

SAFETY DATA SHEET (SDS)

Ready Mixed Concrete




Established 1909

Section 1. Identification

Product identifier:	Ready Mixed Concrete
Other means of identification:	Concrete, Ready Mix Concrete, Concrete Ready Mix, Portland Cement Concrete, Ready Mix Grout, Permeable Concrete, Shotcrete, Gunite, Colored Concrete, Flowable Fill, Roller- Compacted Concrete, Fiber Reinforced Concrete
Identified uses:	Concrete is widely used as a structural component in many construction applications.
Supplier's details:	Thomas, Bennett & Hunter, Inc., 70 John St., Westminster, MD 21157
Emergency telephone number:	410-848-9030, Mon – Fri, 7:00am to 4:30pm Poison Help line: 1-800-222-1222

Section 2. Hazards Identification

Classification of mixture:	Skin Corrosion/Irritation: Category 1 Eye Damage/Irritation: Category 1 Sensitization – Skin: Category 1 Specific Target Organ Toxicity (Single Exposure) (Respiratory tract irritation): Category 3
Signal word:	Danger
Pictograms:	
Hazard statements:	Cause severe skin burns and serious eye damage. May cause an allergic skin reaction. May cause respiratory irritation.
Precautionary statements:	Wear protective gloves. Wear eye and/or face protection. Avoid breathing dust. Wash hands thoroughly after handling. May cause eye and skin burns. See Section 4 for additional details. May present risk of engulfment. See Section 7 for additional details. Overexposure to wet concrete can cause severe, potentially irreversible tissue (skin, eye, respiratory tract) damage in the form of chemical burns, including third degree burns. The same severe injury can occur if wet or moist skin is exposed to dry Ready Mixed Concrete dust. Clothing wet with moisture from concrete can transmit the caustic effects to the skin, causing chemical burns. Ready Mixed Concrete may cause skin burns with little warning; discomfort or pain cannot be relied upon to alert a person to a serious injury. Pain or the severity of the burn may not be felt or known until hours after the exposure. Medical conditions which may be aggravated by exposure: Contact with wet concrete may aggravate existing skin conditions. Sensitivity to hexavalent chromium can be aggravated by exposure.
Continued...	
Hazards not otherwise classified:	Not applicable.

Section 3. Composition/Information on Ingredients

Substance/mixture:	Mixture (Portland Cement, Coarse Aggregate, Fine Aggregate, Water, Admixtures)	
CAS number:	Not applicable.	
Product code:	Not applicable.	
Ingredient name (Structure of Ready Mixed Concrete may contain the following in some concentration ranges):	%	CAS Number
Quartz (Aggregates)	0-80	14808-60-7
Limestone (Aggregates)	0-80	131 7-65-3
Portland cement	0-20	65997-15-1
Slag cement	0-15	N/A
Fly ash	0-10	68131-74-8
<p>Any concentration shown as a range is to protect confidentiality or is due to batch variation. Chemical admixtures may be present in ranges of less than 1%.</p> <p>Individual composition of hazardous constituents may vary between types/different mix designs of Ready Mixed Concrete.</p> <p>There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.</p> <p>Occupational exposure limits, if available, are listed in Section 8.</p>		

Section 4. First-aid Measures

Inhalation:	Seek medical help if coughing or other symptoms persist. Inhalation of large amounts of Ready Mixed Concrete requires immediate medical attention. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If the individual is not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway.
Skin contact: Continued...	Get medical attention immediately. Heavy exposure to Ready Mixed Concrete dust, wet concrete or associated water requires prompt attention. Quickly remove contaminated clothing, shoes, and leather goods such as watchbands and belts. Quickly wash or brush away Ready Mixed Concrete. Immediately wash thoroughly with gently flowing water and non-abrasive pH neutral soap. Seek medical attention for rashes, burns, irritation, dermatitis and prolonged unprotected exposures to wet concrete, concrete mixtures or liquids from wet concrete. Burns should be treated as caustic burns. Ready Mixed Concrete may cause skin burns with little warning. Discomfort or pain cannot be relied upon to alert a person to a serious injury. You may not feel pain or the severity of the burn until hours after the exposure. Chemical burns must be treated promptly by a physician. In the event of any complaints or symptoms, avoid further exposure.
Eye contact:	Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 20 minutes. Chemical burns must be treated promptly by a physician.
Ingestion:	Get medical attention immediately. Call a poison center or physician. Have victim rinse mouth thoroughly with water. Do not induce vomiting unless directed to do so by medical personnel. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop giving water if the exposed person feels sick as vomiting may be dangerous. If vomiting occurs, the head should be kept low so that vomit does not

	enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway.
Important symptoms/effects, acute and delayed:	
Inhalation:	May cause respiratory irritation. Adverse symptoms may include the following: respiratory tract irritation, coughing
Skin contact:	May cause severe burns. May cause an allergic skin reaction. Adverse symptoms may include the following: pain or irritation, redness, blistering may occur
Eye contact:	May cause serious eye damage. Adverse symptoms may include the following: pain, watering, redness
Ingestion:	May cause burns to mouth, throat and stomach. Adverse symptoms may include the following: stomach pains
Indication of immediate medical attention and special treatment, if necessary:	
If inhaled:	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Prolonged and repeated inhalation of respirable crystalline silica-containing dust in excess of appropriate exposure limits has caused silicosis, fibrosis or scar tissue formations in the lungs. Call a poison center or physician if you feel unwell.
If on skin: Continued...	Wash with plenty of pH neutral soap and water. Take off contaminated clothing. Wash contaminated clothing before reuse. If skin irritation or rash occurs: get medical attention. Ready Mixed Concrete may contain trace amounts of hexavalent chromium. Hexavalent chromium is associated with allergic skin reactions which may appear as contact dermatitis and skin ulcerations. Persons already sensitized may react to their first exposure to concrete. Other individuals may develop allergic dermatitis after repeated exposure to concrete. The symptoms of allergic reactions may include reddening of the skin, rash, and irritation. Symptoms of chronic exposure to wet concrete may include reddening, irritation, and eczematous rashes. Drying, thickening, and cracking of the skin and nails may also occur.
If in eyes:	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Exposure to dust may cause immediate or delayed irritation or inflammation. Eye contact by larger amount of dry power or splashes of wet Ready Mixed Concrete may cause effects ranging from moderate eye irritation to chemical burns or blindness. Immediately call a poison center or physician.
If ingested:	Irritating to mouth, throat and stomach. Ingestion of large quantities may cause severe irritation and chemical burns of the mouth, throat, stomach and digestive tract. Do not ingest Ready Mixed Concrete. Get immediate medical attention.
Notes to physician:	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Protection of first-aiders:	No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wear gloves when removing contaminated clothing.
See toxicological information listed in Section 11.	

Section 5. Fire-fighting Measures

Suitable extinguishing media:	Use an extinguishing agent suitable for the surrounding fire.
Unsuitable extinguishing media:	None known.
Specific hazards arising from the product:	No specific fire or explosion hazard.
Hazardous thermal decomposition products may include:	Carbon dioxide, carbon monoxide, sulfur oxides, metal oxide/oxides
Special protective equipment and precautions for fire-fighters:	Fire-fighters should wear appropriate protective equipment.

Section 6. Accidental Release Measures

For non-emergency personnel:	Personnel involved with the handling of wet unhardened concrete should take steps to avoid contact with the eyes and skin, through the use of gloves and suitable clothing as described in Section 8. Silica-containing respirable dust particles may be generated by crushing, cutting, grinding, or drilling hardened concrete or concrete products, and should always be avoided. Follow protective controls defined in Section 8 when handling these products. When cutting, grinding, crushing or drilling hardened concrete, use local exhaust or general dilution ventilation or other suppression methods to maintain dust levels below exposure limits.
For emergency responders :	For personal protective clothing and equipment requirements, please see Section 8.
Environmental precautions:	Wet unhardened concrete should be recycled or allowed to harden and disposed. Do not wash concrete down sewage and drainage systems or into bodies of water (e.g. lakes, streams, wetlands, etc.).
Methods and materials for containment and cleaning up spills:	Place spilled material into a contained area and allow wet unhardened concrete to harden and dispose in a landfill as common solid waste. Follow applicable Federal, State, and local regulations for disposal. Uncontaminated ready mixed concrete is neither a listed nor a characteristic hazardous waste under designations by the USEPA or USDOT.
USDOT Class: Uncontaminated ready mixed concrete does not meet any hazardous material class definition found in Title 49 Code of Federal Regulations Part 173.	

Section 7. Handling and Storage

Precautions for safe handling:	When required use appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure by obtaining and following special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe dust. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed.
Conditions for safe storage, including any incompatibilities:	A key to using the product safely requires the user to recognize that Ready Mixed Concrete reacts chemically with water to produce calcium hydroxide which can cause severe chemical burns. Every attempt should be made to

avoid skin and eye contact with concrete. Do not get Ready Mixed Concrete inside boots, shoes or gloves. Do not allow wet, saturated clothing to remain against the skin. Promptly remove clothing and shoes that are dusty or wet with concrete mixtures. Launder/clean clothing and shoes before reuse.

Section 8. Exposure Controls/Personal Protection

Ingredient name:	Exposure limits:			
	OSHA PEL:	ACGIH TLV:	NIOSH REL:	MSHA PEL:
Quartz* Continued...	TWA: 10 mg/m ³ / (%SiO ₂ +2) 8 hours. Form: Respirable TWA: 250 MPPCF / (%SiO ₂ +5) 8 hours. Form: Respirable	TWA: 0.025 mg/m ³ 8 hours. Form: Respirable fraction	TWA: 0.05 mg/m ³ 10 hours. Form: respirable dust	N/A
Portland cement	TWA: 5 mg/m ³ 8 hours. Form: Respirable fraction TWA: 15 mg/m ³ 8 hours. Form: Total dust	TWA: 1 mg/m ³ 8 hours. Form: Respirable fraction	TWA: 5 mg/m ³ 10 hours. Form: Respirable fraction TWA: 10 mg/m ³ 10 hours. Form: Total	N/A
Limestone*	TWA: 5 mg/m ³ 8 hours. Form: Respirable fraction TWA: 15 mg/m ³ 8 hours. Form: Total dust	N/A	TWA: 5 mg/m ³ 10 hours. Form: Respirable fraction TWA: 10 mg/m ³ 10 hours. Form: Total	N/A
Fly ash*	TWA: 5 mg/m ³ 8 hours. Form: Respirable fraction TWA: 15 mg/m ³ 8 hours. Form: Total dust	TWA: 10 mg/m ³ 10 hours. Form: Total	N/A	N/A
Slag cement	N/A	N/A	N/A	N/A
<p>*Each of these ingredients may have crystalline silica (quartz) as a component. The percent of silica varies greatly from product to product and also within the same product. Silica exposure may occur when respirable dust is present. Dust is not present in freshly mixed unhardened Ready Mixed Concrete.</p> <p>Admixtures may be present in quantities of less than 1%.</p>				
Appropriate engineering controls:	Use only with adequate ventilation. If user operations generate dust, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.			

	Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.
Individual protection measures (including Personal Protective Equipment): Continued...	<p>Clean water should always be readily available for skin and (emergency) eye washing. Periodically wash areas contacted by Ready Mixed Concrete with a pH neutral soap and clean, uncontaminated water. If clothing becomes saturated with Ready Mixed Concrete, it should be removed and replaced with clean, dry clothing. To prevent eye contact, wear safety glasses with side shields, safety goggles or face shields when handling dust or wet concrete. Wearing contact lenses when working with concrete is not recommended.</p> <p>Use impervious, waterproof, abrasion and alkali-resistant gloves. Do not rely on barrier creams in place of impervious gloves. Do not get Ready Mixed Concrete inside gloves.</p> <p>Use impervious, waterproof, abrasion and alkali-resistant boots and long-sleeved and long-legged clothing to protect the skin from contact with wet Ready Mixed Concrete. To reduce foot and ankle exposure, wear impervious boots that are high enough to prevent Ready Mixed Concrete from getting inside them. If finishing concrete, wear waterproof knee pads to protect knees. Do not get Ready Mixed Concrete inside boots, shoes, or gloves. Remove clothing and protective equipment that becomes saturated with concrete and immediately wash exposed areas of the body.</p> <p>Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved. Footwear and other gear to protect the skin should be approved by a specialist before handling this product.</p> <p>Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. (See OSHA Respiratory Protection Standard 29 CFR 1910.134)</p>

Section 9. Physical and Chemical Properties

Appearance (physical state, color, etc.)	Solid, semi-fluid, flowable, granular paste, varying Gray color, varying	Upper/lower flammability or explosive limits:	N/A
Odor:	Odorless	Vapor pressure:	N/A
Odor threshold:	N/A	Vapor density:	N/A
pH:	Pour solution: 12+	Relative density:	Normal weight concrete: 2.2 to 2.6
Melting point/freezing point:	N/A	Solubility:	N/A
Initial boiling and boiling range:	N/A	Partition coefficient: n-octanol/water:	N/A
Flash point:	Not flammable. Not combustible.	Auto-ignition temperature:	N/A
Evaporation rate:	N/A	Decomposition temperature:	N/A
Flammability (solid, gas):	N/A	Viscosity:	N/A

Section 10. Stability and Reactivity

Reactivity:	Cementitious materials react slowly with water forming hydrated compounds, releasing heat and producing a strong alkaline solution.
Chemical stability:	The product is stable.

Possibility of hazardous reactions:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid:	No specific data.
Incompatible materials:	Reactive or incompatible with the following materials: oxidizing materials, acids, aluminum and ammonium salt. Ready Mixed Concrete is highly alkaline and will react with acids to produce a violent, heat-generating reaction. Toxic gases or vapors may be given off depending on the acid involved. Reacts with acids, aluminum metals and ammonium salts. Aluminum powder and other alkali and alkaline earth elements will react in wet mortar or concrete, liberating hydrogen gas. Limestone ignites on contact with fluorine and is incompatible with acids, alum, ammonium salts, and magnesium. Silica reacts violently with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride yielding possible fire and/or explosions. Silicates dissolve readily in hydrofluoric acid producing a corrosive gas - silicon tetrafluoride.
Hazardous decomposition products:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological Information

Likely routes of exposure:	Dermal contact. Eye contact. Inhalation. Ingestion.						
Summary of symptoms (see additional detail in the pages that follow):							
Inhalation:	May cause respiratory irritation. Adverse symptoms may include the following: respiratory tract irritation, coughing.						
Skin contact:	May cause severe burns. May cause an allergic skin reaction. Adverse symptoms may include the following: pain or irritation, redness, blistering may occur						
Eye contact:	May cause serious eye damage. Adverse symptoms may include the following: pain, watering, redness						
Ingestion:	May cause burns to mouth, throat and stomach. Adverse symptoms may include the following: stomach pains						
Delayed and immediate effects:	Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation. If sensitized to hexavalent chromium, a severe allergic dermal reaction may occur when subsequently exposed to very low levels.						
Numerical measures of toxicity:	No data available.						
Ingredient name:	NPT	IARC	OSHA	MSHA	NIOSH	EPA	ACG IH
Portland cement	Known to be a human carcinogen.	N/A	N/A	N/A	N/A	N/A	A4
Quartz	Known to be a human carcinogen.	1	N/A	N/A	N/A	N/A	A2

INHALATION:

Dust generated from hardened product may irritate nose, throat, mucous membranes and respiratory tract by mechanical abrasion or corrosive action. Coughing, sneezing, chest pain, shortness of breath, inflammation of mucous membrane, and flu-like fever may occur following exposures in excess of appropriate exposure limits.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

Inhaling respirable dust and/or crystalline silica may aggravate existing respiratory system disease(s) (e.g., bronchitis, emphysema, chronic obstructive pulmonary disease) and/or dysfunctions. Exposure to dust may aggravate existing skin and/or eye conditions. Smoking and obstructive/restrictive lung diseases may also exacerbate the effects of excessive exposure to this product.

This product is a mixture of components. The composition percentages are listed in Section 3. Toxicological information for each component is listed below:

Chronic exposure to liquid cement has caused chronic dermatitis, the symptoms of which may include erythema (reddening), skin irritation, and eczematous rashes. Drying, thickening, and cracking of the skin and nails may also occur. Irritated or broken skin is more likely to develop further complications such as ulcers and infection, and may increase the chance of absorbing toxic materials into the body through the skin.

Individuals who become allergically sensitized to hexavalent chromates may experience an allergic reaction upon subsequent contact with those compounds (delayed Type IV hypersensitivity reaction).

The chronic toxicity effects described above have been associated with exposure to liquid cement. Once the product has set and hardened, these effects are extremely unlikely to occur; hardened cement base poses no known health hazard. If hardened product is subjected to mechanical force (such as in demolition work) which generate dust particles, exposure to respirable quartz dust is possible. Health effects of crystalline silica is described in this section.

Portland Cement:

Exposure Routes: inhalation, ingestion, skin and/or eye contact

Target Organs: Eyes, skin, respiratory system.

Acute Effect: Exposure to dry Portland cement may cause drying of the skin and mild irritation, or more significant effects from the aggravation of other conditions. Liquid Portland cement is caustic (pH > 12) and dermal exposure may cause more severe skin effects, including thickening, cracking or fissuring of the skin. Eye exposures to Portland cement may cause immediate or delayed irritation or inflammation of the cornea. Eye contact with larger amounts of dry powder or splashes of liquid Portland cement may cause effects ranging from moderate eye irritation to chemical burns and blindness. Inhalation of dry Portland cement may cause irritation to the moist mucous membranes of the nose, throat and upper respiratory system, or may cause or aggravate certain lung diseases or conditions.

Chronic Effect: Prolonged exposure can cause severe skin damage in the form of chemical (caustic) burns. Portland Cement is not listed as carcinogen on the NTP, IARC or OSHA list of carcinogens, however Portland Cement contains trace amounts of hexavalent chromium [Cr(VI)] and certain chromium compounds which are listed on the NTP and IARC lists of carcinogens. The total amounts of chromium and chromium compounds in Portland Cement are typically less than 0.003% and hexavalent chromium less than 0.001%.

Note: Some individuals who are exposed to Portland cement may exhibit an allergic response, which can result in symptoms ranging from mild rashes to severe skin ulcers. Cement dermatitis may be irritant contact dermatitis induced by the alkaline, abrasive, and hygroscopic (water-absorbing) properties of Portland cement, or it may be allergic contact dermatitis elicited by an immunological reaction to Cr(VI), or it may be a combination of the two.

Fly Ash:

Fly Ash is a mixture of components and the composition is highly variable depending on the source. The primary components of fly ash are silicon oxide and calcium oxide. Other typical ingredients in smaller percentage by weight include oxides of metals such as aluminum, iron and magnesium, and trace amounts of heavy metals. The possible toxic effects of the metal oxides are provided in this section.

Silicon Dioxide:

It is comprised of amorphous and crystalline forms of silica. In some batches, crystalline silica may represent up to 100% of silicon dioxide.

Exposure route: Eyes, respiratory system.

Target organs: Eyes, skin, respiratory system.

ACGIH, MSHA, and OSHA have determined that adverse effects are not likely to occur in the workplace provided exposure levels do not exceed the appropriate exposure limits. Lower exposure limits may be appropriate for some individuals including persons with pre-existing medical conditions as described under medical conditions aggravated by exposure.

A. SILICOSIS

The major concern is silicosis (lung disease), caused by the inhalation and retention of respirable crystalline silica dust. Silicosis leads to conditions such as lung fibrosis and reduced pulmonary function. The form and severity in which silicosis manifests itself, depends in part on the type and extent of exposure to silica dusts: chronic, accelerated and acute forms are recognized. In later stages the critical condition may become disabling and potentially fatal. Restrictive and/or obstructive changes in lung function may occur due to exposure. A risk associated with silicosis is development of pulmonary tuberculosis (silico- tuberculosis). Respiratory insufficiencies due to massive fibrosis and reduced pulmonary function, possibly with accompanying heart failure, are other potential causes of death due to silicosis.

Chronic or Ordinary Silicosis is the most common form of silicosis and can occur after many years of exposure to levels above the OELs for airborne respirable crystalline silica dust. Not all individuals with silicosis will exhibit symptoms (signs) of the disease. Symptoms of silicosis may include (but are not limited to): Shortness of breath; difficulty breathing with or without exertion; coughing; diminished work capacity; diminished chest expansion; reduction of lung volume; heart enlargement and/or failure. It is further defined as either simple or complicated silicosis.

Simple Silicosis is characterized by lung lesions (shown as radiographic opacities) less than 1 centimeter in diameter, primarily in the upper lung zones. Often, simple silicosis is not associated with symptoms, detectable changes in lung function or disability. Simple silicosis may be progressive and may develop into complicated silicosis or progressive massive fibrosis (PMF).

Complicated Silicosis or PMF is characterized by lung lesions (shown as radiographic opacities) greater than 1 centimeter in diameter. Although there may be no symptoms associated with complicated silicosis or PMF, the symptoms, if present, are shortness of breath, wheezing, cough and sputum production. Complicated silicosis or PMF may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease (cor pulmonale) secondary to the lung disease.

Accelerated Silicosis can occur with exposure to high concentrations of respirable crystalline silica over a relatively short period; the lung lesions can appear within five (5) years of the initial exposure. The progression can be rapid. Accelerated silicosis is similar to chronic or ordinary silicosis, except that the lung lesions appear earlier and the progression is more rapid.

Acute Silicosis can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough and weight loss. Acute silicosis is a rapidly progressive, incurable lung disease and is typically fatal.

B. CANCER

IARC - The International Agency for Research on Cancer ("IARC") concluded that there is "sufficient evidence in humans for the carcinogenicity of crystalline silica in the form of quartz or cristobalite", there is "sufficient evidence in experimental animals for the carcinogenicity of quartz dust" and that there is "limited evidence in experimental animals for the carcinogenicity of tridymite dust and cristobalite dust." The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite dust is carcinogenic to humans (Group 1)." The IARC evaluation noted that not all industrial circumstances studied evidenced carcinogenicity. The monograph also stated that "Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." For further information on the IARC evaluation, see IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 100C, "Silica Dust, Crystalline, in the Form of Quartz or Cristobalite" (2012).

NTP - In its Eleventh Annual Report on Carcinogens, concluded that respirable crystalline silica is known to be a human carcinogen, based on sufficient evidence of carcinogenicity from studies in humans indicating a causal relationship between exposure to respirable crystalline silica and increased lung cancer rates in workers exposed to crystalline silica dust.

OSHA - Crystalline silica is not on the OSHA carcinogen list.

CALIFORNIA PROPOSITION 65 - Crystalline silica in October 1996 was listed on the Safe Drinking Water and Toxic Enforcement ACT of 1986 as a chemical known to the state to cause cancer or reproductive toxicity.

There have been many articles published on the carcinogenicity of crystalline silica, which the reader should consult for additional information; the following are examples of recently published articles: (1) "Dose-Response Meta-Analysis of Silica and Lung Cancer", *Cancer Causes Control*, (20):925-33 (2009); (2) "Occupational Silica Exposure and Lung Cancer Risk: A Review of Epidemiological Studies 1996-2005", *Ann Oncol*, (17) 1039-50 (2006); (3) "Lung Cancer Among Industrial Sand Workers Exposed to Crystalline Silica", *Am J Epidemiol*, (153) 695-703 (2001); (4) "Crystalline Silica and The Risk of Lung Cancer in The Potteries", *Occup Environ Med*, (55) 779-785 (1998); (5) "Is Silicosis Required for Silica-Associated Lung Cancer?", *American Journal of Industrial Medicine*, (37) 252- 259 (2000); (6) "Silica, Silicosis, and Lung Cancer: A Risk Assessment", *American Journal of Industrial Medicine*, (38) 8-18 (2000); (7) "Silica, Silicosis, and Lung Cancer: A Response to a Recent Working Group Report", *Journal of Occupational and Environmental Medicine*, (42) 704-720 (2000).

C. AUTOIMMUNE DISEASES

There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders, -- scleroderma, systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys. For a review of the subject, the following may be consulted: (1) "Antinuclear Antibody and Rheumatoid Factor in Silica-Exposed Workers", *Arh Hig Rada Toksikol*, (60) 185-90 (2009); (2) "Occupational Exposure to Crystalline Silica and Autoimmune Disease", *Environmental Health Perspectives*, (107) Supplement 5, 793-802 (1999); (3) "Occupational Scleroderma", *Current Opinion in Rheumatology*, (11) 490-494 (1999); (4) "Connective Tissue Disease and Silicosis", *Am J Ind Med*, (35), 375-381 (1999).

D. TUBERCULOSIS

Individuals with silicosis are at increased risk to develop pulmonary tuberculosis, if exposed to persons with tuberculosis. The following may be consulted for further information: (1) "Tuberculosis and Silicosis: Epidemiology, Diagnosis and Chemoprophylaxis", *J Bras Pneumol*, (34) 959-66 (2008); (2) *Occupational Lung Disorders*, Third Edition, Chapter 12, entitled "Silicosis and Related Diseases", Parkes, W. Raymond (1994); (3) "Risk of Pulmonary Tuberculosis Relative to Silicosis and Exposure to Silica Dust in South African Gold Miners," *Occup Environ Med*, (55) 496-502 (1998); (4) "Occupational Risk Factors for Developing Tuberculosis", *Am J Ind Med*, (30) 148-154 (1996).

E. KIDNEY DISEASE

There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis is associated with the increased incidence of kidney diseases, including end stage renal disease. For additional information on the subject, the following may be consulted: (1) "Mortality from Lung and Kidney Disease in a Cohort of North American Industrial Sand Workers: An Update", *Ann Occup Hyg*, (49) 367-73 (2005); (2) "Kidney Disease and Silicosis", *Nephron*, (85) 14-19 (2000); (3) "End Stage Renal Disease Among Ceramic Workers Exposed to Silica", *Occup Environ Med*, (56) 559-561 (1999); (4) "Kidney Disease and Arthritis in a Cohort Study of Workers Exposed to Silica", *Epidemiology*, (12) 405-412 (2001).

F. NON-MALIGNANT RESPIRATORY DISEASES

NIOSH has cited the results of studies that report an association between dusts found in various mining operations and non- malignant respiratory disease, particularly among smokers, including bronchitis, emphysema, and small airways disease. NIOSH Hazard Review – Health Effects of Occupational Exposure to Respirable Crystalline Silica, published in April 2002, available from NIOSH, 4676 Columbia Parkway, Cincinnati, OH 45226, or at <http://www.cdc.gov/niosh/02-129A.html>.

Respirable dust containing newly broken particles has been shown to be more hazardous to animals in laboratory tests than respirable dust containing older silica particles of similar size. Respirable silica particles which had aged for sixty days or more showed less lung injury in animals than equal exposures of respirable dust containing newly broken pieces of silica.

Aluminum Oxide:

Exposure route: Inhalation, ingestion, eye/skin contact.

Target organs: Respiratory system, gastrointestinal system, eyes, skin.

Acute effect: Inhalation or ingestion of high concentrations of this substance may cause gastrointestinal and/or upper respiratory tract irritation. Eye and skin irritant.

Chronic effect/carcinogenicity: Aluminum oxide is not classifiable as a human carcinogen. On occasion workers chronically exposed to aluminum-containing dusts or fumes have developed severe pulmonary reactions including fibrosis, emphysema and pneumothorax. Long-term exposure may have effects on the central nervous system.

Iron Oxide: (Ferrous and Ferric Oxides) Exposure route: Inhalation, ingestion, skin

Target organs: Respiratory system, skin, eyes, neurological system

Acute effect: Major findings: stupor, shock, acidosis, hematemesis, bloody diarrhea or coma. Minor findings: vomiting, diarrhea, mild lethargy. Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis. Experimental work in animals exposed by intratracheal injection or by inhalation to iron oxide mixed with less than 5% silica has shown no evidence of fibrosis produced in lung tissue.

Chronic effect/carcinogenicity: Irritability, nausea or vomiting, and normocytic anemia. When exposed to levels greater than 50 to 100 milligram per day, it can result in pathological deposition of iron in the body tissues causing fibrosis of the pancreas, diabetes mellitus, and liver cirrhosis. Workers exposed to iron oxide fume and silica may develop a "mixed dust pneumoconiosis." Not classifiable as human carcinogen.

Calcium Oxide:

Exposure route: Inhalation, ingestion, skin/eye contact.

Target organs: Eyes, skin, respiratory system.

Acute effect: Direct contact with tissues, can result in burns and severe irritation because of its high reactivity and alkalinity. Major complaints of workers exposed to lime consist of irritation of the skin and eyes, although inflammation of the respiratory passages, ulceration and perforation of the nasal septum, and even pneumonia has been attributed to inhalation of the dust.

Chronic effect/carcinogenicity: Not classifiable as human carcinogen.

Magnesium Oxide:

Exposure route: Inhalation, eye/skin contact.

Target organs: Eyes, respiratory system.

Acute effect: Magnesium oxide dust caused slight irritation of the eyes and nose, conjunctivitis, inflammation of the mucous membrane, and coughing up discolored sputum after industrial exposures amongst workers exposed to an unspecified concentration of MgO.

Chronic effect/carcinogenicity: Not classifiable as human carcinogen.

Limestone:

Exposure Route: Eyes, skin, inhalation, ingestion.

Target Organs: Eyes, skin, respiratory system, gastrointestinal system

Acute Effect: Direct eye and skin contact with dust may cause irritation by mechanical abrasion or burning sensations, pain or blisters from corrosive/irritant effects. Dusts may irritate the nose, throat, gastrointestinal region and respiratory tract by mechanical abrasion or corrosive/irritant action. Coughing, sneezing, chest pain, shortness of breath, inflammation of mucous membrane, and flu-like fever may occur following exposures in excess of appropriate exposure limits. Small amounts (a tablespoonful) swallowed during normal handling operations are not likely to cause injury.

Ingestion of large amounts may cause gastrointestinal irritation and blockage. Other conditions related to acute exposure to some of the metal oxides in limestone include stupor, shock, acidosis, abdominal pain, hematemesis, bloody diarrhea, coma, vomiting, diarrhea, mild lethargy, benign pneumoconiosis, sore throat, burning sensation, inflammation of the respiratory passages, ulceration, perforation of the nasal septum, pneumonia and conjunctivitis.

Chronic Effect: Repeated exposure to respirable dust in excess of appropriate exposure limits has caused silicosis, a progressive pneumoconiosis (lung disease) and lung cancer. Restrictive and/or obstructive lung function changes may result from chronic exposure. Chronic tobacco smoking may further increase the risk of developing chronic lung problems. On occasion workers chronically exposed to the metal oxides in limestone have developed severe pulmonary reactions, effects on the central nervous system, irritability, nausea or vomiting, normocytic anemia, fibrosis of the pancreas, diabetes mellitus, liver cirrhosis, and "mixed dust pneumoconiosis."

Acute Toxicity Estimates for Ready-Mixed Concrete – Not Available

Section 12. Ecological Information

Ecotoxicity:	Only relevant in accidental spillages of fresh unhardened concrete. If it reaches water, it can result in a slight rise in pH. Hardened concrete is inert.
Persistence and degradability:	No data available.
Bioaccumulative potential :	No data available.
Mobility in soil:	No data available.
Other adverse effects:	No known significant effects or critical hazards.

Section 13. Disposal Considerations

If disposing Ready Mixed Concrete, it should be done in accordance with local, regional, and national regulations.

The generation of waste should be avoided or minimized wherever possible.

If disposing this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Process water should not be released to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Landfill should only be considered when recycling is not feasible. This material must be disposed of in a safe manner. Avoid dispersal of spilled material and runoff in waterways, drains and sewers.

Section 14. Transport Information

UN number:	Not regulated.
UN proper shipping name:	N/A
Transport hazard class(es):	N/A
Packing group:	N/A
Environmental hazards:	None.
Transport in bulk:	Annex II of MARPOL 73/78 and the IBC Code
Special precautions:	Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory Information

OSHA Hazard Communication: This product is considered by OSHA to be a hazardous material and should be included in the employer's hazard communication program.

CERCLA/SUPERFUND: This product is not listed as a CERCLA hazardous substance.

EPCRA SARA Title III: This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 and is considered a hazardous and a delayed health hazard.

EPCRA SARA Section 313: This product may contain substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

RCRA: If discarded in its hardened form, this product would not be a hazardous waste either by listing characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

TSCA: Portland Cement and crystalline silica are exempt from reporting under the inventory update rule.

California Proposition 65: Crystalline silica (airborne particulates of respirable size) and Chromium (hexavalent compounds) are substances known by the State of California to cause cancer.

WHMIS/DSL: Products containing crystalline silica and calcium carbonate are classified as D2A, E and are subject to WHMIS requirements.

Section 16. Other Information

Date of last revision:	June 2018
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***NOTICE TO READER/PRODUCT USER:**

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any 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, we cannot guarantee that these are the only hazards that exist.

This Safety Data Sheet (SDS) represents ingredients and values typical for Portland cement concrete. Concrete and its constituent ingredients vary in composition. Information on specific aggregates, cementitious materials, water and admixtures can be provided by the supplier upon request. The information contained in this SDS relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

The information set forth herein is intended for use by persons having technical skill and at their own discretion and risk. Since conditions of use are outside the concrete/concrete products producer's control, the producer makes no warranties, expressed or implied, and assumes no liability in connection with any use of this information.

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