



**Architectural Premix GFRC
Product Mix Information**

General Glass Fiber Reinforced Concrete (GFRC) Mix Design

GFRC is a glass fiber reinforced concrete produced differently than standard wet pour concrete. Cement, fine aggregates, and glass fibers are combined to produce shapes with less mass and substantially less weight. The mix is sprayed applied to ridged forms to make concrete composites used in architectural applications. The product mix consists of sand, cement, acrylic polymer, water, other admixtures as well as alkali-resistant (AR) glass fibers. Fine aggregates and Portland cement are premixed with AR glass fibers to produce a strong, sprayable slurry. Fiber content in our premix varies, but ranges are generally about 2.3% to 4.5% by weight. AR glass fiber content significantly increases Flexural Yield Strength. Typical water to cement ratios range from 0.32 to 0.38. The liquid acrylic polymer is added to the mix as a curing admixture in lieu of moist curing.

Mesa Precast Premix GFRC Mix Design (Mix ID: G-A)

General premix design is as follows (based on 94 lb of cement):

94 lb	Portland cement	Gray or White based (ASTM C150 type IP or II)
80 lb	Silica sand	White #30 silica sand (30-50 screen)
25 – 27 lb	Water	Potable water chilled with ice
5 lb	AR Glass fiber	Alkali resistant chopped fiber glass (1" strands)
10 lb	Liquid polymer	Forton polymer VF-774 (EPS 2774, PCI-MNL 128)
6 oz. – 8 oz.	Admixture	Daracem 19 (ASTM C494 Type A and F)
As REQ'D	*Integral color	Concrete color oxides pigments (ASTM C979)

*If color is requested options should be selected from Mesa Precast color charts unless otherwise noted.

We look forward to working with you on this and future projects. If you have any questions or concerns please call.

Sincerely,
Mesa Precast and Supply, LLC





Western Technologies Inc.
The Quality People
Since 1955

3737 East Broadway Road
Phoenix, Arizona 85040-2921
(602) 437-3737 • fax 470-1341

SAMPLING / TESTING OF PORTLAND CEMENT CONCRETE

Client **MESA PRECAST AND SUPPLY, LLC**
ATTN: CURT ALBRIGHT
415 SOUTH PRICE ROAD
TEMPE, ARIZONA 85281

Date of Report **9-04-2009**
Job No. **2149XL007**
Event / Invoice No. **40**
Authorized By **MPS/ALBRIGHT**
Sampled By **MPS/ADKINS**
Submitted By **MPS/BOGEL**
Lab No. **25569**
Date **9-03-09**
Date **8-06-09**
Date **9-03-09**

Project **LABORATORY SERVICES**
Contractor --
Type / Use of Concrete **GLASS FIBER REINFORCED CONCRETE**
Sample Source / Location **MIX G-A WITH LEHIGH WHITE CEMENT**
Reference: **FLEXURAL STRENGTH OF CONCRETE**
 ASTM C78 ASTM C947

Location --
Arch. / Engr. --
Supplier / Source **MESA PRECAST & SUPPLY**
Source / Location Desig. By **MPS/ADKINS**
Code / Specification: --
Date **8-06-09**

MATERIAL DATA

TEST PROCEDURES & RESULTS

FRESHLY MIXED CONCRETE SAMPLED IN ACCORDANCE WITH: ASTM C172 AASHTO T141
DEVIATIONS (AREA 1)

RESULTS OF TESTS ON FRESHLY MIXED CONCRETE:

TEMPERATURE, °F ASTM C1084 UNIT WEIGHT, LBF PER CF ASTM C138 AASHTO T121
SLUMP, IN. ASTM C143 AASHTO T118 AIR CONTENT, % ASTM C173 ASTM C231 AASHTO T153 AASHTO T186
DEVIATIONS (AREA 2)

SPECIMENS MADE / CURED / MOVED TO LABORATORY IN ACCORDANCE WITH: ASTM C31 AASHTO T23
SPECIMENS MADE & CURED IN THE LABORATORY IN ACCORDANCE WITH: ASTM C192

DEVIATIONS (AREA 3) **DEFLECTION VS. LOAD CURVE NOT RECORDED**

(ALL MEASUREMENTS TO 0.05 MM PER 5 PSI) FLEXURAL STRENGTH OF CONCRETE: ASTM C78 ASTM C947

SPECIMEN MARKING IF ANY	DATE TESTED	AGE IN DAYS	AVERAGE WIDTH, IN.	AVERAGE DEPTH, IN.	CONFORMANCE INDICATED	MAXIMUM LOAD, LBF	MODULUS OF RUPTURE, PSI	DEFECTS IN SPECIMENS / CAPS IF ANY	TESTED BY
	9-03-09	28	2.30	0.510	--	91.6	1530		RT
	9-03-09	28	2.26	0.530	--	114.7	1280		RT
	9-03-09	28	2.26	0.600	--	118.1	1450		RT
	9-03-09	28	2.37	0.680	--	133.8	1220		RT
	9-03-09	28	2.41	0.585	--	126.8	1535		RT
	9-03-09	28	2.26	0.545	--	103.9	1550		RT
AVERAGE							1430		

SPAN LENGTH, IN. **10** SPECIMENS WERE: CAPPED GROUND SHIMMED WITH LEATHER FOR TESTING

APPARENT MOISTURE CONDITION AT TIME OF TEST: **DRY**

Comments: **SPECIMENS WERE PREPARED BY CLIENT**

Copies To: **CLIENT (1)**

453095WT
092899

THE SERVICES REFERRED TO HEREIN WERE PERFORMED IN ACCORDANCE WITH THE STANDARDS OF CARE PRACTICED LOCALLY FOR THE REFERENCED METHODS AND RELATE ONLY TO THE CONDITIONS ON SAMPLE(S) TESTED AS STATED HEREIN. WESTERN TECHNOLOGIES INC. MAKES NO OTHER WARRANTY OR REPRESENTATION, EXPRESSED OR IMPLIED, AND HAS NOT CONFIRMED INFORMATION INCLUDING SOURCE OF MATERIALS SUBMITTED BY OTHERS.

REVIEWED BY

RT 9-4-9



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The Quality People
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3737 East Broadway Road
Phoenix, Arizona 85040-2921
(602) 437-3737 • fax 470-1341

LABORATORY REPORT

Client MESA PRECAST AND SUPPLY, LLC
ATTN: CURT ALBRIGHT
415 SOUTH PRICE ROAD
TEMPE, ARIZONA 85281

Date of Report 9-28-09
Job No. 2149XL007
Event / Invoice No. 40
Authorized By MPS/ALBRIGHT
Sampled By MPS/ADKINS
Submitted By MPS/BOGEL

Lab No. 25569
Date 9-03-09
Date 8-06-09
Date 9-03-09

Project LABORATORY SERVICES
Contractor --
Type / Use of Material GLASS FIBER REINFORCED CONCRETE
Sample Source / Location MIX G-A WITH LEHIGH WHITE CEMENT
Reference: ASTM C 948
Special Instructions: TWO SPECIMENS SUBMITTED

Location --
Arch. / Engr. --
Supplier / Source MESA PRECAST & SUPPLY
Source / Location Desig. By MPS/ADKINS
Date 8-06-09

TEST RESULTS

SPECIMENS NOMINAL SIZE: 12 IN. X 2 IN. X 1/4 IN.

DATE OF TEST: 9-03-09

SPECIMEN ID	DRY BULK DENSITY (PCF)	WET BULK DENSITY (PCF)	WATER ABSORPTION	APPARENT POROSITY
1	113	125	10.1%	18.3%
2	112	123	10.1%	18.1%

Comments:

Copies To: CLIENT (1)

450055WT1
092895

THE SERVICES REFERRED TO HEREIN WERE PERFORMED IN ACCORDANCE WITH THE STANDARD OF CARE PRACTICED LOCALLY FOR THE REFERENCED METHOD(S) AND RELATE ONLY TO THE CONDITION(S) OR SAMPLE(S) TESTED AS STATED HEREIN. WESTERN TECHNOLOGIES INC. MAKES NO OTHER WARRANTY OR REPRESENTATION, EXPRESSED OR IMPLIED, AND HAS NOT CONFIRMED INFORMATION INCLUDING SOURCE OF MATERIALS SUBMITTED BY OTHERS.

REVIEWED BY

[Signature] 9-29-09

PORTLAND POZZOLAN™ (MS) Type IP Portland Cement

Phoenix Cement Portland Pozzolan cement meets all chemical and physical requirements of the current ASTM Specification C 595, UBC Standard 19-1 and IBC 2000, 1903.2 for Types IP and IP (MS) blended hydraulic cements. In addition, Phoenix Cement Portland Pozzolan meets the performance requirements of ASTM C 1157 for Type Ms, moderate sulfate-resistant cement.

Phoenix Cement Portland Pozzolan is a blend of Phoenix Cement Company Type III (LA) and ASTM C 618 Class F fly ash interground at the mill. It is a general, all-purpose cement for use in most general construction applications where a typical Type III cement would be used.

Strength, Set Time and Pumping Ability

Phoenix Cement Type IP (MS) is designed to provide strength development and setting characteristics closely matching those of a typical Type I or Type II cement. Note that no further substitution of cement with fly ash or other pozzolan is necessary or recommended.

The spherical particle shape of the fly ash creates a ball-bearing effect in concrete that leads to superior pumpability and homogeneity.

Durability

As an intimate blend of Type III low alkali cement and Class F fly ash, Phoenix Cement Type IP (MS) provides superior resistance to sulfate attack. ACI 232.2, Use of Fly Ash in Concrete recommends Type II cement and Class F fly ash as superior to Type I cement alone for high resistance to sulfate attack.

The low alkali cement portion combined with the Class F fly ash greatly minimizes the potential for damage due to alkali-aggregate reactivity.

Uniformity

Testing after the blending process ensures consistency in strength, color, fineness, chemical composition and set time.

The Class F fly ash is subject to a rigorous quality assurance program meeting our own requirements that far exceed those of ASTM C 595, C 1157, UBC 19-1 and IBC 2000.

Convenience

For producers with limited silo space or who simply want the many benefits of utilizing fly ash, Phoenix Cement Type IP (MS) is the logical choice.

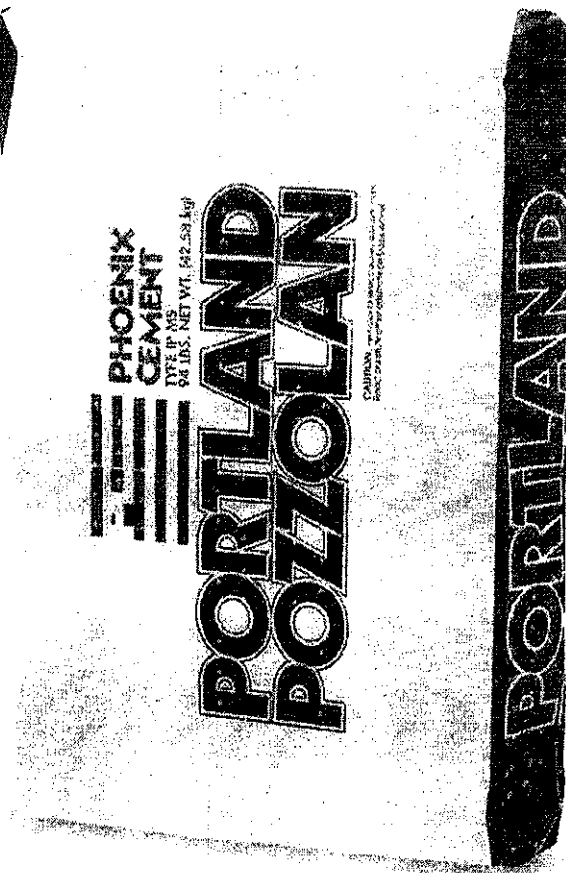
Availability

Produced year-round at our Clarkdale manufacturing facility 100 miles north of Phoenix, Type IP (MS) is available in bulk and sack, by rail or truck, 7 days a week.

Phoenix Cement Company has manufactured cement specifically designed for the Southwest since 1959. This experience enables Phoenix Cement Company to continue to provide some of the highest quality cement

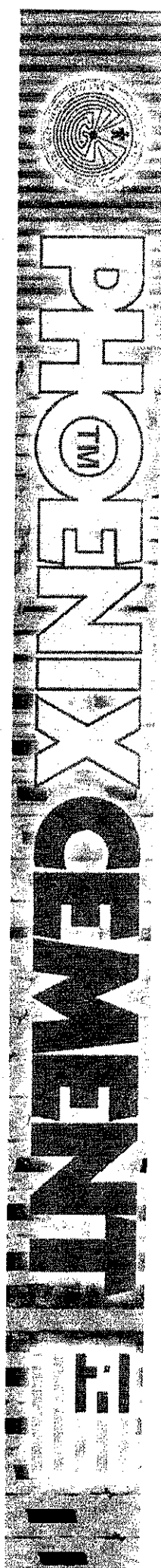
products available.

Phoenix Cement Company is an entity of the Salt River Pima Maricopa Indian Community.



Phoenix Cement Company

3300 E. Chaparral Rd., Suite 155, Scottsdale, AZ 85250
(480) 850-5757 / Fax: (480) 850-5758
www.phoenixcement.com





Salt River Materials Group

100% AMERICAN

MATERIAL SAFETY DATA SHEET

February 03, 2010

SECTION 1	CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
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Product Name: Portland Cements (Types IP, IP-MA)

Manufacturer's Name and Address:

Salt River Materials Group
Phoenix Cement Company
8800 E. Chaparral Rd. Suite 155
Scottsdale, AZ 85250-2606

24 - Hour Emergency Telephone: CHEMTREC: 1-800-424-9300

Customer Service: (480)-850-5757 Fax (480) 850-4333

Chemical Name: Mixture

Chemical Formula: Complex mixture of inorganic minerals including metals and silica

SECTION 2	COMPOSITION / INFORMATION ON INGREDIENTS
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Chemical Family

Calcium salts. Calcium silicate salts and other calcium salts containing iron and aluminum make up the majority of this product.

Chemical Name and Synonyms

Portland cement is also known as hydraulic cement.

Formula

This product consists of finely ground Portland Cement clinker mixed with up to 30% Class F Fly Ash and a small amount of calcium sulfate (gypsum).

Ingredients:

Portland cement (CAS #65997-15-1) – approximately 64% by weight
ACGIH TLV-TWA (1995-1996) = 10 mg total dust/m³
OSHA PEL (8-hour TWA) = 50 million particles/ft³

Portland Cements (Types IP, IP-MA)

Class F Fly Ash - approximately 30% by weight

Ingredients:

Silica (CAS #7631-86-9) 50 to 75%

Aluminum Oxide (CAS #1344-28-1) 20 to 35%

{OSHA TWA 15mg/m³tot} {OTHER OSHA LIMIT 5 mg/m³ respirable}

{ACGIHA LIMIT 10 mg/m³ as aluminum}

Silica Oxide (Quartz) (CAS #14808-60-7) 0 to 0.5%

{ACGIH TWA 0.1 mg/m³re}

Ferric Oxide (CAS #1309-37-1) 1 to 8%

{OSHA TWA 10mg/m³} {ACGIH TWA 5mg/m³ as I}

Calcium Oxide (CAS #1305-78-8) 1 to 8%

{OSHA TWA 5mg/m³} {ACGIH TWA 2mg/m³}

Gypsum (CAS #7778-18-9) – approximately 6% by weight

ACGIH TLV – TWA (1995-1996) = 10mg total dust/m³

OSHA PEL (8-hour TWA) = 10 total dust/m³

OSHA PEL (8-hour TWA) = 5 mg respirable dust/m³

Respirable quartz (CAS #14808-60-7) – less than 0.75% by weight

ACGIH TLV – TWA (1995-1996) = 0.10mg respirable quartz dust/m³

OSHA PEL (8-hour TWA) = (10 mg of respirable dust/m³) / (percent silica +2)

NIOSH REL (8-hour TWA) = 0.05 mg respirable quartz dust/m³

Other ingredients:

Diethylene-glycol (CAS #111-46-6) less than 0.1% by weight

Amine Phenolate (CAS #23184-71-6 / 64601-03-2) less than 0.1% by weight

Trace Constituents

Portland cement is made from materials mined from the earth and is processed using heat provided by fossil fuels. Trace amounts of naturally occurring, potentially harmful chemicals might be detected during chemical analysis. For example, Portland cement may contain up to 0.75% insoluble residue, some of which may be free crystalline silica. Other trace constituents may include calcium oxide (also known as lime or quick lime), magnesium oxide, potassium sulfate, sodium sulfate, chromium compounds, and nickel compounds.

SECTION 3	HAZARD IDENTIFICATION
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Emergency Overview:

Portland cement is a light gray powder that poses little immediate hazard. A single short-term exposure to the dry powder is not likely to cause serious harm. However, exposure of sufficient duration to wet portland cement can cause serious, potentially irreversible tissue (skin or eye) destruction in the form of chemical (caustic) burns. The same type of tissue destruction can occur if wet or moist areas of the body are exposed for sufficient duration to dry portland cement.

Portland Cements (Types IP, IP-MA)

POTENTIAL HEALTH EFFECTS

Relevant Routes of Exposure:

Eye contact, skin contact, inhalation, and ingestion.

Inhalation:

Portland cement may contain trace amounts of free crystalline silica. Prolonged exposure to respirable free crystalline silica can aggravate other lung conditions and cause silicosis, a disabling and potentially fatal lung disease. Iron Oxide contained in Fly Ash upon chronic exposure may result in Iron pigmentation of the lungs, siderosis, and benign pneumoconiosis. (Also see "Carcinogenic potential" below)

Exposure to portland cement may cause irritation to the moist mucous membranes of the nose, throat, and upper respiratory system. It may also leave unpleasant deposits in the nose.

Ingestion:

Although small quantities of dust are not known to be harmful, ill effects are possible if larger quantities are consumed. Portland cement should not be eaten.

Eyes:

Exposure to airborne dust may cause immediate or delayed irritation or inflammation.

Eye contact by larger amounts of dry powder or splashes of wet portland cement may cause effects ranging from moderate eye irritation to chemical burns and blindness. Calcium Oxide may cause acute corneal damage if sufficient amounts contact cornea. Such exposures require immediate first aid (see Section 4) and medical attention to prevent significant damage to the eye.

Skin:

Discomfort or pain cannot be relied upon to alert a person to hazardous skin exposure. Consequently, the only effective means of avoiding skin injury or illness involves minimizing skin contact, particularly contact with wet cement. Exposed persons may not feel discomfort until hours after the exposure has ended and significant injury has occurred.

Exposure to dry portland cement may cause drying of the skin with consequent mild irritation or more significant effects attributable to aggravation of other conditions. Dry portland cement contacting wet skin or exposure to moist or wet portland cement may cause more severe skin effects including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of (alkali) chemical burns.

Portland Cements (Types IP, IP-MA)

Carcinogenic potential:

Portland cement is not listed as a carcinogen by NTP, OSHA, or IARC. It may, however, contain trace amounts of substances listed as carcinogens by these organizations.

Crystalline silica, a potential trace level contaminant in portland cement, is now classified by IARC as a known human carcinogen (Group 1). NTP has characterized respirable silica as "reasonably anticipated to be [a] carcinogen".

Medical conditions which may be aggravated by inhalation or dermal exposure:

Pre-existing upper respiratory and lung diseases.

Unusual (hyper) sensitivity to hexavalent chromium (chromium +6) salts.

SECTION 4	FIRST AID MEASURES
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Eyes:

Immediately flush eyes thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

Skin:

Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment in all cases of prolonged exposure to wet cement, cement mixtures, liquids from fresh cement products, or prolonged wet skin exposure to dry cement.

Inhalation of Airborne Dust:

Remove to fresh air. Seek medical help if coughing and other symptoms do not subside. ("Inhalation" of gross amounts of portland cement requires immediate medical attention)

Ingestion:

Do not induce vomiting. If conscious, have the victim drink plenty of water and call physician immediately.

SECTION 5	FIRE FIGHTING MEASURES
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Flash Point [provided method used]:

None

Upper Explosion Limit: None

Lower Explosion Limit: None

Auto ignition Temperature:

Not combustible

Extinguishing Media:

Not combustible

Special Fire Fighting Procedures:

None

Portland Cements (Types IP, IP-MA)

Hazardous Combustion Products:

None

Unusual Fire and Explosion Hazards:

None

SECTION 6	ACCIDENTIAL RELEASE MEASURES
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Personal Precautions:

Collect dry material using a scoop. Avoid actions that cause dust to become airborne. Avoid inhalation of dust and contact with skin. Wear appropriate personal protective equipment as described in Section 8.

Environmental Precautions and Methods for Clean up:

Scrape up wet material and place in an appropriate container. Allow the material to "dry" before disposal. Do not attempt to wash Portland cement down drains.

Dispose of waste material according to local, state and federal regulations.

SECTION 7	HANDLING AND STORAGE
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Handling:

Promptly remove dusty clothing or clothing which is wet with cement fluids and launder before reuse. Wash thoroughly after exposure to dust or wet cement mixtures or fluids.

Storage:

Keep portland cement dry until used. Normal temperatures and pressures do not affect the material.

SECTION 8	EXPOSURE CONTROL / PERSONAL PROTECTION
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PERSONAL PROTECTION

Respiratory:

Avoid actions that cause dust to become airborne. Use local and general ventilation to control exposures below applicable exposure limits.

Use NIOSH/MSHA – approved (under 30 CFR 11) or NIOSH – approved (under 42 CFR 84) respirators in poorly ventilated areas, if an applicable exposure limit is exceeded, or when dust causes discomfort or irritation. (Advisory: Respirators and filters purchased after July 10, 1998 must be certified under 42 CFR 84.)

Portland Cements (Types IP, IP-MA)

Eye/Face:

Where potentially subject to splashes or puffs of cement, wear safety glasses with side shields or goggles. In extremely dusty environments and unpredictable environments, wear unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when working with portland cement or fresh cement products.

Skin:

Prevention is essential to avoiding potentially severe skin injury. Avoid contact with unhardened portland cement. If contact occurs, promptly wash affected area with soap and water. Where prolonged exposure to unhardened portland cement products might occur, wear impervious clothing and gloves to eliminate skin contact. Where required, wear sturdy boots that are impervious to water to eliminate foot and ankle exposure.

Do not rely on barrier creams; barrier creams should not be used in place of gloves.

Periodically wash areas contacted by dry portland cement or by wet cement or concrete fluids with a pH neutral soap. Wash again at the end of the work. If clothing becomes saturated with wet concrete, it should be removed and replaced with clean dry clothing.

Ventilation:

Use local exhaust or general dilution ventilation to control exposure within applicable limits.

SECTION 9	PHYSICAL AND CHEMICAL PROPERTIES
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Appearance:

Gray powder

Odor:

No distinct odor

Physical State:

Solid powder

Specific Gravity (H₂O = 1.0):

2.82

Vapor Density:

Not applicable

Vapor Pressure

Not applicable

Evaporation Rate:

Not applicable

Boiling Point:

Not applicable (i.e., >1000C)

Melting Point:

Not applicable

Solubility in Water:

Slightly soluble (0.1 to 1.0%)

Portland Cements (Types IP, IP-MA)

SECTION 10

STABILITY AND REACTIVITY

Stability:

Stable

Incompatibility:

Wet portland cement is alkaline. As such it is incompatible with acids, ammonium salts and phosphorus. Class F fly Ash will react violently with bromine trifluoride, fluorine, hydrogen fluoride, and phosphorus.

Hazardous Polymerization:

Will not occur

Hazardous Decomposition:

Will not spontaneously occur. Adding water produces (caustic) calcium hydroxide.

Conditions to Avoid:

Unintentional contact with water.

SECTION 11

TOXICOLOGICAL INFORMATION

For a description of available, more detailed toxicological information, contact the supplier or manufacturer.

SECTION 12

ECOLOGICAL INFORMATION

Ecotoxicity:

No recognized unusual toxicity to plants or animals.

Relevant Physical and Chemical Properties:

(See Sections 9 and 10)

SECTION 13

DISPOSAL CONSIDERATIONS

Dispose of waste material according to local, state and federal regulations. (Since portland cement is stable, uncontaminated material may be saved for future use.)

Dispose of bags in an approved landfill or incinerator.

Portland Cements (Types IP, IP-MA)

SECTION 14	TRANSPORTATION DATA
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Materials Description/Proper Shipping Name:

Portland cement is not hazardous under U.S. Department of Transportation (DOT) regulations.

Hazard Class:

Not applicable

Identification Number:

Not applicable

Required Label Text:

Not applicable

Hazardous Substances/Reportable Quantities (RO):

Not applicable

SECTION 15	OTHER REGULATORY INFORMATION
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Status under USDOL – OSHA Hazard Communications Rules, 29 CFR 1910.1200

Portland cement is considered a “hazardous chemical” under this regulation, and should be part of any hazard communication program.

Status under CERCLA/Superfund, 40 CFR 117 and 302

Not listed

Hazard Category under SARA (Title III), Sections 311 and 312

Portland cement qualifies as a “hazardous substance” with delayed health effects.

Status under SARA (Title III), Section 313

Not subject to reporting requirements under Section 313 and all potentially covered constituents are present in de minimus concentrations.

Status under TSCA (as of May 1997)

Some substances in portland cement are on the TSCA inventory list.

Status under the Federal Hazardous Substances Act

Portland cement is a “hazardous substance” subject to statutes promulgated under the subject act.

Status under California Proposition 65

This product contains up to 0.05 percent of chemicals (trace elements) known to the State of California to cause cancer, birth defects or other reproductive harm. California law requires the manufacturer to give the above warning in the absence of definitive testing to prove that the defined risks do not exist.

Portland Cements (Types IP, IP-MA)

SECTION 16	OTHER INFORMATION
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Prepared by:

Phoenix Cement Company

Approved by:

Phoenix Cement Company

Approval Date or Revision Date:

February 03, 2010

Date of Previous MSDS:

2004

Other Important Information

Portland cement should only be used by knowledgeable persons. A key to using the product safely requires the user to recognize that Portland cements (types IP, IP-MA chemically reacts with water, and that some of the intermediate products of this reaction (that is, those present while a portland cement product is "setting") pose a far more severe hazard than does portland cement itself.

DISCLAIMER:

While the information provided in this material safety data sheet is believed to provide a useful summary of the hazards of portland cement as it is commonly used, the sheet cannot anticipate and provide all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product.

SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THERE OF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY Phoenix Cement Company, except that the product shall conform to contracted specifications. The information provided herein was believed by Phoenix Cement

Company, to be accurate at the time of preparation or prepared from sources believed to be reliable. It is the responsibility of the user to investigate and understand other pertinent sources of information to comply with all laws and procedures applicable to the safe handling and use of product and to determine the suitability of the product for its intended use. Buyer's exclusive remedy shall be for damages and no claim of any kind, whether as to product delivered or for non-delivery of product, and whether based on contract, breach of warranty, negligence, or otherwise shall be greater in amount than the purchase price of the quantity of product in respect of which damages are claimed. In no event shall Seller be liable for incidental or consequential damages, whether Buyer's claim is based on contract, breach of warranty, negligence or otherwise.

Portland Cements (Types IP, IP-MA)

In particular, the data furnished in this sheet does not address hazards that may be posed by other materials mixed with Portland cement to produce Portland cement products. Users should review other relevant material safety data sheets before working with this portland cement or working on Portland cement products, for example, Portland cement concrete.

LEHIGH WHITE CEMENT



PRODUCT NAME

- Lehigh White Portland Cement Type I
- Lehigh White Portland Cement Type II/V
- Lehigh High Early Strength White Portland Cement, Type III
- Lehigh White Portland Cement - Water Repellent Added
- Lehigh White Masonry Cement, Type N
- Lehigh White Masonry Cement, Type S

MANUFACTURER

Lehigh Cement Company
White Cement Division
7660 Imperial Way • Allentown, PA 18195
Phone (800) 523-5488
(610) 366-4600
Fax: (610) 366-4638
E-mail: info@lehighwhitecement.com
www.lehighwhitecement.com

PRODUCT DESCRIPTION

Portland cement is the most widely used construction material in the world. Since 1897, the name Lehigh has meant quality in the cement industry. Lehigh White Cement has a well established reputation for serving the construction industry with high performance products that encourage creativity and ensure longevity.

Lehigh White Cement is the foremost supplier of white cements in North America; the company actively participates in educational programs, trade associations and industry expositions throughout the United States.

Depending on the application, Lehigh cement products may be specified in Division 3 - Concrete or Division 4 - Masonry.

APPLICATIONS

Lehigh White Portland Cement, Type I

• Lehigh White Type I Portland Cement is recommended for general architectural applications, such as; precast and prestressed architectural concrete, cast-in-place architectural and structural concrete, architectural concrete masonry, swimming pools and spas, colored mortars, ornamental statuary, reflective floors, floor tiles and pavers, cast stone, terrazzo, tile grout, glass fiber reinforced concrete products, concrete countertops, concrete roof tiles, traffic calming and delineation, median barriers, bridge parapets, sound walls, retaining walls, tunnel construction and reflective concrete paving. Lehigh White Type I Portland Cement may be used as a base to produce vibrant and true colors prized in almost any architectural concrete application.

Lehigh White Portland Cement - Type II/V

• Is typically suitable for the same applications as Type I cement. It is often specified when concrete will be exposed to seawater, soils and or ground water that have elevated sulfate contents or in mass concrete work where lower heat of hydration is desired.

Lehigh High Early Strength White Portland Cement, Type III

• Precast and prestressed architectural concrete, architectural concrete masonry units, cast stone, concrete brick, pavers, roof tile, cold weather construction or any application requiring high early strengths.

Lehigh White Portland Cement - Water Repellent Added

• Plastering applications, masonry mortar, tile grout and as a component in the manufacturer of cementitious coatings and water repellent products.

Lehigh White Masonry Cement, Type N

• For use in masonry mortar where a white or bright colored mortar joint is desired; for use in preparing Type N Mortar as described in ASTM Specification C270, Standard Specification for Mortar for Unit Masonry.

Lehigh White Masonry Cement, Type S

• For use in masonry mortar where a white or bright colored mortar joint is desired; for use in preparing Type S Mortar as described in ASTM Specification C270, Standard Specification for Mortar for Unit Masonry.

QUALITY

Lehigh White Portland and Masonry Cements are produced using carefully selected raw materials and rigid manufacturing standards to assure uniform whiteness and strength. When consistent white or bright colors are desired you can depend on Lehigh White Cements.

SUSTAINABILITY

Portland cement is manufactured by combining four of the top five most common elements on earth. White cement concrete is primarily used in architectural applications and does not have to be painted or covered to look great. Concrete construction can significantly reduce energy consumption due to the thermal mass properties of the material, it is durable and has an unsurpassed service life. White Portland cement concrete has high reflectivity values which helps reduce heat island effects.

STORAGE

Lehigh White Portland and Masonry Cements are moisture sensitive materials. Portland cement must be kept dry in order to retain its quality. Bulk Lehigh White Portland Cement should be stored in weather tight bins or silos. Lehigh White Portland and Masonry Cement bags should be kept in a dry area and stored on pallets whenever possible.

AVAILABILITY

Lehigh White Portland Cement is available through a network of distributors throughout the United States. Lehigh White Masonry Cement is widely available through a network of distributors east of the Rocky Mountains. For more information on Lehigh products or technical assistance, visit us online at www.lehighwhitecement.com or phone 800-523-5488.

CAUTION

Portland cement when dry is non-hazardous. When in contact with moisture (such as in eyes or skin) or when mixed with water to make concrete, mortar or grout, it becomes highly caustic and will burn (as severely as third-degree) the eyes or skin. Inhalation of dry Portland cement can irritate the upper respiratory system. For additional safety information please reference our Material Safety Data Sheets available online at www.lehighwhitecement.com or phone 800-523-5488.

WARRANTY

The information and statements herein are believed to be reliable, but are not to be construed as a warranty or representation for which we assume legal responsibility. No other warranty, representation, or condition of any kind, expressed or implied (including NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), shall apply. Having no control over the use of cement, Lehigh Companies will not guarantee finished work, nor shall they be liable for consequential damages.



ALCA

LEHIGH[™]

WHITE CEMENT

LEHIGH CEMENT COMPANY

MATERIAL SAFETY DATA SHEET

FOR

WHITE PORTLAND CEMENT

REVISED DATE: Sept. 2009

1. PRODUCT/COMPANY IDENTIFICATION

Supplier:
Lehigh Cement Company
7660 Imperial Way – Allentown, PA 18195
Contact our nearest Sales office for further information (SEE PAGE 7).
Sales office phone numbers and locations are also listed on our WEBSITE
(www.lehighwhitecement.com).

Chemical Family: Calcium Compounds

Chemical Name and Synonyms:
Portland Cement (CAS # 65997-15-1), Hydraulic Cement Types I, I (WRA), II, III, V

Trade Name and Synonyms:
Lehigh White Portland Cement

2. EMERGENCY AND FIRST AID

EMERGENCY INFORMATION:

Portland cement is a light gray or white powder. When in contact with moisture in eyes or on skin, or when mixed with water, portland cement becomes highly caustic (pH > 12) and will damage or burn (as severely as third-degree) the eyes or skin. Inhalation may cause irritation to the moist mucous membranes of the nose, throat and upper respiratory system or may cause or may aggravate certain lung diseases or conditions. Use exposure controls or personal protection methods described in Section 10.

EYES:

Immediately flush eye thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

SKIN:

Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment if irritation or inflammation develops or persists. Seek immediate medical treatment in the event of burns.

INHALATION:

Remove person to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Seek medical help if coughing and other symptoms do not subside. Inhalation of large amounts of portland cement require immediate medical attention.

INGESTION:

Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

ACCIDENTIAL RELEASE MEASURES

Clean up spilled material without causing it to become airborne or mixed with water to limit potential harm. Wear appropriate personal protective equipment. Dispose of waste material according to local, state or federal regulations.

3. COMPOSITION INFORMATION

DESCRIPTION:

This product consists of finely ground portland cement clinker mixed with a small amount of gypsum (calcium sulfate dihydrate). The portland cement clinker is made by heating to a high temperature a mixture of substances such as limestone, sand, clay and shale. Portland cement is essentially hydraulic calcium silicates contained in a crystalline mass, not separable into individual components. Major compounds are:

3CaO•SiO ₂	Tricalcium Silicate	CAS #12168-85-3
2CaO•SiO ₂	Dicalcium Silicate	CAS #10034-77-2
3CaO•Al ₂ O ₃	Tricalcium Aluminate	CAS #12042-78-3
4CaO•Al ₂ O ₃ •Fe ₂ O ₃	Tetracalcium aluminoferrite	CAS #12068-35-8
CaSO ₄ •2H ₂ O	Calcium Sulfate dihydrate (Gypsum)	CAS #7778-18-9 (CAS #13397-24-5)
CaCO ₃	Calcium Carbonate	CAS #1317-65-3

4. HAZARDOUS INGREDIENTS

COMPONENT	OSHA PEL (8-Hour TWA)	ACGIH TLV-TWA (1995-1996)	NIOSH REL (8-Hour TWA)
Portland Cement (CAS #65997-15-1) 50 to 95% by weight	5 mg respirable dust/m ³ 15 mg total dust/m ³	10 mg total dust/m ³	
Calcium sulfate (CAS #7778-18-9) {Gypsum (CAS #13397-24-5)} 0 to 10% by weight	5 mg respirable dust/m ³ 15 mg total dust/m ³	10 mg total dust/m ³	
Iron oxide (CAS #1309-37-1) 0 to 15% by weight	10 mg/m ³	5 mg/m ³	
Calcium carbonate (CAS #1317-65-3) 0 to 5% by weight	5 mg respirable dust/m ³ 15 mg total dust/m ³	10 mg total dust/m ³	
Magnesium oxide (CAS #1309-48-4) 0 to 5% by weight	15 mg total dust/m ³	10 mg total dust/m ³	
Calcium oxide (CAS #1305-78-8) 0 to 5% ¹ by weight	5 mg/m ³	2 mg/m ³	
Crystalline silica (CAS #14808-60-7) 0 to 5% by weight	<u>10 mg of respirable dust/m³</u> % SiO ₂ + 2 <u>30 mg of total dust/m³</u> % SiO ₂ + 2 <u>250 million particles/ft³</u> % SiO ₂ + 5	0.05 mg respirable quartz/m ³	0.05 mg respirable quartz dust/m ³

TRACE INGREDIENTS:

Due to the use of substances mined from the earth's crust, trace amounts of naturally occurring, potentially harmful constituents may be detected during chemical analysis. Portland cement may contain up to 0.75% insoluble residue. A small amount of this residue includes free crystalline silica. Portland cement also may contain trace (<0.05%) amounts of chromium salts or compounds (including hexavalent chromium) or other metals (including nickel compounds) found to be hazardous or toxic in some chemical forms. These metals are present mostly as trace substitutions within the principal minerals. Other trace constituents may include potassium and sodium sulfate compounds.

¹ If Portland/Lime blended product "0 to 25%" values.

5. HAZARD IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

NOTE: Potential health effects may vary depending upon the duration and degree of exposure. To reduce or eliminate health hazards associated with this product, use exposure controls or personal protection methods as described in Section 10.

EYE CONTACT:

(Acute/Chronic) Exposure to airborne dust may cause immediate or delayed irritation or inflammation of the cornea. Eye contact by larger amounts of dry powder or splashes of wet portland cement may cause effects ranging from moderate eye irritation to chemical burns and blindness.

SKIN CONTACT:

(Acute) Exposure to dry portland cement may cause drying of the skin with consequent mild irritation or more significant effects attributable to aggravation of other conditions. Discomfort or pain cannot be relied upon to alert a person to a hazardous skin exposure.

(Chronic) Dry portland cement coming in contact with wet skin or exposure to wet portland cement may cause more severe skin effects, including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of chemical (caustic) burns.

(Acute/Chronic) Some individuals may exhibit an allergic response upon exposure to portland cement. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers.

INHALATION:

(Acute) Exposure to portland cement may cause irritation to the moist mucous membranes of the nose, throat and upper respiratory system. Pre-existing upper respiratory and lung diseases may be aggravated by inhalation of portland cement.

(Chronic) Inhalation exposure to free crystalline silica may cause delayed lung injury including silicosis, a disabling and potentially fatal lung disease, and/or cause or aggravate other lung diseases or conditions.

INGESTION:

(Acute/Chronic) Internal discomfort or ill effects are possible if large quantities are swallowed.

CARCINOGENIC POTENTIAL:

Portland cement is not recognized as a carcinogen by NTP, OSHA, or IARC. However, it may contain trace amounts of heavy metals recognized as carcinogens by these organizations. In addition, IARC classifies crystalline silica, a trace constituent, as a known human carcinogen (Group 1). NTP has characterized respirable silica as "reasonably anticipated to be a carcinogen." (See also Section 13.)

6. PHYSICAL/CHEMICAL DATA

APPEARANCE/ODOR:	Gray, white or colored powder, odorless	PHYSICAL STATE:	Solid (Powder)
BOILING POINT:	> 1000°C	MELTING POINT:	Not applicable
VAPOR PRESSURE:	Not applicable	VAPOR DENSITY:	Not applicable
pH (IN WATER) (ASTM D 1293-95)	12 to 13	SOLUBILITY IN WATER:	Slightly soluble (0.1% to 1.0%)
SPECIFIC GRAVITY (H ₂ O = 1.0):	3.15	EVAPORATION RATE:	Not applicable

7. FIRE AND EXPLOSION

FLASH POINT:	None	LOWER EXPLOSIVE LIMIT:	None
AUTO IGNITION TEMPERATURE:	Not combustible	UPPER EXPLOSIVE LIMIT:	None
FLAMMABLE LIMITS	Not applicable	SPECIAL FIRE FIGHTING PROCEDURES:	None
EXTINGUISHING MEDIA:	Not combustible	UNUSUAL FIRE AND EXPLOSION HAZARDS:	None
HAZARDOUS COMBUSTION PRODUCTS:	None		

8. STABILITY AND REACTIVITY DATA

STABILITY:	Product is stable. Keep dry until used.
CONDITIONS TO AVOID:	Unintentional contact with water. Contact with water will result in hydration and produces (caustic) calcium hydroxide.
INCOMPATIBILITY:	Wet portland cement is alkaline. As such, it is incompatible with acids, ammonium salts and aluminum metal.
HAZARDOUS DECOMPOSITION:	Will not occur.
HAZARDOUS POLYMERIZATION:	Will not occur.

9. PRECAUTIONS FOR HANDLING, STORAGE AND DISPOSAL

HANDLING AND STORAGE	Keep dry until used. Handle and store in a manner so that airborne dust does not exceed applicable exposure limits. Use adequate ventilation and dust collection. Use exposure control and personal protection methods as described in Section 10.
SPILL:	Use dry clean-up methods that do not disperse dust into the air or entry into surface water. Material can be used if not contaminated. Place in an appropriate container for disposal or use. Avoid inhalation of dust and contact with skin and eyes. Use exposure control and personal protection methods as described in Section 10.
DISPOSAL:	Comply with all applicable local, state and federal regulations for disposal of unusable or contaminated materials. Dispose of packaging/containers according to local, state and federal regulations.

10. EXPOSURE CONTROLS/PERSONAL PROTECTION

RESPIRATORY PROTECTION:

Use local exhaust or general dilution ventilation to control dust levels below applicable exposure limits. Minimize dispersal of dust into the air.

If local or general ventilation is not adequate to control dust levels below applicable exposure limits or when dust causes irritation or discomfort, use MSHA/NIOSH approved respirators.

EYE PROTECTION:

Wear safety glasses with side shields or goggles to avoid contact with the eyes. In extremely dusty environments and unpredictable environments, wear tight-fitting unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when handling cement or cement containing products.

SKIN PROTECTION:

Wear impervious abrasion- and alkali-resistant gloves, boots, long-sleeved shirt, long pants or other protective clothing to prevent skin contact. Promptly remove clothing dusty with dry portland cement or clothing dampened with moisture mixed with portland cement, and launder before re-use. If contact occurs, wash areas contacted by material with pH neutral soap and water.

11. TRANSPORTATION DATA

Portland cement is not hazardous under U.S. DOT regulations.

12. TOXICOLOGICAL AND ECOLOGICAL INFORMATION

For a description of available, more detailed toxicological and ecological information, contact Lehigh Cement Company.

13. OTHER REGULATORY INFORMATION

Status under US OSHA Hazard Communication Rule 29 CFR 1910.1200:

Portland cement is considered a hazardous chemical under this regulation and should be included in the employer's hazard communication program.

Status under CERCLA/Superfund, 40 CFR 117 and 302:

Not listed.

Hazard Category under SARA (Title III), Sections 311 and 312:

Portland cement qualifies as a hazardous substance with delayed health effects.

Status under SARA (Title III), Section 313:

May be subject to reporting requirements under Section 313. Contact sales office for further information.

Status under TSCA (as of May 1997):

Some substances in portland cement are on the TSCA inventory list.

Status under the Federal Hazardous Substances Act:

Portland cement is a hazardous substance subject to statutes promulgated under the subject act.

Status under California Proposition 65:

This product contains crystalline silica, a substance known to the State of California to cause cancer. This product also may contain trace amounts of heavy metals known to the State of California to cause cancer, birth defects or other reproductive harm.

14. OTHER INFORMATION

This MSDS provides information on various types of portland cement products. A particular product's composition may vary from sample to sample. The information provided herein is believed by Lehigh Cement Company to be accurate at the time of preparation or prepared from sources believed to be reliable. Health and safety precautions in this data sheet may not be adequate for all individuals or situations. Users have the responsibility to comply with all laws and procedures applicable to the safe handling and use of the product, to determine the suitability of the product for its intended use, and to understand possible hazards associated with mixing portland cement with other materials. This product neither contains nor is directly manufactured with any controlled ozone depleting substances, Class I and II. SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY LEHIGH CEMENT COMPANY.

ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ASTM	American Society for Testing and Materials
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
ft ³	Cubic foot
IARC	International Agency for Research on Cancer
m ³	Cubic meter
mg	Milligram
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
REL	Recommended Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
TLV	Threshold Limit Value
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average

LEHIGH WHITE SALES OFFICES:

**NORTH & SOUTHEAST
REGIONS**

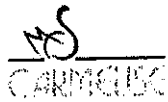
Lehigh Cement Company
7660 Imperial Way
Allentown, PA 18195
Toll Free: 800-961-5932
Tel: 610-366-4600
Fax: 610-366-4888

CENTRAL REGION

Lehigh Cement Company
1512 Lake Air Drive, Suite 105
Waco, Texas 76710
Toll Free: 800-331-7062
Tel: 254-772-9350
Fax: 254-776-1799

WESTERN REGION

Lehigh Cement Company
1980 Atlanta Avenue
Riverside, CA 92507
Toll Free: 800-368-7557
Tel: 951-683-7796
Fax: 951-683-7798



Carmeuse Industrial Sands, Inc.
 11 Stanwix Street, 21st Floor
 Pittsburgh, PA 15222
 Phone: 412-995-5500
 Fax: 412-995-5594

Date of Revision: 02/14/2011
Revision No. 5

Material Safety Data Sheet

Product Name:	SAND (Whole Grain)
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INFOTRAC: 800-535-5053 [In case of an emergency call this number 24 HOURS a day 7 DAYS a week.]

SECTION 1 - IDENTIFICATION OF THE SUBSTANCE AND COMPANY

1.1. Identification of the substance:

Chemical name: Silica
 Product name & synonyms: Silica Sand, Colorado Silica Sand ®, Glass Sand, Sand, Silica Sand, Quartz, Crystalline Silica, Foundry Sand, Engine Sand, Frac Sand, Filtration Sand, Bunker Sand, Turf Sand, Glass Sand, Natural alluvial sand and gravel, ¼, ⅝, ½, ¼, #4, #6, #12, #16, #20, #30, #60, #80, 4x50, Root Zone, Top Dressing, Bunker Sand, Play Sand, Masonry, Plaster Sand, 1/8th washed, .45-.55, Davis, or blends.

Formula: SiO₂
 Material Uses: Industries such as gas & oil, water filtration, construction materials, cement, non-skid surfaces, fillers, golf course sand, artificial athletic sands and insecticides

1.2. Company:

Main Office:
 11 Stanwix Street, 21st Floor
 Pittsburgh, PA 15222
 Telephone: 412-995-5500
 Fax: 412-995-5594

Canadian Office:
 P.O. Box 190
 Ingersoll, Ontario N5C 3K5
 Telephone: 519-423-6283
 Fax: 519-423-6545

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	% by Weight	CAS #	Exposure Limits
Crystalline silica quartz	74.0 – 99.5	308075-07-2	OSHA PEL: 30 mg/m ³ / (% silica + 2) (total) 10 mg/m ³ / (% silica + 2) (respirable) ACGIH TLV: 0.025 mg/m ³ (respirable)

This material is classified as hazardous under OSHA regulations.

WARNING: Never Use This Material for Sand Blasting

Product Name:	SAND (whole grain) (continued)
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SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: A white or tan sand, or ground sand. It is not flammable, combustible or explosive. Do not breathe this material. Crystalline silica (quartz) is not known to be an environmental hazard. Crystalline silica (quartz) is incompatible with hydrofluoric acid, fluorine, chlorine trifluoride or oxygen difluoride.

POTENTIAL HEALTH EFFECTS

- EYE** Contact can cause moderate to severe irritation of eyes, including discomfort or pain, local redness and swelling of the conjunctiva.
- SKIN** Contact can cause dryness or moderate irritation of skin.
- INGESTION** None known.
- INHALATION** If inhaled as dust, this product can cause irritation of the respiratory system resulting in coughing and/or sneezing. Higher exposures may cause a build-up of fluid in the lungs with severe shortness of breath. Inhalation of silica can also cause a chronic irreversible lung disorder, silicosis. Some medical reports state inhalation of silica dust may cause lung cancer.

Per ACGIH, adverse effects are not likely to occur in the workplace provided exposure levels do not exceed the appropriate TLVs/PELs. See Section 8. However, because of the wide variation in individual susceptibility, lower exposure limits may be appropriate for some individuals including persons with pre-existing medical conditions.

CHRONIC EFFECTS / CARCINOGENICITY: Silicosis, cancer, scleroderma, tuberculosis, nephrotoxicity and arthritis are potential chronic effects. See Section 11 for further information regarding these conditions

SIGNS AND SYMPTOMS OF EXPOSURE: There are generally no signs or symptoms of exposure to crystalline silica (quartz). Often, chronic silicosis has no symptoms. The symptoms of chronic silicosis, if present, are shortness of breath, wheezing, cough and sputum production. The symptoms of acute silicosis are the same; additionally, weight loss and fever are associated with acute silicosis. The symptoms of scleroderma include thickening and stiffness of the skin, particularly in the fingers, shortness of breath, difficulty swallowing and joint problems.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: The condition of individuals with lung disease (e.g., bronchitis, emphysema, chronic obstructive pulmonary disease) can be aggravated by exposure. See Section 11 for additional detail on potential adverse health effects.

POTENTIAL ENVIRONMENTAL EFFECTS: None known.

SECTION 4 - FIRST AID MEASURES

- EYE** Quickly and gently blot or brush away sand. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 15 minutes or until the sand is removed, while holding the eyelid(s) open. Occasionally lift eyelid(s) to ensure thorough rinsing. Beyond flushing, do not attempt to remove material from eye(s). Do not rub eyes. Seek medical attention immediately.
- SKIN** Wash with soap and water. Seek medical attention if irritation persists.
- INGESTION** Never give anything by mouth if the victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. If irritation or discomfort occurs, obtain medical advice immediately.
- INHALATION** Remove source of contamination or move victim to fresh air. Seek medical attention if necessary. If breathing has stopped, give artificial respiration.

Product Name:	SAND (whole grain) (continued)
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SECTION 5 - FIRE FIGHTING MEASURES

Flammable Properties

Flash Point: Not flammable

Method: N/A

EXTINGUISHING MEDIA	None required. Use suitable extinguishing media for surrounding fire.
FIRE & EXPLOSION HAZARDS	None
FIRE FIGHTING INSTRUCTIONS	None

SECTION 6 - ACCIDENTAL RELEASE MEASURES

SPILL /LEAK PROCEDURES	Use dustless methods (vacuum) and place in closable container for disposal or flush with water. Do not dry sweep. Use proper protective equipment indicated in Section 8.
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SECTION 7 - HANDLING AND STORAGE

HANDLING Keep in tightly closed containers. Protect containers from physical damage. Avoid direct skin contact with the material.

Silica sand material contains fine dust. If you breathe this dust you can suffer severe, irreversible lung damage and death. Some medical reports state inhalation of silica dust may cause lung cancer. Medical reports also link breathing silica dust to crippling arthritis and skin and eye irritation. See Section 11 for further information.

You must never use this material without having a government-approved respirator. The work area must also be thoroughly ventilated by the use of forced air ventilation during and after use of this material.

If dusty, use protective goggles. An eye wash station should be readily available where this product is used.

Prior to use or handling, you are advised to review and thoroughly understand all health precautions outlined in the Material Safety Data Sheet (MSDS).

STORAGE Store in a cool, dry, and well-ventilated location. Do not store near incompatible materials. (See Section 10 for list of incompatible materials.) Avoid breakage of bagged materials or spills of bulk material.

Product Name:	SAND (whole grain) (continued)
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SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS	Use sufficient local exhaust to reduce the level of respirable crystalline silica to below the PEL. See ACGIH "Industrial Ventilation, A Manual of Recommended Practice" (latest edition).	
RESPIRATORY PROTECTION	Use NIOSH/MSHA approved respirators if airborne concentration exceeds PEL. It is a violation of federal safety laws (OSHA) for employers to require workers to use this material without full respiratory protection. The federal laws that apply are: 29CFR 1910.134; 29CFR 1910.1000; 29CFR 1910.94.	
	The following chart specifies the types of respirators that may provide respiratory protection for crystalline silica.	
	<u>Particulate Concentration</u>	<u>MINIMUM RESPIRATORY PROTECTION*</u>
	10 x PEL or less	Any particulate respirator, except single -use or quarter-mask respirator. Any fume respirator or high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.
	50 x PEL or less	A high efficiency particulate filter respirator with a full facepiece. Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
	500 x PEL or less	A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
	Greater than 500 x PEL or entry and escape from unknown concentrations	A type C, supplied-air respirator with a full facepiece, hood, or helmet, operated in a positive pressure mode (see 29 CFR 1910.94(a)(iii)). Also see 30 CFR Part 11.
	*Use only NIOSH-approved or MSHA-approved equipment. See 29 CFR §1910.134 and 42 CFR §84. See also ANSI standard Z88.2 (latest revision) "American National Standard for Respiratory Protection"	
SKIN PROTECTION	Use appropriate gloves to prevent skin contact. Clothing should fully cover arms and legs and be tight fitting at the cuffs, neck and ankles to prevent dust from contacting the body. Clothing should be regularly washed to prevent dust accumulation.	
EYE PROTECTION	Use safety goggles.	
EXPOSURE GUIDELINES	OSHA PEL	ACGIH TLV
Crystalline silica (respirable)	10 mg/m ³ ÷ (% silica in the dust plus 2)	0.025 mg/m ³

Crystalline silica exists in several forms, the most common of which is quartz. If crystalline silica (quartz) is heated to more than 870°C it can change to a form of crystalline silica known as trydimite, and if crystalline silica (quartz) is heated to more than 1470°C, it can change to a form of crystalline silica known as cristobalite. Crystalline silica as trydimite and cristobalite are more fibrogenic than crystalline silica as quartz. The OSHA PEL for crystalline silica as trydimite and cristobalite is one-half the PEL for crystalline silica (quartz); the ACGIH TLV for crystalline silica as trydimite and cristobalite is one-half the TLV for crystalline silica as quartz.

Product Name:	SAND (whole grain) (continued)
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SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE	White or tan sand; granular, crushed
ODOR	Odorless
BOILING POINT	4046°F
MELTING POINT	3110°F
VAPOR PRESSURE	N/A
SOLUBILITY IN WATER	Insoluble
SPECIFIC GRAVITY	2.65
pH	N/Ap

SECTION 10 - STABILITY AND REACTIVITY

STABILITY	Chemically stable.
MATERIALS TO AVOID	Contact with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, oxygen difluoride, may cause fires and/or explosions.
CONDITIONS TO AVOID	None
HAZARDOUS DECOMPOSITION PRODUCTS	Silica will dissolve in hydrofluoric acid and produce a corrosive gas - silicon tetrafluoride.

SECTION 11 - TOXICOLOGICAL INFORMATION

No LD₅₀ or LC₅₀ have been identified for this product.

SILICOSIS

The major concern is silicosis, caused by the inhalation and retention of respirable crystalline silica dust. Silicosis can exist in several forms, chronic (or ordinary), accelerated, or acute.

Chronic or Ordinary Silicosis is the most common form of silicosis, and can occur after many years of exposure to relatively low levels of airborne respirable crystalline silica dust. 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 secondary to the lung disease (cor pulmonale).

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 fatal.

CANCER

IARC - The International Agency for Research on Cancer ("IARC") concluded that there was "sufficient evidence in humans for the carcinogenicity of crystalline silica in the forms of quartz or cristobalite from occupational sources", and that there is "sufficient evidence in experimental animals for the carcinogenicity of quartz and cristobalite." The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans

Product Name:

SAND (whole grain) (continued)

(Group 1).” The IARC evaluation noted that “carcinogenicity was not detected in all industrial circumstances studies. 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 68, “Silica, Some Silicates...” (1997). (Emphasis added)

NTP - The National Toxicology Program, in its Sixth Annual Report on Carcinogens, concluded that “silica, crystalline (respirable)” may reasonably be anticipated to be a carcinogen, based on sufficient evidence in experimental animals and limited evidence in humans.

OSHA - Crystalline silica (quartz) is not regulated by the U. S. Occupational Safety and Health Administration as a carcinogen.

There is substantial literature on the issues of the carcinogenicity of crystalline silica, which the reader should consult for additional information. A summary of the literature is set forth in “Exposure to crystalline silica and risk of lung cancer; the epidemiological evidence”, Thorax, Volume 51, pp. 97-102 (1996). The official statement of the American Thoracic Society on the issue of silica carcinogenicity was published in “Adverse Effects of Crystalline Silica Exposure”, American Journal of Respiratory and Critical Care Medicine, Volume 155, pp. 761-765 (1997). The official statement concluded that “The available data support the conclusion that silicosis produces increased risk for bronchogenic carcinoma. The cancer risk may also be increased by smoking and other carcinogens in the workplace. Epidemiologic studies provide convincing evidence for increased cancer risk among tobacco smokers with silicosis. Less information is available for never-smokers and for workers exposed to silica but who do not have silicosis. For workers with silicosis, the risks for lung cancer are relatively high and consistent among various countries and investigators. Silicosis should be considered a condition that predisposes workers to an increased risk of lung cancer.” Id. at 763.

SCLERODERMA

There is evidence that exposure to respirable crystalline silica or that the disease silicosis is associated with the increased incidence of scleroderma, an immune system disorder manifested by a fibrosis (scarring) of the lungs, skin and other internal organs. Recently, the American Thoracic Society noted that “there is persuasive evidence relating scleroderma to occupational silica exposures in setting where there is appreciable silicosis risk.” The following may be consulted for additional information on silica, silicosis and scleroderma (also known as progressive systemic sclerosis): Occupational Lung Disorders, Third Edition, Chapter 12, entitled “Silicosis and Related Diseases”, Parkes, W. Raymond (1994). “Adverse Effects of Crystalline Silica Exposure”, American Journal of Respiratory and Critical Care Medicine, Volume 155, pp. 761-765 (1997).

TUBERCULOSIS

Individuals with silicosis are at increased risk to develop tuberculosis, if exposed to persons with tuberculosis. The following may be consulted for further information: Occupational Lung Disorders, Third Edition, Chapter 12, entitled “Silicosis and Related Diseases”, Parkes, W. Raymond (1994). “Adverse Effects of Crystalline Silica Exposure”, American Journal of Respiratory and Critical Care Medicine, Volume 155, pp. 761-765 (1997). Silica Sand (Brady, Colorado Springs. Riverside, Bakersfield)

NEPHROTOXICITY

There are several recent studies suggesting that exposure to respirable crystalline silica or that the disease silicosis is associated with the increased incidence of kidney disorders. The following may be consulted for additional information on silica, silicosis and nephrotoxicity: Occupational Lung Disorders, Third Edition, Chapter 12, entitled “Silicosis and Related Diseases”, Parkes, W. Raymond (1994). “Further evidence of human silica nephrotoxicity in occupationally exposed workers”, British Journal of Industrial Medicine, Vol. 50, No. 10, pp. 907-912 (1993). “Adverse Effects of Crystalline Silica Exposure”, American Journal of Respiratory and Critical Care Medicine, Volume 155, pp. 761-765 (1997).

ARTHRITIS

There are recent studies suggesting that exposure to respirable crystalline silica or that the disease silicosis is associated with the increased incidence of arthritis. The following may be consulted for additional information on silica exposure and arthritis: American Journal of Industrial Medicine, Volume 35, pp. 375-381 “Connective Tissue Disease and Silicosis”, Rosenman KD; Moore-Fuller M.; Reilly MJ. (1999). Environmental Health Perspective, Volume 107, pp. 793-802 “Occupational Exposure to Crystalline Silica and Autoimmune Disease”, Parks CG; Conrad K; Cooper GS. (1999).

Product Name:	SAND (whole grain) (continued)
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SECTION 12 - ECOLOGICAL INFORMATION

ECOTOXICITY: Crystalline silica (quartz) is not known to be ecotoxic; i.e., no data suggests that crystalline silica (quartz) is toxic to birds, fish, invertebrates, microorganisms or plants.

ENVIRONMENTAL FATE: This material shows no bioaccumulation effect or food chain concentration toxicity.

SECTION 13 - DISPOSAL CONSIDERATIONS

Dispose of in accordance with all applicable federal, state, and local environmental regulations. The material may be landfilled; however, used material may contain materials derived from other sources that because of contamination may not be disposed of in landfills. Disposed material should be covered to minimize generation of airborne dust.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq. However, the material may be contaminated during use, and it is the responsibility of the user to assess the appropriate disposal of the used material.

SECTION 14 - TRANSPORT INFORMATION

US DOT	Not regulated
Proper Shipping Name	NA
Class	NA
UN Number	NA
Packing Group	NA

SECTION 15 - REGULATORY INFORMATION

United States

EPA

- RCRA Hazardous Waste Number: not listed (40 CFR 261.33)
- RCRA Hazardous Waste Classification (40 CFR 261): not classified
- CERCLA Hazardous Substance (40 CFR 302.4) unlisted specific per RCRA, Sec. 3001; CWA, Sec. 311(b)(4); CWA, Sec. 307(a), CAA, Sec. 112
- CERCLA Reportable Quantity (RQ): not listed.
- SARA 311/312 Codes: not listed.
- SARA Toxic Chemical (40 CFR 372.65): not listed.
- SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed, Threshold Planning Quantity (TPQ): not listed.
- TSCA: All chemical ingredients are listed on the U.S. TSCA Inventory List.
- FDA: Silica is included in the list of substances that may be included in coatings used in food contact surfaces, 21 CFR §175.300(b)(3)(xxvi).
- California Proposition 65: Respirable crystalline silica (quartz) is classified as a substance known to the state of California to be a carcinogen.

OSHA/MSHA Regulations

- Air contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): 5 mg/m³ TWA-8
- MSHA: not listed.
- OSHA Specifically Regulated Substance (29CFR 1910): not listed.

SECTION 16 - OTHER INFORMATION

HMIS: Health Risks 0*, Flammability 0, Reactivity 0, Personal Protection, E

NFPA: Health Hazard 0, Fire Hazard 0, Reactivity 0

The information contained herein is believed to be accurate and reliable as of the date hereof. However, Carmeuse makes no representation, warranty or guarantee as to results or as to the information's accuracy, reliability or completeness. Carmeuse has no liability for any loss or damage that may result from use of the information. Each user is responsible to review this information, satisfy itself as to the information's suitability and completeness, and circulate the information to its employees, customers and other appropriate third parties.

Orange County Sand - Typical Specifications & Properties

Products	Sieves									
	8	12	16	20	30	40	50	60	70	80
12 Mesh	0 - 19	42.7	50							
16 Mesh		0 - 6	25 - 50	28 - 63	4 - 30		0 - 10			
20 Mesh			0 - 0.1	7 - 31	40 - 70	10 - 40	0 - 10		0 - 3	
30 Mesh				0 - 1	2 - 40	40 - 80	20 - 45			
60 Mesh					0 - 0.2	0 - 3.3	2.8 - 22.8		44.8 - 60	
60I				0		0 - 5		5 - 25		20 - 45
90 Mesh						0	0 - 2		5 - 20	

Orange County Sand

Products	#10	#18	#35	#60	#100	#(140 - 270)	Pan
ProTour	0	2.6 - 7.7	41.4 - 50.6	37.6 - 45.9	3.3 - 4.5	1.7 - 3.1	0.5 - 0.9
Caltega Series	0	2.9 - 8.7	38.6 - 47.2	33.7 - 41.1	7.4 - 10.0	2.9 - 5.0	0.5 - 0.9
Wedge White	0	1.8 - 5.4	37.5 - 45.9	44 - 53.8	3.0 - 4.0	1.3 - 2.5	0.5 - 0.9
USGA Mix	0.05 - 0.6	2.9 - 8.6	38.7 - 47.3	32.3 - 40.0	0.5 - 8.9	3.1 - 5.0	2.1 - 3.3
ProCourt	0	1.5 - 5.4	37.5 - 45.9	44 - 53.8	3.0 - 4.0	1.3 - 2.5	0.5 - 0.9

Close

Orange County Sand - Typical Chemical Analysis

Chemical	
SiO ₂ (Silicon Dioxide)	75 - 84%
Fe ₂ O ₃ (Iron Oxide)	0.2 - 0.6%
Al ₂ O ₃ (Aluminum Oxide)	8 - 12%
TiO ₂ (Titanium Dioxide)	0 - 0.3%
CaO (Calcium Oxide)	1 - 3%
MgO (Magnesium Oxide)	0 - 0.1%
K ₂ O (Potassium Oxide)	3 - 5%
Na ₂ O (Sodium Oxide)	1 - 4%
LOI	0 - 0.2%

Close

Orange County Sand

Product	AFS	Effective Size (mm)	Coef. Of Unif.
12 Mesh	9	1.2 - 1.3	< 1.5
16 Mesh	13	0.85 - 0.75	< 1.6
20 Mesh	24	0.45 - 0.55	< 1.5
30 Mesh	39	0.3 - 0.4	< 1.5
60 Mesh	68	0.11 - 0.15	< 1.8
60I	70	0.1 - 0.15	< 1.8
90 Mesh	102	0.07 - 0.1	< 1.8

Close

Orange County Sand - Typical Physical Analysis

Nippon Electric Glass Co., Ltd.

906, Ima, Notogawa
Kanzaki, Shiga, Japan
TEL: (81) 748 42 7530
FAX: (81) 748 42 3956

Date: February 5, 2001
Version 2

ARG CHOPPED STRAND SPECIFICATION

1. Code Name : ACS 19 PH-901X(20)/V

2. Product Specification :

Type of Glass	Alkali Resistant Glass
Filament Diameter *(μ m)	18.0 \pm 2.0
Moisture content*(%)	less than 0.5
Strand Length*(mm)	19.0 \pm 2.0

*Data measured in accordance with Japanese Industrial Standard

3. Package :

Packaged in plastic bag

Safety Data Sheet

0. Introduction

Continuous glass fiber products are articles under EU regulation (REACH), US regulation (TSCA) and Japanese Regulation and therefore, no MSDS is legally required. GFA decides to continue to provide our customers SDS for assuring the safe handling and use of continuous glass fiber products. This SDS was revised in accordance with GHS.

1. Product and Company Identification

Product name: Alkali Resistant Glass Fiber Product
Product code: -
Manufacturer: Nippon Electric Glass Co., Ltd.
Address: 906, Imacho, Higashiomi, Shiga 521-1295, Japan
Phone: +81-748-42-2255
Fax: +81-748-42-6995

2. Hazards Identification

GHS classification:

Skin corrosion property·stimulativeness: Category 2 (irritation to skin)
Critical damage and stimulativeness to eye: Category 2B (low irritation to eye)
Specified target organ·general toxicity - single exposure: Category 3 (Irritating to respiratory tract)
*Other hazards are neither applicable nor available.

GHS Label element:

Pictogram or symbol:



*Continuous glass fiber products are articles and no MSDS is legally required. Therefore pictogram is not printed on our product label.

Signal word: Alert

Hazard statement:

Skin stimulativeness
Eye stimulativeness
Irritating to respiratory tract

Precautionary statement:

Contact with fibers can cause temporary irritation or itching to skin, eyes, nose or throat.
Avoid breathing dust and contact with skin or eyes. Follow these work practices:

- Wear long- sleeves, loose-fitting clothes, gloves and eye protection. Use a respirator approved by the national standards, such as a 3M Model 8710 or equivalent.
- Put waste fiber into a bag immediately after chopping and cutting glass fiber to minimize released fibers.
- Wash exposed areas with soap and warm water and gargle after handling.
- Wash work clothes separately from other clothing.
- Consult a physician in case of prolonged irritation, itching or pain.

When chopping, cutting or grinding glass fibers and handling glass powder or milled fiber, use local exhaust ventilation to ensure that the level of floating particles are below safety standards. Glass fibers are nonflammable, but most sizing and binder agents coated on the fibers are flammable. Fiber fuzz or cotton-like forms are especially easy to catch fire.

- Remove fuzz or cotton-like forms from the ventilation ducts and the working space.
- Clean or vacuum the dust before using a grinding or welding machine.

3. Composition / Information on Ingredient

Chemical name	Common Name	Content Wt. %	CAS No.
Soda zirconia silicate glass	AR-Glass (*1)	>=98	65997-17-3
N/A	Surface treating agent	<2	-

(*1: See attached document 1)

4. First-Aid Measures

Inhalation:

Gargle with clean water about ten times. Also, blow your nose gently. Seek medical attention if you feel some itching or irritation in the nose and/or throat.

Skin Contact:

Do not rub or scratch the affected areas. Rubbing or scratching may cause harsh itching or irritation. Rinse with running water first and then wash with warm water and soap. Bathing is an effective way

Product name	ARG-Fiber	Registry code	ARG-1E-8	Date revised	Oct..05,2009	Page 1/5
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to remove glass fiber.

Eye Contact:

Flush the eye with clean water for at least 15 minutes. Seek medical attention if irritation persists.

Ingestion:

Wash mouth with water thoroughly. Seek medical attention if necessary.

5. Fire-Fighting Measures

Suitable extinguishing agent: Any of the extinguishing agents, including water, carbon dioxide gas, foam, dry chemicals and powder are effective. Select an extinguishing agent depending on circumstances (source of fire, etc.).

Suitable extinguishing method: Use any of the ordinary fire extinguishing methods.

Other information: Glass fiber itself is not combustible. But the binders or surface treating agents on glass fiber are generally combustible and give off little hazardous by-products other than carbon monoxide, carbon dioxide and water on combustion.

6. Accidental Release Measures

Personal precautions: If necessary, wear a safety mask, safety gloves or safety goggles.

Environmental precautions: No special environmental precautions required.

Cleanup Method: If spilled on the floor, clean quietly so that dust particles will not be dispersed and put into a container or bag. For disposal, treat it same as general industrial waste.

7. Handling and Storage

Handling: Avoid inhalation or contact with the eye or skin. If necessary, use gloves, safety glasses (preferably goggles) and dust mask (approved by the government authorities: replaceable/one-way). Glass fiber is readily charged with static electricity. Static electricity can damage electronic components and cause explosions and fires. Take measures to prevent the build up of electrostatic charge.

Storage: Not applicable

8. Exposure Controls / Personal Protection

Occupational Exposure Limits:

- "Regulation on Prevention of Hazards Due to Dust" of Japan; 3.0mg/m³
- Japan Society for Occupational Health (2004 - 2005);
2mg/m³ (Inhalable dust: recommendation), 8mg/m³ (Total dust: recommendation)
- OSHA; 15mg/m³ TWA (total dust), 5mg/m³ TWA (inhalable dust)
- ACGIH; 1 fiber/cm³ TWA (respirable fraction)

Equipment measures: Install localized ventilation units in workplaces where dusts are generated by cutting, grinding and so on, and powder products such as milled fibers are handled. If ventilation units can't be installed for some reasons, be sure to wear a dust mask (approved by the government) during work. It is also preferable to provide facilities for washing the face and the body, gargling, changing and washing clothes.

Protective gear: Use the following protective gear as necessary in view of the conditions in the workplace environment.

- Respiratory protection: Dust mask (approved by the government authorities: replaceable / one-way)
- Hand protection: Gloves such as leather which don't allow glass fiber to pierce
- Eye protection: Safety glasses (goggle type)
- Skin and body protection: Loose-fitting top garment with long sleeves and collar (tightened cuffs) and long pants (tightened at the ankles).

9. Physical and Chemical Properties

Appearance: White glass fiber aggregate, solid

Odor: none

pH: Not applicable

Melting point (°C): (Softening point) approx. 820

Specific Gravity (25°C): Approx. 2.8 (bare glass)

Solubility (in water): Insoluble

10. Stability and Reactivity

Stability: Stable at normal condition

11. Toxicological Information

Acute toxicity: Not available.

Skin corrosion property · stimulativeness: Category 2

Critical damage and stimulativeness to eye: Category 2B

Respiratory organs sensitization or skin sensitization: Not available

Generative cell mutagenicity: Not available

Carcinogenicity: Not applicable. The International Agency for Research on Cancer (IARC) classes glass fiber into category 3 (No classification exists with regard to its carcinogenicity in humans.)

Product name	ARG-Fiber	Registry code	ARG-1E-8	Date revised	Oct..05,2009	Page 2/5
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Reproductive toxicity: Not available
Specified target organ - general toxicity – single exposure: Category 3
Specified target organ - general toxicity – repetitive exposure: Not available
Aspiration respiratory organs hazard: Not available

12. Ecological Information

Persistence/degradability: No data available.
Bioaccumulation: No data available.
Mobility in soil: No information available.

13. Disposal Consideration

For disposal, handle in the same manner as general industrial wastes. Also follow all other concerned laws, bylaws and legal regulations.

14. Transport Information

Not classified as hazardous in the meaning of transport regulation. No correspondence to UN classification and UN number.

15. Regulatory Information

Continuous glass fiber is not classified as a "Dangerous Substance" or "Dangerous Preparation" according to EU-Directives 67/548/EEC, 1999/45/EC and amendments.

Continuous glass fiber complies with all other national or local regulations regarding the use, transport, recycling, reuse, or disposal.

Glass fiber is considered an article and is exempted from requirements of TSCA, REACH, EINECS, DSL, AICS and so on.

Existing registration of chemical substances in the major countries

- Registration, Evaluation, Authorization and Restriction of Chemicals (REACH regulation in the EU)

EINECS No. Not applicable

CAS No. Not applicable

Registered names: (Article)

- European Inventory of Existing Commercial Chemical Substances

EINECS No. 266-046-0

CAS No. 65997-17-3

Registered names: Glass, oxide, chemicals

- Inventory of Toxic Substances Control Act (TSCA) in the US

CAS No. 65997-17-3

Registered names: Glass, oxide, chemicals

- Current chemical substances registration in China

CAS No. 65997-17-3

Registered names: Glass, oxide, chemicals

16. Other information

1) Literature references

- Recommendation on maximum allowable concentration (2008) Journal of Japan Society for Occupational Health, vol 50.157, 2008.
- Monographs on the Evaluation of the Carcinogenic Risks to Humans, Vol. 81 (2002), "Man-made Vitreous Fibers" International Agency for Research on Cancer (IARC).
- ACGIH (2001)
- ATSDR (2004)

2) Glass is not a chemical substance registered under the following Japanese laws.

- Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances.
- Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management

3) We have the following domestic laws and bylaws related to occupational safety and health.

- "Regulation on Prevention of Hazards Due to Dust" lay down in the provisions of the Enforcement Ordinance of the "Occupational Health and Safety Law".
- "Instructions on Labor Hygiene for Glass Fiber and Rock wool" (Statement of Principle No.1 by the Director-General of the Labor Standards Bureau at the Ministry of Labor: Jan. 1, 1993)

4) This SDS was revised in accordance with GHS. The information in this SDS has been prepared on the basis of the materials, information and data that are currently available and may be updated or corrected based on new findings. Moreover, cautions apply to normal handling. In the event of special handling take safety measures appropriate for the applications and the methods. The information in this SDS is solely intended for providing information and does not constitute any guaranteed values.

Product name	ARG-Fiber	Registry code	ARG-1E-8	Date revised	Oct..05,2009	Page 3/5
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Appendix 1

AR-Glass Composition

Component	AR-Glass Composition / wt%	CAS Numbers	Reference Number in Gazette List in Japan
SiO ₂	54 - 65	60676-86-0	1-548
ZrO ₂	16 - 24	1314-23-4	1-563
RO(MgO+CaO)	0 - 10	—	—
(MgO)	—	1309-48-4	1-465
(CaO)	—	1305-78-8	1-189
TiO ₂	1 - 7	13463-67-7	1-558
Al ₂ O ₃	0 - 2	1344-28-1	1-23
R ₂ O (Li ₂ O+Na ₂ O+K ₂ O)	10 - 30	—	—
(Li ₂ O)	—	—	9-2424
(Na ₂ O)	—	1313-59-3	1-495
(K ₂ O)	—	12136-45-7	9-2423

Note :

AR-glass chemical composition is generally described in the above table, where the each component is expressed in oxide according to the rule in the glass industry. However, glass is indeed obtained by a mineralogical process, resulting in a chemical network (matrix). Its constituents are closely linked together and are in a specific chemical environment, totally different from the initial state (in a raw materials) and from that occurring in simple compounds as metals or oxides. In any usual conditions, glass never gives metal or oxide as direct dissociation products. Glass is characterized by a continuous and essentially amorphous inorganic macromolecular structure, which is highly insoluble and biologically and chemically inert.

Appendix 2

Continuous Glass Fiber and Human Health

- 1) Continuous glass fiber (Continuous glass filament) is generally used as fibers for reinforcing resins such as FRP and FRTP.
- 2) Continuous glass fibers do not come under the provisions concerning "Respirable Fibers" lay down by the World Health Organization (WHO).

Note: The WHO's Definition of "Respirable Fibers": The WHO defines fibrous substances that are inhaled by humans on breathing and thus reach the lungs as "Respirable fibers". The definition specifies respirable fibers as: "a length larger than 5µm, a diameter smaller than 3µm, and an aspect ratio (i.e., ratio of length to diameter) larger than or equal to 3.)"

Continuous glass fibers do not possess cleavage planes which would allow them to split length-wise into fibers with smaller diameters, rather they break across the fiber, resulting in fibers which are of the same diameter as the original fiber with a shorter length and a small amount of dust (APFE: European Glass Fibre Producers Association, July 2003).

- 3) The International Agency for Research on Cancer (IARC), a sub-organization of the WHO, conducted twice evaluation studies on the "carcinogenicity of manmade mineral fibers in humans" in 1987 and in 2001. In both these evaluation studies, IARC concluded that the classification of continuous glass fibers in Group 3 is appropriate, confirming that there is currently no evidence for the carcinogenicity of continuous glass fibers to humans.

Note: Report statements on continuous glass fibers in the IARC Monograph Man-Made Vitreous Fibres Vol. 81, 2002

- (1) *Two of the plants of the US cohort study manufactured only continuous glass filament. For all workers and for long-term workers from these two plants, no evidence of excess mortality from respiratory cancer was found when compared with local rates. Adjustment for smoking had little effect on the standardized mortality ratio for respiratory cancer. A nested case-control study that included adjustments for smoking and co-exposure also provided no consistent evidence of excess mortality from respiratory cancer.*

The European cohort study reported few data to evaluate cancer risks among workers exposed to continuous glass filament. This study provided no convincing evidence of an elevated risk for lung cancer.

Results were also available from two smaller cohort studies in the USA and Canada. The US cohort study on one continuous glass filament plant, which included a nested case-control study, with information on smoking and co-exposure, provided no consistent evidence of an excess risk for lung cancer. The Canadian cohort study of one continuous glass filament plant did not include an assessment of smoking or co-exposure. This study also provided no consistent evidence of an excess risk for lung cancer.

- (2) *In experiments in which three types of continuous glass filament of relatively large diameter (>3µm) were administered intraperitoneally to rats, no significant increase in tumor response was observed.*

- 4) Continuous glass fibers are not considered as a dangerous substance following the rules of the European Directive 67/548/EC for labeling of dangerous substances and its subsequent amendments. This has been confirmed by the 23rd amendment (Directive 97/69/EC) on Man-made Mineral Fiber where continuous filament glass fibers are not to be labeled either for toxicity, carcinogenicity or irritation.

Note: Labeling is only applicable to glass or rock wool in certain circumstances and refractory fibers, i.e. "insulation wool"

- 5) Germany has added its own regulations to the EU Directive. The German regulations are generally accepted as being the toughest in the world. Yet even these exclude continuous glass fiber from the regulatory scope.

Approved by	Tamiya Sekiya
Created by	Katsuhiko Imai

Product name	ARG-Fiber	Registry code	ARG-1E-8	Date revised	Oct..05,2009	Page 5/5
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Forton VF-774

Technical Data

May 8, 2007

Description

- Water based, all acrylic co-polymer emulsion formulated to comply with PCI MNL 130, Quality Control Manual, Appendix L for curing admixtures used in GFRC.
- VF-774 also has long term natural ageing data to verify that its use in GFRC composites improves aged flexural properties.
- VF-774 can be used in precast concrete to reduce absorption, maintain color uniformity, and reduce or eliminate crazing and efflorescence.
- It is also used in concrete repair products and bonding agents due to its superior adhesive properties.

Physical Data (also MNL 130 specification)

- | | |
|---|------------------------|
| ○ Solids by weight | 51% ($\pm 1\%$) |
| ○ Viscosity 23°C (Brookfield, Spindle 2/50 rpm) | 100 – 300 cps |
| ○ pH | 8 – 10 |
| ○ Density at 20°C | 1055 kg/m ³ |
| ○ Tg | 11°C |
| ○ Particle Size | .1300 - .2500 |
| ○ Grit | 0 – 50 ppm |

Storage

- Forton VF-774 should be stored in a closed container, in a dry environment at storage temperatures between 5°C and 30°C.
- Storage should be enclosed, out of direct sun light and away from direct sources of heat.

Shelf Life

- With proper storage conditions the normal shelf life will typically be 9 months.

www.Ball-Consulting-Ltd.com

2301 Duss Avenue, Ambridge, PA 15003, Phone: 800-225-2673, Fax 724-266-1504, email: ball@ball-consulting-ltd.com
4665 South Ash, Suite G15, Tempe, AZ 85282, Phone: 888-967-7727, Fax: 480-967-8113, email: sshaffer@ball-consulting-ltd.com



Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identification

Product ID: VF-774 (EPS 2774)
Product Name: ACRYLIC EMULSION
Product Use: Resin product.
Print date: 01/Apr/2010
Revision Date: 30/Mar/2010

Company Identification

EPS Materials
1400 N. STATE ST.
MARENGO, IL 60152

EPS Tech Info Phone: 1-800-601-8111

24-Hour Medical Emergency Phone: 1-888-345-5732

2. HAZARDS IDENTIFICATION

Primary Routes of Exposure:

Inhalation
Ingestion
Skin absorption

Eye Contact:
None known.

Skin Contact:
None known.

Ingestion:
None known.

Inhalation:
None known.

3. COMPOSITION / INFORMATION ON HAZARDOUS INGREDIENTS

If this section is blank there are no hazardous components per OSHA guidelines.

4. FIRST AID MEASURES

4. FIRST AID MEASURES

Eye Contact:

Get medical attention, if symptoms develop or persist. Immediately flush eye(s) with plenty of water.

Skin Contact:

Wash off with plenty of water.

Ingestion:

Get medical attention if symptoms occur

Inhalation:

Get medical attention, if symptoms develop or persist. Move to fresh air.

Medical conditions aggravated by exposure:

Any respiratory or skin condition.

5. FIRE FIGHTING MEASURES

Flash point (Fahrenheit):

201

Flash point (Celsius):

94

Lower explosive limit (%):

not determined

Upper explosive limit (%):

not determined

Autoignition temperature:

not determined

Sensitivity to impact:

no

Sensitivity to static discharge:

Sensitivity to static discharge is not expected.

Hazardous combustion products:

See Section 10.

Unusual fire and explosion hazards:

None known.

Extinguishing media:

Carbon dioxide, dry chemical, foam and/or water fog.

Fire fighting procedures:

Firefighters should be equipped with self-contained breathing apparatus and turn out gear. Keep containers and surroundings cool with water spray.

6. ACCIDENTAL RELEASE MEASURES

Action to be taken if material is released or spilled:

Ventilate the area. Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13). Avoid contact with eyes.

7. HANDLING AND STORAGE

Precautions to be taken in handling and storage:

Keep container closed when not in use. Do not freeze. Since emptied containers may contain product residue, follow all label warnings, even after container is emptied. Do not cut, drill, grind, or weld on or near this container.

8. PERSONAL PROTECTIVE EQUIPMENT AND EXPOSURE CONTROLS

Personal Protective Equipment

Eye and face protection:

Wear safety glasses or goggles to protect against exposure.

Skin protection:

Usual hand protection for handling resin products.

Other Personal Protection Data:

Usual clothing for handling resin products.

Respiratory protection:

If exposure cannot be controlled below applicable limits, use the appropriate NIOSH approved respirator such as an air purifying respirator with organic vapor cartridge and dust/mist filter. Consult the respirator manufacturer's literature to ensure that the respirator will provide adequate protection. Read and follow all respirator manufacturer's instructions.

Ventilation

Ensure adequate ventilation, especially in confined areas.

Exposure Guidelines

OSHA Permissible Exposure Limits (PEL's)

ACGIH Threshold Limit Value (TLV's)

9. PHYSICAL PROPERTIES

Odor:	Normal for this product type.
Physical State:	liquid
pH:	not determined
Vapor pressure:	24 mmHg @ 77°F (25°C)
Vapor density (air = 1.0):	0.6
Boiling point:	not determined
Solubility in water:	Complete (soluble in all proportions)
Coefficient of water/oil distribution:	not determined
Density (lbs per US gallon):	8.8
Specific Gravity:	1.056
Evaporation rate (butyl acetate = 1.0):	0.1
Flash point (Fahrenheit):	201
Flash point (Celsius):	94
Lower explosive limit (%):	not determined
Upper explosive limit (%):	not determined
Autoignition temperature:	not determined

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	None known.
Incompatibility:	Avoid water-reactive materials, heat or contact with peroxides or other catalysts.
Hazardous Polymerization:	None anticipated.
Hazardous Decomposition Products:	Carbon monoxide and carbon dioxide.
Sensitivity to static discharge:	Sensitivity to static discharge is not expected.

11. TOXICOLOGICAL INFORMATION

Mutagens/Teratogens/Carcinogens: None known.

12. ECOLOGICAL DATA

No information on ecology is available.

13. DISPOSAL CONSIDERATIONS

Disposal should be made in accordance with federal, state and local regulations.

14. TRANSPORTATION INFORMATION

U.S. Department of Transportation

Proper Shipping Name: RESIN, NOT REGULATED

U.S. Highway & Rail Shipments

The supplier may apply one of the following exceptions: Combustible Liquid, Consumer Commodity, Limited Quantity, Viscous Liquid, Does Not Sustain Combustion, or others, as allowed under 49CFR Hazmat Regulations. Please consult 49CFR Subchapter C to ensure that subsequent shipments comply with these exceptions.

Reportable Quantity Description:

International Air Transport Association (IATA):

Proper Shipping Name: RESIN SOLUTION

International Maritime Organization (IMO):

Proper Shipping Name: RESIN SOLUTION

15. REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS:

SARA 311/312 Hazard Class:

Acute:	no
Chronic:	no
Flammability:	no
Reactivity:	no
Sudden Pressure:	no

U.S. STATE REGULATIONS:

Right to Know:

The specific chemical identity of a component may be withheld as a trade secret under 34 Pennsylvania Code, Chapter 317.

Pennsylvania Right To Know:

Additional Non-Hazardous Materials

PROPRIETARY RESIN	Trade Secret
WATER	7732-18-5

Rule 66 status of product

Not photochemically reactive.

INTERNATIONAL REGULATIONS - Chemical Inventories

US TSCA Inventory:

All components of this product are in compliance with U.S. TSCA Chemical Substance Inventory Requirements.

Canada Domestic Substances List:

All components of this product are listed on the Domestic Substances List.

16. OTHER INFORMATION

16. OTHER INFORMATION

HMIS Codes

Health: 0
Flammability: 1
Reactivity: 0
PPE: X - See Section 8 for Personal Protective Equipment (PPE).

Abbreviations:

OSHA - Occupational Safety and Health Administration, IARC - International Agency for Research on Cancer, NIOSH - National Institute of Occupational Safety and Health, NTP - National Toxicology Program, ACGIH - American Conference of Governmental Industrial Hygienists, SCAQMD - South Coast Air Quality Management District, TSCA - Toxic Substances Control Act, IATA - International Air Transport Association, IMO - International Maritime Organization, DOT - Department of Transportation, NA - Not applicable, NOT ESTAB - Not established, N.A.V. - Not available, RQ - Reportable quantity, WT - Weight, MG/CU M - Milligrams per cubic meter, G/L - Grams per liter, MM - Millimeters, MPPCF - Millions of particles per cubic foot, PPM - parts per million, PPT - parts per thousand, TCC/PM - Tag closed cup / Pensky-Martens, PB - Lead, PEL - Permissible exposure level, TWA - Time Weighted Average, STEL - Short term exposure limit, C - Celsius, F - Fahrenheit.

Disclaimer:

The data on this sheet represent typical values. Since application variables are a major factor in product performance, this information should serve only as a general guide. EPS assumes no obligation or liability for use of this information.

NOTICE: EPS MAKES NO WARRANTIES WITH RESPECT TO THIS PRODUCT, EXPRESS OR IMPLIED. EPS DISCLAIMS ALL IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR FREEDOM FROM PATENT INFRINGEMENT. EPS WILL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES. Your only remedy for any defect in this product is the replacement of the defective product, or a refund of its purchase price, at our option. This MSDS contains additional information required by the state of Pennsylvania.

Preparation Information:

Prepared By: Regulatory Affairs Department
Print date: 01/Apr/2010
Revision Date: 30/Mar/2010

DARAVAIR® 1000

Air-entraining admixture

ASTM C260

Product Description

Daravair® 1000 is a liquid air-entraining admixture that provides freeze-thaw resistance, yield control, and finishability performance across the full range of concrete mix designs. Daravair 1000 is a clean, light-orange product designed to generate specification-quality air systems. Based on a high-grade saponified rosin formulation, Daravair 1000 is chemically similar to vinsol-based products, but with increased purity and supply dependability. Daravair 1000 weighs approximately 8.5 lbs/gal (1.02 kg/L). Daravair 1000 does not contain intentionally added chloride.

Uses

Daravair 1000 air-entraining admixture may be used wherever the purposeful entrainment of air is required by concrete specifications. Formulated to perform across the entire spectrum of production mixes, Daravair 1000 generates quality, freeze-thaw resistant air systems in concrete conditions that include the following:

- Low slump
- Paving
- Central mix
- Extruded slip form
- Mixes containing hot water and accelerators
- Precast

- High cement factor
- Fly ash and slag
- Superplasticizers
- Manufactured sands

Performance

Air is incorporated into the concrete by the mechanics of mixing and stabilized into millions of discrete semi-microscopic bubbles in the presence of a specifically designed air-entraining admixture such as Daravair 1000. These air bubbles act much like flexible ball bearings increasing the mobility, or plasticity and workability of the concrete. This can permit a reduction in mixing water with no loss of slump. Placeability is improved. Bleeding, plastic shrinkage and segregation are minimized.

Through the purposeful entrainment of air, Daravair 1000 markedly increases the durability of concrete to severe exposures particularly to freezing and thawing. It has also demonstrated a remarkable ability to impart resistance to the action of frost and de-icing salts as well as sulfate, sea and alkaline waters.

Product Advantages

- Rapid air build suitable for short mix cycles
- Can be used in wide spectrum of mix designs



Addition Rates

There is no standard addition rate for Daravair 1000. The amount to be used will depend upon the amount of air required for job conditions, usually in the range of 4 to 8%. Typical factors which might influence the amount of air-entraining admixture required are temperature, cement, sand gradation, and the use of extra fine materials such as fly ash and microsilica. Typical Daravair 1000 addition rates range from ½ to 3 fl oz/100 lbs (30 to 200 mL/100 kg) of cement. Pretesting of concrete should be performed to confirm dosage rates required to achieve desired concrete performance.

The air-entraining capacity of Daravair 1000 is usually increased when other concrete admixtures are contained in the concrete, particularly water-reducing admixtures and water-reducing retarders. This may allow up to ⅓ reduction in the amount of Daravair 1000 required.

Mix Adjustment

Entrained air will increase the volume of the concrete making it necessary to adjust the mix proportions to maintain the cement factor and yield. This may be accomplished by a reduction in water requirement and aggregate content.

Compatibility with Other Admixtures and Batch Sequencing

Daravair 1000 is compatible with most Grace admixtures as long as they are added separately to the concrete mix. In general, it is recommended that Daravair 1000 be added to the concrete mix near the beginning of the batch sequence for optimum performance, preferably by “dribbling” on the sand. Different sequencing may be used if local testing shows better performance. Please see Grace

Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations. Daravair 1000 should not be added directly to heated water.

Pretesting of the concrete mix should be performed before use, and as conditions and materials change in order to assure compatibility, and to optimize dosage rates, addition times in the batch sequencing and concrete performance. Please consult your Grace representative for guidance.

Packaging & Handling

Daravair 1000 is available in bulk, delivered by metered tank trucks and in 55 gal (210 L) drums. Daravair 1000 will freeze at about 30°F (-1°C) but its air-entraining properties are completely restored by thawing and thorough mechanical agitation.

Dispensing Equipment

A complete line of accurate automatic dispensing equipment is available. These dispensers can be located to discharge into the water line, the mixer, or on the sand.

Specifications

Concrete shall be air entrained concrete, containing 4 to 8% entrained air. The air contents in the concrete shall be determined by the pressure method (ASTM Designation C231) or volumetric method (ASTM Designation C173). The air-entraining admixture shall be a completely neutralized rosin solution, such as Daravair 1000, as manufactured by Grace Construction Products, or equal, and comply with *Standard Specification for Air-Entraining Admixtures* (ASTM Designation C260). The air-entraining admixture shall be added at the concrete mixer or batching plant at approximately ½ to 3 fl oz/100 lbs (30 to 200 mL/100 kg) of cement, or in such quantities as to give the specified air contents.

www.graceconstruction.com

North American Customer Service: 1-877-4AD-MIX1 (1-877-423-6491)

Daravair is a registered trademark of W. R. Grace & Co.—Conn.

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.—Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

This product may be covered by patents or patents pending.
AIR-7G Printed in U.S.A. 5/09

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FA/LVI/1M

GRACE

W. R. GRACE
MATERIAL SAFETY DATA SHEET

Product Name: Daravair® 1000
MSDS ID Number: D-06421

MSDS Date: 10/21/2008

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Daravair® 1000
MSDS Number: D-06421
Cancelled MSDS Number: D-06208
MSDS Date: 10/21/2008
Chemical Family Name: Aqueous Solution of Neutralized Resin Acids and Rosin Acids
Product Use: Concrete Air Entraining Agent
Chemical Formula: Mixture-NA
CAS # (Chemical Abstracts Service Number): Mixture-NA

Manufactured by:

W.R.Grace & Co.-Conn.
62 Whittemore Avenue
Cambridge, MA 02140

Grace Canada, Inc.
294 Clements Road West
Ajax, Ontario L1S 3C6

In Case of Emergency Call:

In USA: (617) 876-1400 In Canada: (905) 683-8561

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS#	Percent (max)
Dipropylene glycol	025265-71-8	1-10
Resin acids and Rosin acids, maleated, potassium salts	085409-27-4	1-10

SECTION 3 - HAZARDS IDENTIFICATION

Emergency Overview:

Caution!

Causes eye burns.
Causes skin irritation.
May be harmful if ingested.
Causes digestive tract burns if ingested.

HMIS Rating:

Health: 2
Flammability: 0
Reactivity: 0
Personal Protective Equipment: B (See Section 8)

Potential Health Effects:

Inhalation: Acute inhalation not expected to result in adverse effects.
If inhaled as a vapor or mist, causes irritation, sore throat, coughing and breathing difficulty.
Effects include: Tightness of chest, hypersensitive individuals may experience allergic respiratory reaction and wheezing.
Eye Contact: Eye contact causes burns.
Skin Contact: Skin contact causes irritation.
Prolonged skin contact can result in burns.
May cause sensitization.
Hypersensitive individuals may develop an allergic reaction resulting in dermatitis, rash or hives.
Skin Absorption: Not expected to be harmful if absorbed through the skin.
Ingestion: Harmful if ingested.
If ingested, causes burns to the linings of the mouth, esophagus and stomach.
Effects include: No other effects expected unless listed below.

SECTION 4 - FIRST AID MEASURES:

Skin Contact: Wash with soap and water.
If discomfort or irritation persists, consult a physician.
Remove contaminated clothing and wash before reuse.

W. R. GRACE
MATERIAL SAFETY DATA SHEET

Product Name: Daravair® 1000
MSDS ID Number: D-06421

MSDS Date: 10/21/2008

Eye Contact: Flush eyes with water for at least 15 minutes while holding eyelids open.

If discomfort or irritation persists, consult a physician.

Ingestion: Do not induce vomiting.

Never give anything by mouth to an unconscious person.

If discomfort or irritation persists, consult a physician.

Inhalation: If symptoms develop, get fresh air. If symptoms persist, consult a physician.

If breathing has stopped, give artificial respiration then oxygen if needed.

SECTION 5 - FIRE AND EXPLOSION HAZARD DATA

Flash Point:	> 212 F
Flash Point Method:	Estimated
Lower Explosion Limit:	Not Available
Upper Explosion Limit:	Not Available
Auto-Ignition Temperature:	Not Available

NFPA Rating:

Health:

Flammability:

Reactivity:

Extinguishing Media: In case of fire, use water spray, dry chemical, Carbon dioxide or foam.

Special Fire Fighting Procedures: Wear self-contained breathing apparatus and complete personal protective equipment when potential for exposure to vapors or products of combustion exist. Water may be used to cool containers to prevent pressure build-up and possible auto-ignition or explosion. Avoid breathing hazardous vapors or products of combustion, keep upwind. Isolate area and keep unnecessary people away. Prevent run-off from fire control or dilution from entering streams or drinking water supplies.

Unusual Fire and Explosion Hazards: None unless noted below.

SECTION 6 - ACCIDENTAL RELEASE MEASURES:

Spills/Leaks: Use proper personal protective equipment. Do not flush to sewer or allow to enter waterways. Keep unnecessary people away.

Contain and/or absorb spill with inert material (i.e. sand, vermiculite) then place in a suitable container. For large spills, dike area and pump waste material into closed containers for disposal or reclamation.

SECTION 7 - HANDLING AND STORAGE

Precautionary Measures: Avoid contact with eyes, skin and clothing.

Do not take internally.

Practice good personal hygiene to avoid ingestion.

Use only with adequate ventilation.

Wash clothing before reuse.

FOR PROFESSIONAL USE ONLY. KEEP OUT OF CHILDREN'S REACH.

SECTION 8 - EXPOSURE CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT

EXPOSURE GUIDELINES (US)

Ingredient	ACGIH TLV			OSHA PEL			
	TWA	STEL	Ceiling	TWA	STEL	Ceiling	Substance Specific and Mineral Dust PELs
Dipropylene glycol	-	-	-	-	-	-	-
Resin acids and Rosin acids, maleated, potassium salts	-	-	-	-	-	-	-

EXPOSURE GUIDELINES (CANADA)

Employers should consult local Provincial regulatory limits for exposure guidelines which may vary locally.

Engineering Controls:

Not generally required.

Personal Protective Equipment:

W. R. GRACE
MATERIAL SAFETY DATA SHEET

Product Name: Daravair® 1000
 MSDS ID Number: D-06421

MSDS Date: 10/21/2008

Respiratory Protection: Respiratory protection is not normally required. However, a chemical cartridge respirator with organic vapor cartridge and a prefilter for dusts/mists is required at or above the applicable exposure limits (Consult above Exposure Guidelines). If no limits exist, use an approved respirator whenever a vapor or mist is generated or if respiratory irritation occurs. Supplied air respirator (SCBA) is required at exposure levels above the capabilities of a chemical cartridge respirator.

Skin Protection: Rubber or other impervious gloves should be worn to prevent skin contact.
Eye Protection: At minimum, safety glasses with side shields should be worn where exposure to excessive dust or spray is likely.
Work/Hygienic Practices: Use good personal hygiene practices.
 None beyond those noted above.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Appearance/Odor:	Dark brown liquid with sweet, pine-like odor.
Odor Threshold: (ppm)	Not Determined
pH:	10.5-11.0
Vapor Pressure: (Mm Hg)	Unknown
Vapor Density: (Air = 1)	Same as Water
Solubility in Water:	Complete
Specific Gravity: (Water = 1)	1.00-1.02
Evaporation Rate: (Butyl Acetate = 1)	~ = Water
Boiling Point:	>212°F/100°C
Viscosity:	Unknown
Bulk Density: (Pounds/Cubic Foot)(Pcf)	Not Applicable
% Volatiles (gr/L): (70°F)(21°C)	~90% Water

SECTION 10 - STABILITY AND REACTIVITY

Chemical Stability:	Stable
Conditions To Avoid:	None known for this product.
Hazardous Polymerization:	Will not polymerize.
Hazardous Decomposition Products:	None known for this product.

SECTION 11 - TOXICOLOGICAL INFORMATION

Ingredient(No data unless listed.) **CAS Number** **LD50 and LC50**

Carcinogenicity:

Ingredient	IARC Group 1	IARC Group 2A	IARC Group 2B	NTP Known	NTP Suspect	OSHA
Dipropylene glycol	No	No	No	No	No	No
Resin acids and Rosin acids, maleated, potassium salts	No	No	No	No	No	No

Mutagenicity:	Not applicable.
Teratogenicity:	Not applicable.
Reproductive Toxicity:	Not applicable.

SECTION 12 - ECOLOGICAL INFORMATION

Environmental Fate:	No data available for product.
Ecotoxicity:	No data available for product.

SECTION 13 - DISPOSAL CONSIDERATIONS

Waste Disposal Procedures: Consult all regulations (federal, state, provincial, local) or a qualified waste disposal firm when characterizing waste for disposal. According to EPA (40 CFR § 261), waste of this product is not defined as hazardous. Dispose of waste in accordance with all applicable regulations.

SECTION 14 - TRANSPORTATION INFORMATION

W. R. GRACE
MATERIAL SAFETY DATA SHEET

Product Name: Daravair® 1000
MSDS ID Number: D-06421

MSDS Date: 10/21/2008

Proper Shipping Name:	Not Applicable
UN/NA Number:	Not Applicable
Domestic Hazard Class:	Nonhazardous
Surface Freight Classification:	Concrete additive
Label/Placard Required:	Not Applicable

W. R. GRACE
MATERIAL SAFETY DATA SHEET

Product Name: Daravair® 1000
MSDS ID Number: D-06421

MSDS Date: 10/21/2008

SECTION 15 - REGULATORY INFORMATION

REGULATORY CHEMICAL LISTS:

CERCLA (Comprehensive Response Compensation and Liability Act):
(None present unless listed below)

<u>Chemical Name</u>	<u>CAS #</u>	<u>Wt %</u>	<u>CERCLA RQ</u>
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SARA Title III (Superfund Amendments and Reauthorization Act)

SARA Section 312/Tier I & II Hazard Categories:

Health Immediate (acute)	Yes
Health Delayed (chronic)	No
Flammable	No
Reactive	No
Pressure	No

302 Reportable Ingredients (Identification Threshold 1%):

<u>Chemical Name</u>	<u>CAS #</u>	<u>Wt %</u>	<u>SARA 302 TPQ</u>
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313 Reportable Ingredients (Chemicals present below reporting threshold are exempt):

<u>Chemical Name</u>	<u>CAS #</u>	<u>Wt %</u>
Tetrahydro-3,5-dimethyl-2H-1,3,5-thiadiazine-2-thione	000533-74-4	.024

National Volatile Organic Compound Emission Standards For Architectural Coatings:

Volatile Organic Content: (gr/L) 0

WHMIS Classification(s): D2 B

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR). This MSDS contains all the information required by the CPR.

State Regulatory Information:

California Proposition 65: This product does not contain substances known to the state of California to cause cancer, birth defects or other reproductive harm.

Massachusetts Hazardous Substance List (Identification threshold 0.0001% (1ppm)):

<u>Chemical Name</u>	<u>CAS #</u>	<u>Wt %</u>
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New Jersey Hazardous Substance List (Identification threshold 0.1%):

<u>Chemical Name</u>	<u>CAS #</u>	<u>Wt %</u>
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Pennsylvania Hazardous Substance List (Identification threshold 0.01%):

<u>Chemical Name</u>	<u>CAS #</u>	<u>Wt %</u>
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CHEMICAL INVENTORY STATUS:

All chemicals in this product are listed or exempt from listing in the following countries:

US	CANADA		EUROPE	AUSTRALIA	JAPAN	KOREA	PHILIPPINES
TSCA	DSL	NDSL	EINECS/ELINCS	AICS	ENCS	ECL	PICCS
Yes	Yes	No	Yes	Yes	No	Yes	Yes

SECTION 16 - OTHER INFORMATION

Non-Hazardous Ingredient Disclosure:

<u>Chemical Name</u>	<u>CAS Number</u>
Water	007732-18-5

Prepared by: EH&S Department
Approved by: EH&S Department
Approved Date: 10/21/08

Disclaimer:

"The data included herein are presented in accordance with various environment, health and safety regulations. It is the responsibility of a recipient of the data to remain currently informed on chemical hazard information, to design and update its own program and to comply with all national, federal, state and local laws and regulations applicable to safety, occupational health, right-to-know and environmental protection."

DARACEM® 19

High-range water-reducing admixture

ASTM C494 Type A and F, and ASTM C1017 Type I

Product Description

Daracem® 19 is an aqueous solution of a modified naphthalene sulfonate. Daracem 19 is a superior dispersing admixture having a marked capacity to disperse the cement agglomerates normally found in a cement-water suspension. The capability of Daracem 19, in this respect, exceeds that of normal water-reducing admixtures. It is a low viscosity liquid manufactured for use as received. Daracem 19 contains no added chloride. Daracem 19 is formulated to comply with *Specifications for Chemical Admixtures for Concrete*, ASTM C494 as a Type A and Type F admixture, and ASTM C1017 as a Type I admixture. One gallon of Daracem 19 weighs approximately 10 lbs (1.2 kg/L).

Uses

Daracem 19 produces concrete with extremely workable characteristics referred to as high slump. Daracem 19 also allows concrete to be produced with very low water/cement ratios at low or normal slumps.

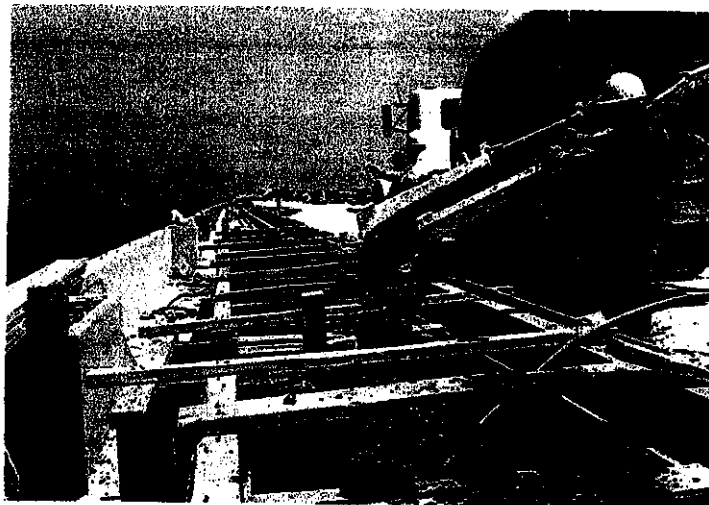
Daracem 19 is ideal for use in prestress, precast, bridge deck or any concrete where it is desired to keep the water/cement ratio to a minimum and still achieve the degree of workability necessary to provide easy placement and consolidation. Daracem 19 will also fluidize concrete, making it ideal for tremie concreting or other applications where high slumps are desired.

Addition Rates

Addition rates of Daracem 19 can vary with type of application, but will normally range from 6 to 20 fl oz/100 lbs (390 to 1300 mL/100 kg) of cement. In most instances the addition of 10 to 16 fl oz/100 lbs (650 to 1040 mL/100 kg) of cement will be sufficient. At a given water/cement ratio, the slump required for placement can be controlled by varying the addition rate. Should job site conditions require using more than recommended addition rates, please consult your Grace representative.

Product Advantages

- Can produce high slump flowable concrete with no loss in strength
- Can produce low water/cement ratio concrete and therefore, high strengths
- Concrete produced with Type I cement may be substituted for normal concrete produced with Type III cement to achieve early strengths
- At high slump, exhibits no significant segregation in comparison to concrete without a superplasticizer at the same slump



Compatibility with Other Admixtures and Batch Sequencing

Daracem 19 is compatible with most Grace admixtures as long as they are added separately to the concrete mix, usually through the water holding tank discharge line. However, Daracem 19 is not recommended for use in concrete containing ADVA[®] superplasticizers or MIRA[®] 92. In general, it is recommended that Daracem 19 be added to the concrete mix near the end of the batch sequence for optimum performance. Different sequencing may be used if local testing shows better performance. Please see Grace Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations. Daracem 19 should not come in contact with any other admixture before or during the batching process, even if diluted in mix water.

Pretesting of the concrete mix should be performed before use, and as conditions and materials change in order to assure compatibility, and to optimize dosage rates, addition times in the batch sequencing and concrete performance. For concrete that requires air entrainment, the use of an ASTM C260 air-entraining agent (such as Daravair[®] or Darex[®] II AEA) is recommended to provide suitable air void parameters for freeze-thaw resistance. Darex AEA is not recommended. Please consult your Grace representative for guidance.

Packaging & Handling

Daracem 19 is available in bulk, delivered by metered tank trucks, and in 55 gal (210 L) drums.

It will begin to freeze at approximately 32°F (0°C), but will return to full strength after thawing and thorough agitation.

In storage, and for proper dispensing, Daracem 19 should be maintained at temperatures above 32°F (0°C).

Dispensing Equipment

A complete line of accurate, automatic dispensing equipment is available.

www.graceconstruction.com

North American Customer Service: 1-877-4AD-MIX1 (1-877-423-6491)

Daracem, ADVA, MIRA, Daravair and Darex are registered trademarks of W. R. Grace & Co.—Conn.

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.—Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

This product may be covered by patents or patents pending.
DC-8I Printed in U.S.A. 11/07

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FALL/1M

GRACE

W. R. GRACE
MATERIAL SAFETY DATA SHEET

Product Name: Daracem® 19
MSDS ID Number: D-06538

MSDS Date: 09/09/2009

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Daracem® 19
MSDS Number: D-06538
Cancelled MSDS Number: D-06109
MSDS Date: 09/09/2009
Chemical Family Name: Naphthalene Sulfonate Formaldehyde Copolymer, in Aqueous Solution
Product Use: Concrete Admixture
Chemical Formula: Mixture-NA
CAS # (Chemical Abstracts Service Number): NA Mixture

Manufactured by:

W.R.Grace & Co.-Conn.
62 Whittemore Avenue
Cambridge, MA 02140

Grace Canada, Inc.
294 Clements Road West
Ajax, Ontario L1S 3C6

In Case of Emergency Call:

In USA: (617) 876-1400 In Canada: (905) 683-8561

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS#	Percent (max)
Naphthalenesulfonic acid, polymer with formaldehyde, calcium	037293-74-6	25-50

SECTION 3 - HAZARDS IDENTIFICATION

Emergency Overview:

Caution!

May cause eye irritation.

HMIS Rating:

Health: 1
Flammability: 1
Reactivity: 0
Personal Protective Equipment: B (See section 8)

Potential Health Effects:

Inhalation: Acute inhalation not expected to result in adverse effects.

Prolonged inhalation may cause respiratory tract irritation.

Effects include: Tightness of chest, hypersensitive individuals may experience allergic respiratory reaction and wheezing.

Eye Contact: Acute eye contact is not expected to result in adverse effects.

Prolonged eye contact can result in redness and itching.

Skin Contact: Acute skin contact is not expected to result in adverse effects.

Prolonged skin contact can result in irritation causing redness and itching.

May cause sensitization.

Hypersensitive individuals may develop an allergic reaction resulting in dermatitis, rash or hives.

Skin Absorption: Not expected to be harmful if absorbed through the skin.

Ingestion: Ingestion not expected to be harmful.

Effects include: No other effects expected unless listed below.

SECTION 4 - FIRST AID MEASURES:

Skin Contact: Wash with soap and water.

If discomfort or irritation persists, consult a physician.

Remove contaminated clothing and wash before reuse.

Eye Contact: Flush eyes with water for at least 15 minutes while holding eyelids open.

If discomfort or irritation persists, consult a physician.

Ingestion: Do not induce vomiting.

Never give anything by mouth to an unconscious person.

W. R. GRACE
MATERIAL SAFETY DATA SHEET

Product Name: Daracem® 19
MSDS ID Number: D-06538

MSDS Date: 09/09/2009

If discomfort or irritation persists, consult a physician.
Inhalation: If symptoms develop, get fresh air. If symptoms persist, consult a physician.
If breathing has stopped, give artificial respiration then oxygen if needed.

SECTION 5 - FIRE AND EXPLOSION HAZARD DATA

Flash Point:	Not Applicable
Flash Point Method:	Estimated
Lower Explosion Limit:	Not Available
Upper Explosion Limit:	Not Available
Auto-Ignition Temperature:	Not Available

NFPA Rating:

Health:	1
Flammability:	1
Reactivity:	0

Extinguishing Media: In case of fire, use water spray, dry chemical, Carbon dioxide or foam.
Special Fire Fighting Procedures: Wear self-contained breathing apparatus and complete personal protective equipment when potential for exposure to vapors or products of combustion exist. Water may be used to cool containers to prevent pressure build-up and possible auto-ignition or explosion. Avoid breathing hazardous vapors or products of combustion. Keep upwind. Isolate area and keep unnecessary people away. Prevent run-off from fire control or dilution from entering streams or drinking water supplies.
No special procedures specific to this product.
Unusual Fire and Explosion Hazards: None.

SECTION 6 - ACCIDENTAL RELEASE MEASURES:

Spills/Leaks: Use proper personal protective equipment. Do not flush to sewer or allow spilled product to enter waterways. Keep unnecessary people away.
Contain and/or absorb spill with inert material (i.e. sand, vermiculite) then place in a suitable container. For large spills, dike area and pump waste material into closed containers for disposal or reclamation.

SECTION 7 - HANDLING AND STORAGE

Precautionary Measures: Avoid contact with eyes, skin and clothing.
Do not take internally.
Practice good personal hygiene to avoid ingestion.
Use only with adequate ventilation.
Wash clothing before reuse.
FOR PROFESSIONAL USE ONLY. KEEP OUT OF CHILDREN'S REACH.

SECTION 8 - EXPOSURE CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT

EXPOSURE GUIDELINES (US)

Ingredient	ACGIH TLV			OSHA PEL			Other
	TWA	STEL	Ceiling	TWA	STEL	Ceiling	
Naphthalenesulfonic acid, polymer with formaldehyde, calcium	-	-	-	-	-	-	-

*Contains formaldehyde below 0.1% threshold. Product is capable of releasing formaldehyde under certain conditions. Exposure during typical application is expected to be insignificant. Exposure to formaldehyde vapor is a potential concern if product is applied under confined space conditions. Consult appropriate exposure guidelines for formaldehyde. (OSHA: 0.75 ppm-TWA, 2.0 ppm - STEL, ACGIH 0.3 ppm Ceiling)

EXPOSURE GUIDELINES (CANADA)

Employers should consult local Provincial regulatory limits for exposure guidelines which may vary locally.

Engineering Controls: Not generally required.

Personal Protective Equipment:

Respiratory Protection: Respiratory protection is not normally required. However, a chemical cartridge respirator with organic vapor cartridge and a pre-filter for dusts/mists is required at or above the applicable exposure limits (Consult above Exposure Guidelines). If no limits exist, use an approved respirator whenever a vapor or mist is generated or if respiratory irritation occurs. Supplied air respirator (SCBA) is required at exposure levels above the capabilities of a chemical cartridge respirator.

W. R. GRACE
MATERIAL SAFETY DATA SHEET

Product Name: Daracem® 19
MSDS ID Number: D-06538

MSDS Date: 09/09/2009

A NIOSH approved respirator for Formaldehyde vapor is required whenever exposures exceed regulatory limits. For additional information, refer to US OSHA Regulations 29 CFR 1910.° 134.

Skin Protection: Rubber or other impervious gloves should be worn to prevent skin contact.

Eye Protection: At minimum, safety glasses with side shields should be worn where exposure to excessive dust or spray is likely.

Work/Hygienic Practices: Use good personal hygiene practices.
None beyond those noted above.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Appearance/Odor:	Clear dark brown liquid with slight mothball (naphthalene) odor.
Odor Threshold: (ppm)	Not Determined
pH:	7.0-10.0
Vapor Pressure: (Mm Hg)	Equal to water
Vapor Density: (Air = 1)	Equal to water
Solubility in Water:	Complete
Specific Gravity: (Water = 1)	~1.0
Evaporation Rate: (Butyl Acetate = 1)	~Equal to water
Boiling Point:	>212°F/100°C
Viscosity:	Unknown
Bulk Density: (Pounds/Cubic Foot)(Pcf)	Not Applicable
% Volatiles (gr/L): (70°F) (21°C)	~60% water

SECTION 10 - STABILITY AND REACTIVITY

Chemical Stability:	Stable
Conditions To Avoid:	None known for this product.
Hazardous Polymerization:	Will not polymerize.
Hazardous Decomposition Products:	None known for this product.

SECTION 11 - TOXICOLOGICAL INFORMATION

Ingredient(No data unless listed.) **CAS Number** **LD50 and LC50**

Carcinogenicity:

Ingredient	IARC Group 1	IARC Group 2A	IARC Group 2B	NTP Known	NTP Suspect	OSHA
Naphthalenesulfonic acid, polymer with formaldehyde, calcium	No	No	No	No	No	No

*Contains formaldehyde below 0.1% threshold. Product is capable of releasing formaldehyde under certain conditions. Exposures during typical applications are expected to be insignificant. Exposure to formaldehyde vapor is a potential concern if product is applied under confined space conditions. NTP: Suspect Carcinogen. IARC: Group 1. OSHA: Potential.

Mutagenicity:	Not applicable.
Teratogenicity:	Not applicable.
Reproductive Toxicity:	Not applicable.

SECTION 12 - ECOLOGICAL INFORMATION

Environmental Fate:	No data available for product.
Ecotoxicity:	No data available for product.

SECTION 13 - DISPOSAL CONSIDERATIONS

Waste Disposal Procedures: Consult all regulations (federal, state, provincial, local) or a qualified waste disposal firm when characterizing waste for disposal. According to EPA (40 CFR § 261), waste of this product is not defined as hazardous. Dispose of waste in accordance with all applicable regulations.

W. R. GRACE
MATERIAL SAFETY DATA SHEET

Product Name: Daracem® 19
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MSDS Date: 09/09/2009

SECTION 16 - OTHER INFORMATION

Non-Hazardous Ingredient Disclosure:

Chemical Name

Water

CAS Number

007732-18-5

Prepared by:

EH&S Department

Approved by:

EH&S Department

Approved Date:

09/09/2009

Disclaimer: "The data included herein are presented in accordance with various environment, health and safety regulations. It is the responsibility of a recipient of the data to remain currently informed on chemical hazard information, to design and update its own program and to comply with all national, federal, state and local laws and regulations applicable to safety, occupational health, right-to-know and environmental protection."

LANXESS

Energizing Chemistry

1. Product Name
Bayferrox® Iron Oxide Pigments

2. Manufacturer
LANXESS Corporation
111 RIDC Park West Drive
Pittsburgh, PA 15275-1112
(800) 526-9377
(412) 809-2212
Fax: (412) 809-3599
E-mail: paul.croushore@lanxess.com
www.Bayferrox.com

3. Product Description

BASIC USE

Bayferrox® synthetic iron oxide pigments are one of the most popular color pigments worldwide for coloring concrete. Bayferrox is suitable for all types of concrete products, including ready-mixed and architectural concrete, concrete blocks, bricks and paving stones, concrete roofing tiles, segmental retaining wall units, architectural precast products, colored mortar cement, stucco and grout. New applications are always being developed. Consult manufacturer.

COMPOSITION & MATERIALS

The most widely used pigments for coloring concrete are synthetic iron oxides. Bayferrox pigments meet stringent color and quality specification parameters set forth by ASTM C979. To help meet these standards, the LANXESS production facilities are ISO 9000-2000 certified.

SIZES

Bayferrox pigments are available in 50 lb (23 kg) bags, bulk bags, and in custom sized packaging.

FINISHES

Final color and appearance are functions of a number of variables, including amount of pigment in the mix, water-to-cement ratio, other mix components such as aggregates and admixtures, finishing technique and curing conditions.

COLORS

At low pigment level concentrations, these pigments can turn gray concrete into a wide range of earth tone colors which show virtually no fading after many years of weather exposure. A full range of high quality color pigments, including yellows, reds, blacks and browns, is produced for a variety of applications. These pigments are available in more than 24 primary colors and hundreds of blends. The shades indicated on the manufacturer's color cards have been chosen for their popularity. Numerous other shades are available.

LIMITATIONS

Consult manufacturer's technical literature for recommended and excluded uses.

4. Technical Data

APPLICABLE STANDARDS

ASTM International - ASTM C979 Standard Specification for Pigments for Integrally Colored Concrete

International Organization for Standardization (ISO) - ISO 9000-2000 Quality Management and Quality Assurance Standards, Parts 1 - 3

APPROVALS

The LANXESS manufacturing plants for Bayferrox are ISO 9000-2000 series certified by the International Organization for Standardization (ISO).

ENVIRONMENTAL CONSIDERATIONS

The LANXESS manufacturing process converts scrap iron into premium iron oxides; minimal salts, no sulfur dioxide or crystalline silica is produced. Use of these products can produce nominal amounts of dust. Use appropriate protective clothing and respiratory protection. Material Safety Data Sheets (MSDS) are available upon request.

PHYSICAL/CHEMICAL PROPERTIES

These pigments are stable under exposure to sunlight and ultraviolet (UV) radiation, and are alkali and weather resistant.

5. Installation

PREPARATORY WORK

Handle and store product according to LANXESS recommendations. Keep materials dry and in their original packaging until ready for use. Once the specific mix design and sequencing of raw materials have been established, it should not be altered. Consistency of



Bayferrox® Iron Oxide Pigments impart color in concrete products.

raw materials in all phases of manufacturing is the most important element in making quality colored concrete.

METHODS

Bayferrox pigments should be added to the concrete mix, not sprinkled or dusted onto the surface of the concrete. The amount of color to be used ranges from 1/2 lb (0.23 kg) up to 7 lb (3 kg) per 94 lb (43 kg) bag of cement. ASTM limits the maximum amount of color per batch to 10% of the cementitious material in the mix. For colored ready-mixed concrete, add carefully weighed aggregates, then add 1/2 to 2/3 of total batch water. Add exact amount of pigment, and mix for 1 minute. Add accurate amount of cement, approved admixtures and remaining water. Mix for a minimum of 5 minutes at high speed. Complete use recommendations for various applications are available from LANXESS.

PRECAUTIONS

Pigmentation levels greater than 10% of cementitious material content, per ASTM standard, can reduce concrete strength.

Health and safety recommendations must be observed when handling Bayferrox synthetic iron oxide pigments. Before working with any product mentioned in the Bayferrox product information, user must read and become familiar with hazards, proper use and handling recommendations. Consult LANXESS for more information.

6. Availability & Cost**AVAILABILITY**

Contact LANXESS for information on product distribution and availability. LANXESS has been making many of the same standard grades of Bayferrox for several decades. These grades are available worldwide.

COST

Information on the cost for coloration can be obtained from a LANXESS representative. Concrete products manufacturers have cost information on their products.

7. Warranty

The application of these products, including any suggested formulation and recommendations, is beyond the control of LANXESS Corporation. Therefore, it is imperative that specifiers and users of Bayferrox pigments test them to ensure they meet the specific product or project requirements. All information is given without warranty or guarantee. Nothing contained in the LANXESS product information or technical recommendations is to be construed as a recommendation to use any product in conflict with patents covering any material or its use.

8. Maintenance

Other than normally expected cleaning or pressure washing of concrete surfaces by owner, concrete products integrally colored with Bayferrox iron oxide pigments require no maintenance beyond that of noncolored concrete or concrete products.

9. Technical Services

For technical assistance, contact LANXESS. A staff of trained service personnel offers design assistance and technical support.

10. Filing Systems

- First Source[®]
- MANU-SPEC[®]
- Additional technical and product information is available from LANXESS Corporation upon request.





Product Information

Bayferrox® Synthetic Iron Oxide Pigments Specification Requirements for Coloring Concrete Products

Colored concrete and precast concrete products have experienced tremendous growth rates around the world. The most widely used pigments for coloring these products are synthetic iron oxides due to their outstanding price/performance ratio. At low dosages, they can turn gray concrete into a wide range of earth tone colors, which show virtually no fading even after years of exposure.

Bayferrox synthetic iron oxide pigments are made by LANXESS Corporation, and each of our manufacturing sites has ISO certification. The pigments must meet stringent color and quality specification parameters set forth by LANXESS and the American Society for the Testing of Materials (ASTM) designation C979. These specifications are closely monitored at the Bayferrox pigments production facilities in Germany and Brazil, and in our quality assurance laboratories. A full range of high quality iron oxide pigments (yellows, reds, blacks, and browns) is produced for various applications. Bayferrox pigments meet the following requirements of ASTM Designation C979, *Standard Specification for Pigments for Integrally Colored Concrete*:

<u>Test</u>	<u>Test Method</u>
1. Water Wettability	ASTM C979 7.1
2. Alkali Resistance	ASTM C979 7.2
3. Total Sulfates	ASTM C979 7.3
4. Water Solubility	ASTM C979 7.4
5. Atmospheric Curing Stability	ASTM C979 7.5
6. Light Resistance	ASTM C979 7.6
7. Effects on Concrete	
A. 28-days Compressive Strength	ASTM C979 7.7.5
B. Initial or Final Set	ASTM C979 7.7.3
8. Color Match of Shipment	ASTM C979 7.8

The chart on the reverse side of this sheet lists the results of data that has been collected on the use of Bayferrox pigments in integrally colored concrete using the ASTM test methods.

Bayferrox pigments have proven to be an excellent choice for coloring concrete products such as:

Concrete blocks and bricks	Segmental retaining wall units
Paving stones / interlocking pavers	Grout
Roof tiles	Colored mortar cement
Patio slabs	Stucco
Precast architectural concrete	Ready-mixed concrete
Other precast products	Fiber cement products

Shade of Bayferrox pigments	Yellows			Reds			Blacks			Browns		
	Straight Pigment	Loading 0.5% 6.0%		Straight Pigment	Loading 0.5% 6.0%		Straight Pigment	Loading 0.5% 6.0%		Straight Pigment	Loading 0.5% 6.0%	
Test												
Water-Wettability (ASTM C979 7.1)	P	N/A	N/A	P	N/A	N/A	P	N/A	N/A	P	N/A	N/A
Alkali Resistance (ASTM C979 7.2)	R	N/A	N/A	R	N/A	N/A	R	N/A	N/A	R	N/A	N/A
Total Sulfates (ASTM C979 7.3)	0.3- 0.7%	N/A	N/A	0.05- 0.13%	N/A	N/A	0.2- 0.7%	N/A	N/A	0.3- 0.7%	N/A	N/A
Water Solubility (ASTM C979 7.4)	0.15- 0.35%	N/A	N/A	0.2- 0.4%	N/A	N/A	0.3- 0.6%	N/A	N/A	0.3- 0.6%	N/A	N/A
Atmospheric Curing Stability (ASTM C979 7.5)	N/A	R	R	N/A	R	R	N/A	R	R	N/A	R	R
Light Resistance (ASTM C979 7.6)	N/A	R	R	N/A	R	R	N/A	R	R	N/A	R	R
Effect on Setting of Concrete (ASTM C979 7.7.3)	N/A	N/A	i* f* -15 +5	N/A	N/A	i* f* -25 -10	N/A	N/A	i* f* +5 +25	N/A	N/A	i* f* -25 +25
Effect on Compressive Strength (ASTM C979 7.7.5)	N/A	N/A	102%**	N/A	N/A	106.5%	N/A	N/A	106%	N/A	N/A	106.5%
Color Match of Shipment (ASTM C979 7.8)	ΔE^* <1.0	N/A	N/A	ΔE^* <1.0	N/A	N/A	ΔE^* <1.5	N/A	N/A	ΔE^* <1.5	N/A	N/A

LEGEND: P = Passed
R = Resistant
 ΔE^* = Color difference according to CIELAB
(see ASTM D2244)

*deviation in minutes Standard = -60/+90
i = initial f = final
**Control (unpigmented) = 100%
N/A - Not Applicable

Bayferrox® is a registered trademark of Bayer AG, Germany.

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations are beyond our control. Therefore, it is imperative that you test our products. Technical assistance and information to determine to your own satisfaction whether they are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are sold strictly pur-

suant to the terms of our standard conditions of sale. All information and technical assistance is given without warranty or guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance, and information. Any statement or recommendation not contained herein is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with patents covering any material or its use. No license is implied or in fact granted under the claims of any patent.

LANXESS

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Health and Safety Information

Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling the LANXESS products mentioned in this publication. Before working with any of these products, you must read and become familiar with the available information on their hazards, proper

use, and handling. This cannot be overemphasized. Information is available in several forms, e.g., material safety data sheets and product labels. Consult your LANXESS Corporation representative or contact LANXESS's Product Safety and Regulatory Affairs Dept., Pittsburgh, PA.

Note: The information contained in this bulletin is current as of January 2007. Please contact LANXESS Corporation to determine if this publication has been revised.