

SILICA FUME

1. IDENTIFICATION OF MATERIAL AND SUPPLIER

Product Identification

Product Name Silica Fume

Other Names Silica (silicon dioxide); micro silica

Recommended Uses Production of refractories, Portland Cement, ceramics and glass.

Supplier Identification

Company Doral Fused Materials Pty. Ltd.

A.B.N. 62 009 415 025

Address Lot 6 Alumina Road, East Rockingham, Western Australia, 6168
PO Box 84, Rockingham, Western Australia, 6968

Telephone Within Australia (08) 9439 2236

International +61 8 9439 2236

Facsimile Within Australia (08) 9439 2892

International +61 8 9439 2892

E-Mail doral@doral.com.au

Emergency Telephone (24 hours) (08) 9439 2236

International +61 8 9439 2236

2. HAZARD IDENTIFICATION

Not classified as a hazardous substance or dangerous goods by the criteria of the Australian Dangerous Goods Code (ADG code) (1), and the UN Globally Harmonised System of Classification and Labelling of Chemicals (GHS) (2).

Poisons Schedule Not applicable

CLASSIFICATION OF THE SUBSTANCE OR MIXTURE

Labelling according to Safe work Australia Labelling of workplace hazardous chemicals Code of Practice (6)

PRECAUTIONARY STATEMENTS

Prevention

P261 Avoid breathing dust/fume

P264 Wash body and clothing thoroughly after handling

P281 Use personal protective equipment as required

P285 In case of inadequate ventilation wear respiratory protection

Response

P308 If exposed or concerned:

P314 Get medical advice/ attention if you feel unwell

P340 Remove person to fresh air and keep comfortable for breathing

P353 Rinse skin with water/shower

P337 If eye irritation persists:

P338 Remove contact lenses if present and easy to do. Continue rinsing

Disposal

P501 Dispose of contents in accordance with local regulations

Silica Fume SDS

Description

- White powder.
- Odourless.
- Non-flammable.
- Not an explosion hazard.

Contains approximately <0.001 % quartz (crystalline silica) (3) and therefore does not meet the GHS criteria of 0.01%w/w to be considered a carcinogenic

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredients (typical)	CAS Number	Proportion %
Silica (amorphous)	69012-64-2	~ 92.0 (wt.%)
Zirconium dioxide	1314-23-4	~1.0 (wt.%)
Cristobalite	14464-46-1	<0.001 (wt.%)
α -Quartz	14808-60-7	<0.001 (wt.%)
Tridymite	15468-32-3	<0.001 (wt.%)
U (uranium)	7440-61-1	100-150 ppm
Th (thorium)	7440-29-1	20-40 ppm

Silica Fume contains low levels of radionuclides, typically 1-2 becquerel per gram (Bq/g) of uranium-238. It may also contain 1-2 Bq/g of radium-228, 7-8 Bq/g of radium-226 and 8-10 Bq/g of lead-210 (7).

Refer to Section 8 for occupational exposure limits.

4. FIRST AID MEASURES

Inhalation	If excess dust is inhaled, remove to fresh air. To protect rescuer, use a full-face Class P2 particulate respirator or air-line respirator where an inhalation risk exists (see Section 8). Apply artificial respiration if not breathing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. Seek medical advice.
Ingestion	Rinse mouth with water. Give plenty of water to drink. Do <u>not</u> induce vomiting. If vomiting occurs give further water. Seek medical advice.
Eye contact	Irrigate eyes gently with copious quantities of water for 15 minutes. In all cases of eye contamination seek medical advice, especially if irritation persists.
Skin contact	If skin contact occurs, remove contaminated clothing and wash affected skin thoroughly with soap and water. If irritation occurs seek medical advice.
Notes to physician	Treat symptomatically.
First Aid Facilities	Eye wash facilities should be available close to the work area.

5. FIRE FIGHTING MEASURES

Specific hazards	Non-flammable, no risk of explosion, non-self-heating solid under the UN GHS (2).
Extinguishing	Fight fires with reference to the surrounding materials.
UN Number	-
Hazchem Code	-
Incineration	The sample should not be considered as a flammable solid.

6. ACCIDENTAL RELEASE MEASURES

Spillage	Ensure spilt material is collected using sweeping up or vacuuming, bulk volumes may require the use of mobile equipment. Collect all material in suitable containers and label appropriately, return to supplier if not useable. Avoid contaminating drains, sewers and waterways. Use dust suppression such as water to minimise dust generation.
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PPE	Wear PPE as for normal handling (see Section 7).
Disposal	Disposal to an approved landfill site and covering with clean fill shall be conducted in accordance with State/Local Council regulations.

7. HANDLING AND STORAGE

Handling	Carefully read the product label or other instructions prior to use. Avoid generating dust, ensure dust suppression techniques are used. Safe work practices should be employed to avoid eye or skin contact and inhalation: avoid breathing dust. Observe good personal hygiene, including thoroughly washing hands and face after handling. All eating, drinking and smoking should be prohibited in work areas. For a sealed container it is recommended that the doors be open for a minimum 1 hour prior to unstuffing.
Storage	Avoid generating dust and consider dust suppression techniques to control dust if required. Store in a dry, well ventilated area, and away from hydrofluoric acid. Ensure product is adequately labelled when stored in designated area. Store away from frequently occupied workplaces.
PPE	Suitable dust controls, including dust extraction and/or wearing a suitable P2 respirator, should be utilised when handling bulk materials. Avoid contact with skin, wear suitable gloves and long sleeved clothing.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

National Occupational Exposure Limits (OELs)

Values assigned for this material by Safe Work Australia (SWA) (8) and are provided in the Table below.

Chemical Name	CAS Number	Proportion (wt %)	OEL TWA
Silica (amorphous)	69012-64-2	~ 92.0	2.0 mg/m ³
Zirconium dioxide	1314-23-4	~1.0	5 mg/m ³ as Zr
Cristobalite	14464-46-1	<0.001	0.05mg/m ³
α Quartz	14808-60-7	<0.001	0.05mg/m ³
Tridymite	15468-32-3	<0.001	0.05mg/m ³
Uranium	7440-61-1	100-150 ppm	0.2 mg/m ³
Thorium	7440-29-1	20-40 ppm	-

Radiation Exposure

Occupational exposure should be as low as reasonably achievable, (ALARA principle), but should not exceed a total of 100 milliSieverts over five consecutive years (9). When safe handling practices are followed radiation exposure of workers is unlikely to exceed one half of the dose limit for the members of the general public given in the IAEA BSS (2014) – 0.5 mSv/year. Blends containing more than 2.5% of Silica Fume are not to be used in inhabited buildings (10). Due to the potential presence of radon in a sealed container it is advised the container is ventilated prior to unloading by keeping the doors open for approximately 1 hour before unstuffing.

ENGINEERING MEASURES

Ensure ventilation is adequate and that air concentrations of components are controlled below OELs.

PERSONAL PROTECTION EQUIPMENT

The selection of PPE is dependent on a detailed site specific risk assessment. The risk assessment should consider the work situation, the physical form of the material, the handling methods, and environmental factors.

Eye	Wear safety glasses/goggles to avoid eye contact.
Skin Protection	Wear appropriate work clothing or overalls and gloves to avoid prolonged direct skin contact.
Respiratory Protection	Avoid generating and inhaling dusts. If dust exists, wear dust respirator in alignment with AS/NZS 1715 (11) and meeting the requirements of AS/NZS 1716(12). Use AS/NZS approved respiratory protection as specified by an Industrial Hygienist or other qualified

professional. For example, a Class P2 or P3 particulate respirator may be worn where dust may be generated, with the workplace atmospheric concentration determined by the occupational hygienist. Where gases may be present then gas filter cartridge for acid gases should be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	White amorphous powder
Boiling Point	Not Applicable
Melting Point	1720 °C
Vapour Pressure	Not Applicable
Specific Gravity	2.5
Flashpoint	Not Applicable
Flammability Limits	Non-flammable
Solubility	Insoluble in water, soluble in concentrated acids and alkalis
Bulk Density	200 - 300 kg/m ³
pH	2 - 4 (10 wt.% in distilled water)
Reactivity	Reacts with hydrofluoric acid (HF) to produce toxic, gaseous silicon tetrafluoride (SiF ₄)

10. STABILITY AND REACTIVITY

Stability	Stable under normal conditions of use, storage, and transportation as shipped, according to the ADG (1) and UN GHS (2).
Conditions to Avoid	None in normal or expected use.
Hazardous Reaction	May evolve toxic gases (SiF ₄) if it reacts with HF. Otherwise inert.
Decomposition	Decomposition will not occur.

11. TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS OF AMORPHOUS SILICA FUME

Inhalation	Inhalation irritant. Over exposure to dust or fumes may result in irritation of the nose and throat with ulceration of the nasal septum. Could also cause flu-like symptoms: headache, fever, chills, aches and chest-tightness (13). Repeated exposure to amorphous silica fume can lead to lung fibrosis (13)
Eye	Low to moderate irritant. Contact may result in irritation, lacrimation, pain and redness. Repeated exposure can damage the eyes.
Skin	Irritant. Contact may result in irritation, redness and rash. May cause discolouration of the skin.
Ingestion	Moderate toxicity. Ingestion may result in nausea, vomiting, abdominal pain and diarrhoea. Ingestion of large quantities may result in liver, kidney and blood damage. Ingestion is considered unlikely due to product form.

AVAILABLE TOXICITY DATA

Amorphous Silica fume

IARC (14) has classified inhaled amorphous silica fume as a Group 3 - not classifiable as to its carcinogenicity to humans. Lungs, thorax, or respiration show structural or functional change in trachea or bronchi. Biochemical - enzyme inhibition, induction, or change in blood or tissue levels and effect on inflammation (15).

Rat: TCLO, inhalation 5 mg/m³/5 days; intermittent (15).

12. ECOLOGICAL INFORMATION

Silica is not expected to cause environmental damage. It is insoluble in water and is unlikely to contaminate waterways or food chains. However, it was noted that sometimes high concentrations of silica can result in excessive growth of aquatic plants such as phytoplankton, cyanobacteria, macrophytes, seagrasses, and filamentous and attached algae, in a range of ecosystems, fresh and marine (16).

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Excessive amounts of material should not be allowed to enter water systems.

13. DISPOSAL CONSIDERATION

Disposal must be in accordance with Federal, State and Local Council regulations. If approved, silica fume may be transferred to an approved landfill site, this will likely require an application and chemical/physical testing. If the content of silica fume in a blended material exceeds 10%, additional approvals for the disposal may be needed.

Note: Many states apply specific regulations for the disposal of waste containing Naturally Occurring Radioactive Materials (NORM) above background levels. Consult and comply with current regulations.

14. TRANSPORT INFORMATION

Transport of Silica Fume is not regulated since the product is not regarded as a transport hazard. Silica Fume is not classified as radioactive pursuant to paragraph 107 of IAEA SSR-6 (17) Regulations for the Safe Transport of Radioactive Material.

Packaging for transport shall be sufficient to prevent the risk of dust generation and if the material is transported in bulk, trucks should be covered.

15. REGULATORY INFORMATION

Not Classified as hazardous according to criteria for Western Australia (4).

Labelling Labelling required according to Safe Work Australia, 2020 (6).

16. OTHER INFORMATION

This SDS has been prepared by Doral Fused Materials, Safety Health and Environment Department.

This SDS is valid for five (5) years from the date of issue but readers should refer to Doral's website (www.doral.com.au) to ensure that this is the latest issue. Each user should review the information in the specific context of the intended application.

Abbreviations

AS/NZS	Australian Standard / New Zealand Standard
Bq/g	Becquerel per gram
BSS	Basic Safety Standards
IARC	International Agency for Research on Cancer
EC ₅₀	Effective concentration. Represents the concentration of a compound where 50% of its maximal effect is observed.
IAEA	International Atomic Energy Agency
LC ₅₀	Lethal concentration. The concentration of the chemical in air that kills 50% of the test animals during the observation period
LD ₅₀	Lethal dose. LD50 is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals
LD _{Lo}	Lowest published lethal dose
mg/m ³	Milligram per cubic metre
OES	Occupational exposure standard
RNA	Ribonucleic acid
ROS	Reactive oxygen species
SH	Self-heating
STEL	Short term exposure limit
SWA	Safe Work Australia, formerly the Australian Safety and Compensation Council (ASCC) or the National Occupational Health and Safety Commission (NOHSC)
TC _{Lo}	Lowest published toxic concentration
TD _{Lo}	Lowest published toxic dose
TLV	Threshold Limit Value
TWA	Time weighted average

Literary references

- (1) ADG (2020). Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code). Seventh edition, 7.7 update. National Transport Commission. Commonwealth of Australia.
- (2) UN 2015. Globally Harmonized System of Classification and Labelling of Chemicals (GHS), sixth revised edition. United Nations, New York and Geneva.
http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html.
- (3) OHMS Hygiene. Doral Silica Review. P19022LTR001RevB. Commercial in Confidence
- (4) Safe Work Australia 2020. Classifying hazardous chemicals National guide.
https://www.safeworkaustralia.gov.au/sites/default/files/2021-03/classifying_hazardous_chemicals_national_guide.pdf
- (5) Safe Work Australia 2012. Guidance on the classification of hazardous chemicals under the WHS regulations: implementation of the globally harmonised system of classification and labelling of chemicals (GHS).
<http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/682/Classification%20Hazardous%20Chemicals.pdf>
- (6) Safe Work Australia 2020, Labelling of workplace hazardous chemicals Code of Practice.
https://www.safeworkaustralia.gov.au/sites/default/files/2020-09/model_code_of_practice_labelling_of_workplace_hazardous_chemicals.pdf
- (7) Ansto Minerals 2016. Technical Memorandum - Analysis of Zircon Samples. April 2016. Commercial in Confidence
- (8) Safe Work Australia (SWA) Occupational Exposure Limits (OELs) - Hazardous Substance Information System (HSIS): <http://hsis.safeworkaustralia.gov.au/ExposureStandards>
- (9) IAEA 2014. Dose Limits for Planned Exposure Situations, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, General Safety requirements Part 3, International Atomic Energy Agency (IAEA), Vienna, (IAEA BSS)
- (10) DMP (2010). Appendix containing Guidance on NORM Blending, Guideline NORM-4.2 Controlling NORM – management of radioactive waste, Department of Mines and Petroleum of Western Australia
- (11) AS/NZS 1715 2009. Selection, use and maintenance of respiratory protective equipment
- (12) AS/NZS 1716 2012. Respiratory protective devices
- (13) New Jersey Department of Health and Senior Services (2003). Hazardous substance fact sheet – silica, amorphous (fume). <http://nj.gov/health/eoh/rtkweb/documents/fs/1655.pdf>
- (14) IARC (1997) *Silica, some silicates, coal dust and para aramid fibrils*. Lyon, International Agency for Research on Cancer, pp 1-242 (IARC Monographs on the Evaluation of Carcinogenic Risk to Humans, Vol 68).
- (15) Canadian Centre for Occupational Health and Safety. RTECS®: Registry of Toxic Effects of Chemical Substances, <http://www.ccohs.ca/products/rtecs/>.
- (16) ANZECC (2000). Australian and New Zealand guidelines for fresh and marine water quality, 2000. Volume 1, Chapter 3 – Aquatic Ecosystems, Section 3.3.3.2. Agriculture and Resource Management Council of Australia and New Zealand. Australian and New Zealand Environment and Conservation Council.
- (17) IAEA 2018. Regulations for the Safe Transport of Radioactive Material 2018 Edition. IAEA Safety Standards for protecting people and the environment. Specific Safety Requirements No. SSR-6 (Rev.1). https://www-pub.iaea.org/MTCD/Publications/PDF/PUB1798_web.pdf
- (18) Safe Work Australia 2018. Preparation of safety data sheets for hazardous chemicals Code of Practice.
https://www.safeworkaustralia.gov.au/system/files/documents/1902/code_of_practice_preparation_of_safety_data_sheets_for_hazardous_chemicals_0.pdf

Safety data sheets are updated frequently. Please ensure that you have a current copy.

This safety data sheet is maintained by Doral Fused Materials, and summarises at the date of issue our best knowledge of the health and safety hazard information of the product, and in particular how to safely handle and use the product in the workplace. Since Doral Fused Materials cannot anticipate or control the conditions under which the product may be used, each user must, prior to usage, review this SDS in the context of how the user intends to handle and use the product in the workplace.

If clarification or further information is needed to ensure that an appropriate assessment can be made, the user should contact Doral Fused Materials. Our responsibility for products sold is subject to our standard terms and conditions, a copy of which is sent to our customers and is also available upon request.

Revisions

Version	Reason for update	Date	Author
1	First issue of MSDS	10 October 2012	Doral Fused Materials
1.1	5 yearly update	October 2016	Doral Fused Materials
2	SDS update	6 April 2017	OHMS Hygiene P16164LTR001A
3	Radon precaution – s 7 & 8	29 November 2018	Doral Fused Materials
4	5 yearly update	24 August 2021	OHMS Hygiene P2100098RPT002A
5	Update to latest available composition data	18/10/2021	OHMS Hygiene P2100098RPT002B

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