



# SAFETY DATA SHEET

**MATERION**

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

### 1.1. Product identifier

**Trade name or designation of the mixture** Pb0.99((Zr, Hf) 0.95Ti0.05)0.98Nb0.02O3  
**Registration number** -  
**Document number** 2PA  
**Synonyms** None.  
**Materion Code** 2PA  
**Issue date** 08-February-2021  
**Version number** 01

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

#### Supplier

**Company name** Materion Advanced Chemicals Inc.  
**Address** 407 N. 13th Street  
1316 W. St. Paul Avenue  
Milwaukee, WI 53233  
United States  
**Division** Milwaukee  
**Telephone** 414.212.0257  
**e-mail** advancedmaterials@materion.com  
**Contact person** Laura Hamilton

### 1.4. Emergency telephone number

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

**Identified uses** Not available.  
**Uses advised against** None known.

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

#### Supplier

**Company name** Materion Advanced Chemicals Inc.  
**Address** 407 N. 13th Street  
1316 W. St. Paul Avenue  
Milwaukee, WI 53233  
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**Contact person** Laura Hamilton

### 1.4. Emergency telephone number

## SECTION 2: Hazards identification

### 2.1. Classification of the substance or mixture

The mixture has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

### Classification according to Regulation (EC) No 1272/2008 as amended

#### Health hazards

Acute toxicity, oral	Category 4	H302 - Harmful if swallowed.
Acute toxicity, inhalation	Category 4	H332 - Harmful if inhaled.
Carcinogenicity	Category 1B	H350 - May cause cancer.
Reproductive toxicity (fertility, the unborn child)	Category 1A	H360FD - May damage fertility. May damage the unborn child.

Specific target organ toxicity - repeated exposure

Category 2

H373 - May cause damage to organs through prolonged or repeated exposure.

### Environmental hazards

Hazardous to the aquatic environment, acute aquatic hazard Category 1

H400 - Very toxic to aquatic life.

Hazardous to the aquatic environment, long-term aquatic hazard Category 1

H410 - Very toxic to aquatic life with long lasting effects.

### Hazard summary

Harmful if inhaled. Harmful if swallowed. May cause damage to organs through prolonged or repeated exposure. May cause cancer. May cause reproductive effects. Prolonged exposure may cause chronic effects. Dangerous for the environment if discharged into watercourses. Occupational exposure to the substance or mixture may cause adverse health effects. The material as sold in solid form is generally not considered hazardous. However, if the process involves grinding, melting, cutting or any other process that causes a release of dust or fumes, hazardous levels of airborne particulate could be generated.

## 2.2. Label elements

### Label according to Regulation (EC) No. 1272/2008 as amended

#### Contains:

Lead oxide, Titanium dioxide

#### Hazard pictograms



#### Signal word

Danger

#### Hazard statements

H302	Harmful if swallowed.
H332	Harmful if inhaled.
H350	May cause cancer.
H360FD	May damage fertility. May damage the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

### Precautionary statements

#### Prevention

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P261	Avoid breathing dust.
P264	Wash thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.

#### Response

P301 + P312	IF SWALLOWED: Call a POISON CENTRE or doctor/physician if you feel unwell.
P330	Rinse mouth.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P308 + P313	IF exposed or concerned: Get medical advice/attention.
P391	Collect spillage.

#### Storage

P405	Store locked up.
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#### Disposal

P501	Dispose of contents/container in accordance with local/regional/national/international regulations.
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### Supplemental label information

44 % of the mixture consists of component(s) of unknown acute oral toxicity. 100 % of the mixture consists of component(s) of unknown acute dermal toxicity. 44 % of the mixture consists of component(s) of unknown acute hazards to the aquatic environment. 44 % of the mixture consists of component(s) of unknown long-term hazards to the aquatic environment. For further information, please contact the Product Stewardship Department at +1.800.862.4118.

### 2.3. Other hazards

This mixture does not contain substances assessed to be vPvB / PBT according to Regulation (EC) No 1907/2006, Annex XIII.

## SECTION 3: Composition/information on ingredients

### 3.2. Mixtures

#### General information

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	Index No.	Notes
Lead oxide	60 - 65	1317-36-8 215-267-0	-	082-001-00-6	#
<b>Classification:</b> Acute Tox. 4;H302, Acute Tox. 4;H332, Carc. 1B;H350, Repr. 1A;H360FD, STOT RE 2;H373, Aquatic Acute 1;H400, Aquatic Chronic 1;H410					
<b>Specific Concentration Limits:</b> STOT RE 2;H373: C >= 0.5 %					
Titanium dioxide	≤ 3	1317-80-2 215-282-2	-	-	
<b>Classification:</b> -					
Other components below reportable levels	32 - 37				

#### List of abbreviations and symbols that may be used above

#: This substance has been assigned Union workplace exposure limit(s).

M: M-factor

PBT: persistent, bioaccumulative and toxic substance.

vPvB: very persistent and very bioaccumulative substance.

All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

**Composition comments** The full text for all H-statements is displayed in section 16.

## SECTION 4: First aid measures

#### General information

IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

#### 4.1. Description of first aid measures

##### Inhalation

Remove victim to fresh air and keep at rest in a position comfortable for breathing. Oxygen or artificial respiration if needed. Call a poison centre or doctor/physician if you feel unwell.

##### Skin contact

Wash off with soap and water. Get medical attention if irritation develops and persists.

##### Eye contact

Do not rub eyes. Rinse with water. Get medical attention if irritation develops and persists.

##### Ingestion

Rinse mouth. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical advice/attention if you feel unwell.

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

Prolonged exposure may cause chronic effects.

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

Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

## SECTION 5: Firefighting measures

#### General fire hazards

No unusual fire or explosion hazards noted.

#### 5.1. Extinguishing media

##### Suitable extinguishing media

Water fog. Foam. Dry chemical powder. Carbon dioxide (CO<sub>2</sub>).

##### Unsuitable extinguishing media

Do not use water jet as an extinguisher, as this will spread the fire.

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

During fire, gases hazardous to health may be formed.

#### 5.3. Advice for firefighters

##### Special protective equipment for firefighters

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

##### Special firefighting procedures

Use water spray to cool unopened containers.

#### Specific methods

Use standard firefighting procedures and consider the hazards of other involved materials.

## SECTION 6: Accidental release measures

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

#### For non-emergency personnel

Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Avoid inhalation of dust. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

#### For emergency responders

Keep unnecessary personnel away. Use personal protection recommended in Section 8 of the SDS.

### 6.2. Environmental precautions

Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

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

Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Prevent entry into waterways, sewer, basements or confined areas. Stop the flow of material, if this is without risk.

Large Spills: Wet down with water and dike for later disposal. Shovel the material into waste container. Following product recovery, flush area with water.

Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. Put material in suitable, covered, labeled containers.

### 6.4. Reference to other sections

For personal protection, see section 8. For waste disposal, see section 13.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Minimise dust generation and accumulation. Do not taste or swallow. Avoid breathing dust. Avoid prolonged exposure. When using, do not eat, drink or smoke. Pregnant or breastfeeding women must not handle this product. Should be handled in closed systems, if possible. Use only outdoors or in a well-ventilated area. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices.

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

Store locked up. Store in tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

### 7.3. Specific end use(s)

Not available.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

#### Occupational exposure limits

#### Austria. MAK List, OEL Ordinance (GwV), BGBl. II, no. 184/2001

Components	Type	Value	Form
Hafnium oxide (CAS 12055-23-1)	MAK	0,5 mg/m <sup>3</sup>	Inhalable fraction.
Lead oxide (CAS 1317-36-8)	MAK	0,1 mg/m <sup>3</sup>	Inhalable fraction.
	STEL	0,4 mg/m <sup>3</sup>	Inhalable fraction.
Niobium oxide (CAS 12034-57-0)	MAK	5 mg/m <sup>3</sup>	Inhalable fraction.
	STEL	10 mg/m <sup>3</sup>	Inhalable fraction.
Titanium dioxide (CAS 1317-80-2)	MAK	5 mg/m <sup>3</sup>	Respirable dust.
	STEL	10 mg/m <sup>3</sup>	Respirable dust.
Zirconium oxide (CAS 1314-23-4)	MAK	5 mg/m <sup>3</sup>	Inhalable fraction.

#### Belgium. Exposure Limit Values

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m <sup>3</sup>	Dust and fume.
Titanium dioxide (CAS 1317-80-2)	TWA	10 mg/m <sup>3</sup>	

**Belgium. Exposure Limit Values Components**

Components	Type	Value	Form
Zirconium oxide (CAS 1314-23-4)	STEL	10 mg/m <sup>3</sup>	
	TWA	5 mg/m <sup>3</sup>	

**Bulgaria. OELs. Regulation No 13 on protection of workers against risks of exposure to chemical agents at work Components**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TWA	0,05 mg/m <sup>3</sup>	
Titanium dioxide (CAS 1317-80-2)	TWA	10 mg/m <sup>3</sup>	Respirable dust.

**Croatia. Dangerous Substance Exposure Limit Values in the Workplace (ELVs), Annexes 1 and 2, Narodne Novine, 13/09**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	MAC	0,15 mg/m <sup>3</sup>	
Titanium dioxide (CAS 1317-80-2)	MAC	4 mg/m <sup>3</sup>	Respirable dust.
		10 mg/m <sup>3</sup>	Total dust.
Zirconium oxide (CAS 1314-23-4)	MAC	5 mg/m <sup>3</sup>	
	STEL	10 mg/m <sup>3</sup>	

**Cyprus. OELs. Control of factory atmosphere and dangerous substances in factories regulation, PI 311/73, as amended.**

Components	Type	Value	Form
Titanium dioxide (CAS 1317-80-2)	TWA	10 mg/m <sup>3</sup>	
Zirconium oxide (CAS 1314-23-4)	TWA	5 mg/m <sup>3</sup>	

**Czech Republic. OELs. Government Decree 361 Components**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	Ceiling	0,2 mg/m <sup>3</sup>	
	TWA	0,05 mg/m <sup>3</sup>	

**Denmark. Exposure Limit Values Components**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TLV	0,05 mg/m <sup>3</sup>	
Niobium oxide (CAS 12034-57-0)	TLV	5 mg/m <sup>3</sup>	
Titanium dioxide (CAS 1317-80-2)	TLV	6 mg/m <sup>3</sup>	
Zirconium oxide (CAS 1314-23-4)	TLV	5 mg/m <sup>3</sup>	

**Estonia. OELs. Occupational Exposure Limits of Hazardous Substances (Regulation No. 105/2001, Annex), as amended**

Components	Type	Value	Form
Titanium dioxide (CAS 1317-80-2)	TWA	5 mg/m <sup>3</sup>	

**Estonia. OELs. Occupational Exposure Limits of Hazardous Substances. (Annex of Regulation No. 293 of 18 September 2001)**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TWA	0,1 mg/m <sup>3</sup>	Total dust.
		0,05 mg/m <sup>3</sup>	Respirable dust.

**Finland. Workplace Exposure Limits Components**

Components	Type	Value	Form
Hafnium oxide (CAS 12055-23-1)	TWA	0,5 mg/m <sup>3</sup>	
Lead oxide (CAS 1317-36-8)	TWA	0,1 mg/m <sup>3</sup>	

**Finland. Workplace Exposure Limits Components**

Components	Type	Value	Form
Titanium dioxide (CAS 1317-80-2)	TWA	10 mg/m <sup>3</sup>	Dust.
Zirconium oxide (CAS 1314-23-4)	TWA	1 mg/m <sup>3</sup>	

**France. Threshold Limit Values (VLEP) for Occupational Exposure to Chemicals in France, INRS ED 984**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	VME	0,1 mg/m <sup>3</sup>	
Titanium dioxide (CAS 1317-80-2)	VME	10 mg/m <sup>3</sup>	

**Regulatory status:** Indicative limit (VL)

**Germany. DFG MAK List (advisory OELs). Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (DFG)**

Components	Type	Value	Form
Titanium dioxide (CAS 1317-80-2)	TWA	0,3 mg/m <sup>3</sup>	Respirable fraction.

**Germany. TRGS 900, Limit Values in the Ambient Air at the Workplace**

Components	Type	Value	Form
Zirconium oxide (CAS 1314-23-4)	AGW	1 mg/m <sup>3</sup>	Inhalable fraction.

**Greece. OELs (Decree No. 90/1999, as amended)**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m <sup>3</sup>	
Titanium dioxide (CAS 1317-80-2)	TWA	5 mg/m <sup>3</sup>	Respirable.
		10 mg/m <sup>3</sup>	Inhalable
Zirconium oxide (CAS 1314-23-4)	STEL	10 mg/m <sup>3</sup>	
	TWA	5 mg/m <sup>3</sup>	

**Hungary. OELs. Joint Decree on Chemical Safety of Workplaces**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m <sup>3</sup>	
Zirconium oxide (CAS 1314-23-4)	STEL	20 mg/m <sup>3</sup>	
	TWA	5 mg/m <sup>3</sup>	

**Iceland. OELs. Regulation 154/1999 on occupational exposure limits**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TWA	0,05 mg/m <sup>3</sup>	Dust and fume.
Titanium dioxide (CAS 1317-80-2)	TWA	6 mg/m <sup>3</sup>	
Zirconium oxide (CAS 1314-23-4)	TWA	5 mg/m <sup>3</sup>	

**Ireland. Occupational Exposure Limits**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m <sup>3</sup>	
Titanium dioxide (CAS 1317-80-2)	TWA	4 mg/m <sup>3</sup>	Respirable dust.
		10 mg/m <sup>3</sup>	Total inhalable dust.
Zirconium oxide (CAS 1314-23-4)	STEL	10 mg/m <sup>3</sup>	
	TWA	5 mg/m <sup>3</sup>	

**Italy. Occupational Exposure Limits Components**

Components	Type	Value
Hafnium oxide (CAS 12055-23-1)	TWA	0,5 mg/m3
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m3
Titanium dioxide (CAS 1317-80-2)	TWA	10 mg/m3
Zirconium oxide (CAS 1314-23-4)	STEL	10 mg/m3
	TWA	5 mg/m3

**Latvia. OELs. Occupational exposure limit values of chemical substances in work environment Components**

Components	Type	Value
Titanium dioxide (CAS 1317-80-2)	TWA	10 mg/m3

**Lithuania. OELs. Limit Values for Chemical Substances, General Requirements**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m3	Inhalable fraction.
		0,07 mg/m3	Respirable fraction.
Titanium dioxide (CAS 1317-80-2)	TWA	5 mg/m3	
Zirconium oxide (CAS 1314-23-4)	TWA	6 mg/m3	

**Luxembourg. Binding Occupational exposure limit values (Annex I), Memorial A Components**

Components	Type	Value
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m3

**Malta. OELs. Occupational Exposure Limit Values (L.N. 227. of Occupational Health and Safety Authority Act (CAP. 424), Schedules I and V)**

Components	Type	Value
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m3

**Netherlands. OELs (binding) Components**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m3	Dust and fume.

**Norway. Administrative Norms for Contaminants in the Workplace Components**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TLV	0,05 mg/m3	Dust and fume.
Titanium dioxide (CAS 1317-80-2)	TLV	5 mg/m3	
Zirconium oxide (CAS 1314-23-4)	TLV	5 mg/m3	

**Poland. Ordinance of the Minister of Labour and Social Policy on 6 June 2014 on the maximum permissible concentrations and intensities of harmful health factors in the work environment, Journal of Laws 2014, item 817**

Components	Type	Value
Hafnium oxide (CAS 12055-23-1)	TWA	0,5 mg/m3
Lead oxide (CAS 1317-36-8)	TWA	0,05 mg/m3
Titanium dioxide (CAS 1317-80-2)	STEL	30 mg/m3
Zirconium oxide (CAS 1314-23-4)	STEL	10 mg/m3
	TWA	5 mg/m3

**Portugal. Decree-Law No. 24/2012, Binding Occupational Exposure Limit Values, Annex I (Diário da República - I.a série - No. 26)**

Components	Type	Value
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m3

**Portugal. VLEs. Norm on occupational exposure to chemical agents (NP 1796)**

Components	Type	Value
Hafnium oxide (CAS 12055-23-1)	TWA	0,5 mg/m <sup>3</sup>
Lead oxide (CAS 1317-36-8)	TWA	0,05 mg/m <sup>3</sup>
Titanium dioxide (CAS 1317-80-2)	TWA	10 mg/m <sup>3</sup>
Zirconium oxide (CAS 1314-23-4)	STEL	10 mg/m <sup>3</sup>
	TWA	5 mg/m <sup>3</sup>

**Romania. OELs. Protection of workers from exposure to chemical agents at the workplace**

Components	Type	Value
Lead oxide (CAS 1317-36-8)	STEL	0,1 mg/m <sup>3</sup>
	TWA	0,05 mg/m <sup>3</sup>
Titanium dioxide (CAS 1317-80-2)	STEL	15 mg/m <sup>3</sup>
	TWA	10 mg/m <sup>3</sup>
Zirconium oxide (CAS 1314-23-4)	STEL	10 mg/m <sup>3</sup>
	TWA	5 mg/m <sup>3</sup>

**Slovakia. OELs. Regulation No. 300/2007 concerning protection of health in work with chemical agents**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TWA	0,5 mg/m <sup>3</sup>	Inhalable fraction.
		0,15 mg/m <sup>3</sup>	Respirable fraction.
Titanium dioxide (CAS 1317-80-2)	TWA	5 mg/m <sup>3</sup>	
Zirconium oxide (CAS 1314-23-4)	TWA	1 mg/m <sup>3</sup>	

**Slovenia. OELs. Regulations concerning protection of workers against risks due to exposure to chemicals while working (Official Gazette of the Republic of Slovenia)**

Components	Type	Value	Form
Hafnium oxide (CAS 12055-23-1)	TWA	0,5 mg/m <sup>3</sup>	Inhalable fraction.
Lead oxide (CAS 1317-36-8)	TWA	0,1 mg/m <sup>3</sup>	Inhalable fraction.
Niobium oxide (CAS 12034-57-0)	TWA	5 mg/m <sup>3</sup>	Inhalable fraction.
Zirconium oxide (CAS 1314-23-4)	TWA	1 mg/m <sup>3</sup>	Inhalable dust.

**Spain. Occupational Exposure Limits**

Components	Type	Value
Hafnium oxide (CAS 12055-23-1)	TWA	0,5 mg/m <sup>3</sup>
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m <sup>3</sup>
Titanium dioxide (CAS 1317-80-2)	TWA	10 mg/m <sup>3</sup>
Zirconium oxide (CAS 1314-23-4)	STEL	10 mg/m <sup>3</sup>
	TWA	5 mg/m <sup>3</sup>

**Sweden. OELs. Work Environment Authority (AV), Occupational Exposure Limit Values (AFS 2015:7)**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TWA	0,05 mg/m <sup>3</sup>	
Titanium dioxide (CAS 1317-80-2)	TWA	5 mg/m <sup>3</sup>	Total dust.



**Switzerland. SUVA Grenzwerte am Arbeitsplatz**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	STEL	0,8 mg/m <sup>3</sup>	Inhalable dust.
	TWA	0,1 mg/m <sup>3</sup>	Inhalable dust.
Titanium dioxide (CAS 1317-80-2)	TWA	3 mg/m <sup>3</sup>	Respirable dust.
Zirconium oxide (CAS 1314-23-4)	TWA	5 mg/m <sup>3</sup>	Inhalable fraction.

**UK. EH40 Workplace Exposure Limits (WELs)**

Components	Type	Value	Form
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m <sup>3</sup>	
Titanium dioxide (CAS 1317-80-2)	TWA	4 mg/m <sup>3</sup>	Respirable.
		10 mg/m <sup>3</sup>	Inhalable
Zirconium oxide (CAS 1314-23-4)	STEL	10 mg/m <sup>3</sup>	
	TWA	5 mg/m <sup>3</sup>	

**EU. Directive 98/24/EC: on the protection of workers from the risks related to chemical agents at work, Annex I List of Binding Occupational Exposure Limit Values**

Components	Type	Value
Lead oxide (CAS 1317-36-8)	TWA	0,15 mg/m <sup>3</sup>

**Biological limit values****Finland. HTP-arvot, App 2., Biological Limit Values, (BRA/BGV) , Social Affairs and Ministry of Health**

Components	Value	Determinant	Specimen	Sampling Time
Lead oxide (CAS 1317-36-8)	1,4 µmol/l	Lead	Blood	*

\* - For sampling details, please see the source document.

**Germany. TRGS 903, BAT List (Biological Limit Values)**

Components	Value	Determinant	Specimen	Sampling Time
Lead oxide (CAS 1317-36-8)	300 µg/l	Blei	Blood	*

\* - For sampling details, please see the source document.

**Hungary. Chemical Safety at Workplace Ordinance Joint Decree No. 25/2000 (Annex 2): Permissible limit values of biological exposure (effect) indices**

Components	Value	Determinant	Specimen	Sampling Time
Lead oxide (CAS 1317-36-8)	300 µg/l	lead	Blood	*
	1,5 µmol/l	lead	Blood	*
	100 µmol/mol hb	zinc protoporphyrin (for pre-screening)	Hemoglobin in blood	

\* - For sampling details, please see the source document.

**Luxembourg. Biological limit values (Annex II), Memorial A, n. 96, p. 1948**

Components	Value	Determinant	Specimen
Lead oxide (CAS 1317-36-8)	70 µg/ml	Pb	Blood

**Portugal. Decree-Law No. 24/2012, Binding Biological Limit Values, Annex II (Diário da República - I.a série - No. 26)**

Components	Value	Determinant	Specimen
Lead oxide (CAS 1317-36-8)	70 µg/100 ml	Chumbo	Blood

**Slovakia. BLVs (Biological Limit Value). Regulation no. 355/2006 concerning protection of workers exposed to chemical agents, Annex 2**

Components	Value	Determinant	Specimen	Sampling Time
Lead oxide (CAS 1317-36-8)	100 µg/l	Lead	Blood	*
	4,03 mg/g	δ-Aminolevulini c acid	Creatinine in urine	
	0,2 mg/g	Coproporphyrin	Creatinine in urine	*

**Slovakia. BLVs (Biological Limit Value). Regulation no. 355/2006 concerning protection of workers exposed to chemical agents, Annex 2**

Components	Value	Determinant
	6 mg/l	δ-Aminolevulinic acid
	0,3 mg/l	Coproporphyrin

\* - For sampling details, please see the source document.

**Spain. Biological Limit Values (VLBs), Occupational Exposure Limits for Chemical Agents, Table 4**

Components	Value	Determinant	Specimen	Sampling Time
Lead oxide (CAS 1317-36-8)	70 µg/dl	Plomo	Blood	*

\* - For sampling details, please see the source document.

**EU. Directive 98/24/EC: on the protection of workers from the risks related to chemical agents at work, Annex II Binding Biological Limit Values and Health Surveillance Measures**

Components	Value	Determinant	Specimen
Lead oxide (CAS 1317-36-8)	70 µg/100 ml	Lead	Blood

**Recommended monitoring procedures** Follow standard monitoring procedures.

**Derived no effect levels (DNELs)** Not available.

**Predicted no effect concentrations (PNECs)** Not available.

## 8.2. Exposure controls

### Appropriate engineering controls

Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

### Individual protection measures, such as personal protective equipment

#### General information

Use personal protective equipment as required. Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.

#### Eye/face protection

If contact is likely, safety glasses with side shields are recommended.

#### Skin protection

##### - Hand protection

Wear appropriate chemical resistant gloves.

##### - Other

Wear suitable protective clothing. Use of an impervious apron is recommended.

#### Respiratory protection

In case of insufficient ventilation, wear suitable respiratory equipment.

#### Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

### Hygiene measures

Observe any medical surveillance requirements. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

### Environmental exposure controls

Inform appropriate managerial or supervisory personnel of all environmental releases. Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. Fume scrubbers, filters or engineering modifications to the process equipment may be necessary to reduce emissions to acceptable levels.

## SECTION 9: Physical and chemical properties

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

#### Appearance

##### Physical state

Solid.

##### Form

Solid.

##### Colour

Not available.

#### Odour

Not available.

#### Odour threshold

Not available.

#### pH

Not available.

**Melting point/freezing point** 888 °C (1630,4 °F) estimated

**Initial boiling point and boiling range** 2500 °C (4532 °F) estimated

<b>Flash point</b>	Not available.
<b>Evaporation rate</b>	Not available.
<b>Flammability (solid, gas)</b>	Not available.
<b>Upper/lower flammability or explosive limits</b>	
<b>Flammability limit - lower (%)</b>	Not available.
<b>Flammability limit - upper (%)</b>	Not available.
<b>Vapour pressure</b>	1541,17 hPa estimated
<b>Vapour density</b>	Not available.
<b>Relative density</b>	Not available.
<b>Solubility(ies)</b>	
<b>Solubility (water)</b>	Not available.
<b>Partition coefficient (n-octanol/water)</b>	Not available.
<b>Auto-ignition temperature</b>	Not available.
<b>Decomposition temperature</b>	Not available.
<b>Viscosity</b>	Not available.
<b>Explosive properties</b>	Not explosive.
<b>Oxidising properties</b>	Not oxidising.

## 9.2. Other information

<b>Density</b>	9,30 g/cm <sup>3</sup> estimated
<b>Specific gravity</b>	9,3 estimated

## SECTION 10: Stability and reactivity

<b>10.1. Reactivity</b>	The product is stable and non-reactive under normal conditions of use, storage and transport.
<b>10.2. Chemical stability</b>	Material is stable under normal conditions.
<b>10.3. Possibility of hazardous reactions</b>	No dangerous reaction known under conditions of normal use.
<b>10.4. Conditions to avoid</b>	Avoid temperatures exceeding the decomposition temperature. Contact with incompatible materials.
<b>10.5. Incompatible materials</b>	Strong oxidising agents.
<b>10.6. Hazardous decomposition products</b>	No hazardous decomposition products are known.

## SECTION 11: Toxicological information

**General information** Occupational exposure to the substance or mixture may cause adverse effects.

### Information on likely routes of exposure

<b>Inhalation</b>	Harmful if inhaled.
<b>Skin contact</b>	No adverse effects due to skin contact are expected.
<b>Eye contact</b>	Direct contact with eyes may cause temporary irritation.
<b>Ingestion</b>	Harmful if swallowed.

**Symptoms** Exposure may cause temporary irritation, redness, or discomfort.

### 11.1. Information on toxicological effects

<b>Acute toxicity</b>	Harmful if inhaled. Harmful if swallowed.
<b>Skin corrosion/irritation</b>	Due to partial or complete lack of data the classification is not possible.
<b>Serious eye damage/eye irritation</b>	Due to partial or complete lack of data the classification is not possible.
<b>Respiratory sensitisation</b>	Due to partial or complete lack of data the classification is not possible.
<b>Skin sensitisation</b>	Due to partial or complete lack of data the classification is not possible.
<b>Germ cell mutagenicity</b>	Due to partial or complete lack of data the classification is not possible.
<b>Carcinogenicity</b>	May cause cancer.

### Hungary. 26/2000 EüM Ordinance on protection against and preventing risk relating to exposure to carcinogens at work (as amended)

Not listed.

## IARC Monographs. Overall Evaluation of Carcinogenicity

Lead oxide (CAS 1317-36-8) 2A Probably carcinogenic to humans.  
Titanium dioxide (CAS 1317-80-2) 2B Possibly carcinogenic to humans.

**Reproductive toxicity** May damage fertility. May damage the unborn child.  
**Specific target organ toxicity - single exposure** Due to partial or complete lack of data the classification is not possible.  
**Specific target organ toxicity - repeated exposure** May cause damage to organs through prolonged or repeated exposure.  
**Aspiration hazard** Due to partial or complete lack of data the classification is not possible.  
**Mixture versus substance information** No information available.  
**Other information** Not available.

## SECTION 12: Ecological information

**12.1. Toxicity** Very toxic to aquatic life with long lasting effects.

Product	Species	Test Results	
Pb0.99((Zr, Hf) 0.95Ti0.05)0.98Nb0.02O3			
<b>Aquatic</b>			
<i>Acute</i>			
Crustacea	EC50	Daphnia	33333,332 mg/l, 48 hours estimated
Fish	LC50	Fish	11758,6074 mg/l, 96 hours estimated

Components	Species	Test Results	
Lead oxide (CAS 1317-36-8)			
<b>Aquatic</b>			
<i>Acute</i>			
Fish	LC50	Fathead minnow (Pimephales promelas)	0,298 mg/l, 96 hours
Titanium dioxide (CAS 1317-80-2)			
<b>Aquatic</b>			
<i>Acute</i>			
Crustacea	EC50	Water flea (Daphnia magna)	> 1000 mg/l, 48 hours
Fish	LC50	Mummichog (Fundulus heteroclitus)	> 1000 mg/l, 96 hours

**12.2. Persistence and degradability** No data is available on the degradability of any ingredients in the mixture.

**12.3. Bioaccumulative potential** No data available.

**Partition coefficient n-octanol/water (log Kow)** Not available.

**Bioconcentration factor (BCF)** Not available.

**12.4. Mobility in soil** No data available.

**12.5. Results of PBT and vPvB assessment** This mixture does not contain substances assessed to be vPvB / PBT according to Regulation (EC) No 1907/2006, Annex XIII.

**12.6. Other adverse effects** No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

### 12.7. Additional information

#### Estonia Dangerous substances in soil Data

Lead oxide (CAS 1317-36-8) Lead (Pb) 300 mg/kg  
Lead (Pb) 50 mg/kg  
Lead (Pb) 600 mg/kg

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

**Residual waste** Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

**Contaminated packaging** Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

<b>EU waste code</b>	The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.
<b>Disposal methods/information</b>	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.
<b>Special precautions</b>	Dispose in accordance with all applicable regulations.

## SECTION 14: Transport information

### ADR

<b>14.1. UN number</b>	UN3077
<b>14.2. UN proper shipping name</b>	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
<b>14.3. Transport hazard class(es)</b>	
Class	9
Subsidiary risk	-
Label(s)	9
Hazard No. (ADR)	90
Tunnel restriction code	E
<b>14.4. Packing group</b>	III
<b>14.5. Environmental hazards</b>	Yes
<b>14.6. Special precautions for user</b>	Read safety instructions, SDS and emergency procedures before handling.

### RID

<b>14.1. UN number</b>	UN3077
<b>14.2. UN proper shipping name</b>	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
<b>14.3. Transport hazard class(es)</b>	
Class	9
Subsidiary risk	-
Label(s)	9
<b>14.4. Packing group</b>	III
<b>14.5. Environmental hazards</b>	Yes
<b>14.6. Special precautions for user</b>	Read safety instructions, SDS and emergency procedures before handling.

### ADN

<b>14.1. UN number</b>	UN3077
<b>14.2. UN proper shipping name</b>	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
<b>14.3. Transport hazard class(es)</b>	
Class	9
Subsidiary risk	-
Label(s)	9
<b>14.4. Packing group</b>	III
<b>14.5. Environmental hazards</b>	Yes
<b>14.6. Special precautions for user</b>	Read safety instructions, SDS and emergency procedures before handling.

### IATA

<b>14.1. UN number</b>	UN3077
<b>14.2. UN proper shipping name</b>	Environmentally hazardous substance, solid, n.o.s.
<b>14.3. Transport hazard class(es)</b>	
Class	9
Subsidiary risk	-
<b>14.4. Packing group</b>	III
<b>14.5. Environmental hazards</b>	Yes
<b>ERG Code</b>	9L
<b>14.6. Special precautions for user</b>	Read safety instructions, SDS and emergency procedures before handling.

## Other information

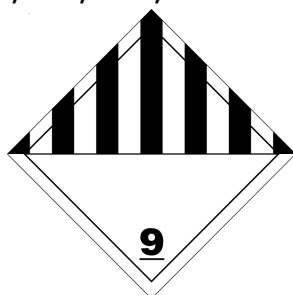
<b>Passenger and cargo aircraft</b>	Allowed with restrictions.
<b>Cargo aircraft only</b>	Allowed with restrictions.

## IMDG

<b>14.1. UN number</b>	UN3288
<b>14.2. UN proper shipping name</b>	TOXIC SOLID, INORGANIC, N.O.S. (Lead oxide), MARINE POLLUTANT
<b>14.3. Transport hazard class(es)</b>	
Class	6.1(PGIII)
Subsidiary risk	-
<b>14.4. Packing group</b>	III
<b>14.5. Environmental hazards</b>	
Marine pollutant	Yes
<b>EmS</b>	F-A, S-A
<b>14.6. Special precautions for user</b>	Read safety instructions, SDS and emergency procedures before handling.

Lead oxide (PbO)

## ADN; ADR; IATA; RID



## IMDG



## Marine pollutant



**General information** IMDG Regulated Marine Pollutant.

## SECTION 15: Regulatory information

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

#### EU regulations

**Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended**

Not listed.

**Regulation (EU) 2019/1021 On persistent organic pollutants (recast), as amended**

Not listed.

**Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended**

Lead oxide (CAS 1317-36-8)

**Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended**

Not listed.

**Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended**

Not listed.

**Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended**

Not listed.

**Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry, as amended**

Lead oxide (CAS 1317-36-8)

**Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA**

Lead oxide (CAS 1317-36-8)

**Authorisations**

**Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended**

Not listed.

**Restrictions on use**

**Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended**

Lead oxide (CAS 1317-36-8)

**Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work, as amended.**

Not listed.

**Other EU regulations**

**Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended**

Lead oxide (CAS 1317-36-8)

**Other regulations**

The product is classified and labelled in accordance with Regulation (EC) 1272/2008 (CLP Regulation) as amended. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006, as amended.

**National regulations**

According to Directive 92/85/EEC as amended, pregnant women should not work with the product, if there is the least risk of exposure.

Young people under 18 years old are not allowed to work with this product according to EU Directive 94/33/EC on the protection of young people at work, as amended. Follow national regulation on the protection of workers from the risks of exposure to carcinogens and mutagens at work, in accordance with Directive 2004/37/EC, as amended.

**15.2. Chemical safety assessment**

No Chemical Safety Assessment has been carried out.

**SECTION 16: Other information**

**List of abbreviations**

ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.  
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road.  
AGW: Occupational threshold limit value (Arbeitsplatzgrenzwert – Germany).  
CAS: Chemical Abstract Service.  
CEN: European Committee for Standardization.  
IATA: International Air Transport Association.  
IBC: Intermediate Bulk Container.  
IMDG: International Maritime Dangerous Goods.  
MAC: Maximum Allowed Concentration.  
MARPOL: International Convention for the Prevention of Pollution from Ships.  
PBT: Persistent, bioaccumulative, toxic.  
RID: Regulations concerning the International Carriage of Dangerous Goods by Rail.  
STEL: Short term exposure limit.  
TLV: Threshold Limit Value.  
TWA: Time Weighted Average.  
VLE: Exposure Limit Value.  
VME: Exposure Average Value.  
vPvB: Very persistent and very bioaccumulative.

**References**

Not available.

**Information on evaluation method leading to the classification of mixture**

The classification for health and environmental hazards is derived by a combination of calculator methods and test data, if available.

**Revision information**

None.

**Training information**

Follow training instructions when handling this material.

**Disclaimer**

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