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

- **1.1 Product identifier**
  - Trade name: Ceria Zirconia
  - Product code: 9994, #222

- **1.2 Relevant identified uses of the substance or mixture and uses advised against**
  - **Application of the substance / the mixture:** Thermal spray powders
  - **Uses advised against:** No further relevant information available.

- **1.3 Details of the supplier of the Safety Data Sheet**
  - **Manufacturer/Supplier:**
    - Saint Gobain Coating Solutions
    - One New Bond Street
    - Worcester, MA 01615-0137
    - (508) 795-5000
    - CeramicMaterials@saint-gobain.com

- **1.4 Emergency telephone number:**
  - ChemTel Inc.
  - (800)255-3924 (North America)
  - +1 (813)248-0585 (International)
  - 1-300-954-583 (Australia)
  - 0-800-591-6042 (Brazil)
  - 400-120-0751 (China)
  - 000-800-100-4086 (India)
  - 01-800-099-0731 (Mexico)

SECTION 2: Hazards identification

- **2.1 Classification of the substance or mixture**
  - **Classification according to Regulation (EC) No 1272/2008**
    - The product is not classified as hazardous according to OSHA GHS regulations within the United States.
    - The product is not classified as hazardous according to the CLP regulation.

  - **Additional information:**
    - Not hazardous as delivered. Long term inhalation of product dusts formed during use is harmful.

- **2.2 Label elements**
  - **Labelling according to Regulation (EC) No 1272/2008**
    - This product does not have a classification according to the CLP regulation.
    - The product is not classified as hazardous according to OSHA GHS regulations within the United States.
  - **Hazard pictograms** Not Regulated
  - **Signal word** Not Regulated
  - **Hazard-determining components of labelling:** None.
  - **Hazard statements** Not Regulated.
  - **Precautionary statements** Not Regulated.

- **2.3 Other hazards**
  - There are no other hazards not otherwise classified that have been identified.

(Cont'd. on page 2)
SECTION 3: Composition/information on ingredients

3.2 Mixtures

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS: 1314-23-4</th>
<th>EINECS: 215-227-2</th>
<th>zirconium oxide substance with a Community workplace exposure limit</th>
<th>70-85%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAS: 1345-13-7</td>
<td>EINECS: 215-718-1</td>
<td>Dicerium trioxide</td>
<td>15-30%</td>
</tr>
<tr>
<td></td>
<td>CAS: 12055-23-1</td>
<td>EINECS: 235-013-2</td>
<td>hafnium dioxide substance with a Community workplace exposure limit</td>
<td>1-3%</td>
</tr>
</tbody>
</table>

Additional information:
For the listed ingredient(s), the identity and/or exact percentages are being withheld as a trade secret.

SECTION 4: First aid measures

4.1 Description of first aid measures

After inhalation:
Supply fresh air; consult doctor in case of complaints.
Provide oxygen treatment if affected person has difficulty breathing.

After skin contact:
Brush off loose particles from skin.
Immediately rinse with water.
If skin irritation is experienced, consult a doctor.

After eye contact:
Remove contact lenses if worn, if possible.
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

After swallowing:
Rinse out mouth and then drink plenty of water.
Do not induce vomiting; call for medical help immediately.

4.2 Most important symptoms and effects, both acute and delayed

Breathing difficulty
Coughing
Slight irritant effect on skin and mucous membranes.
Slight irritant effect on eyes.
May cause gastro-intestinal irritation if ingested.

4.3 Indication of any immediate medical attention and special treatment needed

No further relevant information available.

(Cont'd. on page 3)
SECTION 5: Firefighting measures

- 5.1 Extinguishing media
  - Suitable extinguishing agents:
    The product is not flammable.
    Use fire extinguishing methods suitable to surrounding conditions.
  - For safety reasons unsuitable extinguishing agents: None.
- 5.2 Special hazards arising from the substance or mixture
  No further relevant information available.
- 5.3 Advice for firefighters
  - Protective equipment:
    Wear self-contained respiratory protective device.
    Wear fully protective suit.

SECTION 6: Accidental release measures

- 6.1 Personal precautions, protective equipment and emergency procedures
  Ensure adequate ventilation
  Do not breathe dust.
  Avoid formation of dust.
  For large spills, use respiratory protective device against the effects of fumes/dust/aerosol.
- 6.2 Environmental precautions
  Damp down dust with water spray.
  Avoid release to the environment.
- 6.3 Methods and material for containment and cleaning up
  Pick up mechanically.
  Dispose of the material collected according to regulations.
  Send for recovery or disposal in suitable receptacles.
- 6.4 Reference to other sections
  See Section 7 for information on safe handling.
  See Section 8 for information on personal protection equipment.
  See Section 13 for disposal information.

SECTION 7: Handling and storage

- 7.1 Precautions for safe handling
  Use only in well ventilated areas.
  Prevent formation of dust.
  Any unavoidable deposit of dust must be regularly removed.
  Use personal protective equipment as required.
  - Information about fire - and explosion protection: No special measures required.
- 7.2 Conditions for safe storage, including any incompatibilities
  - Requirements to be met by storerooms and receptacles:
    Store in cool, dry conditions in well sealed receptacles.
  - Information about storage in one common storage facility: Store away from foodstuffs.
- 7.3 Specific end use(s) No further relevant information available.
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with limit values that require monitoring at the workplace:

<table>
<thead>
<tr>
<th>1314-23-4 zirconium oxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL (Canada)</td>
</tr>
<tr>
<td>Short-term value: 10 mg/m³</td>
</tr>
<tr>
<td>Long-term value: 5 mg/m³ as Zr</td>
</tr>
<tr>
<td>WEL (Great Britain)</td>
</tr>
<tr>
<td>Short-term value: 10 mg/m³</td>
</tr>
<tr>
<td>Long-term value: 5 mg/m³ as Zr</td>
</tr>
<tr>
<td>OEL (Ireland)</td>
</tr>
<tr>
<td>Short-term value: 10 mg/m³</td>
</tr>
<tr>
<td>Long-term value: 5 mg/m³ as Zr</td>
</tr>
<tr>
<td>PEL (USA)</td>
</tr>
<tr>
<td>Long-term value: 5 mg/m³ as Zr</td>
</tr>
<tr>
<td>REL (USA)</td>
</tr>
<tr>
<td>Short-term value: 10 mg/m³</td>
</tr>
<tr>
<td>Long-term value: 5 mg/m³ as Zr</td>
</tr>
<tr>
<td>TLV (USA)</td>
</tr>
<tr>
<td>Short-term value: 10 mg/m³</td>
</tr>
<tr>
<td>Long-term value: 5 mg/m³ as Zr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>12055-23-1 hafnium dioxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL (Canada)</td>
</tr>
<tr>
<td>Long-term value: 0,5 mg/m³</td>
</tr>
<tr>
<td>as Hf</td>
</tr>
<tr>
<td>PEL (USA)</td>
</tr>
<tr>
<td>Long-term value: 0,5 mg/m³</td>
</tr>
<tr>
<td>as Hf</td>
</tr>
<tr>
<td>REL (USA)</td>
</tr>
<tr>
<td>Long-term value: 0,5 mg/m³</td>
</tr>
<tr>
<td>as Hf</td>
</tr>
<tr>
<td>TLV (USA)</td>
</tr>
<tr>
<td>Long-term value: 0,5 mg/m³</td>
</tr>
<tr>
<td>as Hf</td>
</tr>
</tbody>
</table>

8.2 Exposure controls

- General protective and hygienic measures:
  The usual precautionary measures are to be adhered to when handling chemicals.
  Keep away from foodstuffs, beverages and feed.
  Avoid breathing dust.
  Avoid contact with the eyes.
  Avoid close or long term contact with the skin.

- Respiratory protection:
  Wear appropriate NIOSH or EU approved respirator when ventilation is inadequate and occupational exposure limits are exceeded.
  Use suitable respiratory protective device in case of insufficient ventilation.
  Use respiratory protection when grinding or cutting material.
  Particulate mask should filter at least 99% of airborne particles.
Trade name: Ceria Zirconia

- **Protection of hands:**
  Wear gloves for the protection against mechanical hazards according to NIOSH or EN 388.
- **Eye protection:**
  Safety glasses
- **Body protection:** Not required under normal conditions of use.
- **Limitation and supervision of exposure into the environment:** Avoid release to the environment.
- **Risk management measures:** No further relevant information available.

### SECTION 9: Physical and chemical properties

<table>
<thead>
<tr>
<th>9.1 Information on basic physical and chemical properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
</tr>
<tr>
<td>Form: Crystalline powder</td>
</tr>
<tr>
<td>Colour: Tan.</td>
</tr>
<tr>
<td>Odour: Odourless</td>
</tr>
<tr>
<td>Odour threshold: Not determined.</td>
</tr>
<tr>
<td><strong>pH-value:</strong> Not applicable.</td>
</tr>
<tr>
<td><strong>Melting point/freezing point:</strong> Not determined.</td>
</tr>
<tr>
<td><strong>Initial boiling point and boiling range:</strong> 2300 °C (4.172 °F)</td>
</tr>
<tr>
<td><strong>Flash point:</strong> Not applicable.</td>
</tr>
<tr>
<td><strong>Flammability (solid, gas):</strong> Product is not flammable.</td>
</tr>
<tr>
<td><strong>Auto/Self-ignition temperature:</strong> Not determined.</td>
</tr>
<tr>
<td>** Decomposition temperature:** Not determined.</td>
</tr>
<tr>
<td><strong>Explosive properties:</strong> Product does not present an explosion hazard.</td>
</tr>
<tr>
<td><strong>Explosion limits</strong></td>
</tr>
<tr>
<td>Lower: Not determined.</td>
</tr>
<tr>
<td>Upper: Not determined.</td>
</tr>
<tr>
<td><strong>Oxidising properties</strong></td>
</tr>
<tr>
<td>Not determined.</td>
</tr>
<tr>
<td><strong>Vapour pressure:</strong> Not determined.</td>
</tr>
<tr>
<td><strong>Density:</strong> Not determined.</td>
</tr>
<tr>
<td><strong>Relative density:</strong> Not determined.</td>
</tr>
<tr>
<td><strong>Vapour density:</strong> Not applicable.</td>
</tr>
<tr>
<td><strong>Evaporation rate:</strong> Not applicable.</td>
</tr>
<tr>
<td><strong>Solubility in / Miscibility with water:</strong> Insoluble.</td>
</tr>
<tr>
<td><strong>Partition coefficient: n-octanol/water:</strong> Not determined.</td>
</tr>
<tr>
<td><strong>Viscosity</strong></td>
</tr>
<tr>
<td>Dynamic: Not applicable.</td>
</tr>
</tbody>
</table>

(Cont'd. on page 6)
SECTION 10: Stability and reactivity

- **10.1 Reactivity** No further relevant information available.
- **10.2 Chemical stability** Stable under normal temperatures and pressures.
- **Thermal decomposition / conditions to be avoided:**
  No decomposition if used and stored according to specifications.
- **10.3 Possibility of hazardous reactions** No dangerous reactions known.
- **10.4 Conditions to avoid** Prevent formation of dust.
- **10.5 Incompatible materials** No further relevant information available.
- **10.6 Hazardous decomposition products** No dangerous decomposition products known.

SECTION 11: Toxicological information

- **11.1 Information on toxicological effects**
  - **Acute toxicity:** Based on available data, the classification criteria are not met.
  - **LD/LC50 values relevant for classification:** None.
  - **Primary irritant effect**
  - **Skin corrosion/irritation:** Slight irritant effect on skin and mucous membranes.
  - **Serious eye damage/irritation:** Slight irritant effect on eyes.
  - **Respiratory or skin sensitisation:** Based on available data, the classification criteria are not met.

- **Carcinogenic categories**

- **IARC (International Agency for Research on Cancer):**
  None of the ingredients are listed.

- **Probable routes of exposure:**
  - Ingestion.
  - Inhalation.
  - Eye contact.
  - Skin contact.

- **Repeated dose toxicity:**
  - Repeated or long-term inhalation of product dusts may cause pulmonary disease.

- **Germ cell mutagenicity:** Based on available data, the classification criteria are not met.
- **Carcinogenicity:** Based on available data, the classification criteria are not met.
- **Reproductive toxicity:** Based on available data, the classification criteria are not met.
- **STOT-single exposure:** Based on available data, the classification criteria are not met.
- **STOT-repeated exposure:** Based on available data, the classification criteria are not met.
- **Aspiration hazard:** Based on available data, the classification criteria are not met.
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- Aquatic toxicity: No further relevant information available.
- 12.2 Persistence and degradability No further relevant information available.
- 12.3 Bioaccumulative potential No further relevant information available.
- 12.4 Mobility in soil No further relevant information available.
- Additional ecological information:
  - General notes: Generally not hazardous for water
- 12.5 Results of PBT and vPvB assessment
  - PBT: Not applicable.
  - vPvB: Not applicable.
- 12.6 Other adverse effects No further relevant information available.

SECTION 13: Disposal considerations

- 13.1 Waste treatment methods
  - Recommendation
    Smaller quantities can be disposed of with household waste.
    Contact waste processors for recycling information.
    The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes.
  - Uncleaned packaging:
    - Recommendation: Disposal must be made according to official regulations.

SECTION 14: Transport information

<table>
<thead>
<tr>
<th>14.1 UN-Number</th>
<th>DOT, ADR, IMDG, IATA</th>
<th>Not Regulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.2 UN proper shipping name</td>
<td>DOT, ADR, IMDG, IATA</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>14.3 Transport hazard class(es)</td>
<td>DOT, ADR, IMDG, IATA</td>
<td>Class Not Regulated</td>
</tr>
<tr>
<td>14.4 Packing group</td>
<td>DOT, ADR, IMDG, IATA</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>14.5 Environmental hazards:</td>
<td>Marine pollutant:</td>
<td>No</td>
</tr>
<tr>
<td>14.6 Special precautions for user</td>
<td>Not applicable.</td>
<td></td>
</tr>
<tr>
<td>14.7 Transport in bulk according to Annex II of Marpol and the IBC Code</td>
<td>Not applicable.</td>
<td></td>
</tr>
</tbody>
</table>
SECTION 15: Regulatory information

- 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
  - United States (USA)
  - SARA
    - Section 355 (extremely hazardous substances):
      None of the ingredients are listed.
    - Section 313 (Specific toxic chemical listings):
      None of the ingredients are listed.
  - TSCA (Toxic Substances Control Act):
    All ingredients are listed.
- Proposition 65 (California):
  - Chemicals known to cause cancer:
    None of the ingredients are listed.
  - Chemicals known to cause developmental toxicity for females:
    None of the ingredients are listed.
  - Chemicals known to cause developmental toxicity for males:
    None of the ingredients are listed.
  - Chemicals known to cause developmental toxicity:
    None of the ingredients are listed.
- EPA (Environmental Protection Agency)
  1306-38-3 cerium dioxide
- IARC (International Agency for Research on Cancer)
  None of the ingredients are listed.
- Canadian Domestic Substances List (DSL) (Substances not listed)
  All ingredients are listed.
- Other regulations, limitations and prohibitive regulations
  - Substances of very high concern (SVHC) according to REACH, Article 57
    None of the ingredients are listed.
- 15.2 Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- Abbreviations and acronyms:
  - ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
  - IMDG: International Maritime Code for Dangerous Goods
  - DOT: US Department of Transportation
  - IATA: International Air Transport Association
Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA
GHS

Printing date: 01 October 2018
Revision: 01 October 2018

Trade name: Ceria Zirconia

(Cont'd. from page 8)

GHS: Globally Harmonised System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bio-accumulative, Toxic
SVHC: Substances of Very High Concern
vPvB: very Persistent and very Bioaccumulative

Sources
Website, European Chemicals Agency (echa.europa.eu)
Website, US EPA Substance Registry Services (ofmpub.epa.gov/sor internet/registry/substreg/home/overview/home.do)
Website, Chemical Abstracts Registry, American Chemical Society (www.cas.org)
Safety Data Sheets, Individual Manufacturers

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