Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier
Product Name • API Modified (silicone)
Synonyms • Anti-Seize; Grease; Lubricant; Sealant; Thread Compound

1.2 Relevant identified uses of the substance or mixture and uses advised against
Relevant identified use(s) • Anti-Seize, Lubricant, and Sealant

1.3 Details of the supplier of the safety data sheet
Manufacturer • Topco Oilsite Products Ltd.
Bay 7, 3401 - 19th Street N.E.
Calgary, Alberta T2E 6S8
Canada
www.topcooilsite.com
msds@topcooilsite.com

Telephone (General) • 403-219-0255

1.4 Emergency telephone number
• 403-219-0255 - Manufacturer
• 1-800-332-1414 - Poison & Drug Information Service (Alberta Health Services)

Section 2: Hazards Identification

EU/EEC

2.1 Classification of the substance or mixture
CLP • Eye Irritation 2 - H319
Carcinogenicity 2 - H351
Effects on or via Lactation - H362
Specific Target Organ Toxicity Repeated Exposure 1 - H372
Hazardous to the aquatic environment Acute 1 - H400
Hazardous to the aquatic environment Chronic 1 - H410

2.2 Label Elements
CLP

DANGER

Hazard statements • H319 - Causes serious eye irritation
H351 - Suspected of causing cancer.
H360FD - May damage fertility. May damage the unborn child.
H362 - May cause harm to breast-fed children
H372 - Causes 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 mist, vapors, and/or spray.
P263 - Avoid contact during pregnancy/while nursing.
P264 - Wash thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P273 - Avoid release to the environment.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.

Response • P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313 - If eye irritation persists: Get medical advice/attention.
P308+P313 - IF exposed or concerned: Get medical advice/attention.
P314 - Get medical advice/attention if you feel unwell.
P391 - Collect spillage.

Storage/Disposal • P405 - Store locked up.
P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other Hazards

CLP • Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain. May form combustible dust concentrations in air.
According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

UN GHS Revision 4
According to: UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS): Fourth Revised Edition

2.1 Classification of the substance or mixture

UN GHS • Skin Mild Irritation 3
Eye Irritation 2
Carcinogenicity 2
Reproductive Toxicity 1A
Specific Target Organ Toxicity Repeated Exposure 1
Hazardous to the aquatic environment Acute 1
Hazardous to the aquatic environment Chronic 1

2.2 Label elements

UN GHS

DANGER

Hazard statements • Causes mild skin irritation
Causes serious eye irritation
Suspected of causing cancer.
May damage fertility or the unborn child.
Causes damage to organs through prolonged or repeated exposure.
Very toxic to aquatic life
Very toxic to aquatic life with long lasting effects
Precautionary statements

Prevention • Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe mist, vapors, and/or spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Avoid release to the environment.
Wear protective gloves/protective clothing/eye protection/face protection.

Response • IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.
If skin irritation occurs: Get medical advice/attention.
IF exposed or concerned: Get medical advice/attention.
Get medical advice/attention if you feel unwell.
Collect spillage.

Storage/Disposal • Store locked up.
Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other hazards
UN GHS • Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain. May form combustible dust concentrations in air. According to the Globally Harmonized System for Classification and Labeling (GHS) this product is considered hazardous.

United States (US)
According to: OSHA 29 CFR 1910.1200 HCS

2.1 Classification of the substance or mixture
OSHA HCS 2012 • Eye Irritation 2
Carcinogenicity 2
Reproductive Toxicity 1A
Specific Target Organ Toxicity Repeated Exposure 1
Combustible Dust
Hazards Not Otherwise Classified - Health Hazards - Metal fume fever

2.2 Label elements
OSHA HCS 2012

DANGER

Hazard statements • Causes serious eye irritation
Suspected of causing cancer.
May damage fertility or the unborn child.
Causes damage to organs through prolonged or repeated exposure.
May form combustible dust concentrations in air.

Precautionary statements

Prevention • Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe mist, vapors, and/or spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear protective gloves/protective clothing/eye protection/face protection.

Response • IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.
IF exposed or concerned: Get medical advice/attention.
Get medical advice/attention if you feel unwell.

Storage/Disposal • Store locked up.
Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other hazards
OSHA HCS 2012 • Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain. Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada
According to: WHMIS 2015

2.1 Classification of the substance or mixture
WHMIS 2015 • Eye Irritation 2
Carcinogenicity 2
Reproductive Toxicity 1A
Specific Target Organ Toxicity Repeated Exposure 1
Combustible Dusts 1
Health Hazards Not Otherwise Classified 1

2.2 Label elements
WHMIS 2015

DANGER

Hazard statements • Causes serious eye irritation
Suspected of causing cancer.
May damage fertility or the unborn child.
Causes damage to organs through prolonged or repeated exposure.
May form combustible dust concentrations in air.
Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain.

Precautionary statements
Prevention • Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe mist, vapors, and/or spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear protective gloves/protective clothing/eye protection/face protection.

Response • IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.
IF exposed or concerned: Get medical advice/attention. Get medical advice/attention if you feel unwell.

Storage/Disposal
• Store locked up.
Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other hazards
WHMIS 2015
• In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

### Section 3 - Composition/Information on Ingredients

#### 3.1 Substances

• Material does not meet the criteria of a substance.

#### 3.2 Mixtures

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Identifiers</th>
<th>%</th>
<th>LD50/LC50</th>
<th>Classifications According to Regulation/Directive</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead, powder</td>
<td>CAS:7439-92-1 EC Number:231-100-4</td>
<td>17.5% TO 70%</td>
<td>NDA</td>
<td>EU CLP: Annex VI, Table 3.1: Repr. 1A, H360FD (Orl); Lact., H362 UN GHS Revision 4: Repr. 1A (Orl); STOT RE 1 (CNS, GI / Orl); Aquatic Acute 3; Aquatic Chronic 1 OSHA HCS 2012: Repr. 1A (Orl); STOT RE 1 (CNS, GI / Orl) WHMIS 2015: Repr. 1A (Orl); STOT RE 1 (CNS, GI / Orl)</td>
<td>NDA</td>
</tr>
<tr>
<td>Graphite</td>
<td>CAS:7782-42-5 EC Number:231-955-3</td>
<td>10.5% TO 70%</td>
<td>NDA</td>
<td>EU CLP: STOT RE 1 (Lungs / Inhl), H372 UN GHS Revision 4: STOT RE 1 (Lungs / Inhalation) OSHA HCS 2012: Comb. Dust; STOT RE 1 (Lungs / Inhl) WHMIS 2015: Comb. Dust; STOT RE 1 (Lungs / Inhl)</td>
<td>NDA</td>
</tr>
<tr>
<td>Polydimethylsiloxane</td>
<td>CAS:63148-62-9</td>
<td>18% TO 30%</td>
<td>Ingestion/Oral-Rat LD50 • &gt;17 g/kg Skin-Rabbit LD50 • &gt;2 g/kg</td>
<td>EU CLP: Eye Irrit. 2, H319; Aquatic Chronic 2, H411 UN GHS Revision 4: Skin Irrit. 3; Eye Irrit. 2; Aquatic Acute 2; Aquatic Chronic 2 OSHA HCS 2012: Eye Irrit. 2 WHMIS 2015: Eye Irrit. 2</td>
<td>NDA</td>
</tr>
<tr>
<td>Crystalline silica</td>
<td>CAS:14808-60-7 EC Number:238-878-4</td>
<td>0% TO 27.4995%</td>
<td>NDA</td>
<td>EU CLP: Carc. 1A, H350i; STOT RE 1, H372 UN GHS Revision 4: Carc. 1A; STOT RE 1 (Lungs/Inhl) OSHA HCS 2012: Carc. 1A; STOT RE 1 (Lungs/Inhl) WHMIS 2015: Carc. 1A; STOT RE 1 (Lungs/Inhl)</td>
<td>NDA</td>
</tr>
<tr>
<td>Asphalt</td>
<td>CAS:8052-42-4 EINECS:232-490-9</td>
<td>0% TO 27.4995%</td>
<td>Ingestion/Oral-Rat LD50 • &gt;5000 mg/kg Skin-Rabbit LD50 • 2000 mg/kg</td>
<td>EU CLP: Carc. 2, H351 UN GHS Revision 4: Carc. 2 OSHA HCS 2012: Carc. 2 WHMIS 2015: Carc. 2</td>
<td>NDA</td>
</tr>
<tr>
<td>Zinc powder, stabilized</td>
<td>CAS:7440-66-6 EC Number:231-175-3</td>
<td>7% TO 10.5%</td>
<td>NDA</td>
<td>EU CLP: Annex VI, Table 3.1: Aquatic Acute 1, H400; Aquatic Chronic 1, H410 UN GHS Revision 4: Skin Irrit. 3; Aquatic Acute 1; Aquatic Chronic 1 OSHA HCS 2012: Comb. Dust;</td>
<td>NDA</td>
</tr>
</tbody>
</table>
### Section 4 - First Aid Measures

#### 4.1 Description of first aid measures

**Inhalation**
- Move victim to fresh air. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing.

**Skin**
- In case of contact with substance, immediately flush skin with running water for at least 20 minutes. Get medical attention if symptoms occur.

**Eye**
- In case of contact with substance, immediately flush eyes with running water for at least 20 minutes. Get medical attention if symptoms occur.

**Ingestion**
- Obtain medical attention immediately if ingested.

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

- Refer to Section 11 - Toxicological Information.

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

**Notes to Physician**
- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

### Section 5 - Firefighting Measures

#### 5.1 Extinguishing media

**Suitable Extinguishing Media**
- In case of fire use media as appropriate for surrounding fire.
  - LARGE FIRE: Water spray, fog or regular foam.
  - SMALL FIRES: Dry chemical, CO2, water spray or regular foam.

**Unsuitable Extinguishing Media**
- No data available
5.2 Special hazards arising from the substance or mixture

**Unusual Fire and Explosion Hazards**
- Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

**Hazardous Combustion Products**
- Hazardous decomposition products formed under fire conditions: Carbon oxides, Zinc oxide, Lead oxides.

5.3 Advice for firefighters
- Structural firefighters' protective clothing will only provide limited protection. Wear positive pressure self-contained breathing apparatus (SCBA). Runoff from fire control may cause pollution.

### Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

**Personal Precautions**
- Ventilate the area. Do not walk through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Ventilate the area before entry. Use appropriate Personal Protective Equipment (PPE)

**Emergency Procedures**
- Keep unauthorized personnel away. Stay upwind. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).

6.2 Environmental precautions
- Avoid run off to waterways and sewers.

6.3 Methods and material for containment and cleaning up

**Containment/Clean-up Measures**
- Avoid generating dust.
- Use clean nonsparking tools to collect material. Carefully shovel or sweep up spilled material and place in suitable container. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air).

6.4 Reference to other sections
- Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

### Section 7 - Handling and Storage

7.1 Precautions for safe handling

**Handling**
- Use only with adequate ventilation. Use good safety and industrial hygiene practices. Keep away from heat, sparks, and flame. Minimize dust generation and accumulation. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmospheres. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Wear appropriate personal protective equipment, avoid direct contact. Do not breathe dust. Avoid contact with skin, eyes, and clothing. Do not eat, drink or smoke when using this product. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

**Storage**
- Keep container tightly closed. Store in a cool, dry, well-ventilated place.

7.3 Specific end use(s)
- Refer to Section 1.2 - Relevant identified uses.

### Section 8 - Exposure Controls/Personal Protection

8.1 Control parameters
<table>
<thead>
<tr>
<th></th>
<th>Result</th>
<th>ACGIH</th>
<th>Argentina</th>
<th>Australia</th>
<th>Canada Alberta</th>
<th>Canada British Columbia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt (8052-42-4)</td>
<td>TWAs</td>
<td>0.5 mg/m³ TWA (fume, inhalable particulate matter, as benzene-soluble aerosol)</td>
<td>0.5 mg/m³ TWA [CMP] (Bitumen, inhalable fraction, as benzene soluble aerosol)</td>
<td>5 mg/m³ TWA (fume)</td>
<td>5 mg/m³ TWA (Petroleum; Bitumen, fume)</td>
<td>0.5 mg/m³ TWA (inhalable fume, as Benzene-soluble aerosol)</td>
</tr>
<tr>
<td>Crystalline silica (14808-60-7)</td>
<td>TWAs</td>
<td>0.025 mg/m³ TWA (respirable particulate matter)</td>
<td>0.05 mg/m³ TWA [CMP] (respirable dust)</td>
<td>0.025 mg/m³ TWA (respirable particulate)</td>
<td>0.025 mg/m³ TWA (respirable)</td>
<td></td>
</tr>
<tr>
<td>Copper oxide</td>
<td>TWAs</td>
<td>1 mg/m³ TWA (dust and mist, as Cu) as Copper compounds</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td></td>
</tr>
<tr>
<td>Graphite</td>
<td>TWAs</td>
<td>2 mg/m³ TWA (all forms except graphite fibers, respirable particulate matter)</td>
<td>2 mg/m³ TWA [CMP] (all forms except Graphite fibres, respirable fraction)</td>
<td>3 mg/m³ TWA containing no asbestos and &lt;1% crystalline silica; all forms except fibres; natural and synthetic, respirable dust</td>
<td>2 mg/m³ TWA (all forms except Graphite fibres, respirable)</td>
<td></td>
</tr>
<tr>
<td>Lead, powder (7439-92-1)</td>
<td>TWAs</td>
<td>0.05 mg/m³ TWA (respirable particulate matter)</td>
<td>0.05 mg/m³ TWA [CMP] (dust and fume)</td>
<td>0.05 mg/m³ TWA</td>
<td>0.05 mg/m³ TWA</td>
<td></td>
</tr>
</tbody>
</table>

### Exposure Limits/Guidelines (Con't.)

<table>
<thead>
<tr>
<th>Result</th>
<th>Canada Manitoba</th>
<th>Canada New Brunswick</th>
<th>Canada Northwest Territories</th>
<th>Canada Nova Scotia</th>
<th>Canada Nunavut</th>
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</thead>
<tbody>
<tr>
<td>Asphalt (8052-42-4)</td>
<td>TWAs</td>
<td>0.5 mg/m³ TWA (fume, inhalable particulate matter, as Benzene soluble aerosol)</td>
<td>5 mg/m³ TWA (petroleum fumes)</td>
<td>0.5 mg/m³ TWA (Bitumen, fume, as Benzene soluble aerosol (inhalable fraction))</td>
<td>0.5 mg/m³ TWA (Bitumen, fume, as Benzene soluble aerosol (inhalable fraction))</td>
</tr>
<tr>
<td></td>
<td>STELs</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>1.5 mg/m³ STEL (Bitumen, fume, as Benzene soluble aerosol (inhalable fraction))</td>
</tr>
<tr>
<td>Crystalline silica (14808-60-7)</td>
<td>TWAs</td>
<td>0.025 mg/m³ TWA (respirable particulate matter)</td>
<td>0.1 mg/m³ TWA (respirable fraction)</td>
<td>0.05 mg/m³ TWA (respirable fraction, listed under Silica - crystalline)</td>
<td>0.025 mg/m³ TWA (respirable particulate matter)</td>
</tr>
<tr>
<td></td>
<td>STELs</td>
<td>Not established</td>
<td>Not established</td>
<td>1 mg/m³ TWA (dust and mist, as Cu) as Copper compounds</td>
<td>Not established</td>
</tr>
<tr>
<td>Copper oxide</td>
<td>TWAs</td>
<td>1 mg/m³ TWA (dust and mist, as Cu) as Copper compounds</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td>Graphite</td>
<td>TWAs</td>
<td>2 mg/m³ TWA (all forms except Graphite fibers, respirable particulate matter)</td>
<td>2 mg/m³ TWA (all forms except Graphite fibres, respirable fraction)</td>
<td>2 mg/m³ TWA (natural, all forms, except Graphite fibres, respirable particulate matter)</td>
<td>2 mg/m³ TWA (natural, all forms, except Graphite fibres, respirable fraction)</td>
</tr>
<tr>
<td></td>
<td>STELs</td>
<td>Not established</td>
<td>Not established</td>
<td>4 mg/m³ STEL (natural, all forms, except Graphite fibres, respirable fraction)</td>
<td>Not established</td>
</tr>
<tr>
<td>Lead, powder (7439-92-1)</td>
<td>TWAs</td>
<td>0.05 mg/m³ TWA</td>
<td>0.05 mg/m³ TWA</td>
<td>0.05 mg/m³ TWA</td>
<td>0.05 mg/m³ TWA</td>
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<tr>
<td></td>
<td>STELs</td>
<td>Not established</td>
<td>Not established</td>
<td>0.15 mg/m³ STEL</td>
<td>Not established</td>
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</table>

### Exposure Limits/Guidelines (Con't.)

<table>
<thead>
<tr>
<th>Result</th>
<th>Canada Ontario</th>
<th>Canada Quebec</th>
<th>Canada Saskatchewan</th>
<th>Canada Yukon</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt (8052-42-4)</td>
<td>STELs</td>
<td>Not established</td>
<td>Not established</td>
<td>1.5 mg/m³ STEL (fume and inhalable fraction, as Benzene soluble aerosol)</td>
<td>10 mg/m³ STEL (fume)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12.5 mg/m³ STEL (fume, as Benzene soluble matter)</td>
</tr>
<tr>
<td>TWAs</td>
<td>STELs</td>
<td>TWAs</td>
<td>STELs</td>
<td>TWAs</td>
<td>STELs</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
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<td>-------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>0.5 mg/m³ TWA (fume, inhalable, as Benzene-soluble aerosol)</td>
<td>Not established</td>
<td>5 mg/m³ TWAEV (fume)</td>
<td>Not established</td>
<td>0.5 mg/m³ TWA (fume and inhalable fraction, as Benzene soluble aerosol)</td>
<td>Not established</td>
</tr>
<tr>
<td>0.5 mg/m³ TWA (fume and inhalable fraction, as Benzene soluble aerosol)</td>
<td>Not established</td>
<td>5 mg/m³ TWA (fume)</td>
<td>Not established</td>
<td>5 mg/m³ TWA (fume, as Benzene soluble matter)</td>
<td>Not established</td>
</tr>
<tr>
<td>2 mg/m³ STEL (containing 10 - 50% free SiO₂, total dust); 1.4 mg/m³ STEL (containing 50 - 80% free SiO₂, total dust); 1 mg/m³ STEL (containing &gt;80% free SiO₂, total dust); 1.4 mg/m³ STEL (containing 10 - 50% free SiO₂, respirable dust); 0.6 mg/m³ STEL (containing 50 - 80% free SiO₂, respirable dust); 0.4 mg/m³ STEL (containing &gt;80% free SiO₂, respirable dust)</td>
<td></td>
<td></td>
<td></td>
<td>0.7 mg/m³ TWA (containing 50 - 80% free SiO₂, total dust); 0.3 mg/m³ TWA (containing 50 - 80% free SiO₂, respirable dust); 1 mg/m³ TWA (containing 10 - 50% free SiO₂, total dust); 0.7 mg/m³ TWA (containing 10 - 50% free SiO₂, respirable dust); 0.5 mg/m³ TWA (containing &gt;80% free SiO₂, total dust); 0.2 mg/m³ TWA (containing &gt;80% free SiO₂, respirable dust)</td>
<td></td>
</tr>
<tr>
<td>0.10 mg/m³ TWA (designated substances regulation, respirable, listed under Silica, crystalline)</td>
<td>0.1 mg/m³ TWAEV (respirable dust)</td>
<td>0.05 mg/m³ TWA (respirable fraction, listed under Silica - crystalline (Trydimite removed))</td>
<td>300 particle/mL TWA (listed under Silica - Quartz, crystalline)</td>
<td>4 mg/m³ STEL (natural, except Graphite fibres, respirable fraction)</td>
<td>Not established</td>
</tr>
<tr>
<td>2 mg/m³ TWA (except Graphite fibres, respirable)</td>
<td>2 mg/m³ TWAEV (containing no Asbestos and &lt;1% Crystalline silica, except Graphite fibres, respirable dust)</td>
<td>2 mg/m³ TWA (natural, except Graphite fibres, respirable fraction)</td>
<td>20 mppcf TWA; 30 mppcf TWA (synthetic); 10 mg/m³ TWA (synthetic)</td>
<td></td>
<td>8 mg/m³ STEL (total dust); 4 mg/m³ STEL (respirable dust)</td>
</tr>
<tr>
<td>0.05 mg/m³ TWA (designated substances regulation); 0.05 mg/m³ TWA (applies to workplaces to which the designated substances regulation does not apply)</td>
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<td></td>
<td></td>
<td>0.45 mg/m³ STEL (dust and fume)</td>
<td>0.15 mg/m³ STEL (dust); 0.09 mg/m³ STEL (fume)</td>
</tr>
<tr>
<td>0.05 mg/m³ TWAEV</td>
<td>0.05 mg/m³ TWA</td>
<td>0.15 mg/m³ TWA (dust and fume)</td>
<td>0.05 mg/m³ TWA (dust); 0.03 mg/m³ TWA (fume)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Exposure Limits/Guidelines (Cont.)**
<table>
<thead>
<tr>
<th></th>
<th>Result</th>
<th>China Highly Toxic Goods</th>
<th>France</th>
<th>Germany DFG</th>
<th>India</th>
<th>Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt (8052-42-4)</td>
<td>TWAs</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>0.5 mg/m³ TWA (soluble aerosol, fume)</td>
</tr>
<tr>
<td>Crystalline silica (14808-60-7)</td>
<td>TWAs</td>
<td>Not established</td>
<td>0.1 mg/m³ TWA [VME] (restrictive limit, alveolar fraction)</td>
<td>Not established</td>
<td>(10600)/(%Quartz + 10) mppcm TWA, dust count; (10)/(%Quartz + 2) mg/m³ TWA, respirable dust; (30)/(%Quartz + 3) mg/m³ TWA, total dust</td>
<td>0.1 mg/m³ TWA (respirable particulate)</td>
</tr>
<tr>
<td>Silica, amorphous, fumed (112945-52-5)</td>
<td>MAKs</td>
<td>Not established</td>
<td>4 mg/m³ TWA MAK (inhalable fraction)</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td>Zinc powder, stabilized (7440-66-6)</td>
<td>Ceilings</td>
<td>Not established</td>
<td>0.4 mg/m³ Peak (respirable fraction); 4 mg/m³ Peak (inhalable fraction)</td>
<td>Not established</td>
<td>Not established</td>
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<tr>
<td></td>
<td>MAKs</td>
<td>Not established</td>
<td>0.1 mg/m³ TWA MAK (respirable fraction); 2 mg/m³ TWA MAK (inhalable fraction)</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td>Graphite (7782-42-5)</td>
<td>TWAs</td>
<td>Not established</td>
<td>2 mg/m³ TWA [VME] (alveolar fraction)</td>
<td>Not established</td>
<td>Not established</td>
<td>2 mg/m³ TWA</td>
</tr>
<tr>
<td></td>
<td>MAKs</td>
<td>Not established</td>
<td>1.5 mg/m³ TWA MAK (respirable fraction); 4 mg/m³ TWA MAK (inhalable fraction)</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td>Lead, powder (7439-92-1)</td>
<td>TWAs</td>
<td>Not established</td>
<td>0.1 mg/m³ TWA [VME] (restrictive limit)</td>
<td>Not established</td>
<td>Not established</td>
<td>0.05 mg/m³ TWA</td>
</tr>
<tr>
<td></td>
<td>Ceilings</td>
<td>Not established</td>
<td>0.05 mg/m³ Ceiling (dust); 0.03 mg/m³ Ceiling (fume)</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
</tbody>
</table>

Exposure Limits/Guidelines (Con’t.)

<table>
<thead>
<tr>
<th></th>
<th>Result</th>
<th>Israel</th>
<th>Italy</th>
<th>Japan</th>
<th>Malaysia</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt (8052-42-4)</td>
<td>STELs</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>10 mg/m³ STEL [PPT-CT]</td>
</tr>
<tr>
<td></td>
<td>TWAs</td>
<td>0.5 mg/m³ TWA (fume, inhalable fraction, as benzene soluble aerosol)</td>
<td>Not established</td>
<td>Not established</td>
<td>5 mg/m³ TWA (fume)</td>
<td>5 mg/m³ TWA VLE-PPT</td>
</tr>
<tr>
<td>Crystalline silica (14808-60-7)</td>
<td>TWAs</td>
<td>0.025 mg/m³ TWA (respirable fraction)</td>
<td>Not established</td>
<td>0.03 mg/m³ OEL (respirable dust) as Silica, crystalline (general form)</td>
<td>0.1 mg/m³ TWA (respirable fraction)</td>
<td>0.1 mg/m³ TWA VLE-PPT (respirable fraction)</td>
</tr>
<tr>
<td>Copper oxide</td>
<td>TWAs</td>
<td>1 mg/m³ TWA (dust and mist, as Cu) as Copper compounds</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td>Graphite (7782-42-5)</td>
<td>TWAs</td>
<td>2 mg/m³ TWA (respirable fraction, all forms except graphite fibers)</td>
<td>Not established</td>
<td>2 mg/m³ OEL (Class 1 Dust, total dust); 0.5 mg/m³ OEL (Class 1 Dust, respirable dust)</td>
<td>2 mg/m³ TWA (all forms except Graphite fibres, respirable fraction)</td>
<td>2 mg/m³ TWA VLE-PPT (synthetic and natural)</td>
</tr>
<tr>
<td>Lead, powder (7439-92-1)</td>
<td>TWAs</td>
<td>0.05 mg/m³ TWA</td>
<td>0.075 mg/m³ TWA Media Ponderata nel Tempo</td>
<td>0.03 mg/m³ OEL (provisional)</td>
<td>0.05 mg/m³ TWA</td>
<td>0.15 mg/m³ TWA VLE-PPT (dust and fume, as Pb)</td>
</tr>
<tr>
<td>Result</td>
<td>Netherlands</td>
<td>NIOSH</td>
<td>OSHA</td>
<td>OSHA Vacated</td>
<td>Portugal</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-------------</td>
<td>-------</td>
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<td>--------------</td>
<td>---------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Asphalt (8052-42-4)</td>
<td>TWAs</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>0.5 mg/m³ TWA [VLE-MP] (fumes, inhalable fraction, as Benzene soluble aerosol)</td>
<td></td>
</tr>
<tr>
<td>Ceilings</td>
<td></td>
<td>5 mg/m³ Ceiling (fume, 15 min)</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td></td>
</tr>
<tr>
<td>Crystalline silica (14808-60-7)</td>
<td>TWAs</td>
<td>0.075 mg/m³ TWA (respirable dust, listed under Silicium dioxide)</td>
<td>0.05 mg/m³ TWA (respirable dust)</td>
<td>50 µg/m³ TWA (listed under Respirable crystalline silica)</td>
<td>0.1 mg/m³ TWA (respirable dust)</td>
<td>0.025 mg/m³ TWA [VLE-MP] (respirable fraction)</td>
</tr>
<tr>
<td>Copper oxide</td>
<td>TWAs</td>
<td>Not established</td>
<td>0.1 mg/m³ TWA (fume, as Cu)</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td>Graphite</td>
<td>TWAs</td>
<td>Not established</td>
<td>2.5 mg/m³ TWA (natural, respirable dust)</td>
<td>15 mg/m³ TWA (synthetic, total dust); 5 mg/m³ TWA (synthetic, respirable fraction)</td>
<td>2.5 mg/m³ TWA (natural, respirable dust); 10 mg/m³ TWA (synthetic, total dust); 5 mg/m³ TWA (synthetic, respirable fraction)</td>
<td>2 mg/m³ TWA [VLE-MP] (all forms except Graphite fibers, respirable fraction)</td>
</tr>
<tr>
<td>Lead, powder (7439-92-1)</td>
<td>TWAs</td>
<td>0.15 mg/m³ TWA</td>
<td>0.050 mg/m³ TWA</td>
<td>50 µg/m³ TWA</td>
<td>Not established</td>
<td>0.15 mg/m³ TWA [VLE-MP] (mandatory indicative limit value)</td>
</tr>
</tbody>
</table>

**Exposure Limits/Guidelines (Con't.)**

<table>
<thead>
<tr>
<th>Result</th>
<th>Russia</th>
<th>Singapore</th>
<th>Thailand</th>
<th>United Kingdom</th>
<th>United States - California</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt (8052-42-4)</td>
<td>TWAs</td>
<td>Not established</td>
<td>5 mg/m³ PEL (fume)</td>
<td>0.5 mg/m³ TWA (as Benzene soluble aerosol)</td>
<td>0.3 mg/m³ PEL (total dust); 0.1 mg/m³ PEL (respirable dust)</td>
</tr>
<tr>
<td></td>
<td>STELs</td>
<td>Not established</td>
<td>Not established</td>
<td>10 mg/m³ STEL (fumes)</td>
<td>Not established</td>
</tr>
<tr>
<td>Crystalline silica</td>
<td>TWAs</td>
<td>1 mg/m³ TWA (quartz glass, disintegration aerosol, total mass of aerosols, listed under Silicon dioxide amorphous and vitreous); 1 mg/m³ TWA (containing &gt;70% Silicon dioxide in dust, total mass of aerosols, listed under Crystalline silicon dioxide)</td>
<td>0.1 mg/m³ PEL (respirable dust)</td>
<td>0.025 mg/m³ TWA (respirable dust)</td>
<td>0.3 mg/m³ STEL (calculated, respirable) as Silica, crystalline (general form)</td>
</tr>
<tr>
<td></td>
<td>STELs</td>
<td>3 mg/m³ STEL (quartz glass, disintegration aerosol, total mass of aerosols, listed under Silicon dioxide amorphous and vitreous); 3 mg/m³ STEL (containing &gt;70% Silicon dioxide in dust, total mass of aerosols, listed under Silicon dioxide crystalline)</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td>Graphite (7782-42-5)</td>
<td>TWAs</td>
<td>Not established</td>
<td>2 mg/m³ PEL (respirable dust)</td>
<td>Not established</td>
<td>2.5 mg/m³ PEL (natural, respirable dust); 10 mg/m³ PEL (synthetic total dust); 5 mg/m³ PEL (synthetic respirable fraction)</td>
</tr>
<tr>
<td>Substance</td>
<td>STELs</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>STELs</td>
</tr>
<tr>
<td>-----------</td>
<td>-------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>-------</td>
</tr>
<tr>
<td>Lead, powder (7439-92-1)</td>
<td>TWAs</td>
<td>0.05 mg/m³ TWA (aerosol)</td>
<td>0.15 mg/m³ PEL</td>
<td>Not established</td>
<td>0.15 mg/m³ TWA</td>
</tr>
<tr>
<td>Asphalt (8052-42-4)</td>
<td>TWAs</td>
<td>0.5 mg/m³ TWA (fume, as Benzene soluble aerosols)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crystalline silica (14808-60-7)</td>
<td>TWAs</td>
<td>0.025 mg/m³ TWA (VTRE-L-8/40 (respirable fraction))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graphite</td>
<td>TWAs</td>
<td>2 mg/m³ TWA (VTRE-L-8/40 (dust))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead, powder (7439-92-1)</td>
<td>TWAs</td>
<td>0.05 ppm TWA (VTRE-L-8/40 (protection of the health and safety of workers from risks related to this chemical agent at work))</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Exposure Control Notations

**Japan**
- Lead, powder (7439-92-1): **Carcinogens**: (Group 2B - Possibly Carcinogenic to Humans)
- Copper oxide as Copper compounds: **Sensitizers**: (Group 2 skin sensitizer (Evaluation does not necessarily apply to all individuals within the group))
- Crystalline silica as Silica, crystalline (general form): **Carcinogens**: (Group 1 - Carcinogenic to Humans)

**Mexico**
- Lead, powder (7439-92-1): **Carcinogens**: (A3 - Confirmed animal carcinogen)
- Asphalt (8052-42-4): **Carcinogens**: (A4 - Not classifiable as a human carcinogen)

**Egypt**
- Lead, powder (7439-92-1): **Carcinogens**: (Animal Carcinogen)
- Graphite (7782-42-5): **Nuisance Dusts**: (10 mg/m³ TWA (synthetic, containing <1% Quartz, total dust); 30 mppcf TWA (synthetic, containing <1% Quartz, total dust); 3 mg/m³ TWA (synthetic, containing <1% Quartz, total dust))

**Portugal**
- Lead, powder (7439-92-1): **Carcinogens**: (A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans)
- Crystalline silica (14808-60-7): **Carcinogens**: (A2 - Suspected Human Carcinogen)
- Asphalt (8052-42-4): **Carcinogens**: (A4 - Not Classifiable as a Human Carcinogen (fumes))

**Indonesia**
- Lead, powder (7439-92-1): **Carcinogens**: (A3 - confirmed animal carcinogen)
- Asphalt (8052-42-4): **Carcinogens**: (A4 - not classifiable as a human carcinogen)

**Argentina**
- Lead, powder (7439-92-1): **Carcinogens**: (A3 - Confirmed animal carcinogen with unknown relevance to humans)
- Crystalline silica (14808-60-7): **Carcinogens**: (A2 - Suspected human carcinogen)
- Asphalt (8052-42-4): **Carcinogens**: (A4 - Not Classifiable as a Human carcinogen (fumes))

**Canada Alberta**
- Lead, powder (7439-92-1): **Designated Substances**: (Designated substance - requires code of practice)
- Crystalline silica as Silica, crystalline (general form): **Designated Substances**: (Designated substance - requires code of practice (respirable))

**Canada British Columbia**
- Lead, powder (7439-92-1): **Carcinogens**: (IARC Category 2B - Possible Human Carcinogenic) | **Designated Substances**: (IARC Category 2B - Possible Human Carcinogenic; Adverse reproductive effect) | **Substances with Reproductive Critical Effects**: (Adverse reproductive effect)
- Crystalline silica (14808-60-7): **Carcinogens**: (ACGIH Category A2 - Suspected Human Carcinogenic; IARC Category 1 - Human Carcinogenic) | **Designated Substances**: (ACGIH Category A2 - Suspected Human Carcinogenic; IARC Category 1 - Human Carcinogenic)
- Asphalt (8052-42-4): **Carcinogens**: (IARC Category 2A - Probable Human Carcinogen (fume; occupational exposure to oxidized Bitumens and their emissions during road paving); IARC Category 2B - Possible Human Carcinogen (fume; occupational exposure to straight-run Bitumens and their emissions during road paving)) | **Designated Substances**: (IARC Category 2B - Possible Human Carcinogenic (fume; occupational exposure to straight-run Bitumens and their emissions during road paving); IARC Category 2A - Probable Human Carcinogen (fume; occupational exposure to oxidized Bitumens and their emissions during road paving))

**Canada Manitoba**
- Lead, powder (7439-92-1): **Carcinogens**: (A3 Confirmed Animal Carcinogen with Unknown Relevance to Humans)
- Crystalline silica (14808-60-7): **Carcinogens**: (A2 Suspected Human Carcinogenic)
- Asphalt (8052-42-4): **Carcinogens**: (A4 Not Classifiable as a Human Carcinogen (fume, Coal tar-free))

**Canada New Brunswick**
- Lead, powder (7439-92-1): **Carcinogens**: (A3 - Animal Carcinogenic)
- Asphalt (8052-42-4): **Carcinogens**: (A4 - Not Classifiable as a Human Carcinogen (fumes))

**Canada Nova Scotia**
- Lead, powder (7439-92-1): **Carcinogens**: (A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans)
• Crystalline silica (14808-60-7): Carcinogens: (A2 - Suspected Human Carcinogen)
• Asphalt (8052-42-4): Carcinogens: (A4 - Not Classifiable as a Human Carcinogen (fume, coal tar-free))

Canada Ontario
• Lead, powder (7439-92-1): Designated Substances: (0.05 mg/m³ TWA)
• Crystalline silica (14808-60-7): Designated Substances: (0.10 mg/m³ TWA (respirable fraction, listed under Silica, crystalline))

Canada Quebec
• Lead, powder (7439-92-1): Carcinogens: (C3 carcinogen - effect detected in animals)
• Crystalline silica (14808-60-7): Carcinogens: (C2 carcinogen - effect suspected in humans)

Canada Saskatchewan
• Lead, powder (7439-92-1): Designated Substances: (Present)
• Crystalline silica as Silica, crystalline (general form): Designated Substances: (Present (respirable size))

France
• Lead, powder (7439-92-1): Carcinogens: (Carcinogen categories 1A, 1B, 2) | Reproductive Toxins: (Reproductive Toxin categories 1A, 1B, 2)

Venezuela
• Lead, powder (7439-92-1): Ceilings: (Present)
• Crystalline silica (14808-60-7): Ceilings: (Present)
• Asphalt (8052-42-4): Ceilings: (Present)

ACGIH
• Lead, powder (7439-92-1): Carcinogens: (A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans)
• Crystalline silica (14808-60-7): Carcinogens: (A2 - Suspected Human Carcinogen)
• Asphalt (8052-42-4): Carcinogens: (A4 - Not Classifiable as a Human Carcinogen (fume, coal tar-free))

Germany TRGS
• Lead, powder (7439-92-1): Developmental Toxins: (Category 1A (metal)) | Reproductive Toxins: (Category 2 (metal))

Germany DFG
• Lead, powder (7439-92-1): Carcinogens: (Category 2 (considered to be carcinogenic for man))
• Zinc powder, stabilized (7440-66-6): Pregnancy: (no risk to embryo/fetus if exposure limits adhered to (respirable; inhalable))
• Graphite (7782-42-5): Pregnancy: (no risk to embryo/fetus if exposure limits adhered to (inhalable fraction; respirable fraction))
• Crystalline silica (14808-60-7): Carcinogens: (Category 1 (causes cancer in man; alveola fraction))
• Asphalt (8052-42-4): Carcinogens: (Category 2 (considered to be carcinogenic for man; aerosol and vapor)) | Skin: (skin notation (aerosol and vapour))
• Silica, amorphous, fumed (112945-52-5): Pregnancy: (no risk to embryo/fetus if exposure limits adhered to)

Exposure Limits Supplemental

Thailand
• Graphite (7782-42-5): Mineral Dusts: (15 mppcf TWA)

• Graphite as Particulates not otherwise classified (PNOC): Mineral Dusts: (15 mppcf TWA (respirable dust); 15 mg/m³ TWA (total dust); 50 mppcf TWA (total dust); 5 mg/m³ TWA (respirable dust))
• Crystalline silica (14808-60-7): Mineral Dusts: (TWA ((250/(%SiO₂ + 5)), mppcf, respirable dust); TWA ((10/(%SiO₂ + 2)), mg/m³, respirable dust); TWA ((30/(%SiO₂ + 2)), mg/m³, total dust))

Argentina
• Lead, powder (7439-92-1): BEIs: (30 µg/100 mL blood not critical Pb (Women of child bearing potential, whose blood Pb level exceeds 10 mg/dL, are at risk of delivering a child with blood Pb level over the current CDC guideline. If the blood Pb of such children remains elevated, they may be at an increased risk of cognitive deficienies. The blood Pb of these children should be closely monitored and appropriate steps should be taken to minimize the child's exposure to environmental lead.))

Canada Yukon
• Lead, powder (7439-92-1): Maximum Acceptable Body Burdens: (80 µg/100 mL Medium: blood; 200 µg/L Medium: urine)

Israel
• Lead, powder (7439-92-1): Action Levels: (0.025 mg/m³ AL (as Pb)) | Biological Markers of Occupational Exposure: (30 µg/100 mL Medium: blood Parameter: Lead)
• Asphalt (8052-42-4): Biological Markers of Occupational Exposure: (Medium: urine Time: end of shift at end of workweek Parameter: 1-Hydroxypropane with hydrolysis (nonquantitative))

Venezuela
• Lead, powder (7439-92-1): Biological Exposure Indices: (30 µg/100 mL blood not critical Lead (Note: Women of reproductive age, whose levels of blood Pb exceed 10 µg/dL, are at risk of giving birth to children with Pb blood values exceeding said level, which was established by the Center of Disease Control in the United States. If Pb levels in said children remain elevated, they may be at an increased risk of cognitive deficiencies. The Pb in the blood of those children must be watched very closely and the children must be kept from being exposed to environmental lead.))

OSHA
• Graphite (7782-42-5): Mineral Dusts: (15 mppcf TWA (natural))

• Graphite as Particulates not otherwise classified (PNOC): Mineral Dusts: (15 mppcf TWA (respirable fraction); 5 mg/m³ TWA (respirable fraction); 50 mppcf TWA (total dust); 15 mg/m³ TWA (total dust))
• Crystalline silica (14808-60-7): Mineral Dusts: ((250)/(%SiO₂ + 5) mppcf TWA, respirable fraction; (10)/(%SiO₂ + 2) mg/m³ TWA, respirable fraction)

ACGIH
• Lead, powder (7439-92-1): BEIs: (200 µg/L Medium: blood Time: not critical Parameter: Lead (Note: Persons applying this BEI are encouraged to counsel female workers of child-bearing age about the risk of delivering a child with a PbB (lead in blood level) over the current CDC reference value.)) | TLV Basis - Critical Effects: (CNS and PNS impairment; hematologic effects)
• Graphite (7782-42-5): TLV Basis - Critical Effects: (pneumoconiosis (all forms except graphite fibers))
• Copper oxide as Copper compounds: TLV Basis - Critical Effects: (gastrointestinal (dust and mist); irritation (dust and mist))
8.2 Exposure controls

Engineering Measures/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.

Personal Protective Equipment

Respiratory
• In case of insufficient ventilation, wear suitable respiratory equipment.

Eye/Face
• Wear protective eyewear (goggles, face shield, or safety glasses).

Skin/Body
• Natural Rubber, latex gloves. Breakthrough time: 4-8 Hours. Wear long sleeves and/or protective coveralls.

Environmental Exposure Controls
• Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways. Follow best practice for site management and disposal of waste.

Key to abbreviations
ACGIH = American Conference of Governmental Industrial Hygiene
BEI = Biological Exposure Indices
MAK = Maximale Arbeitsplatz Konzentration is the maximum permissible concentration
NIOSH = National Institute of Occupational Safety and Health
OSHA = Occupational Safety and Health Administration
PEL = Permissible Exposure Level determined by the Occupational Safety and Health Administration (OSHA)
STEL = Short Term Exposure Limits are based on 15-minute exposures
TLV = Threshold Limit Value determined by the American Conference of Governmental Industrial Hygienists (ACGIH)
TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures
TWAEV = Time-Weighted Average Exposure Value

Section 9 - Physical and Chemical Properties

9.1 Information on Basic Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Physical Form</th>
<th>Appearance/Description</th>
<th>Brown/copper semi-solid paste with mild petroleum odor.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form</td>
<td>Solid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>Brown/copper</td>
<td>Odor</td>
<td>Mild, petroleum.</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Data lacking</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

General Properties

| Boiling Point | Data lacking | Melting Point/Freezing Point | Data lacking |
| Decomposition Temperature | Data lacking | pH                         | Data lacking |
| Specific Gravity/Relative Density | 1.01 Water=1 | Density | 8.42 lbs/gal |
| Water Solubility | Data lacking | Viscosity | Data lacking |
| Explosive Properties | Data lacking | Oxidizing Properties: | Data lacking |

Volutility

| Vapor Pressure | Data lacking | Vapor Density | Data lacking |
| Evaporation Rate | Data lacking | VOC (Wt.)     | 100 %       |

Flammability

| Flash Point | > 200 °F(> 93.3333 °C) | UEL | Data lacking |
| LEL | Data lacking | Auto ignition | Data lacking |
| Flammability (solid, gas) | Data lacking |

Environmental

<table>
<thead>
<tr>
<th>Octanol/Water Partition coefficient</th>
<th>Data lacking</th>
</tr>
</thead>
</table>

9.2 Other Information
• No additional physical and chemical parameters noted.
Section 10: Stability and Reactivity

10.1 Reactivity
• No dangerous reaction known under conditions of normal use.

10.2 Chemical stability
• Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions
• Hazardous polymerization will not occur. Hazardous polymerization not indicated.

10.4 Conditions to avoid
• Keep away from heat, sparks and flame. Avoid generating dust.

10.5 Incompatible materials
• None in particular.

10.6 Hazardous decomposition products
• Hazardous decomposition products formed under fire conditions: Carbon oxides, Zinc oxide, Lead oxides.

Section 11 - Toxicological Information

11.1 Information on toxicological effects

| Components                                      | Acute Toxicity: Ingestion/Oral-Rat TLLo • 0.2 mg/kg; Reproductive Effects: Paternal Effects: Spermatogenesis; Inhalation-Human TLLo • 10 µg/m³; Gastrointestinal: Gastritis; Liver: Other changes;
|                                               | Multi-dose Toxicity: Ingestion/Oral-Rat TLDo • 43.75 mg/kg 1 Week(s)-Continuous; Blood: Other changes; Kidney, Ureter, and Bladder: Other changes in urine composition;
|                                               | Biochemical: Metabolism (intermediary): Porphyrin, including bile pigments; Inhalation-Human TLLo • 0.011 mg/m³ 26 Week(s)-Intermittent; Brain and Coverings: Other degenerative changes; Inhalation-Man TLLo • 0.03 mg/m³ 5 Year(s)-Intermittent; Endocrine: Androgenic;
|                                               | Mutagen: Cytogenetic analysis • Ingestion/Oral-Monkey • 42 mg/kg 30 Week(s); Cytogenetic analysis • Inhalation-Rat • 23 µg/m³ 16 Week(s);
<p>|                                               | Reproductive: Ingestion/Oral-Rat TLLo • 790 mg/kg (multigenerations); Reproductive Effects: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus); Reproductive Effects: Effects on Embryo or Fetus: Fetal death; Inhalation-Rat TLLo • 10 mg/m³ 24 Hour(s)(1-21D preg); Reproductive Effects: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus); Reproductive Effects: Specific Developmental Abnormalities: Blood and lymphatic system |
|                                               | Irritation: Skin-Human • 300 µg 3 Day(s)-Intermittent Mild irritation; Tumorigen / Carcinogen: Ingestion/Oral-Mouse TLLo • 2000 mg/kg 8 Week(s)-Continuous; Tumorigenic: Carcinogenic by RTECS criteria; Gastrointestinal: Tumors; Tumorigenic: Facilitates action of known carcinogen |
|                                               | Acute Toxicity: Ingestion/Oral-Rat LD50 • 470 mg/kg |
|                                               | Acute Toxicity: Ingestion/Oral-Rat LD50 • 3.6 g/kg; Behavioral: Somnolence (general depressed activity); Lungs, Thorax, or Respiration: Other changes; Gastrointestinal: Hypermotility, diarrhea |
|                                               | Acute Toxicity: Inhalation-Human TLo • 16 mppcf 8 Hour(s) 17.9 Year(s)-Intermittent; Lungs, Thorax, or Respiration: Fibrosis, focal (pneumoconiosis); Lungs, Thorax, or Respiration: Cough; Lungs, Thorax, or Respiration: Dyspnea; Inhalation-Rat TLo • 200 mg/kg; Lungs, Thorax, or Respiration: Fibrosis, focal (pneumoconiosis); Lungs, Thorax, or Respiration: Other changes; Nutritional and Gross Metabolic: Changes in Chemistry or Temperature: Fe; Multi-dose Toxicity: Inhalation-Rat TLo • 80 mg/m³ 26 Week(s)-Intermittent; Lungs, Thorax, or Respiration: Fibrosis, focal (pneumoconiosis); Blood: Changes in spleen; Immunological: Including Allergic: Decrease in cellular immune response; Inhalation-Rat TLo • 6.2 mg/m³ 6 Hour(s) 6 Week(s)-Intermittent; Lungs, Thorax, or Respiration: Other changes; Blood: Changes in spleen; Immunological: Including Allergic: Increase in cellular immune response; Mutagen: Micronucleus test • Unreported Route-Hamster • Lung (Somatic cell) • 160 µg/cm²; DNA damage • Unreported Route-Human • Other Cell Type • 120 mg/L 24 Hour(s); Micronucleus test • Unreported Route-Human • Lung (Somatic cell) • 40 µg/cm²; Tumorigen / Carcinogen: Inhalation-Rat TLo • 50 mg/m³ 6 Hour(s) 71 Week(s)-Intermittent; Tumorigenic: Carcinogenic by RTECS criteria; Liver: Tumors |
| Lead, powder (17.5% TO 70%)                   | 7439-92-1 |
| Zinc powder, stabilized (7% TO 10.5%)        | 7440-66-6 |
| Copper oxide (0.7% TO 3.5%)                  | 1317-38-0 |
| Zinc O,O-bis(mixed iso-butyl and pentyl)     | 68457-79-4 |
| phosphorodithioate (0.4998%)                 | 14808-60-7 |
| Crystalline silica (0% TO 27.4995%)          |</p>
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<tr>
<th>Substance</th>
<th>CAS Number</th>
<th>Acute Toxicity</th>
<th>Skin sensitization</th>
<th>Respiratory sensitization</th>
<th>Aspiration Hazard</th>
<th>Carcinogenicity</th>
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</thead>
<tbody>
<tr>
<td>Asphalt (0% TO 27.4995%)</td>
<td>8052-42-4</td>
<td>Ingestion/Oral-Rat LD50 • &gt;5000 mg/kg; Gastrointestinal/Hypermotility, diarrhea</td>
<td>Data lacking</td>
<td>Data lacking</td>
<td>Data lacking</td>
<td>Carcinogenicity 2; Suspected of causing cancer</td>
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<tr>
<td>Polydimethylsiloxane (18% TO 30%)</td>
<td>63148-62-9</td>
<td>Ingestion/Oral-Rat LD50 • &gt;17 g/kg; Kidney, Ureter, and Bladder/Other changes</td>
<td>Data lacking</td>
<td>Data lacking</td>
<td>Data lacking</td>
<td>Data lacking</td>
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<tr>
<td>Silica, amorphous, fumed (1.5% TO 3%)</td>
<td>112945-52-5</td>
<td>Ingestion/Oral-Rat LD50 • 3160 mg/kg; Multi-dose Toxicity</td>
<td>Data lacking</td>
<td>Data lacking</td>
<td>Data lacking</td>
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Toxicity for Reproduction

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<td></td>
<td>OSHA HCS 2012</td>
<td>Data lacking</td>
</tr>
<tr>
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<td>Data lacking</td>
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<table>
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<th>STOT-RE</th>
<th>EU/CLP</th>
<th>Specific Target Organ Toxicity Repeated Exposure 1</th>
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<td>Specific Target Organ Toxicity Repeated Exposure 1</td>
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<td></td>
<td>OSHA HCS 2012</td>
<td>Specific Target Organ Toxicity Repeated Exposure 1</td>
</tr>
<tr>
<td></td>
<td>WHMIS 2015</td>
<td>Specific Target Organ Toxicity Repeated Exposure 1</td>
</tr>
</tbody>
</table>

Potential Health Effects

Inhalation

Acute (Immediate) • Under normal conditions of use, no health effects are expected.

Chronic (Delayed) • No data available

Skin

Acute (Immediate) • Causes mild skin irritation.

Chronic (Delayed) • No data available

Eye

Acute (Immediate) • Causes serious eye irritation.

Chronic (Delayed) • No data available

Ingestion

Acute (Immediate) • No data available

Chronic (Delayed) • No data available

Other

Chronic (Delayed) • Repeated and prolonged exposure to lead may cause effects on the gastrointestinal tract and central nervous system.

Carcinogenic Effects • Repeated and prolonged exposure may cause cancer.

<table>
<thead>
<tr>
<th>Carcinogenic Effects</th>
<th>CAS</th>
<th>IARC</th>
<th>NTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt</td>
<td>8052-42-4</td>
<td>Group 2B-Possible Carcinogen</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Crystalline silica</td>
<td>14808-60-7</td>
<td>Group 1-Carcinogenic</td>
<td>Known Human Carcinogen</td>
</tr>
<tr>
<td>Lead, powder</td>
<td>7439-92-1</td>
<td>Group 2A-Probable Carcinogen</td>
<td>Reasonably Anticipated to be Human Carcinogen</td>
</tr>
</tbody>
</table>

Reproductive Effects • Repeated and prolonged exposure may cause reproductive effects. May cause harm to breast-fed children.

11.2 Other information

• Heating above the melting point releases metallic oxides which may cause metal fume fever which is an influenza like illness. Symptoms include headache, metallic taste in the mouth, cough, thirst, throat irritation, shortness of breath, fever, sweating and pain in the limbs. This illness is not permanent and recovery usually occurs within 24-48 hours after onset.

Key to abbreviations

LC = Lethal Concentration
LD = Lethal Dose
TC = Toxic Concentration
TD = Toxic Dose

Section 12 - Ecological Information

12.1 Toxicity
### Components

<table>
<thead>
<tr>
<th>Lead, powder (17.5% TO 70%)</th>
<th>7439-92-1</th>
<th><strong>Aquatic Toxicity - Fish:</strong> 96 Hour(s) LC50 <em>Cyprinus carpio</em> (Common Carp) 0.4 mg/L Comments: Acute Toxicity of Heavy Metals to Common Carp (<em>Cyprinus carpio</em>) 28 Day(s) NOEC <em>Cyprinus carpio</em> (Common Carp) 0.00003 mg/L Comments: Bioaccumulation of Micropollutants and Biomarker Responses in Caged Carp (<em>Cyprinus carpio</em>) <strong>Aquatic Toxicity - Crustacea:</strong> 28 Day(s) NOEC <em>Hyalella azteca</em> (Scud) 0.006 mg/L Comments: Acute and Chronic Toxicity of Lead in Water and Diet to the Amphipod <em>Hyalella azteca</em> <strong>Aquatic Toxicity - Algae and Other Aquatic Plant(s):</strong> 72 Hour(s) EC50 <em>Chaetoceros sp.</em> (Diatom) 0.105 mg/L Comments: Toxicity and Bioaccumulation of Copper and Lead in Five Marine Microalgae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc powder, stabilized (7% TO 10.8%)</td>
<td>7440-66-6</td>
<td><strong>Aquatic Toxicity - Fish:</strong> 96 Hour(s) LC50 <em>Pimephales promelas</em> (Fathead Minnow) 0.238 mg/L 28 Day(s) NOEC <em>Cyprinus carpio</em> (Common Carp) 0.0026 mg/L <strong>Aquatic Toxicity - Crustacea:</strong> 21 Day(s) NOEC <em>Daphnia magna</em> (Water Flea) 0.062 mg/L 48 Hour(s) EC50 <em>Ceriodaphnia dubia</em> 0.07 mg/L <strong>Aquatic Toxicity - Algae and Other Aquatic Plant(s):</strong> 72 Hour(s) EC50 <em>Pseudokirchneriella subcapitata</em> (Green Algae) 0.106 mg/L 14 Day(s) NOEC <em>Euglena gracilis</em> (Flagellate Euglenoid) 0.0075 mg/L</td>
</tr>
<tr>
<td>Copper oxide (0.7% TO 3.5%)</td>
<td>1317-38-0</td>
<td><strong>Aquatic Toxicity - Fish:</strong> 96 Hour(s) LC50 <em>Gambusia affinis</em> (Western Mosquitofish) &gt;56000 mg/L 15 Day(s) NOEC <em>Cyprinus carpio</em> (Common Carp) 0.0128 mg/L <strong>Aquatic Toxicity - Crustacea:</strong> 48 Hour(s) EC50 <em>Daphnia magna</em> (Water Flea) 92.7 mg/L <strong>Aquatic Toxicity - Algae and Other Aquatic Plant(s):</strong> 72 Hour(s) EC50 <em>Pseudokirchneriella subcapitata</em> (Green Algae) 0.014 mg/L 3 Day(s) NOEC <em>Pseudokirchneriella subcapitata</em> (Green Algae) 0.421 mg/L</td>
</tr>
<tr>
<td>Polydimethylsiloxane (18% TO 30%)</td>
<td>63148-62-9</td>
<td><strong>Aquatic Toxicity - Fish:</strong> 96 Hour(s) LC50 <em>Ictalurus punctatus</em> (Channel Catfish) 3.6 mg/L <strong>Aquatic Toxicity - Crustacea:</strong> 48 Hour(s) LC50 <em>Daphnia magna</em> (Water Flea) 44.5 mg/L</td>
</tr>
</tbody>
</table>

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

### 12.2 Persistence and degradability
- Material data lacking.

### 12.3 Bioaccumulative potential
- Material data lacking.

### 12.4 Mobility in Soil
- Material data lacking.

### 12.5 Results of PBT and vPvB assessment
- No PBT and vPvB assessment has been conducted.

### 12.6 Other adverse effects
- No studies have been found.

### Section 13 - Disposal Considerations

#### 13.1 Waste treatment methods
- **Product waste**
  - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.
- **Packaging waste**
  - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th>14.1 UN number</th>
<th>14.2 UN proper shipping name</th>
<th>14.3 Transport hazard class(es)</th>
<th>14.4 Packing group</th>
<th>14.5 Environmental hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOT</td>
<td>UN3077</td>
<td>Environmentally hazardous solid, n.o.s. (Zinc, Copper oxide, Lead)</td>
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<td>TDG</td>
<td>UN3077</td>
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**Section 15 - Regulatory Information**

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

#### State Right To Know

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<thead>
<tr>
<th>Component</th>
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<td>Asphalt</td>
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<tr>
<td>Copper oxide</td>
<td>1317-38-0</td>
<td>No</td>
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<tr>
<td>Crystalline silica</td>
<td>14808-60-7</td>
<td>Yes</td>
</tr>
<tr>
<td>Graphite</td>
<td>7782-42-5</td>
<td>Yes</td>
</tr>
<tr>
<td>Lead, powder</td>
<td>7439-92-1</td>
<td>Yes</td>
</tr>
<tr>
<td>Polydimethylsiloxane</td>
<td>63148-62-9</td>
<td>No</td>
</tr>
<tr>
<td>Silica, amorphous, fumed</td>
<td>112945-52-5</td>
<td>No</td>
</tr>
<tr>
<td>Zinc O,O-bis(mixed iso-butyl and pentyl) phosphorodithioate</td>
<td>68457-79-4</td>
<td>No</td>
</tr>
<tr>
<td>Zinc powder, stabilized</td>
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#### Inventory

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<td>Copper oxide</td>
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<td>Crystalline silica</td>
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<td>Graphite</td>
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<td>Lead, powder</td>
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<td>Yes</td>
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<tr>
<td>Zinc O,O-bis(mixed iso-butyl and pentyl) phosphorodithioate</td>
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<td>Yes</td>
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#### Inventory (Con't.)

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<td>Graphite</td>
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</tbody>
</table>

**United States - California**

**Environment**

**U.S. - California - Proposition 65 - Carcinogens List**

- Polydimethylsiloxane
- Copper oxide
- Lead, powder
- Asphalt
- Zinc powder, stabilized
- Zinc O,O-bis(mixed iso-butyl and pentyl) phosphorodithioate
- Crystalline silica
- Silica, amorphous, fumed
- Graphite

**U.S. - California - Proposition 65 - Developmental Toxicity**

- Polydimethylsiloxane
- Copper oxide
- Lead, powder
- Asphalt
- Zinc powder, stabilized
- Zinc O,O-bis(mixed iso-butyl and pentyl) phosphorodithioate
- Crystalline silica
- Silica, amorphous, fumed
- Graphite

**U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)**

- Polydimethylsiloxane
- Copper oxide
- Lead, powder
- Asphalt
- Zinc powder, stabilized
- Zinc O,O-bis(mixed iso-butyl and pentyl) phosphorodithioate
- Crystalline silica
- Silica, amorphous, fumed
- Graphite

**U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)**

- Polydimethylsiloxane
- Copper oxide
- Lead, powder
- Asphalt
- Zinc powder, stabilized
- Zinc O,O-bis(mixed iso-butyl and pentyl) phosphorodithioate
- Crystalline silica
- Silica, amorphous, fumed
- Graphite

**U.S. - California - Proposition 65 - Reproductive Toxicity - Female**

- Polydimethylsiloxane
- Copper oxide
- Lead, powder
- Asphalt
- Zinc powder, stabilized
- Zinc O,O-bis(mixed iso-butyl and pentyl) phosphorodithioate
- Crystalline silica
- Silica, amorphous, fumed
- Graphite

**U.S. - California - Proposition 65 - Reproductive Toxicity - Male**

- Polydimethylsiloxane
- Copper oxide
• Lead, powder 7439-92-1 male reproductive toxicity, 2/27/87
• Asphalt 8052-42-4 Not Listed
• Zinc powder, stabilized 7440-66-6 Not Listed
• Zinc O,O-bis(mixed iso-butyl and pentyl) phosphorodithioate 68457-79-4 Not Listed
• Crystalline silica 14808-60-7 Not Listed
• Silica, amorphous, fumed 112945-52-5 Not Listed
• Graphite 7782-42-5 Not Listed

15.2 Chemical Safety Assessment
• No Chemical Safety Assessment has been carried out.

15.3 Other Information
• WARNING: This product contains a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

Section 16 - Other Information

Relevant Phrases (code & full text)
• H350i - May cause cancer by inhalation.
• H360FD - May damage fertility. May damage the unborn child.
• H411 - Toxic to aquatic life with long lasting effects

Revision Date • 10/October/2018
Last Revision Date • 10/October/2018
Preparation Date • 10/October/2018

Disclaimer/Statement of Liability
• The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Key to abbreviations
NDA = No Data Available