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

1.1. Product identifier

Product name
HYDRAZINE HYDRATE 100%

Product No.
HH100, 4D

REACH Registration number
01-2119492624-31-xxxx

REACH Registration notes
registration number for hydrazine

CAS-No.
10217-52-4

EU Index No.
007-008-00-3

EC No.
206-114-9

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

Identified uses
Corrosion inhibitor in steam generating and heating systems. Intermediate in chemical
synthesis under strictly controlled conditions Use as a laboratory chemical

1.3. Details of the supplier of the safety data sheet

Supplier
Lansdowne Chemicals Plc
Winstons House
Carterton, Oxford
OX18 3EZ

+44 (0)1993 843081
+44 (0)1993 841261

Technical Department
regulatory.affairs@lansdownechemicals.com

1.4. Emergency telephone number

EMERGENCY INFORMATION OUT OF OFFICE HOURS CONTACT CARECHEM 24: +44 (0)1270 502891

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification (EC 1272/2008)

Physical and Chemical Hazards
Not classified.

Human health
Acute Tox. 3 - H301; Acute Tox. 3 - H311; Acute Tox. 2 - H330; Skin Corr. 1B - H314; Skin Sens. 1 - H317; Carc. 1B - H350

Environment
Aquatic Acute 1 - H400; Aquatic Chronic 1 - H410

Classification (1999/45/EEC)
T; R23/24/25. Carc. Cat. 2; R45. C; R34. R43. N; R50/53.

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

2.2. Label elements

EC No.
206-114-9

Contains
HYDRAZINE

Label In Accordance With (EC) No. 1272/2008

Signal Word
Danger
Hazard Statements

H301 Toxic if swallowed.
H311 Toxic in contact with skin.
H314 Causes severe skin burns and eye damage.
H317 May cause an allergic skin reaction.
H330 Fatal if inhaled.
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary Statements

P201 Obtain special instructions before use.
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P281 Use personal protective equipment as required.
P301+310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P305+351+338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+313 IF exposed or in contact: Get medical advice/attention.
P310 Immediately call a POISON CENTER or doctor/physician.
P361 Remove/Take off immediately all contaminated clothing.

Supplementary Precautionary Statements

P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 Wash … thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P272 Contaminated work clothing should not be allowed out of the workplace.
P284 Wear respiratory protection.
P301+330+331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P302+352 IF ON SKIN: Wash with plenty of soap and water.
P303+361+353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312 Call a POISON CENTER or doctor/physician if you feel unwell.
P320 Specific treatment is urgent (see … on this label).
P321 Specific treatment (see … on this label).
P322 Specific measures (see … on this label).
P330 Rinse mouth.
P333+313 If skin irritation or rash occurs: Get medical advice/attention.
P363 Wash contaminated clothing before reuse.
P391 Collect spillage.
P403+233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.
P501 Dispose of contents/container to …

Supplemental label information

RCH002 Restricted to professional users.

2.3. Other hazards

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixtures
HYDRAZINE HYDRATE 100%

CAS-No.: 302-01-2  EC No.: 206-114-9

Classification (EC 1272/2008)  Classification (67/548/EEC)
Flam. Liq. 3 - H226  R10
Acute Tox. 3 - H301  Carc. Cat. 2;R45
Acute Tox. 3 - H311  T;R23/24/25
Acute Tox. 3 - H331  C;R34
Skin Corr. 1B - H314  R43
Skin Sens. 1 - H317  N;R50/53
Carc. 1B - H350
Aquatic Acute 1 - H400
Aquatic Chronic 1 - H410

Classification (EC 1272/2008)
Flam. Liq. 3 - H226
Acute Tox. 3 - H301
Acute Tox. 3 - H311
Acute Tox. 3 - H331
Skin Corr. 1B - H314
Skin Sens. 1 - H317
Carc. 1B - H350
Aquatic Acute 1 - H400
Aquatic Chronic 1 - H410

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

**SECTION 4: FIRST AID MEASURES**

**4.1. Description of first aid measures**

**General information**
Get medical attention immediately! Use emergency shower

**Inhalation**
Move the exposed person to fresh air at once. Perform artificial respiration if breathing has stopped. For breathing difficulties oxygen may be necessary. physician should be called immediately.

**Ingestion**
NEVER MAKE AN UNCONSCIOUS PERSON VOMIT OR DRINK FLUIDS! Immediately rinse mouth and drink plenty of water. Call an ambulance. Bring along these instructions.

**Skin contact**
Promptly wash contaminated skin with water. Promptly remove clothing if soaked through and wash the skin with water. Get medical attention immediately!

**Eye contact**
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes and get medical attention.

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

**General information**
NO DATA AVAILABLE

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

NO DATA AVAILABLE

**SECTION 5: FIREFIGHTING MEASURES**

**5.1. Extinguishing media**

**Extinguishing media**
Water spray. Foam, carbon dioxide or dry powder.

**Unsuitable extinguishing media**
Do not use water jet as an extinguisher, as this will spread the fire.

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

**Unusual Fire & Explosion Hazards**
May explode in a fire. May develop highly toxic or corrosive fumes if heated. May form explosive or toxic mixtures with air. May explode when heated or when exposed to flames or sparks. May travel considerable distance to source of ignition and flash back. Vapour explosion and poison hazard indoors, outdoors and in sewers.
5.3. Advice for firefighters

Special Fire Fighting Procedures
Use water spray to reduce vapours. Do not scatter spilled material with more water than needed to fight the fire. Cool containers/tanks with water sprays. Move container from fire area if it can be done without risk. Evacuate area.

Protective equipment for fire-fighters
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures
Avoid inhalation of vapours and contact with skin and eyes. Do not smoke, use open fire or other sources of ignition. Wear protective clothing as described in Section 8 of this safety data sheet.

6.2. Environmental precautions
Do not allow ANY environmental contamination. Spillages or uncontrolled discharges into watercourses must be IMMEDIATELY alerted to the Environmental Agency or other appropriate regulatory body.

6.3. Methods and material for containment and cleaning up
Ventilate well, stop flow of gas or liquid if possible. Remove ignition sources. Do not allow chemical to enter confined spaces such as sewers due to explosion risk. Sewers designed to preclude formation of explosive concentrations of vapour may be permitted. Absorb with paper towels as found in a specialist spill kit. Small Spillages: Stop leak if possible without risk. DO NOT touch spilled material! Place in suitable containers for disposal, labelled appropriately. Hold for waste disposal. For waste disposal, see section 13. Large Spillages: Dilute Hydrazine Hydrate with water so the concentration of Hydrazine is less than 5% w/w. Neutalise using either <5% calcium hypochloride or <5% sodium hypochloride by a ratio of 1:1. Collect in containers and seal securely. Dispose of via licensed hazardous waste contractor.

6.4. Reference to other sections
Wear protective clothing as described in Section 8 of this safety data sheet. For waste disposal, see section 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling
Keep away from heat, sparks and open flame. Avoid spilling, skin and eye contact. Ventilate well, avoid breathing vapours. Use approved respirator if air contamination is above accepted level. Avoid acids, moisture, and combustible materials. Wear full protective clothing for prolonged exposure and/or high concentrations.

7.2. Conditions for safe storage, including any incompatibilities
Flammable/combustible - Keep away from oxidisers, heat and flames. Store in tightly closed original container in a dry, cool and well-ventilated place. Protect from light, including direct sunrays.

7.3. Specific end use(s)
The identified uses for this product are detailed in Section 1.2.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>STD</th>
<th>TWA - 8 Hrs</th>
<th>STEL - 15 Min</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDRAZINE</td>
<td>WEL</td>
<td>0.02 ppm(Sk)</td>
<td>0.03 mg/m3(Sk)</td>
<td>0.1 ppm(Sk)</td>
</tr>
</tbody>
</table>

WEL = Workplace Exposure Limit.

Ingredient Comments
WEL = Workplace Exposure Limits

DNEL
Industry  Inhalation.  Short Term  Systemic Effects  0.1332 mg/m3
Industry  Inhalation.  Long Term  Systemic Effects  0.013 mg/m3
Industry  Dermal.  Long Term  Systemic Effects  0.006 mg/kg/day
Industry  Inhalation.  Long Term  Local Effects  0.013 mg/m3
Industry  Inhalation.  Short Term  Local Effects  0.133 mg/m3

PNEC
Water  0.0006 mg/l
Marinewater  0.00006 mg/l
STP  0.055 mg/l
8.2. Exposure controls

Protective equipment

Engineering measures
Provide adequate general and local exhaust ventilation.

Respiratory equipment
Supplied-air respirator. Self-contained breathing apparatus. recommended: Use respiratory equipment with gas filter, type K.

Hand protection
Use protective gloves made of: Neoprene. Obtain the appropriate professional advice taking into account of the conditions under which the glove is used. The gloves must satisfy the specifications of EU directive 89/686/EEC and the standard EN 374 derived from it.

Eye protection
Wear full-face visor or shield. Wear approved safety goggles.

Other Protection
Provide eyewash station and safety shower. Wear appropriate clothing to prevent any possibility of skin contact.

Hygiene measures
Wash hands at the end of each work shift and before eating, smoking and using the toilet. Wash promptly if skin becomes contaminated. Promptly remove any clothing that becomes wet.

Skin protection
Protection suit must be worn.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Liquid</td>
</tr>
<tr>
<td>Colour</td>
<td>Colourless</td>
</tr>
<tr>
<td>Odour</td>
<td>Ammonia. Penetrating.</td>
</tr>
<tr>
<td>Solubility</td>
<td>Completely soluble in water Soluble in: Ethanol.</td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>110-120 760 mm Hg</td>
</tr>
<tr>
<td>Melting point (°C)</td>
<td>-31 to -62</td>
</tr>
<tr>
<td>Relative density</td>
<td>1.030 kg/m³ 25°C</td>
</tr>
<tr>
<td>Vapour density (air=1)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>12 hpa @ 25 °C</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not available.</td>
</tr>
<tr>
<td>pH-Value, Diluted Solution</td>
<td>&gt;12 64%</td>
</tr>
<tr>
<td>Viscosity</td>
<td>1.5 mPas 25°</td>
</tr>
<tr>
<td>Decomposition temperature (°C)</td>
<td>&gt;250</td>
</tr>
<tr>
<td>Flash point</td>
<td>&gt;60 A9 Method (D.92/69/ECC)</td>
</tr>
<tr>
<td>Auto Ignition Temperature (°C)</td>
<td>HYDRAZINE: 290 deg C</td>
</tr>
<tr>
<td>Flammability Limit - Lower(%)</td>
<td>3.4</td>
</tr>
<tr>
<td>Flammability Limit - Upper(%)</td>
<td>100</td>
</tr>
</tbody>
</table>
Partition Coefficient (N-Octanol/Water)  
OECD guideline 107

Explosive properties  
Not explosive (A14 method)

Oxidising properties  
Not relevant

9.2. Other information  
Not available.

Volatile By Vol. (%)  
100

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity  
Strong reducing agents.

10.2. Chemical stability  
Stable under normal temperature conditions and recommended use.

10.3. Possibility of hazardous reactions  
Not available.

10.4. Conditions to avoid  
Avoid heat, flames and other sources of ignition. Contact with cellulose or cotton textiles, especially at elevated temperatures, may result in ignition.

10.5. Incompatible materials  
Materials To Avoid  
Oxidising agents. Nitrites, nitrate and heavy metal salts. Metal oxides. decomposition catalysts (finely divides substances)

10.6. Hazardous decomposition products  

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects  
Toxic Dose 1 - LD 50  
165-262 mg/kg (oral rat)

Toxic Dose 2 - LD 50  
91 mg/kg (skin-rat)

Toxic Conc. - LC 50  
759mg/m³ (4 hours) (inh-rat)

Other Health Effects  

Acute toxicity:  
ATE (Oral)  
244.1 mg/kg

ATE (Dermal)  
468.7 mg/kg

ATE (Inhalation)  
1186 mg/l (vapours)

Skin Corrosion/Irritation:  
Hydrazine: Corrosive to skin.

Serious eye damage/irritation:  
Hydrazine: causes serious eye damage. In animals - vapour at high concentrations and direct contact with liquid; risk of serious damage to eyes. Severely irritating or even corrosive to eyes.

Respiratory or skin sensitisation:  
Respiratory sensitisation  
Not available.

Sensitising. Eczema-like dermatitis possible. Possible cross sensitization with hydrazine derivatives
**Germ cell mutagenicity:**
Genotoxicity - In Vitro
Bacterial Reverse Mutation Test
OECD473 Mammalian Chromosomal Aberration Test: Positive
OECD 476 In Vitro Mammalian Cell Gene In Vitro: Positive Positive.

**Carcinogenicity:**
Carcinogenicity
NOAEL (1.3mg/m3) 0.3mg/m3 Rat
LOAEL (0.3 mg/m3) 1.3mg/m3
Possible cancer hazard
Exposure to vapours. Nasal tumours only observed at high concentrations in association with permanent irritating lesions of the epithelium in the upper respiratory tract induced by the exposure. Absence of causal relationship between the incidence of cancer and exposure to product in epidemiological studies. Slight carcinogenic effects in animals.

**Reproductive Toxicity:**
According to available experimental data; absence of toxic effects on fertility
Absence of congenital malformations and embryotoxic effects in rodents at non-toxic doses for the mothers

**Specific target organ toxicity - single exposure:**
Target Organs
Respiratory system, lungs

**Specific target organ toxicity - repeated exposure:**
STOT - Repeated exposure
LOAEL 0.066mg/m3 Inhalation. Rat
NOAEL = 1.92mg/kg (rat, subacute)
Target Organs
Liver Kidneys Central nervous system

**Aspiration hazard:**
Viscosity
not available

Inhalation
Fatal if inhaled

Ingestion
Toxic if swallowed.

Skin contact
Toxic in contact with skin.

Eye contact
Risk of serious damage to eyes.

**Health Warnings**
Repeated exposure may cause chronic eye irritation. Repeated exposure may cause chronic upper respiratory irritation. Burning pain and severe corrosive skin damage. Acute eczematous dermatitis, contact type erythema, oedema, papules, vesicles, bullae, crusts, desquamation. Swallowing concentrated chemical may cause severe internal injury. Liver and/or kidney damage. Methemoglobin formation.

**Route of entry**
Inhalation. Ingestion. Skin and/or eye contact.

**Target Organs**
Blood Central nervous system Eyes Kidneys Liver Respiratory system, lungs Skin
HYDRAZINE HYDRATE 100%

Medical Symptoms

Medical Considerations
Skin disorders and allergies. Liver and/or kidney problems. Convulsive disorders, CNS problems.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Acute Fish Toxicity
LETHAL concentration to Rainbow Trout is reported to be 146 mg/l after 1 hour of exposure.

Acute Toxicity - Fish
LC50 96 hours 0.61 mg/l
very toxic to fish

Acute Toxicity - Aquatic Invertebrates
EC50 48 hours 0.16 mg/l Daphnia magna
very toxic to daphnia

Acute Toxicity - Aquatic Plants
72 hours 0.017 mg/l
IC50, Pseudokirchneriella subcapitata. Method OECD Test guideline 201. NOEC = 0.006mg/l
EC5, 16HRS, (PSUEDOMONAS PUTIDA); 0.019mg/l

Chronic Toxicity - Aquatic Invertebrates
NOEC 21 days 0.01 mg/l Daphnia magna
OECD Guideline 211, reproduction inhibition, Test substance: Active ingredient
NOEC 0.123 mg/l

Immobilization

12.2. Persistence and degradability

Degradability
The product is easily biodegradable.

Phototransformation
Air. Half-life: 6.3 hours

Biodegradation
Water Degradation (100%) 1 days
Zahn-Wellens test OECD Guideline 302B

12.3. Bioaccumulative potential

Bioaccumulative potential
Will not bio-accumulate.

Partition coefficient (HYDRAZINE) log Kow = -0.16
OECD guideline 107

12.4. Mobility in soil

Mobility:
The product is non-volatile.

Henry's Law Constant
960 Pa m3/mol

12.5. Results of PBT and vPvB assessment

Not Classified as PBT/vPvB by current EU criteria.

12.6. Other adverse effects

SECTION 13: DISPOSAL CONSIDERATIONS
13.1. Waste treatment methods

Dilute Hydrazine hydrate with water until the concentration of Hydrazine is less than 5% w/w, neutralise with either sodium hyperchlorite <5% w/w or calcium hyperchlorite < 5% w/w. Dispose of waste and residues in accordance with local authority requirements. Contact specialist disposal companies.

SECTION 14: TRANSPORT INFORMATION

14.1. UN number

UN No. (ADR/RID/ADN) 2030
UN No. (ICAO) 2030

14.2. UN proper shipping name

Proper Shipping Name HYDRAZINE HYDRATE or HYDRAZINE, AQUEOUS SOLUTION with not less than 37% but not more than 64% hydrazine, by mass

14.3. Transport hazard class(es)

ADR/RID/ADN Class CLASS 8, SUB RISK: 6.1
ADR/RID/ADN Class Class 8: Corrosive substances. Class 6.1: Toxic substances.

ADR Label No. ENVIRONMENTALLY HAZARDOUS SYMBOL
IMDG Class 8, 6.1
ICAO Subsidiary risk 8, 6.1

Transport Labels

14.4. Packing group

ADR/RID/ADN Packing group PG II
IMDG Packing group II
ICAO Packing group II

14.5. Environmental hazards

Environmentally Hazardous Substance/Marine Pollutant

14.6. Special precautions for user

Emergency Action Code 2P (B)
Hazard No. (ADR) 86 Corrosive or slightly corrosive substance, toxic.
Tunnel Restriction Code (E)

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
EU Legislation
Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals
Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and

15.2. Chemical Safety Assessment
A chemical safety assessment has been carried out.

SECTION 16: OTHER INFORMATION

Information Sources
Material Safety Data Sheet, Misc. manufacturers.

Revision Comments
Revision due to addition of environmentally hazardous ADR symbol

<table>
<thead>
<tr>
<th>Revision Date</th>
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<tr>
<td>Revision</td>
<td>003</td>
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<tr>
<td>Supersedes date</td>
<td>12-10</td>
</tr>
<tr>
<td>SDS No.</td>
<td>10005</td>
</tr>
<tr>
<td>Date</td>
<td>08-11</td>
</tr>
</tbody>
</table>

Risk Phrases In Full
- R34 Causes burns.
- R10 Flammable.
- R45 May cause cancer.
- R43 May cause sensitisation by skin contact.
- R23/24/25 Toxic by inhalation, in contact with skin and if swallowed.
- R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Hazard Statements In Full
- H226 Flammable liquid and vapour.
- H301 Toxic if swallowed.
- H311 Toxic in contact with skin.
- H314 Causes severe skin burns and eye damage.
- H317 May cause an allergic skin reaction.
- H330 Fatal if inhaled.
- H331 Toxic if inhaled.
- H350 May cause cancer.
- H400 Very toxic to aquatic life.
- H410 Very toxic to aquatic life with long lasting effects.

Disclaimer
This information relates only to the specific material designated and may not be valid for such material used in
combination with any other materials or in any process. Such information is, to the best of the company's knowledge
and belief, accurate and reliable as of the date indicated. However, no warranty guarantee or representation is made to
its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability of such
information for his own particular use.