SAFETY DATA SHEET
Hafnium (pieces)

1. Identification

Product identifier

Product name  Hafnium (pieces)
Internal identification  Replaces M-1000-135
CAS number  7440-58-6

Recommended use of the chemical and restrictions on use

Application  Exterior surface coating.
Uses advised against  No specific uses advised against are identified.

Details of the supplier of the safety data sheet

Supplier  Kurt J Lesker Company
Manufacturer  Kurt J Lesker Company
            1925 Route 51
            Jefferson Hills, PA 15025
            +1 412-387-9200

Kurt J Lesker Company LTD
United Kingdom
15-16 Burgess Road
Hastings, East Sussex, TN35 4NR
England
Customer Service: +44 (0) 1424 458100
msds@lesker.com

Emergency telephone number

Emergency telephone  North America [USA, Canada, Mexico]: 1-866-519-4752
Mainland China: (+86) 4001 2001 74
Europe: {int'l call prefix}-1-760-476-3961
Asia Pacific: {int'l call prefix}-1-760-476-3960
Middle East & Africa: {int'l call prefix}-1-760-476-3959

2. Hazard(s) identification

Classification of the substance or mixture

Physical hazards  Not Classified
Health hazards  Not Classified
Environmental hazards  Not Classified

Label elements

Hazard statements  NC Not Classified
Other hazards
Hafnium (pieces)

This product does not contain any substances classified as PBT or vPvB. Based on available knowledge of this material, it has been determined to be non-hazardous and will not pose a risk to persons or the environment in its provided form. However, any cutting, welding, melting, grinding, or use for deposition will produce dust, fume, or particulates containing component elements of this material. Exposure to these components may present significant health hazards. Note: Fine particulate may be a combustible dust which, when dispersed in air, may present an explosion hazard.

3. Composition/information on ingredients

Mixtures

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hafnium (pieces)</td>
<td>0 - 100%</td>
</tr>
<tr>
<td>CAS number</td>
<td>7440-58-6</td>
</tr>
</tbody>
</table>

Classification

Not Classified

The Full Text for all Hazard Statements are Displayed in Section 16.

4. First-aid measures

Description of first aid measures

General information

If in doubt, get medical attention promptly. Show this Safety Data Sheet to the medical personnel.

Inhalation

No specific recommendations. If throat irritation or coughing persists, proceed as follows. Move affected person to fresh air and keep warm and at rest in a position comfortable for breathing. Loosen tight clothing such as collar, tie or belt. Get medical attention if any discomfort continues.

Ingestion

No specific recommendations. If throat irritation or coughing persists, proceed as follows. Rinse mouth. Get medical attention if any discomfort continues.

Skin Contact

No specific recommendations. Rinse with water. Get medical attention if any discomfort continues.

Eye contact

Rinse with water. Get medical attention if any discomfort continues.

Protection of first aiders

Use protective equipment appropriate for surrounding materials.

Most important symptoms and effects, both acute and delayed

General information

The severity of the symptoms described will vary dependent on the concentration and the length of exposure.

Inhalation

No specific symptoms known.

Ingestion

No specific symptoms known. May cause discomfort if swallowed.

Skin contact

Prolonged contact may cause dryness of the skin.

Eye contact

No specific symptoms known. May be slightly irritating to eyes.

Indication of immediate medical attention and special treatment needed

Notes for the doctor

Treat symptomatically.

Specific treatments

No special treatment required.

5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media

The product is not flammable. Extinguish with alcohol-resistant foam, carbon dioxide, dry powder or water fog. Use fire-extinguishing media suitable for the surrounding fire.
Hafnium (pieces)

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

Special hazards arising from the substance or mixture
Specific hazards
None known.
Hazardous combustion products
Thermal decomposition or combustion products may include the following substances:
Harmful gases or vapors.

Advice for firefighters
Protective actions during firefighting
Avoid breathing fire gases or vapors. Evacuate area. Cool containers exposed to heat with water spray and remove them from the fire area if it can be done without risk. Cool containers exposed to flames with water until well after the fire is out.

Special protective equipment for firefighters
Wear positive-pressure self-contained breathing apparatus (SCBA) and appropriate protective clothing. Standard Firefighter's clothing including helmets, protective boots and gloves will provide a basic level of protection for chemical incidents.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Personal precautions
No specific recommendations. For personal protection, see Section 8.

Environmental precautions
Environmental precautions
Avoid discharge into drains or watercourses or onto the ground.

Methods and material for containment and cleaning up
Methods for cleaning up
Reuse or recycle products wherever possible. Collect spillage with a shovel and broom, or similar and reuse, if possible. Collect and place in suitable waste disposal containers and seal securely. Flush contaminated area with plenty of water. Wash thoroughly after dealing with a spillage. Dispose of contents/container in accordance with national regulations.

Reference to other sections
For personal protection, see Section 8.

7. Handling and storage

Precautions for safe handling
Usage precautions
Read and follow manufacturer's recommendations. Wear protective clothing as described in Section 8 of this safety data sheet. Keep away from food, drink and animal feeding stuffs. Keep container tightly sealed when not in use.

Advice on general occupational hygiene
Wash promptly if skin becomes contaminated. Take off contaminated clothing and wash before reuse. Wash contaminated clothing before reuse.

Conditions for safe storage, including any Incompatibilities
Storage precautions
No specific recommendations.

Storage class
Unspecified storage.

Specific end use(s)

Specific end use(s)
The identified uses for this product are detailed in Section 1.2.

8. Exposure Controls/personal protection

Control parameters
Occupational exposure limits
Hafnium (pieces)

Long-term exposure limit (8-hour TWA): OSHA 0.5 mg/m³
Long-term exposure limit (8-hour TWA): ACGIH 0.5 mg/m³
as Hf

Hafnium (pieces)

Long-term exposure limit (8-hour TWA): OSHA 0.5 mg/m³
Long-term exposure limit (8-hour TWA): ACGIH 0.5 mg/m³
as Hf

OSHA = Occupational Safety and Health Administration.
ACGIH = American Conference of Governmental Industrial Hygienists.

Immediate danger to life and health 50 mg/m³

Hafnium (pieces) (CAS: 7440-58-6)

Immediate danger to life and health 50 mg/m³

Exposure controls

Appropriate engineering controls No specific ventilation requirements.

Eye/face protection No specific eye protection required during normal use. Large Spillages: Eyewear complying with an approved standard should be worn if a risk assessment indicates eye contact is possible.

Hand protection No specific hand protection recommended. Large Spillages: Wear protective gloves.

Hygiene measures Wash hands thoroughly after handling. Wash at the end of each work shift and before eating, smoking and using the toilet. Do not eat, drink or smoke when using this product.

Respiratory protection No specific recommendations. Provide adequate ventilation. Large Spillages: If ventilation is inadequate, suitable respiratory protection must be worn.

Environmental exposure controls Not regarded as dangerous for the environment.

9. Physical and Chemical Properties

Information on basic physical and chemical properties

Appearance Solid.

Color Grey.

Odor No characteristic odor.

Odor threshold Not applicable.

pH Not applicable.

Melting point 2233°C

Initial boiling point and range Not available.

Flash point Not applicable.

Evaporation rate Not applicable.

Flammability (solid, gas) Not applicable.
Hafnium (pieces)

**Upper/lower flammability or explosive limits**
Not applicable.

**Vapor pressure**
Not available.

**Vapor density**
Not available.

**Relative density**
13.31 @ 25°C

**Bulk density**
Not available.

**Solubility(ies)**
Insoluble in water.

**Partition coefficient**
Not applicable.

**Auto-ignition temperature**
Not applicable.

**Decomposition Temperature**
Not available.

**Viscosity**
Not applicable.

**Molecular weight**
178.49

### 10. Stability and reactivity

**Reactivity**
There are no known reactivity hazards associated with this product.

**Stability**
Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions.

**Possibility of hazardous reactions**
No potentially hazardous reactions known.

**Conditions to avoid**
There are no known conditions that are likely to result in a hazardous situation.

**Materials to avoid**
No specific material or group of materials is likely to react with the product to produce a hazardous situation.

**Hazardous decomposition products**
Does not decompose when used and stored as recommended. Thermal decomposition or combustion products may include the following substances: Harmful gases or vapors.

### 11. Toxicological information

**Information on toxicological effects**

**Toxicological effects**
Not regarded as a health hazard under current legislation.

**Acute toxicity - oral**

**Notes (oral LD₅₀)**
Based on available data the classification criteria are not met.

**Acute toxicity - dermal**

**Notes (dermal LD₅₀)**
Based on available data the classification criteria are not met.

**Acute toxicity - inhalation**

**Notes (inhalation LC₅₀)**
Based on available data the classification criteria are not met.

**Skin corrosion/irritation**

**Animal data**
Based on available data the classification criteria are not met.

**Serious eye damage/irritation**
Based on available data the classification criteria are not met.
Hafnium (pieces)

Respiratory sensitization
Based on available data the classification criteria are not met.

Skin sensitization
Based on available data the classification criteria are not met.

Germ cell mutagenicity
Genotoxicity - in vitro
Based on available data the classification criteria are not met.

Carcinogenicity
Based on available data the classification criteria are not met.

IARC carcinogenicity
None of the ingredients are listed or exempt.

Reproductive toxicity
Reproductive toxicity - fertility
Based on available data the classification criteria are not met.

Reproductive toxicity - development
Based on available data the classification criteria are not met.

Specific target organ toxicity - single exposure
STOT - single exposure
Not classified as a specific target organ toxicant after a single exposure.

Specific target organ toxicity - repeated exposure
STOT - repeated exposure
Not classified as a specific target organ toxicant after repeated exposure.

Aspiration hazard
Not relevant. Solid.

General information
No specific health hazards known. The severity of the symptoms described will vary dependent on the concentration and the length of exposure.

Inhalation
No specific symptoms known.

Ingestion
No specific symptoms known. May cause discomfort if swallowed.

Skin Contact
Prolonged contact may cause dryness of the skin.

Eye contact
No specific symptoms known. May be slightly irritating to eyes.

Route of entry
Ingestion Inhalation Skin and/or eye contact

Target Organs
No specific target organs known.

12. Ecological Information

Ecotoxicity
Not regarded as dangerous for the environment. However, large or frequent spills may have hazardous effects on the environment.

Toxicity
Based on available data the classification criteria are not met.

Persistence and degradability
The degradability of the product is not known.

Bioaccumulative Potential
No data available on bioaccumulation.

Partition coefficient
Not applicable.
Hafnium (pieces)

Mobility in soil

Mobility
No data available.

Other adverse effects
None known.

13. Disposal considerations

Waste treatment methods

General information
The generation of waste should be minimized or avoided wherever possible. Reuse or recycle products wherever possible. This material and its container must be disposed of in a safe way.

Disposal methods
Dispose of surplus products and those that cannot be recycled via a licensed waste disposal contractor. Waste packaging should be collected for reuse or recycling. Incineration or landfill should only be considered when recycling is not feasible. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of the local water authority.

14. Transport information

General
The product is not covered by international regulations on the transport of dangerous goods (IMDG, IATA, DoT).

UN Number
Not applicable.

UN proper shipping name
Not applicable.

Transport hazard class(es)
No transport warning sign required.

Packing group
Not applicable.

Environmental hazards
Environmentally Hazardous Substance
No.

Special precautions for user
Not applicable.

Transport in bulk according to
Annex II of MARPOL 73/78 and the IBC Code
Not applicable.

15. Regulatory information

US Federal Regulations

SARA Section 302 Extremely Hazardous Substances Tier II Threshold Planning Quantities
None of the ingredients are listed or exempt.

CERCLA/Superfund, Hazardous Substances/Reportable Quantities (EPA)
None of the ingredients are listed or exempt.
Hafnium (pieces)

SARA Extremely Hazardous Substances EPCRA Reportable Quantities
None of the ingredients are listed or exempt.

SARA 313 Emission Reporting
None of the ingredients are listed or exempt.

CAA Accidental Release Prevention
None of the ingredients are listed or exempt.

FDA - Essential Chemical
None of the ingredients are listed or exempt.

FDA - Precursor Chemical
None of the ingredients are listed or exempt.

SARA (311/312) Hazard Categories
None of the ingredients are listed or exempt.

OSHA Highly Hazardous Chemicals
None of the ingredients are listed or exempt.

US State Regulations
California Proposition 65 Carcinogens and Reproductive Toxins
None of the ingredients are listed or exempt.

California Air Toxics "Hot Spots" (A-I)
None of the ingredients are listed or exempt.

California Air Toxics "Hot Spots" (A-II)
None of the ingredients are listed or exempt.

California Directors List of Hazardous Substances
None of the ingredients are listed or exempt.

Massachusetts "Right To Know" List
None of the ingredients are listed or exempt.

Rhode Island "Right To Know" List
Yes

Minnesota "Right To Know" List
None of the ingredients are listed or exempt.

New Jersey "Right To Know" List
Yes

Pennsylvania "Right To Know" List
Yes

Inventories
US - TSCA
All the ingredients are listed or exempt.

US - TSCA 12(b) Export Notification
None of the ingredients are listed or exempt.
Hafnium (pieces)

Philippines - PICCS
All the ingredients are listed or exempt.

New Zealand - NZIOC
All the ingredients are listed or exempt.

16. Other Information

Training advice
Only trained personnel should use this material.

Revision comments
NOTE: Lines within the margin indicate significant changes from the previous revision.

Issued by
HS&E Manager.

Revision date
3/16/2017

Revision
5

Supersedes date
11/24/2015

SDS No.
4669

SDS status
Approved.

End of SDS

This 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. Such information is, to the best of the company's knowledge and belief, accurate and reliable as of the date indicated. However, no warranty, guarantee or representation is made to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability of such information for his own particular use.