

COMPRESSIVE STRENGTH AND ABSORPTION REPORT



Report Number: 95121076.0014
Service Date: 05/09/13
Report Date: 05/10/13

2501 East Loop 820 North
Fort Worth, TX 76118
817-268-8600 Reg No: F-3272

Client

Advanced Cast Stone
Attn: John
102 Lee St
Fort Worth, TX 76140

Project

Cast Stone Testing
Various Projects
Fort Worth, TX -

Project Number: 95121076

Services: Perform compressive strength and absorption tests in accordance with ASTM C1194 and C1195 on nominal 2" x 2" X 2" cast stone samples submitted to this facility. Identification and age supplied by client.

Project: John B. Connally Tech. Center
Sample ID: 921 Q
Cast Date: 4-11-13

Compressive Strength: ASTM C1194

Compressive Strength

<u>Sample</u>	<u>Age (Days)</u>	<u>Area (Sq. In.)</u>	<u>Total Load (lb)</u>	<u>PSI</u>
1	28	4.08	44,570	10,920
2	28	4.00	44,130	11,030
3	28	4.00	42,930	10,730
Average				10,890

Absorption: ASTM C1195

<u>Sample</u>	<u>Age (Days)</u>	<u>Absorption (%)</u>
1	28	4.5
2	28	4.0
3	28	4.5
Average		4.3

Services:

Terracon Rep.:

Reported To:

Contractor:

Report Distribution:

(1) Advanced Cast Stone,
john@advancedcaststone.com
(1) Advanced Cast Stone,
@advancedcaststone.com

(1) Advanced Cast Stone,
debbie@advancedcaststone.com

Reviewed By:

Eric J. Cleveland, P.E.

Senior Associate

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

COMPRESSIVE STRENGTH & ABSORPTION REPORT

Report Number: 95121076.0016
Service Date: 07/03/13
Report Date: 07/03/13



2501 East Loop 820 North
Fort Worth, TX 76118
817-268-8600 Reg No: F-3272

Client

Advanced Cast Stone
Attn: John
102 Lee St
Fort Worth, TX 76140

Project

Cast Stone Testing
Various Projects
Fort Worth, TX -

Project Number: 95121076

Services: Perform compressive strength and absorption tests in accordance with ASTM C1194 and C1195 on nominal 2" x 2" X 2" cast stone samples submitted to this facility. Identification and age supplied by client.

Project: Sundance Square E. Building
Sample ID: 995-P
Cast Date: 6-5-13

Compressive Strength: ASTM C1194

Compressive Strength

<u>Sample</u>	<u>Age (Days)</u>	<u>Area (Sq. In.)</u>	<u>Total Load (lb)</u>	<u>PSI</u>
1	28	4.0	41,060	9,780
2	28	4.0	39,290	9,350
3	28	4.0	38,520	9,220
Average				9,450

Absorption: ASTM C1195

<u>Sample</u>	<u>Age (Days)</u>	<u>Absorption (%)</u>
1	28	3.2
2	28	3.1
3	28	3.2
Average		3.2

Services:

Terracon Rep.: Taylor, Frankie

Reported To:

Contractor:

Report Distribution:

(1) Advanced Cast Stone,
john@advancedcaststone.com
(1) Advanced Cast Stone,
ron@advancedcaststone.com

(1) Advanced Cast Stone,
debbie@advancedcaststone.com

Reviewed By:

Eric J. Cleveland, P.E.

Senior Associate

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LABORATORY SERVICES REPORT

Report Number: 95121076.0017
Service Date: 09/10/13
Report Date: 09/11/13



2501 East Loop 820 North
Fort Worth, TX 76118
817-268-8600 Reg No: F-3272

Client

Advanced Cast Stone
Attn: John .
102 Lee St
Fort Worth, TX 76140

Project

Cast Stone Testing
Various Projects
Fort Worth, TX -

Project Number: 95121076

Services: Perform compressive strength and absorption tests in accordance with ASTM C1194 and C1195 on nominal 2" x 2" X 2" cast stone samples submitted to this facility. Identification and age supplied by client.

Project: Manzo Organization
Sample ID: 91-L
Cast Date: 8-13-13

Compressive Strength: ASTM C1194

Compressive Strength

<u>Sample</u>	<u>Age (Days)</u>	<u>Area (Sq. In.)</u>	<u>Total Load (lb)</u>	<u>PSI</u>
1	28	4.16	45,020	10,820
2	28	4.14	42,780	10,330
3	28	4.18	48,170	11,520
Average				10,890

Absorption: ASTM C1195

<u>Sample</u>	<u>Age (Days)</u>	<u>Absorption (%)</u>
1	28	4.4
2	28	4.7
3	28	4.1
Average		4.4

Services:

Terracon Rep.: Taylor, Frankie

Reported To:

Contractor:

Report Distribution:

(1) Advanced Cast Stone,
john@advancedcaststone.com
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COMPRESSIVE STRENGTH AND ABSORPTION REPORT

Terracon

2501 East Loop 820 North
Fort Worth, TX 76118
817-268-8600 Reg No: F-3272

Report Number: 95121076.0018
Service Date: 09/18/13
Report Date: 09/18/13

Client
Advanced Cast Stone
Attn: John
102 Lee St
Fort Worth, TX 76140

Project
Cast Stone Testing
Various Projects
Fort Worth, TX -

Project Number: 95121076

Services: Perform compressive strength and absorption tests in accordance with ASTM C1194 and C1195 on nominal 2" x 2" X 2" cast stone samples submitted to this facility. Identification and age supplied by client.

Project: Trophy Club Ward - LDS Church
Sample ID: 102-W
Cast Date: 8-21-13

Compressive Strength: ASTM C1194

Compressive Strength

<u>Sample</u>	<u>Age (Days)</u>	<u>Area (Sq. In.)</u>	<u>Total Load (lb)</u>	<u>PSI</u>
1	28	4.24	42,890	10,120
2	28	4.28	43,290	10,110
3	28	4.37	47,500	10,870
Average				10,370

Absorption: ASTM C1195

<u>Sample</u>	<u>Age (Days)</u>	<u>Absorption (%)</u>
1	28	5.3
2	28	5.5
3	28	5.5
Average		5.4

Services:

Terracon Rep.: Taylor, Frankie

Reported To:

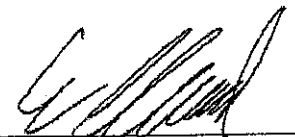
Contractor:

Report Distribution:

(1) Advanced Cast Stone,
john@advancedcaststone.com
(1) Advanced Cast Stone,
ron@advancedcaststone.com

(1) Advanced Cast Stone,
debbie@advancedcaststone.com

Reviewed By:



Eric J. Cleveland, P.E.

Senior Associate

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LEHIGH
WHITE CEMENT

Lehigh Cement Company
WHITE CEMENT DIVISION
1512 Lake Air Drive Suite 105
Waco, Texas 76710
Phone (254) 772-9350
Phone (800) 331-7082
Fax (254) 776-1799
www.lehighcement.com

Advanced Masonry
Eyerman, TX
Attn: Larry
FAX: 817-293-6378

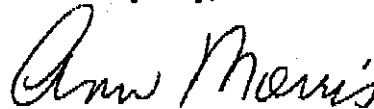
Dear Sir or Madam:

We certify that Lehigh White Portland Cement, which may be used on the above project, meets the regular requirements of ANSI/ASTM Specification C-150 and Federal Specifications for Portland Cement.

We are not responsible for improper use and/or workmanship.

If we can be of further assistance, please contact our sales office.

Yours very truly,



Ann Morris
Administration Manager
White Cements

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 I). 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

July 3, 2010

Advanced Cast Stone

115 Lee St.

Everman, Tx 76140

Certification Letter

This is to certify that our C-144 Sand meets ASTM C-33 specification as it refers to particle shape, as well as silt and clay content. Our sand is clear of silt and clay content to the best of our knowledge. Our sand is processed through a high powered plant that uses both cardiodic ions and flocculent treatments. It is doubled washed to help prevent any problems with getting our sand into proper specifications.

Sincerely,



Angela Budzisz

SUPERIOR SILICA SANDS LLCDATE: November 16, 2009;
amended March 8, 2010**MATERIAL SAFETY DATA SHEET****SECTION 1 – PRODUCT AND COMPANY IDENTIFICATION**

PRODUCT NAME: Silica Sand

SYNONYMS / SOLD AS: Silica Sand, Quartz, Crystalline Silica, Ground Silica, Frac Sand, Filtration Sand, Bunker Sand, Turf Sand, Foundry Sand, 100 Mesh Frac Sand, 16/30 Sand, 20/40 Sand, 30/70 Sand, 40/70 Sand, 50/50 Sand Golf Course Sand, 75/25 Sand (75% Greens Plus 25% Texas Best) 80/20 Sand (TB 20% & Greens Plus 80% Mix), 90/10 Mix, C-144 White (Mason Sand), C-144 Yellow (Mason Sand), Caylor White (Golf Course Sand), Green Colored Sand, F50 Sand, Greens Mix Greens (mix for golf course), Greens Plus (Golf Course Sand), Klassic White (Mason Sand), Ottawa White 20/40 frac, Ottawa White 40/70 frac, P50 Sand Kosse, Perma Pore Mix (Mix with Caylor White & Perma Pore), Stone White (Mason Sand), Texas Best White (Bunker Sand) (collectively referred to herein as "Crystalline Silica Sand")

MANUFACTURER: Superior Silica Sands LLC. Product is sold under various names including "Superior Silica Sands LLC" and "Texas Sport Sands Inc."

Superior Silica Sands LLC
3014 LCR 704
Kosse, TX 76653
Phone: (254) 746-7977

EMERGENCY TELEPHONE: CHEMTREC (800) 424-9300

WARNING: Never Use This Material (Crystalline Silica Sand) for Sand Blasting**SECTION 2 – HAZARDS IDENTIFICATION****A. EMERGENCY OVERVIEW**

A white or tan sand that is granular, crushed or ground. It is mined in several locations in Wisconsin and Kosse, Texas. Uses include, but are not limited to, as sand for golf courses and in horse arenas, in the stone and masonry industry, and in oil and natural gas well fracing. It is not flammable, combustibile or explosive. Do not breathe this material - a "National Institute for Occupational Safety and Health" ("NIOSH") approved personal respirator (discussed in Section 8) should be used as directed in Section 8. Additional measures to protect skin and eyes, as set forth in Section 8, should also be taken. Crystalline Silica Sand is not known to be an environmental hazard, however, it is classified as "hazardous" by the Occupational Safety and Health Administration ("OSHA"). This material is a carcinogen, as classified by International Agency for Research on Cancer ("IARC") and The National Toxicology Program ("NTP"). See

SUPERIOR SILICA SANDS LLC

DATE: November 16, 2009;
amended March 8, 2010

MATERIAL SAFETY DATA SHEET

Section 11. Crystalline Silica Sand is incompatible/reactive with ammonia, acetylene, hydrofluoric acid, fluorine, chlorine, and other powerful oxidizers as described in Section 10.

B. POTENTIAL HEALTH EFFECTS

EYE: Crystalline Silica Sand can cause moderate to severe irritation of eyes, including discomfort or pain, local redness and swelling of the conjunctiva.

SKIN: Contact by Crystalline Silica Sand can cause dryness or moderate irritation of skin.

INGESTION: None known.

INHALATION:

- a. Silicosis - Respirable Crystalline Silica Sand can cause silicosis, a fibrosis (scarring) of the lungs. Silicosis may be progressive; it may lead to disability and death.
- b. Lung Cancer - Crystalline Silica Sand is classified by IARC and NTP as a known human carcinogen.
- c. Tuberculosis - Silicosis increases the risk of tuberculosis.
- d. Autoimmune Disease - Some studies show excess numbers of cases of scleroderma, lupus and other autoimmune diseases, rheumatoid arthritis, chronic kidney diseases and end-stage kidney disease in workers exposed to respirable Crystalline Silica Sand.
- e. Non-Malignant Respiratory Diseases (other than silicosis) - Some studies show an increased incidence in chronic bronchitis and emphysema in workers exposed to respirable Crystalline Silica Sand.

CHRONIC EFFECTS / CARCINOGENICITY: Silicosis, cancer, scleroderma, tuberculosis, nephrotoxicity, emphysema, chronic bronchitis, lupus, and arthritis are potential chronic effects of exposure. 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 Sand. Often, chronic silicosis has no symptoms. The symptoms of chronic silicosis, if present, are shortness of breath, wheezing, cough and sputum production. Accelerated silicosis is similar, but symptoms may develop earlier than with chronic silicosis, and may also include weight loss. The symptoms of acute silicosis are the same, but also may include weight loss and fever. Symptoms of chronic bronchitis include a productive cough on most days for at least three months of two sequential years. Chronic coughing is also a symptom of emphysema; other emphysema symptoms include wheezing, shortness of breath, chest tightness, reduced capacity for physical activity, fatigue, reduced appetite, and weight loss. The

SUPERIOR SILICA SANDS LLC

DATE: November 16, 2009;
amended March 8, 2010**MATERIAL SAFETY DATA SHEET**

symptoms of scleroderma include thickening and stiffness of the skin, particularly in the fingers, shortness of breath, difficulty swallowing and joint problems. Joint pain, swelling, inflammation, and stiffness are the primary symptoms of rheumatoid arthritis. Lupus has a wide range of potential symptoms, including fatigue, fever, weight loss or gain, joint pain, stiffness and swelling, skin lesions or rash, mouth sores, hair loss, white or blue fingers under cold or stressful conditions, shortness of breath, chest pain, dry eyes, easy bruising, anxiety, depression, and memory loss. Symptoms of chronic kidney disease include changes in urine output or color, blood in urine, swelling of the legs, ankles, feet, face, or hands, fatigue, skin rash/itching, metallic taste in the mouth/ammonia breath, nausea and vomiting, shortness of breath, anemia, dizziness or trouble concentrating, and side, back, or leg pain.

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 3 – COMPOSITION / INFORMATION ON INGREDIENTS

<u>HAZARDOUS INGREDIENTS</u>	<u>CAS Registry No.</u>	<u>Percentage (wt/wt)</u>
Crystalline silica (quartz)	14808-60-7	90-99.9*

OSHA Regulatory Status: This ingredient is classified as hazardous under OSHA regulations.

* The remaining 10-0.1% of the material is considered to be inert.

SECTION 4 – FIRST AID MEASURES

EYE: Quickly and gently blot or brush away sand. Do not rub eyes. Do not attempt to manually remove material stuck to the eye(s). 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). 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.

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INHALATION: Remove source of contamination or move victim to fresh air. Seek medical attention if necessary. If breathing has stopped, give artificial respiration. If high airborne concentrations are present, take proper precautions to ensure your own safety before attempting rescue (i.e., wear proper protective equipment as described in Section 8).

SECTION 5 – FIRE FIGHTING MEASURE**A. Flammable Properties**

Flash Point: Not Flammable

Method: N/A

B. Extinguishing Media

None required. Use suitable extinguishing media for surrounding fire.

C. Fire & Explosion Hazards

None.

D. Fire Fighting Instructions

None.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

SPILL /LEAK PROCEDURES: Use dustless methods (vacuum equipped with HEPA filters) and place in closable container for disposal or flush with water. Do not dry sweep. Use proper protective equipment indicated in Section 8.

SECTION 7 – HANDLING AND STORAGE

HANDLING: Keep in tightly closed containers. Protect containers from physical damage. Avoid direct skin contact with the material. Crystalline 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 Crystalline Silica Sand dust may increase the risk of lung cancer. Medical reports also link breathing Crystalline Silica Sand dust to crippling arthritis, and link direct contact to skin and eye irritation. See Section 11 for further information. Any time that a potential exists for you to be exposed to Crystalline Silica Sand in excess of the permissible exposure limit (PEL), you must use a NIOSH-approved respirator. The work area must also be thoroughly ventilated by the use of forced air ventilation during and after use of Crystalline Silica Sand. If the work area is dusty, use protective goggles. An eye wash station must be

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readily available where Crystalline Silica Sand is used. Prior to use or handling, you are advised to review and thoroughly understand all health precautions outlined in this Material Safety Data Sheet.

STORAGE: Store in a cool, dry, and well-ventilated location. Do not store near incompatible materials such as hydrofluoric acid, fluorine, chlorine, and other incompatible chemicals as described in Section 10.

SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Use sufficient air ventilation and exhaust ventilation to reduce the level of respirable Crystalline Silica Sand to below the PEL. See ACGIH “Industrial Ventilation, A Manual of Recommended Practice” (latest edition). Process or personal enclosure, control of process conditions, and process modification are other potential engineering control options.

RESPIRATORY PROTECTION: Use NIOSH-approved respirators whenever conditions create a risk of employee exposure to airborne concentrations in excess of the PEL. It is a violation of federal safety laws (OSHA) for employers to permit workers to be exposed to Crystalline Silica Sand without sufficient respiratory protection. The OSHA regulations that apply are: 29 CFR § 1910.134; 29 CFR § 1910.1000; 29 CFR § 1910.94 – (This last one is the regulation for sand blasting and this MSDS provides that this substance should not be used for sand blasting). Engineering controls must be first instituted whenever feasible; when such controls are not feasible to achieve full compliance, then personal protective equipment or other protection should be used. Personal protective equipment should be available for use in emergencies such as spills. The following chart specifies the types of respirators that may provide respiratory protection for Crystalline Silica Sand.

MINIMUM RESPIRATORY PROTECTION*

Particulate Concentrations

0.5 mg/m³ or less - Any air-purifying respirator with a high-efficiency particulate filter (Assigned Protection Factor (“APF”) = 10).

1.25 mg/m³ or less - Any powered air-purifying respirator with a high-efficiency particulate filter (APF = 25) OR Any supplied-air respirator operated in a continuous-flow mode (APF = 25).

2.5 mg/m³ or less - Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter (APF = 50) OR Any powered air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter (APF = 50).

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25 mg/m³ or less - Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode (APF = 1,000).

Emergency or planned entry into unknown concentrations or immediately dangerous to life and health (IDLH) conditions - Any self-contained breathing apparatus (SCBA) that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) OR Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in a pressure-demand or other positive-pressure mode (APF = 10,000).

Escape - Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter (APF = 50) OR Any appropriate escape-type SCBA.

Also see 42 CFR Part 84.

***Regardless of the type of respirator required, use only NIOSH-approved equipment that, if available, employs an end of service life indicator. See 29 CFR § 1910.134. See also ANSI standard Z88.2 (latest revision) "American National Standard for Respiratory Protection".**

APFs are based on the NIOSH recommended exposure limit (REL) of 0.05 mg/m³; an APF of 10, for example, is protective at concentrations up to 10 times the REL.

PEL = permissible exposure limit

TLV = threshold limit value

REL = recommended exposure limit

IDLH = immediately dangerous to life and health

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: Crystalline Silica Sand (respirable)

OSHA PEL (8-hour time weighted average [TWA])
TWA)

ACGIH TLV (8-hour

10 mg/m³ ÷ (% silica in the dust plus 2)

0.025 mg/m³

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Crystalline Silica Sand exists in several forms, the most common of which is quartz. If Crystalline Silica Sand is heated to more than 870°C it can change to a form of crystalline silica known as tridymite, 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 tridymite and cristobalite are more fibrogenic than crystalline silica as quartz.

The OSHA PEL for crystalline silica as tridymite and cristobalite is one-half the PEL for crystalline silica (quartz); the ACGIH TLV for crystalline silica as tridymite and cristobalite is one-half the TLV for crystalline silica as quartz; the IDLH concentration for crystalline silica as tridymite and cristobalite is one-half the IDLH concentration for crystalline silica (quartz, tripoli).

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES**APPEARANCE:** White or tan sand; granular, crushed, or ground**ODOR:** Odorless**BOILING POINT:** 4046°F**MELTING POINT:** 3110°F**VAPOR PRESSURE:** N/A (0 mmHg approximate)**MOLECULAR WEIGHT:** 60.08**SOLUBILITY IN WATER:** Insoluble**SPECIFIC GRAVITY:** 2.66**PH:** N/A**SECTION 10 – STABILITY AND REACTIVITY****STABILITY:** Chemically stable**MATERIAL TO AVOID:** Contact with powerful oxidizing agents such as fluorine, boron

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trifluoride, chlorine trifluoride, manganese trioxide, oxygen difluoride, hydrogen peroxide, and others may cause fires and/or explosions. Heating a mixture of powdered magnesium with slightly wet silica may cause a violent explosion. A violent reaction may result from combination of manganese trifluoride and silica. Finely divided silica (sand) will often react with burning sodium. Combination with xenon hexafluoride may form the explosive xenon trioxide. The *NIOSH Pocket Guide to Chemical Hazards* also indicates incompatibility/reactivity with ammonia and acetylene; details are not specified.

CONDITIONS TO AVOID: Generation of dust.

HAZARDOUS DECOMPOSITION PRODUCTS: Silica will dissolve in hydrofluoric acid and produce a corrosive gas – silicon tetrafluoride.

SECTION 11 – TOXICOLOGICAL INFORMATION

No median lethal dose (“LD50 or LC50”) has been identified for Crystalline Silica Sand.

A. SILICOSIS

The major concern is silicosis, caused by the inhalation and retention of respirable Crystalline Silica Sand 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 Sand 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 Sand 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

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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 Sand 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.

B. CANCER

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 (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.

Crystalline Silica Sand is not regulated by OSHA as a carcinogen.

C. SCLERODERMA

There are several studies that show exposure to respirable Crystalline Silica Sand or 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. 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).

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D. 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).

E. NEPHROTOXICITY

Several studies suggest that exposure to respirable Crystalline Silica Sand or 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).

Several studies have reported excess cases of kidney diseases, including end-stage renal disease, among silica-exposed workers. For additional information, the following may be consulted: "Kidney Disease and silicosis," Nephron, Vol. 85, pp. 14-19 (2000).

F. ARTHRITIS

There are recent studies suggesting that exposure to respirable Crystalline Silica Sand or 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).

H. NON-MALIGNANT RESPIRATORY DISEASES

For information concerning the association between exposure to Crystalline Silica Sand and chronic bronchitis, emphysema and small airways disease, refer to Section 3.5 of the NIOSH Special Hazard Review. There are studies that disclose an association between dusts found in various mining occupations and non-malignant respiratory diseases, particularly among smokers. It is unclear whether the observed associations exist only with underlying silicosis, only among smokers, or result from exposure to mineral dusts generally (independent of the presence or absence of Crystalline Silica Sand, or the level of crystalline silica in the dust).

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The *NIOSH Hazard Review - Health Effects of Occupational Exposure to Respirable Crystalline Silica* published in April 2002 summarizes the medical and epidemiological literature on the health risks and diseases associated with occupational exposures to respirable Crystalline Silica Sand. The *NIOSH Hazard Review* should be consulted for additional information, and references to published studies on health risks and diseases associated with occupational exposures to respirable Crystalline Silica Sand. The *NIOSH Hazard Review* is available from NIOSH - Publications Dissemination, 4676 Columbia Parkway, Cincinnati, OH 45226, or by calling 1-800-356-4646, or through the NIOSH web site, www.cdc.gov/niosh/topics/silica. then click on the link "NIOSH Hazard Review: Health Effects of Occupational Exposure to Respirable Crystalline Silica."

SECTION 12 -- ECOLOGICAL INFORMATION

ECOTOXICITY: Crystalline Silica Sand is not known to be eco-toxic; *i.e.*, no data suggests that Crystalline Silica Sand 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.

Crystalline Silica Sand 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: N/A

CLASS: N/A

UN NUMBER: N/A

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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).

C. OSHA/MSHA Regulations**Air contaminant (29 CFR 1910.1000, Table Z-3):** $10 \text{ mg/m}^3 \div (\% \text{ silica in the dust plus } 2) \text{ TWA-8 hour PEL}$.**MSHA:** not listed.**OSHA Specifically Regulated Substance (29 CFR § 1910):** not listed.**OSHA Hazard Communication Evaluation:** meets the criteria for hazardous material, as defined by 29 CFR § 1910.1200.

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Health Risks - 1*

Flammability - 0

Physical Hazards - 0

Health Hazards:

4. Severe hazard; Life-threatening, major or permanent damage may result from single or repeated overexposures.
 3. Serious hazard; Major injury likely unless prompt action is taken and medical treatment is given.
 2. Moderate hazard; Temporary or minor injury may occur.
 1. Slight hazard; Irritation or minor reversible injury possible.
 0. Minimal hazard; No significant risk to health.
- * Chronic hazard; chronic (long-term) health effects may result from repeated overexposure.

Flammability Hazards:

4. Severe hazard; Flammable gases, or very flammable volatile liquids with flash points below 73 °F, and boiling points below 100 °F. Materials may ignite spontaneously with air.
3. Serious hazard; Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 °F and boiling points above 100 °F, as well as liquids with flash points between 73 °F and 100 °F.
2. Moderate hazard; Materials which must be moderately heated or exposed to high ambient temperatures before ignition will occur. Includes liquids having a flash point at or above 100 °F but below 200 °F.
1. Slight hazard; Materials that must be preheated before ignition will occur. Includes liquids, solids, and semi solids having a flash point above 200 °F.
0. Minimal hazard; Materials that will not burn.

Physical Hazards:

4. Severe hazard; Materials that are readily capable of water reaction, detonation, or explosive decomposition at normal temperatures and pressures.
3. Serious hazard; Materials that may form explosive mixtures with water are capable of detonation or explosive reaction in the presence of a strong initiating source or undergo chemical change at normal temperature and pressure with moderate risk of explosion.
2. Moderate hazard; Materials that are unstable and may undergo violent chemical change and normal temperature and pressure with low risk for explosion. Materials may react violently with water or form peroxides upon exposure to air.

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1. Slight hazard; Materials that are normally stable but can become unstable at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

0. Minimal hazard; Materials that are normally stable under fire conditions and will not react to water, polymerize, decompose, condense, or self-react.

B. National Fire Protection Association

Health Hazard - 1

Fire Hazard - 0

Reactivity - 0

Health Hazards:

4. Deadly
3. Extreme danger
2. Hazardous
1. Slightly hazardous
0. Normal material

Fire Hazards – Flash Point Temp.:

4. Below 73° F
3. Below 100° F
2. Below 200° F
1. Above 200° F.
0. Will not burn

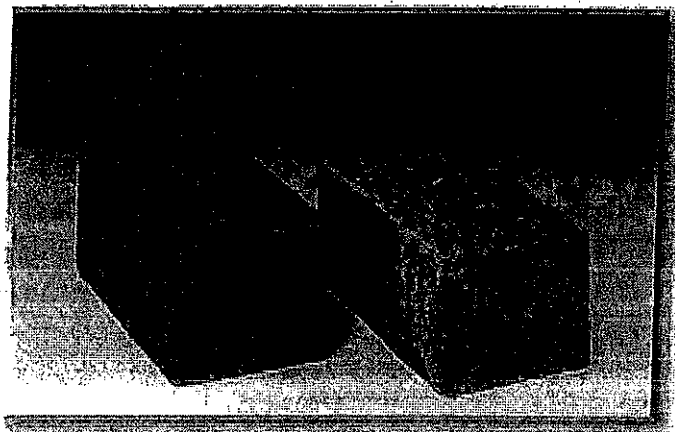
Reactivity:

4. May detonate
3. Shock or heat may detonate
2. Violent chemical reaction
1. Unstable if heated
0. Stable

COLOR-GUARD 2LV CAST STONE ADMIXTURE

PRODUCT

COLOR-GUARD 2LV is a new and improved plasticizing and integral waterproofing admixture used to increase the strength and density while helping to control water absorption and efflorescence in cast stone products.



ADVANTAGES

- **COLOR-GUARD 2LV** improves green strength and tamping density.
- Dispersing properties on cement and pigments increases strength and color consistency.
- Higher early strengths with better cement hydration and mix water retention.
- Stronger corners and edges on the stone. Edges tooled easier.
- Permeability reduced with integral waterproofing.
- Chloride deposits on the surface are reduced.
- Mold life extended by reduced concrete friction.
- Durability improved with a stronger, denser, water-repelling and freeze-thaw resistant product.

DIRECTIONS

COLOR-GUARD 2LV should be added to the mix and mixed into the aggregates before adding cement. Thoroughly mix after adding water.

DOSAGE

8-16 oz. per sack or 100 lb. (520-1040 ml per kg) of cement. Higher dosage rates improve strength and absorption performance.

Trials are essential to determine the most effective dosage rate.

PACKAGING

55 gallon (207.9 L) drums and 265 gallon (1000 L) containers.
Keep from freezing.

TECHNICAL SALES AND SERVICE



BETON CHEMIE USA CORP.

P.O. Box 549

Cassville, GA 30123

Phone: 770/ 336-9391

Fax: 770/ 336-9394

E-mail: betonchemie@bellsouth.net



VCAS™ White Pozzolans

Custom-engineered, high performance, pozzolanic mineral additives
for use in white cement, mortar, and concrete products

www.vitrominerals.com

Product Description

VCAS™ (vitreous calcium aluminosilicate) pozzolans are new custom-engineered, high performance supplementary cementing materials for use in white Portland cement, mortar, and concrete products. They are manufactured by heating a blend of ground silica, lime, and alumina compounds to a molten state which is then solidified by quench cooling, processed, and ground to a fine white powder with highly-reactive pozzolanic characteristics.

After primary sizing and drying, the feedstock is finely ground and processed through high efficiency classifiers to produce a fine bright white powder with quality assured physical properties. The consistent chemical composition and tightly controlled particle size distribution result in highly reactive and superior quality pozzolans for concrete applications. Currently, the VCAS™ patented technology produces pozzolans in two grades, VCAS-8™ and VCAS-micronHS™, described in this technical summary.

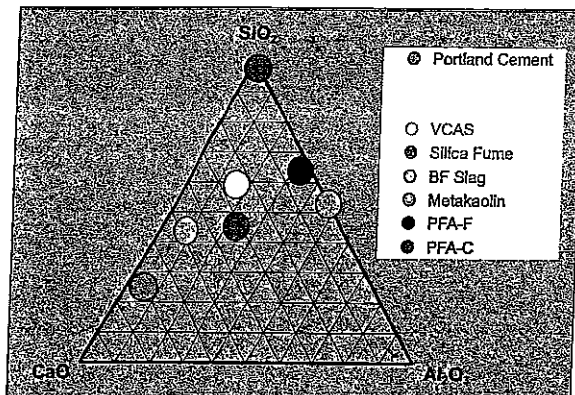


Unlike silica fume, coal fly ash, ground granulated blast furnace slag, and other by-products, VCAS™ pozzolans are free of iron, manganese, and other undesirable color-inducing impurities, making them ideally suited for all applications using white cement and in pigmented concrete.

VCAS™ pozzolans are value-added supplementary cementing materials that exhibit pozzolanic activity comparable to silica fume and metakaolin when tested in accordance with ASTM C618 and ASTM C1240. VCAS™ pozzolans react with calcium hydroxide produced during the hydration of Portland cement to form additional cementitious compounds such as calcium silicate and aluminosilicate hydrates. Pozzolans are widely used in cement and concrete technology to increase concrete strength, density, and resistance to chemical attack as well as control efflorescence.

Silica, SiO ₂	50-55%	Titanium, TiO ₂	< 1%
Alumina, Al ₂ O ₃	15-20%	Phosphorus oxide, P ₂ O ₅	< 0.1%
Iron oxide, Fe ₂ O ₃	< 1%	Manganese oxide, MnO	< 0.01%
Calcium, CaO	20-25%	Boron oxide, B ₂ O ₃	0-8%
Magnesia, MgO	< 1%	Sulphur oxide, SO ₃	< 0.1%
Sodium oxide, Na ₂ O	< 1%	Chloride, Cl	< 0.01%
Potassium oxide, K ₂ O	< 0.2%	Loss on ignition, LOI	< 0.5%

Chemically, VCAS™ pozzolans are comprised largely of oxides of silicon, aluminum and calcium with no deleterious impurities. The CaO-SiO₂-Al₂O₃ proportions, the low alkali metal content, and the amorphous structure are ideal for a pozzolanic additive in hydraulic concrete. The low iron content makes them particularly well suited for applications using white cement, such as mortars, stuccos, terrazzo, artificial stone, and cast-in-place or precast concrete products.



Ternary diagram (CaO-SiO₂-Al₂O₃) for the composition of VCAS™ pozzolans relative to Portland cement and the common pozzolans.

VCAS™ pozzolans have superior powder handling compared with silica fume and metakaolin. Tight process control provides consistent product quality and physical properties.

	VCAS-micronHS	VCAS-8
Specific Gravity	2.5	2.5
Bulk Density, Loose lbm	40-44	50-55
Med Particle Size, μm	3	8
Passing No. 325 Mesh, %	99.9	97
Specific Surface Area, cm ² /g	8,500	4,040
Pozzolanic Strength Index; 28d, % control	127	104
Brightness, %	92	89
Melting Point, °C	1200	1200
Hardness, Mohs	5.5	5.5

Vitro Minerals

1645-L Lakes Parkway, Lawrenceville, GA 30043 Phone: 678-990-5652 Fax: 678-990-2658

Benefits of VCAS™ Pozzolans

Fresh Concrete:

- Improved workability
- Reduction in water requirements
- Ease of dispersability
- Reduction in superplasticizer
- Reduction in bleeding
- Reduction in aggregate segregation

Hardened Concrete:

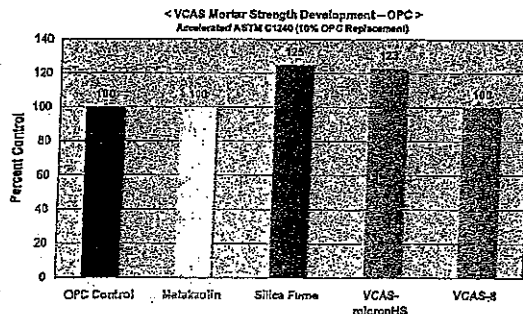
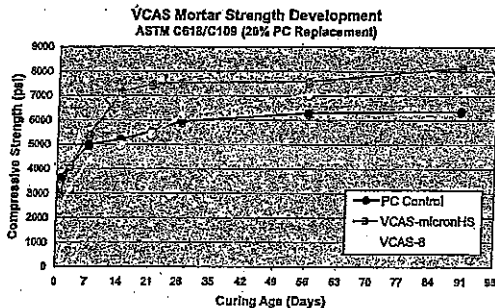
- Increased compressive strength
- Decreased permeability
- Increased durability

Added-Value:

- Mix-color neutrality and brightness
- Improved retention of mold detail
- Sustainability

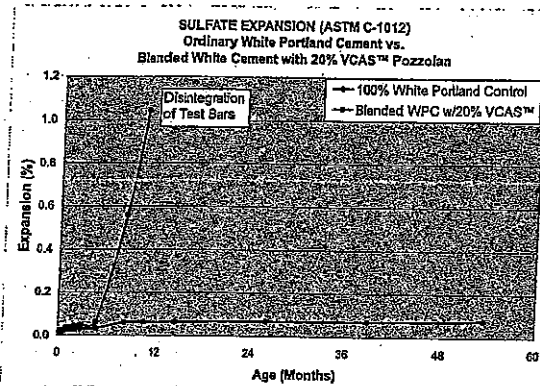
High Performance

VCAS-micronHS™ and VCAS-8™ meet the technical requirements of ASTM C618 for use as supplementary cementitious materials in concrete. Blended pozzolanic cements produced with VCAS pozzolans also comfortably exceed the requirements of ASTM C1157: Standard Performance Specification for Hydraulic Cement. Typical strength curves at 20% cement replacement are shown below. VCAS-micronHS™ exceeds the control before 3 days, making it an excellent choice for high performance applications where high early strength is required. VCAS-micronHS™ also meets the accelerated pozzolanic activity index, ASR control, and sulfate resistance requirements of ASTM C1240 for silica fume. Coupled with low water demand, reduced efflorescence, and improved chloride resistance, VCAS™ pozzolans are extremely cost effective.



Enhanced Durability

VCAS™ pozzolans provide white Portland cement with superior resistance to sulfate attack (ASTM C1012). The graph below shows the excellent dimensional stability of a white cement mortar with 20% VCAS replacement after over 4 years of exposure. Under these harsh test conditions, the 100% white cement control mortar disintegrated in less than 200 days. VCAS is also very effective at controlling expansion due to the alkali-silica reaction (ASTM C441) and reducing chloride ion penetration (ASTM C1202).



Comparison with Other Pozzolans

VCAS™ pozzolans are excellent high reactivity materials for use with white cement to produce durable, high performance architectural concrete structures and reflective highway barriers.

Pozzolan	Replacement	Reactivity	Color (Powder)	Water Demand	Environmental
VCAS-8™	10-30	Mod	White	Reduction	Positive
VCAS-micronHS™	10-30	High	White	Reduction	Positive
Silica Fume	6-8	High	Dark grey	Large increase	Positive
Metakaolin	6-8	High	Cream/pink	Large increase	Negative
Blastfurnace Slag	25-50	Mod	Buff	Neutral	Positive
Fly ash	10-30	Low	Dark	Reduction	Positive

Environmental, Health & Safety

VCAS™ pozzolans have an important role to play in sustainable construction by increasing service life and reducing the net greenhouse gas emissions (GHG) for a cubic yard of concrete.

VCAS™ pozzolans are non-toxic, contain no crystalline silica, and are classed as a nuisance dust, in common with other common fine particulate industrial minerals.

Product Availability

VCAS™ pozzolans are sold in bulk tanker trucks, 1-ton super-sacks, and 50 lb bags.

Disclaimer: The statements in this bulletin are based on data which is believed to be reliable, and is offered in good faith to be applied accordingly to the user's best judgment. Since operating conditions at customer's sites are beyond our control, Vitro Minerals will not assume responsibility for the accuracy of this data, or liability which may result from the use of its products. Likewise, no patent liability is assumed for use of Vitro Mineral products in any manner which could or would infringe on patent rights of others.

Vitro Minerals

1645-L Lakes Parkway, Lawrenceville, GA 30043 Phone: 678-990-5652 Fax: 678-990-2658



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Liquid Color For Concrete

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Product Description

Basic Use

DCS Liquid Cement Colors are all manufactured using pure mineral pigments designed to be used specifically in cementitious materials. DCS Liquid Cement Colors can be used for integral coloring of concrete block, concrete floors, walks, patios, driveways, concrete pavers, vertical precast, and poured in place concrete construction.

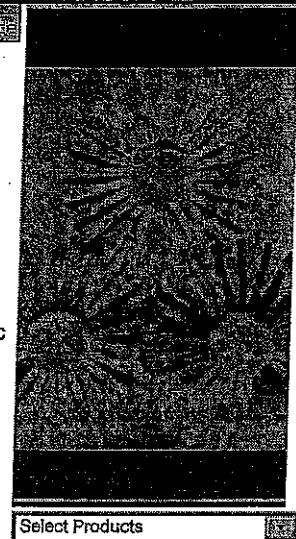
Composition and Materials

DCS Liquid Cement Colors are composed of finely milled 95-99% minus 325 mesh inorganic synthetic and natural iron oxides. Depending upon the color, different combinations of natural yellow, red, brown and black iron oxides, and mineral blacks are blended with synthetic red, yellow, and black iron oxides, and chromium oxide greens. The natural iron oxides are dried, pulverized and classified from mineral earth iron oxides (in a range of 50-80% iron oxide). These materials are suspended in a water based slurry to create a stable and easy to use liquid color.

The synthetic iron oxides are manufactured by different methods of calcination and precipitation of iron solutions or oxides under carefully controlled conditions. These processes produce roughly 93-99% pure iron oxides. DCS synthetic and natural inorganic iron oxides are inert, stable to all atmospheric conditions, ultra violet rays, alkalis and normal acid conditions. They are sunfast, limeproof and absolutely free of any water soluble fillers.

Packaging

DCS Liquid Cement Colors are packaged in 35 gallon or 55 gallon blow lined fiber drums, or in semi bulk containers as needed.



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Technical Data

Performance Properties

DCS Liquid Cement Colors are alkali resistant, water insoluble, inert, light resistant, inorganic, and limeproof.

Physical Properties

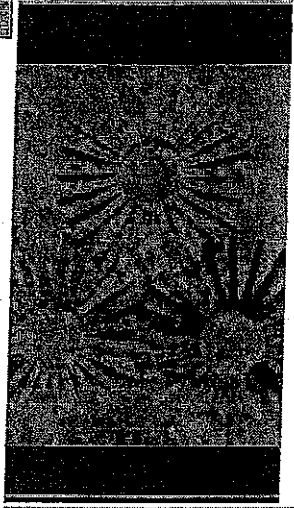
Depending upon the DCS Color Index Name and Number, the fineness of the pigment in each ranges from 95-99% minus 325 mesh.

General Formula

$Fe_2O_3 + H_2O$

pH

6.5 to 8.5



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Installation

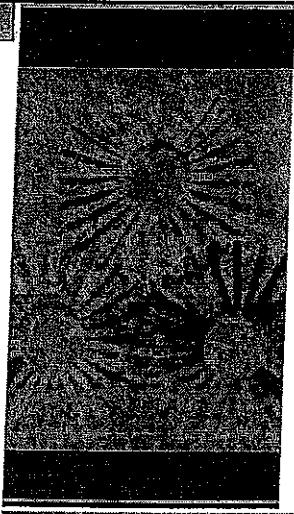
Preparatory Work

The mixing shall conform to ASTM C94, the portland cement ASTM C150, and the coarse and fine aggregates ASTM C33. Color addition (dry weight basis) should not exceed 10% of the weight of the cement conforming to ASTM C979.

Application

A power mixer should be used to provide thorough mixing and dispersing of color. To provide consistent and uniform color a sound method is: (1) Load the mixer with selected mix design of coarse, and fine aggregate. (2) Add the designated amount of DCS Liquid Cement Color by weight or volume as desired. Add the cement for the mix and agitate at full speed for several minutes. Any change in proportioning the amount of water, aggregate, sand and color to the cement and/or type of cement and aggregate used on the same job can result in variation of color tone in the finished job.

Before loading, agitator should be checked for residual water from cleaning.



Select Products

Maintenance

After the concrete has cured for a period of at least 28 days various proprietary sealers may be used for protection against the elements. Please check with the sealer manufacturer for aesthetic changes the sealer may cause to the appearance of the Colored Concrete Surface.



DESCRIPTION AND USE

Weather Seal GP is an economical, ready-to-use, water-based silane/siloxane water repellent for concrete, stucco, and most masonry surfaces. Weather Seal GP helps masonry resist cracking, spalling, staining and other damage related to water intrusion. Low odor and alkaline stable, Weather Seal GP is ideal for many field applications.

ADVANTAGES

- Penetrates for long-lasting protection on vertical or horizontal surfaces.
- Service life is estimated at 3-5 years.
- Water-based formula minimizes explosion and fire hazards of alcohol- or solvent-based water repellents.
- Easy cleanup with Enviro Klean® 2010 All Surface Cleaner.
- Alkaline stable – suitable for new “green” concrete.
- Low odor for safer application to occupied buildings.
- Treated surfaces “breathe” – does not trap moisture.
- Complies with all known national, state and district AIM VOC regulations.

Limitations

- Will not keep water out of cracks, defects or open joints.
- Not suitable for application to synthetic resin paints, gypsum, or other nonmasonry surfaces.

TYPICAL TECHNICAL DATA

FORM: White milky liquid
 SPECIFIC GRAVITY: 0.996
 pH: 4-5
 WT/GAL: 8.29 lbs.
 ACTIVE CONTENT: 2%
 TOTAL SOLIDS: 1% ASTM D 5095
 FLASH POINT: >212°F (100°C) ASTM D 3278
 FREEZE POINT: 32°F (0°C)
 SHELF LIFE: 1 year in tightly sealed, unopened container

VOC Information

US EPA: maximum VOC content 600 g/L
 CARB SCM Districts: maximum VOC content 120 g/L
 SCAQMD: maximum VOC content 120 g/L
 Maricopa County, AZ: maximum VOC content 400 g/L
 NEOTC: maximum VOC content 120 g/L

PREPARATION

Protect people, vehicles, property, plants, windows and all nonmasonry surfaces from product, splash, residue, fumes and wind drift. Protect and/or divert foot and auto traffic.

Thoroughly clean the surface using the appropriate Sure Klean® or Enviro Klean® product. Newly constructed and repointed surfaces should be cleaned and cured before application. Always test for compatibility. Though product may be applied to slightly damp surfaces, best performance is achieved on clean, visibly dry and absorbent surfaces. Excessive moisture inhibits penetration, reducing the service life and performance of the treatment.

Protect window glass before using Weather Seal GP. Sure Klean® Strippable Masking is effective protection for use with this product. If protecting windows is impractical, follow these steps:

1. Clean window glass thoroughly before application to nearby concrete or masonry. Do not use in wind or when air or surface temperatures are hotter than 95°F (35°C).
2. Try to keep Weather Seal GP off the glass.
3. After surface has been protected from water for 6 hours, if product is on window glass, clean it off as soon as possible with soap and warm water. Otherwise use Enviro Klean® 2010 All Surface Cleaner to remove dried residues within 3-5 days.

Weather Seal GP is recommended for these substrates.
 Always test. Coverage is in sq.ft./m. per gallon.

Substrate	Type	Use?	Coverage
Architectural Concrete Block*	Burnished	no	NA
	Smooth	no	
	Split-faced	no	
	Ribbed	no	
Concrete	Brick	yes	100-175 sq.ft. 9-16 sq.m.
	Tile	yes	
	Precast Panels	yes	
	Pavers	yes	
	Cast-in-place	yes	
Fired Clay	Brick	yes	100-200 sq.ft. 9-19 sq.m.
	Tile	yes	
	Terra Cotta	yes	
	Pavers	yes	
Marble, Travertine, Limestone	Polished	no	NA
	Unpolished	no	NA
Granite	Polished	no	NA
	Unpolished	no	NA
Sandstone	Unpolished	yes	50-125 sq.ft. 5-12 sq.m.
Slate	Unpolished	no	NA

*For porous block, Sure Klean® Custom Masonry Sealer or Weather Seal Block-Guard® & Grout Control may be more appropriate.
 Always test to ensure desired results. Coverage estimates depend on surface texture and porosity.

Surface and Air Temperatures

Best surface and air temperatures are 40-95°F (4-35°C) during use and for 8 hours after. If freezing conditions exist before application, let masonry thaw. Weather Seal GP's water carrier may freeze at low temperatures or evaporate in high temperatures. Both conditions impair penetration and results. Cleanup is more difficult on surfaces hotter than 95°F (35°C).

Equipment

Apply with brush, roller or low pressure spray (<50 psi). Fan tips are recommended for sprayers. Avoid atomization of material.

Storage and Handling

Store in a cool, dry place. Always seal container after dispensing. Do not alter or mix with other chemicals. Published shelf life assumes upright storage of factory-sealed containers in a dry place. Maintain temperature of 45-100°F (7-38°C). Keep from freezing. Do not double stack pallets. Dispose of unused product and container in accordance with local, state and federal regulations.

APPLICATION

Before use, read "Preparation" and "Safety Information."

ALWAYS TEST each type of surface before overall application for suitability and results. Test using the following application instructions. Let area dry thoroughly before inspection.

Dilution

Do not dilute or alter.

Vertical Application Instructions

For best results, apply "wet-on-wet" to a visibly dry and absorbent surface.

Spray:

Saturate from the bottom up, creating a 4-8" (15-20 cm) rundown below the spray contact point. Let the first application penetrate for 5-10 minutes. Resaturate while surface still appears moist. Less will be needed for the second application.

NOTE: Hot, windy conditions evaporate the water carrier, reducing penetration and performance. On hot days, apply early and in shade if possible.

Brush or roller:

Saturate uniformly. Let penetrate for 5-10 minutes. Brush out heavy runs and drips that don't penetrate.

Horizontal Application Instructions

Saturate in a single application. Use enough to keep the surface wet for 2-3 minutes before penetration. Broom out puddles until they soak in.

Dense Surface Application Instructions

Apply a single coat. Use enough to completely wet the surface without creating drips, puddles or rundown. Do not over apply. Test for application rate.

Treated surfaces dry to touch in 1 hour. Protect surfaces from rainfall for 6 hours following treatment. Weather Seal GP gains its water-repellency properties in 72 hours.

Cleanup

Clean tools, equipment, and overspray with soap and warm water.

Paint Adhesion

Always test to make sure paint sticks to treated surfaces. Improve adhesion before painting by pressure water-rinsing the treated surface, then letting it dry.

Do not use Weather Seal GP as a paint primer. Some cementitious coatings, plaster, stucco, etc., may not adhere well to treated surfaces. Install and let them thoroughly cure before application.

Always test to verify compatibility between Weather Seal GP and other proposed surface treatments.

SAFETY INFORMATION

Sure Klean® Weather Seal Weather Seal GP is a water carried product. Use appropriate safety equipment and job site controls during application and handling. Read the full label and MSDS for precautionary instructions before use.

First Aid

Ingestion: Call a physician, emergency room or poison control center immediately for instruction on properly inducing vomiting. Get medical assistance.

Eye Contact: Rinse thoroughly for 15 minutes. Get immediate medical assistance.

Skin Contact: Remove contaminated clothing and rinse thoroughly for 15 minutes. Seek medical assistance if persistent irritation develops. Launder contaminated clothing before reuse.

Inhalation: Seek medical attention if irritation develops.

24-Hour Emergency Information: INFOTRAC at 800-535-5053

WARRANTY

The information and recommendations made are based on our own research and the research of others, and are believed to be accurate. However, no guarantee of their accuracy is made because we cannot cover every possible application of our products, nor anticipate every variation encountered in masonry surfaces, job conditions and methods used. The purchaser shall be responsible to make his own tests to determine the suitability of this product for his particular purpose.

Weather Seal GP

PROSOCO, Inc. warrants this product to be free from defects. **Where permitted by law, PROSOCO makes no other warranties with respect to this product, express or implied, including without limitation the implied warranties of merchantability or fitness for particular purpose.** PROSOCO's liability shall be limited in all events to supplying sufficient product to re-treat the specific areas to which defective product has been applied. Acceptance and use of this product absolves PROSOCO from any other liability, from whatever source, including liability for incidental, consequential or resultant damages whether due to breach of warranty, negligence or strict liability. This warranty may not be modified or extended by representatives of PROSOCO, its distributors or dealers.

CUSTOMER CARE

Factory personnel are available for product, environment and job-safety assistance with no obligation. Call 800-255-4255 and ask for Customer Care - technical support.

Factory-trained representatives are established in principal cities throughout the continental United States. Call Customer Care at 800-255-4255, or visit our web site at www.prosoco.com, and request the name of the Sure-Klean® Weather-Seal representative in your area.