

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION
1.1 Product identifier
Product name: 1,3-Butadiene

Product code(s): 1,3-Butadiene

Synonym(s): Butadiene; Buta-1,3-diene; trans-Butadiene; Vinylethylene

1.2 Relevant identified uses of the substance or mixture and uses advised against
General use: Rubber chemicals; industrial applications; use only in well ventilated areas

Uses advised against: No data available

1.3 Details of the supplier and of the safety data sheet

Mitsubishi International Corporation

1221 McKinney St, Suite 3500

Houston, Texas 77010

+1-713-652-9324

1.4 Emergency telephone number: Chemtrec: +1-800-424-9300

SECTION 2 - HAZARDS IDENTIFICATION
2.1 Classification of substance or mixture
Product definition: Substance

Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable Gases - Category 1 [H220]

Gases Under Pressure/Liquified Gas - [H280]

Germ Cell Mutagenicity - Category 1B [H340]

Carcinogenicity - Category 1 [H350]

2.2 Label elements
Hazard symbol(s):


GHS02



GHS07



GHS08

Signal word: Danger

Hazard statement(s): H220 - Extremely flammable gas
 H280 - Contains gas under pressure; may explode if heated
 H340 - May cause genetic defects
 H350 - May cause cancer

Precautionary statements:
[Prevention]

 P201 - Obtain special instructions before use.
 P202 - Do not handle until all safety precautions have been read and understood
 P210 - Keep away from heat, open flames and hot surfaces. No smoking.
 P280 - Wear protective gloves, protective clothing, eye protection and respiratory protection.

[Response]

 P308 + P313 - If exposed or concerned: Get medical attention.
 P321 - Specific treatment: Call a POISON CENTER or doctor if you feel unwell. Refer to Section 4 of this SDS.
 P377 - Leaking gas fire: Do not extinguish unless leak can be stopped safely.
 P381 - Eliminate ignition sources if safe to do so.

[Storage]

P405 + P410 + P403 - Store locked up. Protect from sunlight. Keep container tightly closed.

[Disposal]

P501 - Dispose of contents and containers in accordance with national and local regulations.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May cause burns similar to frostbite.

Simple asphyxiant; may displace oxygen and cause rapid suffocation.

SECTION 3 - COMPOSITION/INFORMATION ON INGREDIENTS
3.1 Substances

% by Weight	Ingredient	CAS Number	EC Number	Index Number	GHS Classification
99.9	1,3-Butadiene	106-99-0	203-450-8	601-013-00-X	H220, H280, H340, H350

There are no additional ingredients present in this product which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

3.2 Mixtures

Not applicable

SECTION 4 - FIRST AID MEASURES

4.1 Description of first aid measures

Inhalation: If product mist or vapor causes respiratory irritation or distress, move the exposed person to fresh air immediately. If breathing is difficult or irregular, administer oxygen; if respiratory arrest occurs, start artificial respiration by trained personnel. If unconscious, maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. If symptoms persist or if the victim feels unwell, seek medical attention.

Eyes: Immediately flush eyes with large amounts of water or saline solution for at least 15 minutes, occasionally lifting the upper and lower lids. Remove contact lenses if present and easy to do after first 2 minutes and continue rinsing. If irritation persists seek medical attention, preferably from an ophthalmologist. Seek immediate medical attention for burns.

Skin: Flush skin with large amounts of water while removing contaminated clothing. Wash the affected area with soap and water followed by thorough rinsing. Wash contaminated clothing and shoes before reuse. If irritation persists, seek medical attention. Seek immediate medical attention for burns.

Ingestion: Rinse mouth with water if the victim is conscious. Remove dentures if present. DO NOT induce vomiting unless directed to do so by medical personnel. Vomiting may occur spontaneously. To prevent aspiration of vomit into the lungs, lay the victim on one side with the head lower than the waist. Never give anything by mouth to an unconscious or convulsing person. Do not leave the victim unattended. Seek immediate medical attention.

4.2 Most important symptoms and effects, both acute and delayed

Potential health symptoms and effects

Eyes: May cause severe eye irritation and possible eye damage. Contact with rapidly expanding gas may cause burns or frostbite. May cause eye damage.

Skin: Causes skin irritation with localized redness, itching and swelling. Contact with rapidly evaporating liquid or rapidly expanding gas could result in freezing of the tissues or frostbite.

Inhalation: Harmful if inhaled. Causes respiratory irritation with headache, sore throat, runny nose, cough, chest tightness and difficulty breathing. Can cause central nervous system depression, characterized by nausea, vomiting, narcosis, dizziness, drowsiness, confusion, weakness, muscle cramps and spasms, numbness, change in pupil size, tremors, seizures, incoordination, convulsions and coma.

Ingestion: Not an anticipated route of exposure. Ingestion of liquid can cause burns similar to frostbite.

Chronic: Individuals with pre-existing respiratory disorders may be more susceptible to the effects of this product. Exposure to this product may cause cancer. Exposure to this material may cause germ cell mutagenicity. Refer to Section 11.2.

4.3 Indication of any immediate medical attention and special treatment needed

Advice to doctor and hospital personnel

Treat symptomatically and supportively.

SECTION 5 - FIRE FIGHTING MEASURES

5.1 Extinguishing media

Suitable methods of extinction: Use extinguishing media suitable for the surrounding fire.

Unsuitable methods of extinction: None known

5.2 Special hazards arising from the substance or mixture

Extremely flammable gas! Vapors are heavier than air and can travel along the ground to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. Exposure to ignition sources (e.g. cell phones) can ignite vapors, causing a flash fire. Electrostatic charges may accumulate and create a hazardous condition when handling this product. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent or may be delayed. Obtain medical attention.

Explosion hazards: Avoid sources of ignition. Contains highly flammable contents under pressure. Exposure to high temperatures or ignition sources can cause containers to rupture or explode.

5.3 Advice to firefighters

Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. Firefighters should wear full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies. Water may be used to cool closed containers to prevent pressure buildup and possible autoignition or explosion when exposed to extreme heat. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Firefighters must control runoff to prevent environmental contamination. Notify appropriate authorities of potential fire and explosion hazard if liquid enters sewers or waterways.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Accidental releases pose a serious fire or explosion hazard. Evacuate non-essential personnel and surrounding areas. Wear appropriate protective clothing and equipment designated in Section 8.2, including appropriate respirator when ventilation is inadequate. Ensure adequate ventilation. Remove all sources of ignition. NO SMOKING. Clean up spills immediately.

6.2 Environmental precautions

Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Prevent further leakage or spillage if safe to do so. Use water sparingly to minimize environmental contamination and reduce disposal requirements.

6.3 Methods and materials for containment and cleaning up

Immediately contact emergency personnel. Approach spill from upwind direction. Stop leak if without risk. Use non-sparking tools and explosion-proof equipment. Do not allow material or runoff from rinsing contaminated areas to enter storm drains and ditches that lead to waterways.

6.4 Reference to other sections

Refer to Section 1 for emergency contact information and Section 13 for waste disposal.

SECTION 7 - HANDLING AND STORAGE

7.1 Precautions for safe handling

Pressurized container! Wear all appropriate personal protective equipment specified in Section 8.2. Do not get in eyes or on skin or clothing. Do not inhale vapor or mist. NO SMOKING. If normal use of material presents a respiratory hazard, ensure adequate ventilation or wear an appropriate respirator. Use explosion-proof equipment. Do not puncture or incinerate container. Open containers slowly to control possible pressure release. Take measures to prevent the buildup of electrostatic charge. Avoid exposure; obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wash contaminated clothing and shoes thoroughly before reuse.

Advice on protection against fire and explosion

Contains highly flammable contents under pressure. Exposure to high temperatures or ignition sources can cause containers to rupture or explode. Exposure to ignition sources (e.g. cell phones) can ignite vapors, causing a flash fire. Take measures to prevent the buildup of electrostatic charge.

7.2 Conditions for safe storage, including any incompatibilities

Pressurized container. Store in accordance with state and local regulations. Store in a segregated and approved area. Cylinder/container temperatures should not exceed 52 °C (125 °F). Store away from direct sunlight in dry, cool, well-ventilated areas away from incompatible materials (see Section 10.5), food and drink. Keep away from heat and ignition sources. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Protect containers against physical damage. Containers are hazardous when empty as they contain product residue. Do not cut, drill, weld, braze, solder grind or perform similar operations on or near empty containers. Use appropriate containment to avoid environmental contamination. Ventilate closed areas. Keep locked up out of reach of children.

7.3 Specific end uses

Apart from the uses mentioned in Section 1.2, no other specific uses are stipulated.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Occupational exposure limit values

CAS Number	Ingredient	OSHA PEL	ACGIH TLV	NIOSH
106-99-0	1,3-Butadiene	1 ppm TWA, 8 hours 5 ppm STEL, 15 minutes	2 ppm; 4.4 mg/m ³ TWA, 8 hours	-----

8.2 Exposure controls

Engineering measures: Use adequate ventilation. Local exhaust is preferable. Use explosion-proof ventilation equipment. Technical measures and appropriate working operations should be given priority over the use of personal protective equipment. Refer to Section 7.1.

Individual protection measures: Wear protective clothing to prevent repeated or prolonged contact with product. Protective clothing needs to be selected specifically for the workplace, depending on concentrations and quantities of hazardous substances handled. The chemical resistance of the protective equipment should be enquired at the representative supplier.

Hygiene measures: Facilities storing or using this material should be equipped with an eyewash station and safety shower. Change contaminated clothing. Preventive skin protection is recommended. Wash hands thoroughly after use, before eating, drinking, smoking or using the lavatory.

Eye/face protection: Wear a face shield and protective splash goggles during use.

Hand protection: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. If contact with the liquid is possible, insulated gloves suitable for low temperatures should be worn. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective Properties. Gloves should be impermeable to chemicals and oil. Breakthrough time of selected gloves must be greater than the intended use period.

Body protection: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear antistatic protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Respiratory protection: Always use an approved respirator when vapor/aerosols exceed permissible exposure limits. When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

Environmental exposure controls: Do not empty into drains.

PPE must not be considered a long-term solution to exposure control. PPE usage must be accompanied by employer programs to properly select,

maintain, clean fit and use. Consult a competent industrial hygiene resource to determine hazard potential and/or the PPE manufacturers to ensure adequate protection.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Colorless gas (liquified compressed gas)
Odor	Mild, aromatic
Odor Threshold	1.3 ppm
Molecular Weight	54.09 g/mol
Chemical Formula	C ₄ H ₆
pH	No data available
Freezing/Melting Point	- 109 °C (- 164.2 °F)
Boiling Point	- 4.4 °C (24.1 °F) @ 1013 hPa
Evaporation Rate	No data available
Flammability (solid, gas)	Extremely flammable gas
Flash Point	- 76.11 °C (- 105 °F)
Autoignition Temperature	420 °C (788 °F)
Decomposition Temperature	No data available
Lower Explosive Limit (LEL)	2% (v)
Upper Explosive Limit (UEL)	11.5% (v)
Vapor Pressure	2,170.13 hPa @ 16.85 °C 2,550.27 hPa @ 21.85 °C
Vapor Density	3.1 [Air = 1]
Density	0.0023 g/cc @ 15 °C
Viscosity, Dynamic	0.149 mPa.s @ 25 °C
Solubility in Water	0.734 g/l; negligible
Partition Coefficient (n-octanol/water)	log P _{ow} = 1.99 @ 23 °C
Oxidizing Properties	No data available
Explosive Properties	No data available
Volatiles by Weight @ 21 °C	100%

9.2 Other Data

No data available

SECTION 10 - STABILITY AND REACTIVITY

10.1 Reactivity

This material is stable under normal handling conditions and use.

10.2 Chemical Stability

This material is stable under recommended storage conditions. Under certain conditions this material can become unstable during storage and handling. Refer to Section 10.3 for further information.

10.3 Possibility of hazardous reactions

Vapors may form explosive mixture with air. Hazardous reactions or instability may occur under certain conditions of storage or use, including shock, friction, exposure to high temperature and sources of ignition. Hazardous polymerization may occur under certain conditions of storage or use.

10.4 Conditions to avoid

Avoid high temperatures, sources of ignition, hot surfaces and contact with incompatible materials. Avoid impact. Avoid use in confined areas.

10.5 Incompatible materials

Oxidizing agents, oxygen, acetylide-forming materials, aluminum tetrahydroborate copper and copper alloys, carbides, halogens, metals, metal oxides

10.6 Hazardous decomposition products

Thermal decomposition products include oxides of carbon.

SECTION 11 - TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute oral toxicity

LD₅₀, rat: 5,480 mg/kg

Acute inhalation toxicity

LC₅₀, rat: 285 mg/l (vapor)

Acute dermal toxicity

No data available

Skin irritation

Causes skin irritation. Contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

Eye irritation

Causes eye irritation. Contact with rapidly expanding gas may cause burns similar to frostbite.

Sensitization

No data available

Carcinogenicity

May cause cancer.

Germ cell mutagenicity

May cause genetic defects.

Ames test (in vitro) bacteria - Positive result

Sister chromatid exchange assay (in vitro) bacteria (metabolic activation: +/-) - Positive result

Cytogenic assay (in vivo) Mammalian (animal) - Positive result

Reproductive toxicity

No data available

Specific organ toxicity - single exposure

May cause respiratory irritation, drowsiness or dizziness.

Specific organ toxicity - repeated exposure

May cause damage to blood system, kidneys, liver and central nervous system through prolonged and repeated exposure.

Aspiration hazard

Not applicable

11.2 Further information

1,3-Butadiene (CAS #106-99-0): IARC, Group 1 carcinogen - *Carcinogenic to humans*; ACGIH A2 carcinogen: *Suspected human carcinogen*; NTP, Known: *Known to be a human carcinogen*; OSHA: *OSHA specifically regulated carcinogen*.

1,3-Butadiene is a known male mouse germ-cell mutagen, which humans may either be occupationally or environmentally exposed. Prolonged exposure to moderate or high doses in male mice can cause dominant lethal mutations and one report has indicated that 10 week inhalation administration of low doses can result in the production of malformed fetuses. Chronic low-dose exposure to 1,3-butadiene increased the frequency of adverse pregnancy outcomes, which is consistent with recent epidemiological data that support the possibility that occupational exposure to 1,3-butadiene induces adverse reproductive effects in humans.

1,3-Butadiene may damage the male (testes) and female (ovaries) reproductive systems in animals. These data, when combined with evidence that 1,3-butadiene is carcinogenic in rodent gonadal tissues and is associated with gonadal atrophy in mice, constitute suggestive evidence that 1,3-butadiene may be a human germ cell mutagen. However, because the mutagenicity of 1,3-butadiene has been studied primarily in bacteria, additional studies in mammalian test systems are needed to further characterize the mutagenic potential of 1,3-butadiene in humans.

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12 - ECOLOGICAL INFORMATION**12.1 Toxicity**

This material is harmful to aquatic life.

Acute toxicity to fish: LC₅₀ - Pimephales promelas (Fathead minnow), 96 h: 45 mg/l

Acute toxicity to aquatic invertebrates: EC₅₀ - Daphnia magna (Water flea), 48 h: 33 mg/l

Acute toxicity to aquatic plants: IC₅₀ - Algae (unspecified species), 72 h: 33 mg/l

12.2 Persistence and degradability

This material is expected to be readily biodegradable.

12.3 Bioaccumulation potential

The bioaccumulation potential for this material is low.

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

This substance is not persistent, bioaccumulative and toxic (PBT) and not very persistent and very bioaccumulative (vPvB).

12.6 Other effects**Additional ecological information**

Do not allow material to enter surface waters, wastewater or soil.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

SECTION 13 - DISPOSAL CONSIDERATIONS**13.1 Waste treatment methods**

The generation of waste should be avoided or minimized whenever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal

contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

SECTION 14 - TRANSPORT INFORMATION

United States Department of Transportation (Ground Transportation)

Proper Shipping Name Butadienes, stabilized
Hazard Class 2.1
UN UN1010
Packing Group -----
NAREG Guide #116P
CERCLA Reportable Quantity 4.45 kg (10 lb)



Transportation of Dangerous Goods (TDG) - Canada

Proper Shipping Name Butadienes, stabilized
Hazard Class 2.1
UN UN1010
Packing Group -----

IMO/IMDG (Marine Transportation)

Proper Shipping Name Butadienes, stabilized
Hazard Class 2.1
UN UN1010
Packing Group -----
Marine Pollutant No

IATA (Air Transportation)

Proper Shipping Name Butadienes, stabilized
Hazard Class 2.1
UN UN1010
Packing Group -----

SECTION 15 - REGULATORY INFORMATION

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

U. S. Federal Regulations

OSHA Hazard Communication Standard: This material is classified as hazardous in accordance with OSHA 29 CFR 1910-1200.

OSHA Process Safety Management Standard: This product is not regulated under OSHA PSM Standard 29 CFR 1910.119.

EPA Risk Management Planning Standard: 1,3-Butadiene (CAS #106-99-0) is regulated under EPA RMP Standard (RMP) 40 CFR Part 68. EPA RMP TQ = 10,000 lb

EPA Federal Insecticide, Fungicide and Rodenticide Act: This product is not a registered Pesticide under the FIFRA, 40 CFR Part 150.

Toxic Substance Control Act (TSCA) Inventory: All substances in this product are listed on the TSCA Inventory. This product is not subject to TSCA 12(b) Export Notification.

Superfund Amendments and Reauthorization Act (SARA)

SARA Section 311/312 Hazard Categories

Extremely flammable gas May cause genetic defects
Contains gas under pressure; may explode if heated May cause cancer

SARA 313 Information: 1,3-Butadiene (CAS #106-99-0) is subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to Know Act of 1986.

SARA 302/304 Extremely Hazardous Substance: None of the components of the product exceed the threshold (de minimis) reporting levels of established by these sections of Title III of SARA.

SARA 302/304 Emergency Planning & Notification: None of the components of the product exceed the threshold (de minimis) reporting levels established by of these sections of Title III of SARA.

Comprehensive Response Compensation and Liability Act (CERCLA): This product contains the following CERCLA reportable substance: 1,3-Butadiene (CAS #106-99-0): RQ = 4.45 kg (10 lb)

Clean Air Act (CAA)

1,3-Butadiene (CAS #106-99-0) is a Hazardous Air Pollutant (HAP) designated in CAA Section 112 (b).

This product does not contain Class 1 Ozone depleters.

This product does not contain Class 2 Ozone depleters.

Clean Water Act (CWA)

1,3-Butadiene (CAS #106-99-0) is a Hazardous Substance.

This product does not contain Priority Pollutants.

This product does not contain Toxic Pollutants.

U.S. State Regulations

California Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986

⚠ WARNING: This product will expose you to 1,3-Butadiene, which is known to the state of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Other U.S. State Inventories

1,3-Butadiene (CAS #106-99-0) is listed on the following State Hazardous Substance Inventories, Right-to-Know lists and/or Air Quality/Air Pollutants lists: CA, DE, ME, MN, NJ, NY, PA, RI, WV, WI.

Canada

WHMIS Hazard Classification

Extremely flammable gas May cause genetic defects
Contains gas under pressure; may explode if heated May cause cancer

Canadian National Pollutant Release Inventory (NPRI): 1,3-Butadiene (CAS #106-99-0) is listed on the NPRI.

Global Chemical Inventory Lists

Country	Inventory Name	Listed
Canada	Domestic Substance List (DSL)	Yes
Canada	Non-Domestic Substance List (NDSL)	No
Europe	Inventory of New and Existing Chemicals (EINECS)	Yes
United States	Toxic Substance Control Act (TSCA)	Yes
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
New Zealand	New Zealand Inventory of Chemicals (NZIoC)	Yes
China	Inventory of Existing Chemical Substances in China	Yes
Japan	Inventory of Existing and New Chemical Substances	Yes
Korea	Existing Chemicals List (KECI)	Yes
Philippines	Philippines Inventory of Chemicals and Chemical	Yes

*Yes - All components of this product comply with the inventory requirements administered by the governing country.

No - One or more components of this product are not on the inventory or are exempt from listing.

15.2 Chemical safety assessment

For this product a chemical safety assessment was not carried out.

SECTION 16 - OTHER INFORMATION

Hazardous Material Information System (HMIS)

HEALTH	*	2
FLAMMABILITY		4
PHYSICAL HAZARD		2
PERSONAL PROTECTION		H

H = goggles, gloves, apron
& vapor respirator

HMIS Hazard Rating Legend

0 = Minimal 1 = Slight 2 = Moderate

3 = Serious 4 = Severe

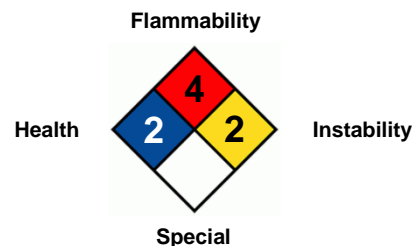
* = Chronic Health Hazard

NFPA Hazard Rating Legend

0 = Insignificant 1 = Slight 2 = Moderate

3 = High 4 = Extreme

National Fire Protection Association (NFPA)



DISCLAIMER OF RESPONSIBILITY

Mitsubishi International Corporation cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in this sheet was written based on the best knowledge and experience currently available.

Version 1

Preparation date: 30 April 2021

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