Base Load Power Hub (BLPH)

Hazardous Material Register and Inventory

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

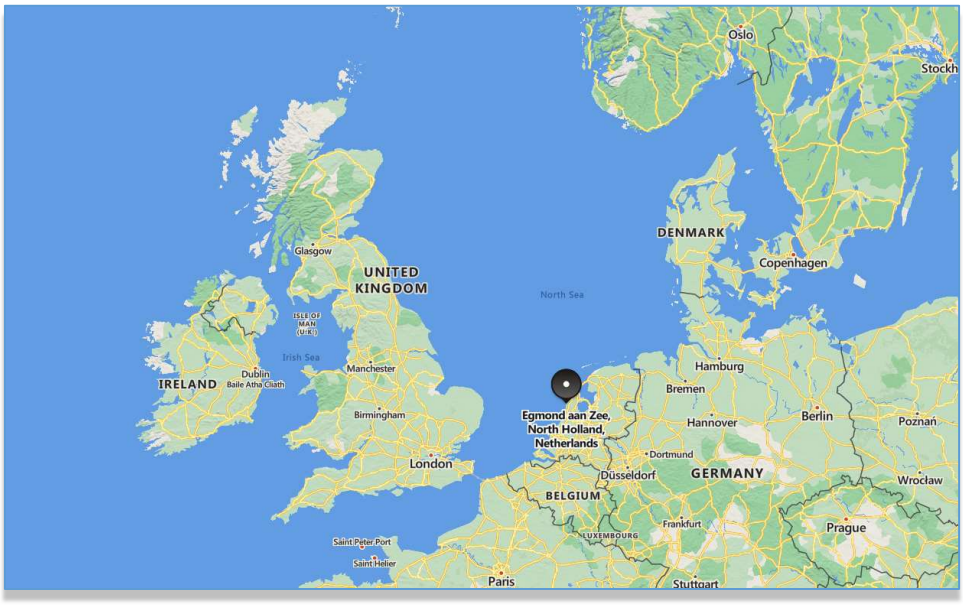


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map



Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

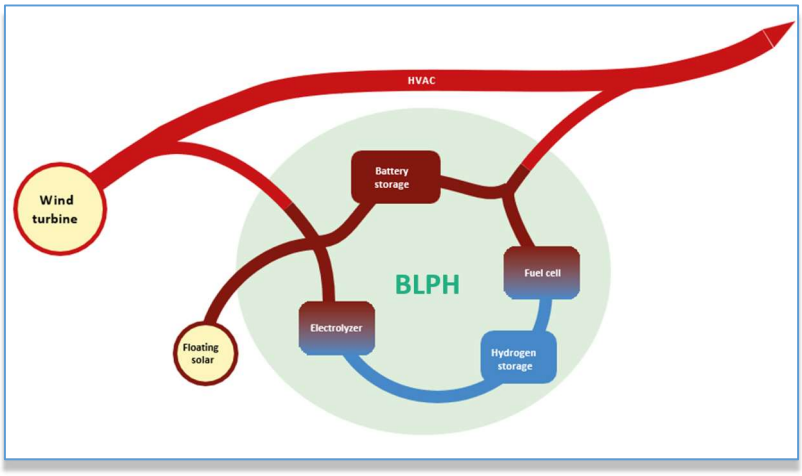


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2 DOCUMENT SCOPE

This document illustrates the list of expected substances that will be handled at the BLPH platform.

The objective of this list is to identify the hazardous fluids and its maximum quantities.

Hazardous materials are intended to be the ones that are at least under one of the following categories:

- Classified as toxic
- Classified as flammable, combustible or explosive
- Classified as dangerous for the environment

This document does not address the mitigation measures that Owner should consider to protect operators health.

2.1 REFERENCES

Doc. No.		Description
[1]	K559-2254-PM-PLN-003	COMPANY Basis for Design Base Load Power Hub (BLPH)
[2]	123A90-DDL-PR-BL-80002	Heat and Mass Balance
[3]	123A90-DDL-SAF-RE-30013	Hazardous Area Classification Schedule
[4]	123A90-DDL-PR-RE-80030	Relief, Vent and Blowdown Report
[5]	1724000448-MAC-LIS-00020	Utilities - chemicals - consumables - lubricants consumption list
[6]	K559-2254-CWIWP4202202-N07-001	BLPH Project - Chemicals and Catalysts
[7]	K559-2254-CWIWP4202302-G02-001	Interfaces and utility list
[8]	K559-2254-CWIWP4202201-D05-001	Material Safety Data Sheets
[9]	1724000437-MAC-DS-00011	Nitrogen Generation package - Equipment Data Sheets

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY (CPY):	CROSSWIND
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project

Table 2 - Definitions

amb	Ambient temperature

atm	Atmospheric pressure
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
CPI	Company Provided Item
ID	Internal Diameter
HKN	Hollandse Kust Noord
PV	Photo Voltaic
VooW	Van Oord Offshore Wind

Table 3 – Abbreviations

3 HAZARDOUS MATERIAL REGISTER

All hazardous substance expected to be used in the BLPH platform are listed in the below table. The document identifies the substances on the installation that have the potential to pose physical, health and / or environmental hazards.

TAG	MATERIAL	INVENTORY	OPERATING TEMPERATURE [°C]	OPERATING PRESSURE [barg]	NOTES
V-25001 A/B/C/D/ E/F	Hydrogen	1680 kg maximum inventory (extreme scenario only if temperature decrease up to -8), normally 1200 kg expected	-8 / 65	30.0	Six H2 vessels sized as 2.8 ID x 15.5 m
A-20000	Oxygen	-	65	0.1	Note: by-product inside CPI scope and directly send to atmosphere
A-50000	Chemical drain	16 m^3	35	atm	-
P-50001 A/B	Lube oil – AXA GR 1 – by TOTAL	170 g (model 25AV24)	amb	atm	The quantity of lubricant used per sheath depends on the pump model
A-50000	Biocide – DBNPA EB Biocide Plus (ref. To appendix 1)	110 l per yr	amb	atm	It is used inside the water treatment package
A-50000	Antiscalant - Everblue 600 (ref. To appendix 1)	12 l per yr	amb	atm	It is used inside the water treatment package
A-50000	Caustic soda 20% (ref. To appendix 1)	58 l @10°C per yr 47 l @23°C per yr	23	atm	It is used inside the water treatment package to control pH. For one year of operation: 60 l demi and 6 l caustic soda 20%.
A-80000	BASF Glysantin J21725 Premix 50%	300 l	amb	atm	Coolant circuit for the Internal HT loop, ref. [6]

TAG	MATERIAL	INVENTORY	OPERATING TEMPERATURE [°C]	OPERATING PRESSURE [barg]	NOTES
A-80000	Glad Long Life Ethylene Glycol Premix 50%	1761 l	amb	atm	Coolant circuit for the External HT and LT loops, ref. [6]
V-43001	Etylene Glycol water	4.7 m^3	amb	atm	Inside the liquid seal drum of the vent package
A-64000	Nitrogen	11 m^3	amb	8.1 bar	Nitrogen package, ref. [9]
B-100	Dry air	6.6kg per bottle, 7 bottles in total	20°C	200kPa	For maintain the GIS 2 pressurized air bottles are required. (42l per bottle, overall volume 294l for the 7 required)
A-20000	Compressed air MPG40% + water Oxygen Hydrogen Nitrogen Oil transformer	Ref. [7]	Ref. [7]	Ref. [7]	Electrolyzer package, for detail refer to Supplier documentation, ref. [7]
A85000	Battery cells Fire suppression aerosol cartridges coolant	ref. [8]	ref. [8]	ref. [8]	BESS package, for detail refer to Supplier documentation, ref. [8]
-	ABC Dry Powder	9 kg	-20°C – 60°C	12 bar	Fire extinguisher media
-	CO2	5 kg	-30°C – 60°C	Test P 310 bar Bursting P 500 bar	Fire extinguisher media

ANNEX 1 – MSDS

1. Hydrogen
2. Oxygen
3. Nitrogen
4. Lube oil
5. Biocide
6. Antiscalant
7. Caustic soda
8. CO2
9. Dry Powder A,B,C
10. Etylene Glycol 50%

IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung

Hydrogen





Identification | Characterisation | Formula | Physical and chemical properties | Occupational health and first aid | Safe handling | Regulations | Links | Literature register

IDENTIFICATION

Hydrogen
E 949

ZVG No:	7010
CAS No:	1333-74-0
EC No:	215-605-7
INDEX No:	001-001-00-9

CHARACTERISATION

SUBSTANCE GROUP CODE

139100 Inorganic gases

STATE OF AGGREGATION

The substance is gaseous.

PROPERTIES

compressed gas
colourless
odourless

CHEMICAL CHARACTERISATION

Extremely flammable gas. Forms explosive mixtures with air.
Danger of auto ignition if gas emits at high velocity.
When mixed with strongly oxidizing gases such as oxygen (oxyhydrogen gas), chlorine (chlorine oxyhydrogen gas), nitrous oxide and nitrogen tetroxide, a violent explosion occurs upon thermal or catalytic ignition, with chlorine already upon exposure to light. The reaction with fluorine can be ignited in the dark and at low temperature by impurities.
Only slightly soluble in water.
Gas is lighter than air.

For hydrogen in cryogenic liquefied form, see data sheet ZVG 7011 "Hydrogen, cryogenic liquefied".

Substance information in Wikipedia

FORMULA

H_2

H—H

Molar mass: 2,02 g/mol
Conversion factor (gaseous phase) at 1013 mbar and 20 °C:
1 ml/m³ = 0,0840 mg/m³

PHYSICAL AND CHEMICAL PROPERTIES

Triple point | Melting point | Boiling point | Critical data | Density | Ignition temperature | Explosion data | Solubility | Hazardous reactions | Further Information

TRIPLE POINT

Temperature: -259,2 °C

Pressure: 0,072 bar

Reference: 00260

MELTING POINT

Melting point: -259,2 °C

Reference: 01411

BOILING POINT

Boiling Point: -253 °C

Reference: 01401 01411

CRITICAL DATA

Crit. temperature: -239,9 °C

Crit. pressure: 12,96 bar

Crit. density: 0,03 g/cm³

Reference: 00440

DENSITY

VAPOUR DENSITY
under standard conditions (0 °C, 1013 mbar)

Value: 0,0899 kg/m³

Reference: 00260

DENSITY OF LIQUID PHASE AT BOILING POINT

Value: 0,07079 kg/l

Reference: 00260

RELATIVE VAPOUR DENSITY
Ratio of the density to dry air at the same temperature and pressure

Value: 0,0695

Reference: 00260

VAPOUR DENSITY
Value: 0,08409 kg/m³
Temperature: 15 °C
at 1 bar
Reference: 00260

IGNITION TEMPERATURE

Ignition temperature: 560 °C
Temperature class: T1
Reference: 00440

EXPLOSION DATA

Lower explosion limit:
4,0 vol.%
3,4 g/m³
Upper explosion limit:
77 vol.%
65 g/m³
Max. exper. safe gap (MESG): 0,29 mm
Explosion group: IIC
Maximum explosion pressure:
8,3 bar
Reference: 00440

SOLUBILITY IN WATER

Concentration: 19,4 ml/l
Temperature: 20 °C
Reference: 00260

HAZARDOUS REACTIONS

Hazardous chemical reactions

Risk of explosion in contact with:
bromine
chlorine
fluorine
oxidizing agents
oxygen
acetylene/ethylene; bromine trifluoride; chlorine dioxide; chlorine trifluoride; dichlorine oxide; dioxygen difluoride/sparks; dinitrogen tetraoxide; dioxan + raney nickel; fluorine perchlorate; oxidizing gases; heat; catalysts/air; iodine heptafluoride/sparks; potassium/heat; catalysts/oils; carbon monoxide/oxygen; copper oxide; air; magnesium + calcium carbonate; nitryl fluoride (heat); ozone; palladium powder; 1-pentol/heat; perchloric acid; platinum powder/air; raney nickel; oxygen compounds; nitrogen trifluoride; hydrogen peroxide/catalyst

The substance can react dangerously with:
iodine
lithium
barium; lead fluoride; bromine fluoride; calcium/heat; palladium oxide; xenon hexafluoride

FURTHER INFORMATION

global warming potential : 6

Reference: 07450

OCCUPATIONAL HEALTH AND FIRST AID

Routes of exposure | Toxic effects |
First Aid

ROUTES OF EXPOSURE

Main routes of exposure

Exposure to hydrogen is possible nearly exclusively via the inhalative pathway.[07748]

Respiratory tract

Relevant exposure to hydrogen is mainly to be expected after its release from pressure gas bottles or during industrial processes which proceed with the use or formation of hydrogen.[99996]
For pulmonary absorption of hydrogen inhaled no data were found in the available literature.[99983]
Because of the poor solubility of the gas in water and in organic solvents only limited transfer into the blood is expected.[99999]

Skin

The uptake of hydrogen via the skin is unlikely.[07656]

Gastrointestinal tract

Ingestion of hydrogen as a gas or deep frozen liquid is not conceivable.[07656]

TOXIC EFFECTS

Main toxic effects

Acute:
Following very high concentrations of the gas suffocating action due to displacement of oxygen (asphyxia);[07748]
local coldness-induced injury through liquified gas[07786]
Chronic:
No effects are known[07748]

Acute toxicity

Hydrogen is an odorless gas and in its pure grade form non-toxic.[07786]
It does not irritate the eyes, airways and skin even at high concentrations.[99983]
This general experience is supported by an animal experiment: a large bubble of hydrogen gas injected into the anterior chamber of the eye of a rabbit was absorbed within 3 days. No damage to the eye was established.[00220]
Liquified hydrogen and the deep frozen gas released from it can directly cause serious frostbite if it contacts the body.[00454]
The gas does not itself have toxic properties. However, in high concentrations it has a suffocating impact due to displacement of oxygen. These can be caused for instance after spontaneous release from pressure gas bottles.[07748]
The following symptoms which also include depressive effects to the CNS are considered to be typical at decreasing oxygen content of the air breathed in: increased respiratory frequency and pulse as well as slight disturbance of the muscle coordination (at 16 - 12 % O2), emotional upset, abnormal fatigue/sleepiness and respiratory disturbances (at 14 - 10 % O2) nausea, vomiting, collapse and unconsciousness (at 10 - 6 % O2). Concentrations below 7 % O2 lead to death by asphyxiation after strong difficulty in breathing, cramps and respiratory depression.[00419]
By comparison with nitrogen which is also effective as a suffocation gas the CNS depressive action caused by hydrogen is thought to be less pronounced. A relationship of 1 : 0.26 has been mentioned.[07636]
A high (squeaky) sound of the voice (as a consequence of the increased velocity of sound in hydrogen) was considered to be a typical sign of a high concentration of hydrogen.[05097]
A 1 h-LC50 value found for hydrogen in an experiment on rats was above 15000 ppm.[00220]
Overall the highest danger resulting from the spontaneous release of hydrogen is self-ignition or explosion rather than suffocation.[00454]

Chronic toxicity

There is no indication of any chronic-toxic action for hydrogen.[99983]
In this regard it was merely pointed out that a chronic oxygen deficiency (< 18 % O2) can lead to impairment of the functions of the heart and nervous system.[00419]
Because of the non-toxicity of hydrogen, animal experiments are not considered to be necessary.[00220]
The establishment of a threshold limit value for occupational exposure is not believed to be necessary.[07748]

Reproductive toxicity, mutagenicity, carcinogenicity

Reproductive toxicity:
No data is available.
Mutagenicity:
No data is available.
Carcinogenicity:
No data is available.[99983]

Biotransformation and excretion

With regard to an exposure of the organism to hydrogen no toxicokinetic data is available.[99983]
It is known that hydrogen endogenously formed in the intestinal tract penetrates the intestinal wall, arrives at the lung and is exhaled.[00220]
This statement allows conclusions to be drawn that hydrogen inhaled is rapidly exhaled again.[99999]

Annotation

This occupational health information was compiled on 04.03.2002.
It will be updated if necessary.

FIRST AID

Eyes

Following contact of the eyes with deep frozen liquid/cold gas:
Mildly rinse the eye concerned with water having a normal temperature. Do not spread the lids! Rinse no longer than 10 - 30 sec. Do not heat up this area!
Do not remove contact lenses initially.
Arrange medical treatment.
[00022, 99999]

Skin

After impact of liquified or deep frozen gas:
Whilst protecting yourself, relocate the casualty away from the source of danger.
Remove contaminated clothing or clothing containing gas carefully.
Do not remove clothes possibly frozen on the skin initially.
Lay the casualty down in a quiet place to rest and protect him against hypothermia.
Rinse areas injured by cold with cold or luke-warm (not hot) water. Do not rub. Then cover injured areas with sterile material.
In the meantime call a physician to the site of the accident.
[00022, 00330, 99992]

Respiratory tract

Whilst protecting yourself remove the casualty from the hazardous area and take him to the fresh air.
Lay the casualty down in a quiet place and protect him against hypothermia.
Apply oxygen in every possible form.
If the casualty is unconscious but breathing lay him in a stable manner on his side.
If the casualty has stopped breathing give mouth to nose resuscitation. If this is not possible use mouth to mouth resuscitation. Keep his respiratory tract clear.
In case of cardiac arrest (no response and no normal breathing), immediately perform chest compressions and ventilation. If available, use Automated External Defibrillator (AED). The protection of the vital functions (respiration and circulation) takes priority over all other measures.
In the meantime, summon an emergency physician.
[00022, 07656, 05097]

Swallowing

Ingestion of the deep frozen liquid is hardly conceivable.
If that happens, first aid analogous to that under "Respiratory tract".
[07656, 99999]

Information for physicians

The odorless gas itself is not toxic. However, an acute risk can result from the release of liquified, deep frozen hydrogen which rapidly vaporizes or from the sudden release of the gas from pressure gas bottles, leading to considerable coldness-conditioned effects and oxygen displacement.

- Symptoms of acute exposure:
Eyes/Skin: local coldness-induced injury (numbness, whitish discoloration)[07786] through to serious frostbite caused by the liquified gas or the release of the deep frozen gas.[00454]
Inhalation: following high gas concentrations -› decrease of the oxygen content in the air -› asphyxiation;[00419] symptoms: sleepiness (rapidly reversible with fresh air),[05097] increased pulse and respiratory frequency, disturbance to the muscle coordination -› exhaustion, dyspnoea, nausea,[00419] unconsciousness -› strong dyspnoea, convulsions, respiratory arrest; the function of the heart can survive the respiratory arrest for a while[99996]
Ingestion: as a consequence of an attempt to drink the liquified gas, shock reactions and also asphyxia are conceivable.

- Medical advice:
Following contact of the eyes with liquified gas or impact of cold gas to the eyes the casualty should immediately be transported to an ophthalmologist after first aid has been administered.[99999]
Other local frostbite or hypothermia should be treated in accordance with the recommended therapy.[00330]
After inhalation artificial ventilation with oxygen as soon as possible.[07656]
Furthermore, check of the functions of the heart/circulatory system and measures for cardiopulmonary and cerebral resuscitation are urgent.
If artificial rescuscitation measures are needed they should be continued for a long time. Further treatment symptomatically.[05097]

Recommendations

Provide the physician information about the substance/product and treatment already administered.

Annotation

This first aid information was compiled on 04.03.2002.
It will be updated if necessary.

SAFE HANDLING

Handling | Storage | Fire and explosion protection | Organisational measures | Personal protection | Disposal considerations | Accidental release measures | Fire fighting measures

TECHNICAL MEASURES - HANDLING

Workplace

Provision of very good ventilation in the working area.
Install a ceiling exhaust.
Provide devices for detecting and reporting gas hazards (gas detectors with alarm triggering).

Equipment

Handle gas in a closed system.
Provide safety valves in gas installations.
Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service.
Check the entire gas system for leaks before use and regularly thereafter!
Avoid gas leakage to the atmosphere.

If release of the substance cannot be prevented, then it should be suctioned off at the point of exit.
Label containers and pipelines clearly.
There should be a shutoff for the lines at a safe distance.

Suitable materials:
All common materials are suitable for cylinders and valves.
Due to the risk of hydrogen embrittlement:
-Use quenched and tempered alloy steels only in accordance with the required maximum strength values of 950 MPa;
-seamless cylinders made of chromium-molybdenum steels shall not exceed a maximum strength value of 950 MPa;
-Use stainless steels for valve membranes and springs only if operational experience proved safe use. (Some stainless steel alloys may be sensitive to hydrogen embrittlement).
Contamination by mercury in certain manufacturing processes must be taken into account, especially for aluminium alloys. Risk of embrittlement.

Suitable for seals or as nonmetallic materials are:
All usual materials.

Advice on safer handling
Do not store cylinders at the working area.
Protect gas cylinders from mechanical damage; do not pull, roll, push or drop.
Always use a gas cylinder trolley or other suitable equipment to transport gas cylinders.
Transport in elevators together with persons is prohibited.
Tightly screw on the protective caps and blind nuts when transporting.
Do not lift the gas cylinder by the valve protection cap or the valve protection ring.
When changing bottles, always inspect the leak-proof closure of the filled and empty bottles.
Prevent cylinders from falling over.
Do not remove the valve protection cap until the bottle has been placed against a wall or laboratory bench or on a bottle stand and is ready for use.
Open valves slowly to avoid pressure surges, do not force open.
Close valves after each use and after draining.
Replace the caps or nuts and valve protection cap as soon as the container is separated from the system.
Do not allow backfeed of gas into the container.
Avoid backflow of water or other liquids into the gas container.
Purge air from equipment before introducing the gas.
Never transfer gas from one container to another!
Never use flames or electric heaters to increase pressure in the container!

Cleaning and maintenance
Regular inspection of leak test required!
Check hoses at least every half-year.
Keep valve connections of the container clean and free of impurities, especially free of oil and water.
Never attempt to repair valves or safety pressure relief devices on the tank. Damage to these devices must be reported immediately to the supplier.

TECHNICAL MEASURES - STORAGE

Storage
Keep container tightly closed.
Store container below 50 °C in a well-ventilated place.
Store containers upright and protect against falling over.
A valve protection cage should be provided or the valve protection cap should be fitted.
Check stored cylinders regularly for leaks and correct storage conditions.
Segregate from oxidant gases and other oxidants.

The containers should be stored in a place without fire hazard and away from heat and ignition sources.
Keep away from combustible materials.
Protect from exposure to sunlight.
Do not store the containers under conditions that accelerate corrosion.
All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere.
Do not store in escape routes, work rooms, or in direct proximity to them.
Filling and decanting in storage rooms is prohibited.

Conditions of collocated storage

Storage class 2 A (Gases)
Only substances of the same storage class should be stored together.
Collocated storage with the following substances is prohibited:
- Pharmaceuticals, foods, and animal feeds including additives.
- Infectious, radioactive und explosive materials.
- Flammable liquids of storage class 3.
- Other explosive substances of storage class 4.1A.
- Flammable solid substances or desensitized substances of storage class 4.1B.
- Pyrophoric substances.
- Substances liberating flammable gases in contact with water.
- Strongly oxidizing substances of storage class 5.1A.
- Oxidizing substances of storage class 5.1B.
- Organic peroxides and self reactive substances.
- Combustible and non combustible acutely toxic substances of stora-ge classes 6.1A and 6.1B.
- Combustible toxic or chronically acting substances of storage class 6.1C.
- Noncombustible toxic or chronically acting substances of storage class 6.1D.
- Combustible liquids of storage class 10.

Under certain conditions the collocated storage with the following sub-stances is permitted (For more details see TRGS 510):
- Aerosols (spray bottles).
- Ammonium nitrate and preparations containing ammonium nitrate.
- Combustible corrosive substances of storage class 8A.
- Combustible solids of storage class 11.

Observe special regulations for the combined storage of different gases according toTRGS 510.

TECHNICAL MEASURES - FIRE AND EXPLOSION PROTECTION

Technical, constructive measures

Substance is combustible.
Fire fighting equipment must be available.
The possibility of the formation of a hazardous explosive atmosphere must be evaluated in the risk assessment. Depending on the result of the risk assessment, measures in accordance with TRGS 722 (prevention of formation), TRGS 723 (prevention of ignition) and TRGS 724 (constructive explosion protection) may be required.
Take precautionary measures against static discharges.
Earth all parts which can be electrically charged.
The floors bleeder impedance should not exeed 1 mega ohm.
Protect from any warming; if necessary provide cooling by water sprinkling.

Precaution on handling

The gas-air mixture is explosive.
Area with explosion risk.
Keep at a distance from sources of ignition (e.g. electrical devices, open flames, heat sources, sparks).
Observe the smoking prohibition!

Absolutely no welding in the working area.
Only work with vessels and lines after these have been thoroughly rinsed and inerting.
Before introducing gas, purge equipment with inert gas to remove air.
Displace contents with inert gas before cleaning and repair.
Use nitrogen to inert or purge equipment for hydrogen gas.
Work done with fire or open flame should only be carried out with written permission if the risk of fire or explosion cannot be completely eliminated.
Do not use any tools that cause sparks.
It must be avoided that gases or vapours can escape into other rooms where sources of ignition are present.

ORGANISATIONAL MEASURES

Compressed gases may only be handled by experienced and appropriately instructed persons.
Instruction on hazards and protective measures based on the operating instructions (TRGS 555) with signature required.
Instruction must be provided before employment and then at a minimum of once per annum thereafter.
An escape and rescue plan must be prepared when the location, scale, and use of the work-site so demand.
Observe the restrictions on juvenile employment as defined in the "Jugendarbeitsschutzgesetz".
Only employees are permitted to enter the work areas. Signposting to this effect must be displayed.

PERSONAL PROTECTION

Body protection
Wear flameproof, antistatic protective clothing.
Use protective boots while handling gas cylinders.

Respiratory protection
Respiratory protection is not usually required.

Eye protection
Wear safety goggles with side protection.

Hand protection
Work gloves must be worn when handling compressed gas cylinders.

Occupational hygiene
Do not smoke when handling the gas or pressure vessels.
Avoid inhalation of gas.
Change contaminated clothing immediately and air the clothing far from ignition sources.

DISPOSAL CONSIDERATIONS

Hazardous waste according to Waste Catalogue Ordinance (AVV).
Compressed gas cylinders can normally be returned to the supplier. Pressurised cans are non-returnable and must be disposed of.
Do not empty pressure vessels to the point of pressure compensation. Mark empty vessels to avoid confusion with full ones.

ACCIDENTAL RELEASE MEASURES

Shut off all sources of ignition.
Provide adequate ventilation.
Evacuate area. Warn affected surroundings.
To eliminate the hazardous condition, the hazardous area may only be entered with a self-contained breathing apparatus unless the harmlessness of the atmosphere is proven.
Attempt to stop the gas from escaping. Otherwise place leaky bottles under a suctioning device or put them outdoors.

Monitor the concentration of the released gas.
Consider the risk of potentially explosive atmospheres.
If gas is released outside, stay on the side facing the wind.
Hydrogen escaping outdoors without fire quickly escapes upwards due to its low density.

Endangerment of watert:
No hazards to sources of water are to be feared if released into water, drainage, sewer, or the ground.

FIRE FIGHTING MEASURES

Classes of fires

C gaseous, also compressed substances

Suitable extinguishing media

Water (spray - not splash)
Dry extinguishing powder

Unsuitable extinguishing media

Carbon dioxide

Instructions

In the case of fire advise fire fighters on the presence of gas cylinders.
Cool endangered pressure vessels with water spray from a protected position.
If possible, take container out of dangerous zone.
Heating causes a rise in pressure, risk of bursting and explosion.
Shut off sources of ignition.
Only put out fire if the gas flow can be interrupted.
Risk of explosion from gas accumulation and backfire.
Use only explosion proved equipment.
If the gas supply cannot be disconnected and the fire burns safely it should not be extinguished to avoid the generation of an explosive atmosphere.

Special protective equipment

Wear self-contained breathing apparatus.

REGULATIONS

GHS Classification/Labelling | Colour coding of gas cylinders | Workplace labelling | Water hazard class | Transport Regulations | SevesoIII | Restriction of use | Technical rules

EUROPEAN GHS CLASSIFICATION AND LABELLING

Classification

Flammable gases, Category 1; H220
Gases under pressure, compressed gas; H280





Signal Word "Danger"

Hazard Statement - H-phrases

H220: Extremely flammable gas.
H280: Contains gas under pressure; may explode if heated.

Precautionary Statement - P-phrases

P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381: In case of leakage, eliminate all ignition sources.
P403: Store in a well-ventilated place.

Manufacturer's specification by Linde

Reference: 01411
State: 2020
Checked: 2020

The substance is listed in appendix VI, table 3 of CLP regulation.
The given classification can deviate from the listed classification, since this classification is to be complemented concerning missing or divergent danger classes and categories for the respective substance.

Reference: 99999

COLOUR CODING OF GAS CYLINDERS



Shoulder colour: Red
(flammable gases)



Shoulder colour: Red
Cylinder colour: Red
(Hydrogen,
alternative)

WORKPLACE LABELLING ACCORDING TO GERMAN ASR A1.3

Prohibition label



No open flame; fire, open ignition sources and smoking prohibited



No admittance for unauthorized persons

Warning label



Caution - gas cylinder



Caution - explosive atmosphere

Precept label



Use safety goggles



Wear safety shoes



Wear safety gloves

GERMAN WATER HAZARD CLASS

Substance No: 741

non-hazardous to waters

Classification according to the announcement of the list of substances hazardous to water in the Federal Register of 10.08.2017, last update 23.06.2023

TRANSPORT REGULATIONS

UN Number: 1049
Shipping name: Hydrogen, compressed
Hazard Identification Number: 23
Class: 2.1 (Flammable Gases)
Packing Group: -
Danger Label: 2.1



Classification code: 1F

Tunnel restrictions:

Transports in tanks: passage forbidden through tunnels of category B, C, D and E.
Other transports: passage forbidden through tunnels of category D and E.

Reference: 07902

DIRECTIVE 2012/18/EU (Seveso III)

The substance is subject to the hazard categories of the Hazardous Incident Ordinance:

P2 Flammable gases, Category 1 or 2

The substance is mentioned by name in Annex 1:

15: Hydrogen

Quantity thresholds for determination of operation scopes:

Annex I Part 2 Number: 15
Hydrogen
The quantity thresholds specified in Annex 1, Part 2 are to be used:
Qualifying quantity for the application of
Lower-tier requirements: 5 t
Upper-tier requirements: 50 t

RESTRICTIONS OF USE / BANS OF USE

REACH Regulation (EC) No 1907/2006 Annex XVII
Annex XVII, Point 40
Shall not be used, as substance or as mixtures in aerosol dispensers where these aerosol dispensers are intended for supply to the general public for entertainment and decorative purposes such as the following:
— metallic glitter intended mainly for decoration,
— artificial snow and frost,
— “whoopee” cushions,
— silly string aerosols,
— imitation excrement,
— horns for parties,
— decorative flakes and foams,
— artificial cobwebs,
— stink bombs.
Further information on prohibitions and exceptions can be taken from the regulation.

Annex XVII to Regulation (EC) No 1907/2006, consolidated version (BAUA) (only in German)

TECHNICAL RULES FOR HAZARDOUS SUBSTANCES

TRGS 201
Einstufung und Kennzeichnung bei Tätigkeiten mit Gefahrstoffen; Ausgabe Februar 2017, zuletzt geändert und ergänzt April 2018

TRGS 400
Gefährdungsbeurteilung für Tätigkeiten mit Gefahrstoffen; Ausgabe Juli 2017

TRGS 555
Betriebsanweisung und Information der Beschäftigten; Ausgabe Februar 2017

TRGS 600
Substitution; Ausgabe Juli 2020

TRGS 407
Tätigkeiten mit Gasen - Gefährdungsbeurteilung; Ausgabe Februar 2016, geändert und ergänzt Oktober 2016

TRGS 745/TRBS 3145
Ortsbewegliche Druckgasbehälter - Füllen, Bereithalten, innerbetriebliche Beförderung, Entleeren; Ausgabe Februar 2016

TRGS 746/TRBS 3146
Ortsfeste Druckanlagen für Gase; Ausgabe September 2016

TRGS 510
Lagerung von Gefahrstoffen in ortsbeweglichen Behältern; Ausgabe Dezember 2020

TRGS 500
Schutzmaßnahmen; Ausgabe September 2019

TRGS 800
Brandschutzmaßnahmen; Ausgabe Dezember 2010

TRGS 720
Gefährliche explosionsfähige Gemische - Allgemeines; Ausgabe Juli 2020, zuletzt berichtigt März 2021

TRGS 721
Gefährliche explosionsfähige Gemische - Beurteilung der Explosionsgefährdung; Ausgabe Oktober 2020, zuletzt berichtigt Dezember 2020

TRGS 722
Vermeidung oder Einschränkung gefährlicher explosionsfähiger Atmosphäre, Ausgabe Februar 2021

TRGS 723
Gefährliche explosionsfähige Gemische - Vermeidung der Entzündung gefährlicher explosionsfähiger Gemische; Ausgabe Juli 2019, zuletzt geändert Oktober 2020

TRGS 724
Gefährliche explosionsfähige Gemische - Maßnahmen des konstruktiven Explosionsschutzes, welche die Auswirkung einer Explosion auf ein unbedenkliches Maß beschränken, Ausgabe Juli 2019

LINKS

Safety instructions for drivers of hydrogen trailers (in german only)
Publications of the IGV (Industriegaseverband e.V.) (in german only)
Storage of Hydrogen in Systems Located Underground (Doc 171/12)
DGUV Information 213-098: List of substances - lesson in schools (in German only)

REFERENCES

Quelle: 00001
IFA: Erfassungs- und Pflegehandbuch der GESTIS-Stoffdatenbank (nicht öffentlich)
Data acquisition and maintenance manual of the GESTIS substance database (non-public)

Quelle: 00022
G. Hommel
"Handbuch der gefährlichen Güter" Loseblattsammlung mit Ergänzungslieferungen
"Handbook of dangerous goods " loose-leaf collection with supplement deliveries
Springer-Verlag, Heidelberg

Quelle: 00220
IUCLID-CD-ROM, Year 2000 edition; European Commission, Joint Research Centre, Institute for Health and Consumer Protection, European Chemicals Bureau; Ispra, Italy

Quelle: 00260
1x1 der Gase. Physikalische Daten für Wissenschaft und Praxis. Herausgeber: AIR LIQUIDE Deutschland GmbH, Düsseldorf, 1. Auflage 2005

Quelle: 00330
U. Welzbacher "Neue Datenblätter für gefährliche Arbeitsstoffe nach Gefahrstoffverordnung" Loseblattsammlung mit Ergänzungslieferungen, WEKA-Verlag, Augsburg

Quelle: 00419
CHEMINFO - Chemical Profiles Created by CCOHS

Quelle: 00440
Datenbank CHEMSAFE, Version 2016.0, DECHEMA-PTB-BAM

Quelle: 00454
Hazardous Substances Data Bank (HSDB)

Quelle: 01401
GHS-Sicherheitsdatenblatt, Air Liquide
GHS Material Safety Data Sheet, Air Liquide

Quelle: 01411
GHS-Sicherheitsdatenblatt, Linde
GHS Material Safety Data Sheet, Linde

Quelle: 02005
IGV IndustrieGaseVerband e.V.
www.industriegaseverband.de

Quelle: 05097
Kühn-Birett-Merkblätter: 97. Ergänzungslieferung; 03/97

Quelle: 05200
Kühn-Birett "Merkblätter Gefährliche Arbeitsstoffe" Loseblattsammlung mit Ergänzungslieferungen, ecomed Sicherheit, Landsberg

Quelle: 05300
TRGS 510 "Lagerung von Gefahrstoffen in ortsbeweglichen Behältern" Ausgabe Dezember 2020

Quelle: 06002
L. Roth, U. Weller
"Gefährliche Chemische Reaktionen" Loseblattsammlung mit Ergänzungslieferungen, ecomed-Verlag ("Dangerous chemical reactions" loose-leaf collection with supplement deliveries)

Quelle: 06505
Gasflaschen – Verträglichkeit von Werkstoffen für Gasflaschen und Ventile mit den in Berührung kommenden Gasen – Teil 1: Metallische Werkstoffe (ISO 11114-1:2020); Deutsche Fassung EN ISO 11114-1:2020

Quelle: 06506
Gasflaschen – Verträglichkeit von Flaschen- und Ventilwerkstoffen mit den in Berührung kommenden Gasen – Teil 2: Nichtmetallische Werkstoffe (ISO 11114-2:2013); Deutsche Fassung EN ISO 11114-2:2013

Quelle: 07450
Verordnung (EU) Nr. 517/2014 des europäischen Parlaments und des Rates vom 16. April 2014 über fluorierte Treibhausgase und zur Aufhebung der Verordnung (EG) Nr. 842/2006

Quelle: 07580
Bekanntmachung der Liste der wassergefährdenden Stoffe im Bundesanzeiger vom 10.08.2017, zuletzt geändert 23.06.2023

Quelle: 07636
L. Parmeggiani (Edt.) "Enzyclopedia of Occupational Health and Safety" 3. Auflage, International Labour Office, Genf 1983

Quelle: 07656
D. Walsh (Hrsg.) "Chemical Safety Data Sheets; Vol. I Solvents, Vol. II Metalls, Vol. III Corrosives and Irritants, Vol. IV Toxic Chemicals, Vol.V Flammable Chemicals" University of Technology, Loughborough 1990

Quelle: 07748
American Conference of Governmental Industrial Hygienists "Documentation of the threshold limit values and biological exposure indices Loseblattsammlung mit Ergänzungslieferungen

Quelle: 07786
Umweltbundesamt "Handbuch Stoffdaten zur Störfall-Verordnung" Band I - IV. Erich Schmidt Verlag Berlin 1992

Quelle: 07902
BAM: Datenbank Gefahrgut-Schnellinfo

Quelle: 80155
BG-Chemie-Merkblatt M 055 Ausgabe 7/91 (BGI 612) Wasserstoff

Quelle: 99983
Liste arbeitsmedizinisch-toxikologischer Standardwerke (2)
List of standard references regarding occupational health and toxikology (2)

Quelle: 99992
Projektgebundene Literatur zur Ersten Hilfe
(Project related bibliographical references regarding first aid)

Quelle: 99996
Projektgebundene arbeitsmedizinisch-toxikologische Literatur (2)
Project related bibliographical references regarding occupational health and toxikology (2)

Quelle: 99999
Angabe des Bearbeiters
Indication of the editor

Identification | Characterisation | Formula | Physical and chemical properties | Occupational health and first aid | Safe handling | Regulations | Links | Literature register

This material data sheet was carefully compiled. However no liability can be assumed for the data content, whatever the legal cause may be.

IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung

Oxygen





Identification | Characterisation | Formula | Physical and chemical properties | Safe handling | Regulations | Links | Literature register

IDENTIFICATION

Oxygen
E 948

ZVG No:	7080
CAS No:	7782-44-7
EC No:	231-956-9
INDEX No:	008-001-00-8

CHARACTERISATION

SUBSTANCE GROUP CODE

139100 Inorganic gases

STATE OF AGGREGATION

The substance is gaseous.

PROPERTIES

compressed gas
colourless
odourless

CHEMICAL CHARACTERISATION

Oxidizing gas.
The substance itself does not burn, but in contact with combustible substances it increases the risk of fire and can fuel any existing fire substantially.
Only slightly soluble in water.
Gas is slightly heavier than air.
The atmosphere contains 21 vol.-% oxygen. Breathing in higher concentrations of oxygen below 50 - 60 vol.-% at normal pressure is harmless for adults. In contrast, pure oxygen, if inhaled over several hours, can lead to poisoning and pulmonary edema.
When the air is enriched with oxygen, the fire behavior of materials changes considerably. Just a slight accumulation causes an increase of burning rate and burning temperature as well as a decrease of the ignition temperature.
Almost all substances (except noble gases and metal oxides) are combustible in oxygen, even if they are normally non-flammable.

Safety releated characteristics of substances can change at increased concentrations of oxygen, e.g.
- upper explosion limits
- dust explosion classes
- pressure increase velocity
- ignition and smouldering temperature
- explosion pressures
- flame temperature

All combustion processes are faster, hotter and brighter with an accumulation of oxygen. Oxygen can cause self-ignition of oil, fat or textiles that are polluted with them. A smouldering fire can change into a bright flame. May react explosively on contact with organic material.

For oxygen in cryogenic liquefied form, see data sheet ZVG 7081 "Oxygen, cryogenic liquefied".

Substance information in Wikipedia

FORMULA

O_2

O=O

Molar mass: 32,00 g/mol

Conversion factor (gaseous phase) at 1013 mbar and 20 °C:

1 ml/m³ = 1,33 mg/m³

PHYSICAL AND CHEMICAL PROPERTIES

Triple point | Melting point | Boiling point | Critical data | Density | Solubility | Hazardous reactions

TRIPLE POINT

Temperature: -218,8 °C

Pressure: 0,0015 bar

Reference: 00260

MELTING POINT

Melting point: -218,4 °C

Reference: 01411

BOILING POINT

Boiling Point: -183 °C

Reference: 00260 00440 01401

CRITICAL DATA

Crit. temperature: -118,6 °C

Crit. pressure: 50,43 bar

Crit. density: 0,436 g/cm³

Reference: 00440

DENSITY

VAPOUR DENSITY
under standard conditions (0 °C, 1013 mbar)

Value: 1,42895 kg/m³

Reference: 00440

DENSITY OF LIQUID PHASE AT BOILING POINT

Value: 1,1410 kg/l

Reference: 00260

RELATIVE VAPOUR DENSITY
Ratio of the density to dry air at the same temperature and pressure

Value: 1,11

Reference: 00440

VAPOUR DENSITY

Value: 1,337 kg/m³

Temperature: 15 °C

at 1 bar

Reference: 00260

SOLUBILITY IN WATER

Concentration: 42,8 mg/l

Solubility of pure oxygen in water (balance between water and pure oxygen atmosphere) at 20°C; 1000 hPa and 100% saturation.

Reference: 06504

Concentration: 8,97 mg/l

Solubility of pure oxygen in water (balance between water and air) at 20 °C; 1000 hPa and 100% saturation.

Reference: 06504

HAZARDOUS REACTIONS

Hazardous chemical reactions

Oxygen reacts with almost every material (except the noble gases neon, helium, argon and metal oxides in the highest oxidation state).
Oxygengas may cause ignition and explosion of combustible materials.
Caution, safety-relevant substance data, like the ignition temperature, are modified in an oxygen-enriched atmosphere! Materials, that are non-combustible in air, like steel, burn in oxygengas.

The following list shows a selection of dangerous reactions:

Risk of explosion in contact with:
alkali metals
alcohols
ammonia
combustible substances
fluorine
organic substances
reducing agents
nitric oxides
acetone; alkylaluminium hydride; aluminium boronhydride; aluminium hydride; barium; bromotrifluoroethene; butadien; butene-3-in; chlorotrifluoroethene; hydrogen cyanide; decaborane (heat); deuterium; diborane (heat); diboron tetrafluoride; dicyanogen; ethers; dioxane; diphenylethene;
ethene; ethene oxide; fibres; fats/oils (spontaneous and at valves); furane; hydrazine; catalysts; hydrocarbons; metal powders; sodium hydride (heat); nickel carbonyl; pentaborane; peroxide forming liquids; phosphorus triiodide; phosphorus trioxide; phosphine; porous substances; carbon sulfide; hydrogen sulfide; nitrogen oxides; sulfides; synthesis gas (hydrogen sulfide containing/catalyst); tetrafluoroethene/alkali; tetrachloromethane/alkali; tetrahydrofurane; textiles; thiophosphoryl chloride; trichloroethene; trichloromethane/alkali; impurities; hydrogen

For liquid oxygen, the following applies in addition to the above mentioned:
Risk of explosion in contact with:
acetylene; asphalt/impact; liquefied gas; combustible gases; glycerine; porous rubber; halogenated hydrocarbons; wood; coal (powder); carbon monoxide; lithium hydride; magnesium (powder); methane; porous substances; rust; tetrafluoroethene (liquid); trioxane
aluminium (powder)

The substance can react dangerously with:
aluminium (powder)
phosphorus
acetaldehyde (heat); acetylene (spark); alkohols/heat; aluminium alkylates; arsenic tribromide; effusion; benzoic acid (powder); caesium (dry); caesium hydride (spontaneously); calcium (fine); dimethylsilane; dimethyl sulfide; ethanol; germanium (heat); glycerol + impurities; porous rubber (spontaneously or heat); hydrides (spontaneously); potassium (wet); combustible synthetic materials (heat/pressure); lithium (wet); metal hydrides (wet/spontaneously); methylsilane; sodium sulfide (anhydrous); non-metal hydrides (spontaneously); oils (large surfaces); phosgene; propene oxide; pyrophoric substances; rubidiun (dry); selenium; silane; styrene, teflon (heat); tetraborane; titanium (pressure); trimethyl silane; uranium hydride

SAFE HANDLING

Handling | Storage | Fire and explosion protection | Organisational measures | Personal protection | Disposal considerations | Accidental release measures | Fire fighting measures | Further Information

TECHNICAL MEASURES - HANDLING

Workplace

Provision of very good ventilation in the working area.

Make sure oxygen can not accumulate in the air (›23,5 %).

Provide devices for detecting and reporting gas hazards (gas detectors with alarm triggering).

Provide an emergency shower.

Equipment

Provide safety valves in gas installations.

Only use lubricants approved for oxygen and approved seals.

Pressure gauges for oxygen must be labelled: "Oxygen! Keep free from oil and fat".

Check the entire gas system for leaks before use and regularly thereafter!

If release of the substance cannot be prevented, then it should be suctioned off at the point of exit.

Label containers and pipelines clearly.

There should be a shutoff for the lines at a safe distance.

Parts of the production plant, cylinders and armatures, in contact with the gas, have to be kept free from organic materials, oil and fat.

Choosing devices pressure and temperature have to be taken into account. Advice is given in the BG-RCI Code of practice M 034.

Valves are subject to a formal qualification test under oxygen.

Suitable materials:

All common materials are suitable for cylinders and valves, with the exception of:

Aluminium and aluminium alloys for valves.

Risk of corrosion in presence of water.

For seals:

Do not use any non-metallic materials unless those permitted. Most non-metallic materials can cause violent reactions when in contact with oxygen. Use only materials specifically suitable for oxygen, such as PTFE and FKM. Molybdenum disulfide as lubricant is acceptable.

Advice on safer handling

Do not store cylinders at the working area.

Protect gas cylinders from mechanical damage; do not pull, roll, push or drop.

Always use a gas cylinder trolley or other suitable equipment to transport gas cylinders.

Transport in elevators together with persons is prohibited.

Tightly screw on the protective caps and blind nuts when transporting.

Do not lift the gas cylinder by the valve protection cap or the valve protection ring.

When changing bottles, always inspect the leak-proof closure of the filled and empty bottles.

Prevent cylinders from falling over.

Do not remove the valve protection cap until the bottle has been placed against a wall or laboratory bench or on a bottle stand and is ready for use.

Open valves slowly to avoid pressure surges, do not force open.

Close valves after each use and after draining.

Replace the caps or nuts and valve protection cap as soon as the container is separated from the system.

Do not allow backfeed of gas into the container.

Avoid backflow of water or other liquids into the gas container.

Never transfer gas from one container to another!

Never use flames or electric heaters to increase pressure in the container!

Odorization of oxygen to avoid an involuntary accumulation is recommended.

Use only warm air, hot water or steam to melt icing on oxygen charged installations.

The interior of completely emptied cylinders for diving and respiratory protective equipment have to be inspected before filling with oxygen or an oxygen containing mixture.

The cylinder may be filled only when its interior exhibits an unobjectionable state or the unobjectionable state has been restored.

For liquid oxygen:

Provide large containers made of copper, aluminium and their alloys (more than 10 litres content) with a tilting device or ascension pipe.

Dry containers carefully before filling.

Do not use pipes made up of organic material.

Mind filling marks. Relieve stodged containers by slowly blowing off. If there is an accumulation of gas supply fresh air, if necessary use an exhauster.

Cleaning and maintenance

Regular inspection of leak test required!

Check hoses at least every half-year.

Keep valve connections of the container clean and free of impurities, especially free of oil and water.

Never attempt to repair valves or safety pressure relief devices on the tank. Damage to these devices must be reported immediately to the supplier.

Consider work permit procedures e.g. for maintenance work.

Because of the fire hazard all parts of the equipment that can come into contact with oxygen must be cleaned very carefully as far as this is technically possible.

This means they must be free from

- loose parts or parts that might come loose during operation such as rust, slag, welding residues and blast material,
- oil, fat and solvents,
- other impurities or foreign materials such as packing material, splinters or rust inhibitor.

Also do not bring equipment into contact with oily fingers or cleaning rags.

Comprehensive information on cleaning can be found in data sheet M 034 "Oxygen" of BG RCI.

Clean apparatus with tri-/tetrachloroethylene (except for aluminium!) or an aqueous surface active agent. Remove any cloth containing oil or fat.

TECHNICAL MEASURES - STORAGE

Storage

Keep container tightly closed.

Store container below 50 °C in a well-ventilated place.

Store containers upright and protect against falling over.

A valve protection cage should be provided or the valve protection cap should be fitted.

Check stored cylinders regularly for leaks and correct storage conditions.

Keep away from flammable gases and other combustible materials.

The containers should be stored in a place without fire hazard and away from heat and ignition sources.

Protect from exposure to sunlight.

Do not store the containers under conditions that accelerate corrosion.

Do not store in escape routes, work rooms, or in direct proximity to them.

Filling and decanting in storage rooms is prohibited.

Conditions of collocated storage

Storage class 2 A (Gases)

Only substances of the same storage class should be stored together.

Collocated storage with the following substances is prohibited:

- Pharmaceuticals, foods, and animal feeds including additives.
- Infectious, radioactive und explosive materials.
- Flammable liquids of storage class 3.
- Other explosive substances of storage class 4.1A.
- Flammable solid substances or desensitized substances of storage class 4.1B.
- Pyrophoric substances.
- Substances liberating flammable gases in contact with water.
- Strongly oxidizing substances of storage class 5.1A.
- Oxidizing substances of storage class 5.1B.
- Organic peroxides and self reactive substances.
- Combustible and non combustible acutely toxic substances of stora-ge classes 6.1A and 6.1B.
- Combustible toxic or chronically acting substances of storage class 6.1C.
- Noncombustible toxic or chronically acting substances of storage class 6.1D.

- Combustible liquids of storage class 10.

Under certain conditions the collocated storage with the following sub-stances is permitted (For more details see TRGS 510):

- Aerosols (spray bottles).
- Ammonium nitrate and preparations containing ammonium nitrate.
- Combustible corrosive substances of storage class 8A.
- Combustible solids of storage class 11.

Observe special regulations for the combined storage of different gases according toTRGS 510.

TECHNICAL MEASURES - FIRE AND EXPLOSION PROTECTION

Technical, constructive measures

Substance has an oxidizing effect.

Oxygen concentrations slightly above 21 vol-% already increase the fire hazard.

Fire fighting equipment must be available.

Areas with a fire or explosion hazard that are adjacent to areas where oxygen is operated with must be impermeable to gas.

All parts that come into contact with the gas must be kept free of oil and grease.

Protect from any warming; if necessary provide cooling by water sprinkling.

Precaution on handling

Keep away from open flames and other heat sources.

Observe the smoking prohibition!

Absolutely no welding in the working area.

Purge with air or nitrogen before carrying out maintenance and repair works.

Do not bring into contact with organic substances or flammable gases.

Work done with fire or open flame should only be carried out with written permission if the risk of fire or explosion cannot be completely eliminated.

Oxygen enrichment of the breathing air is prohibited. Oxygen must not be used instead of compressed air.

Take special care that clothes will not be enriched with oxygen. If the clothes ignite rescue is hardly possible due to the accelerated combustion and closeness to the body.

This even applies to flameproof protective clothing.

Safety showers have proven reliable for extinguishing burning clothes.

ORGANISATIONAL MEASURES

Compressed gases may only be handled by experienced and appropriately instructed persons.

Instruction on hazards and protective measures based on the operating instructions (TRGS 555) with signature required.

Instruction must be provided before employment and then at a minimum of once per annum thereafter.

An escape and rescue plan must be prepared when the location, scale, and use of the work-site so demand.

Observe the restrictions on juvenile employment as defined in the "Jugendarbeitsschutzgesetz".

PERSONAL PROTECTION

Body protection

Use protective boots while handling gas cylinders.

Wear flame-retardant, oil and grease-free protective clothing.

Respiratory protection

Respiratory protection is not required.

Eye protection

Wear safety goggles with side protection.

Hand protection

Work gloves must be worn when handling compressed gas cylinders.

Occupational hygiene

Do not smoke when handling the gas or pressure vessels.

Avoid inhalation of gas.

Change contaminated clothing immediately and air the clothing far from ignition sources.

Attention! Clothing contaminated with oil and grease can ignite spontaneously after oxygen permeation. If the oxygen content of the air is increased by 5 %, it is hardly possible to save the injured person in case of a violent clothing fire.

DISPOSAL CONSIDERATIONS

Hazardous waste according to Waste Catalogue Ordinance (AVV).

Compressed gas cylinders can normally be returned to the supplier. Pressurised cans are non-returnable and must be disposed of.

Do not empty pressure vessels to the point of pressure compensation. Mark empty vessels to avoid confusion with full ones.

Oxygen can be released into the atmosphere in a well-ventilated place.

ACCIDENTAL RELEASE MEASURES

Shut off all sources of ignition.

Provide adequate ventilation.

Evacuate area. Warn affected surroundings.

To eliminate the hazardous condition, the hazardous area may only be entered with a self-contained breathing apparatus unless the harmlessness of the atmosphere is proven.

Attempt to stop the gas from escaping. Otherwise place leaky bottles under a suctioning device or put them outdoors.

Monitor the concentration of the released gas.

If gas is released outside, stay on the side facing the wind.

Endangerment of watert:

No hazards to sources of water are to be feared if released into water, drainage, sewer, or the ground.

FIRE FIGHTING MEASURES

Instructions

Substance is non-combustible, but has an oxidizing effect.

In the case of fire advise fire fighters on the presence of gas cylinders.

Cool endangered pressure vessels with water spray from a protected position.

If possible, take container out of dangerous zone.

Rise in pressure and risk of bursting when heating.

Shut off sources of ignition.

If oxygen has already been released, do not fight the fire, but let the oxygen flow out first.

Water jet pipe for persons fire. Do not use fire blankets. Also for the rescuer there is highest danger of life.

FURTHER INFORMATION

Special requirements according to TRGS 407:

1. Completely empty cylinders for diving and breathing apparatus must be inspected inside the cylinder before filling (with oxygen or with an oxygen-containing mixture) The bottle may only be filled if the inside of the bottle is in a perfect condition or if the perfect condition has been restored. This also applies if other substances are mixed with the oxygen.

2. Gas-contacted equipment (fittings and piping) must be selected according to pressure and temperature. Information on this can be found in the corresponding tables for DGUV Information 213-073.

3. Gas-contacted equipment parts contaminated with organic impurities such as grease or oil must be cleaned before filling.

REGULATIONS

GHS Classification/Labelling | Colour coding of gas cylinders | Workplace labelling | Water hazard class | Transport Regulations | SevesoIII | Restriction of use | Technical rules

EUROPEAN GHS CLASSIFICATION AND LABELLING

Classification
Oxidising gases, Category 1; H270
Gases under pressure, compressed gas; H280




Signal Word "Danger"

Hazard Statement - H-phrases
H270: May cause or intensify fire; oxidiser.
H280: Contains gas under pressure; may explode if heated.

Precautionary Statement - P-phrases
P220: Keep away from clothing and other combustible materials.
P244: Keep valves and fittings free from oil and grease.
P370+P376: In case of fire: Stop leak if safe to do so.
P403: Store in a well-ventilated place.

Manufacturer's specification by Air Liquide

Reference: 01401
State: 2018
Checked: 2020

The substance is listed in appendix VI, table 3 of CLP regulation.
The given classification can deviate from the listed classification, since this classification is to be complemented concerning missing or divergent danger classes and categories for the respective substance.

Reference: 99999

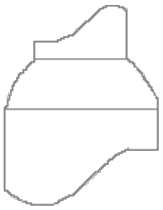
COLOUR CODING OF GAS CYLINDERS



Shoulder colour: White
(Oxygen)



Shoulder colour: White
Cylinder colour: Blue
(Oxygen, alternative)



Shoulder colour: White
Cylinder colour: White
(Oxygen for medical applications)



Shoulder colour: Gray and white
Cylinder colour: White
(Oxygen-Carbon dioxide mixture for medical applications)



Shoulder colour: Brown and white
Cylinder colour: White
(Oxygen-helium mixture for medical applications)



Shoulder colour: Blue and white
Cylinder colour: White
(Oxygen-nitrous oxide mixture for medical applications)

WORKPLACE LABELLING ACCORDING TO GERMAN ASR A1.3

Prohibition label



No open flame; fire, open ignition sources and smoking prohibited

Warning label



Caution - oxidizing material



Caution - gas cylinder

Precept label



Use safety goggles



Wear safety shoes



Wear safety gloves

GERMAN WATER HAZARD CLASS

Substance No: 743

non-hazardous to waters

Classification according to the announcement of the list of substances hazardous to water in the Federal Register of 10.08.2017, last update 23.06.2023

TRANSPORT REGULATIONS

UN Number: 1072
Shipping name: Oxygen, compressed
Hazard Identification Number: 25
Class: 2.2 (Non-flammable, non-toxic gases)
Packing Group: -
Danger Label: 2.2/5.1



Classification code: 1O

Tunnel restrictions:
Passage forbidden through tunnels of category E.

Reference: 07902

DIRECTIVE 2012/18/EU (Seveso III)

The substance is subject to the hazard categories of the Hazardous Incident Ordinance:

P4 Oxidising gases, Category 1

The substance is mentioned by name in Annex 1:

25: Oxygen

Quantity thresholds for determination of operation scopes:

Annex I Part 2 Number: 25
Oxygen
The quantity thresholds specified in Annex 1, Part 2 are to be used:
Qualifying quantity for the application of
Lower-tier requirements: 200 t
Upper-tier requirements: 2000 t

RESTRICTIONS OF USE / BANS OF USE

BG-RCI leaflet M 034 (DGUV Information 213-073) Issued: September 2018 "Oxygen"
With the exception of breathing apparatus and for medical purposes, breathing air must not be enriched with oxygen.
Oxygen must not be used instead of compressed air. Oxygen must not be used, for example, for spraying paint, driving mechanical tools, starting engines, blowing away chips and dust or blowing off clothing and improving the breathing air in rooms.
Oxygen must either not be used for flushing, pressure testing of containers and pipes and as gas cushions of liquid containers. Excluded are tanks and lines designed for operation with oxygen.

TECHNICAL RULES FOR HAZARDOUS SUBSTANCES

TRGS 201
Einstufung und Kennzeichnung bei Tätigkeiten mit Gefahrstoffen; Ausgabe Februar 2017, zuletzt geändert und ergänzt April 2018

TRGS 400
Gefährdungsbeurteilung für Tätigkeiten mit Gefahrstoffen; Ausgabe Juli 2017

TRGS 555
Betriebsanweisung und Information der Beschäftigten; Ausgabe Februar 2017

TRGS 600
Substitution; Ausgabe Juli 2020

TRGS 407
Tätigkeiten mit Gasen - Gefährdungsbeurteilung; Ausgabe Februar 2016, geändert und ergänzt Oktober 2016

TRGS 745/TRBS 3145
Ortsbewegliche Druckgasbehälter - Füllen, Bereithalten, innerbetriebliche Beförderung, Entleeren; Ausgabe Februar 2016

TRGS 746/TRBS 3146
Ortsfeste Druckanlagen für Gase; Ausgabe September 2016

TRGS 510
Lagerung von Gefahrstoffen in ortsbeweglichen Behältern; Ausgabe Dezember 2020

TRGS 500
Schutzmaßnahmen; Ausgabe September 2019

TRGS 800
Brandschutzmaßnahmen; Ausgabe Dezember 2010

LINKS

BG-RCI leaflet M 034 "Oxygen" (in German only)
Safety instructions – oxygen accumulation (in german only)
Fire hazards of oxygen and oxygen enriched atmospheres (EIGA Doc 04/18)
Publications of the IGV (Industriegaseverband e.V.) (in german only)
DGUV Information 213-098: List of substances - lesson in schools (in German only)

REFERENCES

Quelle: 00001
IFA: Erfassungs- und Pflegehandbuch der GESTIS-Stoffdatenbank (nicht öffentlich)
Data acquisition and maintenance manual of the GESTIS substance database (non-public)

Quelle: 00260
1x1 der Gase. Physikalische Daten für Wissenschaft und Praxis. Herausgeber: AIR LIQUIDE Deutschland GmbH, Düsseldorf, 1. Auflage 2005

Quelle: 00440
Datenbank CHEMSAFE, Version 2016.0, DECHEMA-PTB-BAM

Quelle: 01401
GHS-Sicherheitsdatenblatt, Air Liquide
GHS Material Safety Data Sheet, Air Liquide

Quelle: 01411
GHS-Sicherheitsdatenblatt, Linde
GHS Material Safety Data Sheet, Linde

Quelle: 02005
IGV IndustrieGaseVerband e.V.
www.industriegaseverband.de

Quelle: 05200
Kühn-Birett "Merkblätter Gefährliche Arbeitsstoffe" Loseblattsammlung mit Ergänzungslieferungen, ecomed Sicherheit, Landsberg

Quelle: 05240
TRGS 407 "Tätigkeiten mit Gasen - Gefährdungsbeurteilung" Ausgabe Februar 2016

Quelle: 05300
TRGS 510 "Lagerung von Gefahrstoffen in ortsbeweglichen Behältern" Ausgabe Dezember 2020

Quelle: 06002
L. Roth, U. Weller
"Gefährliche Chemische Reaktionen" Loseblattsammlung mit Ergänzungslieferungen, ecomed-Verlag ("Dangerous chemical reactions" loose-leaf collection with supplement deliveries)

Quelle: 06504
Water quality - Determination of dissolved oxygen - Electrochemical probe method; German version EN ISO 5814:2013-05-15

Quelle: 06505
Gasflaschen – Verträglichkeit von Werkstoffen für Gasflaschen und Ventile mit den in Berührung kommenden Gasen – Teil 1: Metallische Werkstoffe (ISO 11114-1:2020); Deutsche Fassung EN ISO 11114-1:2020

Quelle: 06506
Gasflaschen – Verträglichkeit von Flaschen- und Ventilwerkstoffen mit den in Berührung kommenden Gasen – Teil 2: Nichtmetallische Werkstoffe (ISO 11114-2:2013); Deutsche Fassung EN ISO 11114-2:2013

Quelle: 07580
Bekanntmachung der Liste der wassergefährdenden Stoffe im Bundesanzeiger vom 10.08.2017, zuletzt geändert 23.06.2023

Quelle: 07902
BAM: Datenbank Gefahrgut-Schnellinfo

Quelle: 80134
DGUV Information 213-073
Sauerstoff (Merkblatt M 034 der Reihe "Gefahrstoffe"), Stand 09/2018 (Überarbeitung der Ausgabe 6/2010)

Quelle: 99999
Angabe des Bearbeiters
Indication of the editor

Identification | Characterisation | Formula | Physical and chemical properties | Safe handling | Regulations | Links | Literature register

This material data sheet was carefully compiled. However no liability can be assumed for the data content, whatever the legal cause may be.

IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung

Nitrogen



Identification | Characterisation | Formula | Physical and chemical properties | Safe handling | Regulations | Links | Literature register

IDENTIFICATION

Nitrogen
E 941

ZVG No:	7070
CAS No:	7727-37-9
EC No:	231-783-9

CHARACTERISATION

SUBSTANCE GROUP CODE

139100 Inorganic gases

STATE OF AGGREGATION

The substance is gaseous.

PROPERTIES

compressed gas
colourless
odourless

CHEMICAL CHARACTERISATION

Non-combustible gas.
Poorly reactive.
Only slightly soluble in water.
Expansion of the gas causes formation of cold mist spreading on the ground.
Danger of suffocation at high concentrations due to oxygen displacement.
For nitrogen in cryogenic liquefied form, see data sheet ZVG 7071 "Nitrogen, cryogenic liquefied".

Substance information in Wikipedia

FORMULA

N_2

N≡N

Molar mass: 28,01 g/mol

Conversion factor (gaseous phase) at 1013 mbar and 20 °C:

1 ml/m³ = 1,16 mg/m³

PHYSICAL AND CHEMICAL PROPERTIES

Triple point | Melting point | Boiling point | Critical data | Density | Solubility | Hazardous reactions

TRIPLE POINT

Temperature: -210 °C

Pressure: 0,1246 bar

Reference: 00260

MELTING POINT

Melting point: -210 °C

Reference: 00419 01401 02001

BOILING POINT

Boiling Point: -196 °C

Reference: 01401 01411 02001

CRITICAL DATA

Crit. temperature: -147 °C

Crit. pressure: 33,99 bar

Crit. density: 0,314 g/cm³

Reference: 00440

DENSITY

VAPOUR DENSITY
under standard conditions (0 °C, 1013 mbar)

Value: 1,2504 kg/m³

Reference: 00440

DENSITY OF LIQUID PHASE AT BOILING POINT

Value: 0,8085 kg/l

Reference: 00260

RELATIVE VAPOUR DENSITY
Ratio of the density to dry air at the same temperature and pressure

Value: 0,97

Reference: 01401 01411

VAPOUR DENSITY

Value: 1,1694 kg/m³

Temperature: 15 °C

at 1 bar

Reference: 00260

SOLUBILITY IN WATER

Concentration: 23,8 ml/l

Temperature: 0 °C

Reference: 00260

Concentration: 16,9 ml/l

Temperature: 20 °C

Reference: 00260

HAZARDOUS REACTIONS

Hazardous chemical reactions

Risk of explosion in contact with:
ozone + metal

The substance can react dangerously with:
chromyl chloride
lithium aluminium hydride (rare)
hydrogen (rare)
Formation of explosive nitrides with alkaline/alkaline earth metals.

SAFE HANDLING

Handling | Storage | Fire and explosion protection | Organisational measures | Personal protection | Disposal considerations | Accidental release measures | Fire fighting measures

PRELIMINARY NOTE

The following information refers to nitrogen in compressed gas cylinders. For nitrogen in cryogenic containers see ZVG 7071 "Nitrogen, cryogenic liquefied".

TECHNICAL MEASURES - HANDLING

Workplace
Provision of ventilation in the working area.
Use oxygen detectors if choking gases can be emitted.

Equipment
Provide safety valves in gas installations.
Check the entire gas system for leaks before use and regularly thereafter!
Avoid gas leakage to the atmosphere.
If larger quantities of the gas are released, suction is required at the point of exit or origin.
Label containers and pipelines clearly.

Suitable materials:
All common materials are suitable for cylinders and valves.
Suitable for seals or as nonmetallic materials are:
All usual materials.

Advice on safer handling
Do not store cylinders at the working area.

Protect gas cylinders from mechanical damage; do not pull, roll, push or drop.
Always use a gas cylinder trolley or other suitable equipment to transport gas cylinders.
Transport in elevators together with persons is prohibited.
Tightly screw on the protective caps and blind nuts when transporting.
Do not lift the gas cylinder by the valve protection cap or the valve protection ring.
When changing bottles, always inspect the leak-proof closure of the filled and empty bottles.
Prevent cylinders from falling over.
Do not remove the valve protection cap until the bottle has been placed against a wall or laboratory bench or on a bottle stand and is ready for use.
Open valves slowly to avoid pressure surges, do not force open.
Close valves after each use and after draining.
Replace the caps or nuts and valve protection cap as soon as the container is separated from the system.
Do not allow backfeed of gas into the container.
Avoid backflow of water or other liquids into the gas container.
Never transfer gas from one container to another!
Never use flames or electric heaters to increase pressure in the container!

Cleaning and maintenance

Regular inspection of leak test required!
Keep valve connections of the container clean and free of impurities, especially free of oil and water.
Never attempt to repair valves or safety pressure relief devices on the tank. Damage to these devices must be reported immediately to the supplier.
Consider work permit procedures e.g. for maintenance work.

TECHNICAL MEASURES - STORAGE

Storage

Keep container tightly closed.
Store container below 50 °C in a well-ventilated place.
Store containers upright and protect against falling over.
A valve protection cage should be provided or the valve protection cap should be fitted.
Check stored cylinders regularly for leaks and correct storage conditions.
The containers should be stored in a place without fire hazard and away from heat and ignition sources.

Keep away from combustible materials.
Protect from exposure to sunlight.
Do not store the containers under conditions that accelerate corrosion.
Do not store in escape routes, work rooms, or in direct proximity to them.
Filling and decanting in storage rooms is prohibited.

Conditions of collocated storage

Storage class 2 A (Gases)
Only substances of the same storage class should be stored together.
Collocated storage with the following substances is prohibited:
- Pharmaceuticals, foods, and animal feeds including additives.
- Infectious, radioactive und explosive materials.
- Flammable liquids of storage class 3.
- Other explosive substances of storage class 4.1A.
- Flammable solid substances or desensitized substances of storage class 4.1B.
- Pyrophoric substances.
- Substances liberating flammable gases in contact with water.
- Strongly oxidizing substances of storage class 5.1A.
- Oxidizing substances of storage class 5.1B.
- Organic peroxides and self reactive substances.

- Combustible and non combustible acutely toxic substances of stora-ge classes 6.1A and 6.1B.
- Combustible toxic or chronically acting substances of storage class 6.1C.
- Noncombustible toxic or chronically acting substances of storage class 6.1D.
- Combustible liquids of storage class 10.

Under certain conditions the collocated storage with the following sub-stances is permitted (For more details see TRGS 510):

- Aerosols (spray bottles).
- Ammonium nitrate and preparations containing ammonium nitrate.
- Combustible corrosive substances of storage class 8A.
- Combustible solids of storage class 11.

Observe special regulations for the combined storage of different gases according toTRGS 510.

TECHNICAL MEASURES - FIRE AND EXPLOSION PROTECTION

Technical, constructive measures

Substance is non-combustible. Select fire and explosion prevention measures according to the other used substances.

Protect from any warming; if necessary provide cooling by water sprinkling.

Precaution on handling

Keep away from open flames and other heat sources.

ORGANISATIONAL MEASURES

Compressed gases may only be handled by experienced and appropriately instructed persons.

Instruction on hazards and protective measures based on the operating instructions (TRGS 555) with signature required.

Instruction must be provided before employment and then at a minimum of once per annum thereafter.

Instruction should include a hint regarding the danger of suffocation.

Observe the restrictions on juvenile employment as defined in the "Jugendarbeitsschutzgesetz".

PERSONAL PROTECTION

Body protection

Use protective boots while handling gas cylinders.

Respiratory protection

Respiratory protection is not normally required.

In exceptional situations (e.g. danger of suffocation in an oxygen-reduced atmosphere due to massive gas release) a self-contained breathing apparatus or a compressed air line with mask must be used. Filter devices are ineffective, danger of suffocation due to lack of oxygen.

Eye protection

Wear safety goggles with side protection.

Hand protection

Work gloves must be worn when handling compressed gas cylinders.

Occupational hygiene

Avoid inhalation of gas.

Do not smoke when handling the gas or pressure vessels.

DISPOSAL CONSIDERATIONS

Hazardous waste according to Waste Catalogue Ordinance (AVV).

Compressed gas cylinders can normally be returned to the supplier. Pressurised cans are non-returnable and must be disposed of.

Do not empty pressure vessels to the point of pressure compensation. Mark empty vessels to avoid confusion with full ones.

ACCIDENTAL RELEASE MEASURES

Provide adequate ventilation.
Evacuate area. Warn affected surroundings.
To eliminate the hazardous condition, the hazardous area may only be entered with a self-contained breathing apparatus unless the harmlessness of the atmosphere is proven.
Use oxygen detectors.
Attempt to stop the gas from escaping. Otherwise place leaky bottles under a suctioning device or put them outdoors.
If gas is released outside, stay on the side facing the wind.

Endangerment of watert:
No hazards to sources of water are to be feared if released into water, drainage, sewer, or the ground.

FIRE FIGHTING MEASURES

Instructions
Substance is incombustible. Select fire fighting measures according to the surrounding conditions.
In the case of fire advise fire fighters on the presence of gas cylinders.
Cool endangered pressure vessels with water spray from a protected position.
If possible, take container out of dangerous zone.
Rise in pressure and risk of bursting when heating.

Special protective equipment
Wear self-contained breathing apparatus.

REGULATIONS

GHS Classification/Labelling | Colour coding of gas cylinders | Workplace labelling | Water hazard class | Transport Regulations | Technical rules | Regulations of accident insurers

EUROPEAN GHS CLASSIFICATION AND LABELLING

Classification
Gases under pressure, compressed gas; H280



Signal Word "Warning"

Hazard Statement - H-phrases
H280: Contains gas under pressure; may explode if heated.

Precautionary Statement - P-phrases
P403: Store in a well-ventilated place.

Other hazards:
Asphyxiant in high concentrations.

Manufacturer's specification by Air Liquide

Reference: 01401
State: 2018

Checked: 2020

COLOUR CODING OF GAS CYLINDERS



Shoulder colour:
Black
(Nitrogen)



Shoulder colour:
Black
Cylinder colour: Green
(Nitrogen, alternative)



Shoulder colour:
Black
Cylinder colour: Black
(Nitrogen, alternative)

WORKPLACE LABELLING ACCORDING TO GERMAN ASR A1.3

Warning label



Caution - gas cylinder

Precept label



Use safety goggles



Wear safety shoes



Wear safety gloves

GERMAN WATER HAZARD CLASS

Substance No: 1351

non-hazardous to waters

Classification according to the announcement of the list of substances hazardous to water in the Federal Register of 10.08.2017, last update 23.06.2023

TRANSPORT REGULATIONS

UN Number: 1066
Shipping name: Nitrogen, compressed
Hazard Identification Number: 20
Class: 2.2 (Non-flammable, non-toxic gases)
Packing Group: -
Danger Label: 2.2



Classification code: 1A

Tunnel restrictions:
Passage forbidden through tunnels of category E.

Reference: 07902

TECHNICAL RULES FOR HAZARDOUS SUBSTANCES

TRGS 407
Tätigkeiten mit Gasen - Gefährdungsbeurteilung; Ausgabe Februar 2016, geändert und ergänzt Oktober 2016

TRGS 745/TRBS 3145
Ortsbewegliche Druckgasbehälter - Füllen, Bereithalten, innerbetriebliche Beförderung, Entleeren; Ausgabe Februar 2016

TRGS 746/TRBS 3146
Ortsfeste Druckanlagen für Gase; Ausgabe September 2016

TRGS 510
Lagerung von Gefahrstoffen in ortsbeweglichen Behältern; Ausgabe Dezember 2020

TRGS 500
Schutzmaßnahmen; Ausgabe September 2019

REGULATIONS OF GERMAN ACCIDENT INSURERS

DGUV Regel 112-190
Benutzung von Atemschutzgeräten, Ausgabe November 2021
(in German only)

LINKS

Oxygen depletion – Hazard of asphyxia (in german only)
Oxygen depletion (in german only)
Publications of the IGV (Industriegaseverband e.V.) (in german only)
Hazards of oxygen deficient atmospheres (Doc 44/18)
DGUV Information 213-098: List of substances - lesson in schools (in German only)

REFERENCES

Quelle: 00001
IFA: Erfassungs- und Pflegehandbuch der GESTIS-Stoffdatenbank (nicht öffentlich)
Data acquisition and maintenance manual of the GESTIS substance database (non-public)

Quelle: 00260
1x1 der Gase. Physikalische Daten für Wissenschaft und Praxis. Herausgeber: AIR LIQUIDE Deutschland GmbH, Düsseldorf, 1. Auflage 2005

Quelle: 00419
CHEMINFO - Chemical Profiles Created by CCOHS

Quelle: 00440
Datenbank CHEMSAFE, Version 2016.0, DECHEMA-PTB-BAM

Quelle: 01401
GHS-Sicherheitsdatenblatt, Air Liquide
GHS Material Safety Data Sheet, Air Liquide

Quelle: 01411
GHS-Sicherheitsdatenblatt, Linde
GHS Material Safety Data Sheet, Linde

Quelle: 02001
International Chemical Safety Cards (ICSC)

Quelle: 05200
Kühn-Birett "Merkblätter Gefährliche Arbeitsstoffe" Loseblattsammlung mit Ergänzungslieferungen, ecomed Sicherheit, Landsberg

Quelle: 05300
TRGS 510 "Lagerung von Gefahrstoffen in ortsbeweglichen Behältern" Ausgabe Dezember 2020

Quelle: 06002
L. Roth, U. Weller
"Gefährliche Chemische Reaktionen" Loseblattsammlung mit Ergänzungslieferungen, ecomed-Verlag ("Dangerous chemical reactions" loose-leaf collection with supplement deliveries)

Quelle: 06505
Gasflaschen – Verträglichkeit von Werkstoffen für Gasflaschen und Ventile mit den in Berührung kommenden Gasen – Teil 1: Metallische Werkstoffe (ISO 11114-1:2020); Deutsche Fassung EN ISO 11114-1:2020

Quelle: 06506
Gasflaschen – Verträglichkeit von Flaschen- und Ventilwerkstoffen mit den in Berührung kommenden Gasen – Teil 2: Nichtmetallische Werkstoffe (ISO 11114-2:2013); Deutsche Fassung EN ISO 11114-2:2013

Quelle: 07580
Bekanntmachung der Liste der wassergefährdenden Stoffe im Bundesanzeiger vom 10.08.2017, zuletzt geändert 23.06.2023

Quelle: 07902
BAM: Datenbank Gefahrgut-Schnellinfo

Quelle: 99999
Angabe des Bearbeiters
Indication of the editor

Identification | Characterisation | Formula | Physical and chemical properties | Safe handling | Regulations | Links | Literature register

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SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

SDS # : 31361

AXA GR 1

Date of the previous version: 2019-07-03 **Revision Date:** 2019-09-10 **Version** 5

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

1.1. Product identifier

Product name **AXA GR 1**
Number EGC
Substance/mixture Mixture

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

Identified uses Grease for incidental food contact.

1.3. Details of the supplier of the safety data sheet

Supplier

A - TOTAL UK LIMITED
183 Eversholt St, Kings Cross
London, NW1 1BU
UNITED KINGDOM
Tel: +44 (0)20 7339 8000
Fax: +44 (0)20 7339 8033

B - TOTAL LUBRIFIANTS
562 Avenue du Parc de L'ile
92029 Nanterre Cedex
FRANCE
Tél: +33 (0)1 41 35 40 00
Fax: +33 (0)1 41 35 84 71

For further information, please contact:

Contact Point A - HSE

B - HSE

E-mail Address A - rm.gb-msds@total.co.uk

B - rm.msds-lubs@total.com

1.4. Emergency telephone number

Emergency telephone: +44 1235 239670

UK: National Poisons Information Service (NPIS): NHS on 111 or a doctor

Section 2: HAZARDS IDENTIFICATION

SDS # : 31361

AXA GR 1

Revision Date: 2019-09-10 **Version** 5

2.1. Classification of the substance or mixture

REGULATION (EC) No 1272/2008
For the full text of the H-Statements mentioned in this Section, see Section 2.2.

Classification
The product is classified as dangerous in accordance with Regulation (EC) No. 1272/2008
Chronic aquatic toxicity - Category 3 - (H412)

2.2. Label elements

Labelled according to REGULATION (EC) No 1272/2008

Signal word
None

Hazard Statements
H412 - Harmful to aquatic life with long lasting effects

Precautionary statements
P273 - Avoid release to the environment
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

2.3. Other hazards

Physical-Chemical Properties Contaminated surfaces will be extremely slippery.***

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixture***

Chemical nature Mineral oil of petroleum origin.***
Hazardous components

Chemical Name	EC-No	REACH Registration Number	CAS-No	Weight %	Classification (Reg. 1272/2008)
2,6-di-tert-butyl-p-cresol	204-881-4	01-2119555270-46	128-37-0	0.25-<1	Aquatic Acute 1 (H400) Aquatic Chronic 1 (H410) Acute M factor = 1 Chronic M factor = 1

Additional information Product containing mineral oil with less than 3% DMSO extract as measured by IP 346.

For the full text of the H-Statements mentioned in this Section, see Section 16.

Section 4: FIRST AID MEASURES

4.1. Description of first aid measures

SDS # : 31361

AXA GR 1

Revision Date: 2019-09-10 **Version** 5

General advice	IN CASE OF SERIOUS OR PERSISTENT CONDITIONS, CALL A DOCTOR OR EMERGENCY MEDICAL CARE.***
Eye contact	Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing.***
Skin contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Wash contaminated clothing before reuse. High pressure jets may cause skin damage. Take victim immediately to hospital.***
Inhalation	Remove casualty to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration.***
Ingestion	Clean mouth with water. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Call a physician or poison control centre immediately.***
Protection of first-aiders	First aider needs to protect himself. See Section 8 for more detail. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.***

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

Eye contact	Not classified based on available data.
Skin contact	Not classified based on available data. High pressure injection of the products under the skin may have very serious consequences even though no symptom or injury may be apparent.
Inhalation	Not classified based on available data.
Ingestion	Not classified based on available data. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

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

Notes to physician	Treat symptomatically.***

Section 5: FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing media	Carbon dioxide (CO_2). ABC powder. Foam. Water spray or fog.***
Unsuitable Extinguishing Media	Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Special hazard	Incomplete combustion and thermolysis may produce gases of varying toxicity such as carbon monoxide, carbon dioxide, various hydrocarbons, aldehydes and soot. These may be highly dangerous if inhaled in confined spaces or at high concentration.***

5.3. Precautions for fire-fighters

SDS # : 31361

AXA GR 1

Revision Date: 2019-09-10 **Version** 5

Special protective equipment for fire-fighters	Wear self-contained breathing apparatus and protective suit.***
Other information	Cool containers / tanks with water spray. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Section 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

General Information	Do not touch or walk through spilled material. Contaminated surfaces will be extremely slippery. Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition.***

6.2. Environmental precautions

General Information	Do not allow material to contaminate ground water system. Prevent entry into waterways, sewers, basements or confined areas. Local authorities should be advised if significant spillages cannot be contained.***

6.3. Methods and material for containment and cleaning up

Methods for containment	If necessary dike the product with dry earth, sand or similar non-combustible materials.***
Methods for cleaning up	Dispose of contents/container in accordance with local regulation. In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.***

6.4. Reference to other sections

Personal protective equipment	See Section 8 for more detail.
Waste treatment	See section 13.

Section 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Advice on safe handling	For personal protection see section 8. Use only in well-ventilated areas. Avoid contact with skin, eyes and clothing.***
Prevention of fire and explosion	Take precautionary measures against static discharges.***
Hygiene measures	Ensure the application of strict rules of hygiene by the personnel exposed to the risk of contact with the product. When using, do not eat, drink or smoke. Wash hands before breaks and immediately after handling the product. Provide regular cleaning of equipment, work area and clothing. Do not use abrasives, solvents or fuels. Do not dry hands with rags that have been contaminated with product. Do not put product contaminated rags into workwear pockets.***

7.2. Conditions for safe storage, including any incompatibilities

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Technical measures/Storage conditions

Keep away from food, drink and animal feedingstuffs. Keep in a bunded area. Keep container tightly closed. Preferably keep in the original container. Otherwise, reproduce all the statutory information from the labels onto the new container. Do not remove the hazard labels of the containers (even if they are empty). Design the installations in order to avoid accidental emissions of product (due to seal breakage, for example) onto hot casings or electrical contacts. Store at room temperature. Protect from moisture.

Materials to avoid

Strong oxidising agents.

7.3. Specific use(s)

Specific use(s)

Please refer to Technical Data Sheet for further information.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parametres

Exposure limits

Mineral oil mist:
USA: OSHA (PEL) TWA 5 mg/m³, NIOSH (REL) TWA 5 mg/m³, STEL 10 mg/m³, ACGIH (TLV) TWA 5 mg/m³ (highly refined)

Chemical Name	European Union	The United Kingdom	Ireland
2,6-di-tert-butyl-p-cresol 128-37-0		STEL 30 mg/m³ TWA 10 mg/m³	TWA 10 mg/m³ STEL 30 mg/m³

Legend See section 16.***

Derived No Effect Level (DNEL)

DNEL Worker (Industrial/Professional)

Chemical Name	Short term, systemic effects	Short term, local effects	Long term, systemic effects	Long term, local effects
2,6-di-tert-butyl-p-cresol 128-37-0			5.8 mg/m³ inhalation 8.3 mg/kg bw/day dermal	

DNEL Consumer

Chemical Name	Short term, systemic effects	Short term, local effects	Long term, systemic effects	Long term, local effects
2,6-di-tert-butyl-p-cresol 128-37-0			5 mg/kg bw/day dermal	

Predicted No Effect Concentration (PNEC)

Chemical Name	Water	Sediment	Soil	Air	STP	Oral
2,6-di-tert-butyl-p-cresol 128-37-0	0.004 mg/L fw 0.004 mg/L mw 0.004 mg/L ir	1.29 mg/kg sediment dw fw	1.04 mg/kg soil dw		100 mg/L	16.7 mg/kg food

8.2. Exposure controls

Occupational Exposure Controls

Engineering measures

Apply technical measures to comply with the occupational exposure limits. Ensure adequate ventilation, especially in confined areas. When working in confined spaces (tanks,

containers, etc.), ensure that there is a supply of air suitable for breathing and wear the recommended equipment.***

Personal protective equipment

General Information	Protective engineering solutions should be implemented and in use before personal protective equipment is considered. These recommendations apply to the product as supplied.***
Respiratory protection	None under normal use conditions. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Respirator with combination filter for vapour/particulate (EN 14387). Type A/P1. Warning ! filters have a limited use duration. The use of breathing apparatus must comply strictly with the manufacturer's instructions and the regulations governing their choices and uses.
Eye protection	If splashes are likely to occur, wear:. Safety glasses with side-shields. EN 166.
Skin and body protection	Wear suitable protective clothing. Protective shoes or boots. Long sleeved clothing. Type 4/6.
Hand protection	Hydrocarbon-proof gloves. Fluorinated rubber. Nitrile rubber. In case of prolonged contact with the product, it is recommended to wear gloves complying with EN 420 and EN 374 standards, protecting at least for 480 minutes and having a thickness of 0,38 mm at least. These values are indicative only. The level of protection is provided by the material of the glove, its technical characteristics, its resistance to the chemicals to be handled, the appropriateness of its use and its replacement frequency. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time.

Environmental exposure controls

General Information	The product should not be allowed to enter drains, water courses or the soil.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Colour	beige
Physical state @20°C	solid
Odour	characteristic
Odour Threshold	No information available

Property	**Values**	**Remarks**	**Method**
pH		Not applicable	
Melting point/range		No information available	
Boiling point/boiling range		Not applicable	
Flash point		Not applicable	
Evapouration rate		No information available	

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Flammability Limits in Air

Upper		No information available
Lower		No information available
Vapour pressure		No information available
Vapour density		No information available
Relative density	0.930	@ 20 °C
Density	930 kg/m³	@ 20 °C
Water solubility		Insoluble
Solubility in other solvents		No information available
logPow		No information available***
Autoignition temperature		No information available
Decomposition temperature		No information available
Viscosity, kinematic		Not applicable
Explosive properties	Not explosive	
Oxidising properties	Not applicable	
Possibility of hazardous reactions	None under normal processing	

9.2. Other information

Freezing point No information available

Section 10: STABILITY AND REACTIVITY

10.1. Reactivity

General Information None under normal processing.***

10.2. Chemical stability

Stability Stable under recommended storage conditions.

10.3. Possibility of hazardous reactions

Hazardous reactions No dangerous reaction known under conditions of normal use.***

10.4. Conditions to avoid

Conditions to avoid Keep away from open flames, hot surfaces and sources of ignition. Keep away from heat and sparks.***

10.5. Incompatible materials

Materials to avoid Strong oxidising agents.***

10.6. Hazardous Decomposition Products

Hazardous Decomposition Products Incomplete combustion and thermolysis may produce gases of varying toxicity such as carbon monoxide, carbon dioxide, various hydrocarbons, aldehydes and soot.***

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Section 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Acute toxicity Local effects Product Information

Skin contact . Not classified based on available data. High pressure injection of the products under the skin may have very serious consequences even though no symptom or injury may be apparent.

Eye contact . Not classified based on available data.

Inhalation . Not classified based on available data.

Ingestion . Not classified based on available data. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

ATEmix (inhalation-dust/mist) 7.90 mg/l

Acute toxicity - Component Information

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
2,6-di-tert-butyl-p-cresol	LD50 > 5000 mg/kg (Rat - OECD 401)	LD50 5001 mg/kg (Rabbit - OECD 402)	

Sensitisation

Sensitisation Not classified based on available data.

Specific effects

Carcinogenicity Not classified based on available data.

Mutagenicity .

Germ cell mutagenicity Not classified based on available data.

Reproductive toxicity Not classified based on available data.

Repeated dose toxicity

Target Organ Effects (STOT)

Specific target organ systemic toxicity (single exposure) Not classified based on available data.

Specific target organ toxicity - repeated exposure Not classified based on available data.

Aspiration toxicity Not classified based on available data.

Other information

Other adverse effects Characteristic skin lesions (oil blisters) may develop following prolonged and repeated exposures (contact with contaminated clothing).

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Section 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Harmful to aquatic life with long lasting effects.

Acute aquatic toxicity - Product Information***

No information available.

Acute aquatic toxicity - Component Information

Chemical Name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates.	Toxicity to fish	Toxicity to microorganisms
2,6-di-tert-butyl-p-cresol 128-37-0	EC50 (72h) 0.5 mg/L (Desmodesmus subspicatus)	LC50 (48h) 0.61 mg/L (Daphnia magna - OECD 202)	LC50 (96h) > 0.57 mg/L (Danio rerio)	

Chronic aquatic toxicity - Product Information
No information available.

Chronic aquatic toxicity - Component Information
.

Chemical Name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates.	Toxicity to fish	Toxicity to microorganisms
2,6-di-tert-butyl-p-cresol 128-37-0		NOEC (21d) 0.07 mg/L (Daphnia magna)		

Effects on terrestrial organisms
No information available.***

12.2. Persistence and Degradability

General Information
No information available.

12.3. Bioaccumulative potential

Product Information No information available.***

logPow No information available***
Component Information .

Chemical Name	log Pow
2,6-di-tert-butyl-p-cresol - 128-37-0	5.1

12.4. Mobility in soil

Soil Given its physical and chemical characteristics, the product has no soil mobility.***

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Air	Loss by evaporation is limited.***
Water	The product is insoluble and floats on water.***

12.5. Results of PBT and vPvB assessment

PBT and vPvB assessment	No information available.***

12.6. Other adverse effects

General Information	No information available.***

Section 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from residues / unused products	Should not be released into the environment. Do not empty into drains. Dispose of in accordance with the European Directives on waste and hazardous waste.
Contaminated packageing	Empty containers should be taken to an approved waste handling site for recycling or disposal.***
EWC Waste Disposal No	According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user based on the application for which the product was used. The following Waste Codes are only suggestions:. 12 01 12.
Other information	Refer to section 8 for safety and protective measures for disposal personnel.

Section 14: TRANSPORT INFORMATION

ADR/RID	not regulated
IMDG/IMO	not regulated
ICAO/IATA	not regulated

ADN

UN/ID No	ID9005
Hazard Class	9
Description	ID9005, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S., MOLTEN, 9 (2,6-di-tert-butyl-p-cresol)
Equipment Requirements	PP

Section 15: REGULATORY INFORMATION

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

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European Union

REACH
All substances contained in this mixture have been pre-registered, registered or are exempt from registration in accordance with Regulation (CE) No. 1907/2006 (REACh)

International Inventories

All the substances contained in this product are listed or exempted from listing in the following inventories:
Australia (AICS)
Canada (DSL/NDSL)
China (IECSC)
Europe (EINECS/ELINCS/NLP)
Japan (ENCS)
Korea (KECL)
Philippines (PICCS)
Taiwan (TCSI)
U.S.A. (TSCA)***

Further information

No information available

15.2. Chemical Safety Assessment

Chemical Safety Assessment No information available

15.3. National regulatory information

The United Kingdom

• Avoid exceeding occupational exposure limits (see section 8).

Ireland

• Avoid exceeding occupational exposure limits (see section 8).

Section 16: OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3
H400 - Very toxic to aquatic life
H410 - Very toxic to aquatic life with long lasting effects
H412 - Harmful to aquatic life with long lasting effects

Abbreviations, acronyms
ACGIH = American Conference of Governmental Industrial Hygienists
bw = body weight
bw/day = body weight/day
EC x = Effect Concentration associated with x% response
GLP = Good Laboratory Practice

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IARC = International Agency for Research of Cancer
LC50 = 50% Lethal concentration - Concentration of a chemical in air or a chemical in water which causes the death of 50% (one half) of a group of test animals
LD50 = 50% Lethal Dose - Chemical amount, given at once, which causes the death of 50% (one half) of a group of test animals
LL = Lethal Loading
NIOSH = National Institute of Occupational Safety and Health
NOAEL = No Observed Adverse Effect Level
NOEC = No Observed Effect Concentration
NOEL = No Observed Effect Level
OECD = Organization for Economic Co-operation and Development
OSHA = Occupational Safety and Health Administration
UVCB = Substance of unknown or Variable composition, Complex reaction products or Biological material
ATE = Acute Toxicity Estimate
QSAR = Quantitative Structure-Activity Relationship
EL50 = median Effective Loading
NOELR = No Observed Effect Loading Rate
PAH = Polycyclic aromatic hydrocarbons
LOEC = Lowest Observed Effect Concentration
PVA = Polyvinyl alcohol
PVC = Polyvinyl chloride
ECOSAR = Ecological Structure Activity Relationships
CNS = Central nervous system
EPA = Environmental Protection Agency
ErL50 = effective loading on growth rate in algae test, to cause a 50% response
EbL50 = effective loading on growth with the control in algae test, to cause a 50% response
DNEL = Derived No Effect Level
PNEC = Predicted No Effect Concentration
dw = dry weight
fw = fresh water
mw = marine water
or = occasional release

Legend Section 8

OEL = Occupational Exposure Limit
TWA: Time Weight Average
STEL: Short Time Exposure Limit
PEL: Permissible exposure limit
REL: Recommended exposure limit
TLV: Threshold Limit Values

+	Sensitiser	*	Skin designation
**	Hazard Designation	C:	Carcinogen
M:	Mutagen	R:	Toxic to reproduction

Revision Date: 2019-09-10
Revision Note *** Indicates updated section.
This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

This safety data sheet serves to complete but not to replace the technical product sheets. The information contained herein is given in good faith and is accurate to the best of knowledge at the date indicated above.It is understood by the user that any use of the product for purposes other than those for which it was designed entails potential risk.The information given herein in no way dispenses the user from knowing and applying all provisions regulating his

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activity.The user bears sole liability for the precautions required when using the product.The regulatory texts indicated herein are intended to aid the user to fulfil his obligations. This list is not to be considered complete and exhaustive.It is the user's responsibility to ensure that he is subject to no other obligations than those mentioned.

End of Safety Data Sheet

LUBGES-AI-32073

1. Exposure scenario

Formulation additives, lubricants and greases, Industrial.

Use Descriptor
Sector of use
SU10 - Formulation
SU3 - Industrial Manufacturing (all)

Process category
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC3 - Use in closed batch process (synthesis or formulation)
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC15 - Use as laboratory reagent

Environmental release category
ERC2 - Formulation of preparations

Specific Environmental Release Category
ATIEL-ATC SpERC 2.Ai-I.v1.

Processes, tasks, activities covered
Industrial formulation of lubricant additives, lubricants and greases. Includes material transfers, mixing, large and small scale packing, sampling, maintenance.

2. Operational conditions and risk management measures

2.1. Control of environmental exposure

Amounts used

Annual site tonnage (tonnes/year): 22
Frequency and duration of use
Emission Days (days/year): 300

Environment factors not influenced by risk management

Local freshwater dilution factor: 10
Local marine water dilution factor: 100

Other operational conditions of use affecting environmental exposure
Negligible wastewater emissions as process operates without water contact.

Release fraction to air from process (after typical onsite RMMs): 5.00E-02
Release fraction to wastewater from process (after typical onsite RMMs and before (municipal) sewage treatment plant): 2.00E-01
Release fraction to soil from process (after typical onsite RMMs): 0
Technical conditions and measures at process level to prevent release
Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Prevent discharge of undissolved substance to or recover from onsite wastewater
User sites are assumed to be provided with oil/water separators and for waste water to be discharged via public sewer system

Organizational measures to prevent/limit release from the site
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Assumed domestic sewage treatment plant flow (m3/d): 2.00E+03

Conditions and measures related to external treatment of waste for disposal

External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

External recovery and recycling of waste should comply with applicable local and/or national regulations.

2.2. Control of exposure - Workers or Consumers

Product characteristics

2.2a. Control of worker exposure

Contributing Scenarios	Operational conditions and risk management measures

Remarks

No exposure assessment presented for human health.

2.2b. Control of consumer exposure

Product Category(ies)	Operational conditions and risk management measures

Remarks

Not applicable.

3. Exposure estimation and references

Health

The risk Management Mesures/Operational Conditions that are identified in the Exposure Scenario are the outcome of a quantitative and qualitative assessment that covers this product

Environment

Used ECETOC TRA model.

4. Guidance for Downstream User (DU) to check compliance with the Exposure scenario

Health

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries html). If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

General For further information see www.atiel.org/reach/introduction

LUBGES-BI-32073

1. Exposure scenario

General use of lubricants and greases in vehicles or machinery. Industrial.

Use Descriptor
Sector of use
SU3 - Industrial Manufacturing (all)

Process category
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Environmental release category
ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles
ERC7 - Industrial use of substances in closed systems

Specific Environmental Release Category
ATIEL-ATC SpERC 4.Bi.v1.

Processes, tasks, activities covered
Covers general use of lubricants and greases in vehiculs or machinery in closed systems. Includes filling and draining of containers and operation of enclosed machinery (including engines) and associated maintenance and storage activities.

2. Operational conditions and risk management measures

2.1. Control of environmental exposure

Amounts used

Annual site tonnage (tonnes/year): 16.5
Frequency and duration of use
Emission Days (days/year): 300

Environment factors not influenced by risk management

Local freshwater dilution factor: 10
Local marine water dilution factor: 100

Other operational conditions of use affecting environmental exposure
Negligible wastewater emissions as process operates without water contact.

Release fraction to air from process (after typical onsite RMMs): 1.00E-01
Release fraction to wastewater from process (after typical onsite RMMs and before (municipal) sewage treatment plant): 2.00E-01
Release fraction to soil from process (after typical onsite RMMs): 1
Technical conditions and measures at process level to prevent release
Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Prevent discharge of undissolved substance to or recover from onsite wastewater
User sites are assumed to be provided with oil/water separators and for waste water to be discharged via public sewer system

Organizational measures to prevent/limit release from the site
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Assumed domestic sewage treatment plant flow (m3/d): 2.00E+03

Conditions and measures related to external treatment of waste for disposal
External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste
External recovery and recycling of waste should comply with applicable local and/or national regulations.

2.2. Control of exposure - Workers or Consumers

Product characteristics

2.2a. Control of worker exposure

Contributing Scenarios	Operational conditions and risk management measures

Remarks
No exposure assessment presented for human health.

2.2b. Control of consumer exposure

Product Category(ies)	Operational conditions and risk management measures

Remarks
Not applicable.

3. Exposure estimation and references

Health
The risk Management Mesures/Operational Conditions that are identified in the Exposure Scenario are the outcome of a quantitative and qualitative assessment that covers this product

Environment
Used ECETOC TRA model.

4. Guidance for Downstream User (DU) to check compliance with the Exposure scenario

Health
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Environment
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries html). If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

General For further information see www.atiel.org/reach/introduction

LUBGES-BP-32073

1. Exposure scenario

General use of lubricants and greases in vehicles or machinery. Professional.

Use Descriptor
Sector of use
SU22 – Professional uses

Process category
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC20 - Heat and pressure transfer fluids in dispersive, professional use but closed systems

Environmental release category
ERC9a - Wide dispersive indoor use of substances in closed systems
ERC9b - Wide dispersive outdoor use of substances in closed systems

Specific Environmental Release Category
ATIEL-ATC SpERC 9.Bp.v1.

Processes, tasks, activities covered
Covers general use of lubricants and greases in vehiculs or machinery in closed systems. Includes filling and draining of containers and operation of enclosed machinery (including engines) and associated maintenance and storage activities.

2. Operational conditions and risk management measures

2.1. Control of environmental exposure

Amounts used

Annual site tonnage (tonnes/year): 27.5
Frequency and duration of use
Emission Days (days/year): 300

Environment factors not influenced by risk management

Local freshwater dilution factor: 10
Local marine water dilution factor: 100

Other operational conditions of use affecting environmental exposure
Negligible wastewater emissions as process operates without water contact.

Release fraction to air from process (after typical onsite RMMs): 0
Release fraction to wastewater from process (after typical onsite RMMs and before (municipal) sewage treatment plant): 0
Release fraction to soil from process (after typical onsite RMMs): 0
Technical conditions and measures at process level to prevent release
Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Prevent discharge of undissolved substance to or recover from onsite wastewater

Organizational measures to prevent/limit release from the site
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Assumed domestic sewage treatment plant flow (m3/d): 2.00E+03

Conditions and measures related to external treatment of waste for disposal
External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste
External recovery and recycling of waste should comply with applicable local and/or national regulations.

2.2. Control of exposure - Workers or Consumers

Product characteristics

2.2a. Control of worker exposure

Contributing Scenarios	Operational conditions and risk management measures

Remarks
No exposure assessment presented for human health.

2.2b. Control of consumer exposure

Product Category(ies)	Operational conditions and risk management measures

Remarks
Not applicable.

3. Exposure estimation and references

Health
The risk Management Mesures/Operational Conditions that are identified in the Exposure Scenario are the outcome of a quantitative and qualitative assessment that covers this product

Environment
Used ECETOC TRA model.

4. Guidance for Downstream User (DU) to check compliance with the Exposure scenario

Health
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Environment
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries html). If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

General For further information see www.atiel.org/reach/introduction

LUBGES-CI-32073

1. Exposure scenario

Use of lubricants and greases in open systems. Industrial.

Use Descriptor
Sector of use
SU3 - Industrial Manufacturing (all)

Process category
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC7 - Industrial spraying
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10 - Roller application or brushing
PROC13 - Treatment of articles by dipping and pouring

Environmental release category
ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles

Specific Environmental Release Category
ATIEL-ATC SpERC 4.Ci.v1.

Processes, tasks, activities covered
Covers use of lubricants and greases in open systems, including application of lubricant to work pieces or equipment by dipping, brushing or spraying (without exposure to heat), e.g. mould releases, corrosion protection, slideways. Includes associated product storage, material transfers, sampling and maintenance activities.

2. Operational conditions and risk management measures

2.1. Control of environmental exposure

Amounts used

Annual site tonnage (tonnes/year): 16.5
Frequency and duration of use
Emission Days (days/year): 300

Environment factors not influenced by risk management

Local freshwater dilution factor: 10
Local marine water dilution factor: 100

Other operational conditions of use affecting environmental exposure

Negligible wastewater emissions as process operates without water contact.

Release fraction to air from process (after typical onsite RMMs): 1.00E-01
Release fraction to wastewater from process (after typical onsite RMMs and before (municipal) sewage treatment plant): 2.00E-01
Release fraction to soil from process (after typical onsite RMMs): 1
Technical conditions and measures at process level to prevent release
Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Prevent discharge of undissolved substance to or recover from onsite wastewater
User sites are assumed to be provided with oil/water separators and for waste water to be discharged via public sewer system

Organizational measures to prevent/limit release from the site
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Assumed domestic sewage treatment plant flow (m3/d): 2.00E+03

Conditions and measures related to external treatment of waste for disposal

External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

External recovery and recycling of waste should comply with applicable local and/or national regulations.

2.2. Control of exposure - Workers or Consumers

Product characteristics

2.2a. Control of worker exposure

Contributing Scenarios	Operational conditions and risk management measures

Remarks

No exposure assessment presented for human health.

2.2b. Control of consumer exposure

Product Category(ies)	Operational conditions and risk management measures

Remarks

Not applicable.

3. Exposure estimation and references

Health

The risk Management Mesures/Operational Conditions that are identified in the Exposure Scenario are the outcome of a quantitative and qualitative assessment that covers this product

Environment

Used ECETOC TRA model.

4. Guidance for Downstream User (DU) to check compliance with the Exposure scenario

Health

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries html).
If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

General For further information see www.atiel.org/reach/introduction

LUBGES-CP-32073

1. Exposure scenario

Use of lubricants and greases in open systems. Professional.

Use Descriptor
Sector of use
SU22 – Professional uses

Process category
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC10 - Roller application or brushing
PROC11 - Non industrial spraying
PROC13 - Treatment of articles by dipping and pouring

Environmental release category
ERC8a - Wide dispersive indoor use of processing aids in open systems
ERC8d - Wide dispersive outdoor use of processing aids in open systems

Specific Environmental Release Category
ATIEL-ATC SpERC 8.Cp.v1.

Processes, tasks, activities covered
Covers use of lubricants and greases in open systems, including application of lubricant to work pieces or equipment by dipping, brushing or spraying (without exposure to heat), e.g. mould releases, corrosion protection, slideways. Includes associated product storage, material transfers, sampling and maintenance activities.

2. Operational conditions and risk management measures

2.1. Control of environmental exposure

Amounts used

Annual site tonnage (tonnes/year): 27.5
Frequency and duration of use
Emission Days (days/year): 365

Environment factors not influenced by risk management

Local freshwater dilution factor: 10
Local marine water dilution factor: 100

Other operational conditions of use affecting environmental exposure
Negligible wastewater emissions as process operates without water contact.

Release fraction to air from process (after typical onsite RMMs): 0
Release fraction to wastewater from process (after typical onsite RMMs and before (municipal) sewage treatment plant): 0
Release fraction to soil from process (after typical onsite RMMs): 0
Technical conditions and measures at process level to prevent release
Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Prevent discharge of undissolved substance to or recover from onsite wastewater

Organizational measures to prevent/limit release from the site
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Assumed domestic sewage treatment plant flow (m3/d): 2.00E+03

Conditions and measures related to external treatment of waste for disposal

External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

External recovery and recycling of waste should comply with applicable local and/or national regulations.

2.2. Control of exposure - Workers or Consumers

Product characteristics

2.2a. Control of worker exposure

Contributing Scenarios	Operational conditions and risk management measures

Remarks

No exposure assessment presented for human health.

2.2b. Control of consumer exposure

Product Category(ies)	Operational conditions and risk management measures

Remarks

Not applicable.

3. Exposure estimation and references

Health

The risk Management Mesures/Operational Conditions that are identified in the Exposure Scenario are the outcome of a quantitative and qualitative assessment that covers this product

Environment

Used ECETOC TRA model.

4. Guidance for Downstream User (DU) to check compliance with the Exposure scenario

Health

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries html).
If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

General For further information see www.atiel.org/reach/introduction

Safety Data Sheet

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

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

1.1. Product identifier

Product name **EB-BIOCIDE PLUS**
UFI : **K500-X0XH-400G-YK59**

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

Intended use **Biocide for Industrial Water**

Identified Uses	Industrial	Professional	Consumer
Additive for biocidal effect	✔	✔	-
Uses Advised Against			
Any use non-professional			
Any use not included among those recommended			

1.3 Details of the supplier of the safety data sheet

Name **EVERBLUE SRL**
Full address **Via Alberto Zanrè, 16**
District and Country **43051 - Loc. Gotra - Albareto (PR)**
Italia
tel. 0039 0525 1920100
Produced for Everblue S.r.l. by: **N. 408994 REA di Bologna**
e-mail address of the competent person responsible for the Safety Data Sheet **info@everblue.it**

Resp. for placing on the market: **EVERBLUE SRL**

1.4. Emergency telephone number

For urgent inquiries refer to **Italia:**
CAV Ospedale Niguarda Ca' Granda - Milano 02 66101029
CAV Azienda Ospedaliera Papa Giovanni XXII - Bergamo 800 883300
CAV Centro Nazionale di Informazione Tossicologica - Pavia 0382 24444
CAV Az. Osp. Careggi - Firenze 055 7947819
CAV Policlinico Gemelli - Roma 06 3054343
CAV Policlinico Umberto I - Roma 06 49978000
CAV Osp. Pediatrico Bambino Gesù - Roma 06 68593726
CAV Az. Osp. Cardarelli - Napoli 081 7472870
CAV Az. Osp. Univ. Foggia - Foggia 800183459

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.

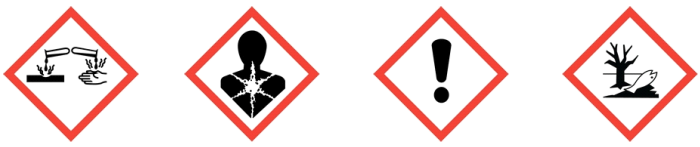
Hazard classification and indication:

Acute toxicity, category 4	H302	Harmful if swallowed.
Acute toxicity, category 4	H332	Harmful if inhaled.
Specific target organ toxicity - repeated exposure, category 1	H372	Causes damage to organs through prolonged or repeated exposure.
Serious eye damage, category 1	H318	Causes serious eye damage.
Skin irritation, category 2	H315	Causes skin irritation.
Skin sensitization, category 1	H317	May cause an allergic skin reaction.
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:

H302+H332	Harmful if swallowed or if inhaled.
H372	Causes damage to organs through prolonged or repeated exposure.
H318	Causes serious eye damage.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H411	Toxic to aquatic life with long lasting effects.

Precautionary statements:

P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P280	Wear protective gloves / eye protection / face protection.
P310	Immediately call a POISON CENTER/doctor.
P273	Avoid release to the environment.
P391	Collect spillage.
P261	Avoid breathing dust, fume, gas, mist, vapours, spray.

Contains: 2,2-dibromo-2-cyanoacetamide (DBNPA)

2.3. Other hazards

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

The product contains substances with endocrine disrupting properties in concentration ≥ 0,1%:

2,2-dibromo-2-cyanoacetamide (DBNPA)

Determination of endocrine-disrupting properties: For more information on substances with potential endocrine-disrupting properties, see https://edlists.org/
2,2 Dibromo-3-nitrilo-propionamide (CAS 10222-01-2) List II

SECTION 3. Composition/information on ingredients

3.1. Substances

Information not relevant

3.2. Mixtures

Contains:

Identification	x = Conc. %	Classification (EC) 1272/2008 (CLP)
2,2-dibromo-2-cyanoacetamide (DBNPA)		
CAS 10222-01-2	10 ≤ x < 15	Acute Tox. 2 H330, Acute Tox. 3 H301, STOT RE 1 H372, Eye Dam. 1 H318, Skin Irrit. 2 H315, Skin Sens. 1 H317, Aquatic Acute 1 H400 M=1, Aquatic Chronic 1 H410 M=1
EC 233-539-7		STA Oral: 100 mg/kg, STA Inhalation mists/powders: 0,051 mg/l
INDEX 607-747-00-7		
REACH Reg. EXEMPTED – Art. 15 (2) of REACH regulation		

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

General measures: Rescuers must be well equipped and well protected.
Inhalation: Transfer the involved person to a well-ventilated place. In the event of illness, get medical advice/attention.
Skin: Immediately remove all contaminated clothing. Rinse the skin or take a shower. In case of irritation, get medical advice/attention.
Eyes: Rinse thoroughly for several minutes. Possibly remove any contact lenses. Get medical advice/attention immediately.
Ingestion: Rinse mouth. DO NOT induce vomiting. Get medical advice/attention immediately.

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

Allergic reactions.

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

Following ingestion proceed with gastric lavage using activated carbon.
Rinse eyes thoroughly with physiological saline solution.

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.

2,2-dibromo-2-cyanoacetamide (DBNPA)
In case of fire, toxic gases such as nitrogen oxides, carbon monoxide, bromine compounds (eg HBr, Br_2) may develop.

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

Block the leakage if there is no hazard.
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. These indications apply for both processing staff and those involved in emergency procedures.

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.

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.

To avoid the release of the product, the packaging must be transported and stored in an upright position, as they are equipped with a safety valve caps.

Storage class TRGS 510 (Germany):
6.1D

7.3. Specific end use(s)

Information not available

SECTION 8. Exposure controls/personal protection

8.1. Control parameters

Information not available

8.2. Exposure controls

As the use of adequate technical equipment must always take priority over personal protective equipment, make sure that the workplace is well aired through effective local aspiration.
When choosing personal protective equipment, ask your chemical substance supplier for advice.
Personal protective equipment must be CE marked, showing that it complies with applicable standards.

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 personal protective equipment so as to guarantee maximum protection (e.g. reduction in replacement times).

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, failure time and permeability.
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 airtight protective goggles (see standard EN 166).

In the presence of risks of exposure to splashes or squirts during work, adequate mouth, nose and eye protection should be used to prevent accidental absorption.

RESPIRATORY PROTECTION
If the threshold value (e.g. TLV-TWA) is exceeded for the substance or one of the substances present in the product, use a mask with a type A filter whose class (1, 2 or 3) must be chosen according to the limit of use concentration. (see standard EN 14387). In the presence of gases or vapours of various kinds and/or gases or vapours containing particulate (aerosol sprays, fumes, mists, etc.) combined filters are required.
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. The protection provided by masks is in any case limited.
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.

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.

Protect the skin beforehand with special ointments.

SECTION 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

Properties	Value	Information
Appearance	liquid	
Colour	from colourless to light yellow	
Odour	none	
Odour threshold	not applicable	
Melting point / freezing point	< -23 °C	Method:ITL 71
Initial boiling point	> 100 °C	
Flammability	not flammable	
Lower explosive limit	not applicable	
Upper explosive limit	not applicable	
Flash point	> 60 °C	Method:ASTM D93
Auto-ignition temperature	not determined	
Decomposition temperature	not determined	
pH	2,5 ÷ 4,0	Method:ITL 70 Concentration: 100 %
		Temperature: 25 °C
Kinematic viscosity	< 100 mm2/s	Method:ITL 66 Remark:100 RPM; LCP
		Temperature: 25 °C
Dynamic viscosity	< 100 cPs	
Solubility	soluble in water	Method:ITL 73
Partition coefficient: n-octanol/water	not determined	
Vapour pressure	not determined	
Density and/or relative density	1,11 ÷ 1,21 g/ml	Method:ITL 15 B Temperature: 20 °C
Relative vapour density	not determined	
Particle characteristics	not applicable	

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Information not available

9.2.2. Other safety characteristics

Evaporation rate	not determined
Explosive properties	not applicable because it does not contain any explosives functional groups
Oxidising properties	not applicable because it does not contain any oxidizing functional groups

SECTION 10. Stability and reactivity

10.1. Reactivity

There are no particular risks of reaction with other substances in normal conditions of use.

10.2. Chemical stability

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

2,2-dibromo-2-cyanoacetamide (DBNPA)

In order to avoid adverse effects on the active substance, the product must not be diluted or mixed with other chemicals before use.

10.3. Possibility of hazardous reactions

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

2,2-dibromo-2-cyanoacetamide (DBNPA)

Exothermic reaction.
Contact with alkalis releases toxic gases.

It corrodes aluminum.

10.4. Conditions to avoid

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

To avoid adverse effects on the active product must not be mixed with other chemicals. Protect from temperatures> 35 ° C.

10.5. Incompatible materials

2,2-dibromo-2-cyanoacetamide (DBNPA)

Avoid contact with: strong bases,oxidising agents,amines,nucleophilic.

10.6. Hazardous decomposition products

2,2-dibromo-2-cyanoacetamide (DBNPA)

In decomposition develops: cyanogen bromide, dibromoacetonitrile.

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

May cause sensitization by skin contact.
Not mutagenic. Not teratogenic.

2,2-dibromo-2-cyanoacetamide (DBNPA)
Unless otherwise specified in the following paragraphs, for the involved substance toxicological data in the following list are considered not available: acute toxicity, skin corrosion/irritation, serious eye damage/irritation, respiratory or skin sensitisation, germ cell mutagenicity, carcinogenicity, reproductive toxicity, STOT - single exposure, STOT - repeated exposure, aspiration hazard.

Metabolism, toxicokinetics, mechanism of action and other information

Information not available

Information on likely routes of exposure

Information not available

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

ATE (Inhalation - mists / powders) of the mixture:	1,6 mg/l
ATE (Oral) of the mixture:	666,67 mg/kg
ATE (Dermal) of the mixture:	Not classified (no significant component)

2,2-dibromo-2-cyanoacetamide (DBNPA)

LD50 (Dermal):	> 2000 mg/kg Rabbit ATE mix at the concentration of 20%
LD50 (Oral):	590 mg/l Calculated ATE mix at the concentration of 20%
STA (Oral):	100 mg/kg estimate from table 3.1.2 of Annex I of the CLP (figure used for calculation of the acute toxicity estimate of the mixture)
LC50 (Inhalation mists/powders):	1,2 mg/l/4h Calculated ATE mix at the concentration of 20%
STA (Inhalation mists/powders):	0,051 mg/l estimate from table 3.1.2 of Annex I of the CLP (figure used for calculation of the acute toxicity estimate of the mixture)

2,2-dibromo-2-cyanoacetamide (DBNPA)
Harmful if swallowed or inhaled.

SKIN CORROSION / IRRITATION

Causes skin irritation

2,2-dibromo-2-cyanoacetamide (DBNPA)
It causes skin irritation (rabbit, OECD 404).

SERIOUS EYE DAMAGE / IRRITATION

Causes serious eye damage

2,2-dibromo-2-cyanoacetamide (DBNPA)
It causes serious eye injuries (rabbit, OECD 405).

RESPIRATORY OR SKIN SENSITISATION

Sensitising for the skin

Respiratory sensitization

Information not available

Skin sensitization

2,2-dibromo-2-cyanoacetamide (DBNPA)
It can cause a skin allergic reaction.

GERM CELL MUTAGENICITY

Does not meet the classification criteria for this hazard class

2,2-dibromo-2-cyanoacetamide (DBNPA)
Based on available data, the classification criteria are not met.

CARCINOGENICITY

Does not meet the classification criteria for this hazard class

2,2-dibromo-2-cyanoacetamide (DBNPA)
Based on available data, the classification criteria are not met.

REPRODUCTIVE TOXICITY

Does not meet the classification criteria for this hazard class

2,2-dibromo-2-cyanoacetamide (DBNPA)
Based on available data, the classification criteria are not met.

Adverse effects on sexual function and fertility

Information not available

Adverse effects on development of the offspring

Information not available

Effects on or via lactation

Information not available

STOT - SINGLE EXPOSURE

Does not meet the classification criteria for this hazard class

2,2-dibromo-2-cyanoacetamide (DBNPA)
Based on available data, the classification criteria are not met.

Target organs

Information not available

Route of exposure

Information not available

STOT - REPEATED EXPOSURE

Causes damage to organs

2,2-dibromo-2-cyanoacetamide (DBNPA)
It causes damage to the respiratory tract through prolonged and repeated exposure. Route of exposure: Inhalation.

Target organs

Information not available

Route of exposure

Information not available

ASPIRATION HAZARD

Does not meet the classification criteria for this hazard class

2,2-dibromo-2-cyanoacetamide (DBNPA)
Based on available data, the classification criteria are not met.

11.2. Information on other hazards

Based on the available data, the product contains the following endocrine disruptors in concentrations of 0.1% or greater by weight that may have endocrine disrupting effects on humans and cause adverse effects on the exposed individual or his or her progeny:

2,2-dibromo-2-cyanoacetamide (DBNPA)

2,2-dibromo-2-cyanoacetamide (DBNPA)
Endocrine Disrupting Properties: Affects the thyroid.

SECTION 12. Ecological information

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

2,2-dibromo-2-cyanoacetamide (DBNPA)
Toxicity to microorganisms:
EC50/3h = 4,6 mg/l (activated sludge, OECD 209).
2,2-dibromo-2-cyanoacetamide (DBNPA)

LC50 - for Fish	3,4 mg/l/96h Cyprinodon variegatus, OECD 203
EC50 - for Crustacea	0,72 mg/l/48h Mysidopsis bahia, US EPA-FIFRA 72-3
EC50 - for Algae / Aquatic Plants	2,3 mg/l/72h Desmodesmus subspicatus, OECD 201
Chronic NOEC for Fish	0,47 mg/l Oncorhynchus mykiss, 28d OECD 215
Chronic NOEC for Crustacea	0,06 mg/l Daphnia magna, 21d, OECD 211
Chronic NOEC for Algae / Aquatic Plants	0,36 mg/l Desmodesmus subspicatus, 72h OECD 201

12.2. Persistence and degradability

Level of biodegradation> 78% Readily biodegradable.
2,2-dibromo-2-cyanoacetamide (DBNPA)

Rapidly degradable
> 80 % OECD 303 A (literature)
12.3. Bioaccumulative potential

2,2-dibromo-2-cyanoacetamide (DBNPA)
It does not accumulate in organisms.
2,2-dibromo-2-cyanoacetamide (DBNPA)

Partition coefficient: n-octanol/water	0,52 Log Kow OECD 107 (Shake Flask Method)
BCF	13 Fish, OECD 305 literature

12.4. Mobility in soil
Information not available

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 ≥ than 0,1%.

12.6. Endocrine disrupting properties

2,2-dibromo-2-cyanoacetamide (DBNPA)
DBNPA is believed to have endocrine disrupting properties relevant to non-target organisms in the environment.
Based on the available data, the product contains the following endocrine disruptors in concentrations of 0.1% or greater by weight that may have endocrine disrupting effects on the environment and on animal species causing adverse effects on the exposed organisms or on their progeny:
2,2-dibromo-2-cyanoacetamide (DBNPA)

12.7. Other adverse effects

The product contains pollutants. Avoid release to the environment.

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.
Disposal must be performed through an authorised waste management firm, in compliance with national and local regulations.
Waste transportation may be subject to ADR restrictions.
CONTAMINATED PACKAGING
Contaminated packaging must be recovered or disposed of in compliance with national waste management regulations.

SECTION 14. Transport information

14.1. UN number or ID number

ADR / RID, IMDG, IATA: 3082

ADR / RID:	In accordance with Special Provision 375, this product, when is packed in receptacles of a capacity ≤ 5Kg or 5L, is not submitted to ADR provisions.
IMDG:	In accordance with Section 2.10.2.7 of IMDG Code, this product, when is packed in receptacles of a capacity ≤ 5Kg or 5L, is not submitted to IMDG Code provisions.
IATA:	In accordance with SP A197, this product, when is packed in receptacles of a capacity ≤ 5Kg or 5L, is not submitted to IATA dangerous goods regulations.

14.2. UN proper shipping name

ADR / RID:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (2,2-dibromo-3-nitrilopropionamide)
IMDG:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (2,2-dibromo-3-nitrilopropionamide)
IATA:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (2,2-dibromo-3-nitrilopropionamide)

14.3. Transport hazard class(es)

ADR / RID: Class: 9 Label: 9



IMDG:	Class: 9	Label: 9
IATA:	Class: 9	Label: 9



14.4. Packing group

ADR / RID, IMDG, IATA: III

14.5. Environmental hazards

ADR / RID:	Environmentally Hazardous
IMDG:	Marine Pollutant
IATA:	Environmentally Hazardous



14.6. Special precautions for user

ADR / RID:	HIN - Kemler: 90	Limited Quantities: 5 L	Tunnel restriction code: (-)
	Special provision: 274, 335, 375, 601		
IMDG:	EMS: F-A, S-F	Limited Quantities: 5 L	
IATA:	Cargo:	Maximum quantity: 450 L	Packaging instructions: 964
	Passengers:	Maximum quantity: 450 L	Packaging instructions: 964
	Special provision:	A97, A158, A197, A215	

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
Point 3

Contained substance

Point	75

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

not applicable

Substances in Candidate List (Art. 59 REACH)

On the basis of available data, the product does not contain any SVHC in percentage ≥ 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.

German regulation on the classification of substances hazardous to water (AwSV, vom 18. April 2017)

WGK 3: Severe hazard to waters

Other legislation:
REGULATION (EU) No 528/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 May 2012 concerning the making available on the market and use of biocidal products

15.2. Chemical safety assessment

A chemical safety assessment has not been performed for the preparation/for the substances indicated in section 3.

SECTION 16. Other information

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

Acute Tox. 2	Acute toxicity, category 2
Acute Tox. 3	Acute toxicity, category 3
Acute Tox. 4	Acute toxicity, category 4
STOT RE 1	Specific target organ toxicity - repeated exposure, category 1
Eye Dam. 1	Serious eye damage, category 1
Skin Irrit. 2	Skin irritation, category 2
Skin Sens. 1	Skin sensitization, category 1
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
H330	Fatal if inhaled.
H301	Toxic if swallowed.
H302+H332	Harmful if swallowed or if inhaled.
H372	Causes damage to organs through prolonged or repeated exposure.
H318	Causes serious eye damage.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
H411	Toxic to aquatic life with long lasting effects.

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
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- OEL: Occupational Exposure Level
- PBT: Persistent bioaccumulative and toxic as REACH Regulation
- PEC: Predicted environmental Concentration
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- 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 as for REACH Regulation
- 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
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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)
- 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 users:
The information contained in the present sheet are based on our own knowledge on the date of the last version. Users must verify the suitability and thoroughness of provided information according to each specific use of the product.
This document must not be regarded as a guarantee on any specific product property.
The use of this product is not subject to our direct control; therefore, users must, under their own responsibility, comply with the current health and safety laws and regulations. The producer is relieved from any liability arising from improper uses.
Provide appointed staff with adequate training on how to use chemical products.
CALCULATION METHODS FOR CLASSIFICATION
Chemical and physical hazards: Product classification derives from criteria established by the CLP Regulation, Annex I, Part 2. The data for evaluation of chemical-physical properties are reported in section 9.
Health hazards: Product classification is based on calculation methods as per Annex I of CLP, Part 3, unless determined otherwise in Section 11.
Environmental hazards: Product classification is based on calculation methods as per Annex I of CLP, Part 4, unless determined otherwise in Section 12.

Changes to previous review:
The following sections were modified:
02 / 11 / 12 / 13 / 14 / 15 / 16.

Information Sheet outside the scope of application of art. 31 of REACH Regulation

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

1.1. Product identifier
Product name **EVERBLUE 600**

1.2. Relevant identified uses of the substance or mixture and uses advised against
Intended use **Antiscalant for membranes**

Identified Uses	Industrial	Professional	Consumer
Additive for industrial water treatment	✔	-	-

Uses Advised Against

Any use not included among those recommended

1.3 Details of the supplier of the safety data sheet

Name	**EVERBLUE SRL**
Full address	**Via Alberto Zanrè, 16**
District and Country	**43051 - Loc. Gotra - Albareto (PR)** **Italia**
	tel. 0039 0525 1920100
Produced for Everblue S.r.l. by:	**N. 408994 REA di Bologna**
e-mail address of the competent person responsible for the Safety Data Sheet	**info@everblue.it**
Resp. for placing on the market:	**EVERBLUE SRL**

1.4. Emergency telephone number

For urgent inquiries refer to

Italia:
CAV Ospedale Niguarda Ca' Granda - Milano 02 66101029
CAV Azienda Ospedaliera Papa Giovanni XXII - Bergamo 800 883300
CAV Centro Nazionale di Informazione Tossicologica - Pavia 0382 24444
CAV Az. Osp. Careggi - Firenze 055 7947819
CAV Policlinico Gemelli - Roma 06 3054343
CAV Policlinico Umberto I - Roma 06 49978000
CAV Osp. Pediatrico Bambino Gesù - Roma 06 68593726
CAV Az. Osp. Cardarelli - Napoli 081 7472870
CAV Az. Osp. Univ. Foggia - Foggia 800183459

SECTION 2. Hazards identification

2.1. Classification of the substance or mixture

The product is not classified as hazardous pursuant to the provisions set forth in EC Regulation 1272/2008 (CLP) (and subsequent amendments and supplements).

Hazard classification and indication: --

2.2. Label elements

Hazard pictograms:	--
Signal words:	--
Hazard statements:	--
Precautionary statements:	--

2.3. Other hazards

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

SECTION 3. Composition/information on ingredients

3.1. Substances

Information not relevant

3.2. Mixtures

The product does not contain substances classified as being hazardous to human health or the environment pursuant to the provisions Regulation (EC) 1272/2008 (CLP) (and subsequent amendments and supplements) in such quantities as to require the statement.

SECTION 4. First aid measures

4.1. Description of first aid measures

Not specifically necessary. Observance of good industrial hygiene is recommended.

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

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

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

Information not available

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.

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

Use breathing equipment if fumes or powders are released into the air. These indications apply for both processing staff and those involved in emergency procedures.

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

Confine using earth or inert material. Collect as much material as possible and eliminate the rest using jets of water. 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.

SECTION 7. Handling and storage

7.1. Precautions for safe handling

Before handling the product, consult all the other sections of this material safety data sheet. Avoid leakage of the product into the environment. Do not eat, drink or smoke during use.

7.2. Conditions for safe storage, including any incompatibilities

Keep the product in clearly labelled containers. Keep containers away from any incompatible materials, see section 10 for details.

Storage class TRGS 510 (Germany):
12

7.3. Specific end use(s)
Information not available

SECTION 8. Exposure controls/personal protection

8.1. Control parameters

Information not available

8.2. Exposure controls

Comply with the safety measures usually applied when handling chemical substances.

HAND PROTECTION
None required.

SKIN PROTECTION
None required.

EYE PROTECTION
None required.

RESPIRATORY PROTECTION
None required, unless indicated otherwise in the chemical risk assessment.

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

SECTION 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

Properties	Value	Information
Appearance	liquid	
Colour	light yellow	
Odour	none	
Odour threshold	not available	
pH	6,8	Method:ITL 70 Remark:Range ± 0,5 Concentration:100 % Temperature:25 °C
Melting point / freezing point	-11 °C	
Initial boiling point	> 100 °C	
Boiling range	not available	
Flash point	> 100 °C	
Evaporation rate	not available	
Flammability of solids and gases	not applicable because the product is liquid	
Lower inflammability limit	not available	
Upper inflammability limit	not available	
Lower explosive limit	not applicable	
Upper explosive limit	not applicable	

Vapour pressure	not available	
Vapour density	not available	
Relative density	1,08 ÷ 1,18	Method:ITL 15 B Concentration:100 % Temperature:20 °C
Solubility	soluble in water	Method:ITL 73
Partition coefficient: n-octanol/water	not available	
Auto-ignition temperature	not applicable	
Decomposition temperature	not available	
Viscosity	< 10 cPs(100RPM/LCP/19,3°C)	Method:ITL 66 Remark:100 RPM; LCP Temperature:25 °C
Explosive properties	not applicable because it does not contain any explosives functional groups	
Oxidising properties	not applicable because it does not contain any oxidizing functional groups	

9.2. Other information

Information not available

SECTION 10. Stability and reactivity

10.1. Reactivity

There are no particular risks of reaction with other substances in normal conditions of use.

10.2. Chemical stability

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

10.3. Possibility of hazardous reactions

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

10.4. Conditions to avoid

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

10.5. Incompatible materials

Information not available

10.6. Hazardous decomposition products

Information not available

SECTION 11. Toxicological information

According to currently available data, this product has not yet produced health damages. Anyway, it must be handled according to good industrial practices.

11.1. Information on toxicological effects

Metabolism, toxicokinetics, mechanism of action and other information

Information not available

Information on likely routes of exposure

Information not available

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

ATE (Inhalation) of the mixture:	Not classified (no significant component)
ATE (Oral) of the mixture:	Not classified (no significant component)
ATE (Dermal) of the mixture:	Not classified (no significant component)

SKIN CORROSION / IRRITATION

Does not meet the classification criteria for this hazard class

SERIOUS EYE DAMAGE / IRRITATION

Does not meet the classification criteria for this hazard class

RESPIRATORY OR SKIN SENSITISATION

Does not meet the classification criteria for this hazard class

GERM CELL MUTAGENICITY

Does not meet the classification criteria for this hazard class

CARCINOGENICITY

Does not meet the classification criteria for this hazard class

REPRODUCTIVE TOXICITY

Does not meet the classification criteria for this hazard class

STOT - SINGLE EXPOSURE

Does not meet the classification criteria for this hazard class

STOT - REPEATED EXPOSURE

Does not meet the classification criteria for this hazard class

ASPIRATION HAZARD

Does not meet the classification criteria for this hazard class

SECTION 12. Ecological information

Use this product according to good working practices. Avoid littering. Inform the competent authorities, should the product reach waterways or contaminate soil or vegetation.

12.1. Toxicity

Information not available

12.2. Persistence and degradability

Information not available

12.3. Bioaccumulative potential

Information not available

12.4. Mobility in soil

Information not available

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 ≥ than 0,1%.

12.6. Other adverse effects

Information not available

SECTION 13. Disposal considerations

13.1. Waste treatment methods

Reuse, when possible. Neat product residues should be considered special non-hazardous waste.
Disposal must be performed through an authorised waste management firm, in compliance with national and local regulations.
CONTAMINATED PACKAGING
Contaminated packaging must be recovered or disposed of in compliance with national waste management regulations.

SECTION 14. Transport information

The product is not dangerous under current provisions of the Code of International Carriage of Dangerous Goods by Road (ADR) and by Rail (RID), of the International Maritime Dangerous Goods Code (IMDG), and of the International Air Transport Association (IATA) regulations.

14.1. UN number

not applicable

14.2. UN proper shipping name

not applicable

14.3. Transport hazard class(es)

not applicable

14.4. Packing group

not applicable

14.5. Environmental hazards

not applicable

14.6. Special precautions for user

not applicable

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

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: None

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

None

Substances in Candidate List (Art. 59 REACH)

On the basis of available data, the product does not contain any SVHC in percentage ≥ 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

Information not available

German regulation on the classification of substances hazardous to water (AwSV, vom 18. April 2017)

WGK 1: Low hazard to waters

15.2. Chemical safety assessment

A chemical safety assessment has not been performed for the preparation/for the substances indicated in section 3.

SECTION 16. Other information

LEGEND:
- ADR: European Agreement concerning the carriage of Dangerous goods by Road
- CAS: Chemical Abstract Service Number
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6. Regulation (EU) 618/2012 (III Atp. CLP) of the European Parliament
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18. Regulation (EU) 2020/217 (XIV Atp. CLP)
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Changes to previous review:
The following sections were modified:
01 / 02 / 03 / 06 / 08 / 09 / 11 / 15.

COLUMBUS CHEMICAL INDUSTRIES

Safety Data Sheet

Sodium Hydroxide 20% (w/w)

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Sodium Hydroxide 20% (w/w)

Synonyms/Generic Names: Caustic Soda Solution

Product Number: 9641

Product Use: Industrial, Manufacturing or Laboratory use

Manufacturer: Columbus Chemical Industries, Inc.
N4335 Temkin Rd.
Columbus, WI. 53925

For More Information: 920-623-2140 (Monday-Friday 8:00-4:30)
www.columbuschemical.com

In Case of Emergency Call: CHEMTREC - 800-424-9300 or 703-527-3887 (24 Hours/Day, 7 Days/Week)

2. HAZARDS IDENTIFICATION

Hazard Not Otherwise Classified (HNOC): None

Signal Words: Danger

Pictograms:



GHS Classification:

Skin corrosion	Category 1
Serious eye damage	Category 1
Acute aquatic toxicity	Category 3

GHS Label Elements, including precautionary statements:

Hazard Statements:

H314	Causes severe skin burns and eye damage.
H401	Harmful to aquatic life.

Precautionary Statements:

P260	Do not breathe dusts or mists.
P264	Wash hands thoroughly after handling.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P301+P330+P331	IF SWALLOWED: Rinse mouth. Do not induce vomiting.

P303+P361+P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER/doctor/physician.
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/container in accordance with local regulations.

Potential Health Effects

Eyes	Causes severe eye burns.
Inhalation	May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Skin	May be harmful if absorbed through skin. Causes skin burns.
Ingestion	May be harmful if swallowed.

NFPA Ratings

Health	3
Flammability	0
Reactivity	1
Specific hazard	Not Available

HMIS Ratings

Health	3
Fire	0
Reactivity	1

3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	Weight %	CAS #	EINECS# / ELINCS#	Formula	Molecular Weight
Sodium Hydroxide	19-21	1310-73-2	215-185-5	NaOH	40.00 g/mol
Water	Balance	7732-18-5	231-791-2	H_2O	18.00 g/mol

4. FIRST-AID MEASURES

Eyes	Rinse with plenty of water for at least 15 minutes and seek medical attention immediately.
Inhalation	Move casualty to fresh air and keep at rest. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention immediately.
Skin	Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and wash using soap. Get medical attention immediately.
Ingestion	**Do Not Induce Vomiting!** Never give anything by mouth to an unconscious person. If conscious, wash out mouth with water. Get medical attention.

5. FIRE-FIGHTING MEASURES

Suitable (and unsuitable) extinguishing media	Product is not flammable. Use appropriate media for adjacent fire. Cool containers with water.
Special protective equipment and precautions for firefighters	Wear self-contained, approved breathing apparatus and full protective clothing, including eye protection and boots.
Specific hazards arising from the chemical	Emits toxic fumes (sodium oxides) under fire conditions. (See also Stability and Reactivity section).

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	See section 8 for recommendations on the use of personal protective equipment.
Environmental precautions	Prevent spillage from entering drains. Any release to the environment may be subject to federal/national or local reporting requirements.
Methods and materials for containment and cleaning up	Neutralize spill. Absorb spill with noncombustible absorbent material, then place in a suitable container for disposal. Clean surfaces thoroughly with water to remove residual contamination. Dispose of all waste and cleanup materials in accordance with regulations.

7. HANDLING AND STORAGE

Precautions for safe handling
See section 8 for recommendations on the use of personal protective equipment. Use with adequate ventilation. Wash thoroughly after using. Keep container closed when not in use. Avoid formation of aerosols.

Conditions for safe storage, including any incompatibilities
Store in cool, dry well ventilated area. Keep away from incompatible materials (see section 10 for incompatibilities).

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational exposure controls:

Component	Exposure Limits	Basis	Entity
Sodium Hydroxide	2 mg/m^3	CEIL	ACGIH
	2 mg/m^3	PEL	OSHA
	2 mg/m^3	CEIL	NIOSH

TWA: Time Weighted Average over 8 hours of work.
TLV: Threshold Limit Value over 8 hours of work.
REL: Recommended Exposure Limit
PEL: Permissible Exposure Limit
STEL: Short Term Exposure Limit during x minutes.
IDLH: Immediately Dangerous to Life or Health
WEEL: Workplace Environmental Exposure Levels
CEIL: Ceiling

Personal Protection

Eyes	Wear chemical safety glasses or goggles, and face shield.
Inhalation	Provide local exhaust, preferably mechanical. If exposure levels are excessive, use an approved respirator.
Skin	Wear nitrile or rubber gloves, and full body covering. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Other	Not Available

Other Recommendations
Provide eyewash stations, quick-drench showers and washing facilities accessible to areas of use and handling.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance (physical state, color, etc.)	Colorless liquid.
Odor	Odorless.
Odor threshold	Not Available
pH	Not Available
Melting point/freezing point	Not Available
Initial boiling point and boiling range	Not Available
Flash point	Not Flammable
Evaporation rate	Not Available
Flammability (solid, gas)	Not Flammable
Upper/lower flammability or explosive limit	Not Explosive
Vapor pressure	Not Available
Vapor density	Not Available
Specific gravity	1.2200
Solubility (ies)	Soluble in water.
Partition coefficient: n-octanol/water	Not Available
Auto-ignition temperature	Not Applicable
Decomposition temperature	Not Available

10. STABILITY AND REACTIVITY

Chemical Stability	Stable
Possibility of Hazardous Reactions	Will not occur.
Conditions to Avoid	Not Available
Incompatible Materials	Acids, organic materials, chlorinated solvents, aluminum, phosphorus, zinc, tin.
Hazardous Decomposition Products	Sodium oxides.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Sodium Hydroxide

Skin	Not Available
Eyes	Not Available
Respiratory	Not Available
Ingestion	Not Available

Carcinogenicity

IARC	No components of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH	No components of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP	No components of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA	No components of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Signs & Symptoms of Exposure

Skin	Extent of damage depends on duration of contact. Burning, itching, redness, inflammation or swelling of exposed tissues.
Eyes	Eye burns, watering eyes.

Respiratory	Burning, choking, coughing, wheezing, laryngitis, shortness of breath, headache, nausea.
Ingestion	Burning, choking, nausea, vomiting, severe pain.

Chronic Toxicity	Not Available
Teratogenicity	Not Available
Mutagenicity	Not Available
Embryotoxicity	Not Available
Target Organ(s)	Kidney, Liver, Eyes, Skin, Mucous membranes, Respiratory system, Cardiovascular system
Reproductive Toxicity	Not Available
Respiratory/Skin Sensitization	Not Available

12. ECOLOGICAL INFORMATION

Ecotoxicity

Sodium Hydroxide

Aquatic Vertebrate	Not Available
Aquatic Invertebrate	Not Available
Terrestrial	Not Available

Persistence and Degradability	Not Available
Bioaccumulative Potential	Not Available
Mobility in Soil	Not Available
PBT and vPvB Assessment	Not Available
Other Adverse Effects	Not Available

13. DISPOSAL CONSIDERATIONS

Waste Product or Residues	Users should review their operations in terms of the applicable federal/national or local regulations and consult with appropriate regulatory agencies if necessary before disposing of waste product or residue.
Product Containers	Users should review their operations in terms of the applicable federal/national or local regulations and consult with appropriate regulatory agencies if necessary before disposing of waste product container.

The information offered in section 13 is for the product as shipped. Use and/or alterations to the product may significantly change the characteristics of the material and alter the waste classification and proper disposal methods.

14. TRANSPORTATION INFORMATION

US DOT	UN1824, Sodium hydroxide solution, 8, pg II
TDG	UN1824, SODIUM HYDROXIDE SOLUTION, 8, pg II
IMDG	UN1824, SODIUM HYDROXIDE SOLUTION, 8, pg II
Marine Pollutant	No
IATA/ICAO	UN1824, Sodium hydroxide solution, 8, pg II

15. REGULATORY INFORMATION

TSCA Inventory Status	All ingredients are listed on the TSCA Active inventory.

DSL / NDSL	All ingredients are listed on the DSL inventory.
California Proposition 65	Not Listed
Rhode Island: Hazardous Substance List	Listed: Sodium Hydroxide
Massachusetts: Toxic or Hazardous Substance List, Right to Know	Not Listed
Pennsylvania: Hazardous Substance List	Listed: Sodium Hydroxide
New Jersey: Right to Know Hazardous Substance List	Listed: Sodium Hydroxide
SARA 302	Not Listed
SARA 304	Not Listed
SARA 311	Acute Health Hazard.
SARA 312	Acute Health Hazard.
SARA 313	Not Listed
WHMIS Canada	Class E: Corrosive material.

16. OTHER INFORMATION

Revision	Date
Original	12/03/2012
Revision 1	07/09/2013
Revision 2	03/21/2016
Revision 3	03/28/2022

Disclaimer: The information provided in this Safety Data Sheet (“SDS”) is correct to the best of our knowledge, information, and belief at the date of publication. The information in this SDS relates only to the specific Product identified under Section 1, and does not relate to its use in combination with other materials or products, or its use as to any particular process. Those handling, storing, or using the Product should satisfy themselves that they have current information regarding the particular way the Product is handled, stored or used and that the same is done in accordance with federal, state and local law. WE DO NOT MAKE ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING (WITHOUT LIMITATION) WARRANTIES WITH RESPECT TO THE COMPLETENESS OR CONTINUING ACCURACY OF THE INFORMATION CONTAINED HEREIN OR WITH RESPECT TO FITNESS FOR ANY PARTICULAR USE. WE DO NOT ASSUME RESPOSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS, INJURY, DAMAGE OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE HANDLING, STORAGE, USE OR DISPOSAL OF THIS PRODUCT.

SCHEDA TECNICA

MAINTAIN FRICOFIN EC

Liquido anticongelante e protettivo concentrato per sistemi di raffreddamento di vetture, mezzi pesanti, autobus, macchinario agricolo, edile ed industriale.

Descrizione

I sistemi di raffreddamento dei moderni motori a combustione interna raffreddati a liquido sono sempre più esigenti sulla qualità dei liquidi di raffreddamento. Questi non devono unicamente garantire protezione alle basse temperature, ma, a concentrazioni relativamente basse, devono assicurare protezione contro la corrosione, l'usura, la formazione di depositi e di schiuma. E' inoltre fondamentale evitare la corrosione di tubazioni e condotti. Infine, il liquido deve mantenere piena efficacia per tutto il periodo di utilizzo indicato dal Costruttore, e deve essere miscibile e compatibile con liquidi anticongelanti di altre Case. MAINTAIN FRICOFIN EC è un antigelo a lunga durata, esente da fosfati, nitriti ed ammine. Adatto per radiatori di autovetture, veicoli commerciali, autobus, mezzi pesanti, macchinario agricolo ed industriale.

Vantaggi

- Compatibile con tutti i materiali usati per le tenute e le guarnizioni.
- Mantenimento delle prestazioni e dell'efficacia degli additivi per tutto il periodo di funzionamento.
- Funzionamento ottimale anche su motori in lega di alluminio.
- Esente da nitriti, ammine e fosfati (come richiesto da alcuni Costruttori per impiego su motori in lega di alluminio).

Applicazioni

- MAINTAIN FRICOFIN EC è idoneo per l'impiego su sistemi di raffreddamento "aperti" o "chiusi".
- Diluire MAINTAIN FRICOFIN EC in acqua distillata. Non usare acqua di rubinetto, piovana, o di pozzo per evitare problemi di inquinamento.
- Eccellente protezione anticorrosiva a concentrazioni del 15% in volume.
- Aggiungere il quantitative di MAINTAIN FRICOFIN EC secondo il grado di protezione richiesto, ed il quantitativo di acqua necessario, quindi lasciar girare il motore per circa 10 minuti con il circuito di raffreddamento aperto. Ciò garantirà la corretta e completa miscelazione.
- MAINTAIN FRICOFIN EC dovrebbe essere utilizzato miscelato con acqua al 35% durante tutto l'anno, a garanzia di protezione contro la corrosione, la formazione di morchie etc. L'utilizzo di sola acqua in estate causa formazione di ruggine e depositi, oltre a non permettere un corretto scambio di calore. L'utilizzo continuo di MAINTAIN FRICOFIN garantisce il perfetto funzionamento di tutte le parti del sistema (termostato, valvole). Inoltre, l'innalzamento del punto di ebollizione della miscela, consente di guidare in sicurezza anche in condizioni climatiche critiche.
- Il livello di protezione di MAINTAIN FRICOFIN EC può essere testato con qualsiasi strumento adatto allo scopo normalmente in commercio.
- E' consigliato evitare concentrazioni troppo elevate poiché le proprietà refrigeranti peggiorano a concentrazioni superiori al 70%. La concentrazione ideale è sempre intorno al 50%; infatti il punto di congelamento della miscela 50:50 in acqua è circa -40°C, ma solo circa -20°C per il prodotto puro.

Le informazioni contenute nella presente Scheda Tecnica sono fornite al meglio delle nostre attuali conoscenze, ed in base a specifiche di produzione.
Possono pertanto subire variazioni senza preavviso.

FUCHS Lubrificanti S.p.A.
14021 Buttigliera d'Asti (AT)
Via Riva, 16 Italia
tel ++39119922.811
fax ++39119922857
E-mail: info.auto@fuchslubrificanti.it
www.fuchslubrificanti.it

Un inquinamento di antigelo dello 0,1% all'interno dell'olio motore, può portare difetti di lubrificazione del sistema. Se l'inquinamento da antigelo è ricorrente la causa è da ricercare in una scarsa tenuta della guarnizione di testa. In caso di inquinamento di antigelo nell'olio motore, la semplice sostituzione di quest'ultimo potrebbe non essere sufficiente. Per rimuovere completamente l'antigelo dal circuito dell'olio motore è di solito necessario un flussaggio con olio motore nuovo per circa 30 minuti o con prodotti appositamente dedicati; al termine l'olio motore va completamente sostituito.

- L'antigelo tal quale non deve essere stoccato all'aperto a basse temperature in inverno poichè potrebbe scatenarsi una contaminazione fungina, che tuttavia non ha effetto sulle prestazioni del fluido.

Adatto per l'uso in veicoli / applicazioni che richiedono le seguenti specifiche:

- ASTM D 3306 - S.A.E. J 814
- ASTM D 4340 - S.A.E. J 1034
- CUNA NC 956 - 16
- B.S. 6580
- FIAT/Chrysler,
- Porsche
- VW/Audi/Seat/Skoda
  TL 774 C (G11)
- Mercedes-Benz
- BMW
- Opel/Chevrolet
- MAN 324 NF
- VOLVO
- Ford

Scala di protezione

Vol. % MAINTAIN FRICOFIN	*Protezione anticorrosiva a:*
15%	-7°C
20%	-10°C
25%	-14°C
30%	-18°C
35%	-23°C
40%	-28°C
45%	-33°C
50%	-38°C

Caratteristiche Medie Indicative

Proprietà	*U. M.*	*Valore*	*Metodo*
Fluido base		Glicole etilenico	DIN 51 511
Colore		Blu	
Densità a 20°C	g/ml	1.22	ASTM D 1298
Ebollizione	°C	165	ASTM D 1120
Infiammabilità	°C	120	ASTM D 92
Ris. Alcalina	ml HCl 0.1N	14	ASTM D 1121
pH al 50%		7.2	ASTM D 1287
Conten. acqua	% peso	< 2.5	ASTM D 1123

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www.fuchslubrificanti.it

MATERIAL SAFETY DATA SHEET

1. IDENTIFICATION

Product Name	:	Carbon Dioxide
Use	:	Fire Extinguishing and Propellant
Supplier	:	Britannia Fire Limited Ashwellthorpe Industrial Estate Ashwellthorpe NR16 1ER United Kingdom
Telephone	:	+44 (0) 1508 488416
E mail	:	sales@britannia-fire.co.uk

2. HAZARDS IDENTIFICATION

Hazards identification : Liquified gas.
: In high concentrations may cause asphyxiation.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance name	Contents	CAS No	EC No	Annex No	Classification
Carbon Dioxide	100%	124-38-9	204-696-9	-------	

4. FIRST AID MEASURES

Inhalation : In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Low concentrations of CO2 cause increased respiration and headache. Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Skin/eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance.

Ingestion : Ingestion is not considered a potential route of exposure.

5. FIREFIGHTING MEASURES

Not applicable as carbon dioxide is non-flammable and non-combustible. Exposure to fire may cause containers to rupture/explode.

6. ACCIDENTAL RELEASE

6.4. Reference to other sections

Personal precautions : Evacuate area.
Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.

Ensure adequate air ventilation.

Environmental precautions	:	Try to stop release. Prevent entry to sewers, basements and workpits, or any place where its accumulation can be dangerous.
Clean up methods	:	Ventilate area.

7. HANDLING AND STORAGE

Storage handling	:	Keep container below 50◦C in a well ventilated place. Suck back of water into the container must be prevented. Do not allow backfeed into container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Refer to suppliers container handling instructions.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal protection	:	Ensure adequate ventilation.
Occupational Exposure Limits	:	Carbon dioxide : TLV©-TWA (ppm): 5000 Carbon dioxide : TLV©-STEL (ppm): 30000 Carbon dioxide : OEL (UK)-LTEL (ppm) : 5000 Carbon dioxide : OEL (UK) -STEL (pm) : 15000 Carbon dioxide : MAK – Germany (ppm) : 5000

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state at 20◦c	:	Liquefied gas.
Colour	:	Colourless
Odour	:	No odour warning properties.
Molecular weight	:	44
Melting point (◦C)	:	-56.6
Boiling point (◦C)	:	-78.5 (s)
Critical temperature (◦C)	:	30
Vapour pressure (20◦C)	:	57.3bar
Relative density, gas (air=1)	:	1.52
Solubility in water (mg/l)	:	2000
Flammability range (vol% in air)	:	Non flammable
Other data	:	Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

10. STABILITY AND REACTIVITY

Stability and reactivity	:	Stable under normal conditions.

11. TOXICOLOGICAL INFORMATION

Toxicity information	:	In high concentrations cause rapid circulatory insufficiency. Symptoms are headache, nausea and vomiting, which may lead to unconsciousness.

12. ECOLOGICAL INFORMATION

Ecological effects information	:	When discharged in large quantities may contribute to the greenhouse effect.
Global warming factor (CO2=1)	:	1

13. DISPOSAL

General	:	Do not discharge into any place where its accumulation could be dangerous to atmosphere in a well vented place. Discharge to atmosphere in large quantities should be avoided. Contact supplier if guidance is require.

14. TRANSPORT INFORMATION

14.1 When transported in a cartridge or side cylinder the cylinder is considered a class 2.2 hazard. The proper shipping name shall be CARBON DIOXIDE and the number is UN1013

UN Number
UN 1013
UN proper shipping name
Carbon Dioxide
Transport hazard class(es)
2.2
Packaging group
Not applicable

14.2 When transported in a stored pressure or cartridge type fire extinguisher, the fire extinguisher is considered a class 2.2 hazard. The proper shipping name shall be FIRE EXTINGUISHER and the number is UN 1044.

UN Number
UN 1044
UN proper shipping name
Fire extinguisher
Transport hazard class(es)
2.2
Packaging group
Not applicable

15. REGULATORY INFORMATION

EC Classification	:	Not included in Annex 1. Not classified as dangerous preparation/substance.
EC Labelling	:	No EC labelling required.
Symbols	:	None
R Phase(s)	:	None
S Phase(s)	:	None

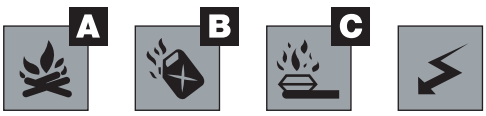
16. OTHER INFORMATION

Training advice	: Asphyxiant in high concentrations. Keep container in a well ventilated place. Do not breathe the gas. Contact with liquid may cause cold burns/frostbite.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. Information source (data sheet) original chemical supplier Air Liquide. The information given is designed only as guidance for safe handling, uses processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The above information relates only to the specific material(s) designated herein and may not be valid for such material(s) used in combination with any other materials or in any process or if the material is altered or processed, unless specified in the text.

PLEASE NOTE: For every 1kg of Co2 in your premises you must ensure you have 5.5 metres of space.

Britannia Premier
Cartridge Operated Fire Extinguisher
BA9 - ABC Dry Powder



POWDER



BA9
ABC Dry Powder



ABC 40 powder is a combination of Mono-ammonium phosphate and ammonium sulphate.

On Class A fires the particles fuse and swell to form a barrier which excludes oxygen and prevents re-ignition. On Class B fires the powder interferes with the chemical reactions, thus the flame ceases to exist.

ABC 40 powder is nonconductive and will extinguish Class A (carbonaceous) fires, Class B (flammable liquid) fires and Class C (flammable gas) fires.

Marine Model Available.

Features

- Manufactured in Great Britain
- Britannia offer a 7 year quality guarantee against material defects and workmanship
- Die cast zinc colour coded headcap
- Large neck ring enables servicing, refilling and internal inspection to be conducted with ease
- 150 gram CO_2 cartridge
- All weather service indicator studs
- Additional anti-corrosion treatment available
- Patented balance valve for ultimate fluidization of compacted powder ensuring complete discharge
- Main approvals and certifications as below

EN3







TECHNICAL SPECIFICATION

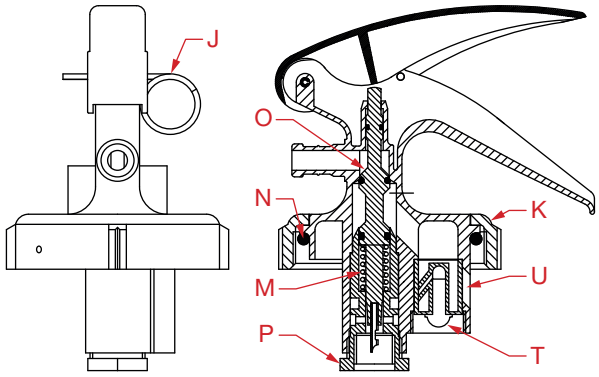
Model	Capacity (Kg)	Fire Rating	Full Weight (Kgs)	Temp Range	Operating Pressure (Bar) @ 20ºC	Discharge Duration (Secs)	Discharge Range (M)	Diameter (mm)	Height (mm)
BA9	9	34A/233B	15.4	-20º to + 60ºC	12	26	7	190	570

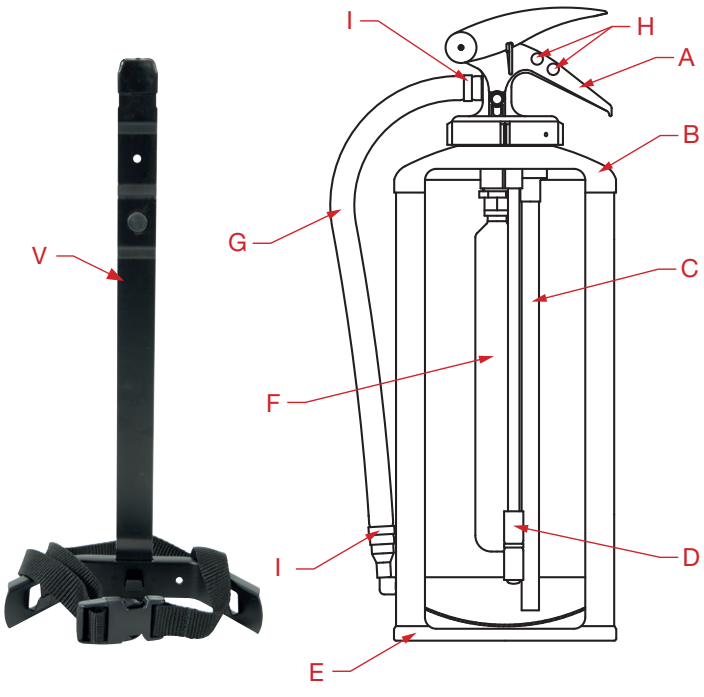
SPECIFICATIONS

Gas Cartridge	150gram CO_2
Operating Pressure @ 20°C	12bar
Test Pressure (PT)	26bar
Maximum Allowable Pressure (PS)	18bar
Minimum Burst Pressure	55bar
Cylinder Material	1.6mm Thick Mild Steel to EN 10111 - DD12
Operating Head Material	Zinc Alloy to EN 1774 - ZnA14 (ZL3)
Hose and Nozzle	Hose - EPDM Synthetic Rubber
Finish - Red RAL3000 UV Protection	Polyester Powder Paint - Thickness (85 microns avg)
Anti-Corrosion Treatment if Requested	Zinc Coating

COMPONENT PARTS

Item	Description	Part No.
A	Headcap Assembly	BRH1100B
B	Welded Body Assembly	BODYLUL
C	Syphon Tube Assembly	BRH-ST09P
D	Gas Tube Assembly	BR0680
E	Skirt Ring	BRH0460
F	Cartridge	C150
G	Hose Assembly and Nozzle	BR0502
H	Service Indicator Stud (Colour Coded) 1. Service Year, 2. Discharge Year	BRH0185
I	Oetiker Clip	BR0540
J	Safety Pin	BRH0180
K	Nut Ring	BRH0105
L		
M	Spring	BRH0200
N	O Ring	BRH0230
O	Valve Control Assembly	BRH0400
P	Cartridge/Valve Holder	BRH0120
Q		
R		
S		
T	Balance Valve	BRH0140
U	Balance Valve Holder	BRH0130
V	Transport Bracket & Strap	BRH0310
-	Pull Tight Seal	BRH0175
-	Wall Bracket	BRH0195
-	9kg ABC 40 Powder refill	PA9
-	Cartridge Spanner	SPANNER22MM
-	Headcap Spanner	HCS
-	Valve Holder Ring Spanner	SPANNER27MM





Safety Data Sheet
Ethylene glycol

Version 1.11 Revision Date: 09/01/2019

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Ethylene glycol

Recommended use of the chemical and restrictions on use

Recommended use : Industrial chemical

Manufacturer or supplier's details

Company : Univar Solutions USA, Inc.
Address 3075 Highland Pkwy Suite 200
Downers Grove, IL 60515
United States of America (USA)

Emergency telephone number:
Transport North America: CHEMTREC (1-800-424-9300)
CHEMTREC INTERNATIONAL Tel # 703-527-3887

Additional Information: : Responsible Party: Product Compliance Department
E-mail: SDSNA@univarsolutions.com
SDS Requests: 1-855-429-2661
Website: www.univarsolutions.com

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Acute toxicity (Oral) : Category 4

Specific target organ toxicity - repeated exposure : Category 2 (Kidney)

GHS label elements

Hazard pictograms :



Signal word : Warning

Hazard statements : H302 Harmful if swallowed.
H373 May cause damage to organs through prolonged or repeated exposure.

Precautionary statements : **Prevention:**
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
Response:
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P314 Get medical advice/ attention if you feel unwell.
Disposal:
P501 Dispose of contents/ container to an approved waste dis-

posal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Hazardous components

CAS-No.	Chemical name	Weight percent
107-21-1	Ethylene glycol	90 - 100
111-46-6	Diethylene glycol	0 - 5

Any Concentration shown as a range is due to batch variation.

Synonyms : Ethylene glycol Industrial/Ethylene glycol Meglobal/Glycol/Solv Ethylene glycol,

SECTION 4. FIRST AID MEASURES

General advice : Move out of dangerous area.
Show this safety data sheet to the doctor in attendance.
Do not leave the victim unattended.

If inhaled : If unconscious, place in recovery position and seek medical advice.
If symptoms persist, call a physician.

In case of skin contact : Wash off with soap and water.
Wash clothing before reuse.
If skin irritation persists, call a physician.

In case of eye contact : Flush eyes with water as a precaution.
Remove contact lenses.
Protect unharmed eye.
Keep eye wide open while rinsing.
If eye irritation persists, consult a specialist.

If swallowed : Do not induce vomiting without medical advice.
Keep respiratory tract clear.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.
Take victim immediately to hospital.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Foam
Dry chemical

Carbon dioxide (CO2)

Unsuitable extinguishing media	:	High volume water jet
Specific hazards during fire-fighting	:	Do not allow run-off from fire fighting to enter drains or water courses.
Hazardous combustion products	:	Carbon oxides toxic fumes
Further information	:	Standard procedure for chemical fires. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Special protective equipment for firefighters	:	Wear self-contained breathing apparatus for firefighting if necessary. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up	:	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion	:	Normal measures for preventive fire protection.
Advice on safe handling	:	Do not breathe vapours/dust. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Dispose of rinse water in accordance with local and national regulations.
Conditions for safe storage	:	Keep container tightly closed in a dry and well-ventilated place. Electrical installations / working materials must comply with the technological safety standards.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

CAS-No.	Components	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
107-21-1	Ethylene glycol	C	50 ppm 125 mg/m3	OSHA P0
		C	100 mg/m3	ACGIH
		C (Aerosol only)	100 mg/m3	ACGIH
111-46-6	Diethylene glycol	TWA	10 mg/m3	US WEEL

Personal protective equipment

Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

Hand protection

Remarks : The suitability for a specific workplace should be discussed with the producers of the protective gloves.

Eye protection : Eye wash bottle with pure water
Tightly fitting safety goggles

Skin and body protection : Impervious clothing
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures : When using do not eat or drink.
When using do not smoke.
Wash hands before breaks and at the end of workday.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Colour : Clear, Colorless

Odour : sweet, slight

Odour Threshold : No data available

pH : 9

Freezing Point (Melting : -13 - -11.2 °C (9 - 11.8 °F)

point/freezing point)		
Boiling Point (Boiling point/boiling range)	:	197.4 °C (387.3 °F)
Flash point	:	111 - 116 °C (232 - 241 °F) Method: closed cup
Evaporation rate	:	0.01 (Butyl Acetate = 1)
Flammability (solid, gas)	:	No data available
Upper explosion limit	:	22 %(V)
Lower explosion limit	:	1.8 %(V)
Vapour pressure	:	< 1 hPa @ 20 - 25 °C (68 - 77 °F)
Relative vapour density	:	< 2.14 @ 20 - 25 °C (68 - 77 °F) (Air = 1.0)
Relative density	:	1.115 @ 20 °C (68 °F) Reference substance: (water = 1)
Density	:	1.11 g/cm3 @ 20 °C (68 °F)
Solubility(ies) Water solubility	:	soluble
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	log Pow: -1.36
Auto-ignition temperature	:	398 °C
Thermal decomposition	:	No data available
Viscosity Viscosity, dynamic	:	19.83 - 21 mPa.s @ 20 - 25 °C (68 - 77 °F)
Viscosity, kinematic	:	145 mm2/s @ 25 °C (77 °F)

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No dangerous reaction known under conditions of normal use.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No hazards to be specially mentioned.

Conditions to avoid	:	Keep away from heat, flame, sparks and other ignition sources.
Incompatible materials	:	Strong bases Strong oxidizing agents Strong acids Aldehydes Aluminium Plastics Reducing agents Peroxides
Hazardous decomposition products	:	Aldehydes Ketones Organic acids Carbon oxides

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Product:

Acute oral toxicity : Acute toxicity estimate: 493.91 mg/kg

Components:

107-21-1:

Acute oral toxicity : Assessment: The component/mixture is moderately toxic after single ingestion.

111-46-6:

Acute oral toxicity : LD50 (Human): Calculated 1,120 mg/kg
Assessment: The component/mixture is moderately toxic after single ingestion.

Carcinogenicity

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

STOT - repeated exposure

Components:

107-21-1:
Target Organs: Kidney
Assessment: The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 2.

Further information

Product:

Remarks: No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

No data available

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
Additional ecological information	:	No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Contaminated packaging	:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION

DOT (Department of Transportation):
UN3082, Environmentally hazardous substances, liquid, n.o.s., (ETHYLENE GLYCOL), 9, III

IATA (International Air Transport Association): Not regulated as a dangerous good

IMDG-Code: Not regulated as a dangerous good

Special Notes: : This material is shipped as a Class 9, Packing Group III when each package meets or exceeds the reportable quantity, otherwise it may be shipped as not regulated.

SECTION 15. REGULATORY INFORMATION

WHMIS Classification : : Not controlled.

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Ethylene glycol	107-21-1	5000	5000
1,4-Dioxane	123-91-1	100	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : Acute toxicity (any route of exposure)
Specific target organ toxicity (single or repeated exposure)

SARA 302 : No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

107-21-1 Ethylene glycol

Clean Air Act

The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 12 (40 CFR 61):

107-21-1 Ethylene glycol

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
The following chemical(s) are listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489):

107-21-1 Ethylene glycol
111-46-6 Diethylene glycol

Clean Water Act

The following Hazardous Substances are listed under the U.S. CleanWater Act, Section 311, Table 116.4A:

75-07-0 Acetaldehyde

The following Hazardous Chemicals are listed under the U.S. CleanWater Act, Section 311, Table 117.3:

75-07-0 Acetaldehyde

This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307

Massachusetts Right To Know

107-21-1	Ethylene glycol
123-91-1	1,4-Dioxane
75-07-0	Acetaldehyde

Pennsylvania Right To Know

107-21-1	Ethylene glycol
111-46-6	Diethylene glycol
123-91-1	1,4-Dioxane
75-07-0	Acetaldehyde

California Prop 65

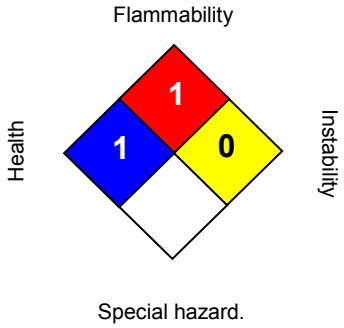
⚠ **WARNING**: This product can expose you to chemicals including 1,4-Dioxane, Acetaldehyde, which is/are known to the State of California to cause cancer, and Ethylene glycol, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

The components of this product are reported in the following inventories:

TSCA	:	On TSCA Inventory
DSL	:	All components of this product are on the Canadian DSL
AICS	:	On the inventory, or in compliance with the inventory
NZIoC	:	On the inventory, or in compliance with the inventory
ENCS	:	On the inventory, or in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PHIL	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory

SECTION16. OTHER INFORMATION

NFPA:



HMIS III:

HEALTH	1*
FLAMMABILITY	1
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 =Extreme, * = Chronic

The information accumulated is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made become available subsequently to the date hereof, we do not assume any responsibility for the results of its use. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by Univar Solutions Product Compliance Department (1-855-429-2661) SDSNA@univarsolutions.com.

Revision Date : 09/01/2019

Legacy SDS: : R0000003

Material number:
16134526, 16141537, 16142192, 16132249, 16131855, 16129552, 16126165, 16114211, 16112352, 16105892, 16103638, 16086745, 16074387, 16072954, 16062967, 16062968, 16062969, 16062427, 16056075, 16056074, 16055096, 16051591, 16045661, 16041542, 16037771, 16037563, 16034406, 16033659, 16033181, 102641, 16030354, 16013884, 16013560, 16012467, 16012189, 16004457, 775747, 768004, 736726, 736570, 729076, 721550, 714457, 714015, 714153, 666370, 611623, 598441, 594558, 86147, 87305, 559851, 554069, 554044, 554070, 554370, 554327, 554244, 554232, 554141, 554097, 554067, 554068, 105297, 103280, 102638, 101896, 88915, 87858, 86506, 86256, 72718, 71481, 70931, 70647, 70642, 70518, 70210, 56154, 55100, 54253, 53829, 508796, 508585, 508339, 508338, 53748, 87014, 69879, 53391, 103693, 85514, 144460, 86148, 54548, 86509, 502712, 29968, 20006, 20002

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Govern-ment Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency

NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%		