 BONDALTI <small>EVOLVING CHEMISTRY</small>	Safety Data Sheet according to EU Regulations 1907/2006 and other amendments Integrated Management System	Processed by computer FS-84-029 Revision: 09-01-2020 Version: 15 (Replace: Version 14 from 08-07-2019)
Nitric Acid		

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

1.1 Product Identifier

Chemical name:	Nitric acid < 70%
EC number:	231-714-2
CAS number:	7697-37-2
Index number:	007-004-00-1
Registration number:	01-2119487297-23-0038
Chemical characterization:	Nitric acid is an inorganic substance

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

Relevant identified uses of the substance

Nitric Acid is used in the manufacture of bulk, large scale chemicals (including petroleum products), manufacture of fine chemicals, as intermediate, formulation of preparations and/or re-packaging (excluding alloys), manufacture of food products, industrial use of processing aids in processes and products, not becoming part of articles, industrial use of reactive processing aids, industrial use of process regulators for polymerization processes in production of resins, rubbers, polymers, use in fertilizers, washing and cleaning products (including solvent based products), metal and non-metal surface treatment products, including galvanic and electroplating products, use in products such as ph-regulators, flocculants, precipitants, neutralization agents and use as laboratory reagent.


For more information see the corresponding Exposure Scenario attached to this SDS.

Uses advised against

Use of Nitric acid containing (cleaning) agents >3% (The threshold of 3%, instead of 5% mentioned in CLP, is to align to the EC regulation 98/2013 on Precursors of explosives, forbidding to provide nitric acid >3% to consumer)

1.3 Details of the supplier of the safety data sheet

Company:	BONDALTI CHEMICALS, SA Rua do Amoníaco Português, nº 10, Beduído 3860-680 Estarreja - Portugal
Telephone:	+351 234 810 300
Fax:	+351 234 810 361
Web page:	www.bondalti.com
Contact:	Maria José Alves
E-mail:	fds@bondalti.com

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1.4 Emergency telephone number

BONDALTI CHEMICALS, SA Telephone: Fax:	+351 234 810 300 (24 hours/day - 7 days/week) +351 234 810 361
Portuguese emergency number	112
SOS – Poisons Centre	In England and Wales: NHS 111 - dial 111 In Scotland: NHS 24 - dial 111 In North Ireland: Contact local GP or pharmacist during normal hours; In Republic of Ireland: 01 809 2166 United States of America: 1-800-222-1222

SECTION 2. HAZARDS IDENTIFICATION


2.1 Classification of the substance or mixture

Self-Classification of Nitric Acid at $\geq 65\%$ according to EU regulation 1272/2008

Hazard Class	Hazard Category	Hazard Statements
Oxidizing Liquid	Oxid. Liq. 3	H272: May intensify fires; oxidizer
Skin Corrosion	Skin Corr. 1A	H314: Causes severe skin burns and eye damage
Corrosive to metals	Met. Corr. 1	H290: May be corrosive to metals.
Acute toxicity	Acute Tox. 3	H331: Toxic if inhaled

Specific concentration limits:

Concentration (%)	Hazard Category
$C \geq 99$	Oxid. Liq. 2
$99 > C \geq 65$	Oxid. Liq. 3
$C \geq 20$	Skin Corr. 1A
$5 \leq C < 20$	Skin Corr. 1B

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2.2 Label Elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard Pictogram:



GHS03



GHS05



GHS06

Word – Signal

Danger

Hazard statements


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

Precautionary statements

P220: Keep away from clothing and other combustible materials
P280: Wear protective gloves/protective clothing/eye protection/face protection
P390: Absorb spillage to prevent material damage.
P304+P340: IF INHALED: Remove **persone** to fresh air and keep comfortable for breathing.
P301+P330+P331: IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303+P361+P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

2.3 Other Hazard

The substance is not classified as PBT/vPvB.

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SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances


Hazardous substance

Chemical Name	CAS-No.	EC-No.	REACH No.	Concentration [%]
Nitric acid	7697-37-2	231-714-2	01-2119487297-23-0038	68 ≤ C ≤ 70

SECTION 4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice:	<p>Give first aid and obtain medical attention immediately.</p> <p>First aiders should be protected adequately (see section “Handling and storage”).</p> <p>Remove affected person from further exposure.</p> <p>Ensure that eyewash facility and safety showers are provided close to the workplace. Speed is essential.</p>
If inhaled:	<p>Move the injured person to fresh air at once.</p> <p>Keep the patient warm and at rest in a half upright position.</p> <p>Apply artificial respiration, if breathing has stopped or shows sign of failing.</p> <p>Mouth to mouth resuscitation may be dangerous.</p> <p>Administer oxygen if competent person is available.</p>
In case of skin contact:	<p>Drench with water, remove contaminated clothing and wash or shower the affected skin with plenty of water for at least 15 minutes.</p> <p>Chemical burns must be treated promptly by a physician.</p>
In case of eye contact:	<p>Immediately irrigate the eyes with eyewash solution or clean water for at least 15 minutes.</p> <p>Hold eyelids open during flushing. Do not allow victim to rub eyes.</p>
If swallowed:	<p>Do not induce vomiting.</p> <p>If the person is conscious, wash out mouth with water and give water or milk to drink.</p> <p>Obtain immediately medical attention.</p>

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Rescuer self-protection

Respiratory protection:	Wear suitable breathing apparatus if exposure levels exceed or may exceed the recommended exposure limits e.g. masks equipped with filter type E (EN 14387) and B, self contained breathing apparatus.
Hand protection:	Chemical resistant gloves complying with EN 374 should be worn at all times when handling nitric acid e.g. > 8 hrs (Breakthrough time) butyl rubber, PVC, PTFE fluoro elastomer.
Eye protection:	Use chemical safety goggles e.g. EN 166 or full face mask EN 402.

4.2 Most important symptoms and effects, both acute and delayed

4.2.1 Inhalation

- Corrosive to respiratory system.
- Symptoms: Breathing difficulties, cough, chemical pneumonia and pulmonar edema.

4.2.2 Skin contact


- Causes severe burns.
- Symptoms: Redness, tissues swelling and burn.

4.2.3. Eye contact

- Causes severe injury.
- Small quantities sprinkled against the eyes can cause irreversible damages and blindness.
- Symptoms: redness, lacrimation, tissues swelling and burn.

4.2.4. Swallowing

- Swallowing can cause sever burns in mouth, throat as well as perforation of stomach and oesophagus.
- Symptoms: Nauseas, abdominal pain, vomit with blood, diarrhea, choking, cough and respiratory failure.

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4.3 Indication of any immediate medical attention and special treatment needed

Following exposure to acid/NO_x fumes the patient should be kept under medical review for at least 48 hours as delayed pulmonary oedema may develop.

SECTION 5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media:	Nitric acid is not combustible but if involved in a fire use the best means available to extinguish the fire (e.g water, or CO ₂)
Unsuitable extinguishing media:	Do not use chemical extinguishers or foams or attempt to smother the fire with steam or sand.

5.2 Special hazards arising from the substance or mixture

- Nitric acid is not combustible, but has oxidizing properties and therefore may react with many combustible materials causing fires and releasing toxic fumes (nitrogen oxides).
- Can explode in contact with a powerful reducing agent.
- Reacts with most ordinary metals by releasing hydrogen which can produce explosive mixtures with the air.
- Use water sprays to cool fire-exposed containers and structures, to disperse vapours and to protect personnel.


5.3 Advice for firefighters

- Wear self-contained breathing apparatus
- Wear full acid- resistant protective clothing.
- Spray with water to cool down containers and structures exposed to fire.
- Contain vapours to protect intervening personnel.
- Avoid releasing fire fighting water into the environment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Those dealing with major releases should wear full protective clothing including respiratory protection. Avoid skin and eye contact and inhalation vapours. Evacuate unnecessary personnel.

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6.1.1 For the personnel not involved in the emergency response

- Keep people in a safe area.
- In case of fire: Evacuate area.

6.1.2 For the personnel in charge of the emergency response

- Use appropriate individual protective equipment (eg: chemical protective suit; glasses; protective shoes, gloves and appropriate respiratory protective equipment)
- Evacuate the personnel to safety areas.
- Ventilate the area.

6.2 Environmental precautions

- Contain spillage where possible and safe to do so.
- Take care to avoid the contamination of watercourses or into the sewage system
- Inform appropriate authority in case of accidental contamination of watercourses or sewage system
- Dilute with water and neutralize the acid with, for example soda, sodium carbonate or limestone before discharging contaminated material into treatment plants or water courses.

6.3 Methods and material for containment and cleaning up

6.3.1 - Isolate source of leak as quickly as possible

- Contain the spill with protective barriers.
- Cover sewer entrances.

6.3.2 - Use absorbent material.

- Gather the waste in suitable containers for this substance.
- Keep the waste in duly labelled containers.
- Pump large amounts of the spilled liquid into containers suitably labelled for disposal


6.3.3 – Do not use water on spills of this product.

- For small spillage dilute with water and neutralise cautiously with soda ash and/or lime and recover for disposal.
- Do not use organic compounds, sawdust etc.

6.4 Reference to other sections

See section 8 for protective measures.

See section 13 on waste treatment.

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SECTION 7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Do not breathe dust/fume/gas/mist/vapours/spray
 Avoid skin and eye contact and inhalation of vapours.
 Provide adequate ventilation.
 Wear eye and hand protection when handling small quantities.
 Wear full protective equipment where there is a risk of leaks or splashes.
 When diluting, add acid to water and not water to acid.
 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.
 Do not eat, drink and smoke in work areas.
 Wash hands after use.
 Remove contaminated clothing and protective equipment before entering eating areas.

7.2 Conditions for safe storage, including any incompatibilities

Store in cool, well ventilated area away from heat, ignition source and direct sunlight.
 Do not permit smoking in the storage area.
 Keep away from incompatible substances. (See Section 10 - Stability and reactivity).
 Protect containers from corrosion and physical damages.
 Follow appropriate Industry or National codes for bulk and container storage.
 Containers should be of stainless steel and preferably of low carbon, content such as 304L or plastic (e.g. PVC).


7.3 Specific end use(s)

See exposure scenarios in annex to this SDS.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components	CAS-No.	Value	Control parameters	Legal Basis	Form of exposure
Nitric acid (HNO ₃)	7697-37-2	2.6 mg/m ³ (1ppm)	STEL	Directive 2006/15/EC	Vapours
Nitrogen dioxide	10102-44-0	1 ppm (1,91 mg/m ³) 0,5 ppm (0,96 mg/m ³)	TWA STEL	Directive (UE) 2017/164	--
Nitrous oxide	10024-97-2	50 ppm	TWA	ACGIH 2015	---

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DNEL values

DNEL Acute exposure for workers through inhalation = 2.6 mg/m³ (local effects)

DNEL Long-term exposure for workers through inhalation = 2.6 mg/m³ (local effects)

DNEL Long-term exposure for general population through inhalation = 1.3 mg/m³ (local effects)

8.2 Exposure controls

8.2.1 Appropriate Engineering Controls

Local exhaust ventilation where appropriate.

Provide safety showers and eye washing facility at any location where skin or eye contact can occur.

Use stationary and/or portable NOx monitors in the working place, monitoring normal NOx levels at well below 2.6 mg/m³.

8.2.2 Individual Protection Measures, Such as Personal Protective Equipment

Respiratory protection:	Wear suitable breathing apparatus if exposure levels exceed or may exceed the recommended exposure limits e.g. masks equipped with filter type E (EN 14387) and B, self contained breathing apparatus.
Hand protection:	Chemical resistant gloves complying with EN 374 should be worn at all times when handling nitric acid e.g. > 8 hrs (Breakthrough time) butyl rubber, PVC, PTFE fluoro elastomer.
Eye protection:	Use chemical safety goggles e.g. EN 166 or full face mask EN 402.
Skin and body protection:	Wear chemical resistant, protective suit (EN 14605) and boots.
Hygiene measures:	When handling the product do not eat, drink or smoke. Wash hands after handling and before eating, smoking and using the lavatory and at the end of the working period.


8.2.3 Environmental exposure controls

Waste must be handled pursuant to the applicable legislation:

- 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council;

- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives and other amendments;

- 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.

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SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties


a) Appearance:	Colourless fluid
b) Odour:	Pungent
c) Odour threshold:	No information available
d) pH:	2
e) Melting/freezing point:	-41.15°C at 101325 Pa
f) Initial boiling point and boiling range:	82.85°C at 101325 Pa
g) Flash point:	Not inflammable (**) (*)
h) Evaporation rate:	No information available
i) Flammability (solid, gas):	Non flammable
j) Upper/lower limits of flammability or explosivity limits:	Not applicable
k) Vapour pressure:	62 hPa@19.85°C
l) Vapour density:	No information available
m) Relative density:	1.513 to 20°C (**)
n) Solubility:	500 g/L at 20°C in water
o) Partition coefficient: n-octanol/water:	No information available. (*)
p) Auto-ignition temperature:	Not sensitive to self-ignition
q) Decomposition temperature:	No information available
r) Viscosity:	0.75 mPa s to 25 deg C. (**)
s) Explosive properties:	Non-explosive
t) Oxidising properties:	Strong oxidizing substance

(*) Since Nitric acid is an inorganic substance, this property needs not to be determined. (CSR)

(**) Value used for CSA

9.2 Other information

Dissociation constant: pKa = -1.3

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SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity

Thermally stable in reaction terms at normal storage conditions.

10.2 Chemical stability

Can react violently with reducing agents, strong bases, organic materials, chlorides and finally divided metals. Is corrosive to concrete.

10.3 Possibility of hazardous reactions

Can react violently with reducing agents, strong bases, organic materials, chlorides and finally divided metals.

10.4 Conditions to avoid

Avoid direct heat and high temperature to prevent nitric acid fumes release and damage of container.
Avoid reaction with most common metals because it may liberate hydrogen.
Reaction with water is exothermic.

10.5 Incompatible materials

Avoid combustible materials, organic matter, reducing agents, alkalies, metallic powders, hydrogen sulphide, alcohols, chlorates and carbides, carbon steel, monel, copper, several other metals and alloys, flammable liquids and chromic acid.
Can react violently with reducing agents, strong bases, organic materials, chlorides and finally divided metals. Is corrosive to concrete.


10.6 Hazardous decomposition products

When heated, nitric acid and NO_x vapours may be evolved.

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Nitric acid is a corrosive substance to skin and eye. It is not considered to have bioaccumulative potential as nitrate is highly soluble in water and rapidly excreted via the urine. From the results obtained on nitric acid, sodium and potassium 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. From the study of Dockery & al, 1996, gaseous acids (HNO₂ and HNO₃) were associated with a significantly higher risk of asthma and showed a positive association with higher reporting of attacks of wheezing, persistent wheeze, and any asthmatic symptoms. Nitric acid is

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not expected to be systemically available in the body under normal handling and use conditions and therefore systemic effects of nitric acid after repeated exposure are not expected to occur.

<i>Hazard class</i>	<i>Dose descriptor</i>	<i>Method/reference</i>
Acute oral toxicity:	No study available	Chemical Safety Report
Acute inhalation toxicity:	LC ₅₀ (4 h): > 2.65 mg/L air (analytical) rat (wistar) male/female based on: act. ingr. (pure nitric acid)	OECD Guideline 403 (Acute Inhalation Toxicity)
Acute dermal toxicity:	No study available	Chemical Safety Report
Skin corrosion/irritation:	No data available	Chemical Safety Report
Serious eye damage/irritation:	No study available	Chemical Safety Report
Respiratory or skin sensitisation:	No study available	Chemical Safety Report
Germ cell mutagenicity Genotoxicity <i>in vivo</i> :	Negative with and without metabolic activation negative for <i>S. typhimurium</i> TA 1535, TA 1537, TA 98 and TA 100(all strains/cell types tested); met. act.: with and without; cytotoxicity: yes (for TA 1537 at 5000 µg/plate for both experiment 1 and 2)	BASF Aktiengesellschaft (1989)
Carcinogenicity:	No data available	Chemical Safety Report
Reproductive toxicity Fertility:	NOAEL (P):1500 mg/kg bw/day (rat (wistar) male/female) (test mat. CAS no: 7757-79-1) (no effects at the highest dose tested);	OECD Guideline 422 (Combined Repeated Dose Toxicity Study with the Reproduction / Developmental Toxicity Screening Test)
Teratogenicity/development:	NOAEL: 1500 mg/kg/day (general toxicity) rat(Sprague-Dawley);	OECD Guideline 422 (Combined Repeated Dose Toxicity Study with the Reproduction / Developmental Toxicity Screening Test)
STOT - SE	No data available	---
STOT- RE	No study available	Chemical Safety Report
Aspiration hazard	No data available	-----

Nitric Acid**SECTION 12. ECOLOGICAL INFORMATION****12.1 Toxicity****Information on environmental effects**

The studies show that a pH caused by adding nitric acid roughly between pH at 3 (or lower) and 4 is critical for fish. Long-term toxicity test on fish does not need to be conducted as nitric acid will dissociate into H⁺ ions (resulting in a pH decrease) and nitrate ions, and the endpoint can consequently be covered with a study done on sodium nitrate, which also dissociates into nitrate ions. Finally, long-term effects to fish at environmentally relevant pH values are not expected to occur, similarly as in aquatic invertebrates.


Hazard class	Dose descriptor	Method/reference
Fish	Median lethal pH (96h) 3-3.5 for <i>Lepomis macrochirus</i>	Ellgaard EG and Gilmore JY III (1984) (no guideline followed).
	Median lethal pH (96h) ca. 3.7 for <i>Oncorhynchus mykiss</i>	Swift MC and Morgan RP (1983) (no guideline followed).
Aquatic Invertebrates	LC ₅₀ (pH range tested: 3.4-8.1) (48 h): 4.4 pH (<i>Ceriodaphnia dubia</i>) standard units based on: mortality; LC ₅₀ (pH range tested: 3.2-8.0) (48 h): 4.7 (<i>Ceriodaphnia dubia</i>) pH standard units based on: mortality	Belanger SE and Cherry DS (1990)
Algae and Aquatic plants	Most of the species (several benthic diatoms; algae) grew well at nitrate concentrations up to 16.9 mmol/L (=1.7 g/L). Nitrate was clearly inhibitory to <i>Nitzschia dubiformis</i> and <i>Amphiprora</i> c.f. <i>paludosa</i> only at the highest test concentration.	Admiraal W. (1977)

12.2 Persistence and degradability

Not applicable to inorganic substance.

12.3 Bioaccumulative potential

As nitric acid is extremely soluble in water, it will not accumulate in fatty tissues. Therefore bioaccumulation studies are deemed not relevant.

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12.4 Mobility in soil

Data not available.

12.5 Results of PBT and vPvB assessment

The criteria for the identification of PBT and vPvB properties, as laid down in REACH Annex XIII do not apply to inorganic substances. This implies that inorganic substances like nitric acid will not be identified as PBT or vPvB substances.

12.6 Other adverse effects

Not applicable.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste disposal procedures:

- Nitric Acid waste can be neutralized with sodium bicarbonate or sodium hydroxide diluted or absorbing material for spills.
- Neutralize carefully with lime or carbonates.
- Dispose of in accordance with relevant local regulations
- It is not advisable to discharge nitric acid waste through wastewater
- EWC Code 06 01 05* - Nitric Acid

Packaging treatment:

- It is preferable to recycle packages instead of disposing of them.
- Wash containers with water and neutralize the waters used with caustic soda.
- EWC code 15 01 10 (*) – Packages with/or contaminated with hazardous substances waste.

Applicable regulation:

- 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council;
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives and other amendments;

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- 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.


SECTION 14. TRANSPORT INFORMATION

	ADR	IATA	IMDG	RID
14.1 UN number:	2031	2031	2031	2031
14.2 UN proper shipping name:	Nitric Acid	Nitric Acid	Nitric Acid	Nitric Acid
14.3 Transport hazard class(es):	8	8 (5.1)	8	8
Labels:	8 (5.1)	Corrosive + Oxidizer	8 + 5.1	8 + 5.1
Packing Instruction:	P001 IBC02		P001 IBC02	
Packing Instruction (cargo aircraft):		855/Max Liq Qty/Pkg: 30 L		
Packing Instruction (cargo passenger):		Forbidden		
Packing Instruction (LQ):	1 L	Forbidden (Cargo aircraft only)	1 L	
Packing Instruction (EQ):	E2	E0	E2	
14.4 Packing group:	II	II	II	II
14.5 Environmental hazards:	NO	No	NO	NO
14.6 Special precautions for user:				
Tunnel restriction code:	(E)			
EmS:			F-A; S-Q	
HI:				85
14.7 Transport in Bulk according to Annex II of Marpol and the IBC Code:				
Pollution Category:			Y	
Hazards:			S/P	
Ship Type:			2	


SECTION 15. REGULATORY INFORMATION

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

- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization 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 and other amendments;

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- 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 and other amendments;
- 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;
- Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work;
- Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) and other amendments;
- Commission Directive 2006/15/EC of 7 February 2006 establishing a second list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC;
- [Commission Directive \(EU\) 2017/164 of 31 January 2017 establishing a fourth list of indicative occupational exposure limit values pursuant to Council Directive 98/24/EC, and amending Commission Directives 91/322/EEC, 2000/39/EC and 2009/161/EU;](#)
- 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council;
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives and other amendments;
- 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 2008/68/EC of the European Parliament and of the Council of 24 September 2008, on the inland transport of dangerous goods (ADR; RID and ADN) and other amendments;
- 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;
- [Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage and other amendments;](#)
- [ACGIH 2015: Guide to Occupational Exposure Values.](#)

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15.2 Chemical safety assessment

A chemical safety study was made.

SECTION 16. OTHER INFORMATION

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

Training Advice

Provide operators with the appropriate information, instruction and training on the product.

Changes:

Changes are in blue text.

DATE	REVISION	CHANGES MADE
09-01-2020	15	Section 2.2
		Section 7.1
		Section 8.1
		Section 8.2.1
		Section 13
		Section 14
		Section 15

Abbreviations mentioned on the Sheet:

ACGIH - American Conference of Governmental Industrial Hygienists

Acute Tox. 3 - Acute toxicity when inhaled, category 3

ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road.

CAS – World's authority for chemicals information's

CAS no. – World authority for chemical information

CLP – Classification, Labelling and Packaging (CLP) Regulation

DNEL – Derived Non Effect Concentration


EC No. – European Community

ERC – Environmental Release Category

ES - Exposure Scenario

EWG: - European Waste List

IATA – International Air Transport Association


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IMDG – International Maritime Dangerous Goods
 LC₅₀ – Median Lethal Concentration
 Met. Corr. 1 – Substance corrosive to metals, category 1
 Ox. Liq. 2 – Oxidising Liquid, class 2
 Ox. Liq. 3 - Oxidising Liquid, class 3
 PBT - Persistent, bioaccumulative and toxic.
 PC - Product Category
 PROC - Process Category
 REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals
 RID – International Rule for Transport of Dangerous Substances by Railway
 STEL: Short term exposure limit based
 SDS - Safety Data Sheet
 Skin Corr. 1A – Skin Corrosion, class 1A
 Skin Corr. 1B - Skin Corrosion, class 1B
 STOT – SE – Specific Target Organ Toxicity – Single Exposure
 STOT- RE - Specific Target Organ Toxicity – Repeated Exposure
 SU - Sector of Use
[TWA – Time-weighted average](#)
 UN – United Nations
 vPvB - Very persistent and very bioaccumulative

References: Chemical Safety Report – 2016 (2010-09-22)

Annex:

Exposure scenario 1: Manufacture - Manufacturing of the substance > 70% (continuous and batch synthesis), including handling, storage and quality control
 Exposure scenario 2: Manufacture - Manufacturing of the substance <70% (continuous and batch synthesis), including handling, storage and quality control
 Exposure scenario 3: Formulation or re-packing - Formulation of mixtures using Nitric acid > 70%
 Exposure scenario 4: Formulation or re-packing - Formulation of mixtures using Nitric acid < 70%
 Exposure scenario 5: Use at industrial sites - Use of Nitric acid > 70% at industrial site as intermediate
 Exposure scenario 6: Use at industrial sites - Use of Nitric acid < 70% at industrial site as intermediate
 Exposure scenario 7: Use at industrial sites - Use of Nitric acid > 70% at industrial site as reactive processing aid (Cleaning agent, pH regulator, waste gas treatment, ion exchange resins regeneration, metal treatment, plastic treatment, surface treatment product, water treatment)
 Exposure scenario 8: Use at industrial sites - Use of Nitric acid < 70% at industrial site as reactive processing aid (Cleaning agent, pH regulator, waste gas treatment, ion exchange resins regeneration, metal treatment, plastic treatment, surface treatment product, water treatment)
 Exposure scenario 9: Widespread use by professional workers - Use of Nitric acid < 70% by professional worker (outdoor and indoor of reactive substances in open systems as cleaning agent, pH regulator, metal treatment)
 Exposure scenario 10: Consumer use - Use of Nitric acid containing products (< 3%)

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Exposure scenario 1: Manufacture - Manufacturing of the substance > 70% (continuous and batch synthesis), including handling, storage and quality control

The liquid nitric acid is mainly manufactured according to the following chemical operations:

- oxidation of ammonia with air to give nitric oxide

- oxidation of the nitric oxide to nitrogen dioxide and absorption in water to give a solution of nitric acid

Based on the described procedures, there are two types of nitric acid plants: single pressure plants, where oxidation and absorption steps take place at the same pressure and dual pressure plants, where absorption takes place at higher pressure than oxidation. In principle, oxidation and absorption steps can be classified according to the pressure as follows: low pressure (<1.7 bar); medium pressure (1.7-6.5 bar); high pressure (6.5 bar-13 bar). Single pressure plants generally operate at medium or high pressure and dual pressure plants operate at medium pressure for the oxidation stage and high pressure for the absorption. These are the most used process in Europe.

The basis process sees ammonia reacting with air on platinum/rhodium alloy catalysts in the oxidation section of nitric acid plants. Nitric oxide and water are immediately formed. Nitric oxide is then oxidized to nitrogen dioxide as the combustion gases are cooled. Secondary air is then added to the gas mixture to increase oxygen content. Absorption of the nitrogen dioxide and its reaction to nitric acid and nitric oxide take place simultaneously in the gaseous and liquid phase, favored by higher pressure and lower temperature. Processes are normally closed and highly automated.


The manufacturing scenario covers normal production steps of plant operators, maintenance and laboratory personnel.

Potential worker exposure to nitric acid may arise during daily activities such as loading, unloading, weighing and mixing, charging reactors, controlling process parameters, maintaining and cleaning of equipment and reactors, sampling and laboratory testing.

1.1. Title section

ES name: Manufacture - Manufacturing of the substance > 70% (continuous and batch synthesis), including handling, storage and quality control

Environment contributing scenario(s):	
Manufacturing of the substance > 70% (continuous and batch synthesis), including handling, storage and quality control (ERC 1)	
Worker contributing scenario(s):	
Sector of Use	
Process Categories	
Product category	<p>All worker activities combined (*)</p> <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 8b: Transfer of substance or preparation (charging/discharging)</p>

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Nitric Acid

	from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 15: Use as laboratory reagent
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*The PROC's do not represent worker exposures, but rather processes. As the actual worker activities have not been determined in detail, they are combined into 1 scenario.

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Manufacturing of the substance > 70% (continuous and batch synthesis), including handling, storage and quality control (ERC 1)

Product (Article) characteristics	
<ul style="list-style-type: none"> Percentage (w/w) of substance in mixture/article: > 70% Physical form of the used product: Liquid (aqueous solution) 	
Amount used (or contained in articles), frequency and duration of use/exposure	
<ul style="list-style-type: none"> Duration of activities in the working area: ≤ 8 hours/day (all worker activities combined) Amount used: Not relevant 	
Technical and organizational conditions and measures	
<ul style="list-style-type: none"> Containment: Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented. Organisational measures: Minimise the number of staff in the working area. Minimise manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area. Suitable material: The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel. Unsuitable materials: Do not use any metal, carbon steel or polypropylene Ventilation conditions in the working area: Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour) Local exhaust ventilation: Use indoor local exhaust ventilation when vapour/mist/spray of nitric acid could be present in the air within the breathing zone of a worker. Storage conditions: Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources. Gas monitoring: Use stationary and/or portable NOx monitors in the working place, monitoring normal NOx levels at well below 2.6 mg/m³ 	
Conditions and measures related to personal protection, hygiene and health evaluation	
<ul style="list-style-type: none"> General: Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area. Respiratory Protection: In case there is any risk of inhalation exposure to the substance, always wear a full- 	

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Nitric Acid

face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract.

- Dermal and Eye protection: In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166). Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage.
- When aerosols/mists of nitric acid can be formed, wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit.
- Suitable material: butyl/fluorinated rubber

1.3. Risks for workers

Route of exposure and type of effects	Risk quantification
Inhalation, systemic, long term	Qualitative (Taking into account the operational conditions and risk management measures (when there is any possibility of exposure), the risk of causing effects is considered to be controlled. Potential exposure to the substance is kept to a minimum)
Inhalation, systemic, acute	
Inhalation, local, long term	
Inhalation, local, acute	
Dermal, systemic, long term	
Dermal, systemic, acute	
Dermal, local, long term	
Dermal, local, acute	
Eye, local	

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Exposure scenario 2: Manufacture - Manufacturing of the substance <70% (continuous and batch synthesis), including handling, storage and quality control

The liquid nitric acid is mainly manufactured according to the following chemical operations:

- oxidation of ammonia with air to give nitric oxide

- oxidation of the nitric oxide to nitrogen dioxide and absorption in water to give a solution of nitric acid

Based on the described procedures, there are two types of nitric acid plants: single pressure plants, where oxidation and absorption steps take place at the same pressure and dual pressure plants, where absorption takes place at higher pressure than oxidation. In principle, oxidation and absorption steps can be classified according to the pressure as follows: low pressure (<1.7 bar); medium pressure (1.7-6.5 bar); high pressure (6.5 bar-13 bar). Single pressure plants generally operate at medium or high pressure and dual pressure plants operate at medium pressure for the oxidation stage and high pressure for the absorption. These are the most used process in Europe.

The basis process sees ammonia reacting with air on platinum/rhodium alloy catalysts in the oxidation section of nitric acid plants. Nitric oxide and water are immediately formed. Nitric oxide is then oxidized to nitrogen dioxide as the combustion gases are cooled. Secondary air is then added to the gas mixture to increase oxygen content. Absorption of the nitrogen dioxide and its reaction to nitric acid and nitric oxide take place simultaneously in the gaseous and liquid phase, favored by higher pressure and lower temperature. Processes are normally closed and highly automated.

The manufacturing scenario covers normal production steps of plant operators, maintenance and laboratory personnel. Potential worker exposure to nitric acid may arise during daily activities such as loading, unloading, weighing and mixing, charging reactors, controlling process parameters, maintaining and cleaning of equipment and reactors, sampling and laboratory testing.

1.1. Title section

ES name: Manufacture - Manufacturing of the substance <70% (continuous and batch synthesis), including handling, storage and quality control

Environment:

Manufacturing of the substance <70% (continuous and batch synthesis), including handling, storage and quality control (ERC 1)

Worker:

All worker activities combined(*)

PROC 1: Use in closed process, no likelihood of exposure

PROC 2: Use in closed, continuous process with occasional controlled exposure


PROC 3: Use in closed batch process (synthesis or formulation)

PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

PROC 15: Use as laboratory reagent

*The PROC's do not represent worker exposures, but rather processes. As the actual worker activities have not been determined in detail, they are combined into 1 scenario.

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1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Manufacturing of the substance > 70% (continuous and batch synthesis), including handling, storage and quality control (ERC 1)

Product (Article) characteristics
<ul style="list-style-type: none"> Percentage (w/w) of substance in mixture/article: < 70% Physical form of the used product: Liquid (aqueous solution)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> Duration of activities in the working area: ≤ 8 hours/day (all worker activities combined) Amount used: Not relevant
Technical and organizational conditions and measures
<ul style="list-style-type: none"> Containment: Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented. Organizational measures: Minimize the number of staff in the working area. Minimize manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area. Suitable material: The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel. Unsuitable materials: Do not use any metal, carbon steel or polypropylene Ventilation conditions in the working area: Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour) Local exhaust ventilation: Use indoor local exhaust ventilation when vapor/mist/spray of nitric acid could be present in the air within the breathing zone of a worker. Storage conditions: Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources. Gas monitoring: Use stationary and/or portable NOx monitors in the working place, monitoring normal NOx levels at well below 2.6 mg/m³
Conditions and measures related to personal protection, hygiene and health evaluation
<p>Conditions and measures related to personal protection, hygiene and health evaluation</p> <ul style="list-style-type: none"> General: Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area. Respiratory Protection: In case there is any risk of inhalation exposure to the substance, always wear a full-face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract. Dermal and Eye protection: In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166). Potential dermal

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Nitric Acid

exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage.

- When aerosols/mists of nitric acid can be formed, wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit.
- Suitable material: butyl/fluorinated rubber

1.3. Risks for workers

Route of exposure and type of effects	Risk quantification
Inhalation, systemic, long term	Qualitative (Taking into account the operational conditions and risk management measures (when there is any possibility of exposure), the risk of causing effects is considered to be controlled. Potential exposure to the substance is kept to a minimum.)
Inhalation, systemic, acute	
Inhalation, local, long term	
Inhalation, local, acute	
Dermal, systemic, long term	
Dermal, systemic, acute	
Dermal, local, long term	
Dermal, local, acute	
Eye, local	

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Nitric Acid		

Exposure scenario 3: Formulation or re-packing - Formulation of mixtures using Nitric acid > 70%

One of the biggest uses of nitric acid in industry is the production of ammonium nitrate in the fertilizer industry.

Also, as nitric acid is a strong oxidiser, it is widely used for purification of metals from their respective ores. Solution of nitric acid can be also used to artificially 'age' maple or pine furniture. Nitric acid has also several laboratory uses.

The industrial processes/activities of nitric acid are listed below.

- Distribution of the substance, including re-packaging, loading, sampling...(big quantities)
- Formulation of mixtures (fertilizer, metal surface treatment product, cleaning product, detergent and maintenance product) by suspension, dilution...
- Use as an intermediate in synthesis of wide range of inorganic and organic substances: mainly use in close continuous process with normal activities as described for manufacturing (i.e loading, unloading, sampling, etc...).
- Use as reactive agent in inorganic and organic synthesis
- Use as a surface treatment product (e.g. ceramic, semiconductor)
- Use as a laboratory agent in organic and inorganic substance (close system)

1.1. Title section

ES name
Formulation or re-packing - Formulation of mixtures using Nitric acid > 70%
Product Category
PC 12: Fertilizers PC 14: Metal surface treatment products, including galvanic and electroplating products PC 15: Non-metal-surface treatment products PC 35: Washing and cleaning products (including solvent based products)
Technical function of the substance during formulation:
pH-regulating agents Plating agents and metal surface treating agents Processing aid, not otherwise listed cleaning agent
Environment:
Formulation of mixtures using Nitric acid > 70% (ERC 2)
Worker:
All worker activities combined(*) PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 15: Use as laboratory reagent

Nitric Acid

*The PROC's do not represent worker exposures, but rather processes. As the actual worker activities have not been determined in detail, they are combined into 1 scenario.

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Formulation of mixtures using Nitric acid > 70% (ERC 2)

Product (Article) characteristics

- Percentage (w/w) of substance in mixture/article: > 70%
- Physical form of the used product: Liquid (aqueous solution)

Amount used (or contained in articles), frequency and duration of use/exposure

- Duration of activities in the working area: ≤ 8 hours/day (all worker activities combined)
- Amount used: Not relevant

Technical and organizational conditions and measures

- Containment: Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented.
- Organizational measures: Minimize the number of staff in the working area. Minimize manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area.
- Suitable material: The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel.
- Unsuitable materials: Do not use any metal, carbon steel or polypropylene
- Ventilation conditions in the working area: Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour)
- Local exhaust ventilation: Use indoor local exhaust ventilation when vapor/mist/spray of nitric acid could be present in the air within the breathing zone of a worker.
- Storage conditions: Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources.
- Gas monitoring: Use stationary and/or portable NOx monitors in the working place, monitoring normal NOx levels at well below 2.6 mg/m³

Conditions and measures related to personal protection, hygiene and health evaluation

- General: Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area.
- Respiratory Protection: In case there is any risk of inhalation exposure to the substance, always wear a full-face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract.
- Dermal and Eye protection: In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves


Nitric Acid

conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166). Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage.

- When aerosols/mists of nitric acid can be formed, wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit.
- Suitable material: butyl/fluorinated rubber

1.3. Risks for workers

Route of exposure and type of effects	Risk quantification
Inhalation, systemic, long term	Qualitative (Taking into account the operational conditions and risk management measures (when there is any possibility of exposure), the risk of causing effects is considered to be controlled. Potential exposure to the substance is kept to a minimum.)
Inhalation, systemic, acute	
Inhalation, local, long term	
Inhalation, local, acute	
Dermal, systemic, long term	
Dermal, systemic, acute	
Dermal, local, long term	
Dermal, local, acute	
Eye, local	

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Exposure scenario 4: Formulation or re-packing - Formulation of mixtures using Nitric acid < 70%

One of the biggest uses of nitric acid in industry is the production of ammonium nitrate in the fertilizer industry.

Also, as nitric acid is a strong oxidiser, it is widely used for purification of metals from their respective ores. Solution of nitric acid can be also used to artificially 'age' maple or pine furniture. Nitric acid has also several laboratory uses.

The industrial processes/activities of nitric acid are listed below.

- Distribution of the substance, including re-packaging, loading, sampling...(big quantities)
- Formulation of mixtures (fertilizer, metal surface treatment product, cleaning product, detergent and maintenance product) by suspension, dilution...
- Use as an intermediate in synthesis of wide range of inorganic and organic substances: mainly use in close continuous process with normal activities as described for manufacturing (i.e loading, unloading, sampling, etc...).
- Use as reactive agent in inorganic and organic synthesis
- Use as a surface treatment product (e.g. ceramic, semiconductor)
- Use as a laboratory agent in organic and inorganic substance (close system)

1.1. Title section

ES name
Formulation or re-packing - Formulation of mixtures using Nitric acid < 70%
Product Category
PC 12: Fertilizers PC 14: Metal surface treatment products, including galvanic and electroplating products PC 15: Non-metal-surface treatment products PC 35: Washing and cleaning products (including solvent based products)
Technical function of the substance during formulation:
pH-regulating agents Plating agents and metal surface treating agents Processing aid, not otherwise listed cleaning agent
Environment:
Formulation of mixtures using Nitric acid < 70% (ERC 2)
Worker:
All worker activities combined(*) PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

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PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

PROC 15: Use as laboratory reagent

*The PROC's do not represent worker exposures, but rather processes. As the actual worker activities have not been determined in detail, they are combined into 1 scenario.

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Formulation of mixtures using Nitric acid > 70% (ERC 2)

Product (Article) characteristics

- Percentage (w/w) of substance in mixture/article: < 70%
- Physical form of the used product: Liquid (aqueous solution)

Amount used (or contained in articles), frequency and duration of use/exposure

- Duration of activities in the working area: ≤ 8 hours/day (all worker activities combined)
- Amount used: Not relevant

Technical and organizational conditions and measures

- Containment: Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented.
- Organizational measures: Minimize the number of staff in the working area. Minimize manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area.
- Suitable material: The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel.
- Unsuitable materials: Do not use any metal, carbon steel or polypropylene
- Ventilation conditions in the working area: Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour)
- Local exhaust ventilation: Use indoor local exhaust ventilation when vapor/mist/spray of nitric acid could be present in the air within the breathing zone of a worker.
- Storage conditions: Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources.
- Gas monitoring: Use stationary and/or portable NOx monitors in the working place, monitoring normal NOx levels at well below 2.6 mg/m³

Conditions and measures related to personal protection, hygiene and health evaluation

- General: Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area.
- Respiratory Protection: In case there is any risk of inhalation exposure to the substance, always wear a fullface mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation


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exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract.

- Dermal and Eye protection: In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166). Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage.
- When aerosols/mists of nitric acid can be formed, wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit.
- Suitable material: butyl/fluorinated rubber

1.3. Risks for workers

Route of exposure and type of effects	Risk quantification
Inhalation, systemic, long term	Qualitative (Taking into account the operational conditions and risk management measures (when there is any possibility of exposure), the risk of causing effects is considered to be controlled. Potential exposure to the substance is kept to a minimum.)
Inhalation, systemic, acute	
Inhalation, local, long term	
Inhalation, local, acute	
Dermal, systemic, long term	
Dermal, systemic, acute	
Dermal, local, long term	
Dermal, local, acute	
Eye, local	

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<h3>Nitric Acid</h3>		

Exposure scenario 5: Use at industrial sites - Use of Nitric acid > 70% at industrial site as intermediate

One of the biggest uses of nitric acid in industry is the production of ammonium nitrate in the fertilizer industry.

Also, as nitric acid is a strong oxidiser, it is widely used for purification of metals from their respective ores. Solution of nitric acid can be also used to artificially 'age' maple or pine furniture. Nitric acid has also several laboratory uses.


The industrial processes/activities of nitric acid are listed below.

- Distribution of the substance, including re-packaging, loading, sampling...(big quantities)
- Formulation of mixtures (fertilizer, metal surface treatment product, cleaning product, detergent and maintenance product) by suspension, dilution...
- Use as an intermediate in synthesis of wide range of inorganic and organic substances: mainly use in close continuous process with normal activities as described for manufacturing (i.e loading, unloading, sampling, etc...).
- Use as reactive agent in inorganic and organic synthesis
- Use as a surface treatment product (e.g. ceramic, semiconductor)
- Use as a laboratory agent in organic and inorganic substance (close system)

1.1. Title section

ES name
Use at industrial sites - Use of Nitric acid > 70% at industrial site as intermediate
Product Category
PC 19: Intermediate
Sector of end use
SU 8: Manufacture of bulk, large scale chemicals (including petroleum products)
SU 9: Manufacture of fine chemicals
Technical function of the substance during formulation:
Intermediates
Environment:
Use of Nitric acid > 70% at industrial site as intermediate (ERC 6a)
Worker:
All worker activities combined(*)
PROC 1: Use in closed process, no likelihood of exposure
PROC 2: Use in closed, continuous process with occasional controlled exposure
PROC 3: Use in closed batch process (synthesis or formulation)
PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC 15: Use as laboratory reagent

*The PROC's do not represent worker exposures, but rather processes. As the actual worker activities have not been determined in detail, they are combined into 1 scenario.

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1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Use of Nitric acid > 70% at industrial site as intermediate (ERC 6a)

Product (Article) characteristics
<ul style="list-style-type: none"> Percentage (w/w) of substance in mixture/article: > 70% Physical form of the used product: Liquid (aqueous solution)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> Duration of activities in the working area: ≤ 8 hours/day (all worker activities combined) Amount used: Not relevant
Technical and organizational conditions and measures
<ul style="list-style-type: none"> Containment: Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented. Organizational measures: Minimize the number of staff in the working area. Minimize manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area. Suitable material: The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel. Unsuitable materials: Do not use any metal, carbon steel or polypropylene Ventilation conditions in the working area: Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour) Local exhaust ventilation: Use indoor local exhaust ventilation when vapor/mist/spray of nitric acid could be present in the air within the breathing zone of a worker. Storage conditions: Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources. Gas monitoring: Use stationary and/or portable NOx monitors in the working place, monitoring normal NOx levels at well below 2.6 mg/m³
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> General: Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area. Respiratory Protection: In case there is any risk of inhalation exposure to the substance, always wear a full-face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract. Dermal and Eye protection: In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166). Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the


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substance may already cause severe burns and/or eye damage.

- When aerosols/mists of nitric acid can be formed, wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit.
- Suitable material: butyl/fluorinated rubber

1.3. Risks for workers

Route of exposure and type of effects	Risk quantification
Inhalation, systemic, long term	Qualitative (Taking into account the operational conditions and risk management measures (when there is any possibility of exposure), the risk of causing effects is considered to be controlled. Potential exposure to the substance is kept to a minimum.)
Inhalation, systemic, acute	
Inhalation, local, long term	
Inhalation, local, acute	
Dermal, systemic, long term	
Dermal, systemic, acute	
Dermal, local, long term	
Dermal, local, acute	
Eye, local	

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<h3>Nitric Acid</h3>		

Exposure scenario 6: Use at industrial sites - Use of Nitric acid < 70% at industrial site as intermediate

One of the biggest uses of nitric acid in industry is the production of ammonium nitrate in the fertilizer industry.

Also, as nitric acid is a strong oxidiser, it is widely used for purification of metals from their respective ores. Solution of nitric acid can be also used to artificially 'age' maple or pine furniture. Nitric acid has also several laboratory uses.

The industrial processes/activities of nitric acid are listed below.

- Distribution of the substance, including re-packaging, loading, sampling...(big quantities)
- Formulation of mixtures (fertilizer, metal surface treatment product, cleaning product, detergent and maintenance product) by suspension, dilution...
- Use as an intermediate in synthesis of wide range of inorganic and organic substances: mainly use in close continuous process with normal activities as described for manufacturing (i.e loading, unloading, sampling, etc...).
- Use as reactive agent in inorganic and organic synthesis
- Use as a surface treatment product (e.g. ceramic, semiconductor)
- Use as a laboratory agent in organic and inorganic substance (close system)

1.1. Title section

ES name
Use at industrial sites - Use of Nitric acid < 70% at industrial site as intermediate
Product Category
PC 19: Intermediate
Sector of end use
SU 0: Other: nuclear fuel cycle
SU 8: Manufacture of bulk, large scale chemicals (including petroleum products)
SU 9: Manufacture of fine chemicals
Technical function of the substance during formulation:
Intermediates
Environment:
Use of Nitric acid < 70% at industrial site as intermediate (ERC 6a)
Worker:
All worker activities combined(*)
PROC 1: Use in closed process, no likelihood of exposure
PROC 2: Use in closed, continuous process with occasional controlled exposure
PROC 3: Use in closed batch process (synthesis or formulation)
PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

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PROC 15: Use as laboratory reagent

*The PROC's do not represent worker exposures, but rather processes. As the actual worker activities have not been determined in detail, they are combined into 1 scenario.

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Use of Nitric acid < 70% at industrial site as intermediate (ERC 6a)

Product (Article) characteristics

- Percentage (w/w) of substance in mixture/article: < 70%
- Physical form of the used product: Liquid (aqueous solution)

Amount used (or contained in articles), frequency and duration of use/exposure

- Duration of activities in the working area: ≤ 8 hours/day (all worker activities combined)
- Amount used: Not relevant

Technical and organizational conditions and measures

- Containment: Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented.
- Organizational measures: Minimize the number of staff in the working area. Minimize manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area.
- Suitable material: The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel.
- Unsuitable materials: Do not use any metal, carbon steel or polypropylene
- Ventilation conditions in the working area: Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour)
- Local exhaust ventilation: Use indoor local exhaust ventilation when vapour/mist/spray of nitric acid could be present in the air within the breathing zone of a worker.
- Storage conditions: Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources.
- Gas monitoring: Use stationary and/or portable NOx monitors in the working place, monitoring normal NOx levels at well below 2.6 mg/m³

Conditions and measures related to personal protection, hygiene and health evaluation

- General: Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area.
- Respiratory Protection: In case there is any risk of inhalation exposure to the substance, always wear a full-face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract.
- Dermal and Eye protection: In case there is any risk of dermal exposure (via contaminated equipment),


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always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166). Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage.

- When aerosols/mists of nitric acid can be formed, wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit.
- Suitable material: butyl/fluorinated rubber

1.3. Risks for workers

Route of exposure and type of effects	Risk quantification
Inhalation, systemic, long term	Qualitative (Taking into account the operational conditions and risk management measures (when there is any possibility of exposure), the risk of causing effects is considered to be controlled. Potential exposure to the substance is kept to a minimum.)
Inhalation, systemic, acute	
Inhalation, local, long term	
Inhalation, local, acute	
Dermal, systemic, long term	
Dermal, systemic, acute	
Dermal, local, long term	
Dermal, local, acute	
Eye, local	

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<h3>Nitric Acid</h3>		

Exposure scenario 7: Use at industrial sites - Use of Nitric acid > 70% at industrial site as reactive processing aid (Cleaning agent, pH regulator, waste gas treatment, ion exchange resins regeneration, metal treatment, plastic treatment, surface treatment product, water treatment)

One of the biggest uses of nitric acid in industry is the production of ammonium nitrate in the fertilizer industry.


Also, as nitric acid is a strong oxidiser, it is widely used for purification of metals from their respective ores. Solution of nitric acid can be also used to artificially 'age' maple or pine furniture. Nitric acid has also several laboratory uses.

The industrial processes/activities of nitric acid are listed below.

- Distribution of the substance, including re-packaging, loading, sampling...(big quantities)
- Formulation of mixtures (fertilizer, metal surface treatment product, cleaning product, detergent and maintenance product) by suspension, dilution...
- Use as an intermediate in synthesis of wide range of inorganic and organic substances: mainly use in close continuous process with normal activities as described for manufacturing (i.e loading, unloading, sampling, etc...).
- Use as reactive agent in inorganic and organic synthesis
- Use as a surface treatment product (e.g. ceramic, semiconductor)
- Use as a laboratory agent in organic and inorganic substance (close system)

1.1. Title section

ES name
Use at industrial sites - Use of Nitric acid > 70% at industrial site as reactive processing aid (Cleaning agent, pH regulator, waste gas treatment, ion exchange resins regeneration, metal treatment, plastic treatment, surface treatment product, water treatment)
Product Category
PC 0: Other: UCN code : A052 50 ion exchanger PC 14: Metal surface treatment products, including galvanic and electroplating products PC 15: Non-metal-surface treatment products PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents PC 35: Washing and cleaning products (including solvent based products) PC 37: Water treatment chemicals
Sector of end use
SU 0: Other: C21-Manufacture of basic pharmaceutical products SU 2a: Mining (without offshore industries) SU 4: Manufacture of food products SU 6a: Manufacture of wood and wood products SU 8: Manufacture of bulk, large scale chemicals (including petroleum products) SU 9: Manufacture of fine chemicals SU 12: Manufacture of plastics products, including compounding and conversion SU 14: Manufacture of basic metals, including alloys SU 15: Manufacture of fabricated metal products, except machinery and equipment

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SU 16: Manufacture of computer, electronic and optical products, electrical equipment

SU 19: Building and construction work

SU 23: Electricity, steam, gas water supply and sewage treatment

Technical function of the substance during formulation:

Processing aid, not otherwise listed

pH-regulating agents

Oxidising agents

cleaning agent

Environment:

Use of Nitric acid > 70% at industrial site as reactive processing aid (Cleaning agent, pH regulator, waste gas treatment, ion exchange resins regeneration, metal treatment, plastic treatment, surface treatment product, water treatment) (ERC 4; ERC 6b)

Worker:

All worker activities combined(*)

PROC 1: Use in closed process, no likelihood of exposure

PROC 2: Use in closed, continuous process with occasional controlled exposure

PROC 3: Use in closed batch process (synthesis or formulation)

PROC 7: Industrial spraying

PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

PROC 13: Treatment of articles by dipping and pouring

PROC 15: Use as laboratory reagent

*The PROC's do not represent worker exposures, but rather processes. As the actual worker activities have not been determined in detail, they are combined into 1 scenario.

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Use of Nitric acid > 70% at industrial site as reactive processing aid (Cleaning agent, pH regulator, waste gas treatment, ion exchange resins regeneration, metal treatment, plastic treatment, surface treatment product, water treatment) (ERC 4; ERC 6b)

Product (Article) characteristics

- Percentage (w/w) of substance in mixture/article: > 70%
- Physical form of the used product: Liquid (aqueous solution)

Amount used (or contained in articles), frequency and duration of use/exposure

- Duration of activities in the working area: ≤ 8 hours/day (all worker activities combined)
- Amount used: Not relevant

Technical and organizational conditions and measures

- Containment: Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented.
- Organizational measures: Minimize the number of staff in the working area. Minimize manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment.

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Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area.

- Suitable material: The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel.
- Unsuitable materials: Do not use any metal, carbon steel or polypropylene
- Ventilation conditions in the working area: Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour)
- Local exhaust ventilation: Use indoor local exhaust ventilation when vapor/mist/spray of nitric acid could be present in the air within the breathing zone of a worker.
- Storage conditions: Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources.
- Gas monitoring: Use stationary and/or portable NOx monitors in the working place, monitoring normal NOx levels at well below 2.6 mg/m³

Conditions and measures related to personal protection, hygiene and health evaluation

- General: Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area.
- Respiratory Protection: In case there is any risk of inhalation exposure to the substance, always wear a full-face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract.
- Dermal and Eye protection: In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166). Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage.
- When aerosols/mists of nitric acid can be formed, wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit.
- Suitable material: butyl/fluorinated rubber

1.3. Risks for workers

Route of exposure and type of effects	Risk quantification
Inhalation, systemic, long term	Qualitative (Taking into account the operational conditions and risk management measures (when there is any possibility of exposure), the risk of causing effects is considered to be controlled. Potential exposure to the substance is kept to a minimum.)
Inhalation, systemic, acute	
Inhalation, local, long term	
Inhalation, local, acute	
Dermal, systemic, long term	
Dermal, systemic, acute	
Dermal, local, long term	
Dermal, local, acute	
Eye, local	

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Exposure scenario 8: Use at industrial sites - Use of Nitric acid < 70% at industrial site as reactive processing aid (Cleaning agent, pH regulator, waste gas treatment, ion exchange resins regeneration, metal treatment, plastic treatment, surface treatment product, water treatment)

One of the biggest uses of nitric acid in industry is the production of ammonium nitrate in the fertilizer industry.

Also, as nitric acid is a strong oxidiser, it is widely used for purification of metals from their respective ores. Solution of nitric acid can be also used to artificially 'age' maple or pine furniture. Nitric acid has also several laboratory uses.

The industrial processes/activities of nitric acid are listed below.

- Distribution of the substance, including re-packaging, loading, sampling...(big quantities)
- Formulation of mixtures (fertilizer, metal surface treatment product, cleaning product, detergent and maintenance product) by suspension, dilution...
- Use as an intermediate in synthesis of wide range of inorganic and organic substances: mainly use in close continuous process with normal activities as described for manufacturing (i.e loading, unloading, sampling, etc...).
- Use as reactive agent in inorganic and organic synthesis
- Use as a surface treatment product (e.g. ceramic, semiconductor)
- Use as a laboratory agent in organic and inorganic substance (close system)

1.1. Title section

ES name


Use at industrial sites - Use of Nitric acid < 70% at industrial site as reactive processing aid (Cleaning agent, pH regulator, waste gas treatment, ion exchange resins regeneration, metal treatment, plastic treatment, surface treatment product, water treatment)

Product Category

PC 0: Other: UCN code : A052 50 ion exchanger
 PC 14: Metal surface treatment products, including galvanic and electroplating products
 PC 15: Non-metal-surface treatment products
 PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents
 PC 35: Washing and cleaning products (including solvent based products)
 PC 37: Water treatment chemicals

Sector of end use

SU 0: Other: C21-Manufacture of basic pharmaceutical products, nuclear fuel cycle
 SU 2a: Mining (without offshore industries)
 SU 4: Manufacture of food products
 SU 6a: Manufacture of wood and wood products
 SU 8: Manufacture of bulk, large scale chemicals (including petroleum products)
 SU 9: Manufacture of fine chemicals
 SU 12: Manufacture of plastics products, including compounding and conversion
 SU 14: Manufacture of basic metals, including alloys
 SU 15: Manufacture of fabricated metal products, except machinery and equipment
 SU 16: Manufacture of computer, electronic and optical products, electrical equipment

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SU 19: Building and construction work

SU 23: Electricity, steam, gas water supply and sewage treatment

Technical function of the substance during formulation:

Processing aid, not otherwise listed

pH-regulating agents

Oxidising agents

cleaning agent

Environment:

Use of Nitric acid < 70% at industrial site as reactive processing aid (Cleaning agent, pH regulator, waste gas treatment, ion exchange resins regeneration, metal treatment, plastic treatment, surface treatment product, water treatment) (ERC 4; ERC 6b)

Worker:

All worker activities combined(*)

PROC 1: Use in closed process, no likelihood of exposure

PROC 2: Use in closed, continuous process with occasional controlled exposure

PROC 3: Use in closed batch process (synthesis or formulation)

PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises

PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

PROC 7: Industrial spraying

PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

PROC 10: Roller application or brushing

PROC 13: Treatment of articles by dipping and pouring

PROC 15: Use as laboratory reagent

*The PROC's do not represent worker exposures, but rather processes. As the actual worker activities have not been determined in detail, they are combined into 1 scenario.

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Use of Nitric acid < 70% at industrial site as reactive processing aid (Cleaning agent, pH regulator, waste gas treatment, ion exchange resins regeneration, metal treatment, plastic treatment, surface treatment product, water treatment) (ERC 4; ERC 6b)

Product (Article) characteristics

- Percentage (w/w) of substance in mixture/article: > 70%
- Physical form of the used product: Liquid (aqueous solution)

Amount used (or contained in articles), frequency and duration of use/exposure

- Duration of activities in the working area: ≤ 8 hours/day (all worker activities combined)
- Amount used: Not relevant


Technical and organizational conditions and measures

Nitric Acid

- **Containment:** Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented.
- **Organizational measures:** Minimize the number of staff in the working area. Minimize manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area.
- **Suitable material:** The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel.
- **Unsuitable materials:** Do not use any metal, carbon steel or polypropylene
- **Ventilation conditions in the working area:** Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour)
- **Local exhaust ventilation:** Use indoor local exhaust ventilation when vapor/mist/spray of nitric acid could be present in the air within the breathing zone of a worker.
- **Storage conditions:** Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources.
- **Gas monitoring:** Use stationary and/or portable NOx monitors in the working place, monitoring normal NOx levels at well below 2.6 mg/m³


Conditions and measures related to personal protection, hygiene and health evaluation

- **General:** Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area.
- **Respiratory Protection:** In case there is any risk of inhalation exposure to the substance, always wear a full-face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract.
- **Dermal and Eye protection:** In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166). Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage.
- **When aerosols/mists of nitric acid can be formed,** wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit.
- **Suitable material:** butyl/fluorinated rubber

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<h1>Nitric Acid</h1>		

1.3. Risks for workers

Route of exposure and type of effects	Risk quantification
Inhalation, systemic, long term	<p>Qualitative (Taking into account the operational conditions and risk management measures (when there is any possibility of exposure), the risk of causing effects is considered to be controlled. Potential exposure to the substance is kept to a minimum.)</p>
Inhalation, systemic, acute	
Inhalation, local, long term	
Inhalation, local, acute	
Dermal, systemic, long term	
Dermal, systemic, acute	
Dermal, local, long term	
Dermal, local, acute	
Eye, local	

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Exposure scenario 9: Widespread use by professional workers - Use of Nitric acid < 70% by professional worker (outdoor and indoor of reactive substances in open systems as cleaning agent, pH regulator, metal treatment)

Professional use of diluted nitric acid and other mixtures containing nitric acid are considered in this exposure scenario.

The primary application of nitric acid is production of fertilizer, as plants require a source of nitrogen for the production of proteins to develop and grow, the more nitrogen available to the plant the better it will grow and

the higher yield the crop is one of the essential elements for plant growth.


Other professional applications considered include uses in metal/concrete treatment, cleaning agent and laboratory applications.

The main uses for nitric acid are listed below and included in this exposure scenario.

- Distribution of the substance (loading, unloading, transfer and repackaging) of small quantities
- Dilution or suspension of fertilizers (liquid or solid)
- Use of fertilizer containing nitric acid in greenhouse (nutritive solution). Incorporation through pipes in greenhouse.
- Use as cleaning product . Use in spray and rinse manual process or dipping process
- Use in metal surface treatment: use of diluted nitric acid for rust removal by professionals
- Use as pH control
- Use as laboratory reagent
- Use as a surface etchant for concrete

1.1. Title section

ES name
Use at industrial sites - Use of Nitric acid < 70% at industrial site as reactive processing aid (Cleaning agent, pH regulator, waste gas treatment, ion exchange resins regeneration, metal treatment, plastic treatment, surface treatment product, water treatment)
Product Category
PC 12: Fertilisers PC 14: Metal surface treatment products, including galvanic and electroplating products PC 15: Non-metal-surface treatment products PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents PC 35: Washing and cleaning products (including solvent based products)
Sector of end use
SU 1: Agriculture, forestry and fishing SU 2a: Mining (without offshore industries) SU 4: Manufacture of food products SU 6a: Manufacture of wood and wood products SU 12: Manufacture of plastics products, including compounding and conversion SU 14: Manufacture of basic metals, including alloys SU 15: Manufacture of fabricated metal products, except machinery and equipment SU 16: Manufacture of computer, electronic and optical products, electrical equipment

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SU 19: Building and construction work

SU 23: Electricity, steam, gas water supply and sewage treatment

Technical function of the substance during formulation:

Processing aid, not otherwise listed

pH-regulating agents

Oxidising agents

cleaning agent

Fertilisers

Environment:

Use of Nitric acid < 70% by professional worker (outdoor and indoor of reactive substances in open systems as cleaning agent, pH regulator, metal treatment) (ERC 8b; ERC 8e)

Worker:

All worker activities combined(*)

PROC 1: Use in closed process, no likelihood of exposure

PROC 2: Use in closed, continuous process with occasional controlled exposure

PROC 3: Use in closed batch process (synthesis or formulation)

PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

PROC 10: Roller application or brushing

PROC 11: Non industrial spraying

PROC 13: Treatment of articles by dipping and pouring

PROC 15: Use as laboratory reagent

PROC 19: Hand-mixing with intimate contact and only PPE available.

*The PROC's do not represent worker exposures, but rather processes. As the actual worker activities have not been determined in detail, they are combined into 1 scenario.

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Use of Nitric acid < 70% at industrial site as reactive processing aid (Cleaning agent, pH regulator, waste gas treatment, ion exchange resins regeneration, metal treatment, plastic treatment, surface treatment product, water treatment) (ERC 4; ERC 6b)

Product (Article) characteristics

- Percentage (w/w) of substance in mixture/article: > 70%
- Physical form of the used product: Liquid (aqueous solution)

Amount used (or contained in articles), frequency and duration of use/exposure

- Duration of activities in the working area: ≤ 8 hours/day (all worker activities combined)
- Amount used: Not relevant

Nitric Acid

Technical and organizational conditions and measures

- **Containment:** Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented.
- **Organizational measures:** Minimize the number of staff in the working area. Minimize manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area.
- **Suitable material:** The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel.
- **Unsuitable materials:** Do not use any metal, carbon steel or polypropylene
- **Ventilation conditions in the working area:** Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour)
- **Local exhaust ventilation:** Use indoor local exhaust ventilation when vapor/mist/spray of nitric acid could be present in the air within the breathing zone of a worker.
- **Storage conditions:** Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources.
- **Gas monitoring:** Use stationary and/or portable NOx monitors in the working place, monitoring normal NOx levels at well below 2.6 mg/m³

Conditions and measures related to personal protection, hygiene and health evaluation

- **General:** Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area.
- **Respiratory Protection:** In case there is any risk of inhalation exposure to the substance, always wear a full-face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract.
- **Dermal and Eye protection:** In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166). Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage.
- **When aerosols/mists of nitric acid can be formed,** wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit.
- **Suitable material:** butyl/fluorinated rubber

1.3. Risks for workers

Route of exposure and type of effects	Risk quantification
Inhalation, systemic, long term	Qualitative (Taking into account the operational conditions and risk management measures (when there is any possibility of exposure), the risk of causing effects is considered to be controlled. Potential
Inhalation, systemic, acute	
Inhalation, local, long term	



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Inhalation, local, acute	exposure to the substance is kept to a minimum.)
Dermal, systemic, long term	
Dermal, systemic, acute	
Dermal, local, long term	
Dermal, local, acute	
Eye, local	

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<h3>Nitric Acid</h3>		

Exposure scenario 10: Consumer use - Use of Nitric acid containing products (< 3%)

1.1. Title section

ES name
Consumer use - Use of Nitric acid containing products (< 3%)
Environment:
Use of Nitric acid containing products (< 3%) (ERC 8b; ERC 8e)
Consumer (*)
PC 3: Air care products PC 12: Fertilisers PC 31: Polishes and wax blends PC 35: Washing and cleaning products (including solvent based products)
Technical function of the substance during formulation:
Processing aid, not otherwise listed pH-regulating agents Oxidising agents cleaning agent Fertilisers

*Nitric acid is not expected to be found in consumer products, or if found it will be found only at trace levels.

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Use of Nitric acid containing products (< 3%)

Exposure assessment and risk characterization are not needed .

1.3. Risks for Consumer

Exposure assessment and risk characterization are not needed .

1.4 Other information

Substance supplied to that use: In a mixture

Subsequent service life relevant for that use: no

Remarks: The threshold of 3% (instead of 5% mentioned in CLP) is to align to the EC regulation 98/2013 on Precursors of explosives, allowing to provide nitric acid <3% to consumer