

1. Product Identification

Group 1	Synonym: Yttria Stabilized Zirconia Fiber or Powder Product Product Types: ZYFB-3, ZYFB-6, FBC, FBD, ZG, ZYBF-1, ZYBF-2, ZYBF-3, ZYBF-4, ZYBF-5, ZYW-15, ZYK-15, ZYW-30A, ZYW-15H, ZYK-15H, ZYF-50, ZYF-100, ZYP-30, ZYP-55	Molecular Formula: ZrO ₂ Y ₂ O ₃
Group 2	Synonym: Yttria Stabilized Zirconia Suspension in Water Product Type: Zirconia Rigidizer	Molecular Formula: ZrO ₂ Y ₂ O ₃
Group 3	Synonym: Yttria Stabilized Zirconia Suspension in Water Types: Zirconia Cement	Molecular Formula: ZrO ₂ Y ₂ O ₃ SiO ₂
Group 4	Synonym: Yttria Stabilized Zirconia Fiber Product Product Types: ZYZ-3, ZYZ-6, ZYC	Molecular Formula: ZrO ₂ Y ₂ O ₃ SiO ₂
Group 5	Synonym: Unstabilized Zirconia Product Product Types: ZOG	Molecular Formula: ZrO ₂

2. Composition

Component	Formula	Molecular Weight	CAS Number	% by Weight
Zirconium Oxide	ZrO ₂	123.2188	1314-23-4	85-100
Silica (amorphous)	SiO ₂	60.08	7631-86-9	0-5

Note: Y₂O₃ is in solid solution for stabilization of ZrO₂ and is not considered separately.

3. Physical/Chemical Properties

	Group 1	Group 2	Group 3	Group 4	Group 5
Form	Solid	Liquid	Viscous Liquid	Solid	Solid
Appearance	White: rigid shapes, textile, granular, fiber or powder. ZYBF-1 is white to dark gray	Clear liquid with white suspended or settled solids	White: paste	White: rigid shape	White to off white: granules
Odor	Odorless	Slightly acidic	Slightly acidic	Odorless	Odorless
Solubility in H₂O	Insoluble	Insoluble after drying	Insoluble after drying	Insoluble	Insoluble
S.G.(g/cc)	0.4 to 6	1.9	2.0	0.4- to 0.6	6
Melting Point	>2590° C (4694°F)	>2590° C (4694°F)	>2590° C (4694°F), dried	>2200° C (3992°F)	>2715° C (4919° F)
% Volatile	0	44 wt. % H ₂ O	44 wt. % H ₂ O	0	0
pH	N/A	4	5.4	N/A	N/A

4. Hazard Identification

Target Organs: Skin, eyes, and lungs

Caution: Handling or machining of these products may produce respirable dust particles. Dust may irritate eyes, skin and respiratory tract.

Inhalation: Dust may cause irritation or soreness of throat and nose.

Eye Contact: Dust may cause temporary irritation or inflammation.

Skin Contact: May cause temporary dryness, irritation or rash.

Ingestion: Ingestion is unlikely. May cause gastrointestinal disturbances. Never induce vomiting without the advise of a physician.

Medical Conditions Aggravated by Exposure: Respiratory effects may be aggravated by smoking. Pre-existing respiratory problems may be aggravated by dust.

5. Exposure Guidelines

Zirconium Oxide	
OSHA PEL as 8 hr TWA	5mg/m ³
NIOSH PEL as 8 hr TWA	5mg/m ³
ACGIH PEL as 8 hr TWA	5mg/m ³
Canadian PEL as 8 hr TWA	5mg/m ³
NIOSH STEL as 8 hr TWA	10mg/m ³
ACGIL STEL as 8 hr TWA	10mg/m ³
Canadian STEL as 8 hr TWA	10mg/m ³
ILDH Level by SCPC	50mg/m ³
Carcinogenicity by ACGIH	Group A4, not classifiable as a human carcinogen
Silica (amorphous)	
OSHA PEL as 8 hr TWA	20 mppcfa, 80mg/m ³
NIOSH PEL as 8 hr TWA	6mg/m ³
Canadian PEL as 8 hr TWA	5/2mg/m ³ Total Mass/ Respirable Mass
ILDH Level by SCPC	3000mg/m ³
Carcinogenicity by ACGIH	Groups 3 and 4

MATERIAL SAFETY DATA SHEET

6. Exposure Controls

Engineering Controls: Use dust suppression. Local exhaust ventilation, point of generation dust collection, and/or down-draft work stations to minimize airborne dust generation is recommended when machining product.

Respiratory Protection: Use appropriate protection pursuant to OSHA 29CFR 1910.134 and 29CFR 1926.103. The following information is provided as a guide and reflects industry recommendations for control of dust:

PPE < 1.0 f/cc: No specific recommendation, use personal protective equipment based on local conditions.

PPE 1.0 f/cc to 5.0 f/cc: Half-face, air purifying respirator equipped with a high efficiency particulate air (HEPA) filter cartridge.

PPE 5.0 to 25 f/cc: Full-face, air purifying respirator equipped with a high-efficiency particulate air (HEPA) filter cartridge.

PPE > 25 f/cc: Full-face, positive pressure, supplied air respirator

PPE Other: Work clothes should be washed separately and the washing machine rinsed following use. If possible, do not take work clothes home following machining or removal activities that produce significant amounts of dust.

Skin Protection: Wear gloves and full body clothing to prevent skin irritation. Store work clothes and street clothes separately.

Eye Protection: Wear safety glasses or goggles. Do not wear contact lenses without goggles. Do not get into eyes. Have eye wash available.

Note: These products are generally not hazardous during normal use. These guidelines are provided for special circumstances involved in machining, use and / or after service removals.

7. First Aid

Inhalation: Remove to fresh air. Rinse mouth to clear throat and expel liquid. Blow nose to evacuate dust. Consult a physician if irritation persists.

Eye Contact: Do not rub eyes. Keep hands or contaminated body parts away from eyes. Remove contact lenses. Flush with water. If irritation persists, consult a physician.

Skin Contact: Wash with soap and water. For dryness, a skin cream may be helpful. Do not apply anything to a rash. Consult a physician if irritation persists.

Ingestion: Do not induce vomiting without advice of a physician. Seek medical attention.

8. Fire Fighting Measures: Materials are not combustible.

9. Accidental Release Measures

Spill Procedures: Clean up procedures should minimize formation of airborne dusts. Remove dust by vacuuming using HEPA filtration where possible. Liquid and moist products (groups 2 & 3) should be cleaned up with sponge, mop or cloth.

Release into Air: Prevent release of airborne particulates where possible. Not a regulated hazardous substance.

Release into Water: Release into water is not appropriate. Not a regulated hazardous substance. Landfill dusts and debris consistent with local regulations.

10. Handling & Storage:

Storage: These materials are stable and may be stored indefinitely. Physical abrasion may produce small amounts of respirable dusts. Liquid and moist products (groups 2 & 3) should be stored in a sealed container.

Normal Use: Materials are stable under normal use and are not expected to produce significant hazardous by-products or emissions.

Machining and Cutting: These materials may produce respirable and nuisance dusts when machined or cut.

High Temperature Conditions: Service significantly above the product design temperature may increase friability and the possibility of generating airborne fibers or particulates. While not considered problematic during use, airborne fibers may complicate removal activities. It is recommended that product use be carefully matched to design parameters.

After Service: Product removal must consider the possibility of usage above design temperatures.

11. Stability & Reactivity

Stability: Materials are stable.

Chemical Incompatibilities: Powerful oxidizers; fluorine, chlorine trifluoride, manganese trioxide, oxygen difluoride, etc.

Hazardous Decomposition Products: None.

12. Disposal Information

Disposal: Consult with local, state and federal regulations. In most cases these materials may be land filled safely.

Hazardous Waste Classification: Not listed as a RCRA Hazardous Waste (40 CFR 261.31). Not listed under SARA, CERCLA, or the Clean Air Act.

Empty Containers: Empty containers may contain product dust or residue. Do not re-use. Disposal regulations vary. Consult with all applicable regulations prior to disposal.

13. Transportation Information: Not regulated hazardous substances, no specific regulations apply

14. Toxicology & Ecological Information

Toxicological Information: No Information available

Epidemiology: No Information Available

Distribution: Zirconia and silica are naturally occurring and are widely distributed in igneous rock. Deposits in sedimentary rock may be found.

Chemical Fate Information: The relative inertness of this material indicate that it may be highly persistent in the environment. No information regarding any negative effects of this persistence has been noted.

15. Regulatory Information

Regulated Constituent: Silica (amorphous)

Mass. CENTER to Know: none

N.J. CENTER to Know: listed

Regulated Constituent: Zirconium Oxide

Mass. CENTER to Know: listed

N.J. CENTER to Know: none

New Jersey CENTER to Know Note: The listed substance is found on the New Jersey Hazardous substance list and is subject to reporting under SARA and the New Jersey Worker and Community CENTER to Know Act.

Mass. CENTER to Know Note: Items on the Massachusetts List of Hazardous Substances require specific hazard labeling in the workplace.

WHMIS Status: (Groups 1 and 4) This is a Class D2 controlled product based on an IARC 2B Classification for ceramic fibers.

California Proposition 65: (Groups 1 and 4) On July 1, 1990 the state of California added "ceramic fibers (airborne particles of respirable size)" to the list of Proposition 65 chemicals which are "known to cause cancer" by the state. Proposition 65 lists all substances classified by the IARC as a Category 1, 2A or 2B carcinogen.

After Service Information: (Groups 3 and 4) Precautions to be taken after service and upon removal: As manufactured this product may contain silica in the form of Zircon, ZrSiO₂. Upon heat treatment (temperatures greater than 1000 deg. C for extended periods of time), cristobalite, as form of crystalline silica, may form from the decomposition of Zircon and the devitrification of amorphous silica. Removal of this product after use may generate dust. Prolonged or repeated inhalation of respirable free crystalline silica dust may cause delayed lung injury. (silicosis). The IARC has classified crystalline silica as group 2A, probable human carcinogen. There is sufficient evidence of carcinogenicity in animals, but limited evidence in humans. The recommended TLV for respirable cristobalite is 0.05 mg/m³. Appropriate ventilation and respiratory protection should be provided in compliance with OSHA standards. Strict adherence to recommended safe work practices is advised.

SARA Section 313 Supplier Notification: This product does not contain toxic chemicals subject to the reporting requirements of the Superfund Amendments and Reauthorization Act of 1986 Section 313 (40 CFR 372).

TSCA Statement: All ingredients are listed in the TSCA Inventory.

16. Other: The information contained herein is based on data considered to be accurate as of the preparation or revision date. It is provided in good faith and in compliance with state and federal regulations. No warranty or representation, express or implied is made as to the accuracy or completeness of this information. Other national, state and/or local regulations may apply.