Safety Data Sheet

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

1.1 Product identifier
Product Name: Magnesium Zirconate – Code 9897, 7008, 7017, #233

1.2 Relevant identified uses of the substance or mixture and uses advised against
Relevant identified use(s): TSP

1.3 Details of the supplier of the safety data sheet
Manufacturer: Saint-Gobain
One New Bond St.
Mail Stop 525-203 Worcester, MA 01615-0137
United States
http://www.ceramicmaterials.saint-gobain.com
cermatworcester@saint-gobain.com

Telephone (General): 1-800-243-0028

1.4 Emergency telephone number
Manufacturer: 800-535-5053 - Infotrac Inc.
Manufacturer: 800-424-9300 - CHEMTREC

Section 2: Hazards Identification

EU/EEC

2.1 Classification of the substance or mixture
CLP: Not classified

2.2 Label Elements
CLP: Hazard statements: No label element(s) required

2.3 Other Hazards
CLP: According to Regulation (EC) No. 1272/2008 (CLP) this material is not considered hazardous.
UN GHS
According to: UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

2.1 Classification of the substance or mixture
UN GHS
• Not classified

2.2 Label elements
UN GHS
Hazard statements • No label element(s) required

2.3 Other hazards
UN GHS
• According to the Globally Harmonized Standard for Classification and Labeling (GHS) this product is considered not hazardous.

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

2.1 Classification of the substance or mixture
OSHA HCS 2012
• Not classified

2.2 Label elements
OSHA HCS 2012
Hazard statements • No label element(s) required

2.3 Other hazards
OSHA HCS 2012
• This product is not considered hazardous under the U.S. OSHA 29 CFR 1910.1200 Hazard Communication Standard.

Canada
According to: WHMIS

2.1 Classification of the substance or mixture
WHMIS
• Other Toxic Effects - D2B

2.2 Label elements
WHMIS

• Other Toxic Effects - D2B

2.3 Other hazards
WHMIS
• 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>Zirconium oxide</td>
<td>CAS:1314-23-4</td>
<td>73% TO 77%</td>
<td>NDA</td>
<td>UN GHS: Not Classified</td>
<td>NDA</td>
</tr>
<tr>
<td></td>
<td>EC Number:215-227-2</td>
<td></td>
<td></td>
<td>EU CLP: Not Classified</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OSHA HCS 2012: Not Classified</td>
<td></td>
</tr>
<tr>
<td>Magnesium oxide</td>
<td>CAS:1309-48-4</td>
<td>20% TO 24%</td>
<td>NDA</td>
<td>UN GHS: Not Classified</td>
<td>NDA</td>
</tr>
<tr>
<td></td>
<td>EC Number:215-171-9</td>
<td></td>
<td></td>
<td>EU CLP: Not Classified</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OSHA HCS 2012: Not Classified</td>
<td></td>
</tr>
<tr>
<td>Hafnium oxide</td>
<td>CAS:12055-23-1</td>
<td>1% TO 3%</td>
<td>NDA</td>
<td>UN GHS: Eye Irrit. 2; Skin Irrit. 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EINECS:235-013-2</td>
<td></td>
<td></td>
<td>EU CLP: Not Classified</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OSHA HCS 2012: Eye Irrit. 2</td>
<td></td>
</tr>
</tbody>
</table>

### Section 4 - First Aid Measures

#### 4.1 Description of first aid measures

**Inhalation**  
• Move victim to fresh air. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. If signs/symptoms continue, get medical attention.

**Skin**  
• In case of contact with substance, immediately flush skin with running water for at least 20 minutes. If irritation develops and persists, get medical attention.

**Eye**  
• In case of contact with substance, immediately flush eyes with running water for at least 20 minutes. If eye irritation persists: Get medical advice/attention.

**Ingestion**  
• Rinse mouth. Do not give anything by mouth to an unconscious person. Do NOT induce vomiting. Get medical attention.

#### 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.

**Unsuitable Extinguishing Media**  
• No data available

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

**Unusual Fire and Explosion Hazards**  
• None known.

**Hazardous Combustion Products**  
• No data available

#### 5.3 Advice for firefighters

• Fire fighters should wear full-face, self-contained breathing apparatus and impervious protective clothing.

• Fire fighters should avoid inhaling any combustion products.
Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal Precautions
- Ventilate enclosed areas. Take proper precautions to minimize exposure by using appropriate personal protective equipment.

Emergency Procedures
- Stay upwind. As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions. Keep unauthorized personnel away.

6.2 Environmental precautions
- Avoid release to the environment.

6.3 Methods and material for containment and cleaning up

Containment/Clean-up Measures
- Avoid generating dust.
  - SMALL DRY SPILLS: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.
  - LARGE SPILLS: Cover powder spill with plastic sheet or tarp to minimize spreading.

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. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Wear appropriate personal protective equipment, avoid direct contact. Avoid breathing dust. Avoid contact with skin, eyes, and clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

7.2 Conditions for safe storage, including any incompatibilities

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>Result</th>
<th>Exposure Limits/Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ACGIH</td>
</tr>
<tr>
<td>Hafnium oxide</td>
<td>TWAs</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnesium oxide (1309-48-4)</td>
<td>STELs</td>
</tr>
<tr>
<td></td>
<td>TWAs</td>
</tr>
<tr>
<td></td>
<td>STELs</td>
</tr>
<tr>
<td>Zirconium oxide</td>
<td></td>
</tr>
</tbody>
</table>

Preparation Date: 07/August/2015
Revision Date: 07/August/2015
Format: EU CLP/REACH Language: English (US)
WHMIS, UN GHS, EU CLP, OSHA HCS 2012
<table>
<thead>
<tr>
<th>TWAs</th>
<th>5 mg/m³ TWA (as Zr) as Zirconium compounds</th>
<th>5 mg/m³ TWA (as Zr) as Zirconium compounds</th>
<th>5 mg/m³ TWA (as Zr) as Zirconium compounds</th>
<th>1 mg/m³ TWA (as Zr) as Zirconium compounds</th>
<th>Not established</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>Result</th>
<th>Germany DFG</th>
<th>Greece</th>
<th>Hungary</th>
<th>Ireland</th>
<th>NIOSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hafnium oxide</td>
<td>TWAs</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>0.5 mg/m³ TWA (as Hf) as Hafnium compounds</td>
</tr>
<tr>
<td></td>
<td>TWAs</td>
<td>Not established</td>
<td>10 mg/m³ TWA (inhalable fraction); 5 mg/m³ TWA (respirable fraction)</td>
<td>6 mg/m³ TWA [AK] (respirable dust, fume)</td>
<td>4 mg/m³ TWA (respirable dust); 5 mg/m³ TWA (fume); 10 mg/m³ TWA (total inhalable dust)</td>
</tr>
<tr>
<td></td>
<td>STELs</td>
<td>Not established</td>
<td>Not established</td>
<td>24 mg/m³ STEL [CK] (respirable dust)</td>
<td>Not established</td>
</tr>
<tr>
<td></td>
<td>MAKs</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></td>
<td>TWAs</td>
<td>Not established</td>
<td>5 mg/m³ TWA (as Zr) as Zirconium compounds</td>
<td>5 mg/m³ TWA [AK] (as Zr) as Zirconium compounds</td>
<td>5 mg/m³ TWA (except Zirconium tetrachloride, as Zr) as Zirconium compounds</td>
</tr>
<tr>
<td></td>
<td>STELs</td>
<td>Not established</td>
<td>10 mg/m³ STEL (as Zr) as Zirconium compounds</td>
<td>20 mg/m³ STEL [CK] (as Zr) as Zirconium compounds</td>
<td>10 mg/m³ STEL (except Zirconium tetrachloride, as Zr) as Zirconium compounds</td>
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</table>

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

<table>
<thead>
<tr>
<th>Result</th>
<th>OSHA</th>
<th>Poland</th>
<th>Portugal</th>
<th>Spain</th>
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<tr>
<td>Hafnium oxide</td>
<td>TWAs</td>
<td>Not established</td>
<td>0.5 mg/m³ TWA [NDS] (as Hf) as Hafnium compounds</td>
<td>0.5 mg/m³ TWA [VLE-MP] (as Hf) as Hafnium compounds</td>
</tr>
<tr>
<td>Magnesium oxide (1309-48-4)</td>
<td>TWAs</td>
<td>15 mg/m³ TWA (fume, total particulate)</td>
<td>10 mg/m³ TWA [NDS] (inhalable fraction)</td>
<td>10 mg/m³ TWA [VLE-MP] (inhalable fraction)</td>
</tr>
<tr>
<td></td>
<td>STELs</td>
<td>Not established</td>
<td>10 mg/m³ STEL [NDSCh] (as Zr) as Zirconium compounds</td>
<td>10 mg/m³ STEL [VLE-CD] (as Zr) as Zirconium compounds</td>
</tr>
<tr>
<td>Zirconium oxide</td>
<td>TWAs</td>
<td>Not established</td>
<td>5 mg/m³ TWA (as Zr) as Zirconium compounds</td>
<td>5 mg/m³ TWA [NDS] (as Zr) as Zirconium compounds</td>
</tr>
</tbody>
</table>
**Exposure Control Notations**

**Portugal**
- Zirconium oxide as Zirconium compounds: **Carcinogens**: (A4 - Not Classifiable as a Human Carcinogen)
- Magnesium oxide (1309-48-4): **Carcinogens**: (A4 - Not Classifiable as a Human Carcinogen)

**ACGIH**
- Zirconium oxide as Zirconium compounds: **Carcinogens**: (A4 - Not Classifiable as a Human Carcinogen)
- Magnesium oxide (1309-48-4): **Carcinogens**: (A4 - Not Classifiable as a Human Carcinogen)

**Germany DFG**
- Magnesium oxide (1309-48-4): **Pregnancy**: (no risk to embryo/fetus if exposure limits adhered to (fume, respirable fraction); no risk to embryo/fetus if exposure limits adhered to (inhalable fraction))

**Exposure Limits Supplemental**

**ACGIH**
- Magnesium oxide (1309-48-4): **TLV Basis - Critical Effects**: (metal fume fever; upper respiratory tract irritation)
- Hafnium oxide as Hafnium compounds: **TLV Basis - Critical Effects**: (eye and upper respiratory tract irritation; liver damage)

**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. Ensure that dust handling systems (such as exhaust ducts, dust collectors, vessels and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment).

**Personal Protective Equipment**

**Respiratory**
- For limited exposure use an N95 dust mask. For prolonged exposure use an air-purifying respirator with high efficiency particulate air (HEPA) filters. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

**Eye/Face**
- Wear safety goggles.

**Skin/Body**
- Wear appropriate gloves. Wear long sleeves and/or protective coveralls.

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

**Key to abbreviations**

ACGIH = American Conference of Governmental Industrial Hygiene

STEL = Short Term Exposure Limits are based on 15-minute exposures

MAK = Maximale Arbeitsplatz Konzentration is the maximum permissible concentration

TLV = Threshold Limit Value determined by the American Conference of Governmental Industrial Hygienists (ACGIH)

NIOSH = National Institute of Occupational Safety and Health

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

OSHA = Occupational Safety and Health Administration

**Section 9 - Physical and Chemical Properties**

**9.1 Information on Physical and Chemical Properties**

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Physical Form</th>
<th>Appearance/Description</th>
<th>Whitish powder.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Solid</td>
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<tr>
<td>Color</td>
<td>White</td>
<td>Odor</td>
<td>Data lacking</td>
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<tr>
<td>Odor Threshold</td>
<td>Data lacking</td>
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</table>
General Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Data lacking</th>
<th>Data lacking</th>
<th>Data lacking</th>
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<tbody>
<tr>
<td>Boiling Point</td>
<td>Data lacking</td>
<td>Melting Point/Freezing Point</td>
<td>Data lacking</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>Data lacking</td>
<td>pH</td>
<td>Data lacking</td>
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<tr>
<td>Specific Gravity/Relative Density</td>
<td>Data lacking</td>
<td>Water Solubility</td>
<td>Data lacking</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Data lacking</td>
<td>Explosive Properties</td>
<td>Data lacking</td>
</tr>
<tr>
<td>Oxidizing Properties</td>
<td>Data lacking</td>
<td>Data lacking</td>
<td>Data lacking</td>
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Volatile

<table>
<thead>
<tr>
<th>Property</th>
<th>Data lacking</th>
<th>Data lacking</th>
<th>Data lacking</th>
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</thead>
<tbody>
<tr>
<td>Vapor Pressure</td>
<td>Data lacking</td>
<td>Vapor Density</td>
<td>Data lacking</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Data lacking</td>
<td>Data lacking</td>
<td>Data lacking</td>
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</tbody>
</table>

Flammability

<table>
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<tr>
<th>Property</th>
<th>Data lacking</th>
<th>UEL</th>
<th>Data lacking</th>
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</thead>
<tbody>
<tr>
<td>Flash Point</td>
<td>Data lacking</td>
<td>UEL</td>
<td>Data lacking</td>
</tr>
<tr>
<td>LEL</td>
<td>Data lacking</td>
<td>Autoignition</td>
<td>Data lacking</td>
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<tr>
<td>Flammability (solid, gas)</td>
<td>Data lacking</td>
<td>Data lacking</td>
<td>Data lacking</td>
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</table>

Environmental

<table>
<thead>
<tr>
<th>Property</th>
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</thead>
<tbody>
<tr>
<td>Octanol/Water Partition coefficient</td>
<td>Data lacking</td>
</tr>
</tbody>
</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 not indicated.

10.4 Conditions to avoid

- No data available

10.5 Incompatible materials

- No data available

10.6 Hazardous decomposition products

- No data available

Section 11 - Toxicological Information

11.1 Information on toxicological effects

<table>
<thead>
<tr>
<th>GHS Properties</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory sensitization</td>
<td>EU/CLP • Data lacking</td>
</tr>
<tr>
<td></td>
<td>OSHA HCS 2012 • Data lacking</td>
</tr>
<tr>
<td></td>
<td>UN GHS • Data lacking</td>
</tr>
<tr>
<td>Serious eye damage/Irritation</td>
<td>EU/CLP • Data lacking</td>
</tr>
<tr>
<td></td>
<td>OSHA HCS 2012 • Data lacking</td>
</tr>
<tr>
<td></td>
<td>UN GHS • Data lacking</td>
</tr>
<tr>
<td>Potential Health Effects</td>
<td>Inhalation</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Acute (Immediate)</strong></td>
<td>Nuisance dust may affect the lungs but reactions are typically reversible.</td>
</tr>
<tr>
<td><strong>Chronic (Delayed)</strong></td>
<td>No data available</td>
</tr>
</tbody>
</table>

### Section 12 - Ecological Information

#### 12.1 Toxicity
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></th>
<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>NDA</td>
<td>Not Regulated</td>
<td>NDA</td>
<td>NDA</td>
<td>NDA</td>
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<td>TDG</td>
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<td>NDA</td>
<td>NDA</td>
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</tr>
<tr>
<td>IMO/IMDG</td>
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<td>Not Regulated</td>
<td>NDA</td>
<td>NDA</td>
<td>NDA</td>
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<tr>
<td>IATA/ICAO</td>
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<td>Not Regulated</td>
<td>NDA</td>
<td>NDA</td>
<td>NDA</td>
</tr>
</tbody>
</table>

### 14.6 Special precautions for user
- None specified.

### 14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
- Data lacking.

---

**Section 15 - Regulatory Information**

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

**SARA Hazard Classifications**
- None

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hafnium oxide</td>
<td>12055-23-1</td>
<td>No</td>
</tr>
<tr>
<td>Magnesium oxide</td>
<td>1309-48-4</td>
<td>Yes</td>
</tr>
<tr>
<td>Component</td>
<td>CAS</td>
<td>Canada DSL</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>Hafnium oxide</td>
<td>12055-23-1</td>
<td>Yes</td>
</tr>
<tr>
<td>Magnesium oxide</td>
<td>1309-48-4</td>
<td>Yes</td>
</tr>
<tr>
<td>Zirconium oxide</td>
<td>1314-23-4</td>
<td>Yes</td>
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</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>Korea KECL</th>
<th>TSCA</th>
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<tbody>
<tr>
<td>Hafnium oxide</td>
<td>12055-23-1</td>
<td>Yes</td>
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<tr>
<td>Magnesium oxide</td>
<td>1309-48-4</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Zirconium oxide</td>
<td>1314-23-4</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Canada**

**Labor**

Canada - WHMIS - Classifications of Substances
- Hafnium oxide 12055-23-1: Not Listed
- Magnesium oxide 1309-48-4: 1%
- Zirconium oxide 1314-23-4: Not Listed

Canada - WHMIS - Ingredient Disclosure List
- Hafnium oxide 12055-23-1: Not Listed
- Magnesium oxide 1309-48-4: 1%
- Zirconium oxide 1314-23-4: Not Listed

**Environment**

Canada - CEPA - Priority Substances List
- Hafnium oxide 12055-23-1: Not Listed
- Magnesium oxide 1309-48-4: Not Listed
- Zirconium oxide 1314-23-4: Not Listed

**China**

**Environment**

China - Ozone Depleting Substances - First Schedule
- Hafnium oxide 12055-23-1: Not Listed
- Magnesium oxide 1309-48-4: Not Listed
- Zirconium oxide 1314-23-4: Not Listed

China - Ozone Depleting Substances - Second Schedule
- Hafnium oxide 12055-23-1: Not Listed
- Magnesium oxide 1309-48-4: Not Listed
- Zirconium oxide 1314-23-4: Not Listed

China - Ozone Depleting Substances - Third Schedule
- Hafnium oxide 12055-23-1: Not Listed
- Magnesium oxide 1309-48-4: Not Listed
- Zirconium oxide 1314-23-4: Not Listed
### Other

**China - Annex I & II - Controlled Chemicals Lists**
- Hafnium oxide
  - Code: 12055-23-1
  - Not Listed
- Magnesium oxide
  - Code: 1309-48-4
  - Not Listed
- Zirconium oxide
  - Code: 1314-23-4
  - Not Listed

**China - Dangerous Goods List**
- Hafnium oxide
  - Code: 12055-23-1
  - Not Listed
- Magnesium oxide
  - Code: 1309-48-4
  - Not Listed
- Zirconium oxide
  - Code: 1314-23-4
  - Not Listed

### Germany

**Labor**

**Germany - Immission Control - Qualifying Quantities for Major Accident Prevention**
- Hafnium oxide
  - Code: 12055-23-1
  - Not Listed
- Magnesium oxide
  - Code: 1309-48-4
  - Not Listed
- Zirconium oxide
  - Code: 1314-23-4
  - Not Listed

**Germany - Immission Control - Qualifying Quantities for Safety Reporting**
- Hafnium oxide
  - Code: 12055-23-1
  - Not Listed
- Magnesium oxide
  - Code: 1309-48-4
  - Not Listed
- Zirconium oxide
  - Code: 1314-23-4
  - Not Listed

**Germany - TRGS 505 - Specific Lead Regulations**
- Hafnium oxide
  - Code: 12055-23-1
  - Not Listed
- Magnesium oxide
  - Code: 1309-48-4
  - Not Listed
- Zirconium oxide
  - Code: 1314-23-4
  - Not Listed

**Germany - TRGS 511 - Specific Ammonium Nitrate Regulations**
- Hafnium oxide
  - Code: 12055-23-1
  - Not Listed
- Magnesium oxide
  - Code: 1309-48-4
  - Not Listed
- Zirconium oxide
  - Code: 1314-23-4
  - Not Listed

### Environment

**Germany - TA Luft - Types and Classes**
- Hafnium oxide
  - Code: 12055-23-1
  - Not Listed
- Magnesium oxide
  - Code: 1309-48-4
  - Not Listed
- Zirconium oxide
  - Code: 1314-23-4
  - Not Listed

**Germany - TA Luft - Emission Limits for Carcinogenic Substances**
- Hafnium oxide
  - Code: 12055-23-1
  - Not Listed
- Magnesium oxide
  - Code: 1309-48-4
  - Not Listed
- Zirconium oxide
  - Code: 1314-23-4
  - Not Listed

**Germany - TA Luft - Emission Limits for Fibers**
- Hafnium oxide
  - Code: 12055-23-1
  - Not Listed
- Magnesium oxide
  - Code: 1309-48-4
  - Not Listed
- Zirconium oxide
  - Code: 1314-23-4
  - Not Listed

**Germany - TA Luft - Emission Limits for Inorganic Dusts**
- Hafnium oxide
  - Code: 12055-23-1
  - Not Listed
- Magnesium oxide
  - Code: 1309-48-4
  - Not Listed
- Zirconium oxide
  - Code: 1314-23-4
  - Not Listed
### Germany - TA Luft - Emission Limits for Inorganic Gases
- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

### Germany - TA Luft - Emission Limits for Organic Substances
- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

### Germany - Water Classification (VwVwS) - Annex 1
- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

### Germany - Water Classification (VwVwS) - Annex 2 - Water Hazard Classes
- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

### Germany - Water Classification (VwVwS) - Annex 3
- Hafnium oxide 12055-23-1 Not Listed
  - ID Number 8672, not considered hazardous to water
- Magnesium oxide 1309-48-4 Not Listed
  - ID Number 5208, hazard class 1 - low hazard to waters (fume)
- Zirconium oxide 1314-23-4 Not Listed
  - ID Number 2894, not considered hazardous to water

### United States

#### Labor

**U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals**
- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

**U.S. - OSHA - Specifically Regulated Chemicals**
- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

#### Environment

**U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants**
- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

**U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities**
- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed
U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

United States - California

Environment

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

- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

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

- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

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

- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

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

- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

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

- Hafnium oxide 12055-23-1 Not Listed
- Magnesium oxide 1309-48-4 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

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

- Hafnium oxide 12055-23-1 Not Listed
15.2 Chemical Safety Assessment

- No Chemical Safety Assessment has been carried out.

Section 16 - Other Information

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Key to abbreviations
NDA = No data available