

**1. IDENTIFICATION OF MATERIAL AND SUPPLIER****1.1. Product Identification**

Product Name Zircon  
Other Names Zircon sand, Zr 95  
CAS number 14940-68-2  
EC EINECS number 239-019-6  
REACH registration number This product is exempt from registration according to the provisions of Article 2(7)(b) and Annex V (7) of REACH

**1.2. Uses and uses advised against**

Recommended Uses Industrial applications for ceramics, refractories and foundry products, abrasives.  
Feedstock for the production of zirconia /zirconium and associated products  
Uses advised against None known

**1.3. Supplier Identification**

Company Doral Mineral Sands Pty. Ltd.  
Address 25 Harris Road, Picton Western Australia 6229  
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Email [admin@doral.com.au](mailto:admin@doral.com.au)  
Website [www.doral.com.au](http://www.doral.com.au)

**1.4. Emergency telephone numbers**

Emergency (24 hours) Within Australia (08) 9725 5444 International +61 8 9725 5444

**2. HAZARD IDENTIFICATION****2.1. Classification of the substance or mixture**

**EU** Not classified according to EU. EC 1272/2008 (CLP/GHS) or UN GHS  
Physical and chemical hazards: Not classified  
Human health hazards: Not classified  
Environmental hazards: Not classified

**USA** Carcinogen Category 1A -- Under OSHA Hazard Communication Standard (29 CRF 1910.1200)  
Physical and chemical hazards: Not classified  
Human health hazards: Carcinogenicity Category 1A  
Environmental hazards: Not classified

**2.2. Label elements**

**EU** Not classified: Pictogram is not required  
Not classified: Signal word, hazard statements, precautionary statement are not applicable.

**USA -**



Signal Word: **DANGER**

| Hazard statements (US)                      | Precautionary statements (US)   |
|---|---|
| H350 –<br>May cause cancer by<br>inhalation | P201 - Obtain special instructions before use.<br>P202 - Do not handle until all safety precautions have been read and understood.<br>P261 - Avoid breathing dust<br>P280 - Wear protective gloves.<br>P308+P313 - If exposed or concerned. Get medical advice/attention.<br>P405 - Store locked up.<br>P501 - Dispose of contents or container to federal, state, and local regulations. |

### 2.3. Other hazards not leading to classification

#### Generic

The principal hazard is due to inhalation of dust. The normal grain size of zircon precludes it from being an inhalation hazard. Avoid the creation of dust during handling and processing.

With some products, certain processes (e.g., grinding, drying), airborne respirable crystalline silica (quartz) may be generated. Prolonged and/or massive inhalation of respirable crystalline silica may cause lung fibrosis, commonly referred to as silicosis. Principal symptoms of silicosis are cough and breathlessness. Occupational exposure to respirable crystalline silica dust should be monitored and controlled.

The Size Weighted Fine Fraction (SWFF) is measured by the BS EN 17289-1 2020, BS EN 17289-2 2020 & BS EN 17289-3 2020

**US Specific:** Additional consideration is need from radionuclides (section 3).

## 3. COMPOSITION / INFORMATION ON INGREDIENTS

### 3.1. Substances

| Name   | EC No.    | CAS No     | Typical content | US Specific US Classification |
|--|-----------|------------|-----------------|-------------------------------|
| ZrSiO <sub>4</sub> (zircon)                                | 239-019-6 | 14940-68-2 | >95 %           | Not classified                |
| TiO <sub>2</sub> (rutile)                                  | 215-282-2 | 1317-80-2  | <0.5 %          | Not classified                |
| Crystalline silica (quartz)<br>[respirable fraction <0.1%] | 238-878-4 | 14808-60-7 | <0.5 %          | Carcinogenicity<br>Cat 1A     |

### 3.2. Additional information

#### Generic

Zircon is a naturally occurring radioactive material (NORM) and is considered a radioactive product (IAEA radioactive material if above 1 Bq/g); however, it is not considered a radioactive product for transportation purpose - limit of 10 Bq/g for NORM. Some countries may use different limits; therefore, local regulations should be consulted.

Uranium (U-238)                      150-300 ppm (2 - 4 Bq/g)  
 Thorium (Th-232)                    150-250 ppm (0.5 - 1.0 Bq/g)  
 Other daughter nuclides:            In secular equilibrium

The contact dose rate from bulk quantities is in the order of 1 to 2µSv/h above the background. A person may work in dust concentrations of 3 mg/m<sup>3</sup> for a full year without exceeding the maximum dose for a worker.

Respirable dust levels in typical zircon processing operations are reported in IAEA Safety Report No 51 and are less than 25% of the maximum dose to workers of 1 mSv/y (ICRP).

For downstream users, the thermal production of zirconia can generate risks associated with worker exposure to radioactive dust; and the chemical production of zirconia can generate risks associated

with disposal of radionuclide containing wastes. It is recommended that regulatory guidance be obtained by the producers of zirconia, when using zircon.

## 4. FIRST AID MEASURES

### 4.1. Description of first aid measures

**Inhalation** Remove person to fresh air and keep comfortable for breathing. Get medical attention if symptoms occur

**Skin Contact** If on skin or hair, brush off loose particles and wash with soap and water.  
If on clothing, brush off loose particles. Use a vacuum cleaner to collect particles from the floor.  
Get medical attention if symptoms occur

**Eye Contact** Rinse gently with water for several minutes.  
Remove contact lenses if applicable.  
Get medical attention if irritation occurs

**Ingestion** If swallowed, rinse mouth with water. Get medical attention if symptoms occur

#### **Self-protection of the first aider**

No special protection is required.

See Section 8 for information on appropriate personal protective equipment.

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

#### **Potential acute health effects**

**Eye contact** No known significant effects or critical hazards.

**Inhalation** No known significant effects or critical hazards

**Skin contact** No known significant effects or critical hazards

**Ingestion** No known significant effects or critical hazards

#### **Over-exposure signs/symptoms**

**Eye contact** No specific data

**Inhalation** No specific data

**Skin contact** No specific data

**Ingestion** No specific data

### 4.3. Indications of any immediate medical attention and special treatment needed

**Notes to physician** No specific treatment – treat symptomatically

**Specific treatments** No specific treatment.

## 5. FIRE FIGHTING MEASURES

### Generic

#### 5.1. Suitable extinguishing media

Dry chemical, carbon dioxide, water spray or foam, aiming not to create dust.

#### 5.2. Unsuitable extinguishing media

Avoid high pressure media that could cause the formation of dust or a dust / air mixture

#### 5.3. Special exposure hazards arising from substance or mixture

The product is not flammable and has no known fire or explosion risk

#### 5.4. Hazardous combustion products

None known

#### 5.5. Advice for fire-fighters

No fire or explosion hazard exists.

Firefighters should wear appropriate protective equipment to minimise inhalation of dust.

## 6. ACCIDENTAL RELEASE MEASURES

### Generic

#### 6.1. Personal precautions, protective equipment and emergency procedures

**For non-emergency personnel:** Wear personal protective equipment (PPE) as detailed in section 8. Clear the area of unprotected personnel. Contact emergency services if appropriate.

**For emergency responders:** Wear personal protective equipment (PPE) as detailed in section 8.

#### 6.2. Environmental precautions

Prevent spilled product from entering sewers, drains and waterways

#### 6.3. Methods and material for containment and cleaning up

Wear safety equipment as for normal handling. Avoid generating dust.

Vacuum up, if possible, otherwise carefully sweep up small spills and re-cycle.

If the spilled product is not suitable for re-use, damp down, collect and where possible return to manufacturer for reprocessing. If necessary, dispose of to an approved landfill site in accordance with applicable local regulations.

#### 6.4. Reference to other sections

See sections 8 and 13 for exposure controls (PPE) and waste disposal

## 7. HANDLING AND STORAGE

### 7.1. Precautions for safe handling

Avoid the creation of dust and prevent wind dispersal. Use of safe work practices are recommended to avoid inhalation, eye or skin contact. Observe good personal hygiene at all times, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas. Avoid breathing dust. Avoid contact with eyes. Wash hands thoroughly after handling the product. Wear protective gloves. Wash hands before eating, drinking or smoking.

### 7.2. Conditions for safe storage, including any incompatibilities

Store in accordance with local regulations where applicable. Store in a locked cool, dry, well-ventilated area, to avoid dust generation and dispersal and removed from foodstuffs. Ensure bags are adequately labelled, protected from physical damage and sealed when not in use.

### 7.3. Specific end uses(s)

See Section 1.2

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1. Control parameters

| Product / ingredient name    | Exposure limit values  |
|------------------------------|--|
| Zircon (ZrSiO <sub>4</sub> ) | <p>Generic OEL ACGIH TLV (United States, 1/2009).<br/>TWA 5 mg/m<sup>3</sup>, (as Zr) 8 hour(s). STEL 10 mg/m<sup>3</sup>, (as Zr) 15 minute(s).</p> <p><b>US specific</b><br/>NIOSH REL (United States, 6/2009).<br/>TWA 5 mg/m<sup>3</sup>, (as Zr) 10 hours. STEL 10 mg/m<sup>3</sup>, (as Zr) 15 minutes.<br/>OSHA PEL (United States, 11/2006).<br/>TWA 5 mg/m<sup>3</sup>, (as Zr) 8 hours.</p>  |
| Quartz (SiO <sub>2</sub> )   | <p><b>Generic OEL ACGIH TLV (United States, 2/2010).</b><br/>TWA 0.025 mg/m<sup>3</sup> 8 hour(s). Form Respirable fraction; see</p> <p><b>US specific</b><br/>OSHA PEL Z3 (United States, 2/2016).<br/>TWA 250 mppcf / (%SiO<sub>2</sub>+5) 8 hours. Form: Respirable<br/>TWA 10 mg/m<sup>3</sup> / (%SiO<sub>2</sub>+2) 8 hours. Form: Respirable<br/>TWA 30 mg/m<sup>3</sup> / (%SiO<sub>2</sub>+2) 8 hours. Form: Total Dust</p> <p><b>NIOSH REL (United States, 10/2013).</b></p> |

|  |  |
|--|--|
|  | <p>TWA 0.05 mg/m<sup>3</sup> 10 hours. Form: Respirable dust</p> <p><b>Other countries' specific OELS</b></p> <p><b>EU Specific</b><br/>Binding OEL 'work involving exposure to crystalline silica dust generated by a work process in the EU under The Protection of Workers from the Risks Related to Exposure to Carcinogens or Mutagens at Work Directive 2017/2398. Each EU country implements the BOEL individually.</p> <p>BOEL - 0.1 mg/m<sup>3</sup> respirable Crystalline Silica Dust</p> |
|--|--|

**Generic****Recommended monitoring procedures**

This product contains ingredients with exposure limits, and therefore personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

**EU Specific**

Reference should be made to monitoring standards, such as the following European Standard EN 689 (Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy) European Standard EN 14042 (Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents) European Standard EN 482 (Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents)

Reference to national guidance documents for methods for the determination of hazardous substances will also be required. The European Network on Silica (NEPSI) <https://www.nepsi.eu> provides current information and control procedures.

**US Specific**

OSHA Occupational Exposure to Respirable Crystalline Silica Updated Rule 29 CFR Parts 1910, 1915, and 1926

**DNEL** Not available  
**PNEC** Not available

**8.2. Exposure controls****Generic****Appropriate engineering controls**

To avoid inhalation of dust, use in a well-ventilated area. Where a dust inhalation risk exists, local exhaust ventilation (LEV) is recommended. Maintain dust levels below the recommended exposure standard.

**Individual protection measures, such as personal protective equipment**

**In dusty conditions:** personal protective equipment (PPE) shall be worn - overalls, safety glasses, gloves and well-fitting mask

**Eye / face protection:** wear safety glasses in normal conditions. wear dust-proof goggles in dusty conditions.

**Hand protection:** wear industrial grade gloves

**Other skin protection:** wear disposable coveralls where heavy

**Respiratory protection:** where an inhalation risk exists, wear a Class P1 (Particulate) respirator.

**Thermal Hazards:** no thermal hazard exists

**Personal protective equipment (pictograms)**

**8.3. Environmental exposure controls**

Encourage the re-use of uncontaminated product. Use LEV to prevent/reduce air emissions. Emissions trapped from LEV should be re-used where possible. Liquid waste can be treated at on-site or off-site wastewater treatment plants. Solid waste that cannot be re-used should be disposed of according to the local laws and regulations. Avoid creating dust and prevent wind dispersal.

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1. Information on basic physical and chemical properties**

| Information on basic physical and chemical properties |                                   |
|---|-----------------------------------|
| Appearance  | Off-white to brown granular solid |
| Odour   | Odourless                         |
| Odour threshold                                       | Not applicable                    |
| pH  | Not applicable                    |
| Melting point/freezing point                          | 2250°C                            |
| Initial boiling point and boiling range               | Not applicable                    |
| Flash point   | Not applicable                    |
| Evaporation rate                                      | Not applicable                    |
| Flammability (solid, gas);                            | Not applicable                    |
| Upper/lower flammability or explosive limits          | Not applicable                    |
| Vapour pressure;                                      | Not applicable                    |
| Vapour density  | Not applicable                    |
| Relative density                                      | 1.7-3 g/cm <sup>3</sup>           |
| Solubility(ies);                                      | Not applicable                    |
| Partition coefficient n-octanol/water;                | Not applicable                    |
| Auto-ignition temperature                             | Not applicable                    |
| Decomposition temperature;                            | Not applicable                    |
| Viscosity   | Not applicable                    |
| Explosive properties                                  | Not applicable                    |
| Oxidising properties                                  | Not applicable                    |

**9.2. Other information: No applicable information****10. STABILITY AND REACTIVITY****10.1. Reactivity**

Very fine particles may ignite in the presence of air/oxygen

**10.2. Chemical stability**

The product is stable

**10.3. Possibility of hazardous reactions**

Under normal conditions of storage and use, hazardous reactions will not occur

**10.4. Conditions to avoid**

No specific conditions to avoid

**10.5. Incompatible materials**

None known

**10.6. Hazardous decomposition products**

Under normal conditions of storage and use, hazardous decomposition products will not occur

**11. TOXICOLOGICAL INFORMATION****11.1. Information on toxicological effects****Acute toxicity**

No concerns from absorption, metabolism, distribution, and excretion. N inert substance with extremely low toxicity to humans and animals

**Skin corrosion/irritation**

Non-irritating to the skin

**Serious eye damage/irritation**

Non-irritating to the eyes

**Respiratory or skin sensitisation**

Non-sensitizer to the respiratory system or skin

**Germ cell mutagenicity**

Not mutagenic (Ames test)

**Carcinogenicity**

Contains 0.5% quartz, so regarded as carcinogenic under US guidelines as >0.1% quartz (see below)

**Reproductive toxicity**

Data not available

**STOT-single exposure**

Data not available

**STOT-repeated exposure**

Data not available

**Aspiration hazard**

Not applicable

**11.2. Information on likely routes of exposure**

**Likely of exposure anticipated:** dermal, inhalation, oral

**11.3. Potential acute health effects**

**Eye contact** No known significant effects or critical hazards.

**Inhalation** No known significant effects or critical hazards.

**Skin contact** No known significant effects or critical hazards.

**Ingestion** No known significant effects or critical hazards.

**11.4. Symptoms related to the physical, chemical, and toxicological characteristics**

**Eye contact** No specific data.

**Inhalation** No specific data.

**Skin contact** No specific data.

**Ingestion** No specific data.

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

**Short-term exposure**

**Potential immediate effects** Not available

**Potential delayed effects** Not available

**Long-term exposure**

**Potential immediate effects** Not available

**Potential delayed effects** Not available

**11.6. Potential chronic health effects**

**Conclusion/Summary**

Prolonged and/or massive exposure to respirable crystalline silica-containing dust may cause silicosis, a nodular pulmonary fibrosis caused by deposition in the lungs of fine respirable particles of crystalline silica. Crystalline silica is regarded as a carcinogen under US guidelines (see below) and substances and mixtures with >0.1% quartz, are regarded as carcinogenic.

**General**

No known significant effects or critical hazards.

**Carcinogenicity**

Contains >0.1% quartz, so regarded as carcinogenic under US/GHS guidelines (see below)

**Mutagenicity**

No known significant effects or critical hazards.

**Teratogenicity**

No known significant effects or critical hazards.

**Developmental effects**

No known significant effects or critical hazards.

**Fertility effects**

No known significant effects or critical hazards.

## 11.7. Other information

### Quartz

Oral rat LD50- > 2000 mg/kg; Dermal rabbit LD50- > 2000 mg/kg.

Prolonged and/or massive exposure to respirable crystalline silica-containing dust may cause silicosis, a nodular pulmonary fibrosis caused by deposition in the lungs of fine respirable particles of crystalline silica.

In 1997, IARC (the International Agency for Research on Cancer) concluded that crystalline silica inhaled from occupational sources can cause lung cancer in humans. However, it pointed out that not all industrial circumstances, nor all crystalline silica types, were to be incriminated. (IARC Monographs on the evaluation of the carcinogenic risks of chemicals to humans, Silica, silicates dust and organic fibres, 1997, Vol. 68, IARC, Lyon, France.) In an update in 2012 IARC confirmed silica dust, crystalline in the form of quartz or cristobalite as Carcinogenic to humans Category 1.

US National Toxicology Program, 2000, known human carcinogen in the form of 'respirable crystalline silica (RCS) primarily quartz dust occurring in industrial and occupational settings

In June 2003, EU SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. "There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk "(SCOEL SUM Doc 94-final, June 2003). So, there is a body of evidence supporting the fact that increased cancer risk would be limited to people already suffering from silicosis. Worker protection against silicosis should be assured by respecting the existing regulatory occupational exposure limits and implementing additional risk management measures where required

## 12. ECOLOGICAL INFORMATION

### 12.1. Toxicity

No known significant effects or critical hazards

### 12.2. Persistence and degradability

Inorganic; not readily biodegradable

### 12.3. Bioaccumulation potential

Not applicable

### 12.4. Mobility in soil

Not available

### 12.5. Results on PBT and vPvB assessment

PBT Not available

PvB Not available

### 12.6. Other adverse effects

No known significant effects or critical hazards.

## 13. DISPOSAL CONSIDERATION

### 13.1. Waste treatment methods

#### Product

#### Method(s) of disposal

the generation of waste should be avoided or minimised wherever possible. Significant quantities of waste product residues shall be processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

#### Hazardous waste

#### EU Specific

Within the present knowledge of the supplier, this product is not regarded as hazardous waste in the EU, as defined by EU Directive 2008/98/EC.



**US Specific**

Dispose of in accordance with applicable federal, state, and local regulations

**Special precautions**

The product and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff to soil, waterways, drains and sewers.

## 14. TRANSPORT INFORMATION

|   |  |
|---|--|
| <b>UN Number</b>  | Not regulated as a dangerous good for transport  |
| <b>US Department of Transport</b>   | Not Regulated for transport  |
| <b>UN proper shipping name</b>  | Not applicable   |
| <b>Transport hazard class(es)</b>   | None applicable (note that the material contains natural radionuclides that may be detected by border control equipment Th-232, Ra-226). |
| <b>Packing group</b>  | Not applicable   |
| <b>Environmental hazards</b>  | None applicable. Not a marine pollutant.   |
| <b>Special precautions for user</b>                                       | See Sections 6.1 and 7.1   |
| <b>Transport in bulk according to Annex II of MARPOL and the IBC Code</b> | Referenced as Zircon Sand. No other applicable information   |

## 15. REGULATORY INFORMATION

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

**US Regulations US Specific****Quartz as an impurity**

|  |   |
|--|---|
| <b>TSCA:</b>                               | Listed on the United States TSCA (Toxic Substances Control Act) Inventory   |
| <b>OSHA:</b>                               | Occupational Safety and Health Administration's (OSHA) Directorate of Enforcement Programs. Hazard Communication Standard (HCS 2012), 29 CFR 1910.1200, for products containing crystalline silica.<br>OSHA Rule 2016 Occupational Exposure to Respirable Crystalline Silica 29 CFR parts 1910. 1915 and 1926 Fed Reg 81, no 58/ Friday, March 25, 2016/Rules and Regulations covers data, the permissible exposure limit of 50ug/m3 8-Hour TWA and includes requirements for exposure assessment, methods for controlling exposure, respiratory protection, medical surveillance, hazard communication and record keeping. |
| <b>SARA Section 313:</b>                   | Emission Reporting. Not subject to reporting requirements of the United States  |
| <b>CERCLA Section 103:</b>                 | This product is not subject to reporting under CERLCA. However, many states have more stringent reporting requirements. Report all spills in accordance with local, state, and federal regulations.   |
| <b>SARA Section 311/312 Hazard Classes</b> | Carcinogenicity Category 1 (Refer to Section 2 for OSHA Hazard Classification.  |
| <b>California Proposition 65 Warning:</b>  | This product can expose you to Quartz, which is known to the State of California to cause cancer. For more information go to <a href="http://www.P65Warnings.ca.gov">www.P65Warnings.ca.gov</a> .   |

**EU Specific**

|           |   |
|-----------|---|
| <b>EU</b> | Listed under The Protection of Workers from the Risks Related to Exposure to Carcinogens or Mutagens at Work Directive 2017/2398. Each EU country implements the BOEL individually. |
|-----------|---|

**EU Specific Chemical safety assessment:** substance is not classified therefore no Chemical Safety Assessment has been carried out for this product by the supplier

## 16. OTHER INFORMATION

This SDS has been prepared by Doral Mineral Sands, Safety Health and Environment Department.

**List of acronyms**

|               |  |
|---------------|--|
| ATE           | = Acute Toxicity Estimate                            |
| CLP           | = Classification, Labelling and Packaging Regulation |
| DMEL          | = Derived Minimal Effect Level                       |
| DNEL          | = Derived No Effect Level                            |
| EUH statement | = CLP-specific Hazard statement                      |

# SAFETY DATA SHEET



IMSBC = International Maritime Solid Bulk Cargoes Code  
PBT = Persistent, Bioaccumulative and Toxic  
PNEC = Predicted No Effect Concentration  
RRN = REACH Registration Number  
vPvB = Very Persistent and Very Bioaccumulative

## List of Abbreviations

|                   |  |
|-------------------|--|
| Bq/gm             | Becquerel per gram                               |
| IAEA              | International Atomic Energy Agency               |
| IRAC              | International Agency for Research on Cancer      |
| ICRP              | International Commission on Radiation Protection |
| mg/m <sup>3</sup> | Milligram per cubic metre                        |
| ASCC              | Australian Safety and Compensation Commission    |
| TLV               | Threshold Limit Value                            |
| TWA               | Time Weighted Average                            |

Date of Issue 20/09/2021  
Replaces 04/01/2021

## Disclaimer

To the best of the supplier's knowledge, the information contained herein is accurate. However, the supplier assumes no liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, the supplier cannot guarantee that these are the only hazards that exist.

This SDS is valid for five (5) years from the date of issue, but readers should refer to Doral's website ([www.doral.com.au](http://www.doral.com.au)) to ensure that this is the latest issue. As per the Worksafe Guidance Note NOHSC 3017, each user should review the information in the specific context of the intended application.

End of SDS