

Safety Data Sheet

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

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

1.1. Product identifier

Code:XEPOXG Gel componente A
XEPOXG3000 Gel componente A
XEPOX70 componente A
JW50-809W-000A-QUTC

Product name

UFI :

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

Intended use

Component A for the preparation of two-component epoxy adhesive

Identified Uses	Industrial	Professional	Consumer
TWO-COMPONENT EPOXY ADHESIVE	ERC: 8a, 8b, 8c, 8d, 8f. PROC: 10, 5. PC: 1.	ERC: 7, 8a, 8b, 8c, 8d, 8f. PROC: 10, 5. PC: 1.	-

1.3. Details of the supplier of the safety data sheet

Name

Full address

District and Country

Rotho Blaas Srl
Via dell'Adige 2/1 -
39040 Cortaccia (BZ)
ITALY
Tel. +39-0471 81 84 00

e-mail address of the competent person
responsible for the Safety Data Sheet

reach@rothoblaas.com

1.4. Emergency telephone number

For urgent inquiries refer to

NHS England and Scotland: 111
NHS Wales: 111 or 0845 4647
NPIC Ireland: 01 809 2166
NPIS UK: 0344 892 0111

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:		
Reproductive toxicity, category 1B	H360F	May damage fertility.
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 word:	Danger
Hazard statements:	
H360F	May damage fertility.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H411	Toxic to aquatic life with long lasting effects.
EUH205	Contains epoxy constituents. May produce an allergic reaction.
Precautionary statements:	
P201	Obtain special instructions before use.
P280	Wear protective gloves/ protective clothing / eye protection / face protection.
P308+P313	IF exposed or concerned: Get medical advice / attention.
P273	Avoid release to the environment.
Contains:	Oxirane, mono [(C12-14-alkyloxy) methyl] derivatives 2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol

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 does not contain substances with endocrine disrupting properties in concentration ≥ 0.1%.

SECTION 3. Composition/information on ingredients

3.2. Mixtures

Contains:

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Identification	x = Conc. %	Classification (EC) 1272/2008 (CLP)
Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol		
INDEX -	30 ≤ x < 50	Skin Irrit. 2 H315, Skin Sens. 1 H317, Aquatic Chronic 2 H411
EC 701-263-0		
CAS 9003-36-5		
REACH Reg. 01-2119454392-40-xxxx		
2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane		
INDEX -	5 ≤ x < 10	Eye Irrit. 2 H319, Skin Irrit. 2 H315, Skin Sens. 1 H317, Aquatic Chronic 2 H411
EC 216-823-5		
CAS 1675-54-3		
REACH Reg. 01-2119456619-26-XXXX		
Oxirane, mono [(C12-14-alkyloxy)methyl] derivatives		
INDEX 603-103-00-4	1 ≤ x < 5	Repr. 1B H360F, Skin Irrit. 2 H315, Skin Sens. 1 H317
EC 271-846-8		
CAS 68609-97-2		
REACH Reg. 01-2119485289-22-xxxx		

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

SECTION 4. First aid measures

4.1. Description of first aid measures

In case of doubt or in the presence of symptoms contact a doctor and show him this document.
In case of more severe symptoms, ask for immediate medical aid.
EYES: Remove, if present, contact lenses if the situation allows you to do so easily. Wash immediately with plenty of water for at least 15 minutes, opening the eyelids fully. Get medical advice/attention.
SKIN: Take off immediately all contaminated clothing. Wash immediately and thoroughly with running water (and soap if possible). Get medical advice/attention. Avoid further contact with contaminated clothing.
INGESTION: Do not induce vomiting unless explicitly authorised by a doctor. Do not give anything by mouth to an unconscious person. Get medical advice/attention.
INHALATION: Remove victim to fresh air, away from the accident scene. In the event of respiratory symptoms (coughing, wheezing, breathing difficulty, asthma) keep the victim in a comfortable position for breathing. If necessary administer oxygen. If the subject stops breathing, administer artificial respiration. Get medical advice/attention.

Rescuer protection

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

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

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

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

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

IF exposed or concerned: Get medical advice / attention.

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

Running water for skin and eye wash.

SECTION 5. Firefighting measures

5.1. Extinguishing media

SUITABLE EXTINGUISHING EQUIPMENT
The extinguishing equipment should be of the conventional kind: carbon dioxide, foam, powder and water spray.
UNSUITABLE EXTINGUISHING EQUIPMENT
None in particular.

5.2. Special hazards arising from the substance or mixture

HAZARDS CAUSED BY EXPOSURE IN THE EVENT OF FIRE
Do not breathe combustion products.

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

If possible contain the spilled material. Absorb with materials such as: Sand. Collect in suitable and correctly labeled containers.
Provide sufficient ventilation of the place affected by the leak. The disposal of contaminated material must be carried out in accordance with the provisions of 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

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Tel. +39 0471 81 84 00 | E-mail info@rothoblaas.com | Pec: rothoblaas@pec.it | www.rothoblaas.it

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. Remove any contaminated clothes and personal protective equipment before entering places in which people eat.

7.2. Conditions for safe storage, including any incompatibilities

Store only in the original container. Store the containers sealed, in a well ventilated place, away from direct sunlight. Keep containers away from any incompatible materials, see section 10 for details.

7.3. Specific end use(s)

See the exposure scenarios attached to this safety datasheet.

SECTION 8. Exposure controls/personal protection

8.1. Control parameters

Regulatory references:

DEU	Deutschland	WirkungDosisNOAELMAK-und BAT-Werte-Liste 2024 Ständige Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe
SVN	Slovenija	Pravilnik o varovanju delavcev pred tveganji zaradi izpostavljenosti rakotvornim, mutagenim ali reprotoksičnim snovem pri delu. Ljubljana, četrtek 4. 4. 2024
	ACGIH	ACGIH 2025

Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.									
Predicted no-effect concentration - PNEC									
Normal value in fresh water				105,8	µg/L				
Normal value in marine water				1058	µg/L				
Normal value for fresh water sediment				307,16	mg/kg				
Normal value for marine water sediment				30,72	mg/kg				
Normal value for water, intermittent release				0,072	µg/L				
Normal value of STP microorganisms				10	mg/l				
Normal value for the atmosphere				NPI					

Health - Derived no-effect level - DNEL / DMEL									
Effects on consumers				Effects on workers					
Route of exposure	Acute local	Acute systemic	Chronic local	Chronic systemic	Acute local	Acute systemic	Chronic local	Chronic systemic	
Oral		NPI		0,5 mg/kg bw/d					
Inhalation		NPI		0,87 mg/m3		NPI		3,6 mg/m3	
Skin		NPI		0,5 mg/kg bw/d		NPI		1 mg/kg bw/d	

Synthetic amorphous silicon dioxide					
Threshold Limit Value					
Type	Country	TWA/8h	STEL/15min		Remarks / Observations
		mg/m3	ppm	mg/m3	ppm
AGW	DEU	4			INHAL
MAK	DEU	4			INHAL
MV	SVN	4			INHAL

2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane

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Predicted no-effect concentration - PNEC		
Normal value in fresh water	0,006	mg/l
Normal value in marine water	0,001	mg/l
Normal value for fresh water sediment	0,341	mg/kg
Normal value for marine water sediment	0,034	mg/kg
Normal value for water, intermittent release	0,18	mg/l
Normal value for marine water, intermittent release	NPI	
Normal value for fresh water, intermittent release	0,002	mg/l
Normal value of STP microorganisms	10	mg/l
Normal value for the food chain (secondary poisoning)	11	mg/kg
Normal value for the terrestrial compartment	0,065	mg/kg

Health - Derived no-effect level - DNEL / DMEL								
Effects on consumers				Effects on workers				
Route of exposure	Acute local	Acute systemic	Chronic local	Chronic systemic	Acute local	Acute systemic	Chronic local	Chronic systemic
Oral				0,5 mg/kg bw/d				0,5 mg/kg bw/d
Inhalation				0,87 mg/m3				4,93 mg/m3
Skin				0,0893 mg/kg bw/d				0,75 mg/kg bw/d

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol		
Predicted no-effect concentration - PNEC		
Normal value in fresh water	0,003	mg/l
Normal value in marine water	0,0003	mg/l
Normal value for fresh water sediment	0,294	mg/kg/d
Normal value for marine water sediment	0,0294	mg/kg/d
Normal value of STP microorganisms	10	mg/l
Normal value for the terrestrial compartment	0,237	mg/kg

Health - Derived no-effect level - DNEL / DMEL								
Effects on consumers				Effects on workers				
Route of exposure	Acute local	Acute systemic	Chronic local	Chronic systemic	Acute local	Acute systemic	Chronic local	Chronic systemic
Oral		NPI		6,25 mg/kg bw/d				
Inhalation	NPI	NPI	NPI	8,7 mg/m3	NPI	NPI	NPI	29,39 mg/m3
Skin	NPI	NPI	NPI	62,5 mg/kg bw/d	NPI	NPI	NPI	104,15 mg/kg bw/d

Iron oxyde yellow Threshold Limit Value					
Type	Country	TWA/8h	STEL/15min	Remarks / Observations	
		mg/m3	ppm	mg/m3	ppm
ACGIH		5			

Legend:

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

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

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.

When choosing risk management measures and operating conditions, consult the exposure scenarios attached.

Provide an emergency shower with face and eye wash station.

HAND PROTECTION
Protect hands with category III work gloves.
The following should be considered when choosing work glove material (see standard EN 374): compatibility, degradation, permeability time.
The work gloves' resistance to chemical agents should be checked before use, as it can be unpredictable. The gloves' wear time depends on the duration and type of use.

SKIN PROTECTION
Wear category II 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 ISO 16321).

RESPIRATORY PROTECTION
Respiratory protection devices must be used if the technical measures adopted are not suitable for restricting the worker's exposure to the threshold values considered. Use a mask with a type A filter whose class (1, 2 or 3) must be chosen according to the limit of use concentration. (see standard EN 14387).
If the substance considered is odourless or its olfactory threshold is higher than the corresponding TLV-TWA and in the case of an emergency, wear open-circuit compressed air breathing apparatus (in compliance with standard EN 137) or external air-intake breathing apparatus (in compliance with standard EN 138). For a correct choice of respiratory protection device, see standard EN 529.

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.

For information on controlling environmental exposure, see the exposure scenarios attached to this safety datasheet.

SECTION 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

Properties	Value	Information
Appearance	viscous liquid	
Colour	yellow	
Odour	characteristic	
Melting point / freezing point	not available	
Initial boiling point	> 100 °C	
Flammability	not available	
Lower explosive limit	not available	

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Upper explosive limit	not available	
Flash point	> 100 °C	
Auto-ignition temperature	not available	
Decomposition temperature	not available	
pH	not available	Reason for missing data:substance/mixture is non-soluble (in water)
Kinematic viscosity	>20,5 mm2/sec (40°C)	
Dynamic viscosity	450000 mPa.s	Temperature: 25 °C
Solubility	soluble in organic solvents	
Partition coefficient: n-octanol/water	not available	
Vapour pressure	not available	
Density and/or relative density	2 g/cm3	Temperature: 25 °C
Relative vapour density	not available	
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

Information not available

SECTION 10. Stability and reactivity

10.1. Reactivity

The product may react exothermically on contact with strong oxidising or reducing agents, strong acids or bases.

2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane

Reacts with: amines,aliphatic amines,amides,organic anhydrides.

Avoid contact with: strong oxidising agents,sodium hydroxide.

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol

Stable in normal conditions of use and storage.

10.2. Chemical stability

Excessively high temperatures can cause thermal decomposition.

2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane

Stable in normal conditions of use and storage.

10.3. Possibility of hazardous reactions

See paragraph 10.1.

10.4. Conditions to avoid

Avoid overheating.

10.5. Incompatible materials

Oxidising or reducing agents. Strong acids or bases.

10.6. Hazardous decomposition products

In the event of thermal decomposition or fire, gases and vapours that are potentially dangerous to health may be released.

2,2 '- [[(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane

In decomposition develops: carbon monoxide,halogenated compounds.

SECTION 11. Toxicological information

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

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)

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol	
LD50 (Dermal):	> 2000 mg/kg rabbit
LD50 (Oral):	> 2000 mg/kg rat

2,2 '- [[(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane	
LD50 (Dermal):	23000 mg/kg Rabbit
LD50 (Oral):	15000 mg/kg Rat

Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.	
LD50 (Dermal):	> 4000 mg/kg
LD50 (Oral):	26800 mg/kg
LC50 (Inhalation vapours):	> 0,15 mg/l Tempo di esposizione: 7 h

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SKIN CORROSION / IRRITATION

Causes skin irritation

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol

This product must be considered: Causes skin irritation. Information given is based on data obtained from similar substances. CAS: 9003-36-5 - Formaldehyde, polymer with (chloromethyl) oxirane and phenol Causes skin irritation. The tests were carried out on rabbits. Reference: Registration dossier - ECHA Chem CAS: 25068-38-6 - Epoxy resin (number average molecular weight ≤ 700) Reaction product: bisphenol-A- (epichlorhydrin) Pursuant to Annex VI of EC regulation 1272/2008: Causes skin irritation.

Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.

Species: Rabbit
Exposure time: 24 h
Method: Acute dermal toxicity
Result: Irritating to skin.

SERIOUS EYE DAMAGE / IRRITATION

Does not meet the classification criteria for this hazard class

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol

This product must be considered: Causes serious eye irritation. Information given is based on data obtained from similar substances. CAS: 25068-38-6 - Epoxy resin (number average molecular weight ≤ 700) Reaction product: bisphenol-A- (epichlorhydrin) According to annex VI of EC regulation 1272/2008: Causes serious eye irritation.

2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane

Species: Rabbit
Assessment: Mild eye irritant
Method: OECD Test Guideline 405
Result: Irritating to eyes.

Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.

Species: Rabbit
Assessment: No eye irritation
Method: OECD Test Guideline 405
Result: mild irritation.

RESPIRATORY OR SKIN SENSITISATION

Sensitising for the skin

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol

This product must be considered: May cause an allergic skin reaction. Information given is based on data obtained from similar substances. CAS: 9003-36-5 - Formaldehyde, polymer with (chloromethyl) oxirane and phenol Skin sensitization test on guinea pigs - local lymph node test (LLNA): positive Reference: Registration dossier - ECHA Chem CAS: 25068-38-6 - Epoxy resin (number average molecular weight ≤ 700) Reaction product: bisphenol-A- (epichlorhydrin) According to annex VI of EC regulation 1272/2008: May cause an allergic skin reaction.

Skin sensitization

2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane

In a study with LLNA assay on mice conducted according to OECD standard no. 429, the estimated EC3 corresponded to a concentration of 5.7%; this result suggests that BADGE is a moderate skin sensitizer in this test system. In a study of maximization on guinea pig according to OECD standard no. 406, BADGE

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induced a positive skin reaction in 100% of the experimental animals at a stimulus dose with a concentration of 50%. Therefore, BADGE is an "extreme" skin sensitizer under the conditions of this study. BADGE was also positive for skin sensitization in a study with the Buehler method on guinea pigs conducted according to OECD standard no. 406.

Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.

Test type: Buehler Test
Route of exposure: Skin
Species: Guinea pig
Method: OPPTS 870.2600
Result: May cause sensitization by skin contact.

GERM CELL MUTAGENICITY

Does not meet the classification criteria for this hazard class

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol

This product must NOT be considered: Mutagenic Information given is based on data obtained from similar substances. CAS: 9003-36-5 - Formaldehyde, polymer with (chloromethyl) oxirane and phenol The in vitro tests revealed mutagenic effects, when the in vivo tests did not reveal them. Reference: Registration dossier - ECHA Chem.

2,2'-[[1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane

In several studies, BADGE was found to induce gene mutation in experimental Ames / Salmonella TA1535 and TA100 strains. In general, mutagenic activity was greater without liver S9 metabolic activation. Induced gene mutation in L5178Y mouse lymphoma cells. Induced gene mutation and chromosomal damage in Chinese hamster V79 cells. Induced cell transformation into Syrian hamster BHK cells based on clonal growth in soft agar. It induced no evidence of chromosomal damage in an oral probe study in a mouse dominant lethal test conducted up to a high dose level of 10 grams / kg and in a mouse micronuclear test conducted up to a high dose of 5000 mg / kg. Negative in a male mouse spermatocytic cytogenetic assay with treatment for 5 days by oral tube up to a high dose of 3000 mg / kg. It did not induce an increase in the frequency of chromosomal damage in an oral Chinese hamster bone marrow cell cytogenetic assay up to a high dose of 3300 mg / kg. It did not induce an increase in DNA strand breaks in rat liver cells following oral gavage treatment with 500 mg / kg, measured by alkaline elution.

Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.

Test type: Ames test
Test System: Salmonella typhimurium
Metabolic activation: with or without metabolic activation
Method: OECD Test Guideline 471
Result: positive
Test type: In vitro mammalian cell gene mutation test
Test System: Chinese Hamster Ovary Cells
Concentration: 0.5 - 5,000 µg / mL
Metabolic activation: with or without metabolic activation
Method: OECD Test Guideline 476
Result: negative.
Test type: In vivo micronucleus test
Species Essay: Mouse (male and female)
Cell type: Bone marrow
Method of application: Intraperitoneal injection
Exposure time: 24 hr, 48 hr, and 72 hr
Method: OECD Test Guideline 474
Result: negative.

CARCINOGENICITY

Does not meet the classification criteria for this hazard class

2,2'-[[1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane

In a rat study with oral probe according to OECD standard no. 453 there was no evidence of carcinogenicity up to the high dose level of 100 mg / kg / day. Skin exposure studies were conducted on male and female rats according to OECD standard no. 453. No evidence of carcinogenicity was observed in male

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mice treated up to the high dose of 100 mg / kg / day and female rats exposed up to the high dose of 1000 mg / kg / day.

REPRODUCTIVE TOXICITY

May damage fertility

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol

This product must NOT be considered: Toxic for reproduction. Information given is based on data obtained from similar substances. CAS: 9003-36-5 - Formaldehyde, polymer with (chloromethyl) oxirane and phenol Animal experiments in the laboratory did not show toxic effects on reproduction. Reference: Registration dossier - ECHA Chem.

Adverse effects on sexual function and fertility

2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane

Test type: Two-generation study
Species: Rat, male and female
Application method: Oral
Dose:> 750 Milligrams per kilo
General toxicity parents: Level within which no effects are observed: 540 mg / kg body weight
General toxicity F1: Level within which no effects are observed: 540 mg / kg body weight
Symptoms: No side effects.
Method: OECD Test Guideline 416
Result: There was no effect on fertility and early embryonic development.

Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.

Species: Rat, male and female
Method of application: Dermal
Duration of the single treatment: 13 Weeks
Treatment frequency: 5 days / week
General toxicity parents: No observed harmful level: 100 mg / kg body weight
Method: OECD Test Guideline 411.

Adverse effects on development of the offspring

2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane

BADGE did not induce any evidence of developmental toxicity in rats and rabbits exposed by oral tube, or in rabbits treated by the dermal route, in GLP studies according to OECD standard No. 414. Oral tube studies were conducted up to a high dose level of 180 mg / kg / day which produced maternal toxicity based on decreased body weight gain. The rabbit skin toxicity study was conducted up to a high dose of 300 mg / kg / day which induced maternal toxicity based on decreased body weight gain.
Species: Rabbit, female
Method of application: Dermal
General toxicity in mothers: No harmful level observed: 30 mg / kg body weight
Method: Other reference guides
Result: No teratogenic effects.
Species: Rabbit, female
Application method: Oral
General toxicity in mothers: No observed harmful level: 60 mg / kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects.
Species: Rat, female
Application method: Oral
General toxicity in mothers: No observed harmful level: 180 mg / kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects.

Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.

Species: Rat, female

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Method of application: Dermal
Duration of the single treatment: 6 h
General toxicity in mothers: No observed harmful level: 200 mg / kg body weight
Developmental Toxicity: No observed harmful level: 200 mg / kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects.

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

2,2'-[[1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane

Species: Rat, male and female
NOAEL: 50 mg / kg
Application method: Ingestion
Exposure time: 14 WeeksNumber of exposures: 7 d
Method: Subchronic toxicity
Species: Rat, male and female
NOEL: 10 mg / kg
Method of application: Skin contact
Exposure time: 13 WeeksNumber of exposures: 5 d
Method: Subchronic toxicity
Species: Mouse, male
NOAEL: 100 mg / kg
Method of application: Skin contact
Exposure time: 13 WeeksNumber of exposures: 3 d
Method: Subchronic toxicity
Repeated Dose Toxicity - Evaluation
:
No adverse effects were observed in chronic toxicity tests.

Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.

Species: Rat, male and female
NOEL: 1 mg / kg
LOAEL: 10 mg / kg
Method of application: Skin contact
Exposure time: 13 Weeks Number of exposures: 5 days / week for 13 weeks
Method: OECD Test Guideline 411.

ASPIRATION HAZARD

Does not meet the classification criteria for this hazard class Viscosity: >20,5 mm2/sec (40°C)

11.2. Information on other hazards

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

SECTION 12. Ecological information

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

12.1. Toxicity

2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane	1,41 mg/l/96h Tipo di test: Prova statica
LC50 - for Fish	
EC50 - for Crustacea	2,7 mg/l/48h
Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.	
Chronic NOEC for Fish	100 mg/l 96 h Rainbow Trout
Chronic NOEC for Algae / Aquatic Plants	500 mg/l 72 h Selenastrum capricornutum
NOEL (48 h) 1.8 mg / l	
Daphnia magna	
OECD TG 202	

12.2. Persistence and degradability

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol
NOT rapidly degradable

This product should NOT be considered: It is rapidly biodegradable. Information given is based on data obtained from similar substances. CAS: 9003-36-5 - Formaldehyde, polymer with (chloromethyl) oxirane and phenol Not readily biodegradable (0% / 28 days). Reference: Registration dossier - ECHA Chem CAS: 25068-38-6 - Epoxy resin (number average molecular weight ≤ 700) Reaction product: bisphenol-A- (epichlorhydrin) According to annex VI of EC regulation 1272/2008: Not immediately biodegradable.

2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane
The level of biodegradation in an "improved" OECD 301F study was 5% within the 28-day contact period. Biodegradation reached 6 - 12% after 28 days of contact in a study conducted according to OECD standard No. 301B. Therefore BADGE is not readily biodegradable under the conditions of the studies.

Stability in water:
Half-life to degradation (TD50): 4.83 d (25 ° C)
pH: 4
Method: OECD TG 111
Observations: Fresh water
Half-life to degradation (TD50): 7.1 d (25 ° C)
pH: 9
Method: OECD TG 111
Observations: Fresh water
Half-life to degradation (TD50): 3.58 d (25 ° C)
pH: 7
Method: OECD TG 111
Observations: Fresh water.

Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.
NOT rapidly degradable

Test type: aerobic
Inoculum: activated sludge
Concentration: 100 mg / l
Result: Readily biodegradable.
Biodegradation: 87%
Exposure time: 28 d
Method: OECD Test Guideline 301F.

12.3. Bioaccumulative potential

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol	
BCF	150

2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane
Partition coefficient: n-octanol/water 2.281
BCF < 6.8 10 ug/l

Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.
log Pow: 3.77 (20 ° C)
Method: OECD Test Guideline 107.

12.4. Mobility in soil

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol
Moderately high mobility in soil. Information given is based on data obtained from similar substances. CAS: 9003-36-5 - Formaldehyde, polymer with (chloromethyl) oxirane and phenol Reference: Registration dossier - ECHA Chem.

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

Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Toxic to aquatic organisms.

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

12.7. Other adverse effects

Information not available

SECTION 13. Disposal considerations

13.1. Waste treatment methods

Reuse, when possible. Product residues should be considered special hazardous waste. The hazard level of waste containing this product should be evaluated according to applicable regulations.
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.
The management of waste arising from the use or dispersal of this product must be organised in accordance with occupational safety regulations. See section 8 for possible need for PPE.
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: UN 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.

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IMDG:

In accordance with Special Provision 375, 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. (Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol; 2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane)

IMDG:

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol; 2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane)

IATA:

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol; 2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane)

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 It	Tunnel restriction code: (-)
IMDG:	Special provision: 274, 335, 375, 601, 650 EMS: F-A, S-F	Limited Quantities: 5 It	
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
Point3

Contained substance

Point75

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.

15.2. Chemical safety assessment

A chemical safety assessment has been performed for the following contained substances

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Oxirane, mono [(C12-14-alkyloxy) methyl] derivatives

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol

SECTION 16. Other information

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

Repr. 1B	Reproductive toxicity, category 1B
Eye Irrit. 2	Eye irritation, category 2
Skin Irrit. 2	Skin irritation, category 2
Skin Sens. 1	Skin sensitization, category 1
Aquatic Chronic 2	Hazardous to the aquatic environment, chronic toxicity, category 2
H360F	May damage fertility.
H319	Causes serious eye irritation.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H411	Toxic to aquatic life with long lasting effects.
EUH205	Contains epoxy constituents. May produce an allergic reaction.

Use descriptor system:

ERC	7	Use of functional fluid at industrial site
ERC	8a	Widespread use of non- reactive processing aid (no inclusion into or onto article, indoor)
ERC	8b	Widespread use of reactive processing aid (no inclusion into or onto article, indoor)
ERC	8c	Widespread use leading to inclusion into/onto article (indoor)
ERC	8d	Widespread use of non- reactive processing aid (no inclusion into or onto article, outdoor)
ERC	8f	Widespread use leading to inclusion into/onto article (outdoor)
PC	1	Adhesives, sealants
PROC	10	Roller application or brushing
PROC	5	Mixing or blending in batch processes

- LEGEND:
- ADR: European Agreement concerning the carriage of Dangerous goods by Road
 - ATE: Acute Toxicity Estimate
 - CAS: Chemical Abstract Service Number
 - CE50: Effective concentration (required to induce a 50% effect)
 - CE: Identifier in ESIS (European archive of existing substances)
 - CLP: Regulation (EC) 1272/2008
 - DNEL: Derived No Effect Level
 - EmS: Emergency Schedule
 - GHS: Globally Harmonized System of classification and labeling of chemicals
 - IATA DGR: International Air Transport Association Dangerous Goods Regulation
 - IC50: Immobilization Concentration 50%
 - IMDG: International Maritime Code for dangerous goods
 - IMO: International Maritime Organization
 - INDEX: Identifier in Annex VI of CLP
 - LC50: Lethal Concentration 50%
 - LD50: Lethal dose 50%
 - OEL: Occupational Exposure Level
 - PBT: Persistent, bioaccumulative and toxic
 - PEC: Predicted environmental Concentration
 - PEL: Predicted exposure level
 - PMT: Persistent, mobile and toxic
 - PNEC: Predicted no effect concentration
 - REACH: Regulation (EC) 1907/2006
 - RID: Regulation concerning the international transport of dangerous goods by train

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- TLV: Threshold Limit Value
- TLV CEILING: Concentration that should not be exceeded during any time of occupational exposure.
- TWA: Time-weighted average exposure limit
- TWA STEL: Short-term exposure limit
- VOC: Volatile organic Compounds
- vPvB: Very persistent and very bioaccumulative
- vPvM: Very persistent and very mobile
- WGK: Water hazard classes (German).

GENERAL BIBLIOGRAPHY

1. Regulation (EC) 1907/2006 (REACH) of the European Parliament
 2. Regulation (EC) 1272/2008 (CLP) of the European Parliament
 3. Regulation (EU) 2020/878 (II Annex of REACH Regulation)
 4. Regulation (EC) 790/2009 (I Atp. CLP) of the European Parliament
 5. Regulation (EU) 286/2011 (II Atp. CLP) of the European Parliament
 6. Regulation (EU) 618/2012 (III Atp. CLP) of the European Parliament
 7. Regulation (EU) 487/2013 (IV Atp. CLP) of the European Parliament
 8. Regulation (EU) 944/2013 (V Atp. CLP) of the European Parliament
 9. Regulation (EU) 605/2014 (VI Atp. CLP) of the European Parliament
 10. Regulation (EU) 2015/1221 (VII Atp. CLP) of the European Parliament
 11. Regulation (EU) 2016/918 (VIII Atp. CLP) of the European Parliament
 12. Regulation (EU) 2016/1179 (IX Atp. CLP)
 13. Regulation (EU) 2017/776 (X Atp. CLP)
 14. Regulation (EU) 2018/669 (XI Atp. CLP)
 15. Regulation (EU) 2019/521 (XII Atp. CLP)
 16. Delegated Regulation (UE) 2018/1480 (XIII Atp. CLP)
 17. Regulation (EU) 2019/1148
 18. Delegated Regulation (UE) 2020/217 (XIV Atp. CLP)
 19. Delegated Regulation (UE) 2020/1182 (XV Atp. CLP)
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 21. Delegated Regulation (UE) 2021/849 (XVII Atp. CLP)
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 23. Delegated Regulation (UE) 2023/707
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 27. Delegated Regulation (UE) 2024/2564 (XXII Atp. CLP)
 28. Regulation (EU) 2024/2865
- 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 / 03 / 04 / 08 / 09 / 11 / 12 / 13 / 14 / 15 / 16.

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Exposure Scenarios

Substance	Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol
Scenario Title	Resina epossidica da bisfenolo F
Revision nr.	1
File	1
Substance	2,2 '- [(1-methylethylidene) bis (4,1-phenyleneoxymethylene)] bisoxirane
Scenario Title	Resina epossidica da bisfenolo A
Revision nr.	1
File	2
Substance	Oxiran, mono[(C12-14-alkyloxy)methyl] derivs.
Scenario Title	AGE C12-14
Revision nr.	1
File	3

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Safety Data Sheet

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

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

1.1. Product identifier

Code:

XEPOXG Gel componente B
XEPOXG3000 Gel componente B
XEPOX70 componente B
4U50-R0MG-P00U-1H79

Product name

UFI :

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

Intended use

Component B for the preparation of two -component epoxy adhesive

Identified Uses	Industrial	Professional	Consumer
TWO-COMPONENT EPOXY ADHESIVE	ERC: 8a, 8b, 8c, 8d, 8f. PROC: 10, 5. PC: 1.	ERC: 7, 8a, 8b, 8c, 8d, 8f. PROC: 10, 5. PC: 1.	-

1.3. Details of the supplier of the safety data sheet

Name

Full address

District and Country

Rotho Blaas Srl
Via dell'Adige 2/1 -
39040 Cortaccia (BZ)
ITALY
Tel. +39-0471 81 84 00

e-mail address of the competent person
responsible for the Safety Data Sheet

reach@rothoblaas.com

1.4. Emergency telephone number

For urgent inquiries refer to

NHS England and Scotland: 111
NHS Wales: 111 or 0845 4647
NPIC Ireland: 01 809 2166
NPIS UK: 0344 892 0111

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.
Skin corrosion, category 1A	H314	Causes severe skin burns and eye damage.
Serious eye damage, category 1	H318	Causes serious eye damage.
Specific target organ toxicity - single exposure, category 3	H335	May cause respiratory irritation.
Skin sensitization, category 1	H317	May cause an allergic skin reaction.
Hazardous to the aquatic environment, chronic toxicity,	H413	May cause long lasting harmful effects to aquatic life.

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category 4

2.2. Label elements

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

Hazard pictograms:



Signal word: Danger

Hazard statements:

- H302

Harmful if swallowed.
- H314

Causes severe skin burns and eye damage.
- H335

May cause respiratory irritation.
- H317

May cause an allergic skin reaction.
- H413

May cause long lasting harmful effects to aquatic life.

Precautionary statements:

- P260

Do not breathe dust / fume / gas / mist / vapours / spray.
- P305+P351+P338

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P303+P361+P353

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].
- P280

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

Contains:

4,4'-methylbis(cyclohexanamine)
Oligomerisation and alkylation reaction products of 2-phenylpropene and phenol
Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia
4,4'-ISOPROPYLIDENEDIPHENOL
3-Azapentane-1,5-diamine

2.3. Other hazards

vPvB substances contained:

Oligomerisation and alkylation reaction products of 2-phenylpropene and phenol

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

4,4'-ISOPROPYLIDENEDIPHENOL

SECTION 3. Composition/information on ingredients

3.2. Mixtures

Contains:

Identification	x = Conc. %	Classification (EC) 1272/2008 (CLP)
4,4'-methylbis(cyclohexanamine)		
INDEX -	20 ≤ x < 25	Acute Tox. 4 H302, Skin Corr. 1A H314, Eye Dam. 1 H318, STOT SE 3 H335, Skin Sens. 1 H317, Aquatic Chronic 4 H413 LD50 Oral: 380 mg/kg
EC 217-168-8		
CAS 1761-71-3		
REACH Reg. 01-2119979542-27-0000		
Oligomerisation and alkylation reaction products of 2-phenylpropene and phenol		
INDEX -	10 ≤ x < 15	Skin Irrit. 2 H315, Skin Sens. 1B H317, Aquatic Chronic 3 H412
EC 700-960-7		
CAS 68512-30-1		
REACH Reg. 01-2119555274-38-xxxx		
Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia		
INDEX -	1 ≤ x < 3	Skin Corr. 1C H314, Eye Dam. 1 H318, Aquatic Chronic 3 H412
EC 618-561-0		
CAS 9046-10-0		
REACH Reg. 01-2119557899-12-xxxx		
3-Azapentane-1,5-diamine		
INDEX 612-058-00-X	0 < x < 1	Acute Tox. 2 H330, Acute Tox. 4 H302, Acute Tox. 4 H312, Skin Corr. 1B H314, Eye Dam. 1 H318, STOT SE 3 H335, Skin Sens. 1 H317 LD50 Oral: 1140 mg/kg, LD50 Dermal: 1045 mg/kg, LC50 Inhalation vapours: 1,8 mg/l/4h
EC 203-865-4		
CAS 111-40-0		
REACH Reg. 01-2119473793-27-0006		
4,4'-ISOPROPYLIDENEDIPHENOL		
INDEX 604-030-00-0	0 < x < 0,25	Repr. 1B H360F, Eye Dam. 1 H318, STOT SE 3 H335, Skin Sens. 1 H317, Aquatic Acute 1 H400 M=1, Aquatic Chronic 1 H410 M=1
EC 201-245-8		
CAS 80-05-7		
REACH Reg. 01-2119457856-23-xxxx		

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

SECTION 4. First aid measures

4.1. Description of first aid measures

In case of doubt or in the presence of symptoms contact a doctor and show him this document.
In case of more severe symptoms, ask for immediate medical aid.

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

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

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

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

Rescuer protection

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

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

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

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

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

Immediately call a POISON CENTER / doctor .

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

Running water for skin and eye wash.

SECTION 5. Firefighting measures

5.1. Extinguishing media

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

UNSUITABLE EXTINGUISHING EQUIPMENT
None in particular.

5.2. Special hazards arising from the substance or mixture

HAZARDS CAUSED BY EXPOSURE IN THE EVENT OF FIRE
Do not breathe combustion products.

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

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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

If possible contain the spilled material. Absorb with materials such as: Sand. Collect in suitable and correctly labeled containers.
Provide sufficient ventilation of the place affected by the leak. The disposal of contaminated material must be carried out in accordance with the provisions of 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

Manipulation:
It is necessary to observe the alert hazard normally indicated in the manipulation of the chemical product. Avoid skin contact.
Mechanical ventilation and local extractor fan are required. The air must be directed in the opposite way of the persons. The efficiency of the installations has to stay under control on a regular basis.
Storage:
Conserve the container well closed avoiding humidity. Keep away from food.
Protect from cooling below 5°C and from heating over 35°C.
Avoid the contact with copper and their league.

7.1. Precautions for safe handling

Information not available

7.2. Conditions for safe storage, including any incompatibilities

Information not available

7.3. Specific end use(s)

See the exposure scenarios attached to this safety datasheet.

SECTION 8. Exposure controls/personal protection

8.1. Control parameters

Regulatory references:

BGR	България	НАРЕДБА № 13 ОТ 30 ДЕКЕМВРИ 2003 Г. ЗА ЗАЩИТА НА РАБОТЕЩИТЕ ОТ РИСКОВЕ, СВЪРЗАНИ С ЕКСПОЗИЦИЯ НА ХИМИЧНИ АГЕНТИ ПРИ РАБОТА (изм. ДВ. бр.28 от 2 Април 2024г.)
CZE	Česká Republika	NARÍZENÍ VLÁDY ze dne 18. října 2023, kterým se mění nařízení vlády č. 361/2007 Sb., kterým se stanoví podmínky ochrany zdraví při práci, ve znění pozdějších předpisů
DEU	Deutschland	WirkungDosisNOAELMAK-und BAT-Werte-Liste 2024 Ständige Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe
ESP	España	Límites de exposición profesional para agentes químicos en España 2024
FRA	France	Valeurs limites d'exposition professionnelle aux agents chimiques en FranceDécret n° 2021-1849 du 28 décembre 2021

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FIN	Suomi	HTP-VÄRDEN 2020. Koncentrationer som befunnits skadliga. SOCIAL - OCH HÄLSOVÄRDSMINISTERIETS PUBLIKATIONER 2020:25
GRC	Ελλάδα	Π.Δ. 26/2020 (ΦΕΚ 50/Α` 6.3.2020) Εναρμόνιση της ελληνικής νομοθεσίας προς τις διατάξεις των οδηγιών 2017/2398/ΕΕ, 2019/130/ΕΕ και 2019/983/ΕΕ «για την τροποποίηση της οδηγίας 2004/37/ΕΚ ``σχετικά με την προστασία των εργαζομένων από τους κινδύνους που συνδέονται με την έκθεση σε καρκινογόνους ή μεταλλαξιγόνους παράγοντες κατά την εργασία``»
LTU	Lietuva	Jsakymas dėl lietuvos higienos normos hn 23:2011 „cheminių medžiagų profesinio poveikio ribiniai dydžiai. Matavimo ir poveikio vertinimo bendrieji reikalavimai“ patvirtinimo
NOR	Norge	Forskrift om endring i forskrift om tiltaksverdier og grenseverdier for fysiske og kjemiske faktorer i arbeidsmiljøet samt smitterisikogrupper for biologiske faktorer (forskrift om tiltaks- og grenseverdier), 21. 10. april 2024 kl. 13.55
NLD	Nederland	Regeling van de Minister van Sociale Zaken en Werkgelegenheid van 13 mei2024, nr. 2024-0000092805, tot wijziging van deArbeidsomstandighedenregeling in verband met de implementatie vanRichtlijn 2022/431
POL	Polska	ROZPORZĄDZENIE MINISTRA RODZINY, PRACY I POLITYKI SPOŁECZNEJ z dnia 24 czerwca 2024 r. zmieniające rozporządzenie w sprawie najwyższych dopuszczalnych stężeń i natężeń czynników szkodliwych dla zdrowia w środowisku pracy
ROU	România	HOTĂRÂRE nr. 179 din 28 februarie 2024 pentru modificarea și completarea Hotărârii Guvernului nr. 1.093/2006 privind stabilirea cerințelor minime de securitate și sănătate pentru protecția lucrătorilor împotriva riscurilor legate de expunerea la agenți ca
RUS	Россия	ПОСТАНОВЛЕНИЕ от 13 февраля 2018 г. N 25 ОБ УТВЕРЖДЕНИИ ГИГИЕНИЧЕСКИХ НОРМАТИВОВ ГН 2.2.5.3532-18 "ПРЕДЕЛЬНО ДОПУСТИМЫЕ КОНЦЕНТРАЦИИ (ПДК) ВРЕДНЫХ ВЕЩЕСТВ В ВОЗДУХЕ РАБОЧЕЙ ЗОНЫ"
SWE	Sverige	Arbetsmiljöverkets föreskrifter och allmänna råd (AFS 2023:14) om gränsvärden för luftvägsexponering i arbetsmiljön
SVK	Slovensko	121_2024 Z. z. Nariadenie vlády o ochrane zdravia zamestnancov pred rizikami súvisiacimi s expozíciou karcinogénnym, mutagénnym alebo reprodukčne toxickým faktorom pri práci
GBR	United Kingdom	EH40/2005 Workplace exposure limits (Fourth Edition 2020)
EU	OEL EU	Directive (EU) 2022/431; Directive (EU) 2019/1831; Directive (EU) 2019/130; Directive (EU) 2019/983; Directive (EU) 2017/2398; Directive (EU) 2017/164; Directive 2009/161/EU; Directive 2006/15/EC; Directive 2004/37/EC; Directive 2000/39/EC; Directive 98/24/EC; Directive 91/322/EEC.
	ACGIH	ACGIH 2025

Oligomerisation and alkylation reaction products of 2-phenylpropene and phenol								
Predicted no-effect concentration - PNEC								
Normal value in fresh water			14		µg/l			
Normal value in marine water			1,4		µg/l			
Normal value for fresh water sediment			1064		mg/kg			
Normal value for marine water sediment			106,4		mg/kg			
Normal value for water, intermittent release			0,14		mg/l			
Normal value of STP microorganisms			2,4		mg/kg			
Normal value for the food chain (secondary poisoning)			8,89		mg/kg			
Normal value for the terrestrial compartment			212,2		mg/kg			
Normal value for the atmosphere			NPI					
Health - Derived no-effect level - DNEL / DMEL								
Route of exposure	Effects on consumers				Effects on workers			
	Acute local	Acute systemic	Chronic local	Chronic systemic	Acute local	Acute systemic	Chronic local	Chronic systemic
Oral		NPI	VND	0,2 mg/kg bw/d				
Inhalation			VND	0,348 mg/m3			VND	1,41 mg/m3
Skin		NPI	VND	1,67 mg/kg bw/d		NPI	VND	3,5 mg/kg/d
4,4'-ISOPROPYLIDENEDIPHENOL								
Threshold Limit Value								
Type	Country	TWA/8h	STEL/15min		Remarks / Observations			
		mg/m3	ppm	mg/m3	ppm			
OEL	EU	2				INHAL	Cute	
Predicted no-effect concentration - PNEC								
Normal value in fresh water			0,018		mg/l			
Normal value in marine water			0,018		mg/l			

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Normal value for fresh water sediment	1,2	mg/kg
Normal value for marine water sediment	0,24	mg/kg
Normal value for water, intermittent release	0,011	mg/l
Normal value of STP microorganisms	320	mg/l
Normal value for the terrestrial compartment	3,7	mg/kg

Health - Derived no-effect level - DNEL / DMEL								
Effects on consumers					Effects on workers			
Route of exposure	Acute local	Acute systemic	Chronic local	Chronic systemic	Acute local	Acute systemic	Chronic local	Chronic systemic
Oral		0,004 mg/kg bw/d		0,004 mg/kg bw/d				
Inhalation	1 mg/m3	1 mg/m3	1 mg/m3	1 mg/m3	2 mg/m3	2 mg/m3	2 mg/m3	2 mg/m3
Skin		0,0019 mg/kg bw/d	VND	0,0019 mg/kg bw/d		0,031 mg/kg bw/d		0,031 mg/kg bw/d

Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia		
Predicted no-effect concentration - PNEC		
Normal value in fresh water	0,015	mg/l
Normal value in marine water	0,0143	mg/l
Normal value for fresh water sediment	0,132	mg/kg
Normal value for marine water sediment	0,125	mg/kg
Normal value for water, intermittent release	0,15	mg/l
Normal value of STP microorganisms	7,5	mg/l
Normal value for the food chain (secondary poisoning)	6,93	mg/kg
Normal value for the terrestrial compartment	0,0176	mg/kg

Health - Derived no-effect level - DNEL / DMEL								
Effects on consumers					Effects on workers			
Route of exposure	Acute local	Acute systemic	Chronic local	Chronic systemic	Acute local	Acute systemic	Chronic local	Chronic systemic
Inhalation								10,58 mg/m3
Skin								2,5 mg/kg bw/d

4,4'-methylbis(cyclohexanamine)		
Predicted no-effect concentration - PNEC		
Normal value in fresh water	0,008	mg/l
Normal value in marine water	0,0008	mg/l
Normal value for fresh water sediment	137	mg/kg
Normal value for marine water sediment	13,7	mg/kg/d
Normal value for water, intermittent release	0,08	mg/l
Normal value of STP microorganisms	3,2	mg/l
Normal value for the food chain (secondary poisoning)	0,556	mg/kg
Normal value for the terrestrial compartment	27,2	mg/kg/d

Health - Derived no-effect level - DNEL / DMEL								
Effects on consumers					Effects on workers			
Route of exposure	Acute local	Acute systemic	Chronic local	Chronic systemic	Acute local	Acute systemic	Chronic local	Chronic systemic
Oral	VND	0,125 mg/kg bw/d						
Inhalation					VND	1,5 mg/m3	VND	0,5 mg/m3
Skin			VND	0,125 mg/kg bw/d	VND	0,63 mg/kg bw/d	VND	0,21 mg/kg bw/d

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TITANIUM DIOXIDE						
Threshold Limit Value						
Type	Country	TWA/8h		STEL/15min		Remarks / Observations
		mg/m3	ppm	mg/m3	ppm	
TLV	BGR	10				RESP
MAK	DEU	0,3		2,4		RESP Hinweis
VLA	ESP	10				
VLEP	FRA	10				
TLV	GRC		10			
RD	LTU	5				
TLV	NOR	5				
NDS/NDSch	POL	10				INHAL
TLV	ROU	10		15		
ПДК	RUS	10				a, Φ
NGV/KGV	SWE	5				Totaldamm
NPEL	SVK	5				
WEL	GBR	10				INHAL
WEL	GBR	4				RESP
ACGIH		0,2				RESP
DIETHYLENETRIAMINE						
Threshold Limit Value						
Type	Country	TWA/8h		STEL/15min		Remarks / Observations
		mg/m3	ppm	mg/m3	ppm	
TLV	BGR	4				
TLV	CZE	4	0,93	8	1,86	
VLA	ESP	4,3	1			SKIN
VLEP	FRA	4	1			
HTP	FIN	4,3	1	13	3	SKIN
TLV	GRC	4	1			
RD	LTU	4,5	1	10	2	SKIN
TLV	NOR	4	1			SKIN
TGG	NLD	0,5				SKIN
NDS/NDSch	POL	4		12		SKIN
TLV	ROU	2	0,5	4	1	SKIN
ПДК	RUS			0,3		n + a, A
NGV/KGV	SWE	4,5	1	10 (C)	2 (C)	SKIN
WEL	GBR	4,3	1			SKIN
ACGIH		4,2	1			SKIN
Predicted no-effect concentration - PNEC						
Normal value in fresh water				0,56	mg/l	
Normal value in marine water				0,056	mg/l	
Normal value for fresh water sediment				1072	mg/kg	
Normal value for marine water sediment				107,2	mg/kg	

Normal value for the terrestrial compartment			214		mg/kg			
Health - Derived no-effect level - DNEL / DMEL								
	Effects on consumers				Effects on workers			
Route of exposure	Acute local	Acute systemic	Chronic local	Chronic systemic	Acute local	Acute systemic	Chronic local	Chronic systemic
Oral	4,88 mg/kg	VND						
Inhalation	VND	27,5 mg/m^3	2,6 mg/m^3	15,4 mg/m^3	VND	92,1 mg/m^3		
Skin	VND	4,88 mg/kg					1,1 mg/kg	11,4 mg/kg
CALCIUM CARBONATE								
Threshold Limit Value								
Type	Country	TWA/8h	STEL/15min		Remarks / Observations			
		mg/m3	ppm	mg/m3	ppm			
VLEP	FRA	10						
NDS/NDSch	POL	10	INHAL					
Health - Derived no-effect level - DNEL / DMEL								
	Effects on consumers				Effects on workers			
Route of exposure	Acute local	Acute systemic	Chronic local	Chronic systemic	Acute local	Acute systemic	Chronic local	Chronic systemic
Inhalation			1,06 mg/m3	10 mg/m3			4,26 mg/m3	10 mg/m3

Legend:

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

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

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.

When choosing risk management measures and operating conditions, consult the exposure scenarios attached.

Provide an emergency shower with face and eye wash station.

HAND PROTECTION
Protect hands with category III work gloves.
The following should be considered when choosing work glove material (see standard EN 374): compatibility, degradation, permeability time.
The work gloves' resistance to chemical agents should be checked before use, as it can be unpredictable. The gloves' wear time depends on the duration and type of use.

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

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

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
Respiratory protection devices must be used if the technical measures adopted are not suitable for restricting the worker's exposure to the threshold values considered. Use a mask with a type A filter whose class (1, 2 or 3) must be chosen according to the limit of use concentration. (see standard EN 14387).
If the substance considered is odourless or its olfactory threshold is higher than the corresponding TLV-TWA and in the case of an emergency, wear open-circuit compressed air breathing apparatus (in compliance with standard EN 137) or external air-intake breathing apparatus (in compliance with standard EN 138). For a correct choice of respiratory protection device, see standard EN 529.

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.

For information on controlling environmental exposure, see the exposure scenarios attached to this safety datasheet.

SECTION 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

Properties	Value	Information
Appearance	viscous liquid	
Colour	white	
Odour	characteristic	
Melting point / freezing point	not available	
Initial boiling point	> 100 °C	
Flammability	not flammable	
Lower explosive limit	not available	
Upper explosive limit	not available	
Flash point	> 100 °C	
Auto-ignition temperature	not available	
Decomposition temperature	not available	
pH	11	Concentration: 100 % Temperature: 25 °C
Kinematic viscosity	>20,5 mm2/sec (40°C)	
Dynamic viscosity	13000 mPa.s	Temperature: 25 °C
Solubility	soluble in organic solvents	
Partition coefficient: n-octanol/water	not available	
Vapour pressure	not available	
Density and/or relative density	1,85 g/cm3	Temperature: 25 °C
Relative vapour density	not available	
Particle characteristics	not applicable	

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Information not available

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9.2.2. Other safety characteristics

VOC (Directive 2010/75/EU)14,50 % - 268,25 g/litre

SECTION 10. Stability and reactivity

10.1. Reactivity

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

Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia

Avoid contact with: acids.

Polymerises developing heat on contact with: epoxy compounds.

Possible formation of corrosive vapours.

May attack: aluminium.

May react dangerously if exposed to: isocyanates.

Reacts violently developing heat on contact with: acids.

Stable in normal conditions of use and storage.

DIETHYLENETRIAMINE

Avoid contact with: acids,oxidising agents.

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.

DIETHYLENETRIAMINE

Polymerises developing heat on contact with: epoxy compounds.

10.4. Conditions to avoid

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

10.5. Incompatible materials

DIETHYLENETRIAMINE

Corrodes: mild steel,aluminium,iron.

Avoid contact with: alcohols,acids,halogenated compounds,nitrites.

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10.6. Hazardous decomposition products

Information not available

SECTION 11. Toxicological information

In the absence of experimental data for the product itself, health hazards are evaluated according to the properties of the substances it contains, using the criteria specified in the applicable regulation for classification.
It is therefore necessary to take into account the concentration of the individual hazardous substances indicated in section 3, to evaluate the toxicological effects of exposure to the product.

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

Metabolism, toxicokinetics, mechanism of action and other information

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

4,4'-methylbis(cyclohexanamine)

A liver injury can occur. Ingestion can cause nausea, vomiting, sore throat, stomach pain and may eventually lead to bowel perforation.

Interactive effects

Information not available

ACUTE TOXICITY

ATE (Inhalation - vapours) of the mixture:	> 20 mg/l
ATE (Oral) of the mixture:	1520,00 mg/kg
ATE (Dermal) of the mixture:	Not classified (no significant component)

4,4'-methylbis(cyclohexanamine)	
LD50 (Oral):	380 mg/kg rat ECHA Chem

Oligomerisation and alkylation reaction products of 2-phenylpropene and phenol	
LD50 (Dermal):	> 2000 mg/kg
LD50 (Oral):	> 2000 mg/kg rat
LC50 (Inhalation mists/powders):	> 4,92 mg/l/4h rat

Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia	
LD50 (Dermal):	2980 mg/kg Rabbit OECD TG 402
LD50 (Oral):	2885 mg/kg Rat OECD TG 401
LC50 (Inhalation vapours):	> 0,74 mg/l/8h Rat OECD TG 403

DIETHYLENETRIAMINE	
LD50 (Dermal):	1045 mg/kg Rabbit
LD50 (Oral):	1140 mg/kg Rat
LC50 (Inhalation vapours):	1,8 mg/l/4h Rat

Inhalation: Fatal if inhaled. It can irritate the respiratory tract. Exposure to the products of decomposition can be dangerous to health. Following the exposure yes may experience serious delayed effects.
Ingestion: Harmful if swallowed. It can cause heartburn in the mouth, throat and stomach.

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Skin contact: Causes severe burns. Harmful in contact with skin. It can cause a allergic skin reaction.
Eye contact: Causes serious eye damage.

4,4'-ISOPROPYLIDENEDIPHENOL

LD50 (Dermal):

LD50 (Oral):

3000 mg/kg

> 2000 mg/kg

SKIN CORROSION / IRRITATION

Corrosive for the skin

4,4'-methylbis(cyclohexanamine)

This product must be considered: Causes severe skin burns and eye damage. Based on published data. The tests were carried out on rabbits. Causes severe burns. Reference: Registration dossier - ECHA Chem (4,4'-methylenebis (cyclohexylamine)).

Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia

Species: Rabbit
Method: OECD TG 404
Result: Corrosive, category 1C (when reactions occur from exposures between 1 hour and 4 hours and observation times up to 14 days).

DIETHYLENETRIAMINE

No official guidelines Rabbit - Corrosive.

4,4'-ISOPROPYLIDENEDIPHENOL

Essentially non-irritating to the skin in case of short contact.
Prolonged contact can cause skin irritation with local redness.
Repeated contact may cause skin irritation with redness.

SERIOUS EYE DAMAGE / IRRITATION

Causes serious eye damage

4,4'-methylbis(cyclohexanamine)

This product must be considered: Causes severe skin burns and eye damage. Based on published data. The tests were carried out on rabbits. Causes serious eye damage. Reference: Registration dossier - ECHA Chem (4,4'-methylenebis (cyclohexylamine)).

Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia

Species: Rabbit
Rating: Corrosive
Method: OECD Test Guideline 405
Result: Risk of serious eye damage.

DIETHYLENETRIAMINE

No official guidelines Rabbit - Corrosive.

4,4'-ISOPROPYLIDENEDIPHENOL

May cause moderate eye irritation.
It can cause a minor corneal injury.
It can cause permanent deterioration of vision.
Dust can irritate the eyes.

RESPIRATORY OR SKIN SENSITISATION

Sensitising for the skin

4,4'-methylbis(cyclohexanamine)

This product must be considered: May cause an allergic skin reaction. Based on published data. It causes awareness about the guinea pig. (OECD Guideline 406) Reference: Registration dossier - ECHA Chem (4,4'-methylenebis (cyclohexylamine)).

DIETHYLENETRIAMINE

OECD 406 Skin Sensitization
Sensitizing guinea pig skin
No official guidelines
Respiratory system Mouse Does not cause sensitization.

4,4'-ISOPROPYLIDENEDIPHENOL

Contact with the skin can cause an allergic skin reaction.
For respiratory sensitization:
No significant data found.

Skin sensitization

Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia

Route of exposure: Skin
Species: Guinea pig
Result: Does not cause skin sensitization.

GERM CELL MUTAGENICITY

Does not meet the classification criteria for this hazard class

4,4'-methylbis(cyclohexanamine)

This product should NOT be considered: Mutagenic Based on published data. Mutagenicity (reverse mutation test on "Ames test" bacteria, in vitro): negative
Mutagenicity (mammals: in vitro cytogenetic assay) negative In vivo micronucleus test negative Reference: Registration dossier - ECHA Chem (4,4'-methylenebis (cyclohexylamine)).

Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia

Concentration: 0 - 10000 ug / plate
Metabolic activation: with or without metabolic activation
Method: OECD TG 471
Result: negative.
Metabolic activation: with or without metabolic activation
Method: OECD TG 476
Result: negative
Genotoxicity in vivo:
Application method: Oral
Dose: 500 mg / kg
Method: OECD TG 474
Result: negative

DIETHYLENETRIAMINE

EPA CFR Negative
OECD 474 Mammalian Erythrocyte

Micronucleus Test
Negative.

4,4'-ISOPROPYLIDENEDIPHENOL

In vitro genetic toxicity studies yielded mostly negative results. The results of genetic toxicity tests conducted on animals gave negative results.

CARCINOGENICITY

Does not meet the classification criteria for this hazard class

DIETHYLENETRIAMINE

No official guidelines Mouse 3 days a week Negative Cutaneous.

4,4'-ISOPROPYLIDENEDIPHENOL

In long-term animal studies no convincing evidence was seen for the carcinogenicity of bisphenol A.

REPRODUCTIVE TOXICITY

Does not meet the classification criteria for this hazard class

4,4'-methylbis(cyclohexanamine)

This product must NOT be considered: Toxic for reproduction. Based on published data. Animal experiments in the laboratory did not show toxic effects on reproduction. The tests were performed on rats. Reference: Registration dossier - ECHA Chem (4,4'-methylenebis (cyclohexylamine)).

DIETHYLENETRIAMINE

OECD 421 Reproduction / Developmental Toxicity Screening
Rat Oral Test: 100 mg / kg NOAE.

Adverse effects on sexual function and fertility

Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia

Species: Rat, male and female
Method of application: Dermal
Method: OECD TG 421
Result: Animal testing did not result in any effects on fertility.

4,4'-ISOPROPYLIDENEDIPHENOL

Bisphenol A reproduced in affected rats and mice, but only at high levels of exposure that exceeded the body's ability to metabolize and deactivate the chemical. Maintaining exposures below appropriate workplace exposure limits should avoid these and other effects.

Adverse effects on development of the offspring

Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia

Test type: Prenatal
Species: Rabbit, female
Application method: Oral
Dose: 15/50/115 Milligram per kilo
Duration of the single treatment: 23 d
General toxicity in mothers: No observed harmful level: 50 mg / kg body weight
Developmental Toxicity: No observed harmful level: 115 mg / kg body weight

 Solutions for Building Technology		Revision nr. 3
XEPOXG Gel componente B		Dated 27/04/2026
		Printed on 27/04/2026
		Page n. 16/25
		Replaced revision:2 (Dated: 21/11/2024)
Method: OECD TG 414 4,4'-ISOPROPYLIDENEDIPHENOL It was toxic to the fetus in laboratory animals at doses toxic to the mother. It did not cause birth defects in laboratory animals. STOT - SINGLE EXPOSURE May cause respiratory irritation DIETHYLENETRIAMINE Category 3 Not applicable. Respiratory tract irritation. 4,4'-ISOPROPYLIDENEDIPHENOL It can irritate the respiratory tract. Route of exposure: Inhalation Target organs: Respiratory tract. STOT - REPEATED EXPOSURE Does not meet the classification criteria for this hazard class 4,4'-methylbis(cyclohexanamine) This product must be considered: May cause damage to organs through prolonged or repeated exposure. Based on published data. The tests were performed on rats. (OECD Guideline 422) NOAEL: No Observed Adverse Effect Level NOAEL (oral, rats) = 15 mg / kg bw / day Target organ: Skeletal muscles. Liver. Reference: Registration dossier - ECHA Chem (4,4'-methylenebis (cyclohexylamine)). Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia Species: Rat, male and female NOAEL:> 250 mg / kg Method of application: Dermal Exposure time: 90 DaysNumber of exposures: 5d Subsequent observation period: 28 days Method: Subchronic toxicity Species: Rat, male and female NOAEL:> 239 mg / kg Method of application: oral (food) Exposure time: 31 Days Method: Subacute toxicity. DIETHYLENETRIAMINE OECD NOEL - 70 to 80 mg / kg / d kidney, liver No official guidelines NOAEL 114 mg / kg / d No official guidelines NOEC Vapors 550 mg / m³ - 4,4'-ISOPROPYLIDENEDIPHENOL Effects on the liver and dubious effects on the kidneys and bladder were observed on animals he had been to administered bisphenol A. ASPIRATION HAZARD Does not meet the classification criteria for this hazard class Viscosity: >20,5 mm2/sec (40°C) 11.2. Information on other hazards ROTHO BLAAS SRL Via dell'Adige N.2/1 I-39040, Cortaccia (BZ) N. REA: BZ - 120599 C.F e P.IVA IT 01433490214 Cap. Soc.: EUR 52.000,00. TeL +39 0471 81 84 00 E-mail info@rothoblaas.com Pec: rothoblaas@pec.it www.rothoblaas.it		

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:

4,4'-ISOPROPYLIDENEDIPHENOL

SECTION 12. Ecological information

This product may damage the structure and/or the functions of the aquatic ecosystems in the long and/or delayed term.

12.1. Toxicity

4,4'-methylbis(cyclohexanamine)	
LC50 - for Fish	< 100 mg/l/96h Specie : Ido dorato (Leuciscus idus)
EC50 - for Crustacea	6,84 mg/l/48h Specie : Daphnia magna
EC50 - for Algae / Aquatic Plants	141,2 mg/l/72h

Oligomerisation and alkylation reaction products of 2-phenylpropene and phenol	
LC50 - for Fish	25,8 mg/l/96h
EC50 - for Crustacea	37 mg/l/48h
EC50 - for Algae / Aquatic Plants	15 mg/l/72h

Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia	
EC50 - for Crustacea	80 mg/l/48h OECD 202 Daphnia sp.

Toxicity to fish:
EC50 (Oncorhynchus mykiss (rainbow trout)):> 15 mg / l
End point: mortality
Exposure time: 96 h
Test type: Semi-static test
Test substance: Fresh water
Method: OECD TG 203
Toxicity to algae / aquatic plants:
EC50r (Selenastrum capricornutum (green alga)): 15 mg / l
Exposure time: 72 h
Test type: Static test
Test substance: Fresh water
Method: OECD Tg 201
Toxicity for micro-organisms:
EC50 (activated sludge): 750 mg / l
Exposure time: 3 h
Test type: Static test
Method: OECD Test Guideline 209

DIETHYLENETRIAMINE	
LC50 - for Fish	430 mg/l/96h Poecilia reticulata
EC50 - for Crustacea	65 mg/l/48h Daphnia magna
EC50 - for Algae / Aquatic Plants	187 mg/l/72h Selenastrum capricornutum
OECD 201 Alga, Chronic Growth Inhibition Test NOEC 72 hours	
Static Algae 10 mg / l	
No official guidelines Chronic NOEC 3 hours	
Static Bacteria 6 mg / l	
EU Chronic NOEC 21 days	
Semistatic Daphnia 5.6 mg / l	
OECD OECD 210 - Fish,	
Early-Life Stage Toxicity Test Chronic NOEC 28 days Semistatic Fish 10 mg / l.	

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4,4'-ISOPROPYLIDENEDIPHENOL

LC50 - for Fish	4,6 mg/l/96h
EC50 - for Crustacea	10,2 mg/l/48h
EC50 - for Algae / Aquatic Plants	1,1 mg/l/72h
Chronic NOEC for Crustacea	0,17 mg/l

12.2. Persistence and degradability

4,4'-methylbis(cyclohexanamine)

NOT rapidly degradable

This product should NOT be considered: It is rapidly biodegradable. Based on published data. Not readily biodegradable (10% / 28 days). (OECD TG 302B).

Reaction products of di-, tri- and tetra-
propoxylated propane-1,2-diol with ammonia
Solubility in water

100000 mg/l

NOT rapidly degradable

Inoculum: Mixture

Result: Not biodegradable.

Biodegradation: 0%

Exposure time: 28 d

Method: OECD TG 301 B.

DIETHYLENETRIAMINE

Solubility in water

1000 - 10000 mg/l

Rapidly degradable

OECD 301D Ready Biodegradability - Closed Bottle Test 21 days 87%

4,4'-ISOPROPYLIDENEDIPHENOL

Rapidly degradable

Biodegradability: The material is readily biodegradable. Pass the (I) OECD tests for the immediate biodegradability.

10-day window period: OK

Biodegradation: 93.1%

Exposure time: 28 d

Method: OECD 301F test method guideline or equivalent

10-day window period: Not applicable

Biodegradation: 87 - 95%

Exposure time: 28 d

Method: OECD 302A test method guideline or equivalent.

12.3. Bioaccumulative potential

4,4'-methylbis(cyclohexanamine)

The product is not considered to be bioaccumulative. Based on published data. log Pow = 2.03 (25 ° C) Reference: Registration dossier - ECHA Chem (4,4'-methylenebis (cyclohexylamine)).

Oligomerisation and alkylation reaction products of 2-phenylpropene and phenol

Partition coefficient: n-octanol/water

3,627 Log Kow pH 5.5 @ 25°C

Reaction products of di-, tri- and tetra-
propoxylated propane-1,2-diol with ammonia

Partition coefficient: n-octanol/water

1,34 @ 25° C

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DIETHYLENETRIAMINE

Partition coefficient: n-octanol/water -5,58

LogPow -1.58

BCF Potential 0.3 to 6.3.

4,4'-ISOPROPYLIDENEDIPHENOL

BCF < 13,3

Bioaccumulation: The potential for bioconcentration is low (BCF less than 100 or Log Pow higher than 7).

Partition coefficient: n-octanol / water (log Pow): 3.4 at 21.5 ° C

test method OECD 107 or equivalent

Bioconcentration factor (BCF): 5.1 - 13.3 Cyprinus carpio (Carp) 42 d.

12.4. Mobility in soil

DIETHYLENETRIAMINE

Partition coefficient: soil/water 3,4

Soil / water partition coefficient (KOC): 19111.

4,4'-ISOPROPYLIDENEDIPHENOL

Partition coefficient: soil/water < 931

Potential for mobility in soil is low (Koc between 500 and 2000).

Partition coefficient (Koc): 636 - 931 Measured.

12.5. Results of PBT and vPvB assessment

4,4'-methylbis(cyclohexanamine)

Substance does not meet the criteria for PBT or vPvB substances. Reference: Registration dossier - ECHA Chem (4,4'-methylenebis (cyclohexylamine)).

4,4'-ISOPROPYLIDENEDIPHENOL

This substance / mixture does not contain components considered to be persistent, bioaccumulative that toxic (PBT), or very persistent and very bioaccumulative (vPvB) at concentrations of 0.1% or higher.

vPvB substances contained:

Oligomerisation and alkylation reaction

products of 2-phenylpropene and phenol

12.6. Endocrine disrupting properties

4,4'-methylbis(cyclohexanamine)

Substance does not meet the criteria for PBT or vPvB substances. Reference: Registration dossier - ECHA Chem (4,4'-methylenebis (cyclohexylamine)).

Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Harmful to aquatic life with long lasting effects.

4,4'-ISOPROPYLIDENEDIPHENOL

This substance is not on the list attached to the Montreal Protocol relating to substances that deplete the ozone layer.

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:
4,4'-ISOPROPYLIDENEDIPHENOL

12.7. Other adverse effects

Information not available

SECTION 13. Disposal considerations

13.1. Waste treatment methods

Reuse, when possible. Product residues should be considered special hazardous waste. The hazard level of waste containing this product should be evaluated according to applicable regulations.
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.
The management of waste arising from the use or dispersal of this product must be organised in accordance with occupational safety regulations. See section 8 for possible need for PPE.
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: UN 2735

14.2. UN proper shipping name

ADR / RID: AMINES, LIQUID, CORROSIVE, N.O.S. or POLYAMINES, LIQUID, CORROSIVE, N.O.S. (4,4'-methylbis(cyclohexanamine); Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia)
IMDG: AMINES, LIQUID, CORROSIVE, N.O.S. or POLYAMINES, LIQUID, CORROSIVE, N.O.S. (4,4'-methylbis(cyclohexanamine); Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia)
IATA: AMINES, LIQUID, CORROSIVE, N.O.S. or POLYAMINES, LIQUID, CORROSIVE, N.O.S. (4,4'-methylbis(cyclohexanamine); Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia)

14.3. Transport hazard class(es)

ADR / RID:	Class: 8	Label: 8	
IMDG:	Class: 8	Label: 8	
IATA:	Class: 8	Label: 8	

14.4. Packing group

ADR / RID, IMDG, IATA: II

14.5. Environmental hazards

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ADR / RID: NO
IMDG: not marine pollutant
IATA: NO

14.6. Special precautions for user

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

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: None

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

Product		
Point	3	
Contained substance		
Point	75	
Point	66	4,4'-ISOPROPYLIDENEDIPHENOL REACH Reg.: 01-2119457856-23-xxxx

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

not applicable

Substances in Candidate List (Art. 59 REACH)

Oligomerisation and alkylation reaction products of 2-phenylpropene and phenol

REACH Reg.: 01-2119555274-38-xxxx

4,4'-ISOPROPYLIDENEDIPHENOL

REACH Reg.: 01-2119457856-23-xxxx

Substances subject to authorisation (Annex XIV REACH)

None

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

None

Substances subject to the Rotterdam Convention:

None

Substances subject to the Stockholm Convention:

None

Healthcare controls

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

15.2. Chemical safety assessment

A chemical safety assessment has been performed for the following contained substances

3-Azapentane-1,5-diamine

SECTION 16. Other information

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

Repr. 1B	Reproductive toxicity, category 1B
Acute Tox. 2	Acute toxicity, category 2
Acute Tox. 4	Acute toxicity, category 4
Skin Corr. 1A	Skin corrosion, category 1A
Skin Corr. 1B	Skin corrosion, category 1B
Skin Corr. 1C	Skin corrosion, category 1C
Skin Corr. 1	Skin corrosion, category 1
Eye Dam. 1	Serious eye damage, category 1
Eye Irrit. 2	Eye irritation, category 2
Skin Irrit. 2	Skin irritation, category 2
STOT SE 3	Specific target organ toxicity - single exposure, category 3
Skin Sens. 1	Skin sensitization, category 1
Skin Sens. 1B	Skin sensitization, category 1B
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 3	Hazardous to the aquatic environment, chronic toxicity, category 3

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Aquatic Chronic 4	Hazardous to the aquatic environment, chronic toxicity, category 4
H360F	May damage fertility.
H330	Fatal if inhaled.
H302	Harmful if swallowed.
H312	Harmful in contact with skin.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H319	Causes serious eye irritation.
H315	Causes skin irritation.
H335	May cause respiratory irritation.
H317	May cause an allergic skin reaction.
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.
H413	May cause long lasting harmful effects to aquatic life.

Use descriptor system:

ERC	7	Use of functional fluid at industrial site
ERC	8a	Widespread use of non- reactive processing aid (no inclusion into or onto article, indoor)
ERC	8b	Widespread use of reactive processing aid (no inclusion into or onto article, indoor)
ERC	8c	Widespread use leading to inclusion into/onto article (indoor)
ERC	8d	Widespread use of non- reactive processing aid (no inclusion into or onto article, outdoor)
ERC	8f	Widespread use leading to inclusion into/onto article (outdoor)
PC	1	Adhesives, sealants
PROC	10	Roller application or brushing
PROC	5	Mixing or blending in batch processes

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

- WGK: Water hazard classes (German).

GENERAL BIBLIOGRAPHY

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- 2. Regulation (EC) 1272/2008 (CLP) of the European Parliament
- 3. Regulation (EU) 2020/878 (II Annex of REACH Regulation)
- 4. Regulation (EC) 790/2009 (I Atp. CLP) of the European Parliament
- 5. Regulation (EU) 286/2011 (II Atp. CLP) of the European Parliament
- 6. Regulation (EU) 618/2012 (III Atp. CLP) of the European Parliament
- 7. Regulation (EU) 487/2013 (IV Atp. CLP) of the European Parliament
- 8. Regulation (EU) 944/2013 (V Atp. CLP) of the European Parliament
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- 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 / 08 / 11 / 12 / 16.

Exposure Scenarios

Substance	4,4'-methylbis(cyclohexanamine)
Scenario Title	PACM
Revision nr.	1
File	1

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Substance	Reaction products of di-, tri- and tetra-propoxylated propane-1,2-diol with ammonia
Scenario Title	D230
Revision nr.	1
File	2
Substance	DIETHYLENETRIAMINE
Scenario Title	DETA
Revision nr.	1
File	3
Substance	4,4'-ISOPROPYLIDENEDIPHENOL
Scenario Title	Bisfenolo A
Revision nr.	1
File	4