

# MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, European Union CLP EC 1272/2008, Australian WorkSafe, the Japanese Industrial Standard JIS Z 7250: 2000 and the Global Harmonization Standard

## 1. PRODUCT IDENTIFICATION

### PRODUCT NAME: FIRED CORE PRODUCTS

**CHEMICAL NAME/CLASS:** Solid Ceramic  
**PRODUCT NAMES:** 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  
**PRODUCT USE:** Investment Casting  
**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 & MSDS INFORMATION:** sales@daiceramics.com  
**DATE OF PREPARATION:** November 8, 2010

**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 product 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.

**Classification:** Not Applicable.      **Signal Word:** Not Applicable      **Hazard Statement:** Not Applicable  
**Precautionary Statements:** Not Applicable      **Hazard Symbol:** Not Applicable

See Section 15 for full text of Hazard and Precautionary Statements

**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.

**EU Classification:** Not Applicable      **EU Risk Phrases:** Not Applicable      **EU Safety Phrases:** Not Applicable

See Section 15 for full text of Ingredient Risk and Safety Phrases

**EMERGENCY OVERVIEW: Product Description:** These products are 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. **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 silicon, alumina, cobalt and zirconium oxides. **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%	EU Hazard Symbol (67/548/EEC)	GHS/EU Hazard Symbol (1272/2008 EC)	EU Classification (67/548/EEC) GHS & EU Classification (1272/2008) Risk Phrases/Hazard & Precautionary Statements
Proprietary Silicon Dioxide, Fused			Unlisted	Proprietary	Listed	May be used as a single component chemical under an appropriate group standard	40-99%	Not Applicable	Not Applicable	EU 67/548 Hazard Classification: Not Applicable. GHS & EU 1272/2008 Classification: Not Applicable.

See Section 15 for full text of Ingredient Risk Phrases and Precautionary Codes

### 3. COMPOSITION and INFORMATION ON INGREDIENTS

Chemical Name	CAS #	EINECS or ELNICS #	Japanese ENCS #	Korean ECL #	Australian AICS	New Zealand NZIoC	WT%	EU Hazard Symbol (67/548/EEC)	GHS/EU Hazard Symbol (1272/2008 EC)	EU Classification (67/548/EEC) GHS & EU Classification (1272/2008) Risk Phrases/Hazard & Precautionary Statements
Zirconium Compound Not in D-100 Cobalt, D-200, D-200, D-500			Unlisted	Proprietary	Listed	May be used as a single component chemical under an appropriate group standard	0-20%	Not Applicable	Not Applicable	EU 67/548 Hazard Classification: Not Applicable. GHS & EU 1272/2008 Classification: Not Applicable.
Metal Oxide Not in P21A, D-100, D-300					Listed	May be used as a single component chemical under an appropriate group standard	1-3%	Not Applicable	Not Applicable	EU 67/548 Hazard Classification: Not Applicable. GHS & EU 1272/2008 Classification: Not Applicable.
Cobalt Compound Only in D100 Cobalt product			Unlisted	Proprietary	Listed	May be used as a single component chemical under an appropriate group standard	5%	Not Applicable	Not Applicable	EU 67/548 Hazard Classification: Not Applicable. GHS & EU 1272/2008 Classification: Not Applicable.
Other Trace Materials							Balance	Not Applicable	Not Applicable	EU 67/548 Hazard Classification: Not Applicable. GHS & EU 1272/2008 Classification: Not Applicable.

See Section 15 for full text of Ingredient Risk Phrases and Precautionary Statements

### 4. FIRST-AID MEASURES

**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.

**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.

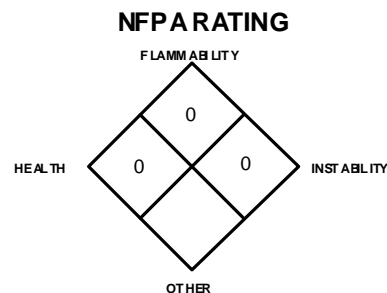
**FIRE EXTINGUISHING MATERIALS NOT TO BE USED:** None known.

**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 silicon, alumina, cobalt and zirconium oxides.

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.



### 6. ACCIDENTAL RELEASE MEASURES

**SPILL AND LEAK RESPONSE:** 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. Sweep-up spilled product and recover. If discarded, dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations).

### 7. HANDLING and USE

**WORK PRACTICES AND HYGIENE PRACTICES:** Wash thoroughly after handling these products. Do not eat, drink, smoke, or apply cosmetics while handling these products. Use in a well-ventilated location

## 7. HANDLING and USE (Continued)

**STORAGE AND HANDLING PRACTICES:** All employees who handle this material should be trained to handle it safely. 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). 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.

**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

**VENTILATION AND ENGINEERING CONTROLS:** Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below, if applicable.

### EXPOSURE LIMITS:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELS		NIOSH IDLH mg/m <sup>3</sup>	OTHER 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 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: TVL-A3
Proprietary Metal Oxide Exposure limits given are for Aluminum Oxide, Aluminum compounds, insoluble		Insoluble 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 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 Compound		NE	NE	NE	NE	NE	NE	NE	NE

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.

#### METAL OXIDE:

Australia: TWA = 10 mg/m<sup>3</sup>, JAN 1993  
Austria: TRK = 0.25 fibers/cc, JAN 2006  
Belgium: TWA = 10 mg(Al)/m<sup>3</sup>, MAR 2002  
Denmark: TWA = 10 mg/m<sup>3</sup>, OCT 2002  
Belgium: TWA = 10 mg(Al)/m<sup>3</sup>, MAR 2002 France: VME = 10 mg/m<sup>3</sup>, FEB 2006  
Belgium: TWA = 10 mg(Al)/m<sup>3</sup>, MAR 2002  
Germany: MAK = 1.5 mg/m<sup>3</sup> (respirable, fume), 2005  
Hungary: TWA = 6 mg/m<sup>3</sup> (resp), SEP 2000  
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 = 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>, DEC 2006

#### METAL OXIDE (continued):

Switzerland: MAK-W = 3 mg/m<sup>3</sup>; KZG-W = 24 mg/m<sup>3</sup>, fume, DEC 2006  
United Kingdom: TWA = 10 mg/m<sup>3</sup> (inhalable), 2005  
United Kingdom: TWA = 4 mg/m<sup>3</sup> (respirable), 2005  
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV  
**PROPRIETARY SILICON DIOXIDE:**  
Denmark: TWA = 0.1 mg/m<sup>3</sup> (resp. dust), MAR 2002  
Denmark: TWA = 2 mg/m<sup>3</sup> (resp. dust), MAR 2002  
Denmark: TWA = 0.1 mg/m<sup>3</sup> (respirable), OCT 2002  
Denmark: TWA = 2 mg/m<sup>3</sup> (respirable), OCT 2002  
Denmark: TWA = 5 mg/m<sup>3</sup>, OCT 2002  
Germany: MAK = 4 mg/m<sup>3</sup> (inhalable), 2005  
Germany: MAK = 0.3 mg/m<sup>3</sup> (respirable), 2005  
Japan: OEL-C = 0.03 mg/m<sup>3</sup> (respirable), APR 2007  
Korea: TWA = 0.1 mg/m<sup>3</sup>, 2006  
Norway: TWA = 0.1 mg/m<sup>3</sup> (respirable), 2004  
New Zealand: TWA = 0.2 mg/m<sup>3</sup> (inspirable dust), JAN 2002  
Norway: TWA = 0.05 mg/m<sup>3</sup> (resp. dust), JAN 1999  
Russia: TWA = 2 mg/m<sup>3</sup>, STEL = 6 mg/m<sup>3</sup>, JUN 2003  
Russia: TWA = 1 mg/m<sup>3</sup>, STEL = 3 mg/m<sup>3</sup>, JUN 2003  
Switzerland: MAK-W = 0.3 mg/m<sup>3</sup>, DEC 2006  
United Kingdom: TWA = 6 mg/m<sup>3</sup> (inhalable), 2005

#### SILICON DIOXIDE (continued):

United Kingdom: TWA = 2.4 mg/m<sup>3</sup> (respirable), 2005  
United Kingdom: TWA = 0.08 mg/m<sup>3</sup> (respirable), 2005  
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV  
**ZIRCONIUM COMPOUND:**  
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>, DEC 2006  
Turkey: TWA = 5 mg(Zr)/m<sup>3</sup>, JAN 1993  
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

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

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), equivalent standards of Canada (including CSA Standard Z94.4-02 and CSA Standard Z94.3-07), standards of EU member states (including EN 529:2005 for respiratory PPE, CEN/TR 15419:2006 for hand protection, and CR 13464:1999 for face/eye protection), or 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) and those of Japan. Please reference applicable regulations and standards for relevant details.

**RESPIRATORY PROTECTION:** No special respiratory protection is required for use of these products during normal use. In instances where dusts may be generated, and respiratory protection is necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-02, European Standard EN 529:2005, EU member state standards, Australian Standard 1716-Respiratory Protective Devices and Australian Standard 1715-Selection, Use, and Maintenance of Respiratory Protective Devices, or Japanese Standard JIS T 8150:2006.

**EYE PROTECTION:** No special eye protection is required for use of these products. Wear safety glasses or goggles if during the use of these products operations may produce flying debris or particulates. Refer to U.S. OSHA 29 CFR 1910.133, Canadian CSA Standard Z94.3-M1982, *Industrial Eye and Face Protectors*, European Standard CR 13464:1999, Australian Standard 1337-Eye Protection for Industrial Applications and Australian Standard 1336-Recommended Practices for Eye Protection in the Industrial Environment, or Japanese Standard JIS T 8147:2003.

**HAND PROTECTION:** No special hand protection is normally required for use of these products. If these products are handled with bare hands or cut by mechanical means, mechanically-resistant or leather gloves may be appropriate. If necessary, refer to U.S. OSHA 29 CFR 1910.138, appropriate Standards of Canada, Australian Standard 2161-Industrial Safety Gloves and Mittens, European Standard CEN/TR 15419:2006, or Japanese Standard JIS T 8116:2005.

**BODY PROTECTION:** Use body protection appropriate for task. If necessary, refer to OSHA Technical Manual (Section VII: Personal Protective Equipment), European Standard CEN/TR 15419:2006, Australian Standard 3765-Clothing for Protection Against Hazardous Chemicals, or Japanese Standard JIS T 8030:2005. 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, as described in U.S. OSHA 29 CFR 1910.136, Canadian CSA Standard Z195.1-02, *Guideline on Selection, Care, and Use of Protective Footwear*, or European Standard CEN ISO/TR 18690:2006.

## 9. PHYSICAL and CHEMICAL PROPERTIES

**BOILING POINT:** Not applicable.

**FREEZING POINT:** Not applicable.

**SOLUBILITY IN WATER:** Insoluble.

**VAPOR PRESSURE:** Not applicable.

**EXPANSION RATIO:** Not applicable.

**EVAPORATION RATE:** Not available.

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

**BULK DENSITY:**

**APPARENT DENSITY:**

**MOLECULAR WEIGHT:** Not applicable.

**MELTING POINT:** ~ 1650°C (~3002°F)

**SOLVENT SOLUBILITY:** Insoluble.

**pH:** Not applicable.

**ODOR THRESHOLD:** Not established.

**SPECIFIC VOLUME:** Not established.

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%

**POROSITY (vol %):**

**APPEARANCE AND COLOR:** These products are 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.

**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

**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 silicon, alumina, cobalt and zirconium oxides. Hydrolysis: None.

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

**HAZARDOUS 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

**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.

**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.

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

**INJECTION:** 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.

**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 MSDS. 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):

**SILICON DIOXIDE FUSED:** 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:** The D-100 Cobalt product contains 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 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.

**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):** Currently, Biological Exposure Indices (BEIs) have not been determined components of these products.



### HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

<b>HEALTH HAZARD</b>	(BLUE)	0
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<b>FLAMMABILITY HAZARD</b>	(RED)	0
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<b>PHYSICAL HAZARD</b>	(YELLOW)	0
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### PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8

For Routine Industrial Use and Handling Applications

## 12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

**MOBILITY:** 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.

### 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:** This material is NOT classified as Dangerous Goods, per regulations of Transport Canada.

**INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA):** This material is NOT classified as dangerous goods, per the International Air Transport Association.

**INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO):** This material is NOT classified as dangerous goods, per the International Maritime Organization.

**EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):** This material is 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:** This material is NOT classified as dangerous goods under the Australian Dangerous Goods Code.

### 15. REGULATORY INFORMATION

#### **ADDITIONAL UNITED STATES REGULATIONS:**

**U.S. SARA REPORTING REQUIREMENTS:** The components of 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:** There are no specific Threshold Planning Quantities for components. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs. (4,540 kg) therefore applies, per 40 CFR 370.20.

**U.S. TSCA INVENTORY STATUS:** The components of these products are listed on the TSCA Inventory.

**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):** No components of these products are on the California Proposition 65 Lists.

**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.

#### **ADDITIONAL CANADIAN REGULATIONS:**

**CANADIAN DSL/NDL 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:**

**GLOBAL HARMONIZATION AND EU CLP REGULATION (EC) 1272/2008 LABELING AND CLASSIFICATION:** Not applicable as articles.

Classification: Not Applicable

Signal Word: Not Applicable

Supplemental Hazard Statements: Not Applicable

Response Precautionary Statements: Not Applicable

Disposal Precautionary Statements: Not Applicable

Supplemental Classification: Not Applicable

Hazard Statements: Not Applicable

Prevention Precautionary Statements: Not Applicable

Storage Precautionary Statements: Not Applicable

Hazard Symbols: Not Applicable

**EU 67/548/EEC LABELING/CLASSIFICATION:** Not applicable as articles.

EU Classification: Not Applicable

EU Safety Phrases: Not Applicable

EU Risk Phrases: Not Applicable

EU Hazard Symbol: Not Applicable

## 15. REGULATORY INFORMATION (Continued)

### **ADDITIONAL AUSTRALIAN INFORMATION FOR PRODUCT:**

**AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS:** The components of these products are listed on the AICS.

**STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS:** Not applicable.

**LABELING AND CLASSIFICATION:** As articles, not applicable.

**HAZARD CLASSIFICATION:** Not Applicable

**RISK PHRASES:** Not Applicable

**SAFETY PHRASES:** Not Applicable

**HAZARD SYMBOL:** Not Applicable

### **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

**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 Material 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.