SAFETY DATA SHEET

Issue Date 28-May-2015 **Revision Date** 10-Apr-2019 **Version 4**

Section 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product Code SAC023
Product Name Hafnium Powder and Fines

UN/ID no 3089
Synonyms Hafnium metal, dry. (Product #403)

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

Recommended Use Alloy product manufacture

Uses advised against

1.3. Details of the supplier of the safety data sheet

Manufacturer
ATI, 1000 Six PPG Place, Pittsburgh, PA 15222 USA

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1.4. Emergency telephone number

Emergency Telephone Chemtrec: +1-703-741-5970

Section 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Regulation (EC) No 1272/2008

Flammable solids	Category 1

2.2. Label elements

Emergency Overview

Danger

Hazard statements
Flammable solids

Appearance Powder **Physical state** Solid **Odour** Odourless

Precautionary Statements - Prevention

Wear protective gloves/protective clothing/eye protection
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
If dust clouds can occur, use explosion-proof electrical/ ventilating/lighting/equipment

Precautionary Statements - Response
In case of fire: Use salt (NaCl) or class D dry powder for extinction

2.3 Hazards not otherwise classified (HNOC)
Not applicable
Other Information
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Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms Hafnium metal, dry. (Product #403).

Chemical Name	EC No	CAS No	Weight-%
Hafnium	231-166-4	7440-58-6	97- >99
Zirconium	231-176-9	7440-67-7	0-3

Section 4: FIRST AID MEASURES

4.1. Description of first aid measures

Inhalation If excessive amounts of smoke, fume, or particulate are inhaled during processing, remove to fresh air and consult a qualified health professional.

Skin Contact None under normal use conditions.

Eye contact In the case of particles coming in contact with eyes during processing, treat as with any foreign object.

Ingestion IF SWALLOWED. Call a POISON CENTER or doctor/physician if you feel unwell.

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

Symptoms None anticipated.

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

Note to doctors Treat symptomatically.

Section 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing media
Isolate large fires and allow to burn out. Smother small fires with salt (NaCl) or class D dry powder fire extinguisher.

Unsuitable extinguishing media
Do not spray water on burning metal as an explosion may occur. This explosive characteristic is caused by the hydrogen and steam generated by the reaction of water with the burning material

5.2. Special hazards arising from the substance or mixture

Intense heat. Very fine, high surface area material resulting from processing this product may ignite spontaneously at room temperature. WARNING: Fine particles of this product may form combustible dust-air mixtures. Keep particles away from all ignition sources including heat, sparks, and flame. Prevent dust accumulations to minimise combustible dust hazard

Hazardous combustion products Not applicable.

5.3. Advice for firefighters

Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear.

Section 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions
Use personal protective equipment as required.

For emergency responders
Use personal protective equipment as required. Follow Emergency Response Guidebook, Guide No. 170.

6.2. Environmental precautions

Collect spillage to prevent release to the environment.

6.3. Methods and material for containment and cleaning up

Methods for containment	Prevent further leakage or spillage if safe to do so.
Methods for cleaning up	Sweep or shovel material into dry containers using non-sparking tools. Avoid creating uncontrolled dust.

6.4. Reference to other sections

See Section 12: ECOLOGICAL INFORMATION.

Section 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Advice on safe handling
Intense heat. Very fine, high surface area material resulting from grinding, buffing, polishing, or similar processes of this product may ignite spontaneously at room temperature. WARNING: Fine particles of this product may form combustible dust-air mixtures. Keep particles away from all ignition sources including heat, sparks, and flame. Prevent dust accumulations to minimise combustible dust hazard.

General Hygiene Considerations
Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Conditions
Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). For long-term storage, keep sealed in argon-filled steel drums.

Incompatible materials
Dissolves in hydrofluoric acid. Ignites in the presence of fluorine. When heated above 200°C, reacts exothermically with the following. Chlorine, bromine, halocarbons, carbon tetrachloride, carbon tetrafluoride, and freon.

7.3. Specific end use(s)

Risk Management Methods (RMM)
The information required is contained in this Safety Data Sheet.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Chemical Name	European Union	United Kingdom	France	Spain	Germany
Hafnium 7440-58-6	-	-	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³	-
Zirconium 7440-67-7	-	TWA: 5 mg/m³	-	STEL: 10 mg/m³ TWA: 5 mg/m³	TWA: 1 mg/m³ Ceiling / Peak: 1 mg/m³
Chemical Name	**Italy**	**Portugal**	**Netherlands**	**Finland**	**Denmark**
Hafnium 7440-58-6	-	TWA: 0.5 mg/m³	-	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³
Zirconium 7440-67-7	-	STEL: 10 mg/m³ TWA: 5 mg/m³	-	TWA: 1 mg/m³	TWA: 5 mg/m³
Chemical Name	**Austria**	**Switzerland**	**Poland**	**Norway**	**Ireland**
Hafnium 7440-58-6	STEL 5 mg/m³ TWA: 0.5 mg/m³	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³ STEL: 1.5 mg/m³	TWA: 0.5 mg/m³ STEL: 1.5 mg/m³
Zirconium 7440-67-7	TWA: 5 mg/m³	TWA: 5 mg/m³	STEL: 10 mg/m³ TWA: 5 mg/m³	TWA: 5 mg/m³ STEL: 10 mg/m³	TWA: 5 mg/m³ STEL: 10 mg/m³

Derived No Effect Level (DNEL) .

Oral 5.5 mg/kg bw/day

Dermal 11 mg/kg bw/day

Inhalation 5 mg/m³

Predicted No Effect Concentration (PNEC) .

Fresh Water 74 ug/L

Sea Water 7.4 ug/L

8.2. Exposure controls

Engineering Controls Avoid generation of uncontrolled particles.

Personal protective equipment

Eye/face protection When airborne particles may be present, appropriate eye protection is recommended. For example, tight-fitting goggles, foam-lined safety glasses or other protective equipment that shield the eyes from particles.

Skin and body protection Fire/flame resistant/retardant clothing may be appropriate during hot work with the product.

Respiratory protection When particulates/fumes/gases are generated and if exposure limits are exceeded or irritation is experienced, proper approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminate concentrations. Respiratory protection must be provided in accordance with current local regulations.

Environmental exposure controls Section 6: ACCIDENTAL RELEASE MEASURES.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Physical state	Solid		
Appearance	Powder	**Odour**	Odourless
Colour	metallic grey or Silver	**Odour threshold**	Not applicable

Property	Values	Remarks • Method
pH	-	Not applicable
Melting point/freezing point	2227 °C / 4050 °F	
Boiling point / boiling range	-	
Flash point	-	
Evaporation rate	-	Not applicable
Flammability (solid, gas)	-	Flammable
Flammability Limit in Air		
Upper flammability limit:		-
Lower flammability limit		-
Vapour pressure	-	Not applicable
Vapour density	-	Not applicable
Specific Gravity	13.3	
Water solubility	Insoluble	
Solubility(ies)		
Partition coefficient	-	Not applicable
Autoignition temperature	-	Not applicable
Decomposition temperature	-	Not applicable
Kinematic viscosity	-	Not applicable
Dynamic viscosity	-	Not applicable
Explosive properties	Not applicable	
Oxidising properties	Not applicable	

9.2. Other information

Softening point	-
Molecular weight	-
VOC Content (%)	Not applicable
Density	-
Bulk density	220-380 lb/ft3

Section 10: STABILITY AND REACTIVITY

10.1. Reactivity

Not applicable .

10.2. Chemical stability

Stable under normal conditions.

Explosion data

Sensitivity to Mechanical Impact	None.
Sensitivity to Static Discharge	May be ignited by heat, sparks or flames.

10.3. Possibility of hazardous reactions

Hazardous polymerisation
Hazardous polymerisation does not occur.

Possibility of Hazardous Reactions
None under normal processing.

10.4. Conditions to avoid

Dust formation and dust accumulation.

10.5. Incompatible materials

Dissolves in hydrofluoric acid. Ignites in the presence of fluorine. When heated above 200°C, reacts exothermically with the following. Chlorine, bromine, halocarbons, carbon tetrachloride, carbon tetrafluoride, and freon.

10.6. Hazardous decomposition products

Not applicable.

Section 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information

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Inhalation Product not classified.
Eye contact Product not classified.
Skin Contact Product not classified.
Ingestion Product not classified.

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Hafnium	> 5000 mg/kg bw	-	>4.3mg/L
Zirconium	5000 mg/kg bw	-	>4.3 mg/L

Information on toxicological effects

Symptoms None known.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Acute toxicity Product not classified.

Skin corrosion/irritation Product not classified.

Serious eye damage/eye irritation Product not classified.

Sensitisation Product not classified.

Germ cell mutagenicity Product not classified.

Carcinogenicity Product not classified.

Reproductive toxicity Product not classified.

STOT - single exposure Product not classified.

STOT - repeated exposure Product not classified.

Aspiration hazard Product not classified.

Section 12: ECOLOGICAL INFORMATION

12.1. Toxicity

This product as shipped is not classified for aquatic toxicity

Chemical Name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Hafnium	The 72 h EC50 of hafnium to Pseudokirchneriella subcapitata was great than 8 ug of Hf/L (100% saturated solution).	The 96 h LC50 of Hafnium dioxide in water to Danio rerio was greater than the solubility limit of 0.007 mg Hf/L .	-	The 48 h EC50 of Hafnium dioxide to Daphnia magna was greater than the solubility limit of 0.007 mg Hf/L.
Zirconium	The 14 d NOEC of zirconium dichloride oxide to Chlorella vulgaris was greater than 102.5 mg of Zr/L.	The 96 h LL50 of zirconium to Danio rerio was greater than 74.03 mg/L.	-	The 48 h EC50 of zirconium dioxide to Daphnia magna was greater than 74.03 mg of Zr/L.

12.2. Persistence and degradability

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12.3. Bioaccumulative potential

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12.4. Mobility in soil

12.5. Results of PBT and vPvB assessment

The PBT and vPvB criteria do not apply to inorganic substances.

12.6. Other adverse effects

Section 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from residues/unused products	Disposal should be in accordance with applicable regional, national and local laws and regulations.
Contaminated packaging	Disposal should be in accordance with applicable regional, national and local laws and regulations.

Section 14: TRANSPORT INFORMATION

IMDG

14.1 UN/ID no	3089
14.2 Proper shipping name	Metal powder, flammable, n.o.s. (Hafnium)
14.3 Hazard Class	4.1
14.4 Packing Group	II
14.5 Marine pollutant	Not applicable
14.6 Special Provisions	IB8, IP2, IP4, T3, TP33
14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code	-

RID

14.1 UN/ID no	3089
14.2 Proper shipping name	Metal powder, flammable, n.o.s. (Hafnium)
14.3 Hazard Class	4.1
14.4 Packing Group	II
14.5 Environmental hazard	Not applicable
14.6 Special Provisions	IB8, IP2, IP4, T3, TP33

ADR

14.1 UN/ID no	3089
14.2 Proper shipping name	Metal powder, flammable, n.o.s. (Hafnium)
14.3 Hazard Class	4.1
14.4 Packing Group	II
14.5 Environmental hazard	Not applicable
14.6 Special Provisions	IB8, IP2, IP4, T3, TP33

ICAO (air)

14.1 UN/ID no	3089
14.2 Proper shipping name	Metal powder, flammable, n.o.s. (Hafnium)

14.3 Hazard Class	4.1
14.4 Packing Group	II
14.5 Environmental hazard	Not applicable
14.6 Special Provisions	IB8, IP2, IP4, T3, TP33

IATA

14.1 UN/ID no	3089
14.2 Proper shipping name	Metal powder, flammable, n.o.s. (Hafnium)
14.3 Hazard Class	4.1
14.4 Packing Group	II
Description	-
14.5 Environmental hazard	Not applicable
14.6 Special Provisions	IB8, IP2, IP4, T3, TP33 170
	ERG Code

Section 15: REGULATORY INFORMATION

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

Chemical Name	French RG number	Title
Hafnium 7440-58-6	-	-
Zirconium 7440-67-7	-	-

European Union

Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work

Authorisations and/or restrictions on use:
This product does not contain substances subject to authorisation (Regulation (EC) No. 1907/2006 (REACH), Annex XIV). This product does not contain substances subject to restriction (Regulation (EC) No. 1907/2006 (REACH), Annex XVII).

International Inventories

DSL/NDSL	Complies
EINECS/ELINCS	Complies
ENCS	Complies
IECSC	Complies
KECL	Complies
PICCS	Complies
AICS	Not Listed

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

15.2. Chemical safety assessment

A Chemical Safety Assessment has been carried out for this substance

Section 16: OTHER INFORMATION

Issue Date 28-May-2015

Revision Date	10-Apr-2019
Revision Note	Updated Section(s): 2, 5, 6, 7, 9, 11, 14, 15.

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

Note:
The information provided in this Material 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.

End of Safety Data Sheet

Additional information available from:	Safety data sheets and labels available at ATImetals.com