

# SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, European Union CLP EC 1272/2008, REACH, Australian WorkSafe, the Japanese Industrial Standard JIS Z 7250: 2000, the Korean ISHA (Notice 2009-68), Mexican Workplace Regulations (NOM-018-STPS-2000), New Zealand HNSO and the Global Harmonization Standard

## 1. SECTION – IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

### PRODUCT NAME: FIRED CORE PRODUCTS

#### IDENTIFICATION OF THE MIXTURE:

**PRODUCT NAMES COVERED BY THIS SDS:** 121A Core Material, PA-21 Alumina Coated Core Material, D-100 Core Material, D-100 Cobalt Core Material, D-200 Core Material, D-210 Core Material, D-300 Core Material, D-300 S2 Core Material, D-400 Core Material, D-500 Core Material; K13; EC3 < 0.250; EC3 0.250-0.500; EC3 > 0.500; EC3F; EC7; EC3G2 < 0.150; EC3G2 > 1.50; EC3 < 0.250 with Cobalt; EC3 0.250-0.500 with Cobalt; EC3 0.500 with Cobalt; EC3FB EC5 and EC5 < 0.275

**CHEMICAL NAME/CLASS:** Resin-Coated Solid Ceramic

**RELEVANT USES of the PRODUCT:** Investment Casting

**USES ADVISED AGAINST:** Other than Relevant Use

#### COMPANY/UNDERTAKING IDENTIFICATION:

**U.S. MANUFACTURER'S NAME:** DAI Ceramics, Inc.

**ADDRESS:** 38240 Airport Parkway  
Willoughby, OH 44094 USA

**U.S. BUSINESS PHONE:** 1-440-946-6964 [8:00 am to 5:00 pm EST]

**U.S. FAX PHONE:** 1-440-951-2106

**EMERGENCY PHONE:** Chemtel: 1-800-255-3924 (from U.S., Canada, Puerto Rico and U.S. Virgin Islands  
+1-813-248-0585 (outside North America)

**EMAIL ADDRESS FOR PRODUCT & SDS INFORMATION:** sales@daiceramics.com

**DATE OF PREPARATION:** November 10, 2010

**DATE OF REVISION:** August 16, 2014

**NOTE:** These products are defined as "Article" under the U.S. Federal OSHA Hazard Communication Standard (29 CFR 1910.1200), EU Directives through EC 1907: 2006, the European Union CLP EC 1272/2008, Australian [NOHSC:2011 (2003)], and Japanese Industrial Standard (JIS Z 7250: 2000) and the Global Harmonization Standard. Refer to Section 15 (Regulatory Information) for specific regulatory citations. As an article, these products present negligible health and physical hazards under reasonably anticipated circumstances of use. Subsequently, a Material Safety Data Sheet is not required under Standards cited above. This document is prepared to provide persons using these products with additional safety information.

## 2. HAZARD IDENTIFICATION

**GLOBAL HARMONIZATION AND EU CLP REGULATION (EC) 1272/2008 LABELING AND CLASSIFICATION:** These products are articles and are not required to be classified under CLP Regulation (EC) 1272/2008. For additional information on classification under (67/548/EEC), see below.

**EU 67/548/EEC LABELING/CLASSIFICATION:** These products are articles and have no requirements under European Union Council Directive 67/548/EEC and subsequent Directives

**KOREAN ISHA (Notice 2009-68) LABELING AND CLASSIFICATION:** These products are articles and have no requirements under the regulation.

**NEW ZEALAND HAZARDOUS SUBSTANCES and NEW ORGANISMS ACT (HNSO) CHEMICAL CLASSIFICATION (COP 8-1 09-06):** These products are articles and have no requirements under the regulation.

**EMERGENCY OVERVIEW: Product Description:** These products are resin-coated, pale yellow-colored solids in formed, block form. The PA-21 Alumina Coated Fired Core product is purple in color. The D-100 Cobalt Fired Core product is blue in color. **Health Hazards:** These products are considered a manufactured article and present negligible health, or reactivity hazards under typical use conditions. Mishandling of the product may result in abrasion. If end-use produces dust, inhalation of dusts may irritate the nose, throat, and respiratory system. Dusts or particulates may irritate the eyes (as foreign particles). If heated, burns may occur from hot product. Repeated inhalation of dust or particulates from these products may cause silicosis and reduced lung function. The Phenolic Resin component of this product contains formaldehyde. Formaldehyde is a known human carcinogen, known skin sensitizer and respiratory sensitizer and reproductive toxin. Normal handling should not result in exposure to formaldehyde. In event these products are heated, causing decomposition of the resin and evolution of formaldehyde fumes, exposure to formaldehyde may be possible. **Flammability Hazards:** These products are not flammable. The products are designed to withstand high temperatures and should not produce any toxic decomposition products unless heated above 1538°C (2800°F) for prolonged periods. Above this temperature they may produce carbon, magnesium, silicon, alumina, cobalt and zirconium oxides and silicates, formaldehyde, formic acid, acetone, methanol, aldehydes, ketones and acids, 2,4-dimethyl-1-heptene, 2-pentene, propylene, 2-methyl-1-pentene, and isobutylene. **Reactivity Hazards:** These products are not reactive. **Environmental Hazards:** These products do not present any hazard to the environment. **Emergency Response Procedures:** Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding.

### 3. COMPOSITION and INFORMATION ON INGREDIENTS

Chemical Name	CAS #	EINECS or ELNICS #	Japanese ENCS #	Korean ECL #	Australian AICS	New Zealand NZIoC	WT%	LABEL ELEMENTS EU Classification (67/548/EEC) GHS & EU Classification (1272/2008) Korean ISHA Classification Risk Phrases/Hazard & Precautionary Statements	
Proprietary Fused Silicon Dioxide Not in K-13, EC5, EC5 or EC7 products		Listed	Not Listed	Listed	Listed	May be used as a single component chemical under an appropriate group standard	0-99%	SELF-CLASSIFICATION EU 67/548: Classification: Not Applicable GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Not Applicable	
Proprietary Zirconium Silicate Not in D-100 Cobalt, D-200, D-210, D-500		Listed	Not Listed	Listed	Listed	May be used as a single component chemical under an appropriate group standard	0-80%	SELF-CLASSIFICATION EU 67/548: Classification: Harmful Risk Phrase Codes: R42 GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Respiratory Sensitization Cat. 1 Hazard Statement Codes: H334	
Proprietary Zirconium Orthosilicate Only in EC3, EC5, EC7 products		Listed	Listed	Listed	Listed	May be used as a component in a product covered by a group standard but it is not approved for use as a chemical in its own right.	0-30%	SELF-CLASSIFICATION EU 67/548: Classification: Harmful Risk Phrase Codes: R42 GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Respiratory Sensitization Cat. 1 Hazard Statement Codes: H334	
Crystalline Silica Quartz	14808-60-7	238-878-4	1-548	KE-29983	Listed	HSR003125	0.1-20%	SELF CLASSIFICATION EU 67/548 Classification: Carcinogenic Cat. 2, Harmful Risk Phrase Codes: R45, R48/20 GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Carcinogenic Cat. 1B, STOT (Inhalation-Lungs) RE Cat. 2 Hazard Statement Codes: H351i, H373	
Proprietary Quartz Not in K-13, EC3, EC5 or EC7 products		Not Listed	Not Listed	Not Listed	Listed	May be used as a single component chemical under an appropriate group standard	0-25%	SELF-CLASSIFICATION EU 67/548: Classification: Not Applicable GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Not Applicable	
Proprietary Silicon Dioxide Aqueous Solution Only in EC3, EC5, EC7 products		Listed	Listed	Listed	Listed	May be used as a single component chemical under an appropriate group standard.	0-10%	SELF-CLASSIFICATION EU 67/548: Classification: Not Applicable GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Not Applicable	
Proprietary Aluminum Silicate (Bentonite) Only in EC3, EC5, EC7 products		Listed	Excepted as Mineral	Listed	Listed	May be used as a component in a product covered by a group standard but it is not approved for use as a chemical in its own right.	0-5%	SELF CLASSIFICATION EU 67/548 Classification: Harmful Risk Phrase Codes: R48/20 GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: STOT (Inhalation-Lungs) RE Cat. 2 Hazard Statement Codes: H373	
Proprietary Aluminum Oxide Not in PA-21, D-100, D-300, EC3, K-13, EC5 or EC7 products		Listed	Listed	Listed	Listed	May be used as a single component chemical under an appropriate group standard	0-3%	SELF-CLASSIFICATION EU 67/548: Classification: Not Applicable GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Not Applicable	
Proprietary Organic Solid Only in K-13, EC3, EC5, EC7 products		Not Applicable						0-5%	SELF-CLASSIFICATION EU 67/548: Classification: Not Applicable GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Not Applicable
Proprietary Clay Compound		Not Listed	Excepted as Mineral	Not listed	Not Listed	Not Listed	0-5%	SELF-CLASSIFICATION EU 67/548: Classification: Not Applicable GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Not Applicable	
Proprietary Cobalt Compound Only in D-100 Cobalt product		Listed	Not Listed	Listed	Listed	May be used as a single component chemical under an appropriate group standard	0-5%	SELF-CLASSIFICATION EU 67/548: Classification: Harmful Risk Phrase Codes: R43 GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Skin Sensitization Cat. 1 Hazard Statement Codes: H317	
Proprietary Starch Only in EC3G2 Products		Listed	Listed	Listed	Listed	May be used as a single component chemical under an appropriate group standard	0-5%	SELF-CLASSIFICATION EU 67/548: Classification: Not Applicable GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Not Applicable	
Proprietary Magnesium Compound In EC5 only		Listed	Excepted as Mineral	Not listed	Not Listed	May be used as a single component chemical under an appropriate group standard	0-5%	SELF-CLASSIFICATION EU 67/548: Classification: Not Applicable GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Not Applicable	

See Section 16 for full text of Classification

### 3. COMPOSITION and INFORMATION ON INGREDIENTS

Chemical Name	CAS #	EINECS or ELNICS #	Japanese ENCS #	Korean ECL #	Australian AICS	New Zealand NZIoC	WT%	LABEL ELEMENTS EU Classification (67/548/EEC) GHS & EU Classification (1272/2008) Korean ISHA Classification Risk Phrases/Hazard & Precautionary Statements
Proprietary Mica Not in EC3, EC5, EC7 products		Not Listed	Excepted as Mineral	KE-25420 (mica-group minerals)	Listed	Mica-group minerals may be used as a single component chemical under an appropriate group standard	0-3%	SELF CLASSIFICATION EU 67/548 Classification: Harmful Risk Phrase Codes: R48/20 GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: STOT (Inhalation-Lungs) RE Cat. 2 Hazard Statement Codes: H373
Phenolic Resin Coating containing phenol (6-12%) and formaldehyde (1.5%)			Mixture				Trace	SELF-CLASSIFICATION EU 67/548: Classification: Corrosive, Harmful Risk Phrase Codes: R34, R43 GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Skin Corrosion Cat. 1B, Skin Sensitization Cat. 1 Hazard Statement Codes: H314, H317
Other Trace Materials							Balance	SELF-CLASSIFICATION EU 67/548: Classification: Not Applicable GHS & EU CLP 1272/2008, KOREAN ISHA: Classification: Not Applicable.

See Section 16 for full text of Classification

### 4. FIRST-AID MEASURES

**PROTECTION OF FIRST AID RESPONDERS:** Rescuers should be taken for medical attention if necessary. Remove or cover gross contamination to avoid exposure to rescuers.

**DESCRIPTION OF FIRST AID MEASURES:** Persons developing hypersensitivity reactions should receive medical attention. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Take a copy of label and SDS to physician or health professional with the contaminated individual.

**Eye or Skin Contact:** If tissue damage occurs after eye or skin contact, place a sterile bandage over the affected area and contact physician or other medical health professional.

**Inhalation:** If any adverse effect occurs as a result of inhalation of fumes from thermal decomposition or from dusts or particulates generated during handling or use, remove individual to fresh air.

**Ingestion:** Ingestion is not a possible route of exposure for these products.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** No medical conditions are known to be aggravated by these products.

**RECOMMENDATIONS TO PHYSICIANS:** Treat symptoms and eliminate overexposure.

### 5. FIRE-FIGHTING MEASURES

**FLASH POINT:** Not applicable.

**AUTOIGNITION TEMPERATURE:** Not applicable.

**FLAMMABLE LIMITS (in air by volume, %):** Not applicable.

**FIRE EXTINGUISHING MATERIALS:** Use fire extinguishing materials appropriate for surrounding materials.

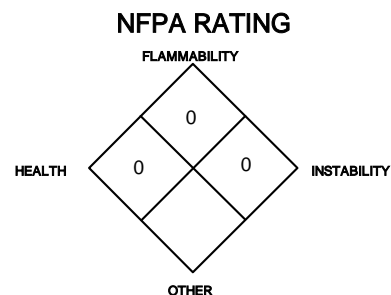
**UNSUITABLE FIRE EXTINGUISHING MATERIALS:** None known.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** These products are designed to withstand high temperatures and should not produce any toxic decomposition products unless heated above 1538°C (2800°F) for prolonged periods. Above this temperature they may produce carbon, magnesium, silicon, alumina, cobalt and zirconium oxides and silicates, formaldehyde, formic acid, acetone, methanol, aldehydes, ketones and acids, 2,4-dimethyl-1-heptene, 2-pentene, propylene, 2-methyl-1-pentene, and isobutylene.

**Explosion Sensitivity to Mechanical Impact:** Not sensitive.

**Explosion Sensitivity to Static Discharge:** Not sensitive.

**SPECIAL FIRE-FIGHTING PROCEDURES:** Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Move containers from fire area if it can be done without risk to personnel.



Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate  
3 = Serious 4 = Severe

### 6. ACCIDENTAL RELEASE MEASURES

**PERSONAL PRECAUTIONS AND EMERGENCY PROCEDURES:** Due to the nature of these products, no special accidental release measures are normally required. Uncontrolled releases involving other materials released near these products should be responded to by appropriately trained personnel using pre-planned procedures.

**PERSONAL PROTECTIVE EQUIPMENT:** Proper protective equipment should be used. Use only non-sparking tools and equipment.

**All Spills Involving Only These Products:** Wear gloves, goggles and appropriate body protection to protect against cuts or abrasions.

## 6. ACCIDENTAL RELEASE MEASURES (Continued)

### PERSONAL PROTECTIVE EQUIPMENT (continued):

**Spills Involving Other Materials:** Minimum Personal Protective Equipment should be rubber gloves, rubber boots, face shield, and Tyvek suit. Minimum level of personal protective equipment for releases in which the level of oxygen is less than 19.5% or is unknown must be **Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), boots, Tyvek or similar protective clothing, hard hat, and Self-Contained Breathing Apparatus.**

### METHODS FOR CLEAN-UP AND CONTAINMENT:

**All Small Spills:** Carefully sweep-up material, avoiding dust generation, wearing gloves, goggles and apron. Recover any material possible. Non-usable or recyclable residues should be placed in appropriate container for disposal, sealing tightly. Remove all residue before decontamination of spill area.

**All Spills:** Place all spill residue in appropriate containment and seal. Decontaminate the area thoroughly. Do not mix with wastes from other materials. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations). For spills on water, contain, minimize dispersion and collect. Dispose of recovered material and report spill per regulatory requirements.

**ENVIRONMENTAL PRECAUTIONS:** Avoid release to the environment. Run-off water may be contaminated by other materials and should be contained to prevent possible environmental damage.

**REFERENCE TO OTHER SECTIONS:** See information in Section 8 (Exposure Controls – Personal Protection) and Section 13 (Disposal Considerations) for additional information.

## 7. HANDLING and USE

**PRECAUTIONS FOR SAFE HANDLING:** All employees who handle these products should be trained to handle them safely. As with all chemicals, avoid getting these products ON YOU or IN YOU. Wash thoroughly after handling these products. Do not eat, drink, smoke, or apply cosmetics while handling these products. If during the use of these products, dusts or particulates are generated, avoid breathing, or skin or eye contact. Use in a well-ventilated location, segregated from other materials and operations. Open containers slowly on a stable surface. Containers of these products must be properly labeled. Care should be taken to avoid the accumulation of dusts. Care should be taken to avoid the accumulation of dusts.

**CONDITIONS FOR SAFE STORAGE:** Store these products in a cool, dry location, away from sources of intense heat and moisture. Store at room temperature (~23.87 [-75°F]). Store away from incompatible materials (see Section 10, Stability and Reactivity). Open containers slowly on a stable surface. Containers of these products must be properly labeled.

**SPECIFIC USE(S):** These products are ceramic cores used in investment casting. Follow all industry standards for use of these products.

**PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:** Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Always use these products in areas where adequate ventilation is provided. Decontaminate equipment thoroughly, before maintenance begins. Collect all rinsates and dispose of according to applicable U.S. Federal, State, or local procedures, or applicable standards of Canada and its Provinces.

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

### EXPOSURE LIMITS/CONTROL PARAMETERS:

**Ventilation and Engineering Controls:** Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below, if applicable. Ensure eyewash stations are available near areas where these products are used.

#### Occupational/Workplace Exposure Limits/Guidelines:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							OTHER mg/m <sup>3</sup>
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELS		NIOSH IDLH mg/m <sup>3</sup>	
		TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>		
Proprietary Aluminum Oxide Exposure limits given are for Aluminum Oxide, Aluminum compounds, insoluble		Insol. Comp.: 1 (resp. fraction)	NE	Oxide: 15 (total dust), 5 (resp. fract.) 10 (total dust) [vacated 1989 PEL]	NE	Insoluble Comp.: 10 (total dust), 5 (resp. fract.)	NE	NE	DFG MAKs: Oxide: TWA = 4 (inhalable fraction), 1.5 (resp. fraction) DFG Pregnancy Risk Classification: D Carcinogen: Oxide: MAK-2 (fibrous dust), TLV-A4
Proprietary Aluminum Silicate Exposure limits given are for aluminum insoluble compounds		1 (resp. fract.)	NE	15 (total dust), 5 (resp. fract.) 10 (vacated 1989 PEL)	NE	10 (total dust), 5 (resp. fract.)	NE	NE	DFG MAKs TWA: 4 (inhalable fraction), 1.5 (respirable fraction) Carcinogen: TLV-A4
Proprietary Silicon Dioxide		NE	NE	NE	NE	NE	NE	NE	NE
Proprietary Organic Solid		NE	NE	NE	NE	NE	NE	NE	NE
Proprietary Clay Compound		2 (resp. fract.)	NE	15 (total dust), 5 (resp. fract.) 10 (vacated 1989 PEL)	5 (vacated 1989 PEL)	10 (total dust), 5 (resp. fract.)	NE	NE	Carcinogen: MAK-3B (quartz content must be considered to be considered separately), TLV-A4

NE = Not Established.

mppcf = Millions of Particles per Cubic Foot

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

### EXPOSURE LIMITS/CONTROL PARAMETERS (continued):

#### Occupational/Workplace Exposure Limits/Guidelines (continued):

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELS		NIOSH	OTHER
		TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	IDLH mg/m <sup>3</sup>	
Proprietary Cobalt Compound Exposure limits are for Cobalt and inorganic compounds, as Co		0.02	NE	0.1 (metal dust & fume, as CO)	0.05 (metal dust & fumes, as Co)	NE	NE	20 (metal dust & fume, as Co)	Carcinogen: TLV-A3
Proprietary Starch		10	NE	15 (total dust), 5 (resp. fract.)	NE	10 (total dust), 5 (resp. fract.)	NE	NE	Carcinogen: TLV-A4
Crystalline Silica (Quartz)	14808-60-7	0.025 (resp. fract.)	NE	<u>30 mg/m<sup>3</sup> (total dust)</u> % SO <sub>2</sub> + 2 0.1 (vacated 1989 PEL) <u>250 mppcf (resp. dust)</u> % SiO <sub>2</sub> + 5 or <u>10 mg/m<sup>3</sup> (resp. dust)</u> % SO <sub>2</sub> + 2		0.05 (resp. dust)	NE	50	Carcinogen: IARC-1, MAK-1 (respirable fraction), NOSH-Ca, NTP-K (respirable fraction), TLV-A2
Formaldehyde	50-00-0	SEN	0.37 (ceiling)	0.75 ppm	2 ppm	0.016 ppm	0.1 ppm (ceiling) 15 min.	20 ppm (Ca)	DFG MAKs: TWA = 0.37 PEAK = 2•MAK 15 min. average value, 1-hr interval, 4 per shift; 1.2 (ceiling) Danger of Skin Sensitization DFG MAK Pregnancy Risk Classification: D DFG MAK Germ Cell Mutagen Category 5 Carcinogen: EPA-B1, IARC-1, MAK-4, NOSH-Ca, NIP-K, OSHA-Ca, TLV-A2
Proprietary Magnesium Compound Exposure limits given are for stearates		10	NE	NE	NE	NE	NE	NE	Carcinogen: TLV-A4
Proprietary Mica		3 (resp. fract.)	NE	20 mppcf (< 1% crystalline silica) 3 (resp. fract.) vacated 1989 PEL		3 (resp. dust-containing < 1% crystalline silica)	NE	1500	NE
Proprietary Quartz		NE	NE	NE	NE	NE	NE	NE	NE
Phenol		19 (skin)	Skin	19 (skin)	Skin	19 (skin)	60 (ceiling) 15-min.	250 ppm	DFG MAK: Skin DFG Germ Cell Category:3B Carcinogen: EPA-I, EPA-D, IARC-3, MAK-3B, TLV-A4
Proprietary Fused Silicon Dioxide		NE	NE	<u>30 mg/m<sup>3</sup> (total dust)</u> % SO <sub>2</sub> + 2 0.1 (vacated 1989 PEL) <u>250 mppcf (resp. dust)</u> % SiO <sub>2</sub> + 5 or <u>10 mg/m<sup>3</sup> (resp. dust)</u> % SO <sub>2</sub> + 2		0.05 (resp. dust)	NE	NE	DFG MAK: TWA = 0.3 (respirable fraction) Carcinogen: IARC-3, NIOSH-Ca
Proprietary Zirconium Orthosilicate Compounds given are for zirconium insoluble compounds		NE	NE	NE	NE	5	10	50 (as Zr)	DFG MAKs: TWA: 1 (respirable fraction) PEAK: 1•MAK 15-min. average value, 4-hr interval, 1-hr interval
Proprietary Zirconium Silicate Exposure limits given are for zirconium compounds, as Zr		5	10	5	10 (vacated 1989 PEL)	5	10	50 (as Zr)	Carcinogen: TLV-A4

NE = Not Established.

mppcf = Millions of Particles per Cubic Foot

**International Exposure Limits:** Currently, the following additional international exposure limits in force for the components of this product. Exposure limits change and appropriate authorities in individual countries should be contacted to determine if more recent information is available.

**PROPRIETARY ALUMINUM OXIDE:**

Austria: TMW = 5 mg/m<sup>3</sup>; KZW = 10 mg/m<sup>3</sup>, resp, 2007  
Belgium: TWA = 10 mg(Al)/m<sup>3</sup>, MAR 2002  
Denmark: TWA = 2 mg(Al)/m<sup>3</sup>, MAY 2011

**PROPRIETARY ALUMINUM OXIDE (continued):**

France: VME = 10 mg/m<sup>3</sup>, FEB 2006  
Hungary: TWA = 6 mg/m<sup>3</sup> (resp), SEP 2000  
Iceland: TWA = 10 mg(Al)/m<sup>3</sup>, NOV 2011

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

### EXPOSURE LIMITS/CONTROL PARAMETERS (continued):

#### International Exposure Limits (continued):

##### PROPRIETARY ALUMINUM OXIDE (continued):

Japan: OEL = 0.5 mg/m<sup>3</sup> (resp. dust), 2 mg/m<sup>3</sup> (total dust), MAY 2012  
Korea: TWA = 10 mg/m<sup>3</sup>, 2006  
Mexico: TWA = 10 mg(Al<sub>2</sub>O<sub>3</sub>)/m<sup>3</sup> (inhalable), 2004  
The Netherlands: MAC-TGG = 10 mg/m<sup>3</sup>, 2003  
New Zealand: TWA = 10 mg/m<sup>3</sup> (inspirable dust), JAN 2002  
Norway: TWA = 2 mg(Al)/m<sup>3</sup>, JAN 1999  
Poland: MAC(TWA) = 2 mg/m<sup>3</sup>, MAC(STEL) = 16 mg/m<sup>3</sup>, JAN 1999  
Russia: TWA = 6 mg/m<sup>3</sup>, JUN 2003  
Sweden: TWA = 5 mg/m<sup>3</sup> (total dust); TWA = 2 mg/m<sup>3</sup> (resp. dust), JUN 2005  
Switzerland: MAK-W = 3 mg/m<sup>3</sup>, KZG-W = 24 mg/m<sup>3</sup>, resp. fume, JAN 2011  
Switzerland: MAK-W = 3 mg/m<sup>3</sup>, resp. JAN 2011  
United Kingdom: TWA = 10 mg/m<sup>3</sup> (inhal. dust), OCT 2007  
United Kingdom: TWA = 4 mg/m<sup>3</sup> (resp. dust), OCT 2007  
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

##### PROPRIETARY ALUMINUM SILICATE:

Australia: TWA = 2 mg(Al)/m<sup>3</sup>, JUL 2008  
Belgium: TWA = 2 mg(Al)/m<sup>3</sup>, MAR 2002  
France: VME = 2 mg(Al)/m<sup>3</sup>, FEB 2006  
Iceland: TWA = 1 f/cc, NOV 2011  
Korea: TWA = 2 mg(Al)/m<sup>3</sup>, 2006  
New Zealand: TWA = 2 mg(Al)/m<sup>3</sup>, JAN 2002  
Norway: TWA = 2 mg(Al)/m<sup>3</sup>, JAN 1999  
Russia: TWA = 6 mg/m<sup>3</sup>, JUN 2003  
Sweden: TWA = 1 mg(Al)/m<sup>3</sup>, JUN 2005  
Switzerland: MAK-W = 2 mg(Al)/m<sup>3</sup>, inhal, JAN 2011  
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

##### PROPRIETARY SILICON DIOXIDE:

Switzerland: MAK-W = 4 mg/m<sup>3</sup>, inhal, JAN 2011

##### PROPRIETARY STARCH:

Belgium: TWA = 10 mg/m<sup>3</sup>, MAR 2002  
Korea: TWA = 10 mg/m<sup>3</sup>, 2006  
New Zealand: TWA = 10 mg/m<sup>3</sup> (inspirable dust), JAN 2002  
Russia: STEL = 10 mg/m<sup>3</sup>, JUN 2003  
Switzerland: MAK-W = 3 mg/m<sup>3</sup>, DEC 2006  
United Kingdom: TWA = 10 mg/m<sup>3</sup> (inhalable dust), OCT 2007  
United Kingdom: TWA = 4 mg/m<sup>3</sup> (respirable dust), OCT 2007  
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

##### CRYSTALLINE SILICA:

Australia: TWA = 0.1 mg/m<sup>3</sup>, JUL 2008  
Belgium: TWA = 0.1 mg/m<sup>3</sup> (resp. dust), MAR 2002  
Denmark: TWA = 0.1 mg/m<sup>3</sup> (respirable), carc, MAY 2011  
Denmark: TWA = 0.1 mg/m<sup>3</sup> (resp.), carc, MAY 2011  
Denmark: TWA = 0.3 mg/m<sup>3</sup> (total), MAY 2011  
Finland: TWA = 0.05 mg/m<sup>3</sup>, resp. dust, SEP 2009  
France: VME = 0.1 mg/m<sup>3</sup>, (resp), FEB 2006  
Iceland: TWA = 0.1 mg/m<sup>3</sup> (resp. dust), NOV 2011  
Japan: OEL-C = 0.03 mg/m<sup>3</sup> (respirable), APR 2007  
Korea: TWA = 0.1 mg/m<sup>3</sup>, 2006  
Mexico: TWA = 0.1 mg/m<sup>3</sup> (respirable), 2004  
The Netherlands: MAC-TGG = 0.075 mg/m<sup>3</sup>, 2003  
New Zealand: TWA = 0.2 mg/m<sup>3</sup> (respirable dust), JAN 2002  
Norway: TWA = 0.1 mg/m<sup>3</sup> (resp. dust), JAN 1999  
Norway: TWA = 0.3 mg/m<sup>3</sup> (total dust), JAN 1999  
Peru: TWA = 0.05 mg/m<sup>3</sup>, JUL 2005  
Russia: TWA = 1 mg/m<sup>3</sup>, STEL = 3 mg/m<sup>3</sup>, JUN 2003  
Sweden: TWA = 0.1 mg/m<sup>3</sup> (resp. dust), JUN 2005  
Switzerland: MAK-W = 0.15 mg/m<sup>3</sup>, DEC 2006  
Thailand: TWA = 10 mg/m<sup>3</sup> (resp. dust), JAN 1993  
Thailand: TWA = 30 mg/m<sup>3</sup> (total dust), JAN 1993  
United Kingdom: TWA = 0.1 mg/m<sup>3</sup> (resp. dust), OCT 2007  
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

##### FORMALDEHYDE:

ARAB Republic of Egypt: TWA = 2 ppm (3 mg/m<sup>3</sup>), JAN 1993  
Australia: TWA = 1 ppm (1.2 mg/m<sup>3</sup>), STEL = 2 ppm (2.5 mg/m<sup>3</sup>), Carcinogen, JUL 2008  
Austria: MAK-TMW = 0.5 ppm (0.6 mg/m<sup>3</sup>); KZW = 0.5 ppm (0.6 mg/m<sup>3</sup>), skin, sen, 2007  
Belgium: STEL = 0.3 ppm (0.38 mg/m<sup>3</sup>), MAR 2002  
Denmark: CL = 0.3 ppm (0.4 mg/m<sup>3</sup>), carc, MAY 2011  
Finland: TWA = 0.3 ppm (0.37 mg/m<sup>3</sup>), CL = 1 ppm (1.2 mg/m<sup>3</sup>), NOV 2011  
France: VME = 0.5 ppm, VLE 1 ppm, C3 Carcinogen, FEB 2006  
Germany: MAK = 0.3 ppm (0.37 mg/m<sup>3</sup>), 2011  
Hungary: TWA = 0.6 mg/m<sup>3</sup>, STEL 0.6 mg/m<sup>3</sup>, Skin, SEP 2000  
Iceland: TWA = 0.3 ppm (0.4 mg/m<sup>3</sup>), STEL 1 ppm (1.2 mg/m<sup>3</sup>), Sen, NOV 2011  
Japan: OEL = 0.1 ppm (0.12 mg/m<sup>3</sup>), 2A Carc, A2 Sen, s1 Sen, MAY 2012  
Japan: OEL = 0.2 ppm (0.24 mg/m<sup>3</sup>), MAY 2012  
Korea: TWA = 1 ppm (1.5 mg/m<sup>3</sup>), STEL = 2 ppm (3 mg/m<sup>3</sup>), 2006  
Mexico: PEAK = 2 ppm (3 mg/m<sup>3</sup>), 2004  
The Netherlands: MAC-TGG = 1.5 mg/m<sup>3</sup>, 2003  
New Zealand: CL = 1 ppm (1.2 mg/m<sup>3</sup>), sen, JAN 2002  
Norway: TWA = 0.5 ppm (0.6 mg/m<sup>3</sup>), JAN 1999  
Peru: TWA STEL = 0.3 ppm (0.37 mg/m<sup>3</sup>), JUL 2005  
The Philippines: TWA = 5 ppm (6 mg/m<sup>3</sup>), JAN 1993

##### FORMALDEHYDE (continued):

Poland: MAC(TWA) = 0.5 mg/m<sup>3</sup>, MAC(STEL) = 1 mg/m<sup>3</sup>, JAN 1999  
Russia: STEL = 0.5 mg/m<sup>3</sup>, Skin, JUN 2003  
Sweden: TWA = 0.5 ppm (0.6 mg/m<sup>3</sup>), CL = 1 ppm (1.2 mg/m<sup>3</sup>), Carcinogen, Sen, JUN 2005  
Switzerland: MAK-W = 0.3 ppm (0.37 mg/m<sup>3</sup>), KZG-W = 0.6 ppm (0.74 mg/m<sup>3</sup>), Carc 3, Sen, JAN 2011  
Thailand: TWA = 3 ppm, STEL = 5 ppm, JAN 1993  
Turkey: TWA = 5 ppm (6 mg/m<sup>3</sup>), JAN 1993  
United Kingdom: TWA = 2 ppm (2.5 mg/m<sup>3</sup>); STEL 2 ppm (2.5 mg/m<sup>3</sup>), OCT 2007  
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

##### PROPRIETARY CLAY COMPOUND:

Belgium: TWA = 2 mg/m<sup>3</sup> (resp. dust), MAR 2002  
Denmark: TWA = 2 mg/m<sup>3</sup> (respirable), MAY 2011  
Finland: TWA = 2 mg/m<sup>3</sup>, resp. dust, NOV 2011  
France: VME = 10 mg/m<sup>3</sup>, FEB 2006  
Iceland: TWA 2 mg/m<sup>3</sup> (resp. dust), NOV 2011  
Japan: OEL = 0.5 mg/m<sup>3</sup> (respirable), 2 mg/m<sup>3</sup> (total), APR 2007  
Korea: TWA = 10 mg/m<sup>3</sup>, 2006  
Mexico: TWA = TWA 10 mg/m<sup>3</sup>; STEL = 20 mg/m<sup>3</sup>, 2004  
The Netherlands: MAC-TGG = 10 mg/m<sup>3</sup>, 2003  
New Zealand: TWA = 10 mg/m<sup>3</sup> (inspirable dust), JAN 2002  
New Zealand: TWA = 2 mg/m<sup>3</sup> (respirable dust), JAN 2002  
Peru: TWA 2 mg/m<sup>3</sup>, JUL 2005  
Switzerland: MAK-W = 3 mg/m<sup>3</sup>, resp, JAN 2011  
United Kingdom: TWA = 2 mg/m<sup>3</sup> (resp. dust), OCT 2007  
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

##### PROPRIETARY MAGNESIUM COMPOUND:

New Zealand: TWA = 10 mg/m<sup>3</sup> (inspirable dust), JAN 2002  
Sweden: TWA = 5 mg/m<sup>3</sup>, JUN 2005

##### PROPRIETARY MICA:

Australia: TWA = 2.5 mg/m<sup>3</sup> (inspirable dust), JUL 2008  
Belgium: TWA = 3 mg/m<sup>3</sup>, MAR 2002  
Mexico: TWA = 3 mg/m<sup>3</sup> (respirable), 2004  
The Netherlands: MAC-TGG = 5 mg/m<sup>3</sup> (total dust), 2003  
The Netherlands: MAC-TGG = 2.5 mg/m<sup>3</sup> (respirable dust), 2003  
New Zealand: TWA = 3 mg/m<sup>3</sup> (respirable dust), JAN 2002  
Peru: TWA 3 mg/m<sup>3</sup>, JUL 2005  
Switzerland: MAK-W = 3 mg/m<sup>3</sup>, JAN 2011  
United Kingdom: TWA = 0.8 mg/m<sup>3</sup> (respirable dust), 2007  
United Kingdom: TWA = 10 mg/m<sup>3</sup> (inhalable dust), 2007  
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

##### PHENOL:

ARAB Republic of Egypt: TWA = 5 ppm (19 mg/m<sup>3</sup>), Skin, JAN 1993  
Australia: TWA = 1 ppm (4 mg/m<sup>3</sup>), JUL 2008  
Austria: MAK-TMW = 2 ppm (7.8 mg/m<sup>3</sup>), skin, 2007  
Denmark: TWA = 2 ppm (7.8 mg/m<sup>3</sup>), Skin, MAR 2002  
Denmark: TWA = 1 ppm (4 mg/m<sup>3</sup>), skin, MAY 2011  
EC: TWA = 7.8 mg/m<sup>3</sup> (2 ppm), skin, JUN 2000  
Finland: TWA = 2 ppm (8 mg/m<sup>3</sup>), STEL = 4 ppm (16 mg/m<sup>3</sup>), skin, NOV 2011  
France: VME = 2 ppm (7.8 mg/m<sup>3</sup>), Skin, FEB 2006  
Hungary: TWA = 7.8 mg/m<sup>3</sup>, STEL = 78 mg/m<sup>3</sup>, Skin, SEP 2000  
Iceland: TWA = 1 ppm (4 mg/m<sup>3</sup>), skin, NOV 2011  
Japan: OEL = 5 ppm (19 mg/m<sup>3</sup>), skin, MAY 2012  
Korea: TWA = 5 ppm (19 mg/m<sup>3</sup>), skin, 2006  
Mexico: TWA = 5 ppm (19 mg/m<sup>3</sup>); STEL = 10 ppm (38 mg/m<sup>3</sup>) (skin), 2004  
The Netherlands: MAC-TGG = 8 mg/m<sup>3</sup>, Skin, 2003  
New Zealand: TWA = 5 ppm (19 mg/m<sup>3</sup>), skin, JAN 2002  
Norway: TWA = 1 ppm (4 mg/m<sup>3</sup>), JAN 1999  
Peru: TWA = 5 ppm (19 mg/m<sup>3</sup>), JUL 2005  
The Philippines: TWA = 5 ppm (10 mg/m<sup>3</sup>), Skin, JAN 1993  
Poland: MAC(TWA) = 10 mg/m<sup>3</sup>, MAC(STEL) = 20 mg/m<sup>3</sup>, JAN 1999  
Russia: TWA = 0.3 mg/m<sup>3</sup>, STEL = 1 mg/m<sup>3</sup>, Skin, JUN 2003  
Sweden: TWA = 1 ppm (4 mg/m<sup>3</sup>); STEL = 2 ppm (8 mg/m<sup>3</sup>), Skin, JUN 2005  
Switzerland: CL 5 ppm (19 mg/m<sup>3</sup>), skin, JAN 2011  
Thailand: TWA = 5 ppm (19 mg/m<sup>3</sup>), JAN 1993  
Turkey: TWA = 5 ppm (19 mg/m<sup>3</sup>), Skin, JAN 1993  
United Kingdom: TWA = 2 ppm (7.8 mg/m<sup>3</sup>), skin, OCT 2007  
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

##### PROPRIETARY ZIRCONIUM SILICATE:

Australia: TWA = 5 mg(Zr)/m<sup>3</sup>, STEL = 10 mg(Zr)/m<sup>3</sup>, JUL 2008  
Belgium: TWA = 5 mg(Zr)/m<sup>3</sup>, STEL = 10 mg(Zr)/m<sup>3</sup>, MAR 2002  
Finland: TWA = 1 mg(Zr)/m<sup>3</sup>, SEP 2009  
Hungary: TWA = 5 mg(Zr)/m<sup>3</sup>, STEL = 20 mg(Zr)/m<sup>3</sup>, SEP 2000  
Korea: TWA = 5 mg(Zr)/m<sup>3</sup>, STEL = 10 mg(Zr)/m<sup>3</sup>, 2006  
The Netherlands: MAC-TGG = 5 mg(Zr)/m<sup>3</sup>, 2003  
New Zealand: TWA = 5 mg(Zr)/m<sup>3</sup>, STEL = 10 mg(Zr)/m<sup>3</sup>, JAN 2002  
Norway: TWA = 5 mg(Zr)/m<sup>3</sup>, JAN 1999  
Poland: TWA = 5 mg(Zr)/m<sup>3</sup>, STEL = 10 mg(Zr)/m<sup>3</sup>, JAN 1999  
Russia: TWA = 6 mg/m<sup>3</sup>, JUN 2003  
Switzerland: MAK-W = 5 mg(Zr)/m<sup>3</sup>, inhal, JAN 2011  
Turkey: TWA = 5 mg(Zr)/m<sup>3</sup>, JAN 1993  
United Kingdom: TWA = 5 mg(Zr)/m<sup>3</sup>; STEL = 10 mg(Zr)/m<sup>3</sup>, OCT 2007  
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

**PROTECTIVE EQUIPMENT:** The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132, including U.S. Federal OSHA Respiratory Protection (29 CFR 1910.134), OSHA Eye Protection 29 CFR 1910.133, OSHA Hard Protection 29 CFR 1910.138, OSHA Foot Protection 29 CFR 1910.136 and OSHA Body Protection 29 CFR 1910.132), equivalent standards of Canada (including CSA Respiratory Standard Z94.4-02, Z94.3-M1982, Industrial Eye and Face Protectors and CSA Standard Z195-02, Protective Footwear), standards of EU member states (including EN 529:2005 for respiratory PPE, CEN/TR 15419:2006 for hand/body protection, and CR 13464:1999 for face/eye protection), standards of Australia (including AS/NZS 1715:1994 for respiratory PPE, AS/NZS 4501.2:2006 for protective clothing, AS/NZS 2161.1:2000 for glove selection, and AS/NZS 1336:1997 for eye protection), or standards of Japan (including JIS T 8116:2005 for glove selection, JIS T 8150:2006 for respiratory PPE, JIS T 8147:2003 for eye protectors, and JIS T 8030:2005 for protective clothing). Please reference applicable regulations and standards for relevant details.

**Respiratory Protection:** Maintain airborne contaminant concentrations below exposure limits listed in this section, if applicable. If respiratory protection is needed, use only protection authorized in applicable regulations. Oxygen levels below 19.5% are considered IDLH by U.S. OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998). The following are NIOSH Respiratory Protection Guidelines for formaldehyde, a possible decomposition product.

### **FORMALDEHYDE**

#### **CONCENTRATION RESPIRATORY PROTECTION**

At Concentrations Above the NIOSH REL, or Where There Is No REL, at Any Detectable Concentration: Any Self-Contained Breathing Apparatus (SCBA) that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode, or any Supplied-Air Respirator (SAR) that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in pressure-demand or other positive-pressure mode

Escape: Any Air-Purifying, Full-Facepiece Respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against Formaldehyde, or any appropriate escape-type, SCBA.

**Eye Protection:** Splash goggles or safety glasses. If necessary, refer to appropriate regulations.

**Hand Protection:** Wear appropriate gloves for the operations in which these products are used. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this SDS. If necessary, refer to appropriate regulations.

**Body Protection:** If necessary, refer to the OSHA Technical Manual (Section VII: Personal Protective Equipment) or appropriate Standards of Canada. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection under appropriate regulations.

## 9. PHYSICAL and CHEMICAL PROPERTIES

**FORM:** Resin-coated, solids in formed, block form.

**MOLECULAR WEIGHT:** Not applicable.

**ODOR:** Odorless.

**BOILING POINT:** Not applicable.

**FREEZING POINT:** Not applicable.

**SOLUBILITY IN WATER:** Insoluble.

**VAPOR PRESSURE:** Not applicable.

**EVAPORATION RATE:** Not available.

**LOG COEFFICIENT WATER/OIL DISTRIBUTION:** Not applicable.

**BULK DENSITY:**

**APPARENT DENSITY:**

**POROSITY (vol %):**

121A: 1.75 g/cc

2.36 g/cc

25.7%

D-100: 1.52 g/cc

2.22 g/cc

31.5%

D-100 Cobalt: 1.56 g/cc

2.29 g/cc

31.75%

D-200: 1.57 g/cc

2.25 g/cc

30.1%

D-300: 1.68 g/cc

2.46 g/cc

31.8%

D-400: 2.14 g/cc

3.15 g/cc

32.0%

D-500: 1.53 g/cc

2.23 g/cc

31.4%

**HOW TO DETECT THIS SUBSTANCE (warning properties):** The appearance of these products is a good identification property in event of an accidental release.

## 10. STABILITY and REACTIVITY

**CHEMICAL STABILITY:** Stable.

**DECOMPOSITION PRODUCTS:** *Combustion:* These products are designed to withstand high temperatures and should not produce any toxic decomposition products unless heated above 1538°C (2800°F) for prolonged periods. Above this temperature they may produce carbon, magnesium, silicon, alumina, cobalt and zirconium oxides and silicates, formaldehyde, formic acid, acetone, methanol, aldehydes, ketones and acids, 2,4-dimethyl-1-heptene, 2-pentene, propylene, 2-methyl-1-pentene, and isobutylene. *Hydrolysis:* None.

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:** Strong acids,

**POSSIBILITY OF HAZARDOUS REACTIONS/POLYMERIZATION:** Will not occur.

**CONDITIONS TO AVOID:** None.



# 11. TOXICOLOGICAL INFORMATION

## SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE:

These products are articles and present no unusual health hazard during handling. The following information is relevant in event of formation of dusts or fumes during use and handling.

**Inhalation:** These products do not normally present a hazard of inhalation due to its form. In the unlikely event that dusts or particulates are inhaled, moderate irritation to the nose, throat, and lungs can occur. Symptoms may include sneezing, coughing, nasal congestion, and difficulty breathing. Symptoms are generally alleviated upon exposure to fresh air. Chronic inhalation exposure to dusts from these products may cause silicosis. If heated to decomposition, this product may evolve Formaldehyde, a known human carcinogen, mutagen, reproductive toxin and human sensitizer.

**Contact with Skin or Eyes:** Under normal conditions of use and handling, no skin or eye hazard is present. If heated sufficiently to cause decomposition, or if involved in a fire, fumes and decomposition products may be irritating to skin or eyes. If the products are cut by mechanical means, a hazard of particles entering the eye can occur. If use creates dusts, mechanical irritation of the eyes may occur. Heated product may cause burns.

**Skin Absorption:** Not a route of exposure for these products.

**Injection:** Not a route of exposure for these products.

**Ingestion:** Not a route of exposure for these products.

**HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms.** Over-exposure to these products may cause the following health effects:

**Acute:** There is no health hazard anticipated to occur during routine use of these products. If sufficiently heated to cause decomposition, or if involved in a fire, fumes from decomposition may be irritating to eyes and respiratory system. If dusts are produced during handling, irritation of eyes and respiratory system may occur. Mishandling may result in cuts or abrasions.

**Chronic:** Repeated or prolonged inhalation of dusts may cause adverse effects on the respiratory system. Heating may evolve formaldehyde which is a known human carcinogen, mutagen, reproductive toxin and sensitizer.

**TARGET ORGANS:** **Acute:** Dusts or particulates: Respiratory system, skin, eyes. **Chronic:** Dusts or particulates: Respiratory system.

**TOXICITY DATA:** As an article, exposure to components is not likely. Toxicity data for components are not given in this SDS. For additional data information, please contact DAI Ceramics.

**CARCINOGENIC POTENTIAL OF COMPONENTS:** Components of the coatings in these products are listed by agencies tracking the carcinogenic potential of chemical compounds as follows (due to the nature of these products, no carcinogenicity hazard is expected):

**PROPRIETARY ALUMINUM SILICATE, STARCH, MAGNESIUM, & ZIRCONIUM COMPOUNDS:** ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen)

**PROPRIETARY CLAY COMPOUND:** ACGIH-TLV4 (Not Classifiable as a Human Carcinogen); MAK-3B (Substances for which *in vitro* tests or animal studies have yielded evidence of carcinogenic effects that is not sufficient for classification of the substance in one of the other categories. Further studies are required before a final classification can be made.)

**COBALT COMPOUNDS:** ACGIH TLV-A3 (Confirmed Animal Carcinogen with Unknown Relevance to Humans)

**CRYSTALLINE SILICA:** ACGIH-TLV-A2 (Suspected Human Carcinogen); IARC-1 (Carcinogenic to Humans); MAK-1 (Substances that Cause Cancer in Man and Can Be Assumed to Make a Significant Contribution to Cancer Risk); NIOSH-Ca (Potential Occupational Carcinogen with No Further Categorization); NTP-K (Known to Be a Human Carcinogen)

**FORMALDEHYDE:** ACGIH TLV-A2 (Suspected Human Carcinogen); EPA-B1 (Probable Human Carcinogen-Limited Evidence of Carcinogenicity from Epidemiologic Studies); IARC-1 (Carcinogenic to Humans); MAK-4 (Substances with Carcinogenic Potential for Which Genotoxicity Plays No or at Most a Minor Role. No significant contribution to human cancer risk is expected, provided the MAK value is observed.); NIOSH-Ca (Potential Occupational Carcinogen with No Further Categorization); NIP-K (Known to Be a Human Carcinogen); OSHA-Ca (Carcinogen Defined with No Further Categorization)

**PHENOL:** ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen); EPA-I (Data are Inadequate for an Assessment of Human Carcinogenic Potential); EPA-D (Not Classifiable to Human Carcinogenicity); IARC-3 (Unclassifiable as to Carcinogenicity in Humans); MAK-3B (Substances for Which *In Vitro* tests or Animal Studies Have Yielded Evidence of Carcinogenic Effects that is Not Sufficient for Classification of the Substance in One of the Other Categories. Further studies are required before a final classification can be made.)

**PROPRIETARY FUSED SILICON DIOXIDE:** IARC-3 (Unclassifiable as to Carcinogenicity in Humans); NIOSH-Ca (Potential Occupational Carcinogen with No Further Categorization)

The remaining components are not found on the following lists: U.S. EPA, U.S. NTP, U.S. OSHA, U.S. NIOSH, GERMAN MAK, IARC, and ACGIH, and therefore are not considered to be, nor suspected to be cancer-causing agents by these agencies.

**IRRITANCY OF PRODUCT:** These products may cause mechanical irritation if inhaled or in contact with the eyes. Mishandling may result in skin abrasion.

**SENSITIZATION TO THE PRODUCT:** Some products contain a cobalt compound. Exposure to cobalt compounds may sensitize the skin and cause allergic contact dermatitis. Once sensitized, susceptible individuals may experience allergic reaction after exposure to very small amount of material. Due to the Zirconium compound components in some products, inhalation of dusts from these products may cause an acute allergic alveolitis like hypersensitivity reaction. These products are coated with a phenolic resin that contains Formaldehyde and Phenol. Formaldehyde is a known human respiratory and skin sensitizer and the Phenol component is a suspect skin sensitizer. Due to the form of these products, this is not expected to be a significant health hazard unless exposure occurs to dusts or fumes in event product is heated and fumes are formed.

**REPRODUCTIVE TOXICITY INFORMATION:** As an article, these products are not expected to cause mutagenic, embryotoxic, teratogenic, or reproductive effects in humans.

**BIOLOGICAL EXPOSURE INDICES (BEIs):** As articles, Biological Exposure Indices (BEIs) are not applicable for these products.



## HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

<b>HEALTH HAZARD</b>	(BLUE)	0
----------------------	--------	---

<b>FLAMMABILITY HAZARD</b>	(RED)	0
----------------------------	-------	---

<b>PHYSICAL HAZARD</b>	(YELLOW)	0
------------------------	----------	---

## PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8

For Routine Industrial Use and Handling Applications

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate  
3 = Serious 4 = Severe \* = Chronic hazard



## 12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

**MOBILITY:** Due to their form, these products are not expected to be mobile.

**PERSISTENCE AND BIODEGRADABILITY:** These products will persist indefinitely and will not biodegrade.

**BIO-ACCUMULATION POTENTIAL:** These products do not present a hazard of bio-accumulation.

**ECOTOXICITY:** These products do not present a toxicity hazard to plants or animals; however, all release to terrestrial, atmospheric and aquatic environments should be avoided.

**OTHER ADVERSE EFFECTS:** The components of these products are not listed as having ozone depletion potential.

**ENVIRONMENTAL EXPOSURE CONTROLS:** Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

**RESULTS OF PBT and vPvB ASSESSMENT:** No data available. PBT and vPvB assessments are part of the chemical safety report required for some substances in European Union Regulation (EC) 1907/2006, Article 14.

## 13. DISPOSAL CONSIDERATIONS

**DISPOSAL METHODS:** Dispose of in accordance with applicable International, Federal, State, and local procedures and standards.

**PRECAUTIONS TO BE FOLLOWED DURING WASTE HANDLING:** No special precautions.

**U.S. EPA WASTE NUMBER:** Not applicable.

**EWC WASTE CODE:** Not applicable.

## 14. TRANSPORTATION INFORMATION

**U.S. DEPARTMENT OF TRANSPORTATION 49 CFR 172.101:** These products are NOT classified as Dangerous Goods, per regulations of the DOT.

**TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:** These products are NOT classified as Dangerous Goods, per regulations of Transport Canada.

**INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA):** These products are NOT as dangerous goods, per the International Air Transport Association.

**INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO):** These products are NOT classified as dangerous goods, per the International Maritime Organization.

**EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):** These products are NOT classified by the Economic Commission for Europe to be dangerous goods.

**AUSTRALIAN FEDERAL OFFICE OF ROAD SAFETY CODE FOR THE TRANSPORTATION OF DANGEROUS GOODS BY ROAD OR RAIL:** These products are NOT classified as dangerous goods under the Australian Dangerous Goods Code.

**TRANSPORT IN BULK ACCORDING TO THE IBC CODE:** Not applicable.

**ENVIRONMENTAL HAZARDS:** These products and their components do not meet the criteria of environmentally hazardous according to the criteria of the UN Model Regulations (as reflected in the IMDG Code, ADR, RID, and ADN); no component is specifically listed in Annex III under MARPOL 73/78.

## 15. REGULATORY INFORMATION

### ADDITIONAL UNITED STATES REGULATIONS:

**U.S. SARA Reporting Requirements:** As Articles, these products are NOT subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

**U.S. SARA Threshold Planning Quantity (TPQ):** As Articles, requirement under this regulation is not applicable to these products.

**U.S. CERCLA Reportable Quantity (RQ):** Not applicable as an article.

**U.S. TSCA Inventory Status:** These products are articles and are not subject to the requirements of TSCA.

**Other U.S. Federal Regulations:** These products meet the definition of "Article" under the U.S. Federal OSHA Hazard Communication Standard (29 CFR 1910.1200). For further information, the definition of "Article" is provided below.

*Article* means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical, and does not pose a physical hazard or health risk to employees.

**California Safe Drinking Water and Toxic Enforcement Act (Proposition 65):** The Crystalline Silica component, and the Formaldehyde component of the phenolic resin, are on the California Proposition 65 Lists. WARNING! This product contains compound known to the State of California to cause cancer and/or developmental harm.

### ADDITIONAL CANADIAN REGULATIONS:

**Canadian DSL/NDSL Inventory Status:** These are manufactured items and are not subject to the DSL requirements under CEPA.

**Canadian Environmental Protection Act (CEPA) Priorities Substances Lists:** No component is on the CEPA Priorities Substance Lists.

**Canadian WHMIS Classification and Regulations:** These products meet the definition of an article under WHMIS Regulations (Hazardous Products Act, 6&7, Part II (Sections 11 and 12)).

### ADDITIONAL EUROPEAN REGULATIONS:

**Safety, Health, and Environmental Regulations/Legislation Specific for the Material:** Currently, there is no specific legislation pertaining to these products.

## 15. REGULATORY INFORMATION (Continued)

### ADDITIONAL EUROPEAN REGULATIONS (continued):

**Chemical Safety Assessment:** No data available. The chemical safety assessment is required for some substances according to European Union Regulation (EC) 1907/2006, Article 14.

### ADDITIONAL AUSTRALIAN INFORMATION FOR PRODUCT:

**Australian Inventory of Chemical Substances (AICS) Status:** The components of these products are listed on the AICS or are excepted.

**Standard for the Uniform Scheduling of Drugs and Poisons:** Not applicable.

### ADDITIONAL MEXICAN REGULATIONS:

**Mexican Workplace Regulations (NOM-018-STPS-2000):** These products are not classified as hazardous.

### ADDITIONAL JAPANESE INFORMATION FOR PRODUCT:

**Japanese ENCS Inventory:** The components of these products are on the ENCS Inventory or are excepted as minerals.

**Poisonous and Deleterious Substances Control Law:** No component is listed under the Poisonous and Deleterious Substances Control Law.

### ADDITIONAL KOREAN INFORMATION FOR PRODUCT:

**Korean Existing Chemicals List (ECL) Status:** The components of these products are listed on the ECL Inventory as indicated in Section 3 (Composition and Information on Ingredients).

## 16. OTHER INFORMATION

**ANSI LABELING (Z129.1):** This is a manufactured article; no label information is required under OSHA 29 CFR 1910.1200 or ANSI Z400.1 to address the chemical hazards.

**GLOBAL HARMONIZATION AND EU CLP REGULATION (EC) 1272/2208 LABELING AND CLASSIFICATION:** These products are articles and have no classification requirements under GHS Standards, U.S., Australian, Japanese and European regulations. For information on EU classification under (67/548/EEC), see below.

**EU 67/548/EEC LABELING/CLASSIFICATION:** These products are articles and have no requirements under the European Union Council Directive 67/548/EEC and subsequent Directives.

**KOREAN ISHA (Notice 2009-68) LABELING AND CLASSIFICATION:** These products are articles and have no requirements under the regulation.

**NEW ZEALAND HAZARDOUS SUBSTANCES and NEW ORGANISMS ACT (HSNO) CHEMICAL CLASSIFICATION (COP 8-1 09-06):** These products are articles and have no requirements under the regulation.

### COMPONENT CLASSIFICATION:

#### Labeling and Classification Full Text under GHS:

**Proprietary Cobalt Compound:** This is a self-classification.

**Classification:** Skin Sensitization Category 1

**Hazard Statements:** H317: May cause an allergic skin reaction.

**Crystalline Silica:** This is a self-classification.

**Classification:** Carcinogenic Category 1B, Specific Target Organ Toxicity (Inhalation-Lungs) Repeated Exposure Category 2

**Hazard Statements:** H350i: May cause cancer by inhalation. H373: May cause damage to lungs through prolonged or repeated exposure by inhalation.

**Proprietary Clay and Mica:** This is a self-classification.

**Classification:** Specific Target Organ Toxicity (Inhalation-Lungs) Repeated Exposure Category 2

**Hazard Statements:** H373: May cause damage to lungs through prolonged or repeated exposure by inhalation.

**Phenolic Resin:** This is a self-classification.

**Classification:** Skin Corrosion Category 1B, Skin Sensitization Category 1

**Hazard Statements:** H314: Causes severe skin burns and eye damage. H317: May cause an allergic skin reaction.

**Proprietary Zirconium Silicate and Zirconium Orthosilicate:** This is a self-classification.

**Classification:** Respiratory sensitization Category 1

**Hazard Statements:** H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled.

#### Labeling and Classification Full Text under EU 67/548/EEC:

**Proprietary Cobalt Compound:** This is a self-classification.

**Classification:** Corrosive, Harmful

**Risk Phrases:** R34: Causes burns. R43: May cause sensitisation by skin contact.

**Crystalline Silica:** This is a self-classification.

**Classification:** Carcinogenic Category 2, Harmful

**Risk Phrases:** R45: May cause cancer. R:48/20: Harmful: danger of serious damage to health by prolonged exposure through inhalation.

**Proprietary Clay and Mica:** This is a self-classification.

**Classification:** Harmful

**Risk Phrases:** R48/20: Harmful: danger of serious damage to health by prolonged exposure through inhalation.

**Phenolic Resin:** This is a self-classification.

**Classification:** Corrosive, Harmful

**Risk Phrases:** R34: Causes burns. R43: May cause sensitisation by skin contact.

**Proprietary Zirconium Silicate and Zirconium Orthosilicate:** This is a self-classification.

**Classification:** Harmful

**Risk Phrases:** R42: May cause sensitisation by inhalation.

**New Zealand HSNO COP 8-1 09-06:** The following are classifications under HSNO for components in pure form. These classifications may not apply to the product. Refer to Section 2 for product classification.

**Crystalline Silica:**

6.7A Known or presumed human carcinogens 6.9A (inhalation) Toxic to human target organs or systems.

9.3C: Harmful to terrestrial vertebrates

## 16. OTHER INFORMATION (Continued)

**REFERENCES AND DATA SOURCES:** Contact the supplier for information.

**METHODS OF EVALUATING INFORMATION FOR THE PURPOSE OF CLASSIFICATION:** Bridging principles were used to classify these products.

**REVISION DETAILS:** August 2014: Up-date to include current GHS and international classification. Change of formulation.

**MIXTURES:** When two or more chemicals are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for these products before you use the product. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember all chemicals have properties that can cause serious injury or death.

**PREPARED BY:**

CHEMICAL SAFETY ASSOCIATES, Inc.

PO 1961, Hilo, HI 96721 • (800) 441-3365 • (808) 969-4846



This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to these products. To the best of DAI Ceramic's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If these products are combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.