



# RHODIUM SULFATE (5%)

Revision n.3  
Date 23/7/2024  
Replaced revision:  
2 - 24/03/2019

## Safety Data Sheet

According to Annex II to REACH - Regulation (EU) 2020/878

### SECTION 1. Identification of the substance/mixture and of the company/undertaking

#### 1.1. Product identifier

Product name **RHODIUM SULFATE - 5%**

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

Intended use Galvanic surface treatment of metals.  
Application in electrolytic processes. Exclusively industrial.  
Uses advised against Uses other than those stated.

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

Name TCA Spa  
Full address Zona Ind. Castelluccio, 11  
District and Country 52010 Capolona (AR) - ITALY  
Tel. +39 0575 3911  
Fax +39 0575 451337

e-mail address of the competent person

responsible for the Safety Data Sheet [tcaspa@pec.tcaspa.com](mailto:tcaspa@pec.tcaspa.com)  
Serena Tavanti

#### 1.4. Emergency telephone number

For urgent inquiries refer to Malta 112

### SECTION 2. Hazards identification

#### 2.1. Classification of the substance or mixture

The product is classified as hazardous pursuant to the provisions set forth in (EC) Regulation 1272/2008 (CLP) (and subsequent amendments and supplements). The product thus requires a safety datasheet that complies with the provisions of (EU) Regulation 2020/878. Any additional information concerning the risks for health and/or the environment are given in sections 11 and 12 of this sheet.

Hazard classification and indication:

|                                                                    |      |                                                  |
|--------------------------------------------------------------------|------|--------------------------------------------------|
| Substance or mixture corrosive to metals, category 1               | H290 | May be corrosive to metals.                      |
| Germ cell mutagenicity, category 2                                 | H341 | Suspected of causing genetic defects.            |
| Skin corrosion, category 1                                         | H314 | Causes severe skin burns and eye damage.         |
| Serious eye damage, category 1                                     | H318 | Causes serious eye damage.                       |
| Hazardous to the aquatic environment, chronic toxicity, category 2 | H411 | Toxic to aquatic life with long lasting effects. |

#### 2.2. Label elements

Hazard labelling pursuant to EC Regulation 1272/2008 (CLP) and subsequent amendments and supplements.

Hazard pictograms:



Signal words:

**DANGER**

Hazard statements:

|               |                                                  |
|---------------|--------------------------------------------------|
| <b>H290</b>   | May be corrosive to metals.                      |
| <b>H341</b>   | Suspected of causing genetic defects.            |
| <b>H314</b>   | Causes severe skin burns and eye damage.         |
| <b>H411</b>   | Toxic to aquatic life with long lasting effects. |
| <b>EUH071</b> | Corrosive to the respiratory tract.              |



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### Precautionary statements:

|                       |                                                                                                                                  |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>P201</b>           | Obtain special instructions before use.                                                                                          |
| <b>P260</b>           | Do not breathe fume / mist / vapours.                                                                                            |
| <b>P273</b>           | Avoid release to the environment.                                                                                                |
| <b>P280</b>           | Wear protective gloves/ protective clothing / eye protection / face protection.                                                  |
| <b>P303+P361+P353</b> | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].                         |
| <b>P305+P351+P338</b> | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| <b>P310</b>           | Immediately call a POISON CENTER / doctor.                                                                                       |
| <b>P391</b>           | Collect spillage.                                                                                                                |

**Contains:** SULPHURIC ACID 12%  
DIRHODIUM TRISULPHATE

### 2.3. Other hazards

On the basis of available data, the product does not contain any PBT or vPvB in percentage  $\geq$  than 0,1%.  
The product does not contain substances with endocrine disrupting properties in concentration  $\geq$  0.1%.

## SECTION 3. Composition/information on ingredients

### 3.2. Mixtures

Contains:

| Identification                   | Conc. %             | Classification (EC) 1272/2008 (CLP)                                                                                                |
|----------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>SULPHURIC ACID</b>            |                     |                                                                                                                                    |
| INDEX 016-020-00-8               | $10 \leq x \leq 12$ | Skin Corr. 1A H314, Eye Dam. 1 H318, Classification note according to Annex VI to the CLP Regulation: B                            |
| EC 231-639-5                     |                     | <u>Specific Concentration Limits (SCL)</u>                                                                                         |
| CAS 7664-93-9                    |                     | Skin Corr. 1A; H314: $C \geq 15\%$ Skin Irrit. 2; H315: $5\% \leq C < 15\%$ Eye Irrit. 2; H319: $5\% \leq C < 15\%$                |
| REACH Reg. 01-2119458838-20-0087 |                     |                                                                                                                                    |
| <b>DIRHODIUM TRISULPHATE</b>     |                     |                                                                                                                                    |
| INDEX -                          | $4,5 \leq x < 5$    | Met. Corr. 1 H290, Muta. 2 H341, Skin Corr. 1B H314, Eye Dam. 1 H318, Aquatic Acute 1 H400 M=1, Aquatic Chronic 1 H410 M=1, EUH071 |
| EC 234-014-5                     |                     |                                                                                                                                    |
| CAS 10489-46-0                   |                     |                                                                                                                                    |

The full wording of hazard (H) phrases is given in section 16 of the sheet.

## SECTION 4. First aid measures

### 4.1. Description of first aid measures

In case of doubt or in the presence of symptoms contact a doctor and show him this document.

In case of more severe symptoms, ask for immediate medical aid.

**EYES:** Remove, if present, contact lenses if the situation allows you to do so easily. Wash immediately with plenty of water for at least 15 minutes, opening the eyelids fully. Get medical advice/attention.

**SKIN:** Take off immediately all contaminated clothing. Wash immediately and thoroughly with running water (and soap if possible). Get medical advice/attention. Avoid further contact with contaminated clothing.

**INGESTION:** Do not induce vomiting unless explicitly authorised by a doctor. Rinse your mouth with running water. Do not give anything by mouth to an unconscious person. Get medical advice/attention.

**INHALATION:** Remove victim to fresh air, away from the accident scene. In the event of respiratory symptoms (coughing, wheezing, breathing difficulty, asthma) keep the victim in a comfortable position for breathing. If necessary administer oxygen. If the subject stops breathing, administer artificial respiration. Get medical advice/attention.

### Rescuer protection

It is good practice for rescuers lending support to a person who has been exposed to a chemical substance or to a mixture to wear personal protective equipment. The nature of such protection depends on the hazard level of the substance or mixture, on the type of exposure and on the extent of the contamination. In the absence of other more specific indications, use of disposable gloves in the event of possible contact with body fluids is recommended. For the type of PPE suitable for the characteristics of the substance or mixture, see section 8.

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

Specific information on symptoms and effects caused by the product are unknown.

**DELAYED EFFECTS:** Based on the information currently available, there are no known cases of delayed effects following exposure to this product.



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### 4.3. Indication of any immediate medical attention and special treatment needed

If symptoms occur, whether acute or delayed, consult a doctor.

Means to have available in the workplace for specific and immediate treatment

Running water for skin and eye wash.

## SECTION 5. Firefighting measures

### 5.1. Extinguishing media

#### SUITABLE EXTINGUISHING EQUIPMENT

The extinguishing equipment should be of the conventional kind: carbon dioxide, foam, powder and water spray.

#### UNSUITABLE EXTINGUISHING EQUIPMENT

None in particular.

### 5.2. Special hazards arising from the substance or mixture

#### HAZARDS CAUSED BY EXPOSURE IN THE EVENT OF FIRE

Do not breathe combustion products.

Metal oxides, sulphuric acid, Sulphur oxides.

### 5.3. Advice for firefighters

#### GENERAL INFORMATION

Use jets of water to cool the containers to prevent product decomposition and the development of substances potentially hazardous for health. Always wear full fire prevention gear. Collect extinguishing water to prevent it from draining into the sewer system. Dispose of contaminated water used for extinction and the remains of the fire according to applicable regulations.

#### SPECIAL PROTECTIVE EQUIPMENT FOR FIRE-FIGHTERS

Normal fire fighting clothing i.e. fire kit (BS EN 469), gloves (BS EN 659) and boots (HO specification A29 and A30) in combination with self-contained open circuit positive pressure compressed air breathing apparatus (BS EN 137).

## SECTION 6. Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

#### 6.1.1 For non-emergency personnel

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Do not touch or walk through spilled material. Wear appropriate respirator when ventilation is inadequate.

Wear suitable protective equipment (including personal protective equipment referred to under Section 8 of the safety data sheet) to prevent any contamination of skin, eyes and personal clothing. Do not breathe mist/vapour/aerosol. Avoid leakage of the product into the environment.

Non-emergency personnel must follow the appropriate internal procedures in case of accidental release.

#### 6.1.2 For emergency responders

Block the leakage if there is no hazard. Evacuate unprotected and untrained personnel from hazard area. Wear suitable protective equipment. (see Section 8 of this Safety data sheet)

Follow the appropriate internal procedures in case of accidental release.

Keep fumes and vapours under control. Isolate hazard area and deny entry. Ventilate closed spaces before entering. Send away individuals who are not suitably equipped. Eliminate all sources of ignition (cigarettes, flames, sparks, etc.) from the leakage site.

### 6.2. Environmental precautions

The product must not penetrate into the sewer system or come into contact with surface water or ground water.

### 6.3. Methods and material for containment and cleaning up

Collect the leaked product into a suitable container. Evaluate the compatibility of the container to be used, by checking section 10. Absorb the remainder with inert absorbent material.

Make sure the leakage site is well aired. Contaminated material should be disposed of in compliance with the provisions set forth in point 13.

### 6.4. Reference to other sections

Any information on personal protection and disposal is given in sections 8 and 13.



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## SECTION 7. Handling and storage

### 7.1. Precautions for safe handling

Ensure that there is an adequate earthing system for the equipment and personnel. Avoid contact with eyes and skin. Do not breathe powders, vapours or mists. Do not eat, drink or smoke during use. Wash hands after use. Avoid leakage of the product into the environment.

### 7.2. Conditions for safe storage, including any incompatibilities

Store only in the original container. Store in a ventilated and dry place, far away from sources of ignition. Keep containers well sealed. Keep the product in clearly labelled containers. Avoid overheating. Avoid violent blows. Keep containers away from any incompatible materials, see section 10 for details.

### 7.3. Specific end use(s)

No use other than as indicated in section 1.2 of this safety data sheet.

## SECTION 8. Exposure controls/personal protection

### 8.1. Control parameters

#### Regulatory references:

|     |           |                                                                                                                                                                                                                                                                                            |
|-----|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IRL | Éire      | 2020 Code of Practice for the Safety, Health and Welfare at Work (Chemical Agents) Regulations (2001-2015) and the Safety, Health and Welfare at Work (Carcinogens) Regulations (2001-2019)                                                                                                |
| MLT | Malta     | PROTECTION OF THE HEALTH AND SAFETY OF WORKERS FROM THE RISKS RELATED TO CHEMICAL AGENTS AT WORK REGULATIONS (S.L.424.24). PROTECTION OF WORKERS FROM THE RISKS RELATED TO EXPOSURE TO CARCINOGENS OR MUTAGENS AT WORK REGULATIONS (S.L.424.22)                                            |
| EU  | OEL EU    | Directive (EU) 2022/431; Directive (EU) 2019/1831; Directive (EU) 2019/130; Directive (EU) 2019/983; Directive (EU) 2017/2398; Directive (EU) 2017/164; Directive 2009/161/EU; Directive 2006/15/EC; Directive 2004/37/EC; Directive 2000/39/EC; Directive 98/24/EC; Directive 91/322/EEC. |
|     | TLV-ACGIH | ACGIH 2024                                                                                                                                                                                                                                                                                 |

#### SULPHURIC ACID Threshold Limit Value

| Type      | Country | TWA/8h | STEL/15min | Remarks / Observations |
|-----------|---------|--------|------------|------------------------|
|           |         | mg/m3  | ppm        |                        |
| OEL       | EU      | 0,05 * |            | THORA                  |
| OELV      | IRL     | 0,05*  |            |                        |
| TLV       | MLT     | 0,05   |            |                        |
| TLV-ACGIH |         | 0,2    |            |                        |

#### Predicted no-effect concentration - PNEC

Normal value in fresh water

Normal value in marine water

Normal value for fresh water sediment

Normal value for marine water sediment

Normal value of STP microorganisms

Normal value for the terrestrial compartment

NPI

Normal value for the atmosphere

NPI

#### Health - Derived no-effect level - DNEL / DMEL

| Route of exposure | Effects on consumers |                |               |                  | Effects on workers |                |               |                  |
|-------------------|----------------------|----------------|---------------|------------------|--------------------|----------------|---------------|------------------|
|                   | Acute local          | Acute systemic | Chronic local | Chronic systemic | Acute local        | Acute systemic | Chronic local | Chronic systemic |
| Inhalation        |                      |                |               |                  | 0,1 mg/m3          |                | 0,05 mg/m3    |                  |



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| DIRHODIUM TRISULPHATE |         |        |            |       |                                       |
|-----------------------|---------|--------|------------|-------|---------------------------------------|
| Threshold Limit Value |         |        |            |       |                                       |
| Type                  | Country | TWA/8h | STEL/15min |       | Remarks / Observations                |
|                       |         | mg/m3  | ppm        | mg/m3 | ppm                                   |
| TLV-ACGIH             |         | 0,1    |            |       | Rhodium Metal and Insoluble compounds |

## Legend:

(C) = CEILING ; INHAL = Inhalable Fraction ; RESP = Respirable Fraction ; THORA = Thoracic Fraction.

VND = hazard identified but no DNEL/PNEC available ; NEA = no exposure expected ; NPI = no hazard identified ; LOW = low hazard ; MED = medium hazard ; HIGH = high hazard.

*\*The mist is defined as the thoracic fraction.*

*When selecting an appropriate exposure monitoring method, account should be taken of potential limitations and interferences that may arise in the presence of other sulphur compounds. (Dir. 2009/161/EU).*

## Recommended monitoring procedures:

This product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Reference should be made to monitoring standards, such as the following:

- European Standard EN 689 (Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy)
- European Standard EN 482 (Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents) Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

## 8.2. Exposure controls

General working hygiene practices involves procedures (such as showering and changing clothes at the end of the work shift) to avoid any contamination of third parties and appropriate cleaning practices (such as regular cleaning, with appropriate cleaning devices), not eating and smoking at the workplace. Personal protective equipment (PPE) must be CE marked, showing that it complies with applicable standards.

Only use PPE provided for the risk assessment for the specific use of the product. Choose the most suitable PPE after assessing the actual conditions of use of the product.

When choosing PPE, ask your technical equipment supplier for advice.

Make sure that the workplace is well aired through effective local aspiration, based on the specific use of the product.

Provide an emergency shower with face and eye wash station. Exposure levels must be kept as low as possible to avoid significant build-up in the organism. Manage PPE so as to guarantee maximum protection (e.g. reduction in replacement times).

### General PPE procedures:

Provide adequate personnel training for use.

Carry out an inspection of PPE to verify the integrity. Do not use damaged or deteriorated PPE.

Carry out the PPE inspection procedures laid down in the user manual.

Do not use PPE after its expiry date or outside the indications given in the technical data sheet/user manual.

Do not reuse single-use PPE.

PPE that is no longer usable must be disposed according to local applicable regulations.

If PPE is used in an explosive or potentially explosive atmosphere, check the compatibility for the usage.

## HAND PROTECTION

Protect hands with category III work gloves.

The following should be considered when choosing work glove material (see standard EN 374): compatibility, degradation, permeability time.

The work gloves' resistance to chemical agents should be checked before use, as it can be unpredictable. The gloves' wear time depends on the duration and type of use.

## SKIN PROTECTION

Wear category III professional long-sleeved overalls and safety footwear (see Regulation 2016/425 and standard EN ISO 20344). Wash body with soap and water after removing protective clothing.

## EYE PROTECTION

Wear a hood visor or protective visor combined with airtight goggles (see standard EN ISO 16321).

## RESPIRATORY PROTECTION

Respiratory protection devices must be used if the technical measures adopted are not suitable for restricting the worker's exposure to the threshold values considered. Use a mask with a type B filter whose class (1, 2 or 3) must be chosen according to the limit of use concentration. (see standard EN 14387).

If the substance considered is odourless or its olfactory threshold is higher than the corresponding TLV-TWA and in the case of an emergency, wear open-circuit compressed air breathing apparatus (in compliance with standard EN 137) or external air-intake breathing apparatus (in compliance with standard EN 138). For a correct choice of respiratory protection device, see standard EN 529.



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### ENVIRONMENTAL EXPOSURE CONTROLS

The emissions generated by manufacturing processes, including those generated by ventilation equipment, should be checked to ensure compliance with environmental standards.

Product residues must not be indiscriminately disposed of with waste water or by dumping in waterways.

## SECTION 9. Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

| Properties                             | Value                                         |
|----------------------------------------|-----------------------------------------------|
| Appearance                             | Liquid                                        |
| Colour                                 | Brown                                         |
| Odour                                  | Pungent                                       |
| Melting point / freezing point         | -1/-2 °C                                      |
| Initial boiling point                  | > 100 °C                                      |
| Flammability                           | Non-flammable according to CLP criteria       |
| Lower explosive limit                  | not available                                 |
| Upper explosive limit                  | not available                                 |
| Flash point                            | not available                                 |
| Auto-ignition temperature              | not available                                 |
| Decomposition temperature              | 340 °C (value for the Sulphuric acid)         |
| pH                                     | -0,1                                          |
| Kinematic viscosity                    | not available                                 |
| Solubility                             | soluble in water                              |
| Partition coefficient: n-octanol/water | not available                                 |
| Vapour pressure                        | not available                                 |
| Density and/or relative density        | not available                                 |
| Relative vapour density                | 3,4 (value for the Sulphuric acid)            |
| Particle characteristics               | not applicable on the basis of physical state |

### 9.2. Other information

#### 9.2.1. Information with regard to physical hazard classes

Information not available

#### 9.2.2. Other safety characteristics

Information not available

## SECTION 10. Stability and reactivity

### 10.1. Reactivity

#### SULPHURIC ACID

It attacks and corrodes numerous metals with hydrogen development; the corrosivity of sulphuric acid against metals depends on its concentration and temperature.

### 10.2. Chemical stability

The product is stable in normal conditions of use and storage.

#### SULPHURIC ACID

At 340 °C it decomposes into sulphur trioxide and water.

### 10.3. Possibility of hazardous reactions

No hazardous reactions are foreseeable in normal conditions of use and storage.



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### SULPHURIC ACID

Reacts violently with, for example: carbides, perchlorates, permanganates, fulminated, nitrates, picrates, acrylonitrile, propargyl alcohol and alkalis. These reactions can be explosive.

The dilution of the substance in water is strongly exothermic and fast. If you pour water on concentrated acid the reaction is violent and accompanied by splashes of liquid.

### 10.4. Conditions to avoid

None in particular. However the usual precautions used for chemical products should be respected.

### 10.5. Incompatible materials

#### SULPHURIC ACID

Flammable, reducing, basic, organic substances, metals and water.

#### DIRHODIUM TRISULPHATE

Corrosive effect on steel and aluminum.

### 10.6. Hazardous decomposition products

Metal oxides, sulphuric acid, sulphur oxides.

## SECTION 11. Toxicological information

In the absence of experimental data for the product itself, health hazards are evaluated according to the properties of the substances it contains, using the criteria specified in the applicable regulation for classification.

It is therefore necessary to take into account the concentration of the individual hazardous substances indicated in section 3, to evaluate the toxicological effects of exposure to the product.

### 11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

#### Metabolism, toxicokinetics, mechanism of action and other information

##### SULPHURIC ACID

References: Clearance Of Sulfuric Acid-Introduced 35S From The Respiratory Tracts Of Rats, Guinea Pigs And Dogs Following Inhalation Or Instillation (Fundamental & Applied Toxicology 3 (4) 293-297 (1983))

Reliability (Klimisch score): 2

Species: rat (F344), dog (Beagle), guinea pig (Hartley)

Routes of exposure: inhalation and instillation

Results: Sulphate is rapidly absorbed by the lungs following exposure by inhalation of sulfuric acid.

#### Information on likely routes of exposure

##### SULPHURIC ACID

The main potential routes of exposure are inhalation, skin contact and ingestion

#### Delayed and immediate effects as well as chronic effects from short and long-term exposure

Information not available

#### Interactive effects

Information not available

#### ACUTE TOXICITY

Corrosive to the respiratory tract.

ATE (Inhalation) of the mixture: Not classified

ATE (Oral) of the mixture: Not classified

ATE (Dermal) of the mixture: Not classified

##### SULPHURIC ACID

Reference: Range-finding toxicity data: List VII (Am Ind Hyg Assoc J. 1969 Sep-Oct; 30 (5): 470-6 (1969))

Reliability (Klimisch score): 2

Species: rat (Wistar)

Routes of exposure: oral

Results LD50: 2140 mg / kg



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Reference: The toxicity of H<sub>2</sub>SO<sub>4</sub> aerosols to CD-1 mice and Fischer-344 rats. (Annual Report of the Inhalation Toxicology Research Institute (p435-439) (1979))

Reliability (Klimisch score): 2

Species: rat (Fischer 344; male / female)

Routes of exposure: inhalation (aerosol)

Results CL<sub>50</sub>: 375 mg/m<sup>3</sup>

Acute skin toxicity: data not available.

Corrosion of the respiratory tract

The concentrated substance, at significant doses, has caustic power.

### DIRHODIUM TRISULPHATE

Based on the weight of evidence of available data determined by expert judgment, the substance is not classified for the acute toxicity hazard class.

### SKIN CORROSION / IRRITATION

Corrosive for the skin

Classification according to the experimental pH value

### SULPHURIC ACID

In humans, direct skin contact with a concentrated solution of SULPHURIC ACID (pH < 2) The more prolonged the contact time and the higher the concentration, the more severe the caustic lesions.

Specific concentration limits (Annex VI Reg. 1272/2008)

Skin Corr. 1A; H314: C ≥ 15 %

Skin Irrit. 2; H315: 5 % ≤ C < 15 %

### DIRHODIUM TRISULPHATE

Method:OECD 435, ex vivo

Reliability (Klimisch score):1

Species: artificial membrane

Results: corrosive, Cat. 1 B

### SERIOUS EYE DAMAGE / IRRITATION

Causes serious eye damage

Classification according to the experimental pH value

### SULPHURIC ACID

Based on the evidence-based data available, determined by expert judgement , the substance is classified as H314 (causes severe skin burns and serious eye damage).

Specific concentration limits (Annex VI Reg. 1272/2008)

Eye Irrit. 2; H319: 5 % ≤ C < 15 %

### DIRHODIUM TRISULPHATE

Based on the evidence of available data determined by expert judgement, the substance causes serious eye damage.

### RESPIRATORY OR SKIN SENSITISATION

Does not meet the classification criteria for this hazard class

### Respiratory sensitization

SULPHURIC ACID

No data available

### Skin sensitization

SULPHURIC ACID

No data available

### DIRHODIUM TRISULPHATE

Rhodium (III) sulphate shows a slight potential for skin sensitization in two limited occupational studies (de la Cuadra and Grau-Massanes, 1991; Gomez de la Fuente et al., 2003).

Based on the probative value of the available data determined by expert judgment, the substance is not classified for the class of respiratory or skin sensitization.

### GERM CELL MUTAGENICITY

Suspected of causing genetic defects

### SULPHURIC ACID .

Reference: Sublethal pH decrease may cause genetic damage to eukaryotic cells: a study on sea urchins and Salmonella typhimurium (Teratog. Carcinog. Mutagen. 6 (4): 275-287 (1986))



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Reliability (Klimisch score): 2  
In vitro test  
Species: TA97, TA98, TA100, TA102, TA1535  
Results: negative  
In vivo test: data not available.

DIRHODIUM TRISULPHATE  
Method: OECD 487, IN VITRO  
Reliability (Klimisch score): 1  
Species: lymphocytes  
Results: positive  
Based on the available data, the substance is classified as mutagenic (Cat. 2).

### CARCINOGENICITY

Does not meet the classification criteria for this hazard class

### SULPHURIC ACID

Based on the evidence of available data, the substance is not classified for the hazard class CLP of carcinogenicity

### DIRHODIUM TRISULPHATE

Based on the evidence of available data, the substance is not classified for the hazard class CLP of carcinogenicity

### REPRODUCTIVE TOXICITY

Does not meet the classification criteria for this hazard class

### DIRHODIUM TRISULPHATE

Based on the available data, the substance is not classified in this hazard class.

### Adverse effects on sexual function and fertility

#### SULPHURIC ACID

No data available

### Adverse effects on development of the offspring

#### SULPHURIC ACID

Method: equivalent or similar to OECD 414

Reliability (Klimisch score): 2

Species: white rabbit (New Zealand); mouse

Routes of exposure: inhalation (aerosol)

Results: NOAEC (maternal - mouse): 5.7 mg / m<sup>3</sup>; NOAEC (development - mouse): 19.3 mg / m<sup>3</sup>; NOAEC (maternal - rabbit): 5.7 mg / m<sup>3</sup>; NOAEC (development - rabbit): 19.3 mg / m<sup>3</sup>.

### STOT - SINGLE EXPOSURE

Does not meet the classification criteria for this hazard class

### SULPHURIC ACID

Exposure to the aerosols of sulphuric acid is responsible for irritation of the respiratory tract with an intensity that depends on the atmospheric concentration of acid, the characteristics of the aerosol, the duration of exposure and the sensitivity of the exposed animal.

### DIRHODIUM TRISULPHATE

Based on the available data, the substance has no specific target organ toxicity effects for single exposure and is not classified under the relevant CLP hazard class.

### STOT - REPEATED EXPOSURE

Does not meet the classification criteria for this hazard class

### SULPHURIC ACID

Based on the available data, the substance has no specific target organ toxicity effects due to repeated exposure and is not classified under the relevant CLP hazard class.

Method: OECD 412

Reliability (Klimisch score): 1

Species: rat (Wistar; females)

Routes of exposure: inhalation (aerosol)

LOAEC results: 0.3 mg / m<sup>3</sup>.

### DIRHODIUM TRISULPHATE

Based on the evidence of available data, determined by the judgement of experts, the substance is not classified for the hazard class CLP of STOT-RE



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### ASPIRATION HAZARD

Does not meet the classification criteria for this hazard class

### SULPHURIC ACID

There no available data for the hazard class CLP of aspiration hazard.

### DIRHODIUM TRISULPHATE

There no available data for the hazard class CLP of aspiration hazard.

### 11.2. Information on other hazards

Based on the available data, the product does not contain substances listed in the main European lists of potential or suspected endocrine disruptors with human health effects under evaluation.

## SECTION 12. Ecological information

This product is dangerous for the environment and is toxic for aquatic organisms. In the long term, it has negative effects on the aquatic environment.

### 12.1. Toxicity

#### SULPHURIC ACID

|                                   |                                                                                                    |
|-----------------------------------|----------------------------------------------------------------------------------------------------|
| LC50 - for Fish                   | > 16 mg/l/96h 16-28 (pH 3.25 to 3.5) <i>Lepomis macrochirus</i> (J. Fish Bid. (1984) 25, 133-137.) |
| EC50 - for Crustacea              | > 100 mg/l/48h <i>Daphnia magna</i> (OECD TG 202)                                                  |
| EC50 - for Algae / Aquatic Plants | > 100 mg/l/72h <i>Desmodesmus subspicatus</i> (OECD TG 201)                                        |

#### Long term effects

Fish (*Salvelinus fontinalis*) NOEC: 0,31 mg/l (pH 5,2) (effect on embryo survival); NOEC: 0,15 mg/l (pH 5,5) (effect on hatching time); NOEC: 0,13 mg/l (pH 5,56 mg/l) (effect on weight of young fish);  
Fish (*Jordanella floridae*) NOEC: 0,025 mg/l (calculated from the LOEC);  
Crustaceans (*Tanytarsus dissimilis*) NOEC-35 days: 0,15 mg/l (pH 5,5) (effect on reproduction) (HSDB,2015)

#### DIRHODIUM TRISULPHATE

|                                   |                                                                   |
|-----------------------------------|-------------------------------------------------------------------|
| LC50 - for Fish                   | 220 mg/l/96h <i>Leuciscus idus melanotus</i> OECD Guideline 203   |
| EC50 - for Crustacea              | 0,29 mg/l/48h <i>Daphnia magna</i> OECD Guideline 202             |
| EC50 - for Algae / Aquatic Plants | 0,522 mg/l/72h <i>Raphidocelis subcapitata</i> OECD Guideline 201 |
| EC10 for Algae / Aquatic Plants   | < 0,3 mg/l/72h <i>Raphidocelis subcapitata</i> OECD Guideline 201 |

### 12.2. Persistence and degradability

#### SULPHURIC ACID

It dissociates rapidly in water with sulphate ions and hydrated protons and is totally miscible in water (at pH 3.92 for example dissociation is 99%) (OECD SIDS 2001).

#### DIRHODIUM TRISULPHATE

Degradability: information not available inorganic substance

### 12.3. Bioaccumulative potential

#### SULPHURIC ACID

It does not bioaccumulate in tissues as it is completely dissociated in water (OECD SIDS 2001).

### 12.4. Mobility in soil

#### SULPHURIC ACID

High mobility in soil (OECD SIDS 2001)

### 12.5. Results of PBT and vPvB assessment

On the basis of available data, the product does not contain any PBT or vPvB in percentage  $\geq$  than 0,1%.



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### 12.6. Endocrine disrupting properties

Based on the available data, the product does not contain substances listed in the main European lists of potential or suspected endocrine disruptors with environmental effects under evaluation.

### 12.7. Other adverse effects

Information not available

## SECTION 13. Disposal considerations

### 13.1. Waste treatment methods

Reuse, when possible. Product residues should be considered special hazardous waste. The hazard level of waste containing this product should be evaluated according to applicable regulations. (Directive 2008/98/EC and subsequent amendments and adjustments and related national transpositions). Disposal must be performed through an authorised waste management firm, in compliance with national and local regulations.

The legal responsibility for disposal is the producer / holder of the waste.

To this mixture different EWC codes could be applied (European Waste Code) based on the specific circumstances that generated the waste, possible alterations and / or possible contamination.

The product as such, contained in the original packaging, or decanted in an appropriate container for the purpose of disposal, or no longer usable (for example following an accidental spill), must be classified with a EWC code that is compatible with the description of the use indicated in section 1.2.

The suitable final destination of the waste must be evaluated by the manufacturer on the basis of the chemical-physical characteristics of the waste, the compatibility with the authorized facility to which it will be given for recovery, and the definitive treatment or disposal according to the procedures established by current regulations.

Disposal through wastewater discharge is not permitted.

For hazardous substances registered according to Regulation EC 1907/2006 (REACH), for which a chemical safety report has been drawn up, refer to the specific information contained in the exposure scenarios attached to this SDS.

### CONTAMINATED PACKAGING

Contaminated packaging must be sent, properly labeled, to recovery or disposal in compliance with national waste management regulations and must be classified with the following EWC code:

**15 01 10\***: packaging containing residues of or contaminated by dangerous substances

### EMPTY PACKAGING

To assign a Chapter 15 Subchapter 01 (1501) code to the waste, it is necessary to determine whether the packaging/container is nominally empty. Citing what is contained in the European Commission Communication relating to the "Technical guidelines on waste classification" C/2018/1447 of 8th April 2018, and confirmed in the Sentence of the European Court of Justice n. 487/2019 and 489/2019, it is suggested to interpret the notion of "nominally empty" in the sense that the contents of the product have been effectively removed. Removal can be done via drainage or scraping. The fact that there is a minimal residue of the original content in packaging waste does not exclude the possibility of classifying this waste as 'nominally empty' and does not prohibit its assignment to subchapter 15 01 packaging waste.

A package can be considered completely emptied if in the event of a further emptying attempt, for example, due to its overturning, no more drops or solid residues are released.

Waste resulting from the use of the substance or mixture must be classified and managed by the following legal references to be considered in their updated version:

- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives;
- 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;
- 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;
- Council Regulation (EU) 2017/997 of 8 June 2017 amending Annex III to Directive 2008/98/EC of the European Parliament and of the Council as regards the hazardous property HP 14 'Ecotoxic'.

## SECTION 14. Transport information

### 14.1. UN number or ID number

ADR / RID, IMDG, IATA: UN 3264

### 14.2. UN proper shipping name

ADR / RID: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Sulphuric acid, Dirhodium trisulphate)



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IMDG: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Sulphuric acid, Dirhodium trisulphate)  
IATA: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Sulphuric acid, Dirhodium trisulphate)

## 14.3. Transport hazard class(es)

ADR / RID: Class: 8 Label: 8

IMDG: Class: 8 Label: 8

IATA: Class: 8 Label: 8



## 14.4. Packing group

ADR / RID, IMDG, IATA: II

## 14.5. Environmental hazards

ADR / RID: Environmentally Hazardous

IMDG: Marine Pollutant

IATA: NO



For Air transport, environmentally hazardous mark is only mandatory for UN 3077 and UN 3082.

## 14.6. Special precautions for user

|            |                                             |                                                             |                                                            |
|------------|---------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------|
| ADR / RID: | HIN - Kemler: 80<br>Special provision: 274  | Limited Quantities: 1 lt                                    | Tunnel restriction code: (E)                               |
| IMDG:      | EMS: F-A, S-B                               | Limited Quantities: 1 lt                                    |                                                            |
| IATA:      | Cargo:<br>Passengers:<br>Special provision: | Maximum quantity: 30 L<br>Maximum quantity: 1 L<br>A3, A803 | Packaging instructions: 855<br>Packaging instructions: 851 |

## 14.7. Maritime transport in bulk according to IMO instruments

Information not relevant

## SECTION 15. Regulatory information

### 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Seveso Category - Directive 2012/18/EU  
E2

Restrictions relating to the product or contained substances pursuant to Annex XVII to EC Regulation 1907/2006

#### Product

3. Liquid substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008:

- (a) hazard classes 2.1 to 2.4, 2.6 and 2.7, 2.8 types A and B, 2.9, 2.10, 2.12, 2.13 categories 1 and 2, 2.14 categories 1 and 2, 2.15 types A to F;
- (b) hazard classes 3.1 to 3.6, 3.7 adverse effects on sexual function and fertility or on development, 3.8 effects other than narcotic effects, 3.9 and 3.10;
- (c) hazard class 4.1;
- (d) hazard class 5.1.



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## Contained substance

Point 75

## Regulation (EU) 2019/1148 - on the marketing and use of explosives precursors

### Regulated explosives precursor

The acquisition, introduction, possession or use of that regulated explosives precursor by members of the general public is subject to reporting obligations as set out in Article 9.

All suspicious transactions and significant disappearances and thefts must be reported to the relevant national contact point.

## Substances in Candidate List (Art. 59 REACH)

On the basis of available data, the product does not contain any SVHC in percentage  $\geq$  than 0,1%.

## Substances subject to authorisation (Annex XIV REACH)

None

## Substances subject to exportation reporting pursuant to Regulation (EU) 649/2012:

None

## Substances subject to the Rotterdam Convention:

None

## Substances subject to the Stockholm Convention:

None

## Healthcare controls

Workers exposed to this chemical agent must not undergo health checks, provided that available risk-assessment data prove that the risks related to the workers' health and safety are modest and that the 98/24/EC directive is respected.

### 15.2. Chemical safety assessment

A chemical safety assessment has been performed for the following contained substances: SULPHURIC ACID.

## SECTION 16. Other information

### Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]

#### Classification according to Regulation (EC) Nr. 1272/2008

|                                                                    |      |
|--------------------------------------------------------------------|------|
| Substance or mixture corrosive to metals, category 1               | H290 |
| Germ cell mutagenicity, category 2                                 | H341 |
| Skin corrosion, category 1                                         | H314 |
| Serious eye damage, category 1                                     | H318 |
| Hazardous to the aquatic environment, chronic toxicity, category 2 | H411 |

#### Classification procedure

|                       |
|-----------------------|
| On basis of test data |
| Calculation method    |
| On basis of test data |
| On basis of test data |
| Calculation method    |

Text of hazard (H) indications mentioned in section 2-3 of the sheet:

|                   |                                                                    |
|-------------------|--------------------------------------------------------------------|
| Met. Corr. 1      | Substance or mixture corrosive to metals, category 1               |
| Muta. 2           | Germ cell mutagenicity, category 2                                 |
| Skin Corr. 1A     | Skin corrosion, category 1A                                        |
| Skin Corr. 1B     | Skin corrosion, category 1B                                        |
| Skin Corr. 1C     | Skin corrosion, category 1C                                        |
| Skin Corr. 1      | Skin corrosion, category 1                                         |
| Eye Dam. 1        | Serious eye damage, category 1                                     |
| Eye Irrit. 2      | Eye irritation, category 2                                         |
| Skin Irrit. 2     | Skin irritation, category 2                                        |
| Aquatic Acute 1   | Hazardous to the aquatic environment, acute toxicity, category 1   |
| Aquatic Chronic 1 | Hazardous to the aquatic environment, chronic toxicity, category 1 |
| Aquatic Chronic 2 | Hazardous to the aquatic environment, chronic toxicity, category 2 |
| H290              | May be corrosive to metals.                                        |
| H341              | Suspected of causing genetic defects.                              |
| H314              | Causes severe skin burns and eye damage.                           |
| H318              | Causes serious eye damage.                                         |



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|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>H319</b>   | Causes serious eye irritation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>H315</b>   | Causes skin irritation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>H400</b>   | Very toxic to aquatic life.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>H410</b>   | Very toxic to aquatic life with long lasting effects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>H411</b>   | Toxic to aquatic life with long lasting effects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>EUH071</b> | Corrosive to the respiratory tract.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Note B</b> | <i>Some substances (acids, bases, etc.) are placed on the market in aqueous solutions at various concentrations and, therefore, these solutions require different classification and labelling since the hazards vary at different concentrations.<br/>In Part 3 entries with Note B have a general designation of the following type: 'nitric acid ... %'.<br/>In this case the supplier must state the percentage concentration of the solution on the label. Unless otherwise stated, it is assumed that the percentage concentration is calculated on a weight/weight basis.</i> |

### LEGEND:

- ADR: European Agreement concerning the carriage of Dangerous goods by Road
- ATE: Acute Toxicity Estimate
- CAS: Chemical Abstract Service Number
- CE50: Effective concentration (required to induce a 50% effect)
- CE: Identifier in ESIS (European archive of existing substances)
- CLP: Regulation (EC) 1272/2008
- DNEL: Derived No Effect Level
- EmS: Emergency Schedule
- GHS: Globally Harmonized System of classification and labeling of chemicals
- IATA DGR: International Air Transport Association Dangerous Goods Regulation
- IC50: Immobilization Concentration 50%
- IMDG: International Maritime Code for dangerous goods
- IMO: International Maritime Organization
- INDEX: Identifier in Annex VI of CLP
- LC50: Lethal Concentration 50%
- LD50: Lethal dose 50%
- OEL: Occupational Exposure Level
- PBT: Persistent, bioaccumulative and toxic
- PEC: Predicted environmental Concentration
- PEL: Predicted exposure level
- PMT: Persistent, mobile and toxic
- PNEC: Predicted no effect concentration
- REACH: Regulation (EC) 1907/2006
- RID: Regulation concerning the international transport of dangerous goods by train
- TLV: Threshold Limit Value
- TLV CEILING: Concentration that should not be exceeded during any time of occupational exposure.
- TWA: Time-weighted average exposure limit
- TWA STEL: Short-term exposure limit
- VOC: Volatile organic Compounds
- vPvB: Very persistent and very bioaccumulative
- vPvM: Very persistent and very mobile
- WGK: Water hazard classes (German).

### GENERAL BIBLIOGRAPHY

1. Regulation (EC) 1907/2006 (REACH) of the European Parliament
2. Regulation (EC) 1272/2008 (CLP) of the European Parliament
3. Regulation (EU) 2020/878 (II Annex of REACH Regulation)
4. Regulation (EC) 790/2009 (I Atp. CLP) of the European Parliament
5. Regulation (EU) 286/2011 (II Atp. CLP) of the European Parliament
6. Regulation (EU) 618/2012 (III Atp. CLP) of the European Parliament
7. Regulation (EU) 487/2013 (IV Atp. CLP) of the European Parliament
8. Regulation (EU) 944/2013 (V Atp. CLP) of the European Parliament
9. Regulation (EU) 605/2014 (VI Atp. CLP) of the European Parliament
10. Regulation (EU) 2015/1221 (VII Atp. CLP) of the European Parliament
11. Regulation (EU) 2016/918 (VIII Atp. CLP) of the European Parliament
12. Regulation (EU) 2016/1179 (IX Atp. CLP)
13. Regulation (EU) 2017/776 (X Atp. CLP)
14. Regulation (EU) 2018/669 (XI Atp. CLP)
15. Regulation (EU) 2019/521 (XII Atp. CLP)
16. Delegated Regulation (UE) 2018/1480 (XIII Atp. CLP)
17. Regulation (EU) 2019/1148
18. Delegated Regulation (UE) 2020/217 (XIV Atp. CLP)
19. Delegated Regulation (UE) 2020/1182 (XV Atp. CLP)
20. Delegated Regulation (UE) 2021/643 (XVI Atp. CLP)
21. Delegated Regulation (UE) 2021/849 (XVII Atp. CLP)
22. Delegated Regulation (UE) 2022/692 (XVIII Atp. CLP)
23. Delegated Regulation (UE) 2023/707
24. Delegated Regulation (UE) 2023/1434 (XIX Atp. CLP)
25. Delegated Regulation (UE) 2023/1435 (XX Atp. CLP)



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26. Delegated Regulation (UE) 2024/197 (XXI Atp. CLP)

- The Merck Index. - 10th Edition
- Handling Chemical Safety
- INRS - Fiche Toxicologique (toxicological sheet)
- Patty - Industrial Hygiene and Toxicology
- N.I. Sax - Dangerous properties of Industrial Materials-7, 1989 Edition
- IFA GESTIS website
- ECHA website
- Database of SDS models for chemicals - Ministry of Health and ISS (Istituto Superiore di Sanità) - Italy

### **Note for the recipient of the Safety Data Sheet (SDS):**

The recipient of this SDS shall make sure of reading and understanding the information included by all people who handle, store, use, or otherwise come into contact in any way with the substance or mixture to which this SDS is referred to. In particular, the recipient shall provide adequate training to the personnel for the use of hazardous substances and/or mixtures. The recipient shall verify the suitability and completeness of the provided information according to the specific use of the substance or mixture.

However, the substance or mixture referred to by this SDS shall not be used for uses other than those specified in Section 1. The Supplier don't assume responsibility for improper uses. Since the use of the product does not fall under the direct control of the Supplier, the user shall, under his own responsibility, fulfill national and EU regulations concerning health and safety.

The information included in this SDS are provided in good faith and are based on the current state of scientific and technical knowledge, at the revision date indicated, available to the Supplier indicated in Section 1 of this SDS. It shall not be meant that the SDS is a guarantee of any specific property of the substance or mixture. The information concern only to the substance or mixture specifically designated in Section 1 and it could not be valid for the substance or mixture used in combination with other materials or in any process not specified in the text.

This version of the SDS substitutes all the previous versions.

### **Changes to previous review:**

The following sections were modified:

01 / 02 / 03 / 04 / 05 / 06 / 07 / 08 / 09 / 10 / 11 / 12 / 13 / 14 / 15 / 16.

## ATTACHED EXPOSURE SCENARIO

| Substance name | Registrazione Number  | Exposure scenario                                                                                                           |
|----------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------|
| SULPHURIC ACID | 01-2119458838-20-0087 | ES6 - Industrial end-use - Use of sulphuric acid in surface treatments, purification and etching and electrolytic processes |



# EXPOSURE SCENARIO

## SULPHURIC ACID N. reg. 01-2119458838-20-0087

### 6. Industrial end-use - Use of sulphuric acid in surface treatments, purification and etching and electrolytic processes

| Section 1 Title of the Exposure Scenario                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>Abbreviated title: Use of sulphuric acid in surface treatments, purification and etching and electrolytic processes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                      |
| <b>Systematic title based on the use of descriptors</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                      |
| Sector of use (SU)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2a, 14, 15, 16                                                                       |
| Product Categories (PC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 14, 15                                                                               |
| Process Categories (PROC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1, 2, 3, 8a, 8b, 9, 13, 15, 28                                                       |
| Environmental Release Categories (ERC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 6b                                                                                   |
| <b>Processes, assignments, activities covered</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                      |
| <p>Sulphuric acid is widely used in surface treatments, purification and incision, and electrolytic processes. Common applications include:</p> <p>Use in pickling steel (also galvanized): electrogalvanizing of iron and steel products;</p> <p>Use in abrasive, descaling and cleaning surfaces before electrolysis;</p> <p>Use in polished immersion techniques of brass;</p> <p>Use in aluminum treatments;</p> <p>Use in the engraving industry (e.g. glass engraving)</p> <p>Use in metal refining</p> <p>Industrial sites that use sulphuric acid in surface treatments, purification and engraving, and electrolytic processes will vary in size.</p> <p>In large-scale chemical synthesis plants, processing equipment, vessels and reactors will generally be housed outdoors and operated by a small number of operators working in a separate closed control room. At these larger sites, processes typically operate uninterruptedly, for long periods without interruption, up to 330 days a year. Operators work a standard shift and a normal working week, with production continuing on weekends. Small-scale operations may also be possible.</p> |                                                                                      |
| <b>Section 2: CS1-Environmental exposure: Use of sulphuric acid in surface treatments, purification and etching and electrolytic processes(ERC 6b)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                      |
| Exposure assessment and risk characterisation are not necessary as no environmental hazard has been identified.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                      |
| <b>Section 3 Exposure for Workers</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |
| <b>Evaluation method</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                      |
| ART 1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                      |
| <b>Worker CS 2: Use of sulphuric acid in closed, continuous processes, without likelihood of exposure (Hot processes, indoors and outdoors) (PROC 1)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                      |
| <b>Product features</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                      |
| Concentration of the substance in the product (% w/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ≤98%                                                                                 |
| Physical state                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Liquid including paste/slurry/suspension                                             |
| Vapour pressure (Pa)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <130 (volatile)                                                                      |
| Viscosity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Liquid with low viscosity (similar to water)                                         |
| <b>Operating conditions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                      |
| Duration of the activity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ≤ 8 h /day                                                                           |
| (ART) duration of the activity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | < 480 min                                                                            |
| (ART) duration of non-exposure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | > 0 min                                                                              |
| <b>Technical and organisational conditions and specific measures for risk management</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                      |
| Proximity to the primary source of emission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | The primary source of emission is not located in the worker's breathing zone         |
| Activity class                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Activities with open liquid surfaces or open tanks/activities with agitated surfaces |
| Situation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Open area 0.1-0.3 m <sup>2</sup> .                                                   |
| Room ventilation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Basic (up to 3 ACH)                                                                  |



# EXPOSURE SCENARIO

SULPHURIC ACID N. reg. 01-2119458838-20-0087

|                                                                                                                                 |                                                                                                                                                                                    |                        |
|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Personal enclosure                                                                                                              | Partial insulation without ventilation (inhalation effectiveness: 70%)<br>Workers are separated from the emission source, e.g. workers are in a separate control room              |                        |
| Occupational Health and Safety Management System                                                                                | Advanced                                                                                                                                                                           |                        |
| Local exhaust ventilation                                                                                                       | No                                                                                                                                                                                 |                        |
| Localized primary control system                                                                                                | No High Level Extraction/Containment [Inhalation Efficacy: 99.9%]                                                                                                                  |                        |
| Localized secondary control system                                                                                              | No system                                                                                                                                                                          |                        |
| Segregation systems                                                                                                             | No system<br>(the source is not isolated from the workspace)                                                                                                                       |                        |
| Process enclosure                                                                                                               | Process fully enclosed<br>The process is completely closed (airtight) and the integrity of the seal is monitored. Containment is not interrupted for sampling or routine cleaning. |                        |
| Dispersion – General ventilation                                                                                                | 3 ACH                                                                                                                                                                              |                        |
| Other conditions affecting the worker's exposure                                                                                |                                                                                                                                                                                    |                        |
| Place of use                                                                                                                    | Indoor                                                                                                                                                                             |                        |
| Operating temperature                                                                                                           | ≤ 40°C                                                                                                                                                                             |                        |
| Work area                                                                                                                       | Indoor                                                                                                                                                                             |                        |
| Room size                                                                                                                       | 1000 m³                                                                                                                                                                            |                        |
| Process temperature                                                                                                             | Hot processes (50-150°C)                                                                                                                                                           |                        |
| Exposure and risk characterisation (RCR)                                                                                        |                                                                                                                                                                                    |                        |
| Route of exposure and type of effects                                                                                           | Exposure                                                                                                                                                                           | Risk Quantification    |
| Inhalation, long-term local effects                                                                                             | 1.1E-3 mg/m³                                                                                                                                                                       | Exposure/DMEL: = 0.022 |
| Inhalation acute local effects                                                                                                  | 8.8E-3 mg/m³                                                                                                                                                                       | Exposure/DMEL: = 0.088 |
| Worker CS 3: Use of sulphuric acid in closed, continuous processes with occasional controlled exposure (Hot processes) (PROC 2) |                                                                                                                                                                                    |                        |
| Product features                                                                                                                |                                                                                                                                                                                    |                        |
| Concentration of the substance in the product (% w/w)                                                                           | ≤98%                                                                                                                                                                               |                        |
| Physical state                                                                                                                  | Liquid including paste/slurry/suspension                                                                                                                                           |                        |
| Vapour pressure (Pa)                                                                                                            | <130 (volatile)                                                                                                                                                                    |                        |
| Viscosity                                                                                                                       | Liquid with low viscosity (similar to water)                                                                                                                                       |                        |
| Operating conditions                                                                                                            |                                                                                                                                                                                    |                        |
| Duration of the activity                                                                                                        | ≤ 8 h /day                                                                                                                                                                         |                        |
| (ART) duration of the activity                                                                                                  | < 480 min                                                                                                                                                                          |                        |
| (ART) duration of non-exposure                                                                                                  | > 0 min                                                                                                                                                                            |                        |
| Technical and organisational conditions and specific measures for risk management                                               |                                                                                                                                                                                    |                        |
| Proximity to the primary source of emission                                                                                     | The primary source of emission is not located in the worker's breathing zone                                                                                                       |                        |
| Activity class                                                                                                                  | Activities with open liquid surfaces or open tanks/activities with agitated surfaces                                                                                               |                        |
| Situation                                                                                                                       | Open area 0.1-0.3 m².                                                                                                                                                              |                        |
| Room ventilation                                                                                                                | Basic (up to 3 ACH)                                                                                                                                                                |                        |
| Personal enclosure                                                                                                              | no personal enclosure                                                                                                                                                              |                        |
| Occupational Health and Safety Management System                                                                                | Advanced                                                                                                                                                                           |                        |
| Local exhaust ventilation                                                                                                       | No                                                                                                                                                                                 |                        |
| Localized primary control system                                                                                                | No High Level Extraction/Containment [Inhalation Efficacy: 99.9%]                                                                                                                  |                        |
| Localized secondary control system                                                                                              | No system                                                                                                                                                                          |                        |

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|                                                                                                                             |                                                                                                                                               |                        |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Segregation systems                                                                                                         | No system                                                                                                                                     |                        |
| Process enclosure                                                                                                           | Process not fully completely enclosed                                                                                                         |                        |
| Housekeeping Practices                                                                                                      | Demonstrable and effective cleaning practices in place                                                                                        |                        |
| Dispersion - Distance of the worker from the emission source (external):                                                    | > 4 m                                                                                                                                         |                        |
| Conditions and measures relating to personal protection, hygiene and health assessment                                      |                                                                                                                                               |                        |
| Chemical Protective clothing                                                                                                | YES, acid-resistant coverall and safety boots to prevent skin contact                                                                         |                        |
| Face/Eye protection                                                                                                         | YES, helmet with full face shield/chemical glasses to avoid eye contact                                                                       |                        |
| Dermal protection                                                                                                           | YES, chemically resistant acid-resistant gloves with activity-specific training) and (other) appropriate skin protection [Skin efficacy: 95%] |                        |
| Other conditions affecting the worker's exposure                                                                            |                                                                                                                                               |                        |
| Place of use                                                                                                                | Indoor                                                                                                                                        |                        |
| Operating temperature                                                                                                       | ≤ 40°C                                                                                                                                        |                        |
| Work area                                                                                                                   | Outdoor (close to buildings)                                                                                                                  |                        |
| Process temperature                                                                                                         | Hot processes 50-150°C                                                                                                                        |                        |
| Exposure and risk characterisation (RCR)                                                                                    |                                                                                                                                               |                        |
| Route of exposure and type of effects                                                                                       | Exposure                                                                                                                                      | Risk Quantification    |
| Inhalation, long-term local effects                                                                                         | 3.1E-4 mg/m <sup>3</sup>                                                                                                                      | Exposure/DMEL: < 0,01  |
| Inhalation acute local effects                                                                                              | 2.5 E-3 mg/m <sup>3</sup>                                                                                                                     | Exposure/DMEL: = 0.025 |
| Worker CS 4: Use of sulphuric acid in closed, batch processes, with occasional controlled exposure (Hot processes) (PROC 3) |                                                                                                                                               |                        |
| Product features                                                                                                            |                                                                                                                                               |                        |
| Concentration of the substance in the product (% w/w)                                                                       | ≤98%                                                                                                                                          |                        |
| Physical state                                                                                                              | Liquid including paste/slurry/suspension                                                                                                      |                        |
| Vapour pressure (Pa)                                                                                                        | <130 (volatile)                                                                                                                               |                        |
| Viscosity                                                                                                                   | Liquid with low viscosity (similar to water)                                                                                                  |                        |
| Operating conditions                                                                                                        |                                                                                                                                               |                        |
| Duration of the activity                                                                                                    | ≤ 8 h /day                                                                                                                                    |                        |
| (ART) duration of the activity                                                                                              | < 480 min                                                                                                                                     |                        |
| (ART) duration of non-exposure                                                                                              | > 0 min                                                                                                                                       |                        |
| Technical and organisational conditions and specific measures for risk management                                           |                                                                                                                                               |                        |
| Proximity to the primary source of emission                                                                                 | The primary source of emission is not located in the worker's breathing zone                                                                  |                        |
| Activity class                                                                                                              | Activities with open liquid surfaces or open tanks/activities with agitated surfaces                                                          |                        |
| Situation                                                                                                                   | Open area 0.1-0.3 m <sup>2</sup> .                                                                                                            |                        |
| Room ventilation                                                                                                            | Basic (up to 3 ACH)                                                                                                                           |                        |
| Personal enclosure                                                                                                          | no personal enclosure                                                                                                                         |                        |
| Occupational Health and Safety Management System                                                                            | Advanced                                                                                                                                      |                        |
| Local exhaust ventilation                                                                                                   | No                                                                                                                                            |                        |
| Localized primary control system                                                                                            | No High Level Extraction/Containment [Inhalation Efficacy: 99.9%]                                                                             |                        |
| Localized secondary control system                                                                                          | No system                                                                                                                                     |                        |
| Segregation systems                                                                                                         | No system                                                                                                                                     |                        |
| Process enclosure                                                                                                           | Process not fully enclosed                                                                                                                    |                        |
| Housekeeping Practices                                                                                                      | Demonstrable and effective cleaning practices in place                                                                                        |                        |
| Dispersion - Distance of the worker from the emission source (external):                                                    | > 4 m                                                                                                                                         |                        |
| Conditions and measures relating to personal protection, hygiene and health assessment                                      |                                                                                                                                               |                        |

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| Chemical Protective clothing                                                                                                                             | YES, acid-resistant coverall and safety boots to prevent skin contact                                                                         |                        |
| Face/Eye protection                                                                                                                                      | YES, helmet with full face shield/chemical glasses to avoid eye contact                                                                       |                        |
| Dermal protection                                                                                                                                        | YES, chemically resistant acid-resistant gloves with activity-specific training) and (other) appropriate skin protection [Skin efficacy: 95%] |                        |
| Other conditions affecting the worker's exposure                                                                                                         |                                                                                                                                               |                        |
| Place of use                                                                                                                                             | Indoor                                                                                                                                        |                        |
| Operating temperature                                                                                                                                    | ≤ 40°C                                                                                                                                        |                        |
| Work area                                                                                                                                                | Outdoor (close to buildings)                                                                                                                  |                        |
| Process temperature                                                                                                                                      | Hot processes 50-150°C                                                                                                                        |                        |
| Exposure and risk characterisation (RCR)                                                                                                                 |                                                                                                                                               |                        |
| Route of exposure and type of effects                                                                                                                    | Exposure                                                                                                                                      | Risk Quantification    |
| Inhalation, long-term local effects                                                                                                                      | 3.1E-4 mg/m <sup>3</sup>                                                                                                                      | Exposure/DMEL: = 0,01  |
| Inhalation acute local effects                                                                                                                           | 2.5 E-3 mg/m <sup>3</sup>                                                                                                                     | Exposure/DMEL: = 0.025 |
| Worker CS 5: Transfer of sulphuric acid from road tankers/cars or other vessels to bulk storage facility and charging (dedicated facilities) ( PROC 8b ) |                                                                                                                                               |                        |
| Product features                                                                                                                                         |                                                                                                                                               |                        |
| Concentration of the substance in the product (% w/w)                                                                                                    | ≤98%                                                                                                                                          |                        |
| Physical state                                                                                                                                           | Liquid including paste/slurry/suspension                                                                                                      |                        |
| Vapour pressure (Pa)                                                                                                                                     | < 6 (low volatility substance, exposure to fog is estimated)                                                                                  |                        |
| Viscosity                                                                                                                                                | Liquid with medium viscosity (similar to oil)                                                                                                 |                        |
| Weight of the fraction                                                                                                                                   | 100%                                                                                                                                          |                        |
| Operating conditions                                                                                                                                     |                                                                                                                                               |                        |
| Duration of the activity                                                                                                                                 | ≤ 8 h /day                                                                                                                                    |                        |
| (ART) duration of the activity                                                                                                                           | < 480 min                                                                                                                                     |                        |
| (ART) duration of non-exposure                                                                                                                           | > 0 min                                                                                                                                       |                        |
| Technical and organisational conditions and specific measures for risk management                                                                        |                                                                                                                                               |                        |
| Proximity to the primary source of emission                                                                                                              | Primary emission source not located in the breathing zone of the worker (Far field source)                                                    |                        |
| Activity class                                                                                                                                           | Transfer of liquid products / Falling liquids                                                                                                 |                        |
| Situation                                                                                                                                                | Transfer of liquid product with flow > 1000 l/minute.                                                                                         |                        |
| Room ventilation                                                                                                                                         | Basic (up to 3 ACH)                                                                                                                           |                        |
| Personal enclosure                                                                                                                                       | no personal enclosure                                                                                                                         |                        |
| Occupational Health and Safety Management System                                                                                                         | Advanced                                                                                                                                      |                        |
| Local exhaust ventilation                                                                                                                                | No                                                                                                                                            |                        |
| Type of loading                                                                                                                                          | Submerged loading, where the liquid dispenser remains below the fluid level reducing the amount of aerosol formation                          |                        |
| Localized primary control system                                                                                                                         | No High Level Extraction/Containment [Inhalation Efficacy: 99.9%]                                                                             |                        |
| Localized secondary control system                                                                                                                       | No system                                                                                                                                     |                        |
| Segregation systems                                                                                                                                      | No system                                                                                                                                     |                        |
| Process enclosure                                                                                                                                        | Process not fully enclosed                                                                                                                    |                        |
| Housekeeping Practices                                                                                                                                   | Demonstrable and effective cleaning practices in place                                                                                        |                        |
| Dispersion - Distance of the worker from the emission source (external):                                                                                 | ≤ 4 m                                                                                                                                         |                        |
| Conditions and measures relating to personal protection, hygiene and health assessment                                                                   |                                                                                                                                               |                        |
| Chemical Protective clothing                                                                                                                             | YES, acid-resistant coverall and safety boots to prevent skin contact                                                                         |                        |
| Face/Eye protection                                                                                                                                      | YES, helmet with full face shield/chemical glasses to avoid eye contact                                                                       |                        |
| Dermal protection                                                                                                                                        | YES, chemically resistant acid-resistant gloves with activity-specific training) and (other) appropriate skin protection [Skin efficacy: 95%] |                        |

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| Other conditions affecting the worker's exposure                                                                                  |                                                                                                                                               |                       |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Place of use                                                                                                                      | Outdoor                                                                                                                                       |                       |
| Operating temperature                                                                                                             | ≤ 40°C                                                                                                                                        |                       |
| Work area                                                                                                                         | Outdoor (close to buildings)                                                                                                                  |                       |
| Process temperature                                                                                                               | Room temperature (15-25°C)                                                                                                                    |                       |
| Exposure and risk characterisation (RCR)                                                                                          |                                                                                                                                               |                       |
| Route of exposure and type of effects                                                                                             | Exposure                                                                                                                                      | Risk Quantification   |
| Inhalation, long-term local effects                                                                                               | 1.9E-6mg/m <sup>3</sup>                                                                                                                       | Exposure/DMEL: < 0,01 |
| Inhalation acute local effects                                                                                                    | 1.5E-5 mg/m <sup>3</sup>                                                                                                                      | Exposure/DMEL: < 0,01 |
| Worker CS 6: Transfer of sulphuric acid into large containers (dedicated facilities; e.g. transferring pickling fluid) ( PROC 8b) |                                                                                                                                               |                       |
| Product features                                                                                                                  |                                                                                                                                               |                       |
| Concentration of the substance in the product (% w/w)                                                                             | ≤98%                                                                                                                                          |                       |
| Physical state                                                                                                                    | Liquid including paste/slurry/suspension                                                                                                      |                       |
| Vapour pressure (Pa)                                                                                                              | < 6 (low volatility substance, exposure to fog is estimated)                                                                                  |                       |
| Viscosity                                                                                                                         | Liquid with medium viscosity (similar to oil)                                                                                                 |                       |
| Operating conditions                                                                                                              |                                                                                                                                               |                       |
| Duration of the activity                                                                                                          | ≤ 8 h /day                                                                                                                                    |                       |
| (ART) duration of the activity                                                                                                    | < 480 min                                                                                                                                     |                       |
| (ART) duration of non-exposure                                                                                                    | > 0 min                                                                                                                                       |                       |
| Technical and organisational conditions and specific measures for risk management                                                 |                                                                                                                                               |                       |
| Proximity to the primary source of emission                                                                                       | Primary emission source not located in the breathing zone of the worker (Far field source)                                                    |                       |
| Activity class                                                                                                                    | Transfer of liquid products / Falling liquids                                                                                                 |                       |
| Situation                                                                                                                         | Transfer of liquid product with flow of 100 - 1000 l/minute e.g. Filling drums.                                                               |                       |
| Room ventilation                                                                                                                  | Basic (up to 3 ACH)                                                                                                                           |                       |
| Personal enclosure                                                                                                                | no personal enclosure                                                                                                                         |                       |
| Occupational Health and Safety Management System                                                                                  | Advanced                                                                                                                                      |                       |
| Local exhaust ventilation                                                                                                         | No                                                                                                                                            |                       |
| Type of loading                                                                                                                   | Submerged loading, where the liquid dispenser remains below the fluid level reducing the amount of aerosol formation                          |                       |
| Localized primary control system                                                                                                  | No High Level Extraction/Containment [Inhalation Efficacy: 99.9%]                                                                             |                       |
| Localized secondary control system                                                                                                | No system                                                                                                                                     |                       |
| Segregation systems                                                                                                               | No system                                                                                                                                     |                       |
| Process enclosure                                                                                                                 | Process not fully enclosed                                                                                                                    |                       |
| Housekeeping Practices                                                                                                            | Demonstrable and effective cleaning practices in place                                                                                        |                       |
| Dispersion – General ventilation                                                                                                  | 3 ACH                                                                                                                                         |                       |
| Conditions and measures relating to personal protection, hygiene and health assessment                                            |                                                                                                                                               |                       |
| Chemical Protective clothing                                                                                                      | YES, acid-resistant coverall and safety boots to prevent skin contact                                                                         |                       |
| Face/Eye protection                                                                                                               | YES, helmet with full face shield/chemical glasses to avoid eye contact                                                                       |                       |
| Dermal protection                                                                                                                 | YES, chemically resistant acid-resistant gloves with activity-specific training) and (other) appropriate skin protection [Skin efficacy: 95%] |                       |
| Other conditions affecting the worker's exposure                                                                                  |                                                                                                                                               |                       |
| Place of use                                                                                                                      | Indoor                                                                                                                                        |                       |
| Room size                                                                                                                         | 1000 m <sup>3</sup>                                                                                                                           |                       |
| Operating temperature                                                                                                             | ≤ 40°C                                                                                                                                        |                       |
| Work area                                                                                                                         | Indoor                                                                                                                                        |                       |



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| Process temperature                                                                                                                           | Room temperature (15-25°C)                                                                                                                    |                       |
| <b>Exposure and risk characterisation (RCR)</b>                                                                                               |                                                                                                                                               |                       |
| Route of exposure and type of effects                                                                                                         | Exposure                                                                                                                                      | Risk Quantification   |
| Inhalation, long-term local effects                                                                                                           | 3.7E-5 mg/m <sup>3</sup>                                                                                                                      | Exposure/DMEL: < 0,01 |
| Inhalation acute local effects                                                                                                                | 3E-4 mg/m <sup>3</sup>                                                                                                                        | Exposure/DMEL: < 0,01 |
| <b>Worker CS 7: Transfer of sulphuric acid into large containers (non-dedicated facilities; e.g. transferring pickling fluid) ( PROC 8a )</b> |                                                                                                                                               |                       |
| <b>Product features</b>                                                                                                                       |                                                                                                                                               |                       |
| Concentration of the substance in the product (% w/w)                                                                                         | ≤98%                                                                                                                                          |                       |
| Physical state                                                                                                                                | Liquid including paste/slurry/suspension                                                                                                      |                       |
| Vapour pressure (Pa)                                                                                                                          | < 6 (low volatility substance, exposure to fog is estimated)                                                                                  |                       |
| Viscosity                                                                                                                                     | Liquid with medium viscosity (similar to oil)                                                                                                 |                       |
| <b>Operating conditions</b>                                                                                                                   |                                                                                                                                               |                       |
| Duration of the activity                                                                                                                      | ≤ 8 h /day                                                                                                                                    |                       |
| (ART) duration of the activity                                                                                                                | < 480 min                                                                                                                                     |                       |
| (ART) duration of non-exposure                                                                                                                | > 0 min                                                                                                                                       |                       |
| <b>Technical and organisational conditions and specific measures for risk management</b>                                                      |                                                                                                                                               |                       |
| Proximity to the primary source of emission                                                                                                   | Primary emission source not located in the breathing zone of the worker (Far field source)                                                    |                       |
| Activity class                                                                                                                                | Transfer of liquid products / Falling liquids                                                                                                 |                       |
| Situation                                                                                                                                     | Transfer of liquid product with flow of 100 - 1000 l/minute e.g. Filling drums.                                                               |                       |
| Room ventilation                                                                                                                              | Basic (up to 3 ACH)                                                                                                                           |                       |
| Personal enclosure                                                                                                                            | no personal enclosure                                                                                                                         |                       |
| Occupational Health and Safety Management System                                                                                              | Advanced                                                                                                                                      |                       |
| Local exhaust ventilation                                                                                                                     | No                                                                                                                                            |                       |
| Type of loading                                                                                                                               | Submerged loading, where the liquid dispenser remains below the fluid level reducing the amount of aerosol formation                          |                       |
| Localized primary control system                                                                                                              | No High Level Extraction/Containment [Inhalation Efficacy: 99.9%]                                                                             |                       |
| Localized secondary control system                                                                                                            | No system                                                                                                                                     |                       |
| Segregation systems                                                                                                                           | No system                                                                                                                                     |                       |
| Process enclosure                                                                                                                             | Process not fully enclosed                                                                                                                    |                       |
| Housekeeping Practices                                                                                                                        | Demonstrable and effective cleaning practices in place                                                                                        |                       |
| Dispersion – General ventilation                                                                                                              | 3 ACH                                                                                                                                         |                       |
| <b>Conditions and measures relating to personal protection, hygiene and health assessment</b>                                                 |                                                                                                                                               |                       |
| Chemical Protective clothing                                                                                                                  | YES, acid-resistant coverall and safety boots to prevent skin contact                                                                         |                       |
| Face/Eye protection                                                                                                                           | YES, helmet with full face shield/chemical glasses to avoid eye contact                                                                       |                       |
| Dermal protection                                                                                                                             | YES, chemically resistant acid-resistant gloves with activity-specific training) and (other) appropriate skin protection [Skin efficacy: 95%] |                       |
| <b>Other conditions affecting the worker's exposure</b>                                                                                       |                                                                                                                                               |                       |
| Place of use                                                                                                                                  | Indoor                                                                                                                                        |                       |
| Room size                                                                                                                                     | 1000 m <sup>3</sup>                                                                                                                           |                       |
| Operating temperature                                                                                                                         | ≤ 40°C                                                                                                                                        |                       |
| Work area                                                                                                                                     | Indoor                                                                                                                                        |                       |
| Process temperature                                                                                                                           | Room temperature (15-25°C)                                                                                                                    |                       |
| <b>Exposure and risk characterisation (RCR)</b>                                                                                               |                                                                                                                                               |                       |
| Route of exposure and type of effects                                                                                                         | Exposure                                                                                                                                      | Risk Quantification   |

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| Inhalation, long-term local effects                                                                          | 3.4E-4 mg/m <sup>3</sup>                                                                                                                      | Exposure/DMEL: < 0,01 |
| Inhalation acute local effects                                                                               | 3E-3 mg/m <sup>3</sup>                                                                                                                        | Exposure/DMEL: < 0,03 |
| <b>Worker CS 8: Transfer of sulphuric acid into small containers (e.g. sampling for analysis) ( PROC 9 )</b> |                                                                                                                                               |                       |
| <b>Product features</b>                                                                                      |                                                                                                                                               |                       |
| Concentration of the substance in the product (% w/w)                                                        | ≤98%                                                                                                                                          |                       |
| Physical state                                                                                               | Liquid including paste/slurry/suspension                                                                                                      |                       |
| Vapour pressure (Pa)                                                                                         | < 6 (low volatility substance, exposure to fog is estimated)                                                                                  |                       |
| Viscosity                                                                                                    | Liquid with medium viscosity (similar to oil)                                                                                                 |                       |
| <b>Operating conditions</b>                                                                                  |                                                                                                                                               |                       |
| Duration of the activity                                                                                     | ≤ 1 h /day                                                                                                                                    |                       |
| (ART) duration of the activity                                                                               | < 60 min                                                                                                                                      |                       |
| (ART) duration of non-exposure                                                                               | > 420 min                                                                                                                                     |                       |
| <b>Technical and organisational conditions and specific measures for risk management</b>                     |                                                                                                                                               |                       |
| Level of containment of the process                                                                          | Handling that reduces contact between product and adjacent air<br><i>Transfer of liquid through a small opening</i>                           |                       |
| Proximity to the primary source of emission                                                                  | Primary emission source located in the breathing zone of the worker (Near field source)                                                       |                       |
| Activity class                                                                                               | Transfer of liquid products / Falling liquids                                                                                                 |                       |
| Situation                                                                                                    | Transfer of liquid product with flow of 0.1 - 1 l/minute<br>e.g. Filling bottles                                                              |                       |
| Room ventilation                                                                                             | Basic (up to 3 ACH)                                                                                                                           |                       |
| Occupational Health and Safety Management System                                                             | Advanced                                                                                                                                      |                       |
| Local exhaust ventilation                                                                                    | No                                                                                                                                            |                       |
| Type of loading                                                                                              | Splash loading, where the liquid dispenser remains at the top of the reservoir and the liquid splashes freely                                 |                       |
| Localized primary control system                                                                             | No High Level Extraction/Containment [Inhalation Efficacy: 99.9%]                                                                             |                       |
| Process enclosure                                                                                            | Process not fully enclosed                                                                                                                    |                       |
| Housekeeping Practices                                                                                       | Demonstrable and effective cleaning practices in place                                                                                        |                       |
| Dispersion – General ventilation                                                                             | Only good natural ventilation                                                                                                                 |                       |
| Secondary emission source                                                                                    | No secondary emission sources present in the workroom in addition to the source in the breathing zone of the worker                           |                       |
| <b>Conditions and measures relating to personal protection, hygiene and health assessment</b>                |                                                                                                                                               |                       |
| Chemical Protective clothing                                                                                 | YES, acid-resistant coverall and safety boots to prevent skin contact                                                                         |                       |
| Face/Eye protection                                                                                          | YES, helmet with full face shield/chemical glasses to avoid eye contact                                                                       |                       |
| Dermal protection                                                                                            | YES, chemically resistant acid-resistant gloves with activity-specific training) and (other) appropriate skin protection [Skin efficacy: 95%] |                       |
| <b>Other conditions affecting the worker's exposure</b>                                                      |                                                                                                                                               |                       |
| Place of use                                                                                                 | Indoor                                                                                                                                        |                       |
| Room size                                                                                                    | Any size                                                                                                                                      |                       |
| Operating temperature                                                                                        | ≤ 40°C                                                                                                                                        |                       |
| Work area                                                                                                    | Indoor                                                                                                                                        |                       |
| Process temperature                                                                                          | Room temperature (15-25°C)                                                                                                                    |                       |
| <b>Exposure and risk characterisation (RCR)</b>                                                              |                                                                                                                                               |                       |
| Route of exposure and type of effects                                                                        | Exposure                                                                                                                                      | Risk Quantification   |
| Inhalation, long-term local effects                                                                          | 2.3E-3 mg/m <sup>3</sup>                                                                                                                      | Exposure/DMEL: 0.046  |
| Inhalation acute local effects                                                                               | 0.018 mg/m <sup>3</sup>                                                                                                                       | Exposure/DMEL: 0.1803 |
| <b>Worker CS 9: Dipping of materials in sulphuric acid (e.g. pickling processes) ( PROC 13 )</b>             |                                                                                                                                               |                       |
| <b>Product features</b>                                                                                      |                                                                                                                                               |                       |

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| Concentration of the substance in the product (% w/w)                                  | ≤10%                                                                                                                                                                                    |                     |
| Physical state                                                                         | Liquid including paste/slurry/suspension                                                                                                                                                |                     |
| Product type                                                                           | Liquid                                                                                                                                                                                  |                     |
| Vapour pressure (Pa)                                                                   | < 130 (low volatility substance, exposure to fog is estimated)                                                                                                                          |                     |
| Operating conditions                                                                   |                                                                                                                                                                                         |                     |
| Duration of the activity                                                               | ≤ 8 h /day                                                                                                                                                                              |                     |
| (ART) duration of the activity                                                         | < 240 min                                                                                                                                                                               |                     |
| (ART) duration of non-exposure                                                         | > 240 min                                                                                                                                                                               |                     |
| Technical and organisational conditions and specific measures for risk management      |                                                                                                                                                                                         |                     |
| Proximity to the primary source of emission                                            | Primary emission source not located in the breathing zone of the worker (Far field source)                                                                                              |                     |
| Activity class                                                                         | Activities with open liquid surfaces or open reservoirs / Activities with relatively undisturbed surfaces (no aerosol formation)<br><i>e.g. Dipping/immersing objects; tank dipping</i> |                     |
| Situation                                                                              | Open surface > 3 m2                                                                                                                                                                     |                     |
| Room ventilation                                                                       | Basic (up to 3 ACH)                                                                                                                                                                     |                     |
| Occupational Health and Safety Management System                                       | Advanced                                                                                                                                                                                |                     |
| Local exhaust ventilation                                                              | No                                                                                                                                                                                      |                     |
| Localized primary control system                                                       | Local exhaust ventilation (LEV) / Capturing hoods / Fixed capturing hood [Effectiveness Inhalation: 90%]                                                                                |                     |
| Process enclosure                                                                      | Process not fully enclosed                                                                                                                                                              |                     |
| Housekeeping Practices                                                                 | Demonstrable and effective cleaning practices in place                                                                                                                                  |                     |
| Dispersion – General ventilation                                                       | Only good natural ventilation                                                                                                                                                           |                     |
| Secondary emission source                                                              | No secondary emission sources present in the workroom in addition to the source in the breathing zone of the worker                                                                     |                     |
| Segregation                                                                            | No segregation                                                                                                                                                                          |                     |
| Conditions and measures relating to personal protection, hygiene and health assessment |                                                                                                                                                                                         |                     |
| Chemical Protective clothing                                                           | YES, acid-resistant coverall and safety boots to prevent skin contact                                                                                                                   |                     |
| Face/Eye protection                                                                    | YES, helmet with full face shield/chemical glasses to avoid eye contact                                                                                                                 |                     |
| Respiratory protection                                                                 | Yes (APF >= 20)                                                                                                                                                                         |                     |
| Dermal protection                                                                      | YES, chemically resistant acid-resistant gloves with activity-specific training) and (other) appropriate skin protection [Skin efficacy: 95%]                                           |                     |
| Other conditions affecting the worker's exposure                                       |                                                                                                                                                                                         |                     |
| Place of use                                                                           | Indoor                                                                                                                                                                                  |                     |
| Room size                                                                              | Large workrooms only                                                                                                                                                                    |                     |
| Operating temperature                                                                  | ≤ 40°C                                                                                                                                                                                  |                     |
| Work area                                                                              | Indoor                                                                                                                                                                                  |                     |
| Process temperature                                                                    | Hot processes (50 - 150 °C)                                                                                                                                                             |                     |
| Exposure and risk characterisation (RCR)                                               |                                                                                                                                                                                         |                     |
| Route of exposure and type of effects                                                  | Exposure                                                                                                                                                                                | Risk Quantification |
| Inhalation, long-term local effects                                                    | 7.5E-3 mg/m³                                                                                                                                                                            | Exposure/DMEL: 0.15 |
| Inhalation acute local effects                                                         | 0.06 mg/m³                                                                                                                                                                              | Exposure/DMEL: 0.6  |
| Worker CS 10: Laboratory analysis ( PROC 15 )                                          |                                                                                                                                                                                         |                     |
| Product features                                                                       |                                                                                                                                                                                         |                     |
| Concentration of the substance in the product (% w/w)                                  | ≤98%                                                                                                                                                                                    |                     |
| Physical state                                                                         | Liquid including paste/slurry/suspension                                                                                                                                                |                     |
| Viscosity                                                                              | Liquids with medium viscosity (like oil)                                                                                                                                                |                     |

# EXPOSURE SCENARIO

## SULPHURIC ACID N. reg. 01-2119458838-20-0087

|                                                                                                             |                                                                                                                                               |                       |
|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Vapour pressure (Pa)                                                                                        | < 6<br><i>The substance is considered to be low volatile and exposure to vapour is estimated</i>                                              |                       |
| <b>Operating conditions</b>                                                                                 |                                                                                                                                               |                       |
| Duration of the activity                                                                                    | ≤ 1 h /day                                                                                                                                    |                       |
| (ART) duration of the activity                                                                              | < 60 min                                                                                                                                      |                       |
| (ART) duration of non-exposure                                                                              | > 420 min                                                                                                                                     |                       |
| <b>Technical and organisational conditions and specific measures for risk management</b>                    |                                                                                                                                               |                       |
| Activity class                                                                                              | Transfer of liquid products / Falling liquids                                                                                                 |                       |
| Primary emission source proximity                                                                           | Primary emission source located in the breathing zone of the worker (Near field source)                                                       |                       |
| Situation                                                                                                   | Transfer of liquid product with flow of < 0.1 l/minute<br><i>e.g. Transfer of small amounts in a laboratory</i>                               |                       |
| Room ventilation                                                                                            | Basic (up to 3 ACH)                                                                                                                           |                       |
| Occupational Health and Safety Management System                                                            | Advanced                                                                                                                                      |                       |
| Local exhaust ventilation                                                                                   | No                                                                                                                                            |                       |
| Type of loading                                                                                             | Splash loading, where the liquid dispenser remains at the top of the reservoir and the liquid splashes freely                                 |                       |
| Localized primary control system                                                                            | Local exhaust ventilation (LEV) / Enclosing hoods / Fume cupboard<br>[Effectiveness Inhalation: 99%]                                          |                       |
| Process enclosure                                                                                           | Process not fully enclosed                                                                                                                    |                       |
| Housekeeping Practices                                                                                      | Demonstrable and effective cleaning practices in place                                                                                        |                       |
| Dispersion – General ventilation                                                                            | 3 ACH                                                                                                                                         |                       |
| Secondary emission source                                                                                   | No secondary emission sources present in the workroom in addition to the source in the breathing zone of the worker                           |                       |
| <b>Conditions and measures relating to personal protection, hygiene and health assessment</b>               |                                                                                                                                               |                       |
| Chemical Protective clothing                                                                                | YES, acid-resistant coverall and safety boots to prevent skin contact                                                                         |                       |
| Face/Eye protection                                                                                         | YES, helmet with full face shield/chemical glasses to avoid eye contact                                                                       |                       |
| Dermal protection                                                                                           | YES, chemically resistant acid-resistant gloves with activity-specific training) and (other) appropriate skin protection [Skin efficacy: 95%] |                       |
| <b>Other conditions affecting the worker's exposure</b>                                                     |                                                                                                                                               |                       |
| Place of use                                                                                                | Indoor                                                                                                                                        |                       |
| Room size                                                                                                   | 300 m <sup>2</sup>                                                                                                                            |                       |
| Operating temperature                                                                                       | ≤ 40°C                                                                                                                                        |                       |
| Work area                                                                                                   | Indoor                                                                                                                                        |                       |
| Process temperature                                                                                         | Room temperature (15 – 25°C)                                                                                                                  |                       |
| <b>Exposure and risk characterisation (RCR)</b>                                                             |                                                                                                                                               |                       |
| Route of exposure and type of effects                                                                       | Exposure                                                                                                                                      | Risk Quantification   |
| Inhalation, long-term local effects                                                                         | 4E-4 mg/m <sup>3</sup>                                                                                                                        | Exposure/DMEL: < 0.01 |
| Inhalation acute local effects                                                                              | 3.3E-3 mg/m <sup>3</sup>                                                                                                                      | Exposure/DMEL: 0.033  |
| <b>Worker CS 11: Maintenance, repair and cleaning operations (including shut-down operations) (PROC 28)</b> |                                                                                                                                               |                       |
| <b>Product features</b>                                                                                     |                                                                                                                                               |                       |
| Concentration of the substance in the product (% w/w)                                                       | ≤98%                                                                                                                                          |                       |
| Physical state                                                                                              | Liquid including paste/slurry/suspension                                                                                                      |                       |
| Vapour pressure (Pa)                                                                                        | < 6 (low volatility substance, exposure to fog is estimated)                                                                                  |                       |
| Viscosity                                                                                                   | Liquid with medium viscosity (similar to oil)                                                                                                 |                       |
| <b>Operating conditions</b>                                                                                 |                                                                                                                                               |                       |
| Duration of the activity                                                                                    | ≤ 8 h /day                                                                                                                                    |                       |



# EXPOSURE SCENARIO

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|                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                               |                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| (ART) duration of the activity                                                                                                                                                                                                                                                                                                                        | < 480 min                                                                                                                                     |                       |
| (ART) duration of non-exposure                                                                                                                                                                                                                                                                                                                        | > 0 min                                                                                                                                       |                       |
| Technical and organisational conditions and specific measures for risk management                                                                                                                                                                                                                                                                     |                                                                                                                                               |                       |
| Proximity to the primary source of emission                                                                                                                                                                                                                                                                                                           | The primary source of emission is located in the breathing zone of the worker (Near field source)                                             |                       |
| Activity class                                                                                                                                                                                                                                                                                                                                        | Handling of contaminated objects                                                                                                              |                       |
| Situation                                                                                                                                                                                                                                                                                                                                             | Activities with treated/contaminated objects (surface 1-3 m²)                                                                                 |                       |
| Room ventilation                                                                                                                                                                                                                                                                                                                                      | Basic (up to 3 ACH)                                                                                                                           |                       |
| Occupational Health and Safety Management System                                                                                                                                                                                                                                                                                                      | Advanced                                                                                                                                      |                       |
| Local exhaust ventilation                                                                                                                                                                                                                                                                                                                             | No                                                                                                                                            |                       |
| Level of contamination                                                                                                                                                                                                                                                                                                                                | Contaminated surface < 10%                                                                                                                    |                       |
| Localized primary control system                                                                                                                                                                                                                                                                                                                      | No system                                                                                                                                     |                       |
| Process enclosure                                                                                                                                                                                                                                                                                                                                     | Process not fully enclosed                                                                                                                    |                       |
| Housekeeping Practices                                                                                                                                                                                                                                                                                                                                | Demonstrable and effective cleaning practices in place                                                                                        |                       |
| Dispersion. General ventilation                                                                                                                                                                                                                                                                                                                       | 3 ACH                                                                                                                                         |                       |
| Secondary emission source                                                                                                                                                                                                                                                                                                                             | No secondary emission source present in the working environment other than the source in the worker's breathing zone                          |                       |
| Conditions and measures relating to personal protection, hygiene and health assessment                                                                                                                                                                                                                                                                |                                                                                                                                               |                       |
| Respiratory protection                                                                                                                                                                                                                                                                                                                                | No                                                                                                                                            |                       |
| Chemical Protective clothing                                                                                                                                                                                                                                                                                                                          | YES, acid-resistant coverall and safety boots to prevent skin contact                                                                         |                       |
| Face/Eye protection                                                                                                                                                                                                                                                                                                                                   | YES, helmet with full face shield/chemical glasses to avoid eye contact                                                                       |                       |
| Dermal protection                                                                                                                                                                                                                                                                                                                                     | YES, chemically resistant acid-resistant gloves with activity-specific training) and (other) appropriate skin protection [Skin efficacy: 95%] |                       |
| Other conditions affecting the worker's exposure                                                                                                                                                                                                                                                                                                      |                                                                                                                                               |                       |
| Place of use                                                                                                                                                                                                                                                                                                                                          | Indoor                                                                                                                                        |                       |
| Operating temperature                                                                                                                                                                                                                                                                                                                                 | ≤ 40°C                                                                                                                                        |                       |
| Work area                                                                                                                                                                                                                                                                                                                                             | Indoor                                                                                                                                        |                       |
| Room size                                                                                                                                                                                                                                                                                                                                             | Any size                                                                                                                                      |                       |
| Process temperature                                                                                                                                                                                                                                                                                                                                   | Room temperature (15-25°C)                                                                                                                    |                       |
| Exposure and risk characterisation (RCR)                                                                                                                                                                                                                                                                                                              |                                                                                                                                               |                       |
| Route of exposure and type of effects                                                                                                                                                                                                                                                                                                                 | Exposure                                                                                                                                      | Risk Quantification   |
| Inhalation, long-term local effects                                                                                                                                                                                                                                                                                                                   | 1E-4 mg/m³                                                                                                                                    | Exposure/DMEL: <0,01  |
| Inhalation acute local effects                                                                                                                                                                                                                                                                                                                        | 8E-4 mg/m³                                                                                                                                    | Exposure/DMEL: < 0,01 |
| Section 4 Guide to verifying compliance with the exposure scenario                                                                                                                                                                                                                                                                                    |                                                                                                                                               |                       |
| 4.1 Health                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                               |                       |
| Exposures are expected not to exceed acute and chronic inhalation DNELs for local effects when the Risk Management Measures/Operating Conditions set out in Section 3 are applied.<br>Where different Risk Management Measures/Operating Conditions are adopted, users are required to ensure that risks are managed at at least an equivalent level. |                                                                                                                                               |                       |