaukio k., Ruklos sen., LT55550

**Country:** Lithuania

**Tel. No.:** +370 349 56465

**URL website:** www.achema.lt

**Person responsible for the Safety Data Sheet (with e-mail address):** R. Dambrauskas, e-mail: [r.dambrauskas@achema.com](mailto:r.dambrauskas@achema.com)

### 1.4. Emergency telephone number

**Please contact:** Poison Information and Control Office in the Republic of Lithuania by phone +370 52362052 or by the Common emergency Center by 112.

**Helpdesk services work** 24 hours a day, 365 days a year.

**Other remarks (language in which assistance is provided):** assistance is provided in Lithuanian.

## SECTION 2. HAZARDS IDENTIFICATION

**Non concentrated nitric acid**

**2.1 Classification of the substance or mixture**

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

Acute Toxicity – Category 3; (H331)

Skin Corr. 1A, H314

**2.2 Label elements**

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



Hazard pictogram (s):

GHS05

GHS06

**Signal word: DANGER**

**Hazard statements:**

H331 – Toxic if inhaled.

H314 – Causes severe skin burns and eye damage.

EUH071 – Corrosive to the respiratory tract.

**Precautionary statements:**

P271 – Use only outdoors or in a well-ventilated area.

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

P261 – Do not breathe dust/ fume/ mist/ vapors/ spray.

P264 – Wash hands thoroughly after handling.

P301+310 – IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

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.

P303+P352 – IF ON SKIN (or hair): rinse with plenty of water/shower.

P312 – Call a POISON CENTER/doctor/if you feel unwell.

P321 – Specific treatment: if on skin wash with 0,5 % boric acid solution.

P363 – Wash contaminated clothing before reuse.

P304+P340 IF INHALED: remove victim to fresh air and keep at rest in a position comfortable for breathing.

**2.3 Other hazards**

The substance does not meet the criteria for PBT or vPvB according to Regulation (EC) No 1907/2006, Annex XIII. In content of oxygen or when heated may form NO<sub>x</sub> vapors. No other hazards identified.

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**SECTION 3. COMPOSITION OR INFORMATION ON INGREDIENTS**

**3.2 Mixtures**

In accordance with Regulation (EC). 1907/2006 nitric acid solution is treated as a mixture.

**Hazardous components**

CAS number	EC number..	Identification Numbers according to Regulation (EC) No. 1272/2008	REACH registration No.	The mass (volume) of %	Name	Classification according to Regulation (EC) 1272/2008
7697-37-2	231-714-2	007-004-00-1	01-2119487297-23-xxxx	56	Nitric acid	Acute Tox. 3, H331; Ox. Liq. 2, H272; Met. Corr 1, H290; Skin Corr. 1A, H314.  Specific concentration limits: Oxidizing liquids: Ox. Liq. 2: ≥ 99,0 %; Ox. Liq. 3 : ≥ 65% – < 99,0%; Skin Corr. 1A: ≥ 20,0 %; Skin Corr. 1B: ≥ 5,0 % - < 20,0 %

**SECTION 4. FIRST AID MEASURES**

**4.1 Description of first aid measures**

**4.1.1 General information**

Immediate first aid is required. Give first aid and consult a doctor immediately. First-aid measures should be suitably protected (see section “Handling and Storage”). Remove the person exposed to nitric acid from any further exposure of the acid. Ensure that the equipment for washing eyes and safety showers are located close to the work area.

**The material can get through: lungs, skin, eyes and mouth.**

**4.1.2. Inhalation:** If the victim of inhalation feels negative symptoms (e.g. dizziness, sleepiness) assist him or carry him out into fresh air. Keep the victim warm and in a position where they can breath easily. Give artificial respiration if necessary. If it is difficult for them to breathe, give oxygen. Consult a doctor. Do not give mouth to mouth resuscitation, it can be dangerous. In case of severe inhalation, consult a doctor immediately.

**4.1.3. Skin contact:** Immediately remove contaminated clothing or footwear. Immediately rinse the skin with plenty of water (for at least 15 minutes). If skin burns appear, call a doctor immediately. If made contact with skin, can be rinsed with 0.5% boric acid solution.

**4.1.4. Eye contact:** Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Remove contact lenses if present and easy to do. Consult an eye specialist immediately, even if there are no immediate symptoms. Do not let the victim touch his eyes.

**4.1.5. Ingestion:** Rinse mouth, do NOT induce vomiting. Solution with pH < 1.5 or unknown: Do NOT give anything to drink, do not induce vomiting. If the person is fully conscious: Rinse mouth out with water, seek medical advice immediately. Solution with pH > 1.5 and in small quantities: Give water to drink and seek medical advice immediately.

**Non concentrated nitric acid****4.2 Most important symptoms and effects (acute and delayed)**

Repeated exposure of high concentrations affects the lungs and teeth, tooth enamel, 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 with death caused by bronchopneumonia and/or pulmonary fibrosis.

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

Instructions for doctors. Following exposure to acid/NO<sub>x</sub> fumes. The exposed person may need to be kept under medical surveillance for at least 48 hours as delayed pulmonary edema may develop.

**SECTION 5. FIRE-FIGHTING MEASURES****5.1 Extinguishing media**

**Suitable extinguishing media:** Pulverized water in important quantity. Carbon dioxide (CO<sub>2</sub>). Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**Unsuitable extinguishing media:** Do not use chemical or powder extinguishers. Do not attempt to suppress the fire with steam or sand.

**5.2 Special material or mixture of hazards**

EUH071: Corrosive to the respiratory tract. Not combustible. But if involved in a fire use the best mean available to extinguish the fire. May accelerate the burning of other combustible materials (wood, cotton, straw). Toxic gases are released (NO<sub>x</sub>). 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.

**5.3 Advice for firefighters**

Cool down the containers/equipment exposed to heat with a 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 fight the fire without suitable protective equipment: acid-resistant clothing, complete protective clothing, self-contained breathing apparatus, rubber gloves.

**5.4 Other information**

The water used for extinguishing is contaminated and must be collected. Do not empty into drains or sewers.

**SECTION 6. ACCIDENTAL RELEASE MEASURES****6.1 Personal precautions, protective equipment and emergency procedures**

**6.1.1. For personnel not involved in emergency situations:** Wear chemical protective clothing, rubber gloves, eye-protecting lenses, face protection (safety shields) in the workplace. Use local exhaust ventilation (in enclosed spaces). Equipment, apparatus and pipelines must be tight, filling and discharging equipment must be well sealed. Ventilate the area where the material spilled or leached to disperse methanol vapors. Do not breathe vapor / water by means of deposition / neutralization of vapor clouds and isolate leakage sources as soon as possible. Avoid any direct contact with the product. For more see section 8.

**6.1.2. For the personnel involved in emergency situations:** Wear breathing apparatus and full body-covering, acid-resistant clothing, acid-resistant boots or bota and gloves. Avoid contact with skin and eyes, avoid inhaling vapor. Evacuate non-emergency personnel.

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**6.2 Environmental precautions**

Due to its high acidity, the product poses a threat to the aquatic ecosystem. Do not allow product to spread into the environment. Do not discharge into drains and / or rivers. In case of accidental plumbing or sewage system pollution, inform the systems supervising institutions. 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 material for containment and cleaning up**

**6.3.1. Containment.** Stop the leak.

**6.3.2. Cleaning.** Pump (scoop) as much as possible of the spilled non concentrated nitric acid into tight and labelled containers. Degas with large amounts of water, neutralize via alkaline solutions (extinguished lime, sodium chloride). Use tools made of corrosion-resistant metal. Neutralize contaminated solid materials via nitric acid and confine into specially labelled containers made of stainless steel or plastic.

**6.3.3. Other information.** Do not use organic compounds or sawdust to collect spilled acid. If needed ventilate the spilled area.

**6.4 Reference to other sections**

For more information on exposure controls/personal protection or disposal considerations, please check section 8 and 13 of this safety data sheet.

**SECTION 7. HANDLING AND STORAGE****7.1 Precaution for safe handling. Protective measures**

**Protective measures:** Ensure adequate ventilation of the work station. Only use materials resistant to acids. Avoid any direct contact with the product. Do not breathe fumes. For preference use pumping techniques for unloading and discharging. Provide an adapted retention system. Avoid any direct contact with the product. Do not breathe vapors. Use protective goggles, work clothes, gloves and boots. Dilutions or neutralizations are very highly exothermic. Carry out slowly. Always add acid to water, not water to acid. Never introduce water or any aqueous agent into tanks or containers containing acids. Do not mix with incompatible materials (see section 10).

**Fire prevention measures.** Keep the product away from sources of ignition. Avoid contamination through any materials, including metal dust and organic materials. Keep the product away from moisture.

**Aerosol and dust prevention measures.** Use adequate ventilation. A local extraction ventilation system must be used. When the wind is blowing, do not allow aerosols to form and circulate.

**Environment protection measures.** Do not allow to enter surface water or groundwater or sewage system.

**Recommendations concerning good general hygiene practices at the work place.** Do not eat, drink or smoke while handling the product. After use / cleaning, wash hands, remove contaminated clothing and protective equipment before beginning to eat, smoke and use the toilet.

**7.2 Conditions for safe storage including any incompatibilities**

The floor of the warehouse should be impermeable, acid resistant and designed to form a water-tight basin. All storage and metal building constructions must be covered with acid / corrosion resistant materials. **Attention:** Nitric acid disperses / decomposes concrete. Keep away from heat, ignition sources, direct sunlight and incompatible substances; the maximum permitted temperature is +40 °C (see section 10). Non concentrated nitric acid is stored in corrosive resistant container with a resistant inner liner and tanks made of corrosion-resistant (stainless) steel. Anti-corrosion electrical installations must be ensured. To prevent the overpressure, install appropriate safety valves. Hatches for storage sites and containers must be sealed with fluoroplastic or teflon gaskets. Protect containers from corrosion and physical damage. The stationary storage tanks and non concentrated nitric acid can not be filled more than 90 % of their volume.

The warehouse must contain a sufficient quantity of neutralizing agents (sodium chloride, lime) and water. The

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containers to which the non-concentrated nitric acid is poured must be clean, among other products.

Do not use plain metals, carbon or rubberized steel, polypropylene.

It is allowed to store up to 50 tons of nitric acid at a time in a warehouse. Larger amounts of nitric acid can be stored in facilities where according to the Resolution of the Government of the Republic of Lithuania No.16.08.2004. 966 “On the Approval of the Description and Listing of Criteria for the Listing and Classification of Substances, Mixtures or Preparations of Hazardous Substances in Hazardous Substances” (Official Gazette, 2004, No. 130-4649) with all subsequent amendments and supplements; and in part 2 of Annex I to Regulation 2012/18/EU, requirements for hazardous objects are met.

### 7.3 Specific end use (s)

Nitric acid registration procedures in the REACH dossier for nitric acid usage, which are not mentioned in the 1.2.1 subsection of this SDS and for which this SDS attachment does not include exposure scenarios are:

#### **Formulation:**

F-2: Mixtures containing < 70% nitric acid.

F-1: Mixtures containing > 70% nitric acid.

#### **Industrial use:**

IW-4: nitric acid < 70% used as a reactive processing measure in industry (cleaning measure, pH regulator, emitted gas cleaning, ion-exchange resin regeneration, metal processing, plastic processing, surface processing product).

IW-3: Nitric acid < 70% used as a reactive treatment agent in the industry (cleaning measure, pH regulator, emitted gas cleaning, ion-exchange resin regeneration, metal processing, plastic processing, surface processing product).

#### **Final user use:**

C-1: use of nitric acid as cleaning agents, containing <3% of nitric acid.

## SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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**8.1 Control parameters**

**Chemical, worker exposure limit value in air:**

**Long-term exposure limit (IPRD):** For long-term DNEL workers: 1,3 mg / m<sup>3</sup> (0,5 ppm);

**Short-term exposure limit (TPRD):** Short-term exposure limit: 2.6 mg / m<sup>3</sup> (1 ppm);

**Non-limiting value (s) (DNEL)**

DNEL values SDS for referred product use in p. 1.2.1, exposure scenarios in the SDS attachment are presented in the tables.

**Exposure scenario (1): Use of nitric acid for production and industrial use - concentration <75%.**

Worker (oral)	In accordance with all hygiene requirements no effect via oral is found.	
DNEL value	Calculated for fluid	
Worker (inhalation)	by MEASE	RCR
DNEL = 1.3 mg / m <sup>3</sup>		
DNEL value		
PROC1	0,001 mg/m <sup>3</sup>	0,0008
PROC2	0,001 mg/m <sup>3</sup>	0,0008
PROC3	0,01 mg/m <sup>3</sup>	0,0077
PROC4	0,05 mg/m <sup>3</sup>	0,0385
PROC5	0,05 mg/m <sup>3</sup>	0,0385
PROC8a	0,05 mg/m <sup>3</sup>	0,0385
PROC8b	0,01 mg/m <sup>3</sup>	0,0077
PROC9	0,01 mg/m <sup>3</sup>	0,0077
PROC10	0,05 mg/m <sup>3</sup>	0,0385
PROC13	0,01 mg/m <sup>3</sup>	0,0077
PROC14	0,01 mg/m <sup>3</sup>	0,0077
PROC15	0,01 mg/m <sup>3</sup>	0,0077
PROC 7 – with mask ATP 20	0,05 mg/m <sup>3</sup>	0,0385

**Exposure scenario (2): professional / specialized use for nitric acid - concentration <75%.**

Worker (oral)	In accordance with all hygiene requirements no effect via oral is found.	
For professional (specialist) worker (if inhaled)	Estimated by MEASE	RCR
DNEL = 1,3 mg/m <sup>3</sup>		
PROC5	0,1 mg/m <sup>3</sup>	0,08
PROC8a	0,05 mg/m <sup>3</sup>	0,04
PROC8b	0,05 mg/m <sup>3</sup>	0,04
PROC9	0,05 mg/m <sup>3</sup>	0,04
PROC10	0,05 mg/m <sup>3</sup>	0,04
PROC13	0,05 mg/m <sup>3</sup>	0,04
PROC14	0,1 mg/m <sup>3</sup>	0,08
PROC15	0,01 mg/m <sup>3</sup>	0,01
PROC19	0,05 mg/m <sup>3</sup>	0,04
PROC 11 with mask APF40	0,5 mg/m <sup>3</sup>	0,38

**Predicted inactive concentration(s) PNEC:**

Task in the field of environmental protection	PNEC value, mg/l
Freshwater	Qualitative treatment was used. pH was used as an estimation factor. The registration dossier for nitric acid states that PNEC was not detected because nitric acid is a strong acid that greatly changes the pH of the solution. The concentration increase in nitric acid has a lower effect than the effect of reducing the pH of the solution.
Freshwater sediment	The registration dossier for nitric acid states that PNEC was not detected because nitric acid is a strong acid that greatly changes the pH of the solution. The concentration increase in nitric acid has a lower effect than the effect of reducing the pH of the solution.



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Sea water	Not applicable.
Sea water sediment	Not applicable.
Food chain	Not applicable because nitric acid does not exhibit bio accumulative properties. Data source - nitric acid registration dossier.
Microorganisms in sewage treatment system	Not applicable.
Soil (agricultural)	Not applicable. Data source - nitric acid registration dossier.
Air	

### 8.2 Exposure control

#### 8.2.1. The technical management measures:

Indoor facilities must have local extract ventilation. Regular air monitoring must be carried out at the environment of the workplace. Disinfectant shower rooms and devices for water to flow must be installed.

#### 8.2.2. Individual protection measures, such as personal protective equipment

**8.2.2.1. Eye and (or) face protection:** To ensure protection of eyes wear chemically resistant protective goggles or face shield according to LST EN 166. Recommended face protection protective measures.

**8.2.2.2. Skin and body protection:** Use chemical resistant protective suit according to LST EN 14605, work footwear according to LST EN ISO 20345.

**8.2.2.3. Hand protection:** Use protective gloves according to LST EN 420, LST EN 374 and LST EN 388. The glove material must be impenetrable and acid-resistant, resistant to cracks. When choosing gloves it must be ensured that they are made of suitable material and are of sufficient thickness and not less than the required penetration resistance. When finished, the gloves must be well cleaned and washed before they are washed off. Used gloves should be stored in a well-ventilated place. Sufficient attention must be given to hand skin care. Skin protection cream from nitric acid does not protect enough. Hand protection is not completely suitable for textile or leather gloves. The inside of the gloves can not contain powders which can cause hand allergy.

Protective gloves must be made of one of the following materials, with a corresponding thickness, penetration resistance:

- When working with up to 10 % nitric acid aqueous solutions:

- Natural rubber or natural latex – NR, not less than 0.5 mm thick (penetration time  $\geq$  480 min);
- Polychloroprene – CR, thickness of at least 0.5 mm (penetration time  $\geq$  480 min);
- Nitrile rubber or nitrile latex – NBR, thickness of at least 0.35 mm (penetration time  $\geq$  480 min);
- Butyl rubber – thickness of at least 0.5 mm (penetration time  $\geq$  480 min);
- Fluorocarbon rubber – FKM, thickness of at least 0.4 mm (penetration time  $\geq$  480 min);
- Polyvinyl chloride – PVC, at least 0.5 mm thick (penetration time  $\geq$  480 min).

- When working with 10 to 50 % nitric acid aqueous solutions:

- Natural rubber or natural latex – NR, not less than 0.5 mm thick (penetration time  $\geq$  480 min);
- Polychloroprene – CR, thickness of at least 0.5 mm (penetration time  $\geq$  480 min);
- Butyl rubber – thickness of at least 0.5 mm (penetration time  $\geq$  480 min);
- Fluorocarbon rubber – FKM, thickness of at least 0.4 mm (penetration time  $\geq$  480 min);
- Polyvinyl chloride – PVC, at least 0.5 mm thick (penetration time  $\geq$  480 min).

Gloves made of nitrile rubber or nitrile latex are not suitable for use in solutions of 10 – 50% nitric acid in aqueous solutions, since, at such a concentration of nitric acid solutions, these materials are not stable: they break, deform, and do not provide sufficient protection.

- When working with 50 to 65% nitric acid aqueous solutions:

- Fluorocarbon rubber – FKM, thickness of at least 0.4 mm (penetration time  $\geq$  480 min).
- Use of protective gloves made of any of the following materials may not be used for more than 120 min:
- Polychloroprene – CR, thickness of at least 0.5 mm (penetration time  $\geq$  120 min);
- Butyl rubber – thickness of at least 0.5 mm (penetration time  $\geq$  120 min);
- Polyvinyl chloride – PVC, at least 0.5 mm thick (penetration time  $\geq$  120 min).



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Gloves made of natural rubber, natural latex, nitrile rubber or nitrile latex are not suitable for use with 50 to 65% aqueous solutions of nitric acid concentration, as these substances do not remain stable at the concentration of nitric acid solutions: they break, deform, and do not provide sufficient protection.

Please note that the penetration time of the glove material in this section has been set at 22 °C. When using a product of higher temperature, the resistance of the glove materials can be reduced, therefore in such cases the permitted use time of gloves should be shortened. If you have any questions about the suitability of the gloves, please contact the manufacturers / suppliers of gloves.

The given glove parameters are suitable only with aqueous solutions of nitric acid. When using mixtures of nitric acid and other substances, the properties of the other substances in the mixture must also be taken into account when choosing the gloves.

**8.2.2.4. Respiratory protection:** In case of emergency (upon permeation occurring, when the working environments' concentration of nitric acid in the air exceeds the limit values of the permissible concentration), use respiratory personal protective equipment: masks with A2B2E2K2P3 filter according to LST EN 14387, analogous brand filtering gas masks, insulating gas masks or breathing apparatus according to LST EN 402. The use of filter gas masks is allowed only in an environment containing at least 17 % oxygen.

**8.2.2.5. Other protection:** Do not eat, drink or smoke at workplace. Wash hands before breaks and at the end of work. Keep work clothes away from other clothes and objects.

**8.2.3 Environmental exposure controls:** Run regular /stable pH of discharged waste water control, to prevent access to sewers and the environment.

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

a) **Appearance:** colorless or yellowish liquid at 20 °C temperature and 1013 hPa pressure.

b) **Odor:** Pungent.

c) **Odour threshold:** The smell is felt from a few drops product.

d) **pH:** <1.

e) **Melting point/Freezing point °C:** At a pressure of 1013 hPa, 232 K or -41 °C. Validation: registration of nitric acid in the REACH dossier summarizes that the melting point of nitric acid is definitely lower than -20 °C. In this case, referring ECHA's dossier “Guidance on information requirements and chemical safety assessment. Section R.7a: Specific guidance for data entry.

f) **The initial boiling point or boiling point range:** At a pressure of 1013 hPa, 356 K or 83 °C. Validation: registration of nitric acid in the REACH dossier states that the boiling point range is obtained when nitric acid is not sufficiently pure.

g) **Flash Point:** According to the REACH regulation attachment VII column 2 using an explanation: it is not detected as the product is a solution of inorganic matter.

h) **Evaporation rate:** Unknown;

i) **Flammability (solid, gas):** Non-flammable;

j) **Upper (lower) flammability or explosive limit values:** Not applicable, non-explosive;

k) **Vapor Pressure:** 6.1 E +03 Pa at 293 K or 20 °C. Validation: registration of nitric acid according to REACH dossier states that the results of several tests have been similar, so the final vapor pressure value was decided to be the average of the results of several tests.

l) **Vapor density:** 2;

m) **Relative density:** 1.513 at 20 °C. Validation: Registration of nitric acid in the REACH dossier states that the results of three tests were very similar. The arithmetic mean of three results was decided as the final result. In the literature there was also found a relative density value of 1,550 g/cm<sup>3</sup> and 1,502 g/cm<sup>3</sup>, but in this literature there is no indication of temperature during tests, therefore these results are not used.

n) **Solubility:** 500 g/l at 20 °C. Validation: The solubility temperature for nitric acid in REACH dossier is not provided.

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Such solubility is expected at room temperature. Based on the fact that nitric acid is highly soluble in water, it was determined that the solubility of nitric acid in water is > 500 g/l at 20°C.

**o) Partition coefficient n-octanol/water:** According to REACH regulation attachment VII column 2, using an explanation: it is not established as the product is a solution of inorganic matter.

**p) Auto-ignition temperature:** Not applicable. Validation: Inorganic oxides in which an inorganic element has the highest degree of oxidation can no longer react with oxygen, therefore they are considered non-flammable. Within nitric acid, nitrogen has the highest degree of possible oxidation (5+), therefore nitric acid is considered non-flammable and it is not sensitive to self-ignition.

**q) Decomposition Temperature:** 83 ° C 1013 hPa;

**r) Viscosity:** 0.75 mPa at 25 °C. Validation: Nitric acid dossiers contain several values from different sources of literature. The final value is decided by calculating the arithmetic mean of all the results.

**s) Explosives (explosive) properties:** Based on REACH regulation attachment VII column 2, explosive properties may not be determined if there are no chemical groups in the product molecules that could lead to explosive properties. Based on the chemical structure of nitric acid criteria which are applied according to ADR, it is stated that nitric acid has no chemical groups that could lead to explosive properties.

**t) Oxidizing Properties:** Oxidizing.

**9.2 Other information**

Miscible with water in all proportion.

**SECTION 10. STABILITY AND REACTIVITY****10.1 Reactivity**

It reacts well with carbon steel, organic materials, alkali. Keeps the concrete.

**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. Reacts with metals in the presence of hydrogen. Corrodes concrete. Refer to section 5 of this SDS for handling the product in case of fire.

**10.4 Conditions to avoid**

Avoid direct light, direct heating, high temperature, nitric acid vapor release and mechanical leakage damage. In contact with carbon steel, toxic nitrogen oxides are released.

**10.5 Incompatible materials**

Organic materials, reducing agents, metal powders, hydrogen silthide, alcohols, chlorates and carbides, carbon steel, monel (nickel and copper alloys), copper, other heavy metals and alloys, base metals, flammable liquids and chromic acids, alkalis and alkaline products .

**10.6 Hazardous decay products**

When heated, vapors and nitrogen oxides are formed.

**SECTION 11. TOXICOLOGICAL INFORMATION**

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**11.1 Information on toxicological effects**

**Acute toxicity:** Of high toxicity after inhalation.

Inhalation: LC50 (1 h) on rats EBPO 403: >2650 ppm (male/female) based on test material.

Corrosive substance and not an acute toxicant via inhalation.

**Practical experience/occurrence on people:** Not determined.

**Effects on animals**

	Exposure dose/concentration	Class	Method	Symptoms/delayed effect	Remarks
Acute ingestion toxicity	According to REACH regulation, an acute toxicity study does not need to be conducted if the material is classified as corrosive to skin (Column 2, attachment VIII, section 8.5).				
Acute skin contact toxicity	According to REACH regulation, an acute toxicity study does not need to be conducted if the material is classified as corrosive to skin (Column 2, attachment VIII, section 8.5).				
Acute inhalation toxicity	LC50 (4 h): > 2.65 mg/L	Rats (male/female)	OECD 403	Acute inhalation toxicity determined	None
	LC50 (1 h): about 2500 ppm (male/female)	Rats (male/female)	OECD 403	Acute inhalation toxicity determined	None
	LC50 (1 h): about 2200 ppm (male)				
	LC50 (1 h): ca. 2800 ppm (female)				

**Other information:** No data available.

**Assessment/classification:** Nitric acid is classified as acute inhalation toxicity, category 3.

**Skin irritation or/and sensitization:** nitric acid is classified as corrosive to skin, category 1A (when concentrations is higher than 20%) and category 1B (when concentrations is 5 – 20%) based on the regulation (EC) No. 1272/2008 annex VI table 3.1, therefore, according to REACH regulation annex VIII section 8.1.1 column 2, experimental tests were not carried out on the basis that nitric acid is a strong acid and has a pH <2.

**High harmfulness for eyes and eye irritation:** nitric acid is classified as corrosive to skin, category 1A (at concentrations above 20%) in accordance with regulation (EC) No. 1272/2008 annex VI table 3.1, therefore, according to REACH regulation annex VII section 8.2 column 2, experimental tests were not carried out on the basis that nitric acid is a strong acid, its pH < 2 and it is classified as corrosive to the skin.

**Sensitizing of the airways or skin:** EUH071: Corrodes respiratory system.

The registration of nitric acid in REACH dossier also provides information on the collected data about the effects of nitric acid on people with asthma. Summarizing the data, it was concluded that nitric acid is not related to moderate cough, asthma or dyspnea.

**Mutagenicity:** test (AMES) result is negative. From the results obtained on nitric acid (OECD 471), sodium (OECD 471, 473) and potassium (EBPO 471, 473 and 476) nitrates and due to their structural similarities with nitric acid, it is possible to conclude that nitric acid is not expected to cause genetic toxicity.

**Carcinogenicity:** nitric acid is not classified as carcinogenic.

**Reproductive toxicity:** According to OECD 422 (rat) NOAEL 1500 mg/kg day no adverse effects on reproduction and development have been established. The summary of carried out results in the studies of nitric acid registration according to REACH dossier states that the local corrosive effects of nitric acid are significantly predominant in comparison with systemic effects.

**Specific toxicity for particular organ (STOT) (one time effect):** no data available.

**Specific toxicity for particular organ (STOT) (repeated effect):** Oral: combined repeated toxicity study.

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Developmental Toxicity Screening Test according to OECD 422 (Rat) NOAEL-1500 mg/kg per day. Inhalation: repeated inhalation toxicity study according to OECD 413 (rats) NOAEC –  $\geq 2.15$  ppm. Skin: no data.

**Aspiration hazard:** None.

**SECTION 12. ECOLOGICAL INFORMATION****12.1 Toxicity****Toxicity to aquatic invertebrates (short-term effect).**

Aquatic invertebrates – Daphnia LC50 –  $>100$  mg/l (48 h);

LC50 (96 h) (ceriodaphnia dubia, USEPA method): pH value – 4,6;

The shore crab LC50 – 180 mg/l (48 h);

**Toxicity to aquatic invertebrates (long-term effect.): No valid data.**

**Toxicity to algae and aquatic plants.** In accordance with REACH regulation annex XI section 1.5, the study does not need to be conducted if studies have already been carried out on materials which have an analogical structure. In the environment nitric acid dissociates into hydrogen (H<sup>+</sup>) and nitrate ions. Hydrogen ion reduces pH, but in the aquatic environment, the pH decrease is limited due to buffering properties. Water eco toxicological studies are required at pH 6-9. At such a pH, the nitric acid effect is reduced to the effect of nitrates, therefore to evaluate the nitric acid toxicity to algae and aquatic plants the results of investigations (Admiral, 1977) may be used, obtained with potassium nitrate. During these experiments, marine benthic pollen was affected to potassium nitrate. Determined NOEC = 6.75 mmol/L (i. e. 682 mg KNO<sub>3</sub>/l or 419 mg nitrate/l).

**Toxicity to soil dwelling organisms:** Depending on the pH level. Increasing the concentration of nitrate varies slightly.

**Toxicity to terrestrial plants:** Depending on the pH level. Increasing the concentration of nitrate varies slightly.

**12.2 Persistence and readability**

Not applicable (because the organic material).

**12.3 Bio accumulative potential**

Not applicable (because the organic material).

**12.4 Mobility in soil**

Not applicable.

**12.5 PBT and vPvB assessment**

According to Annex XIII of Regulation (EC) No 1907/2006, no PBT and vPvB assessment has been conducted to inorganic material.

**12.6 Other adverse effects**

Not applicable.

**SECTION 13. DISPOSAL CONSIDERATIONS****13.1 Waste treatment methods**

**13.1.1. Identification of the substance/ mixture of waste-removal:** Non concentrated nitric acid waste and other nitric acid solutions waste containing 5 % or more of nitric acid according to Regulation (EC) No. 1357/2014 is classified as hazardous waste by **HP 8** „Corrosive“, hazard statement code H314 “Causes severe skin burns and eye damage”. Do not empty into drains (environment). Nitric acid waste must be fully neutralized with lime or sodium alkali, diluted with

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water, collected in closed and labeled stainless steel or acid-resistant plastic containers. Nitric acid waste must be stored under lock. Dispose of nitric acid waste in accordance with all applicable local and national regulations.

**13.1.2. Non concentrated nitric acid waste product packaging:** Emptied rail and road tankers should be cleaned by appropriate method and then re-used. According to Regulation (EC) No. 1357/2014 the packing of nitric acid solution is classified as hazardous waste by **HP 8** „Corrosive“, hazard statement code H314 “Causes severe skin burns and eye damage”. Non concentrated nitric acid packaging waste must be transferred to waste handling companies. Dispose of methanol packaging waste in a safe way and in accordance with all applicable local and national regulations.

Do not remove label until packing is thoroughly cleaned.

## SECTION 14. TRANSPORT INFORMATION

### 14.1 UN number

2031

### UN proper shipping name

Nitric acid

### 14.3 Transportation (transport) of hazard class (-s)

8

### 14.4 Packaging group

II

### 14.5 Environmental hazard

Limited: LQ22 EmS: F-A, S-B. marine pollutant: NO.

### 14.6 Special precautions for use

None.

### 14.7 Bulk shipment of MARPOL 73/78 Annex II and IBC Code

It is not foreseeable that the product will be transported unpackaged, therefore this subsection is not fulfilled.

## 15. REGULATORY INFORMATION

**Non concentrated nitric acid****15.1 Safety, health and environmental regulations/legislation specific for the substance****EU legislation:**

- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC;
- Commission Regulation (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH);
- Commission Regulation (EC) No 552/2009 of 22 June 2009 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as regards Annex XVII;
- REGULATION (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006;
- Commission Regulation (EU) No 1357/2014 of 18 December 2014 replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives;
- Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC;
- Regulation (EU) No 98/2013 of the European Parliament and of the Council of 15 January 2013 on the marketing and use of explosives precursors;
- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR);
- The International Rule for Transport of Dangerous Substances by Railway (RID);
- The International Maritime Dangerous Goods (IMDG);
- International Convention for the Prevention of Pollution from Ships (MARPOL 73/78);
- The International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code) (the IBC Code).

**National legislation (Lithuania):**

- Applicable Law on Waste Disposal of the Republic of Lithuania;
- Applicable Law on Package and Package Waste Handling of the Republic of Lithuania;
- HN23 Maximum Allowable Concentrations of Hazardous Chemical Substances and Preparations in Working Environment. General Requirements;
- HN36 Banned and Restricted Substances;
- Applicable Regulations for Workers "Protection against the Impact of Chemical Factors" and Regulations for Workers "Protection against Carcinogenous and Mutagenous Impacts";
- Applicable Procedure of Safety Data Sheet Requirements and Supply thereof to Professional Users;
- Applicable Rules on Labelling of Items (Products) to be Sold in Lithuania and Referring Price thereof;
- Applicable Rules on Waste Disposal;
- 17 of August 2004 Governments of the LR resolution No. 966 „On Prevention, Response and Investigation of dangerous objects and substances, mixtures or preparations classified as hazardous materials, and a list of criteria for designation of the Approval, as subsequently amended and supplemented. (Official Gazette, 2004, No. 130-4649; 2005 No. 131-4731, 2008, No. 109-4159; 2009 No. 90-3855; 2010, No. 59-2894; 2012 No. 61-3078), as amended and supplemented.
- LST EN 149 “Respiratory protective devices. Filterable half mask for particle protection. Requirements, testing, marking”;
- LST EN 166 “Personal eye protection. Technical requirements”;



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- LST EN ISO 374-1 “Protective gloves against hazardous chemicals and micro-organisms. Part 1. Protective gloves against hazardous chemicals and micro-organisms. Part 1. Terminology and chemical resistance requirements (ISO 374-1: 2016)”;
- LST EN 388 “Protective gloves against mechanical hazards”;
- LST EN 402 “Respiratory protective devices. A lung-operated, life-saving, autonomous, open-air compressed air breathing apparatus with full-face mask or mouthpiece set-up. Requirements, tests, marking”;
- LST EN 420 “Protective gloves. General requirements and test methods”;
- LST EN 14387 “Respiratory protective devices. Gas filters and composite filters. Requirements, tests, marking”;
- LST EN 14605 “Protective clothing from liquid chemicals. Protective clothing with fluids (type 3 clothing) or spray (type 4 clothing), with its impermeable connections, including its elements protecting only certain body parts (PB clothing [3] and PB (4) clothing) using requirements”;
- LST EN ISO 20345 “Personal protective equipment. Safe footwear (ISO 20345:2011)”.

**Additional information on the relevant Community provisions on safety, health and the environment for the product:**

It is allowed to store up to 50 tons of nitric acid at a time in a warehouse. Larger amounts of nitric acid can be stored in facilities where according to the Resolution of the Government of the Republic of Lithuania No.16.08.2004. 966 “On the Approval of the Description and Listing of Criteria for the Listing and Classification of Substances, Mixtures or Preparations of Hazardous Substances in Hazardous Substances” (Official Gazette, 2004, No. 130-4649) with all subsequent amendments and supplements; and in part 2 of Annex I to Regulation 2012/18/EU, requirements for hazardous objects are met.

**Restrictions on the product as regards Regulation (EU) No. 98/2013:** nitric acid falls within the scope of Regulation (EU) No. 98/2013, and therefore it can not be supplied to members of the general public either in pure form or in mixtures or substances unless it is present in concentrations below 3% by mass.

**15.2 Chemical safety assessment**

A chemical safety assessment has been carried out for this product. Exposure scenarios are presented in SDS attachment.

**SECTION 16. OTHER INFORMATION**

**Revision date: 2018.07.12**

**Version No.: 4.0**

**Revision No.: 0**

**Issuing date: 2018.07.12**

**(i) A clear evidence of added, deleted or modified information:**

The safety data sheet, as compared to its previous version, has been modified in accordance with Commission Regulation (EU) No. 2015/830 requirements. Other changes were made:

- Section 2.2: The labeling of the product in accordance with the CLP Regulation has been supplemented with the new hazard statement EUH071.
- Section 7.2: Storage conditions are supplemented by information that the product is not subject to restrictions also in accordance with Part 2 of Annex I to Directive 2012/18/EU.
- Section 8.2.2: Standards for personal protective equipment have been changed from European standards to Lithuanian standards.
- Section 14.7: Changed information to indicate that the product is not intended to be transported unpackaged.

**(ii) List of abbreviations and acronyms used throughout the Safety Data Sheet:**

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ADR – European Agreement on Dangerous Goods by Road;  
RID – Regulations Concerning the International Carriage of Dangerous Goods by Rail;  
IMDG – International Maritime Organisation;  
IATA – International Air Transport Association;  
IMO – Cross-border maritime transport organization;  
SMGS – Agreement on the International Carriage of Goods by Rail.;  
OECD – Organization for Economic Co-Operation and Development;  
CAS – Chemical Abstracts Service;  
CO<sub>2</sub> – Carbon Dioxide;  
EC – European Community;  
EU – European Union;  
H – Hazard Statement;  
HNO<sub>3</sub> – Nitric acid;  
LC50 – Median lethal dose;  
PC – Product Category;  
PVC – Polyvinyl Chloride;  
PROC – Process Category;  
TPRV – Short-term exposure limit;  
IPRD – Long-term exposure limit;  
Cat. – Category.  
Acute Tox. 3 – Acute toxicity category 3;  
Met. Corr 1 – Metal corrosion causing material category 1;  
Ox. Liq 2 – Oxidizing liquids category 2;  
Skin. Corr. 1A – Skin corrosion/irritation category 1A;

#### Explanation of the utilization sector (SU):

SU1 – Agriculture, forestry, fisheries.  
SU3 – Industrial use: the use of materials as such or in mixtures.  
SU4 – Food industry.  
SU8 – Production of bulk, high-volume chemicals (including petroleum products).  
SU9 – Production of small chemicals.  
SU10 – Composition (mixing) and repackaging (except alloy) of items.  
SU12 – Production of plastic products, including production and processing.  
SU14 – Production of metals including alloys.  
SU15 – Production of metal products, except machinery and installations.  
SU16 – Production of computer, electronic and optical, electrical equipment products.  
SU22 – Public property (administration, education, entertainment, services, craftsmen).

#### Product category (PC) explanation:

PC0 – Other.  
PC3 – Air control products.  
PC7 – Untreated Crude metals and alloy.  
PC12 – Fertilizer.  
PC14 – Metal surface processing products, including galvanic and galvanic products.  
PC15 – Non-surface metal processing products.  
PC19 – Intermediate.  
PC20 – Products such as p-regulators, flocculants, sedimentation tanks, neutralizing agents.  
PC21 – Laboratory chemicals.  
PC31 – Polishers and wax mixtures.  
PC33 – Semiconductors.

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PC35 – Washing and cleaning equipment (including solvents).  
PC37 – Chemicals for water purification.

#### (iii) Bibliography:

- 1) Registration of nitric acid according to REACH dossier is declared on the website of the European Chemicals Agency.
- 2) Admiraal W. (1977). Tolerance of estuarine benthic diatoms to high concentrations of ammonia, nitrite ion, nitrate ion and orthophosphate. Marine Biology 43: 307-315.
- 3) <http://gestis-en.itrust.de/nxt/gateway.dll?f=templates&fn=default.htm&vid=gestiseng:sdbeng> [data used 2018-07-10]

#### (iv) Applicable classification and procedures used to determine the classification of mixtures in accordance with Regulation (EC) No. 1272/2008 [CLP Regulation]:

Classification in accordance to regulation (EC) No. 1272/2008	Classification procedure
Acute Tox. 3, H331	Based on the specific concentration limits that were determined by the nitric acid leading registrant with a calculating method and included in the nitric acid registration REACH dossier.
Skin Corr. 1A, H314	Based on the specific concentration limits that are in Regulation (EC) No. 1272/2008 annex VI Table 3.1
Ox. Liq. 2, H272	Based on the specific concentration limits that are in Regulation (EC) No. 1272/2008 annex VI Table 3.1
Met. Corr 1, H290	Based on the specific concentration limits that were determined by the nitric acid leading registrant with a calculating method and included in the nitric acid registration REACH dossier.

#### (v) Relevant precautionary statements:

- 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.  
P280 – Wear protective gloves/protective clothing/eye protection/face protection.  
P260 – Do not breathe vapors.  
P264 – Wash hands thoroughly after handling.  
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.  
P310 – Immediately call a POISON CENTER or doctor/physician.  
P305+P351+P338 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P405 – Store locked up.  
P501 – Dispose of contents/container of stainless steel/acid-resistant plastic sealed and labeled packaging/containers.

#### (vi) Training Advice:

Workers must be trained in the proper use and handling of this product as required under applicable regulations. People handling this product must be trained to work with hazardous substances, hygiene skills, working with hazardous substances, nitric acid properties and risks.

NOTE. The information provided in this safety data sheet is correct to the best of our knowledge, information, and



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

Release info: This version replaces all previous documents.

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**ANNEX**

**Exposure scenarios:**

**1 Exposure scenario (1): Manufacturing and industrial use of nitric acid – Concentration <75%**

**2 Exposure scenario (2): Professional use of nitric acid – Concentration < 75%**

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<b>1. Short title of exposure scenario (1)</b>	
Manufacturing and industrial use of nitric acid – Concentration <75%	
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>
<b>2. Operational conditions</b>	
<b>2.1 Operational conditions related with frequency and quantities of use</b>	
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.
<b>2.2 Operational conditions related with substance/ product</b>	
Physical state	Liquid
Concentration of substance in mixture	Aqueous solutions contain more than 25% nitric acid up to a maximum of 75% nitric acid.
<b>2.3 Other relevant operational conditions</b>	



## Non concentrated nitric acid

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.	
<b>3. Risk Management Measures</b>	
<b>3.1 RMMs related to workers</b>	
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"> <li>• Use closed/ automated systems or covering of open containers (e.g. screens) to avoid irritating mists, sprayings and potential splashes. (Good practice)</li> <li>• Transport over pipes, technical barrel filling/emptying of barrel with automatic systems (suction pumps etc.) (Good practice)</li> <li>• 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)</li> <li>• 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).</li> <li>• Compatible materials: stainless steel 316-L; high density polyethylene; glass</li> <li>• Local exhaust / general ventilation is not required but good practice</li> </ul>
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.
<b>3.2 RMMs related to the environment</b>	
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.
<b>3.3 Waste related measures</b>	

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Type of waste	Liquid waste. Packaging material	
Disposal technique	The neutralized 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.	
<b>4. Prediction of exposure resulting from the conditions described above and the substance properties.</b>		
<b>4.1. Human exposure</b>		
Workers (oral)	No significant oral exposure due to good hygiene practice.	
Workers (inhalation) <i>DNEL = 1.3 mg/m<sup>3</sup></i>	Liquid - Calculated with MEASE	RCR
PROC 1	0.001 mg/m <sup>3</sup>	0.0008
PROC 2	0.001 mg/m <sup>3</sup>	0.0008
PROC3	0.01 mg/m <sup>3</sup>	0.0077
PROC 4	0.05 mg/m <sup>3</sup>	0.0385
PROC 5	0.05 mg/m <sup>3</sup>	0.0385
PROC 8a	0.05 mg/m <sup>3</sup>	0.0385
PROC 8b	0.01 mg/m <sup>3</sup>	0.0077
PROC 9	0.01 mg/m <sup>3</sup>	0.0077
PROC 10	0.05 mg/m <sup>3</sup>	0.0385
PROC 13	0.01 mg/m <sup>3</sup>	0.0077
PROC 14	0.01 mg/m <sup>3</sup>	0.0077
PROC15	0.01 mg/m <sup>3</sup>	0.0077
PROC 7 – With mask APF 20	0.05 mg/m <sup>3</sup>	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.	
<b>4.2. Environmental exposure (qualitative assessment)</b>		
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 <sup>+</sup> and NO <sup>3-</sup> 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.	

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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 and in air will react into NO <sub>x</sub> . These NO <sub>x</sub> emissions in the troposphere are small compared to releases from combustion processes
Secondary poisoning	Bioaccumulation in organisms is not relevant for nitric acid.

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<b>1. Short title of exposure scenario (2)</b>	
Professional use of nitric acid – Concentration < 75%	
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>
<b>2. Operational conditions</b>	
<b>2.1 Operational conditions related with frequency and quantities of use</b>	
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.
<b>2.2 Operational conditions related with substance/ product</b>	
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%.
<b>2.3 Other relevant operational conditions</b>	
The amount used per professional workers varies from activity to activity. The maximum duration >4 h/day was considered as worst case assumption.	
<b>3. Risk Management Measures</b>	
<b>3.1 RMMs related to workers</b>	

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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.		
	<i>HNO3 concentration in product &gt; 20%:</i>	<i>HNO3 concentration in product between 5% and 20%:</i>	<i>HNO3 concentration in product &lt; 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..		
<b>3.2 RMMs related to the environment</b>			
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.		
<b>3.3 Waste related measures</b>			
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.		
<b>4. Prediction of exposure resulting from the conditions described above and the substance properties.</b>			
<b>4.1. Human exposure</b>			
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		

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	thus repeated daily dermal exposure to commercial product is considered negligible.	
Professional (inhalation) <i>DNEL = 1.3 mg/m<sup>3</sup></i>	Calculated with MEASE	RCR
PROC 5,	0.1 mg/m <sup>3</sup>	0.08
PROC8a	0.05 mg/m <sup>3</sup>	0.04
PROC8b	0.05 mg/m <sup>3</sup>	0.04
PROC9	0.05 mg/m <sup>3</sup>	0.04
PROC10	0.05 mg/m <sup>3</sup>	0.04
PROC 13	0.05 mg/m <sup>3</sup>	0.04
PROC14	0.1 mg/m <sup>3</sup>	0.08
PROC15	0.01 mg/m <sup>3</sup>	0.01
PROC19	0.05 mg/m <sup>3</sup>	0.04
PROC 11 with mask APF40	0.5 mg/m <sup>3</sup>	0.38
<b>4.2. Environmental exposure (qualitative assessment)</b>		
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 <sup>+</sup> and NO <sup>3-</sup> 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 NO <sub>x</sub> .	
Secondary poisoning	Bioaccumulation in organisms is not relevant for nitric acid.	