

# MATERIAL SAFETY DATA SHEET

Complies with Approved Code of Practice: Chemical (Hazard Information and Packaging for Supply) Regulations 2002 (UK) and European 91/155/EEC, 67/548/EEC, 1999/45/EC format, Australian NOHSC: 1008, 10005(1999), 2011(2003) and 2001/58/E, ANSI Standard Z400.1 and U.S. Federal OSHA Hazard Communication

## Section 1. Identification of Chemical Substance and Company

- 1.1. **PRODUCTS IDENTIFICATION:** zp®131 powder
- 1.2. **USE OF SUBSTANCE:** Plaster powder for making rapid-prototyping 3D models.
- 1.3. **COMPANY:** Z Corporation  
32 Second Ave.  
Burlington, MA 01803  
Contact Person: Manager of Technical Services  
Telephone Number: 781-852-5005  
**Foreign Contact:** +(45) 48 14 11 22  
Svanevang 2, 3450 Allerød, Denmark  
**Date of Preparation:** 7/06 **Revision:** 4/07
- 1.4. **EMERGENCY TELEPHONE:** 781-852-5005

## Section 2. Composition/Information of Ingredients

Substance is a mixture with following general composition:

Ingredients	Approximate % by weight	C.A.S. No. & EINECS No.	UK/EU Classification
1. Plaster which contains Crystalline Silica <sup>1</sup> at <1%	50-95%	Trade Secret	None
2. Vinyl Polymer	2-20%	Trade Secret	S22, S26, S51
3. Carbohydrate	1-20%	Trade Secret	None
4. Sulfate Salt	1-20%	Trade Secret	None

## Section 3. Hazard Identification

### Potential Human Health Effects:

May cause irritation of the eyes, mucous membranes, and respiratory tract. Eye contact may cause mechanical abrasion with burning, tearing and redness. Persons subjected to large amounts of this dust may experience conditions such as coughing, sneezing, nasal discharge, hoarseness, and nasal irritation. Labored breathing and chest pain may occur after excessive inhalation. Ingestion may cause gastrointestinal disturbances such as upset stomach and intestinal irritation.

### Target Organs or Systems:

Caution: May cause irritation to the eyes, skin, mucous membranes, upper respiratory tract. Ingestion of large amounts may be harmful. Kidneys.

<sup>1</sup> Testing of dust by manufacturer has not detected respirable crystalline silica, no exceedance of OSHA/TLV anticipated.

**Route of Exposure:**

Skin Contact: Repeated contact may dry the skin, causing cracking and dermatitis (rash), abrasion, redness, pain, burns, and itching. Sensitive individuals may develop an allergic dermatitis. When mixed with water, this material hardens and then slowly becomes hot.

**DO NOT** attempt to make a cast enclosing any part of the body using this material. This can result in severe burns that may require surgical removal of affected tissue or amputation of limb.

Eye Contact: May cause eye irritation. Symptoms may include pain, redness, tearing and corneal abrasion.

Inhalation: May be harmful if inhaled. Material may be irritating to the mucous membranes and upper respiratory tract.

Ingestion: May cause gastric disturbances, including inflammation of the mouth, throat, esophagus and/or stomach, abdominal pain, stomach upset, vomiting, and diarrhea.

Ingestion of a sufficient quantity could lead to mechanical obstruction of the gut, especially the pyloric region.

**Signs and Symptoms of Exposure:****Acute:**

May cause irritation of the eyes, skin, mucous membranes, and respiratory tract. May be harmful by inhalation, ingestion, or skin absorption.

**Chronic:**

Inhalation: Prolonged or repeated overexposure may cause signs/symptoms which include cough, shortness of breath, chest tightness, wheezing, increased heart rate, bluish colored skin, sputum production, changes in lung function tests, and/or respiratory failure. Pre-existing upper respiratory and lung disease may be aggravated by exposure. Prolonged and repeated exposure to respirable crystalline silica can result in lung disease (i.e. silicosis) and/or lung cancer. The product does not contain detectable levels of respirable silica based on the plaster manufacturer's test data and the overall total weight of crystalline silica is less than 1% in the product. If the final models are sanded, ground or pulverized low levels of respirable dust may be generated that contain respirable fractions of silica. Thus the actual workplace exposure must be determined by workplace exposure testing.

Skin: Repeated contact may dry the skin, causing cracking and dermatitis (rash). Sensitive individuals may develop an allergic dermatitis.

**Medical Conditions which may be aggravated by exposure:**

Significant exposure may adversely affect people with acute or chronic disease of the: Respiratory tract, skin, eyes, or digestive tract.

**Carcinogens Under OSHA, ACGIH, NTP, IARC, OTHER:**

This product contains less than 1% by weight of crystalline silica and there is less than 0.1% respirable crystalline silica. Respirable silica is listed as cancer agent by ACGIH, IARC as Group 1 and NTP as human carcinogen.

**Potential Environmental Effects:**

No significant environmental hazards are expected if material is released to the environment.

**Section 4. Emergency First Aid****Inhalation:**

Remove from area to fresh air. Seek medical attention if respiratory irritation develops or if breathing becomes difficult.

**Eye Contact:**

Immediately flush eyes with copious amounts of water for at least 15 minutes. Call physician if irritation continues.

**Skin Contact:**

Immediately wash skin with soap and rinse with large amounts of water. Remove and wash contaminated clothing promptly. If skin has become cracked, take appropriate action to prevent infection and promote healing.

**Ingestion:**

Wash out mouth with water provided the person is conscious and seek medical attention. Do not induce vomiting. Plaster hardens when wetted and, if ingested, may result in obstruction of the gut, particularly the pyloric region. Drinking gelatin solutions or large volumes of water may delay setting.

**Section 5. Fire and Explosion Hazard**

Flash point (Method Used)	Flammable limits	LEL	UEL
	Not Applicable	Not Applicable	Not Applicable
Product is not combustible.			

**Extinguishing Media:**

Use ABC type fire extinguishers.

**Special Fire Fighting Procedures**

As with all fires, fire fighters should wear full protective gear including supplied air respirators.

**Unusual Fire & Explosion:**

Emits toxic fumes under fire conditions. Avoid conditions, which produce dust.

**Exposure Hazard(s):** Material: Irritant

**Section 6. Accidental Release Measures****Procedures of Personal Precautions:**

Wear respirator, chemical safety goggles, and chemical gloves. Use appropriate precautions to minimize direct contact with skin or eyes and prevent inhalation of dust.

**Environmental Precautions:**

No significant environmental hazards identified. Surfaces subject to spills or dusting with this product can become slippery when wet, use care to avoid falls.

**Methods of Cleaning Up:**

Sweep or vacuum material from spillage into a waste container for disposal. Avoid production of dust. Do not flush down drains. Place in closed containers. Ventilate area and wash spill site after material pickup is complete.

**Waste Disposal Method:**

Follow safe solid waste disposal guidelines in accordance with federal, state and local regulations. National or regional provisions may also be in force.

**Section 7. Storage and Handling****Handling Precautions:**

**User Exposure:** Avoid handling procedures that produce high levels of dust.

**Storage Precautions:**

**Suitable:** Store product in a cool, dry, ventilated area away from sources of heat, moisture, strong oxidizing materials and explosives. Keep containers tightly closed.

**Special Requirements:**

Under planned use this product should not result in excessive dust or hazards to the user following the recommended processes for creating prototype models.

## Section 8. Exposure Controls & Personal Protection

### Exposure Limit Values:

The European Member States have different standards for the components in this preparation. These powders are potentially irritant dusts with general exposure standard of 10 mg/m<sup>3</sup>. Particulates not otherwise classified (total dust) in Germany are 6 mg/m<sup>3</sup>, and 10 mg/m<sup>3</sup> in other European Countries. The respirable dust levels are 5 mg/m<sup>3</sup>.

Component	IOELVs (UK)	EC OEL	ACGIH TLV	OSHA PEL
1. Plaster which contains Crystalline Silica <sup>2</sup> at <1%	6 mg/m <sup>3</sup> R  0.3 mg/m <sup>3</sup> total 0.1 mg/m <sup>3</sup> R	10 mg/m <sup>3</sup>	10 mg/m <sup>3</sup> Inhalable 3 mg/m <sup>3</sup> R  Respirable Dust = 10 mg/m <sup>3</sup> / % Silica + 2	15 mg/m <sup>3</sup> Total 5 mg/m <sup>3</sup> Respirable  Respirable Dust = 10 mg/m <sup>3</sup> / % Silica + 2
2. Vinyl Polymer	None established	None established	None established	None established
3. Carbohydrate	General Dust 4 mg/m <sup>3</sup> Inhalable 1.5 mg/m <sup>3</sup> R	10 mg/m <sup>3</sup>	10 mg/m <sup>3</sup> Inhalable 3 mg/m <sup>3</sup> R	15 mg/m <sup>3</sup> Total 5 mg/m <sup>3</sup> R
4. Sulfate Salt	None established	None established	None established	None established

### Notations:

IOELVs = Indicative Occupational Exposure Limit Values

OEL = Occupational Exposure Limits

TLV = Threshold Limit Value

R = Respirable

TWA = time weighted average

PEL = Permissible Exposure Limit

STEL = Short Term Exposure Limit

### Exposure Controls:

#### Ventilation Controls:

Use mechanical ventilation to prevent dust generation, if necessary.

#### Respiratory Protection:

Respirators are generally not needed under normal conditions of use. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). If dust levels exceed the exposure limits use a NIOSH-approved dust respirator (N95 or better). The actual workplace exposure to dust and crystalline silica should be determined by workplace exposure testing if the final product is sanded, ground, or pulverized. If there is exposure to respirable silica over workplace limits, an N100 respirator filter should be used along with proper engineering controls. In Europe, the respirator must be CE-marked and filter FFP3 is for high efficiency.

#### Protective Gloves:

Avoid skin contact by use of neoprene or like type chemical resistant gloves for dust exposure.

#### Eye Protection:

Safety goggles for dust are recommended during powder additions and cleaning.

#### Skin Protection:

Special skin protection is not routinely needed when using the product. If clothing becomes contaminated wash contaminated clothing before reuse.

#### Other Controls:

Safety shower and eyewash. Wash contaminated clothing before reuse. Always use good personal hygiene and housekeeping practices to minimize dust exposures. Wash thoroughly after handling.

<sup>2</sup> There is <0.1% respirable crystalline silica, no exceedance of OSHA/TLV anticipated.

**Environmental Exposure Controls:**

This product is not known to contain chemical components requiring specific environmental exposure controls. Specific environmental requirements, however do vary and each user needs to follow local Community environmental protection requirements.

**Section 9. Physical & Chemical Properties****Appearance:** Powder**Boiling Point (F°):** Not applicable (NA)**Vapor Pressure (MM Hg):** NA**Vapor Density (air = 1):** NA**pH:** 4 - 8 (aqueous solution)**Melting Point:** Not known**Flash Point:** NA**Flammability (solid, gas):** Noncombustible**Explosive Properties:** NA**Oxidizing Properties:** NA**Bulk Density:** 55-70 lb/ft<sup>3</sup>**Water/Oil Distribution:** NA**Spec Gravity (H<sub>2</sub>O = 1):** 1.3 - 3.0**Color:** White/Off-White Powder**Odour:** Slight odour**Clarity:** NA**Solubility:** 0.67 to 0.88 g/100 g solution**Solubility Fat:** NA**Evaporation Rate:** NA**Partition coefficient: n octanol/water:** NA**Density:** Not known**Viscosity:** Not known**Section 10. Stability and Reactivity**

**Stability:** Stable in dry environments. Dew point conditions or other conditions causing presence of liquid will harden the material.

**Conditions to Avoid:** Avoid wet / high humidity conditions. Avoid generating dust.

**Materials to Avoid: Incompatible:** Acids, strong basis, oxidizing agents, phosphorous, reactive metals (sodium, zinc, copper, calcium, aluminum, magnesium, carbon steel etc.), water, high humidity.

**Hazardous Decomposition Products:** Aldehydes, oxides of carbon, oxides of sulfur, oxides of potassium, nitrogen oxides, ammonia, and aluminum oxide. Temperatures above 1,450°C calcium oxide and sulfur dioxide. Irritating and toxic fumes at elevated temperatures.

**Hazardous Polymerization:** Will not occur.

**Section 11. Toxicological Information**

Data for product components only, mixture not evaluated.

<b>1. Plaster</b>	
<i>Human</i>	Oral LD50 – >5,000 mg/kg; Skin LD50 – not determined; Eye Irritation – not determined; Dermal LD50 – not determined The sulfate ion has caused gastro-intestinal disturbance in humans following large oral doses. Plaster has <1% Crystalline Silica as total weight and exposures to any hazardous levels of respirable silica are not anticipated. The following information is based on silica toxicology information not the hazard of this product. <b>Crystalline silica:</b> Prolonged and repeated exposure to airborne free respirable crystalline silica can result in lung disease (i.e., silicosis) and/or lung cancer. The development of silicosis may increase the risks of additional health effects. The risk of developing silicosis is dependent upon the exposure intensity and duration. In June, 1997, IARC classified crystalline silica (quartz and cristobalite) as a human carcinogen. In making the overall evaluation, the IARC Working Group noted that carcinogenicity in humans was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs. IARC states that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1).
<i>Monkeys, Rats, Hamsters</i>	Limited studies involving the repeated inhalation of an (unspecified) calcium sulfate failed to identify any particular target organs in monkeys, rats and hamsters
<i>Other</i>	Ames bacterial Test – no mutagenicity
<b>2. Vinyl Polymer</b>	
<i>Human</i>	Eye Irritation – Severe; Skin Irritant – Mild
<i>Rabbit</i>	Skin: In powder form, nonirritating. In aqueous solution, slight irritation. Practically nontoxic to animals. Skin LD50 – >1000 mg/kg Eye: The powder and aqueous solutions are slightly irritating to rabbit eyes; irritation subsided by 48 hours after exposure.

<i>Rat</i>	Inhalation LC50 – >20.0 mg/l 1 hr exposure. Note: This study is of limited quality since the concentration reported was nominal (i.e. not measured analytically): practically nontoxic to animals by acute inhalation exposure. Oral LD50 ->5000 mg/kg
<i>Guinea Pig</i>	Not a skin sensitizer in guinea pigs when dosed as a 10% aqueous solution.
<i>Other</i>	IARC Cancer Review: Group 3 IMEMDT 7,56,87; Animal Limited Evidence IMEMDT 19,341,79; Human Inadequate Evidence IMEMDT 19,341,79. Mutagenicity: Not mutagenic in vitro (Ames Test; Cytogenetic (Chromosomal Aberration) Assay in Chines Hamster V-79 Cells). Not mutagenic in vivo (mouse micronucleus assay).
<b>3. Carbohydrate</b>	
<i>Human</i>	Skin Irritant – 300 ug/3D-I Mild
<i>Mouse</i>	Intraperitoneal-Mouse LD50: 6600 mg/kg
<b>4. Sulfate Salt</b>	
<i>Rat</i>	Oral LD50 – 6,600 mg/kg

## Section 12. Ecological Information

Data for product components only, mixture not evaluated.

<b>1. Plaster</b>					
No known adverse effect on ecology.					
<b>2. Vinyl Polymer</b>					
<i>Aquatic Toxicity</i>	Test: LC50 Fish Species: Pimephales promelas Value: >40,000 ppm Time: 96 hr	Test: LC50 Fish Species: Lepomis macrochirus Value: > 10,000 ppm Time: 96 hr	Test: LC50 Crustacean Species: Ceriodaphnia dubia Value: 7,850 ppm Time: 48 hr	Test: LC50 Crustacean Species: Daphnia magna Value: 8,300 ppm Time: 48 hr	Test: EC50 Bacteria Species: Photobacterium phosphoreum Value: >50,000 ppm
<i>Bioaccumulation</i>	Biodegradability >90% (Zahn-Wellens test)				
<i>Biodegradability</i>	Biological Oxygen Demand (BOD): BOD5 = 0-5%; BOD30 = 100%				
<i>Other Adverse Effects</i>	No data available				
<b>3. Carbohydrate</b>					
No data available.					
<b>4. Sulfate Salt</b>					
No data available					

## Section 13. Disposal Considerations

Follow disposal procedures in accordance with federal, state and local regulations or applicable national or regional provisions.

## Section 14. Transportation Information

Non-regulated material.

## Section 15. Regulatory Information

The following provides a summary of the legal requirements. All ingredients are listed on the chemical inventories as listed below or qualifies for an exemption.

Ingredient	EPA TSCA	CA Prop 65	European Economic Community (EEC)				Canada Regs	
			EINECS	European Community Standards	Listed as dangerous chemicals	EEC Symbol	DSL	NPRI
(1) Plaster	Yes	Yes	Yes	Nuisance dust 10 mg/m <sup>3</sup>	No	None	No	No
(2) Vinyl Polymer	Yes	No	No	None	S22 S26 S51	None	Yes	No

(3) Carbohydrate	Yes	No	No	Nuisance dust 10 mg/m <sup>3</sup>	No	None	No	No
(4) Sulfate Salt	Yes	No	Yes	None	No	None	Yes	No

DSL = Canadian Domestic Substance List

NPRI = National Pollutant Release Inventory

### **Relevant Risk and Safety Phrases for the Mixture:**

#### **Safety Phrases:**

S2: Keep out of reach of children

S7: Keep container tightly closed

S22: Do not breathe dust

S24/25: Avoid contact with skin and eyes

S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

S36/37: Wear suitable personal protective equipment and gloves

S51: Use only in well ventilated areas

Pursuant to Title III of the Superfund Amendments and Reauthorization Act of 1986, (SARA) and 40 CFR 372 Part 372, this product does not contain any chemicals subject to the reporting requirements under Section 313.

This product does not contain chemicals subject to the reporting requirements under the Canadian National Pollutant Release Inventory (NPRI).

California Proposition 65: This product contains trace amounts of crystalline silica in raw product which are known to the state of California to cause cancer.

### **Section 16. Other Information**

#### **HMIS (Hazardous Materials Information System) for secondary labeling:**

**Health 1\***

**Fire Hazard 0**

**Reactivity 1**

**Personal Protective Equipment B**

\*additional chronic hazards present

**Reason for Revision:** Updated physical data information.

### **References**

- 1) 2006 Threshold Limit Values and Biological Exposure Indices. American Conference of Governmental Industrial Hygienists.
- 2) MSDS + Cheminfo, Canadian Centre for Occupational Health and Safety
- 3) SAX'S Dangerous Properties of Industrial Materials, Tenth Edition
- 4) TSCA & SARA Title III by the U.S. Environmental Protection Agency and the National Technical Information Services
- 5) ESIS:European Chemical Substance Information System
- 6) Raw Material Manufacturers Material Safety Data Sheets
- 7) US National Institute of Medicines Toxnet current 2007

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