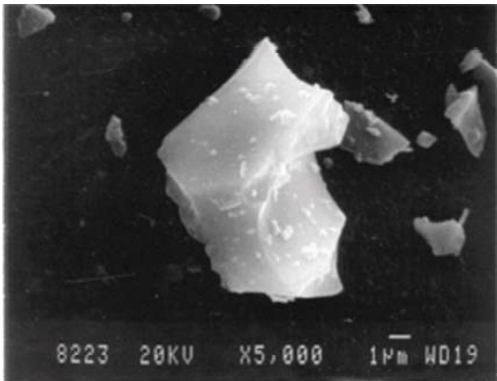


SafSil Amorphous Silica in Coatings

SafSil®

A HIGH-PERFORMANCE FUNCTIONAL FILLER CONTAINING LESS THAN 0.1% CRYSTALLINE SILICA

SafSil® is a naturally occurring volcanic glass, classified as a vitreous silica/silicate; it contains less than 0.1% crystalline silica. The material may be classified as vitreous silica by composition.



Scanning Electron Micrograph of a SafSil® particle

TYPICAL CHEMICAL ANALYSIS, % By Wt.

SiO ₂	73
Al ₂ O ₃	12
K ₂ O	4
Na ₂ O	4
Fe ₂ O ₃	<2
CaO	<2
MgO	<2
TiO ₂	<2

TYPICAL PHYSICAL PROPERTIES*

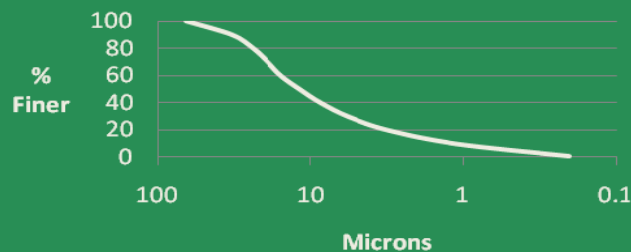
Grade	CT200	CT450	CT550
Hegman	2.0 – 3.0	4.5 – 5.5	5.0 – 6.0
Oil Absorption (ASTM D281)	39	40	40
GE Brightness	77	78	79
Median Particle Size	12µ	7µ	5µ
pH (10% in water)	8.0 – 10.0	8.0 – 10.0	8.0 – 10.0
Hardness, Mohs	5.5 – 6.0	5.5 – 6.0	5.5 – 6.0
Index of Refraction	1.5	1.5	1.5
Specific Gravity	2.4	2.4	2.4
Bulking Value, gal/lb	0.05	0.05	0.05
Moisture	<1%	<1%	<1%

*The above values are relative. They should not be considered specifications.

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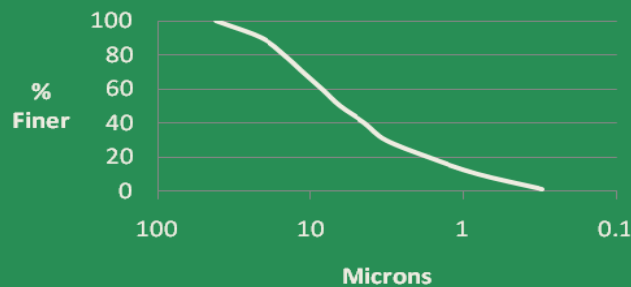
Particle Size Distribution*

SafSil® CT200



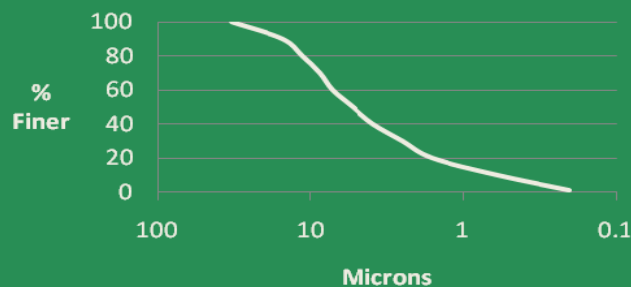
Particle Size Distribution*

SafSil® CT450



Particle Size Distribution*

SafSil® CT550



*Actual Particle Distribution Will Vary Within Test Parameter

SafSil Amorphous Silica in Coatings

Environmentally friendly paints meeting the Leadership in Energy and Environmental Design (LEED) and MPI Green Performance™ requirements may be produced with SafSil®.

In addition to being environmentally friendly, SafSil® functional fillers offer the following key attributes for paints and related products. The degree of enhancement varies with the grade selected.

- Alkalinity-pH buffer
- Film reinforcement
- Relatively low specific gravity
- Ease of dispersion
- Flatting-sheen control
- Scrub resistance- film integrity
- Burnish resistance
- Sheen uniformity
- Touch-up enhancement
- Superior deep tone color development
- Exterior durability-improves degradability
- Inertness-frost resistance
- Acid resistant-ideal for severe industrial atmospheres
- Low soluble salt content-20,500 ohm-cm ASTM D2448
- Provides “tooth” in primer formulations

INTERIOR PAINTS

SafSil® CT200 is the workhorse for interior flat wall paints. SafSil® CT450 and CT550 may be used effectively where greater angular sheen and less film surface texture are desired. The materials are the ideal choice for low sheen and satin paints. SafSil® CT200 has a broad particle size distribution which aids in achieving flatting, burnish resistance, sheen uniformity, and touch- up. The material is also beneficial as a possible alternative for diatomaceous earth.

SafSil Amorphous Silica in Coatings

Although not a pound for pound replacement, flattening can be achieved with less film porosity and enhanced film integrity.

High performance ceiling paints may be formulated with SafSil® CT200. Flattening and sheen uniformity are important properties which are readily enhanced with paints containing SafSil®.

SafSil® Grades CT200 and CT450 have performed very well as replacements for ceramic microspheres. Equivalent or superior properties i.e. burnish resistance, stain removal, and scrubbability has been realized with formulation conversions. In addition to performance improvement, cost savings are generally achieved.

SafSil® CT550 is the best choice for sheen control in both latex and alkyd eggshell and semigloss paints.

EXTERIOR HOUSE PAINTS AND STAINS

SafSil® CT200 and CT450 have performed very well in exterior house paints and stains. Quality paints may be formulated to meet today's requirements for various substrates. Outstanding tint retention is obtained in systems containing SafSil®. The materials excellent acid resistance renders frost free exterior paints. SafSil® containing paints should perform well in cases where acid radicals are released by binder degradation. Exterior properties related to film integrity i.e. grain cracking and flaking appear comparable to other commonly used fillers. Exterior exposures, at our Florida Test Station, indicate mildew resistance of SafSil® containing paints to be satisfactory. This is attributed to the materials relatively high pH.

SafSil Amorphous Silica in Coatings

FLOOR PAINTS

The hardness, chemical resistance, and abrasive qualities of SafSil® makes it an ideal candidate for floor and deck coatings. Pool deck coatings have been successfully formulated with SafSil®.

PRIMERS AND UNDERCOATS

SafSil® is ideal for both architectural and industrial primer applications. The relatively low soluble salt content should help minimize corrosion in maintenance primers. The film texture of SafSil® CT450 contained paints provides tooth for subsequent topcoat adhesion. Even though relatively hard SafSil® CT450 containing primers have exhibited very good sanding qualities.

POWDER COATINGS

SafSil® grades have been used successfully in powder coatings. The hardness of SafSil® is a plus and angular sheen control and reinforcement are provided.

INDUSTRIAL MAINTENANCE FINISHES

SafSil® CT550 has been used successfully by a number of manufacturers to produce quality OEM finishes.

DRY FALL COATINGS

Dry fall coatings are another opportunity for SafSil®. In these systems sheen uniformity and corrosion resistance may be key properties. The SafSil® grades should help retard corrosion.

SafSil Amorphous Silica in Coatings

EIFS SYSYEMS

Exterior Insulation Finishing System (EIFS) basecoats and topcoats may be improved with the use of SafSil®. In basecoats SafSil® can help bridge large nodular sand grains and enhance reinforcing. SafSil® is an asset for improving tint retention in topcoats.

TENNIS COURT FINISHES

SafSil® has been used successfully in tennis court coatings. Film reinforcement, sheen control, and tint retention are provided.

TRAFFIC PAINT

SafSil® Grades are efficacious in traffic paint applications. The hardness of the material makes it ideal in replacing calcium carbonate in these systems. SafSil® CT200 may also replace diatomaceous earth in traffic paints which contain the material. Improved performance will occur due to greater free binder.

DRIVEWAY SEALERS

SafSil® has been used successfully in driveway sealers. The material contributes to ideal rheology and helps film reinforcement.

HIGH HEAT COATINGS

SafSil® has successfully been used in high heat coatings. The material can easily withstand temperatures well over 1000 F.

SafSil Amorphous Silica in Coatings

FORMULATING WITH SafSil®

SafSil® may be used in both water and solvent-based paints. The material is easy to disperse and may be post added to finished batches to help control sheen or gloss.

The recommended starting point for reformulating toned or tinted paints is to substitute **SafSil®** on an equal volume basis for the present extenders. It is very important to remember **SafSil®** has a relatively low specific gravity. In most cases fewer pounds are required. **SafSil®** may be blended with other minerals to achieve desired optics. In many cases **SafSil®** can be the sole functional filler but there are times the desired film properties may be enhanced with blending. The blue/grey undertone of **SafSil®** is generally masked by toners or colorant. Very light pastel color system off-whites have been produced with **SafSil®** contained paints.

In reformulating higher reflectance paints, blending with other extenders has been beneficial to maintain optics. Reducing **SafSil®** level and blending with other minerals has been successful as a means of mirroring the optical properties of other systems. By proper choice of mineral type, shape, particle size, and particle size distribution ideal results may be obtained.

Deeptone factory colors, are a natural for the use of **SafSil®**. The refractive index of **SafSil®** is very similar to that of resin which transfers to excellent film clarity. Enhanced chroma (intensity) is achieved with the use of **SafSil®**.

The above information is only a guide for using **SafSil®** in coatings applications. To learn more call on us to see how **SafSil®** may be used to enhance your formulations. The CR Minerals laboratory is available to assist. Contact Fred Marschall for technical information (727-230-2183) or email fred@crminerals.com.