



# **CARD SHARK**

**Michigan Technological University**

**MTDS Addendum**

**2023**

## Summary Table

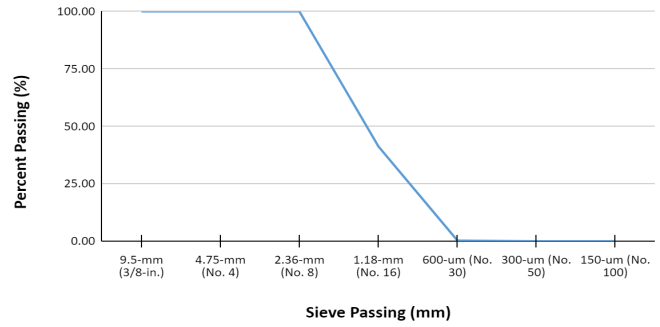
Product Name	Type	ASTM	Link
Lafarge - Portland Cement	Cement	C-150	<a href="https://www.lafargeholcim.us/our-solutions-and-products">https://www.lafargeholcim.us/our-solutions-and-products</a>
Lafarge - Blast Furnace Slag	Cementitious Material	C-989	<a href="https://www.lafarge.ca/en/newcem">https://www.lafarge.ca/en/newcem</a>
Ecomaterials - Class C Fly Ash	Cementitious Material	C-618	<a href="https://ecomaterial.com/wp-content/uploads/2022/03/EM-Fly-Ash-Class-C-Brochure_f-3-24-22.pdf">https://ecomaterial.com/wp-content/uploads/2022/03/EM-Fly-Ash-Class-C-Brochure_f-3-24-22.pdf</a>
NORCHEM - Undensified Silica Fume	Cementitious Material	C-1240	<a href="https://www.norchem.com/technical-data-sheet.html">https://www.norchem.com/technical-data-sheet.html</a>
Burgess- Metakaolin	Cementitious Material	C-618	<a href="https://www.burgesspigment.com/tds/burgess-optipozz/">https://www.burgesspigment.com/tds/burgess-optipozz/</a>
NYCON - RFS400 PVA	Secondary Reinforcement	C-1116	<a href="https://cdn.shopify.com/s/files/1/0088/0764/5299/files/NyconPVARFS400Sheet042015.pdf?7980">https://cdn.shopify.com/s/files/1/0088/0764/5299/files/NyconPVARFS400Sheet042015.pdf?7980</a>
NYCON - RF4000 PVA	Secondary Reinforcement	C-1116	<a href="https://cdn.shopify.com/s/files/1/0088/0764/5299/files/NyconPVARF4000Sheet041015.pdf?7980">https://cdn.shopify.com/s/files/1/0088/0764/5299/files/NyconPVARF4000Sheet041015.pdf?7980</a>
Tensor - GlasGrid 8511	Primary Reinforcement	C-338, D-276, D-5261, D-6637	<a href="https://www.tensorcorp.com/getattachment/4934a568-1014-4ecd-bcea-1c2f211d40af/G_MPDS_8501-8511.pdf">https://www.tensorcorp.com/getattachment/4934a568-1014-4ecd-bcea-1c2f211d40af/G_MPDS_8501-8511.pdf</a>
SpyderLath	Primary Reinforcement	D-3775, D-1777, D-5035	<a href="https://spiderlath.com/wp-content/uploads/2019/09/Test_Summary.pdf">https://spiderlath.com/wp-content/uploads/2019/09/Test_Summary.pdf</a>
1/16" Steel Cable	Cable Reinforcement	-	<a href="https://thd.co/3oMmt5M">https://thd.co/3oMmt5M</a>
McMastercarr Cable Ties	Wire Rope Stop	-	<a href="https://www.mcmaster.com/3936T35/">https://www.mcmaster.com/3936T35/</a>
Simpson Strong Tie TP15	Bearing Plate	-	<a href="https://www.strongtie.com/miscellaneousplates_miscellaneousconnectors/tp_plate/p/tp">https://www.strongtie.com/miscellaneousplates_miscellaneousconnectors/tp_plate/p/tp</a>
Heat Shrink Supply Tubing	Wire Tubing	-	<a href="https://www.heatshrinksupply.com/datasheets/M230535C1.pdf">https://www.heatshrinksupply.com/datasheets/M230535C1.pdf</a>

Super Lube Multi-Use Synthetice Oil	Grease	-	<a href="https://www.super-lube.com/Content/Images/uploaded/documents/TDS/Technical_Data_Sheet_Multi_Use_Oil_w_Syncolon.pdf">https://www.super-lube.com/Content/Images/uploaded/documents/TDS/Technical_Data_Sheet_Multi_Use_Oil_w_Syncolon.pdf</a>
TotalBoat 2 Part Flotation Foam	Flotation Foam	-	<a href="https://cdn.shopify.com/s/files/1/0648/5282/0192/files/totalboat-polyurethane-flotation-foam-2lb-density-tds-4.22.21_98adc598-4be1-4e40-92fc-d17ae5e2ed5d.pdf?v=7754233285020659401">https://cdn.shopify.com/s/files/1/0648/5282/0192/files/totalboat-polyurethane-flotation-foam-2lb-density-tds-4.22.21_98adc598-4be1-4e40-92fc-d17ae5e2ed5d.pdf?v=7754233285020659401</a>
3M - Glass Bubbles K1, K37	Aggregate	-	<a href="https://multimedia.3m.com/mws/media/91049O/3m-glass-bubbles-k-s-and-im-series.pdf">https://multimedia.3m.com/mws/media/91049O/3m-glass-bubbles-k-s-and-im-series.pdf</a>
Poraver Expanded Glass	Aggregate	-	<a href="https://www.stobec.com/DATA/PRODUIT/1692~v~data_8739.pdf">https://www.stobec.com/DATA/PRODUIT/1692~v~data_8739.pdf</a>
Hess Pumice #3	Aggregate	C-330	<a href="https://hesspumice.com/downloads/PDFs/dataSheets/TDS/TDS-Grade-3.pdf">https://hesspumice.com/downloads/PDFs/dataSheets/TDS/TDS-Grade-3.pdf</a>
Hess Pumice #5	Aggregate	C-330	<a href="https://hesspumice.com/downloads/PDFs/dataSheets/TDS/TDS-Grade-5.pdf">https://hesspumice.com/downloads/PDFs/dataSheets/TDS/TDS-Grade-5.pdf</a>
Hess Pumice #7	Aggregate	C-330	<a href="https://hesspumice.com/downloads/PDFs/dataSheets/TDS/TDS-Grade-7.pdf">https://hesspumice.com/downloads/PDFs/dataSheets/TDS/TDS-Grade-7.pdf</a>
Direct Colors Concrete Pigments	Pigment	C-979	<a href="https://directcolors.com/concrete-pigment/">https://directcolors.com/concrete-pigment/</a>
BASF MasterGlenium 7500	Superplastisizer	C-494	<a href="https://assets.master-builders-solutions.com/en-us/masterglenium-7500-tds.pdf">https://assets.master-builders-solutions.com/en-us/masterglenium-7500-tds.pdf</a>
BASF MasterSet DELVO	Set Retardant	C-494	<a href="https://assets.master-builders-solutions.com/en-us/mbs-masterset-delvo-tds.pdf">https://assets.master-builders-solutions.com/en-us/mbs-masterset-delvo-tds.pdf</a>
SikaColor 430 Elements	Concrete Stain	-	<a href="https://usa.sika.com/content/dam/dms/us01/y/sikacolor-430-elements.pdf">https://usa.sika.com/content/dam/dms/us01/y/sikacolor-430-elements.pdf</a>
Chemmasters Crystal Clear	Sealer	C-1315, C-309	<a href="https://www.chemmasters.net/TDS/Crystal_Clear.pdf">https://www.chemmasters.net/TDS/Crystal_Clear.pdf</a>

## 1-2 mm Poravers

Sieve	Percent Passing
9.5-mm (3/8-in.)	100.00
4.75-mm (No. 4)	100.00
2.36-mm (No. 8)	100.00
1.18-mm (No. 16)	41.24
600-um (No. 30)	0.28
300-um (No. 50)	0.00
150-um (No. 100)	0.00

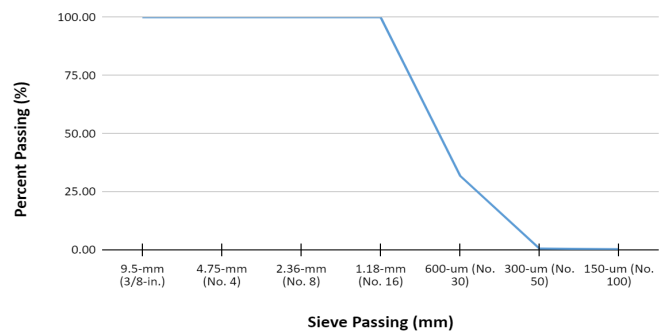
2-1 mm Poraver Particle Distribution Curve



## .5-1 mm Poravers

Sieve	Percent Passing
9.5-mm (3/8-in.)	100.00
4.75-mm (No. 4)	100.00
2.36-mm (No. 8)	100.00
1.18-mm (No. 16)	100.00
600-um (No. 30)	31.82
300-um (No. 50)	0.52
150-um (No. 100)	0.24

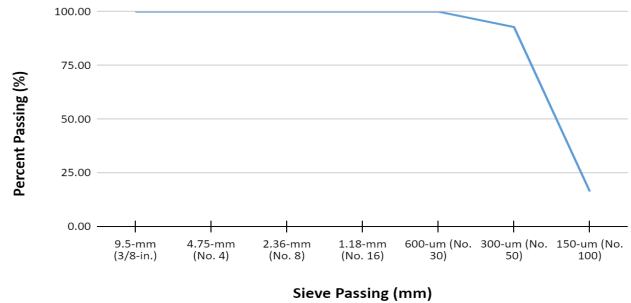
.5-1 mm Poraver Particle Distribution Curve



## .25-.5 mm Poravers

Sieve	Percent Passing
9.5-mm (3/8-in.)	100.00
4.75-mm (No. 4)	100.00
2.36-mm (No. 8)	100.00
1.18-mm (No. 16)	100.00
600-um (No. 30)	100.00
300-um (No. 50)	92.86
150-um (No. 100)	16.30

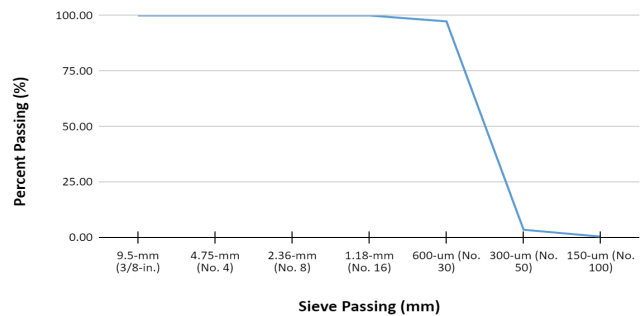
.25-.5 mm Poraver Distribution Curve



## .1-.3 mm Poravers

Sieve	Percent Passing
9.5-mm (3/8-in.)	100.00
4.75-mm (No. 4)	100.00
2.36-mm (No. 8)	100.00
1.18-mm (No. 16)	100.00
600-um (No. 30)	97.36
300-um (No. 50)	3.48
150-um (No. 100)	0.40

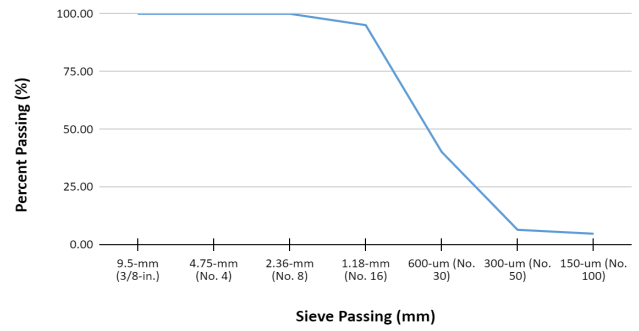
.1-.3 mm Poraver Particle Distribution Curve



## Grade #3 Pumice

Sieve	Percent Passing
9.5-mm (3/8-in.)	100.00
4.75-mm (No. 4)	100.00
2.36-mm (No. 8)	100.00
1.18-mm (No. 16)	95.09
600-um (No. 30)	40.16
300-um (No. 50)	6.41
150-um (No. 100)	4.71

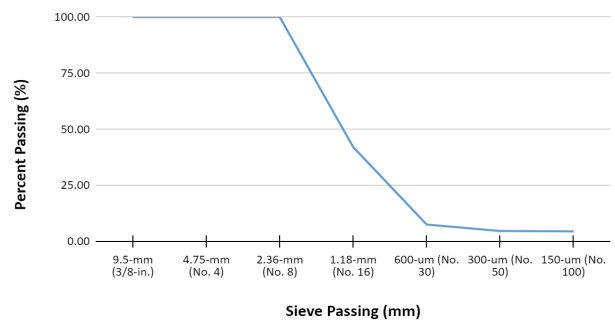
Grade #3 Pumice Particle Distribution Curve



## Grade #5 Pumice

Sieve	Percent Passing
9.5-mm (3/8-in.)	100.00
4.75-mm (No. 4)	100.00
2.36-mm (No. 8)	100.00
1.18-mm (No. 16)	42.02
600-um (No. 30)	7.51
300-um (No. 50)	4.62
150-um (No. 100)	4.49

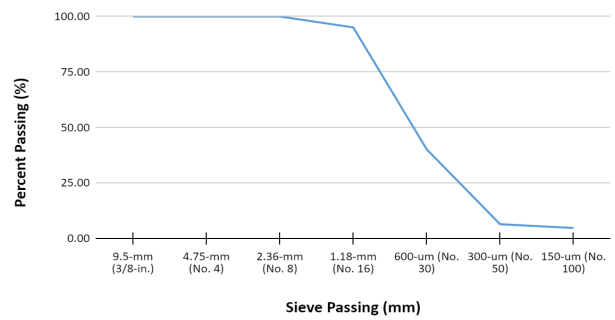
Grade #5 Pumice Particle Distribution Curve



## Grade #7 Pumice

Sieve	Percent Passing
9.5-mm (3/8-in.)	100.00
4.75-mm (No. 4)	100.00
2.36-mm (No. 8)	99.68
1.18-mm (No. 16)	30.75
600-um (No. 30)	9.99
300-um (No. 50)	3.68
150-um (No. 100)	2.51

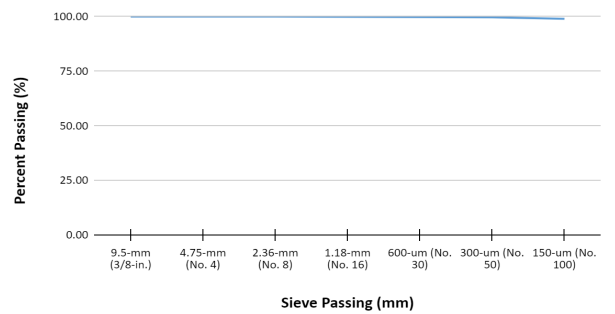
Grade #7 Pumice Distribution Curve



## K1

Sieve	Percent Passing
9.5-mm (3/8-in.)	100.00
4.75-mm (No. 4)	100.00
2.36-mm (No. 8)	100.00
1.18-mm (No. 16)	99.90
600-um (No. 30)	99.80
300-um (No. 50)	99.70
150-um (No. 100)	99.00

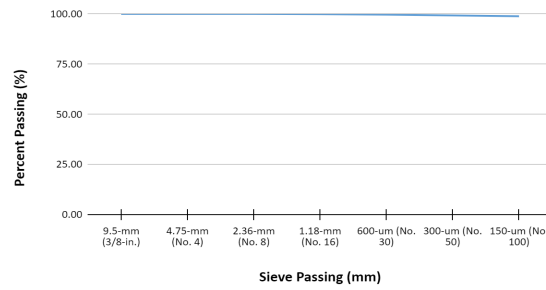
K1 Particle Distribution Curve



## K37

Sieve	Percent Passing
9.5-mm (3/8-in.)	100.00
4.75-mm (No. 4)	100.00
2.36-mm (No. 8)	100.00
1.18-mm (No. 16)	99.90
600-um (No. 30)	99.70
300-um (No. 50)	99.30
150-um (No. 100)	98.90

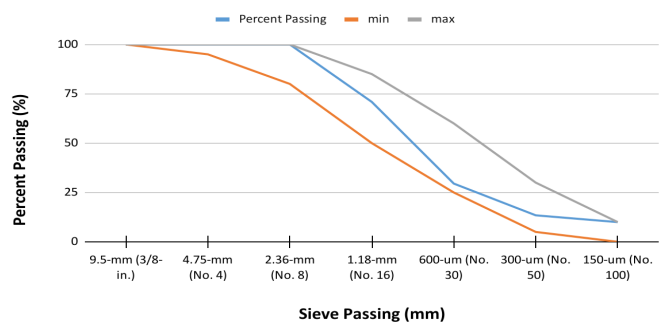
K37 Particle Distribution Curve



## Primary Mix Gradation

Sieve	Percent Passing
9.5-mm (3/8-in.)	100.00
4.75-mm (No. 4)	100.00
2.36-mm (No. 8)	99.99
1.18-mm (No. 16)	70.89
600-um (No. 30)	29.52
300-um (No. 50)	13.43
150-um (No. 100)	9.98

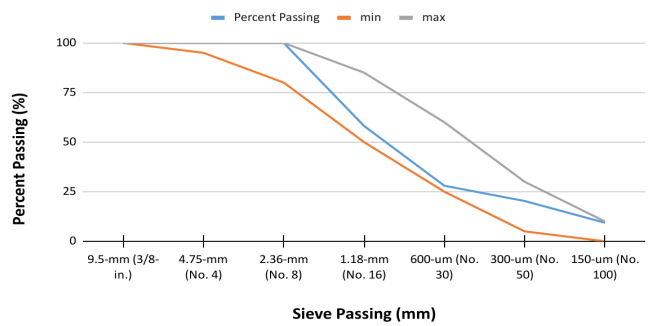
Primary Mix Particle Distribution Curve



## Secondary Mix Gradation

Sieve	Percent Passing
9.5-mm (3/8-in.)	100.00
4.75-mm (No. 4)	100.00
2.36-mm (No. 8)	99.97
1.18-mm (No. 16)	58.14
600-um (No. 30)	28.00
300-um (No. 50)	20.30
150-um (No. 100)	9.34

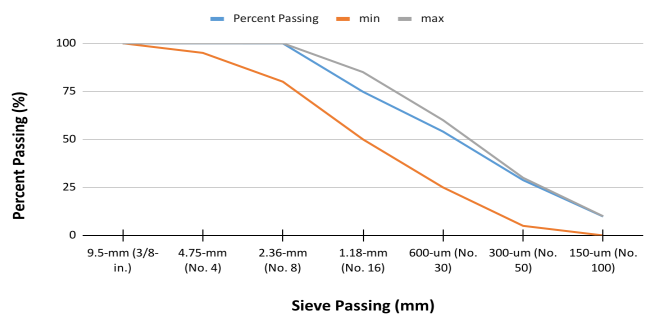
Secondary Mix Particle Distribution Curve



## Finishing Mix Gradation

Sieve	Percent Passing
9.5-mm (3/8-in.)	100.00
4.75-mm (No. 4)	100.00
2.36-mm (No. 8)	99.94
1.18-mm (No. 16)	74.77
600-um (No. 30)	54.04
300-um (No. 50)	28.79
150-um (No. 100)	9.85

Finishing Mix Particle Distribution Curve





# Lafarge Portland Cement

## LAFARGE

Lafarge Portland Cement is a high quality, cost-effective basic building material used in virtually all forms of construction, from hospitals and homes to schools, tunnels and airports. Lafarge Portland Cement meets or exceeds all applicable chemical and physical requirements of ASTM C 150.

### Product Description

#### Portland Cement

ASTM C 150 Type I, Type IA, Type II, Type III, Type V

**Basic Use:** Lafarge Portland Cement is a cost-effective basic building material. It can be used in a wide variety of commercial and architectural concrete construction applications. Uses include cast-in-place, pre-cast, tilt-up, water tanks, drains, bridges, roads, pipes, concrete masonry units, pre-stressed concrete members, masonry mortars and grouts.





# LAFARGE PORTLAND CEMENT

- Type I** – This is a general-purpose cement suitable for all uses where the special properties of other types of portland cement are not required.
- Type IA** – This cement contains an additive that will entrain air bubbles to aid in durability when concrete is exposed to freezing temperatures.
- Type II** – For general use, especially when moderate sulfate resistance or moderate heat of hydration is desired.
- Type III** – This cement provides high early strength when compared with Type I.
- Type V** – This is for use when high sulfate resistance is desired. Type V generally gains strength more slowly than Type I.

## Options

Select Lafarge North America manufacturing plants produce air-entrained (Type IA) portland cement that contains an additive that will entrain air bubbles to aid in durability when concrete is exposed to freezing temperatures. Certain locations manufacture cements meeting the optional physical and chemical requirements of ASTM. AASHTO cements are available in certain geographic areas. Contact your Lafarge Cement representative for product use and availability.

## Technical data

Lafarge Portland Cement meets or exceeds all applicable chemical and physical requirements of ASTM C 150.

## Use and limitations

Lafarge North America manufactures all products in accordance with strict QA/QC (quality assurance and quality control) procedures to ensure optimum product performance and uniformity. There are many variables that affect concrete performance that are beyond the control of the cement manufacturer. Good concreting practices in accordance with the American Concrete Institute are required to achieve desired results. Skilled persons should use these products with special attention given to formwork, batching, mixing, placing, finishing and curing. In most applications, quality aggregates, admixtures and additives should be utilized. For detailed information, contact your Lafarge North America sales office.

## Precautions

Direct contact with wet cement should be avoided. If contact occurs, the skin should be washed with water as soon as possible. Exposure can cause serious, potentially irreversible tissue destruction in the form of chemical (caustic) burns. If cement gets into the eyes, immediately rinse thoroughly with water and seek medical attention. For more information, reference the applicable Lafarge Material Safety Data Sheet (MSDS). The MSDS should be consulted prior to use of this product and is available upon request and online at [www.lafargenorthamerica.com](http://www.lafargenorthamerica.com).

## Product Name

Lafarge Portland Cement

## Manufacturer

Lafarge North America Inc.  
12950 Worldgate Drive, Suite 500  
Herndon, Virginia 20170  
[www.lafargenorthamerica.com](http://www.lafargenorthamerica.com)

**Contact your Lafarge Regional Office for specific product information, availability and ordering.**

## Great Lakes Region

Bingham Farms, Michigan  
Phone: 248-594-1991

## Northeast Region

Montréal, Québec  
Phone: 514-861-1411

## River Region

Lee's Summit, Missouri  
Phone: 816-251-2100

## Southeast Region

Alpharetta, Georgia  
Phone: 678-746-2000

## Western Region

Calgary, Alberta  
Phone: 403-271-9110

## Limited Warranty

Lafarge warrants that Lafarge Portland Cement meets all applicable requirements of ASTM C 150. Lafarge makes no other warranty, whether of merchantability or fitness for a particular purpose, with respect to Lafarge Portland Cement. Having no control over its use, Lafarge will not guarantee finished work in which Lafarge Portland Cement is used.







# LAFARGE

## NewCem<sup>®</sup> Slag Cement

Provides flexibility in concrete proportioning to assist in achieving:

Reduced Permeability

Reduced Ingress of Chlorides

Sulfate Resistance

Resistance to Alkali Silica Reaction

Greater Strength Potential

Lower Temperatures for Mass Concrete

Improved Workability

A Lighter, More Pleasing Color

Reduced Impact on the Environment



**Lafarge NewCem® slag cement** is a finely ground, granulated blast furnace slag (GGBFS), a product of the iron-making process. Through our extensive distribution system, NewCem is available for blending with conventional portland cement at the concrete plant to produce high-quality, durable concrete.



**Front cover photo:**

NewCem was used to construct the thick walls and floor of the Peel Reservoir which serves the Regional Municipality of Peel, Ontario.

**Slag** is produced during the iron-manufacturing process. During the manufacturing process the materials are heated in a blast furnace to a molten state. The slag rises to the top and is separated from the iron for further processing. When slag is separated from iron and rapidly cooled with water (granulated), the morphology of the slag changes. This morphology change provides the slag with its cementitious properties. The granulated slag is then ground to a controlled fineness, typically greater than that of Type I portland cement, and the finished product is ready for shipment to our customers.

**The NewCem® Slag Cement Advantage**

To produce top-quality slag, a producer needs to have slag with an ideal chemistry from a consistent source and needs to have a granulator close to the slag source to provide rapid quenching of the slag. Lafarge plants have been designed with these criteria in mind.

Lafarge engineers and scientists have led North America in the research and development of specifications for slag. Today, Lafarge's knowledge and technical experience is unequalled by any other producer of GGBFS. Lafarge's technical staff is available to ready-mixed concrete producers, engineers and specifiers for questions about the proper use of NewCem in any application.

**NewCem® Slag Cement and the Environment**

NewCem is a product derived from the iron-making process. It makes use of by-product material that might otherwise be landfilled. The use of NewCem in concrete saves virgin raw materials that would otherwise be needed for the production of portland cement. NewCem also requires less energy to produce than portland cement, so the amount of greenhouse gases released into the environment is reduced when NewCem partially replaces portland cement in concrete. The result is superior concrete with less environmental impact.



Lafarge NewCem provides a significant contribution to sustainable construction. The use of NewCem in concrete production consumes less energy and offers improved efficiency and building performance. NewCem can also be used to help achieve LEED (Leadership in Energy and Environmental Design)



points in the USGBC's (U.S. Green Building Council) and CaGBC's (Canada Green Building Council) LEED programs.



# Advantages of Lafarge NewCem® Slag Cement

## Strength

When properly used, NewCem can increase the 28-day strength of the concrete by 5 to 25 percent. The highest strength increases are found when the replacement level approaches 50 percent. High strength for concrete subjected to repeated flexural loads is critical for the long-term service life of highways, roads and airfield runways. NewCem provides strength and enhances the placeability and finishing characteristics of low-slump concrete. NewCem can also improve the consistency of concrete strengths. Most fluctuations in concrete strengths occur in the summer when high temperatures can cause slump loss and increased water demand. NewCem naturally retards the initial setting time of concrete, which leads to more consistent strengths.

## Durability

Long-term durability is a recognized need for all concrete structures. Concrete durability is affected by such variables as strength, permeability, consistency, resistance to extreme environmental conditions and resistance to chemical attack. When properly used, NewCem can increase the durability of concrete by improving resistance to sulfate attack, mitigating alkali silica reactions, reducing concrete permeability and decreasing concrete temperatures. NewCem's ability to dramatically increase the durability of concrete makes it an ideal ingredient for high-performance concrete. Many state DOT's have specified NewCem for their high-performance concrete mixes.

## Permeability

A concern with concrete structures exposed to de-icing salts is deterioration of the structure due to salt-induced corrosion of the reinforcing steel. When reinforcing steel corrodes, it takes up more volume than the original steel. This places the concrete around the reinforcing steel in tension. Because concrete tensile strength is about 1/10 of the compressive strength, the corroding steel can cause the concrete to crack. Once a crack develops, chlorides or other aggressive agents are provided a path to the reinforcing steel and further deterioration can occur. When used properly, concrete containing NewCem can reduce the permeability of the concrete; this reduces the ingress of chlorides and extends the life of the structure.

## ASR

The deterioration of concrete by the action of alkali silica reaction (ASR) is a concern in many areas of North America. ASR is a chemical reaction that occurs between the alkalis in portland cement and certain siliceous aggregates. These aggregates, when placed in a highly alkaline solution and in the presence of moisture, form an expansive gel that can cause the concrete to crack. If the crack reaches the surface of the concrete, a path is opened for the ingress of additional moisture, which will further fuel the reaction.

NewCem can reduce this potential expansion. It reduces the effective alkalis loading of the concrete. It reacts with the effective alkalis in portland cement and makes them unavailable to react with the reactive aggregates. Finally, NewCem can reduce the permeability of the concrete, which reduces the ingress of moisture that is available for the reaction.



Hartsfield International Airport,  
Atlanta, Georgia

## Sulfate Resistance

Sulfates, present in seawater and in some soils and wastewater, react with the alumina in hardened portland cement paste to cause deleterious expansion. Concrete containing NewCem can provide superior resistance to sulfate attack due to a decrease in the cement compounds that can cause expansion. Also contributing to sulfate resistance is the decrease in permeability of the concrete, which reduces the movement of sulfate solutions in the concrete.

*Resistance to sulfate attack may vary according to the chemistry of the cement and the slag cement used. Any combination of these materials should be tested to assure that desired sulfate resistance levels are achieved. Consult a Lafarge Cement Technical Representative before using NewCem in sulfate environments.*



National Archives - Silver Spring, Maryland



Chesapeake Bay Bridge Tunnel, Virginia

# Applications for Lafarge NewCem® Slag Cement

## High-Strength Concrete

In 1995, after the tragedy of the Oklahoma City bombing, engineers had to take a new look at how they designed structures, especially federal buildings. For example, construction was stopped on the new FBI building in Washington, D.C. while engineers and architects worked together to develop a design that would be more resistant to terrorist attack. One of the special designs employed in the FBI building was for a very high-strength blast wall. The concrete producer used a mix of 50 percent NewCem with 50 percent portland cement.

Another high-strength concrete project utilizing 50 percent NewCem and 50 percent portland cement is Lincoln Square in Washington, D.C. The specified strengths for this project ranged on the high end from 8,000 psi to 12,000 psi. Design strengths were usually achieved in about seven days, and 28-day strength results were often over 15,000 psi.

## Precast/Prestress

One of the earliest uses of NewCem was in precast and prestressed concrete. There were some initial concerns with using NewCem for these applications because of NewCem's natural tendency to reduce the early strength of the concrete. It was shown; however, that NewCem can react well when concrete is cured at elevated temperatures.

The light rail tunnels leading to the Minneapolis-St. Paul International Airport are constructed with precast concrete tunnel liners containing NewCem. This concrete met the low-permeability rating specification.

## Mass Concrete

A primary consideration in designing any mass concrete structure is the development of thermal cracks due to temperature differentials within the concrete. Cement produces heat during the hydration process. In the center of a mass concrete section the temperature of the concrete can build up quickly because there is no way for the heat to dissipate. On the exterior of the concrete section the heat dissipates much more rapidly. When the temperature differential between the center of the concrete mass and the exterior of the concrete becomes large enough, thermal cracking can develop.

Used in high percentages, NewCem has been very effective in reducing both the maximum temperature of the concrete and the rate of temperature rise, resulting in a lower temperature differential between the center of the concrete mass and the exterior of the concrete.

NewCem is produced in accordance with ASTM C 989 *Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars*, AASHTO M302 *Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars*, and CSA A3000 *Cementitious Materials Compendium*.



Light rail tunnel leading to the Minneapolis-St. Paul International Airport



FBI Building, Washington, D.C.



Lincoln Square, Washington, D.C.

## Properties of “Fresh Concrete” – NewCem® Slag Cement

**Water Requirements:** Concrete mixes containing NewCem will require about the same amount of water for a given slump as concrete containing only portland cement.

**Air Content:** The use of NewCem as a partial replacement for portland cement will not appreciably change the dosage rate requirements of air entraining agents. When changing mix ingredients, it is recommended to check dosage rates and adjust if necessary.

**Bleeding:** The bleeding characteristics of concrete containing NewCem will not be appreciably affected.

**Segregation:** There is no segregation issue related to the use of NewCem.

**Heat of Hydration:** NewCem can be used to moderate the development of heat in mass concrete. It is recommended that replacement factors of 60% or greater be used for this type of application. It is highly recommended that mix designs be assessed on an individual basis.

**Setting Time:** Concrete containing NewCem may have extended set times compared to straight portland mixes, especially at lower ambient/concrete temperatures and higher replacement levels. At normal summertime temperatures, set times will only be slightly affected.

**Finishability:** The finishability of concrete is generally improved with the use of NewCem.

**Pumping:** Concrete containing NewCem generally has improved pumpability.

**Proportioning:** NewCem has a lower specific gravity than normal portland cement. Consequently, the mix design should be modified to accommodate this change. ACI 211 should be followed for proportioning and mix proportions should be verified.

**Curing:** Proper curing of all concrete is essential. It is recommended that the procedures in ACI 308 *Standard Practice for Curing Concrete* and CSA A23.1 be followed.

## Properties of “Hardened Concrete” – NewCem® Slag Cement

**Strength:** Generally, later strengths (beyond 7 days) both compressive and flexural, are enhanced with NewCem. Early strengths (up to 14 days) can be reduced when compared to straight portland mixes, especially at higher replacement rates and at cooler temperatures.

**Permeability and Absorption:** When properly proportioned, concrete containing NewCem is less permeable and has a lower absorption rate than mixes containing only portland cement.

**Concrete Color:** Concrete made with NewCem as a replacement for portland cement will be lighter in color. A green or blue-green color may occasionally be observed in freshly cured concrete; however, this is very rare and will only occur under certain conditions. This tint normally disappears once the concrete surface is exposed to air and dries out.

**Alkali-Silica Reactivity:** Concrete containing NewCem can help mitigate ASR. This is dependent on the qualities of the aggregate and the replacement rate as well as other variables. Concrete mixtures should be assessed on an individual basis.

**Resistance to Sulfate Attack:** NewCem can be used as part of a system to improve the resistance of concrete to sulfate attack. The degree of resistance achieved is dependent on the replacement rate and other factors. Mixes should be assessed individually.

Resistance to sulfate attack may vary according to the chemistry of the cement and the slag cement used. Any combination of these materials should be tested to assure that desired sulfate resistance levels are achieved. Consult a Lafarge Cement Technical Representative before using NewCem in sulfate environments.

**Corrosion of Embedded Steel:** There is a direct relationship between permeability and corrosion resistance. Corrosion can be reduced by replacing part of the portland cement with NewCem in concrete mixtures.

**Carbonation:** When used in a properly designed concrete mix, and with appropriate finishing and curing procedures applied in the field, the use of NewCem will not significantly affect the depth of carbonation.

**Freeze-Thaw Resistance:** When used in a properly designed concrete mix with an adequate air-void system and with proper finishing and curing procedures applied in the field, the use of NewCem will not detract from the freeze-thaw resistance of concrete.

**Deicer Salt Scaling:** When using NewCem as a replacement for portland cement in concrete that will be exposed to deicing salts, the limits specified in ACI 318 *Building Code Requirements for Structural Concrete*, ACI 301 *Specifications for Structural Concrete* and CSA A23.1 must be followed.

**Chemical Resistance:** Reduced permeability, and therefore improved chemical resistance, can be achieved through the use of NewCem in concrete mixtures.

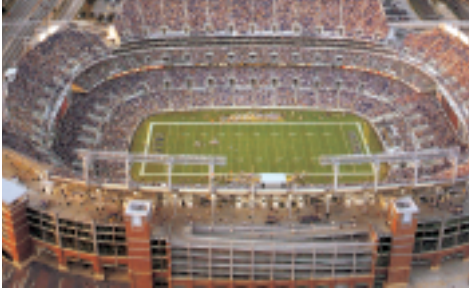
**Note:** Appropriate testing should be conducted with different NewCem/portland levels to assure desired results are achieved. Results may vary with the use of different portland cements.



I-895 Interchange near Richmond, Virginia



Liberty View Towers - Jersey City, New Jersey



Ravens' Stadium, Baltimore, MD

### Company Profile

Lafarge in North America is part of the Lafarge Group. The world leader in building materials, active on five continents, the Lafarge Group holds top-ranking positions in cement, aggregates, concrete and gypsum.

By focusing on the development and improvement of building materials, Lafarge puts the customer at the core of its strategy and offers the construction industry and the general public innovative solutions that will bring more safety, comfort and beauty to our everyday lives.

**Please consult a Lafarge Cement Technical Representative prior to using NewCem in specialized applications.**

#### Precautions

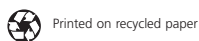
Direct contact with wet cement should be avoided. If contact occurs, the skin should be washed with water as soon as possible. Exposure can cause serious, potentially irreversible tissue destruction in the form of chemical (caustic) burns. If cement gets into the eyes, immediately rinse thoroughly with water and seek medical attention. For more information, reference the applicable Lafarge Material Safety Data Sheet (MSDS). The MSDS should be consulted prior to use of this product and is available upon request and online at [www.lafarge-na.com](http://www.lafarge-na.com).

### Limited Warranty

Lafarge warrants that Lafarge NewCem slag cement meets the requirements of ASTM C 989 and CSA-A3001. Lafarge makes no other warranty, whether of merchantability or fitness for a particular purpose with respect to Lafarge NewCem slag cement. Having no control over its use, Lafarge will not guarantee finished work in which Lafarge NewCem slag cement is used.

PBNCE

1/07



# Lafarge NewCem® Slag Cement

For more than three decades, NewCem has been used in conjunction with regular portland cement to produce improved concrete properties for architects, engineers, contractors, ready-mixed concrete and concrete products producers. Today, Lafarge maintains NewCem's market leadership through consistent product quality backed by solid technical expertise.

Please contact your Lafarge Office for specific product information, availability and ordering.

#### Lakes and Seaway Business Unit

Bingham Farms, Michigan  
Phone: 248-594-1991

#### U.S. East Business Unit

Alpharetta, Georgia  
Phone: 678-746-2000

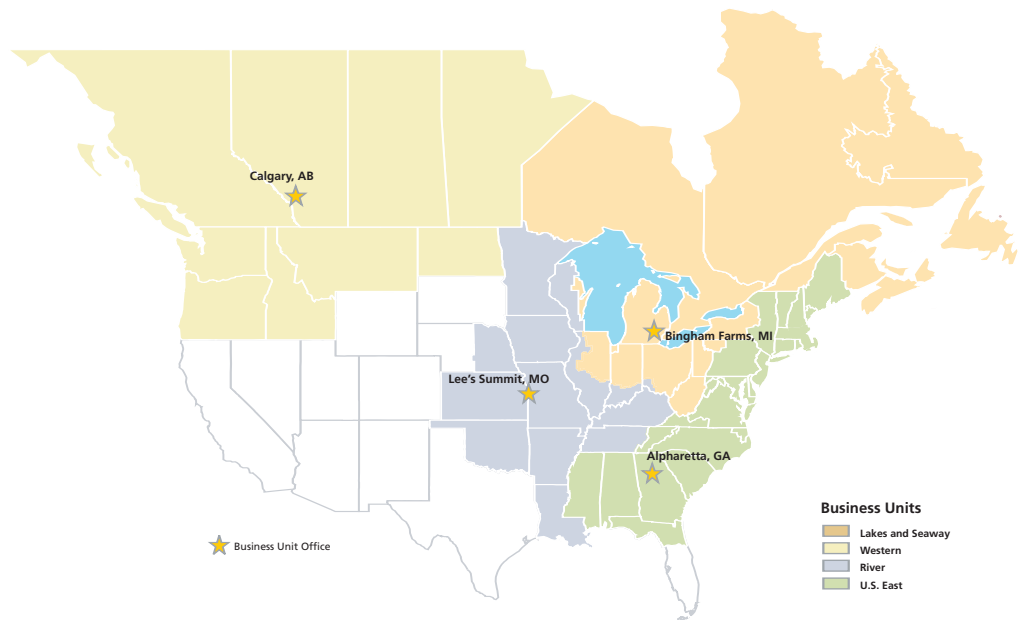
#### River Business Unit

Lee's Summit, Missouri  
Phone: 816-251-2100

#### Western Business Unit

Calgary, Alberta  
Phone: 403-271-9110

### Lafarge North America Cement Operating Areas



**Lafarge North America Inc.**  
12950 Worldgate Drive, Suite 500  
Herndon, VA 20170

**Lafarge Canada Inc.**  
606 Cathcart Street  
Montréal, Québec H3B 1L7



CEMENT

[www.lafarge-na.com](http://www.lafarge-na.com)

## ASTM C618 / AASHTO M295 Testing of

**Sample Date:**  
**Sample Type:** Class C Fly Ash  
**Sample ID:** WA Parish FA

**Report Date:** 10/12/2021  
**MTRF ID:** 2040 WP

Chemical Analysis	Results	ASTM Limit Class F / C	AASHTO Limit Class F / C
Silicon Dioxide (SiO <sub>2</sub> )	<u>34.85</u> %		
Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> )	<u>17.62</u> %		
Iron Oxide (Fe <sub>2</sub> O <sub>3</sub> )	<u>5.88</u> %		
Sum (SiO <sub>2</sub> +Al <sub>2</sub> O <sub>3</sub> +Fe <sub>2</sub> O <sub>3</sub> )	<u>58.35</u> %	50.0 min	50.0 min
Sulfur Trioxide (SO <sub>3</sub> )	<u>1.98</u> %	5.0 max	5.0 max
Calcium Oxide (CaO)	<u>28.14</u> %	18.0 max / >18.0	18.0 max / >18.0
Magnesium Oxide (MgO)	<u>5.99</u> %		
Sodium Oxide (Na <sub>2</sub> O)	<u>1.55</u> %		
Potassium Oxide (K <sub>2</sub> O)	<u>0.46</u> %		
Sodium Oxide Equivalent (Na <sub>2</sub> O+0.658K <sub>2</sub> O)	<u>1.85</u> %		
Moisture	<u>0.04</u> %	3.0 max	3.0 max
Loss on Ignition	<u>0.10</u> %	6.0 max	5.0 max
<b>Physical Analysis</b>			
Fineness, % retained on 45-µm sieve	<u>10.66</u> %	34 max	34 max
Strength Activity Index - 7 or 28 day requirement			
7 day, % of control	<u>113</u> %	75 min	75 min
28 day, % of control	<u>108</u> %	75 min	75 min
Water Requirement, % control	<u>94</u> %	105 max	105 max
Autoclave Soundness	<u>NT</u> %	0.8 max	0.8 max
Density	<u>2.79</u> g/cm <sup>3</sup>		

The test data listed herein was generated by applicable ASTM methods. The reported results pertain only to the sample(s) or lot(s) tested. This report cannot be reproduced without permission from Boral Resources.



## SILICA FUME -TECHNICAL DATA SHEET

**SILICA FUME** is a very fine pozzolanic material, composed of amorphous silica produced by electric arc furnaces as a byproduct of the production of elemental silicon or ferro silicon alloys.

**SILICA FUME** can be used in a variety of applications such as concrete, grouts, mortars, fibre cement products, refractory, oil/gas well cements, ceramics, elastomer, and polymer applications.

**SILICA FUME** is produced in conformance with the ASTM C-1240 specifications. The quality is controlled and monitored throughout the entire production process to ensure that it meets or exceeds specification requirements.

PROPERTIES	
State	Amorphous - Sub-micron powder
Color	Gray to medium gray powder
Specific Gravity	2.25
Solubility	Insoluble
Bulk Density - Densified (bulk and bagged products)	41 to 48 lb/ft <sup>3</sup> (655 to 770 kg/m <sup>3</sup> )
Bulk Density - Undensified (bulk & paper bags)	16 to 22 lb/ft <sup>3</sup> (256 to 352 kg/m <sup>3</sup> )
Bulk Density - Undensified (supersacks)	22 to 26 lb/ft <sup>3</sup> (252 to 416 kg/m <sup>3</sup> )

SPECIFICATIONS		
Chemical Requirements	ASTM	Typical
Silicon Dioxide (SiO <sub>2</sub> ) %	85.0 % Minimum	93.74 %
Moisture Content %	3.0 % Maximum	0.45 %
Loss on Ignition (LOI) %	6.0 % Maximum	3.75 %
Physical Requirements	ASTM	Typical
Oversize percent retained on 45- $\mu$ m (325 sieve)	10.0 % Maximum	1.91 %
Accelerated Pozzolanic Strength Activity Index with Portland cement (7 day)	105.0 % Minimum	139 %
Specific Surface	15 m <sup>2</sup> /g Minimum	22.49 m <sup>2</sup> /g

### POZZOLANIC REACTION IN A CEMENTITOUS SYSTEM

**SILICA FUME** in contact with water goes into solution within an hour. The silica in solution forms an amorphous silica rich, Ca poor, gel on the surface of the silica fume particles and agglomerates. After time the silica rich, Ca poor, coating dissolves and the agglomerates of silica fume reacts with free lime (CaOH<sub>2</sub>) to form calcium silicate hydrates (CSH). This reaction is called the *pozzolanic reaction*.



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# SILICA FUME – TECHNICAL DATA SHEET

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## PACKAGING, STORAGE AND HANDLING

PRODUCT FORM	PACKAGING	WEIGHT
Silica Fume – Densified	Bulk Truckload	46,000 lbs. max
	Super Sack	2,200 lbs.
	Paper Bag	50 lbs.
Silica Fume - Undensified	Paper Bag	25 lbs.
	Super Sack	1,000 lbs.
	Paper Bag	50 lbs.

## STORAGE

**SILICA FUME** should be kept dry, out of weather and the elements.

## SAFETY AND HANDLING PRECAUTIONS

**SILICA FUME** is generally considered a nuisance dust. Use and handling of silica fume does not represent a health risk when normal safety rules are observed. Direct contact may cause irritation of eyes. Prolonged contact may cause skin irritation. Inhalation may cause respiratory irritation resulting in coughing and shortness of breath. This product may be harmful if swallowed. Do not get in eyes and avoid prolonged skin contact. Do not take internally. Wash thoroughly with water after handling. For more detail, see our **SDS**.

## WARRANTY STATEMENT

The information given here is based on our best knowledge, and we believe it to be true and accurate. Norchem assumes no responsibility for the use of these statements, recommendations or suggestions, nor are they intended as a recommendation for any use, which would infringe any patent or copyright.



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Hauppauge, NY 11788  
Tel: 631-724-8639



*Where Ideas Are Concrete!*

[www.norchem.com](http://www.norchem.com)

Norchem, Inc – Florida Office  
985 Seaway Drive  
Fort Pierce, FL 34949  
Tel: 631-724-8669



# BURGESS OPTIPOZZ

## CALCINED ALUMINUM SILICATE

BURGESS OPTIPOZZ® is a high reactivity metakaolin produced by a patented process. Burgess OPTIPOZZ increases chemical resistance and durability, and reduces shrinkage. An OPTIPOZZ mix design will yield higher initial and long term strength. Additionally, the use of OPTIPOZZ will result in reduced efflorescence. Our strict process control allows for better whiteness and a clean color with outstanding batch to batch consistency. The use of OPTIPOZZ will eliminate the undertone associated with other pozzolans.

BURGESS OPTIPOZZ® is classified as a CLASS N POZZOLAN under ASTM C-618.

### Typical Physical Properties

Visual Color Cream White

Particle Structure Amorphous

325 Mesh Residue % 0.09

Average Particle Size Sedigraph 1.4  $\mu$

Free Moisture % Max 0.5

Specific Gravity 2.2

pH (20% Solids) 4.0

### Typical Chemical Properties

Silica (SiO<sub>2</sub>) % 51.0 – 52.4

Alumina (Al<sub>2</sub>O<sub>3</sub>) % 42.1 – 44.3

Iron Oxide (Fe<sub>2</sub>O<sub>3</sub>) % 0.30 – 0.50

Titanium Dioxide (TiO<sub>2</sub>) % 1.56 – 2.50

### Issue Date: CD00F

The suggestions and data contained in this bulletin are based on data which are believed to be reliable. They are offered in good faith, to be applied according to the user's own best judgment. Since operating conditions in the processor's plant are beyond our control, Burgess Pigment Company cannot assume responsibility for any risks or liabilities which may result from the use of its products. Likewise, no liability is assumed for any claimed patent infringement occurring by reason of any method or manner of use, or any product made by a consumer. While the Burgess Pigment Company guarantees the quality of its products, it cannot give any warranty regarding the results obtained by the use thereof.

**NYCON-PVA RFS400**  
PVA (Polyvinyl Alcohol), Medium Denier, Superior Bond



**ULTRA-HIGH PERFORMANCE FIBERS**

PVA fibers are unique in their ability to create a fully-engaged molecular bond with mortar and concrete that is **300% greater** than other fibers.



**NYCON-PVA RFS400 Physical Properties**

Filament Diameter	40 Denier (200 Microns)
Fiber Length	0.75" (19 mm)
Specific Gravity	1.3
Tensile Strength	150 ksi (1000 MPa)
Flexural Strength	4200 ksi (29 GPa)
Melting Point	435° F (225° C)
Color	White
Water Absorption	<1% by Weight
Alkali Resistance	Excellent
Concrete Surface	Not Fuzzy
Corrosion Resistance	Excellent



**Description**

NYCON-PVA RFS400 fiber products are 40 denier, monofilament PVA fibers for use in fiber reinforced concrete, stucco, shotcrete and precast. NYCON-PVA RFS400 is specifically designed for use in concrete products for the purpose of controlling plastic shrinkage, thermal cracking and improving abrasion resistance.

*NYCON-PVA RFS400 meets the requirements of ASTM C-1116, Section 4.1.3 and AC-32 at 1.0 lb (0.45 kg) per CY.*

**Applications**

NYCON-PVA utilizes the mixing activity to disperse the fibers into the mix. NYCON-PVA acts with a molecular bond in the concrete with a multi-dimensional fiber network. NYCON-PVA does not affect curing process chemically.

NYCON-PVA can be used in all types of concrete. Synthetic fibers help the concrete at early ages, which is especially beneficial where stripping time and handling is important.

# NYCON-PVA RFS400

## PVA (Polyvinyl Alcohol), Medium Denier, Superior Bond



<b>Advantages/Benefits</b>	<ul style="list-style-type: none"><li>• Molecular bond with the concrete</li><li>• Reduces the formation of plastic shrinkage cracking in concrete.</li><li>• Provides multi-dimensional reinforcement.</li><li>• Improves impact, shatter and abrasion resistance of concrete.</li><li>• Enhances durability and toughness of concrete.</li><li>• Excellent, "no fuzz" finishability</li></ul>
<b>Mixing</b>	NYCON-PVA RFS400 can be added directly to the mixing system during or after the batching of the ingredients and mixed at high speed for a minimum of five minutes. Additional mixing does not adversely affect the distribution or overall performance of NYCON-PVA. The addition of NYCON-PVA at the normal or high dosage rate does not require any mix design or application changes. A water reducer or super-plasticizer is recommended in concrete products where improved workability and finishability are desired.
<b>Tooling &amp; Finishing</b>	Fiber reinforced concrete can be finished by most finishing techniques. NYCON-PVA does not affect the finishing characteristics of concrete. NYCON-PVA can be used in power/hand troweled concrete, colored and broom finished concrete.  NYCON-PVA can be pumped and placed using conventional equipment. Hand screeds can be used, but vibratory and laser screeds are recommended to provide added compaction and bury surface fibers.
<b>Packaging</b>	(35) 1 lb (0.45 kg) paper beater bags per box, 700 lbs per pallet (35) 1 lb (0.45 kg) water soluble bags per box, 700 lbs per pallet (21) 40 lb (18 kg) paper bulk bags, 693 lbs per pallet
<b>Storage and Shelf Life</b>	NYCON-PVA should be stored in dry warehouse. Protect product from the rain.

**KEEP CONTAINER TIGHTLY CLOSED - KEEP OUT OF REACH OF CHILDREN - NOT FOR INTERNAL CONSUMPTION - FOR INDUSTRIAL USE ONLY**

All information provided by Nycon Corporation concerning Nycon products, including but not limited to, any recommendations and advice relating to the application and use of Nycon products, is given in good faith based on Nycon's current experience and knowledge of its products when properly stored, handled and applied under normal conditions in accordance with Nycon's instructions. In practice, the differences in materials, substrates, storage and handling conditions, actual site conditions and other factors outside of Nycon's control are such that Nycon assumes no liability for the provision of such information, advice, recommendations or instructions related to its products, nor shall any legal relationship be created by or arise from the provision of such information, advice, recommendations or instructions related to its products. The user of the Nycon product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with the full application of the product(s).

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Prior to each use of any Nycon product, the user must always read and follow the warnings and instructions on the product's most current Technical Data Sheet, product label and Material Safety Data Sheet which are available. Nothing contained in any Nycon materials relieves the user of the obligation to read and follow the warnings and instruction for each Nycon product as set forth in the current Product Data Sheet, product label and Material Safety Data Sheet prior to product use.

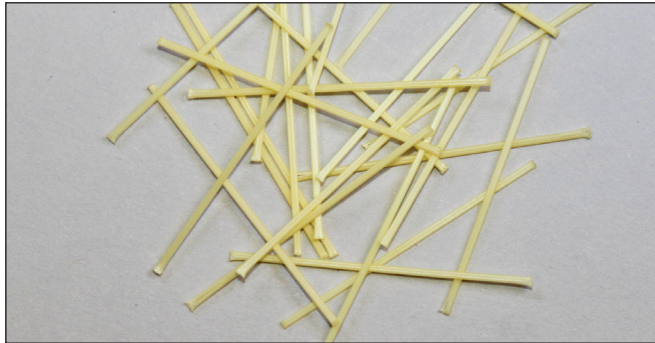
Nycon warrants this product for one year from date of shipment to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within shelf life. User determines suitability of product for intended use and assumes all risks. Buyer's sole remedy shall be limited to the purchase price or replacement of product exclusive of labor or cost of labor.

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# NYCON-PVA RF4000

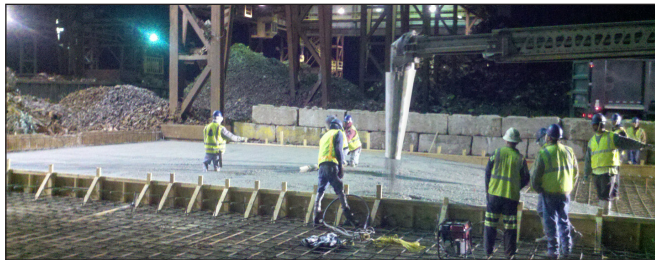
PVA (Polyvinyl Alcohol), Large Denier Macro, Superior Bond



### ULTRA-HIGH PERFORMANCE FIBERS

PVA fibers are unique in their ability to create a fully-engaged molecular bond with mortar and concrete that is **300% greater** than other fibers.

Nycon-PVA RF4000 is a component of the Nycon TUFF-SLAB™ blend.



### NYCON-PVA RF4000 Physical Properties

Filament Diameter	130 Denier (660 Microns)
Fiber Length	1.25" (30 mm)
Specific Gravity	1.3
Tensile Strength	120 ksi (800 MPa)
Flexural Strength	3300 ksi (23 GPa)
Melting Point	435° F (225° C)
Color	Yellow
Water Absorption	<1% by Weight
Alkali Resistance	Excellent
Concrete Surface	Not Fuzzy
Corrosion Resistance	Excellent



### Description

NYCON-PVA RF4000 fiber products are 130 denier, monofilament PVA fibers for use in fiber reinforced concrete, shotcrete, TUFF-SLAB™ and precast. NYCON-PVA RF4000 is specifically designed for use in concrete products for the purpose of controlling plastic shrinkage, thermal cracking and improving abrasion resistance.

*NYCON-PVA RF4000 meets the requirements of ASTM C-1116, Section 4.1.3 and AC-32 at 1.0 lb (0.45 kg) per CY.*

### Applications

NYCON-PVA utilizes the mixing activity to disperse the fibers into the mix. NYCON-PVA acts with a molecular bond in the concrete with a multi-dimensional fiber network. NYCON-PVA does not affect curing process chemically.

NYCON-PVA can be used in all types of concrete. NYCON-PVA RF4000 at 6 lb (2.7 kg) per CY is the macro fiber and NYCON-PVA RSC15 at 3 lbs (1.35 kg) per CY is the micro fiber used together in Nycon's TUFF-SLAB™ product.

800-456-9266

www.nycon.com

sales@nycon.com

# NYCON-PVA RF4000

## PVA (Polyvinyl Alcohol), Large Denier Macro, Superior Bond



<b>Advantages/Benefits</b>	<ul style="list-style-type: none"><li>• Molecular bond with the concrete</li><li>• Reduces the formation of plastic shrinkage cracking in concrete.</li><li>• Provides multi-dimensional reinforcement.</li><li>• Improves impact, shatter and abrasion resistance of concrete.</li><li>• Enhances durability and toughness of concrete.</li><li>• Excellent, "no fuzz" finishability</li></ul>
<b>Mixing</b>	NYCON-PVA RF4000 can be added directly to the mixing system during or after the batching of the ingredients and mixed at high speed for a minimum of five minutes. Additional mixing does not adversely affect the distribution or overall performance of NYCON-PVA. The addition of NYCON-PVA at the normal or high dosage rate does not require any mix design or application changes. A water reducer or super-plasticizer is recommended in concrete products where improved workability and finishability are desired.
<b>Tooling &amp; Finishing</b>	Fiber reinforced concrete can be finished by most finishing techniques. NYCON-PVA does not affect the finishing characteristics of concrete. NYCON-PVA can be used in power/hand troweled concrete, colored and broom finished concrete.  NYCON-PVA can be pumped and placed using conventional equipment. Hand screeds can be used, but vibratory and laser screeds are recommended to provide added compaction and bury surface fibers.
<b>Packaging</b>	(30) 1 lb (0.45 kg) paper beater bags per box, 600 lbs per pallet (30) 1 lb (0.45 kg) water soluble bags per box, 600 lbs per pallet (21) 22 lb (10 kg) paper bulk bags, 462 lbs per pallet
<b>Storage and Shelf Life</b>	NYCON products should be stored in dry warehouse. Protect product from the rain.

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Nycon warrants this product for one year from date of shipment to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within shelf life. User determines suitability of product for intended use and assumes all risks. Buyer's sole remedy shall be limited to the purchase price or replacement of product exclusive of labor or cost of labor.

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# GlasGrid® Asphalt Reinforcement System

## Specification Sheet – GlasGrid® 8501/8511 Asphalt Reinforcement System

Specifications for Use in Asphalt Overlays					
Property	Test Method	8501		8511	
		Metric	Imperial	Metric	Imperial
<b>Tensile Strength</b> (Ultimate) (MD x XD)	ASTM D6637 EN-ISO 10319	100 x 100 kN/m	571 x 571 lbs/in	100 x 100 kN/m	571 x 571 lbs/in
<b>Tensile Elongation</b> (Ultimate)	ASTM D6637 EN-ISO 10319	< 3%	< 3%	< 3%	< 3%
<b>Tensile Resistance @ 2% Strain</b> (MD x XD)	ASTM D6637 EN-ISO 10319	80 x 80 kN/m	456 x 456 lbs/in	80 x 80 kN/m	456 x 456 lbs/in
<b>Young's Modulus E</b>		73,000 MPa	10.6 x 10 <sup>6</sup> psi	73,000 MPa	10.6 x 10 <sup>6</sup> psi
<b>Mass/Unit Area</b>	ASTM D5261 ISO 9864	405 g/m <sup>2</sup>	12.0 oz/yd <sup>2</sup>	405 g/m <sup>2</sup>	12.0 oz/yd <sup>2</sup>
<b>Melting Point Coating</b>	ASTM D276/EN-ISO 3146	>232° C	>450° F	>232° C	>450° F
<b>Melting Point Glass</b>	ASTM C338	>820° C	>1508° F	>820° C	>1508° F
<b>Roll Length</b>		100 m	328 ft	100 m	328 ft
<b>Roll Width</b>		1.5 m	5 ft	1.5 m	5 ft
<b>Roll Area</b>		150 m <sup>2</sup>	179 yd <sup>2</sup>	150 m <sup>2</sup>	179 yd <sup>2</sup>
<b>Adhesive Backing</b>		Pressure Sensitive		Pressure Sensitive	
<b>Grid Size</b> (Center to Center of Strand)		12.5 x 12.5 mm	0.5 x 0.5 in	25 x 25 mm	1.0 x 1.0 in
<b>Material</b>		Fiberglass reinforcement with modified polymer coating and pressure-sensitive adhesive backing			

The values and tolerances given are obtained in our laboratories and in accredited testing institutions. All imperial values are approximate. The information given in this data sheet is to the best of our knowledge true and correct. However new research and practical experience can make revisions necessary. We reserve the right to make changes at any time. Statements concerning possible use of our product are not intended as recommendations for their use in the infringement of any patent. No patent warranty of any kind, expressed or implied, is made or intended.



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The following “Summary of Results” is a summary of the testing required to comply with ICC- ES Acceptance Criteria for Glass Fiber Lath Used in Cementitious Exterior Wall Coatings or Exterior Cement Plaster (AC-275).

**Product Description as tested:**

- Fiberglass “E Glass” lath / mesh is a three dimensional Leno Weave with a weight of 8.82 oz per sq. yard (300 gsm).
- Nominal opening size 0.25 inch square
- Semi rigid coating containing alkali resistant Zirconium Dioxide (14.5%).
- Attached to the back of the mesh is a semi rigid foam stripping spaced 9 equal times (6” o.c.) with 0.25 in x 0.5 in x 75 ft dimensions.

**Summary of Results**

<b>Test Name</b>	<b>Reference Document</b>	<b>Test Method</b>	<b>Conditions of Acceptance</b>	<b>Results</b>
Tensile Strength (Un-Exposed)	AC-275 (Section 3.1)	ASTM E-2098	120 lb/lin-ft	556 lb/lin-ft (Warp) 749 lb/lin-ft (Fill)
Tensile Strength (Exposed)	AC-275 (Section 3.2)	ASTM E-2098	120 lb/lin-ft	384 lb/lin-ft (Warp) 398 lb/lin-ft (Fill)
Transverse Load (Positive- Wood Studs)	AC-275 (Section 3.2)	AC-11 (Section 4.3)	Max Load as Reported (psf) 15% Variation (Max)	232 psf 4% variation
Transverse Load (Negative- Wood Studs)	AC-275 (Section 3.2)	AC-11 (Section 4.3)	Max Load as Reported (psf) 15% Variation (Max)	149 psf 9% variation
Transverse Load (Positive- Steel Studs)	AC-275 (Section 3.2)	AC-11 (Section 4.3)	Max Load as Reported (psf) 15% Variation (Max)	234 psf 3% variation
Transverse Load (Negative- Steel Studs)	AC-275 (Section 3.2)	AC-11 (Section 4.3)	Max Load as Reported (psf) 15% Variation (Max)	406 psf 4% variation
Attachment Test (Wood Studs)	AC-275 (Section 3.2.3)	AC-275 (Section 3.2.3.2)	18 lbf (Min)	95 lbf
Attachment Test (Steel Studs)	AC-275 (Section 3.2.3)	AC-275 (Section 3.2.3.2)	48 lbf (Min)	123 lbf
Embedment Test	AC-275 (Section 3.3)	AC-191 (Section 3.7)	50% @ ¼” (Min)	Average 82% greater than ¼”
Surface Burning (Characteristics)	AC-275 (Section 3.5)	ASTM E-84	Report as Tested	Flame Spread = 0 Smoke Density = 0





Everbilt

# 1/16 in. x 500 ft. Galvanized Steel Uncoated Wire Rope

★★★★★ (22) [Questions & Answers \(6\)](#)



## Product Overview

7 x 7 wire rope is constructed of 7 strands of 7 wires and is semi flexible. 7 x 7 uses heavier gauge wire and offers better abrasion resistance than 7 x 19. Superior strength allows for multiple uses, such as guy wires, net suspension, animal leash, tether lines and winches.

- Steel with galvanized finish for good weather resistance
- Light duty
- Working load limit of 96 lbs.
- Maximum working load limit that shall be applied in direct tension to a new and undamaged wire rope

### Info & Guides

- [FAQ](#)

You will need Adobe® Acrobat® Reader to view PDF documents. [Download a free copy from the Adobe Web site.](#)

## Specifications

### Dimensions

Product Depth (in.)	3	Product Height (in.)	8.5 in
Product Length (ft.)	500 ft	Product Width (in.)	8.5 in
Rope Diameter (in.)	1/16 inch		

### Details

Coating Material	Not Coated	Color Family	Metallics
Fastener Type	Wire Rope	Features	Weather Resistant
Finish Family	Galvanized	Gauge	.0625
Hardware Color Family	Gray	Material	Steel
Package Quantity	1	Product Weight (lb.)	3.74
Returnable	90-Day	Rope Configuration	Twisted
Strand Construction	7x7	Working Load Limit (lbs.)	96.0

### Warranty / Certifications

Manufacturer Warranty	No		
-----------------------	----	--	--

## Wire Rope Stop-Not for Lifting

Zinc-Plated Copper, for 1/16" Diameter Steel and Stainless Steel Rope

\$12.00 per pack of 50  
3936T35



Application	Not for Lifting
Material	Zinc-Plated Copper
For Wire Rope Material	Steel, Stainless Steel
For Wire Rope	
Diameter	1/16"
Construction	1 × 7 Strand Core 1 × 19 Strand Core 3 × 7 Hollow Core 6 × 7 Fiber Core 7 × 7 Strand Core 7 × 19 IWRC 7 × 19 Strand Core 18 × 7 IWRC 19 × 7 Strand Core
Attachment Type	Stop
OD	13/64"
Compressed OD	3/16"
Sleeve Length	7/32"
Required Installation	
Tool	Compression Tool
Required Number of Compressions	1
Capacity	40% of the Rope's Capacity
RoHS	RoHS 3 (2015/863/EU) Compliant
REACH	REACH (EC 1907/2006) (07/08/2021, 219 SVHC) Compliant
DFARS	Specialty Metals COTS-Exempt
Country of Origin	United States
USMCA Qualifying	No
Schedule B	741980.5500
ECCN	EAR99
Related Product	<a href="#">Compression Tools</a>

Copper stops are stronger than aluminum.

Zinc-plated copper stops are more corrosion resistant than uncoated copper.

Warning: Fittings must match rope diameter and be installed correctly to obtain maximum holding power. Test all assemblies for required strength before use. Do not use with coated rope unless the coating is removed.

# TP/TPA

## Tie Plates

TPs are nail-on tie plates. TPAs are flanged for added support.

**Material:** 20 gauge

**Finish:** Galvanized

**Installation:**

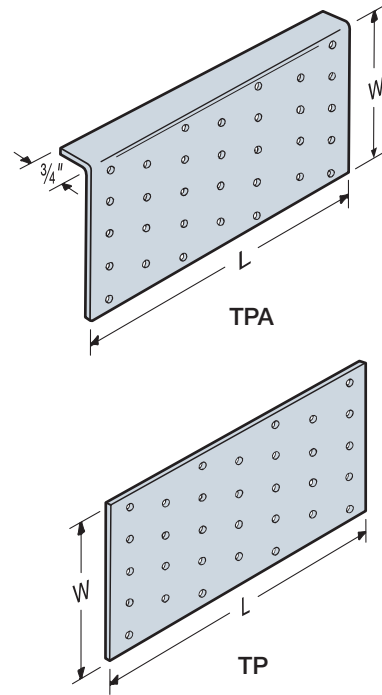
- Holes are sized for 0.131" x 2½" nails or 0.131" x 1½" nails

**Codes:** See p. 11 for Code Reference Key Chart

**SD** Many of these products are approved for installation with Strong-Drive® SD Connector screws. See pp. 348–352 for more information.

Model No.	Dimensions (in.)		Number of Nail Holes	Code Ref.
	W	L		
TP15	1 15/16	5	13	—
TPA37	3 1/2	7	32	
TPA39	3 1/2	9	41	
TP35	3 1/8	5	23	
TP37	3 1/8	7	32	
TP39	3 1/8	9	41	
TP312	3 1/8	12	54	
TP316	3 1/8	16	72	
TP45	4 1/8	5	30	
TP47	4 1/8	7	42	
TP49	4 1/8	9	54	
TP411	4 1/8	11	66	
TP57	5 3/4	7	60	
TPA57	5	7	49	

1. Connectors are not load rated.



## J/JP

### Floor Beam Levelers

Jack piers and standard floor beam levelers offer unique leveling simplicity during and after construction.

**Material:** 12-gauge plates; ¾" threaded rod; 1 1/8" O.D. steel pipe

**Finish:** None

**Installation:**

- Use all specified fasteners; see General Notes
- Holes are provided for installation with (4) 0.148" x 1½" nails
- Do not use J/JPs for dynamic jacking of structures, such as houses

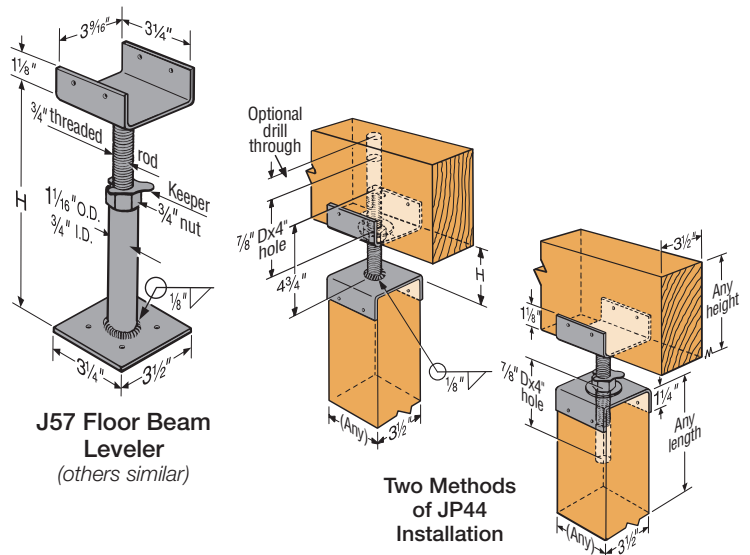
**Codes:** See p. 11 for Code Reference Key Chart

Model No.	Dimensions			Allowable Bearing Loads (DF/SP/SPF/HF) (100)	Code Ref.
	H (Min.–Max.) (in.)	Pipe Length (in.)	Threaded Rod Length (in.)		
JP44	2–4	—	4¾	4,440	—
J57	5–7	4	4	4,380	
J813	8–13	7	8	4,380	
J1318	13–18	12	10	4,380	
J1621	16–21	15	10	4,380	
J2126	21–26	20	10	4,380	

1. Post design by designer. See strongtie.com/post for post allowable loads.

2. Loads may not be increased for duration of load.

3. **Fasteners:** Nail dimensions are listed diameter by length. See pp. 21–22 for fastener information.



## M23053/5 C1

2:1 SHRINK RATIO, FLEXIBLE, FLAME RETARDANT, POLYOLEFIN TUBING


### Applications

MIL-DTL-23053/5 C1 is a flexible, flame retardant heat shrinkable polyolefin tube. It is designed for a wide range of applications requiring high heat-resistance, including insulation for electric & electronic devices, wire strain relief and protective covering for parts such as resistors and capacitors.

### Features

- ★ Low Temperature Printable – Thermal Transfer or Hot Stamp
- ★ In stock for immediate shipments – All Colors and Yellow/Green stripe.
- ★ Shrink ratio: 50% or more in the radial direction, 7% or less in the axial direction
- ★ Continuous operating temperature: - 55°C to 135°C
- ★ Flammability: UL VW-1, CSA OFT, -F-MARK (except clear)
- ★ Highly heat-resistance
- ★ High resistance to chemicals and oils

### Standard

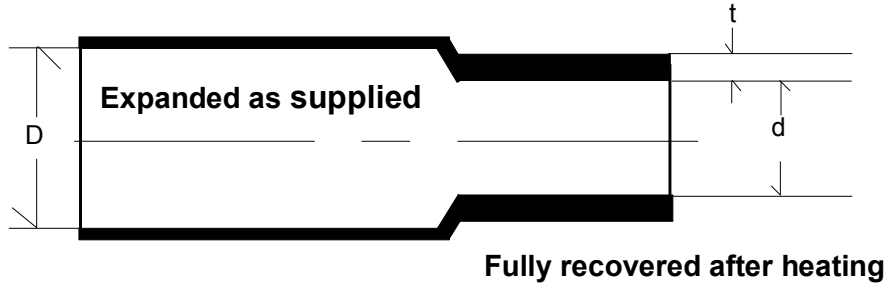
- ★ UL 224 (File Number: E319303) 
- ★ MIL-DTL-23053/5 Class 1 & Class 3 (Clear is Class 2)
- ★ RoHS Compliant

### Specification Values

Property		Test Method	Value	
Physical	Unaged	Tensile strength	ASTM D 2671	Min. 1.06 kgf/mm <sup>2</sup> (1,500 psi)
		Elongation		Min. 200%
	Aged	Tensile strength	175°C/168 hrs	Min. 0.8 kgf/ mm <sup>2</sup> (1,000 psi)
		Elongation		Min. 100%
	Deformation		158°C/1 hr	Max. 50%
	Heat shock		250°C/4 hrs	No crack
	Cold bend		- 55°C/4 hrs	No crack
	Flexibility		158°C/168 hrs	No crack
	Secant modulus		-	Max. 17.59 kgf/mm <sup>2</sup> (25,000 psi)
Specific gravity		ASTM D 2671	1.5 max.	
Electrical	Dielectric strength		ASTM D 149	Min. 20kV/1 minute
	Volume resistivity		-	Min. 10 <sup>14</sup> Ω - cm
Chemical	Copper corrosion		175°C/16 hrs	No corrosion
	Copper stability		158°C/168 hrs	No sign of degradation
	Fungus resistance		ASTM G 21	No growth
	Flammability		UL VW-1 ASTM D 2671	Pass – self extinguishing

# M23053/5 C1

2:1 SHRINK RATIO, FLEXIBLE, FLAME RETARDANT, POLYOLEFIN TUBING



## Product Dimensions

Minimum Shrink Temperature: 90°C

Size	Expanded		Recovered				Standard Spool Length
	Internal Diameter (min.) (D)		Internal Diameter (max.) (d)		Minimum Total Wall Thickness (t)		
	In.	mm	In.	mm	In.	mm	
<b>Inch Size</b>							<b>Ft.</b>
3/64"	0.051	1.3	0.022	0.58	0.013	0.330	500
1/16"	0.070	1.8	0.031	0.79	0.014	0.356	500
3/32"	0.106	2.7	0.046	1.17	0.017	0.432	500
1/8"	0.133	3.4	0.062	1.57	0.017	0.432	500
3/16"	0.192	4.9	0.093	2.36	0.017	0.432	250
1/4"	0.251	6.4	0.125	3.18	0.022	0.559	250
5/16"	0.314	8.0	0.157	4.0	0.022	0.559	250
3/8"	0.374	9.5	0.187	4.75	0.022	0.559	200
1/2"	0.500	12.7	0.250	6.35	0.022	0.559	200
5/8"	0.657	16.7	0.314	8.0	0.027	0.686	200
3/4"	0.751	19.1	0.370	9.35	0.027	0.686	100
1"	1.02	25.7	0.500	12.7	0.030	0.762	100
1-1/4"	1.26	32.2	0.630	15.9	0.034	0.864	100
1-1/2"	1.5	38.1	0.750	19.10	0.034	0.864	100
2"	2.0	51.0	1.0	25.4	0.038	0.965	100
3"	3.0	76.2	1.5	38.1	0.042	1.07	100
4"	4.0	101.6	2.0	50.8	0.046	1.17	100
5"	5.0	127.0	2.5	63.5	0.046	1.17	100
<b>Metric Size</b>							
1.5	0.067	1.7	0.030	0.75	0.014	0.356	Cut to meet your special orders
2.0	0.083	2.1	0.039	1.00	0.017	0.432	
2.5	0.102	2.6	0.050	1.25	0.017	0.432	
3.0	0.122	3.1	0.060	1.50	0.017	0.432	
3.5	0.142	3.6	0.069	1.75	0.017	0.432	
4.0	0.161	4.1	0.079	2.00	0.017	0.432	
5.0	0.201	5.1	0.098	2.50	0.022	0.559	
6.0	0.240	6.1	0.118	3.00	0.022	0.559	
7.0	0.280	7.1	0.138	3.50	0.022	0.559	
8.0	0.319	8.1	0.158	4.00	0.022	0.559	
9.0	0.358	9.1	0.177	4.50	0.022	0.559	
10.0	0.398	10.1	0.197	5.00	0.022	0.559	
11.0	0.437	11.1	0.217	5.50	0.022	0.559	
12.0	0.476	12.1	0.236	6.00	0.022	0.559	
13.0	0.516	13.1	0.256	6.50	0.027	0.686	
14.0	0.555	14.1	0.276	7.00	0.027	0.686	
15.0	0.595	15.1	0.295	7.50	0.027	0.686	
16.0	0.634	16.1	0.315	8.00	0.027	0.686	
18.0	0.713	18.1	0.354	9.00	0.030	0.762	
20.0	0.791	20.1	0.394	10.00	0.030	0.762	
22.0	0.870	22.1	0.433	11.00	0.030	0.762	
24.0	0.949	24.1	0.472	12.00	0.030	0.762	
25.0	0.992	25.2	0.492	12.50	0.034	0.864	
26.0	1.032	26.2	0.512	13.00	0.034	0.864	
28.0	1.110	28.2	0.551	14.00	0.034	0.864	
30.0	1.190	30.2	0.591	15.00	0.034	0.864	
32.0	1.268	32.2	0.630	16.00	0.034	0.864	



## TECHNICAL DATA SHEET

### SUPER LUBE® MULTI-USE SYNTHETIC OIL WITH SYNCOLON® (PTFE)

January 2021

#### PRODUCT DESCRIPTION:

Super Lube® Multi-Use Synthetic Oil is a premium synthetic oil with suspended Syncolon® (PTFE) particles that is used as a general-purpose lubricant for industrial machinery and equipment. Provides protection against friction, wear, rust and corrosion. Machinery lasts longer, downtime is reduced, and productivity is increased.

Super Lube® Multi-Use Synthetic Oil with Syncolon® (PTFE) is safe to use on metal, plastic, wood, leather, painted surfaces and most rubbers.

Super Lube® Multi-Use Synthetic Oil with Syncolon® (PTFE) is an NSF registered Food Grade Lubricant, rated H1 for incidental food contact. Meets former USDA (H1) guidelines.



#### FEATURES:

- ❖ Waterproof
- ❖ Food grade
- ❖ Clean
- ❖ Synthetic blend with Syncolon® (PTFE)
- ❖ Dielectric
- ❖ Reduces friction and wear
- ❖ Viscosity stable
- ❖ Rust and corrosion inhibitor
- ❖ Environmentally friendly
- ❖ Biodegradable
- ❖ Kosher certified
- ❖ NSF Registered H1, # 136742

#### TYPICAL APPLICATIONS:

- ❖ Plain, anti-friction and roller bearings
- ❖ Enclosed industrial gears
- ❖ Paper shredding machines
- ❖ Hinges, nuts and bolts
- ❖ Machine ways
- ❖ Machine tools
- ❖ Centralized lubricating systems
- ❖ Straight, helical, bevel and spiral gears
- ❖ Chains and cables
- ❖ Conveyors
- ❖ Gear head motors
- ❖ Reciprocating compressor lubricant additive
- ❖ Food processing equipment



**TECHNICAL DATA SHEET**

SUPER LUBE® MULTI-USE SYNTHETIC OIL WITH SYNCOLON® (PTFE)

January 2021

PACKAGE SIZES:

Part No.	Description	Part No.	Description
51010	7 ml Precision Oiler (Blistered)	51150	15 Gallon Keg
51014	7 ml Precision Oiler (Bulk)	51550	55 Gallon Drum
51004	4 oz. Bottle	51014/UV	7 ml Precision Oiler (Bulk)
51008	8 oz. Bottle	51004/UV	4 oz. Bottle
51025	1 Pint Bottle	51030/UV	1 Quart Bottle
51030	1 Quart Bottle	51040/UV	1 Gallon Bottle
51040	1 Gallon Bottle	51050/UV	5 Gallon Pail
51050	5 Gallon Pail		

UV tracer validates the existence of the lubricant.

PROPERTIES:

Test	Test Method	Rating
Color:		Translucent
Temperature range		
Continuous:		-45°F to 450°F (-43°C to 232°C)
Intermittent:		-50°F to 500°F (-45°C to 260°C)
Viscosity		
cSt @ 100°C:	ASTM D445	15
cSt @ 40°C:	ASTM D445	118
ISO Grade:	ASTM D445	100
Replaces ISO Grades:		100 – 150
Replaces SAE Grade Gear Oils:		85W
Viscosity Index:	ASTM D2270	131
Specific Gravity:	ASTM D1298	.84 @ 60°F
Pour Point:	DSTM D97	-20°F (-29°C) maximum
Lbs./Gallon:		7.4 @ 60°F
Water, PPM	ASTM D1744	35 ppm
Tan:	ASTM D974	0.04 maximum
Four Ball Test	ASTM D2783	
Load Wear Index:		21.2 kg
Weld Point:		126 kg
Four Ball EP Test Scar Diameter:	ASTM D4172	0.47 mm
Salt Spray Test (100 hrs.)	ASTM B117	Pass
Dielectric Loss:	ASTM D924	1.2 x 10 <sup>12</sup>



TECHNICAL DATA SHEET

SUPER LUBE® MULTI-USE SYNTHETIC OIL WITH SYNCOLON® (PTFE)

January 2021

<b>Dielectric Resistivity:</b>	ASTM D1169	1.7 x 10 <sup>14</sup>
<b>Dielectric Constant:</b>	ASTM D924	2.5
<b>Evaporation Loss 22 hrs. @ 212°F (100°C)</b>	ASTM D972	< 2%
<b>Oxidation Stability, 100 hrs.:</b>	ASTM D942 and D943	4 psi
<b>Timken OK Load:</b>	ASTM D2782	40 lbs.
<b>Flash Point:</b>	ASTM D92	>428°F (220°C)
<b>Fire Point:</b>	ASTM D92	>572°F (300°C)
<b>Copper Corrosion 24 hrs. @ 100°C</b>	ASTM D130	1A
<b>Acid Number:</b>	ASTM D664	.5 mg KOH/g
<b>Biodegradability:</b>	CEC-L33-T82	50% degradability in 28-35 days 60+% degradability in 56 days

**DIRECTIONS:**

- Wipe areas to be treated.
- Apply enough oil to coat all areas of contact.
- Re-apply as needed.

**SHELF LIFE / WARRANTY:**

Super Lube® products have a five (5) year recommended shelf life when stored in the original container and in reasonable ambient conditions. The warranty period is twenty-four (24) months from the date of purchase. For complete information visit [www.super-lube.com/what-is-the-shelf-life-ezp-320.html](http://www.super-lube.com/what-is-the-shelf-life-ezp-320.html).



See Safety Data Sheet (SDS) for further details regarding safe use of this product.



The information provided in this Technical Data Sheet, including the recommendations for use and application of the product are based on our knowledge and experience of the product as of the date of this data sheet. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. Synco Chemical Corporation is, therefore not liable for the suitability of our product for the production processes and conditions in respect for which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product.

All Super Lube® and Syncon® trademarks in this document are trademarks of Synco Chemical Corporation.



## TotalBoat Flotation Foam - 2 LB Density -- Tech Data Sheet

### PREPARATION:

**FOAM PREPARATION:** Before mixing this product, several considerations must first be addressed:

- **TEMPERATURE:** TotalBoat Flotation Foam should be mixed and applied at a warm room temperature, 75-80°F is optimum. If the material or environmental conditions are too cool, the polyurethane will shrink back after rising, losing much of its insulating properties and flotation strength.
- **PREPAREDNESS:** This product must be poured immediately after a quick mixing. The area to be filled must be accessible and prepped ahead of time. Drilling holes in advance may be required for proper accessibility and application. For proper bonding, the surface should be clean and free of contaminants. Be sure the substrate you are pouring the foam into will not be compromised by the foam's thermal reaction, which can reach temperatures nearing 130°F.
- **OVERFLOW RELIEF:** TotalBoat Flotation Foam will expand tremendously by volume. In doing so, it can exert as much as 5 psi of pressure in contained areas. This is enough pressure to lift the deck off a boat when poured into cavities without proper venting. It may be necessary to cut overflow vents over large surface areas such as decks. This can be accomplished easily with a hole saw.

### APPLICATION:

- 1 Clean the surface thoroughly. Remove any water, oil, grease, dust, or other contaminants before starting.
- 2 Ensure products are within the proper application temperature range, and the substrate can safely handle an exothermic reaction up to 130°F.
- 3 Combine resin and hardener (100:100 by volume or 100:109 by weight) into a sufficiently sized mixing pot. Accuracy is very important when measuring each component.
- 4 Mix thoroughly for 25 seconds. Timing is important.
  - In hot conditions over 80 degrees, mixing time may only be as little as 15 seconds before expansion begins — mix dilligently, and be ready to pour.
- 5 Pour foam.
- 6 Foam will start expanding 10-20 seconds after mixing and will expand for about 5 minutes (in 70-80°F conditions).
- 7 Once cured, the foam can be overcoated with more foam, epoxy resin, or polyester resin.

### PROPERTIES:

**Molded Density:** 3.3 pcf  
**Compressive Strength:** 38 psi  
**Closed-Cell Content:** > 94%  
**Water Absorption:** ≤ .06 lbs./sq. ft.  
**Solvent Resistance:** Excellent  
**Mold and Mildew Resistance:** Excellent  
**Maximum Service Temperature:** 200°F  
**Flotation:** 75 lbs./quart, 300 lbs./gallon (admixed)

### APPLICATION DATA:

<b>Mix Ratio:</b> 100:109 (by Weight) 100:100 (by Volume)
<b>Cream Time:</b> 45 seconds
<b>Gel Time:</b> 235 seconds
<b>Tack-Free Time:</b> 380 seconds
<b>Rise Time:</b> 400 seconds
<b>Free Rise Core Density:</b> 2.1 pcf
<b>Yield:</b> 2 cubic feet (2-Quart Kit), 8 cubic feet (2-Gallon Kit)
<b>Application Temperature:</b> 60-85°F (75-80°F is optimal for yield and cure/working times)

### PHYSICAL DATA:

<b>Color:</b> Transparent brown liquid (resin and activator)
<b>Components:</b> 2 - Resin and Activator
<b>Units of Measure:</b> 2-Quart Kit, 2-Gallon Kit
<b>Storage:</b> 50-95°F - DO NOT ALLOW TO FREEZE
<b>Weight:</b> 9.4 lbs./gallon (resin), 10.2 lbs./gallon (activator)
<b>Flotation:</b> 75 lbs./quart, 300 lbs./gallon (admixed)

REVISION DATE: April 22, 2021



# 3M™ Glass Bubbles K Series, S Series and iM Series

## Introduction

3M™ Glass Bubbles are engineered hollow glass microspheres that are alternatives to conventional fillers and additives such as silicas, calcium carbonate, talc, clay, etc., for many demanding applications. These low-density particles are used in a wide range of industries to reduce part weight, lower costs and enhance product properties.

The unique spherical shape of 3M glass bubbles offers a number of important benefits, including: higher filler loading, lower viscosity/improved flow and reduced shrinkage and warpage. It also helps the 3M glass bubbles blend readily into compounds and makes them adaptable to a variety of production processes including spraying, casting and molding.

The chemically stable soda-lime-borosilicate glass composition of 3M glass bubbles provides excellent water resistance to create more stable emulsions. They are also non-combustible and non-porous, so they do not absorb resin. And, their low alkalinity gives 3M glass bubbles compatibility with most resins, stable viscosity and long shelf life.

**3M Glass Bubbles K Series, S Series and iM Series** are specially formulated for a high strength-to-weight ratio. This allows greater survivability under many demanding processing conditions, such as injection molding. They also produce stable voids, which results in low thermal conductivity and a low dielectric constant. 3M glass bubbles are available in a variety of sizes and grades to help you meet your product and processing requirements.

## Typical Properties

Not for specification purposes

### Isostatic Crush Strength

	Product	Test Pressure (psi)	Target Fractional Survival	Minimum Fractional Survival
K Series	K1	250	90%	80%
	K15	300	90%	80%
	K20	500	90%	80%
	K25	750	90%	80%
	K37	3,000	90%	80%
	K46	6,000	90%	80%
S Series	S15	300	90%	80%
	S22	400	90%	80%
	S32	2,000	90%	80%
	S35	3,000	90%	80%
	S38	4,000	90%	80%
	S38HS	5,500	90%	80%
	S60	10,000	90%	80%
	S60HS	18,000	90%	90%
iM Series	iM16K	16,000	90%	90%
	iM30K	28,000	90%	90%

### True Density

	Product	Typical	True Density (g/cc)	
			Minimum	Maximum
K Series	K1	0.125	0.10	0.14
	K15	0.15	0.13	0.17
	K20	0.20	0.18	0.22
	K25	0.25	0.23	0.27
	K37	0.37	0.34	0.40
	K46	0.46	0.43	0.49
S Series	S15	0.15	0.13	0.17
	S22	0.22	0.19	0.25
	S32	0.32	0.29	0.35
	S35	0.35	0.32	0.38
	S38	0.38	0.35	0.41
	S38HS	0.38	0.35	0.41
	S60	0.60	0.57	0.63
	S60HS	0.60	0.57	0.63
iM Series	iM16K	0.46	0.43	0.49
	iM30K	0.60	0.57	0.63



## Typical Properties

### Chemical Resistance

In general, the chemical properties of 3M™ Glass Bubbles resemble those of a soda-lime-borosilicate glass.

### Thermal Conductivity

Product	Calculated Thermal Conductivity (W-m-1-K-1) at 70°F (21°C)	
K Series	K1	0.047
	K15	0.055
	K20	0.070
	K25	0.085
	K37	0.124
	K46	0.153
S Series	S15	0.055
	S22	0.076
	S32	0.108
	S35	0.117
	S38	0.127
	S38HS	0.127
	S60	0.200
	S60HS	0.200
iM Series	iM16K	0.153
	iM30K	0.200

Conductivity increases with temperature and product density. The thermal conductivity of a composite will depend on the matrix material and volume loading of 3M glass bubbles.

### Thermal Stability

Appreciable changes in bubble properties may occur above 1112°F (600°C) depending on temperature and duration of exposure.

### Flotation

Product	Floaters (% by bulk volume)		
	Typical	Minimum	
K Series	K1	96%	90%
	K15	96%	90%
	K20	96%	90%
	K25	96%	90%
	K37	94%	90%
	K46	92%	90%
S Series	S15	96%	90%
	S22	96%	90%
	S32	94%	90%
	S35	96%	90%
	S38	94%	90%
	S38HS	96%	90%
	S60	92%	90%
	S60HS	92%	90%
iM Series	iM16K	96%	90%
	iM30K	92%	90%

### Packing Factor (Ratio of bulk density to true particle density)

Averages about 60%.

### Oil Absorption

0.2–0.6 g oil/cc of 3M glass bubbles, per ASTM D281-84.

### Volatile Content

Maximum of 0.5 percent by weight.

### Alkalinity

Maximum of 0.5 milliequivalents per gram

### pH

Because 3M glass bubbles are a dry powder, pH is not defined. The pH effect will be determined by the alkalinity as indicated above.

When 3M glass bubbles are mixed with deionized water at 5% volume loading, the resulting pH of the slurry is typically 9.1 to 9.9, as measured by a pH meter.

### Dielectric Constant

**K Series:** 1.2 to 1.7 @ 100 MHz, based on theoretical calculations.

**S Series:** 1.2 to 2.0 @ 100 MHz, based on theoretical calculations.

**iM Series:** 1.2 to 1.7 @ 100 MHz, based on theoretical calculations

The dielectric constant of a composite will depend on the matrix material and volume loading of 3M glass bubbles.

### Particle Size

Product	Particle Size (microns, by volume) 3M QCM 193.0				
	Distribution			Effective Top Size	
	10th%	50th%	90th%		
K Series	K1	30	65	115	120
	K15	30	60	105	115
	K20	30	60	90	105
	K25	25	55	90	105
	K37	20	45	80	85
	K46	15	40	70	80
S Series	S15	25	55	90	95
	S22	20	35	65	75
	S32	20	40	70	80
	S35	20	40	65	80
	S38	15	40	75	85
	S38HS	19	44	70	85
	S60	15	30	55	65
	S60HS	12	29	48	60
iM Series	iM16K	12	20	30	40
	iM30K	8.6	15.3	23.6	26.7

## Particle Size (continued)

### Hard Particles (3M QCM 93.4.3)

No hard particles (e.g. glass slag, flow agent, etc.) greater than U.S. number 40 (420 microns) standard sieve will exist.

### Oversize Particles (3M QCM 93.4.4)

For *K1*, *K15*, *K20* and *K25* glass bubbles:

Using a 10 gram sample on a U.S. number 80 standard sieve (177 microns), a maximum of five (5) percent by weight glass bubbles will be retained on the sieve.

For *K37* and *K46* glass bubbles:

Using a 10 gram sample on U.S. number 100 standard sieve (149 microns), a maximum of one (1) percent by weight glass bubbles will be retained on the sieve.

For *S15*, *S32*, *S35*, *S38*, *S38HS*, *S60*, *S60HS*, *iM16K* and *iM30K* glass bubbles:

Using a 10 gram sample on a U.S. number 140 standard sieve (105 microns), a maximum of three (3) percent by weight glass bubbles will be retained on the sieve.

For *S22* glass bubbles:

Using a 10 gram sample on a U.S. number 200 standard sieve (74 microns), a maximum of five (5) percent by weight glass bubbles will be retained on the sieve.

### Appearance (3M QCM 22.85)

White to the unaided eye.

### Flow (3M QCM 22.83)

3M™ Glass Bubbles remain free flowing for at least one year from the date of shipment if stored in the original, unopened container in the minimum storage conditions of an unheated warehouse.

### Labeling

3M glass bubbles will be packaged in suitable containers to help prevent damage during normal handling and shipping. Each container will be labeled with:

1. Name of manufacturer
2. Type of 3M glass bubbles
3. Lot number
4. Quantity in pounds

## Storage and Handling

To help ensure ease of storage and handling while maintaining free flowing properties, 3M™ Glass Bubbles have been made from a chemically stable glass and are packaged in a heavy-duty polyethylene bag within a cardboard container.

Minimum storage conditions should be unopened cartons in an unheated warehouse.

Under high humidity conditions with an ambient temperature cycling over a wide range, moisture can be drawn into the bag as the temperature drops and the air contracts. The result may be moisture condensation within the bag. Extended exposure to these conditions may result in “caking” of the 3M glass bubbles to various degrees. To minimize the potential for “caking” and prolong the storage life, the following suggestions are made:

1. Carefully re-tie open bags after use.
2. If the polyethylene bag is punctured during shipping or handling, use this bag as soon as possible, patch the hole, or insert the contents into an undamaged bag.
3. During humid summer months, store in the driest, coolest space available.
4. If good storage conditions are unavailable, carry a minimum inventory, and process on a first in/first out basis.

Dusting problems that may occur while handling and processing can be minimized by the following procedures:

1. For eye protection wear chemical safety goggles. For respiratory system protection wear an appropriate NIOSH/MSHA approved respirator. (For additional information about personal protective equipment, refer to Material Safety Data Sheet.)
2. Use appropriate ventilation in the work area.
3. Pneumatic conveyor systems have been used successfully to transport 3M glass bubbles without dusting from shipping containers to batch mixing equipment. Static eliminators should be used to help prevent static charges.

Diaphragm pumps have been used to successfully convey 3M glass bubbles. Vendors should be consulted for specific recommendations.

3M glass bubble breakage may occur if the product is improperly processed. To minimize breakage, avoid high shear processes such as high speed Cowles Dissolvers, point contact shear such as gear pumps or 3-roll mills, and processing pressures above the strength test pressure for each product.

## Health and Safety Information

For product Health and Safety Information, refer to product label and Material Safety Data Sheet (MSDS) before using product.

## Packaging Information

### Small Box (10 Cubic ft.)

A single corrugated box with a plastic liner. All boxes are banded together and to the wooden pallet. 4 boxes per pallet.

Each box inside diameter is 22 in. × 19 in. × 39 in.

Pallet size is 42 in. × 48 in.

### Large Box (50 Cubic ft.)\*

A single corrugated box with a plastic liner. Top enclosed with interlocking double cover banded. Bottom is normal box closure, entire box banded to wooden pallet.

Each box inside diameter is 48 in. × 42 in. × 44 in. Overall load size is 48<sup>3</sup>/<sub>4</sub> in. × 42<sup>3</sup>/<sub>4</sub> in. × 50 in. including pallet.

Pallet size is 42 in. × 48 in.

\*S60 and S60HS large boxes are 38 cubic ft.

## Resources

3M™ Glass Bubbles are supported by global sales, technical and customer service resources, with fully-staffed technical service laboratories in the U.S., Europe, Japan, Latin America and Southeast Asia. Users benefit from 3M's broad technology base and continuing attention to product development, performance, safety and environmental issues.

For additional technical information on 3M glass bubbles in the United States, call 3M Advanced Materials Division, **800-367-8905**. For other 3M global offices, and information on additional 3M products, visit our website at: [www.3M.com/engineeredadditives](http://www.3M.com/engineeredadditives).

### Box Weights

	Product	Small Box	Large Box*	Truckload Large Box* 44 Pallets
K Series	K1	40 lb.	210 lb.	9,240 lb.
	K15	50 lb.	265 lb.	11,660 lb.
	K20	60 lb.	350 lb.	15,400 lb.
	K25	80 lb.	430 lb.	18,920 lb.
	K37	100 lb.	660 lb.	29,040 lb.
	K46	125 lb.	815 lb.	35,860 lb.
S Series	S15	50 lb.	265 lb.	11,660 lb.
	S22	60 lb.	385 lb.	16,940 lb.
	S32	100 lb.	525 lb.	23,100 lb.
	S35	100 lb.	630 lb.	27,720 lb.
	S38	100 lb.	680 lb.	29,920 lb.
	S38HS	100 lb.	680 lb.	29,920 lb.
	S60	125 lb.	850 lb.	37,400 lb.
	S60HS	125 lb.	850 lb.	37,400 lb.
iM Series	iM16K	99 lb.	800 lb.	—
	iM30K	125 lb.	850 lb.	37,400 lb.

\*Box weights may vary due to manufacturing tolerances on each product.

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**Limitation of Liability:** Except where prohibited by law, 3M will not be liable for any loss or damages arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.

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# TECHNICAL DATA SHEET

According to ASTM C330, C331, C332

Poraver® expanded glass is available in five standard and two special grain sizes. With this wide variety of grain sizes from 0.04 mm to 8 mm, Poraver® expanded glass granulate offers a suitable lightweight aggregate solution for every field of application.

PROPERTIES	STANDARD	PORAVER® STANDARD GRAIN SIZES					PORAVER® SPECIAL GRAIN SIZES			
		0.1-0.3	0.25-0.5	0.5-1	1-2	2-4	0.04-0.125	NEW 0.1-0.5	4-8	
<b>Grain size</b> [mm]	ASTM C136	0.1-0.3	0.25-0.5	0.5-1	1-2	2-4	0.04-0.125	0.1-0.5	4-8	
<b>Particle size</b> [mesh #]		140-50	60-35	35-18	18-10	10-5	400-120	140-35	5-5/16"	
<b>Fineness modulus</b>		0.66	1.92	2.72	3.81	4.7	on request	0.81	5.73	
<b>Dry loose bulk density</b>	ASTM C9/C29M	[kg/m <sup>3</sup> ]	400 ± 60	340 ± 30	270 ± 30	230 ± 30	190 ± 20	530 ± 70	380 ± 60	180 ± 20
		[lb/ft <sup>3</sup> ]	25 ± 3.8	21.2 ± 3.2	16.9 ± 3	14.4 ± 2.1	11.9 ± 1.8	33.1 ± 4.4	23.7 ± 3.8	11.2 ± 1.7
<b>Apparent density</b>	ASTM C128	[kg/m <sup>3</sup> ]	850 ± 120	680 ± 50	450 ± 50	410 ± 50	350 ± 40	on request	800 ± 60	300 ± 40
		[lb/ft <sup>3</sup> ]	53.1 ± 8.4	42.5 ± 5.6	28.1 ± 4.4	25.6 ± 3.6	21.8 ± 3	on request	49.9 ± 3.8	18.7 ± 2.7
<b>Compressive strength</b>	EN 13055-1	[MPa]	2.8	2.6	2	1.6	1.4	on request	3.0	1.2
		[PSI]	406	377	290	232	203	on request	435	174
<b>Water absorption by mass</b> <sup>1)</sup> [Mass. %]	ASTM C128	35	28	20	20	23	on request	32	20	
<b>Water absorption by volume</b> <sup>1)</sup> [Vol. %]	ASTM C128	22	15	9	7	7	on request	20	5	
<b>Organic impurities</b>	ASTM C40	no injurious compounds					no injurious compounds			
<b>Staining index (index number)</b>	ASTM C641	0					0			
<b>Loss on ignition</b> [%]	ASTM C114	~1					~1			
<b>Clay lumps and friable particles</b> [%]	ASTM C142	-	-	-	< 2	< 2	-	-	< 2	
<b>Oversize</b>	EN 13055-1	≤ 10% by mass					≤ 10% by mass			
<b>Undersize</b>		≤ 15% by mass					≤ 15% by mass			

<sup>1)</sup> % absorption determined after 5 minutes submerged in water

The following data are valid for all grain sizes:

<b>pH value</b>		9-12	9-12						
<b>Moisture content on delivery</b>		≤ 0.5 %	≤ 0.5 %						
<b>Softening point</b>		approx. 700°C / 1300°F	approx. 700°C / 1300°F						
<b>Color</b>		creamy white	creamy white						
<b>Thermal conductivity</b>	[W/m-K]	-	-	-	-	0.07 <sup>2)</sup>	-	-	0.07 <sup>2)</sup>
	[BTU-in/hr-ft <sup>2</sup> -°F]	-	-	-	-	0.486 <sup>2)</sup>	-	-	0.486 <sup>2)</sup>

The strength grades may vary within the tolerance range of bulk densities.  
The availability and delivery conditions for special grain sizes will be agreed on an individual basis.

<sup>2)</sup> calculated values DIBt according to approval Z-23.11-114



# Hess Grade: 3

## PARTICLE SIZE SPECIFICATION GRADE 3

SIZE			ALLOWABLE PERCENT PASSING
MICRON	MM	U.S. MESH	
1400	1.4	14	99.5-100
600	0.6	30	11-31
425	0.425	40	0-19
300	0.3	50	0-9
250	0.25	60	0-7

TEST METHOD: ASTM C136-06

## LOOSE BULK DENSITY GRADE 3

48 lb/per cubic foot [768.8 kg/per cubic meter] (ASTM C29)



Left: HP Grade number 3. Right: Grade 3 is the top size used in coarse exfoliating and scrubbing creams.

## GRADE APPLICATIONS

- Polishing/cleansing abrasive
- Texturing grit/non-skid surface paints and coating
- Tumbling media (matt finish)
- Cosmetic exfoliating grit (foot/body scrub)
- Sand blasting media
- Leather/suede finishing

## RETAIL PRODUCT BRANDS

Brands under the Hess umbrella using HP Grade 3: Magma™ exfoliating supplement, Dimension Grit™ in-suspension texturizing grit.

## PACKAGING OPTIONS

- 1 or 2 lb resealable bags
- 2.5 lb jar
- 20 lb [9 kg] box
- 40 lb [18 kg] bags
- 900 lb [408 kg] super sacks (palletted)
- Bulk shipped in rail car or tractor trailer

## ORDER

- Samples, small quantities, and single production bags (up to 3): order direct from the [PumiceStore.com](http://PumiceStore.com)
- Partial pallets, full pallets, truckloads: contact us at [sales@hesspumice.com](mailto:sales@hesspumice.com) or call 208-766-4777



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*Mining and refining the purest commercial deposit of white pumice on the planet.*

## PUMICE TECHNICAL DATA

Chemical analysis, physical properties, and other common data shared by all Hess Pumice grades are detailed on back.

# Hess Pumice Technical Data

## CHEMICAL ANALYSIS AND PHYSICAL PROPERTIES

**Chemical Name:** Amorphous Aluminum Silicate

TYPICAL ANALYSIS	GENERAL PROPERTIES
• Silicon Dioxide: 76.2%	• Appearance: White powder
• Aluminum Oxide: 13.5%	• Hardness (MOHS): 6
• Ferric Oxide: 1.1%	• pH: 7.2
• Ferrous Oxide: 0.1%	• Radioactivity: None
• Sodium Oxide: 1.6%	• Softening Point: 900 degrees C
• Potassium Oxide: 1.8%	• Water Soluble Substances: 0.15%
• Calcium Oxide: 0.8%	• Loss on Ignition - 5%
• Titanium Oxide: 0.2%	• GE Brightness: 84
• Magnesium Oxide: .05%	• Specific Gravity: 2.2
• Moisture: <1.0%	• Reactivity: Inert
• Crystalline SiO <sub>2</sub> : None Detected	(except in the presence of calcium hydroxide or hydrofluoric acid)

## DESCRIPTION

Amorphous (non-crystalline) in structure and composed primarily of aluminum silicate, pumice is a naturally calcined volcanic glass foam consisting of highly vesicular strands permeated with tiny air bubbles. It is these frothy, friable glass vesicles that, when carefully refined to various grades, give pumice its unique and infinitely useful qualities.

## NOTES

- Chemical analysis and physical properties provided are common to all raw Hess pumice grades.
- **Grade Variety.** The natural, hard-yet-friable character of our pumice combined with our crushing and screening expertise allow us to offer pumice grades and grade blends down to 3 microns.
- **Safe to Use.** No hazardous crystalline structure: testing for crystalline silica (airborne particles of respirable size) finds no measurable Crystalline Silica (SiO<sub>2</sub>) present. Free of heavy metals, pesticides, nano-particles, allergens. Certified organic input material.
- **Purity:** As the result of centuries of wave action from a now-extinct inland sea, our pumice is remarkably pure. Our mine grades are typically comprised of 98% pumice and 2% other igneous minerals, which are not removed through our mining processes.
- **Storage:** Keep dry and protected from the elements until use.



*Pumice is a foamed glass stone naturally expanded by explosive volcanic eruption.*



# Hess Grade: 5

## PARTICLE SIZE SPECIFICATION GRADE 5

SIZE			ALLOWABLE PERCENT PASSING
MICRON	MM	U.S. MESH	
2000	2.0	10	99.5-100
1400	1.4	14	67-97
600	0.6	30	0-12

TEST METHOD: ASTM C136-06

## LOOSE BULK DENSITY GRADE 5

46 lb/per cubic foot [736.8 kg/per cubic meter] (ASTM C29)



HP Grade number 5.

## GRADE APPLICATIONS

- Metal polishing abrasive
- Texturing grit/non-skid surface paints and coating
- Water filtration media in pool-filtration and other tank-type filter systems

## PACKAGING OPTIONS

- 1 or 2 lb resealable bags
- 20 lb [9 kg] box
- 35 lb [15.8 kg] bags
- 900 lb [408 kg] super sacks (palletted)
- 1800 lb [816 kg] super sacks (palletted)
- Bulk shipped in rail car or tractor trailer

## ORDER

- Samples, small quantities, and single production bags (up to 3): order direct from the [PumiceStore.com](http://PumiceStore.com)
- Partial pallets, full pallets, truckloads: contact us at [sales@hesspumice.com](mailto:sales@hesspumice.com) or call 208-766-4777

## PUMICE TECHNICAL DATA

Chemical analysis, physical properties, and other common data shared by all Hess Pumice grades are detailed on back.

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# Hess Pumice Technical Data

## CHEMICAL ANALYSIS AND PHYSICAL PROPERTIES

**Chemical Name:** Amorphous Aluminum Silicate

TYPICAL ANALYSIS	GENERAL PROPERTIES
• Silicon Dioxide: 76.2%	• Appearance: White powder
• Aluminum Oxide: 13.5%	• Hardness (MOHS): 6
• Ferric Oxide: 1.1%	• pH: 7.2
• Ferrous Oxide: 0.1%	• Radioactivity: None
• Sodium Oxide: 1.6%	• Softening Point: 900 degrees C
• Potassium Oxide: 1.8%	• Water Soluble Substances: 0.15%
• Calcium Oxide: 0.8%	• Loss on Ignition - 5%
• Titanium Oxide: 0.2%	• GE Brightness: 84
• Magnesium Oxide: .05%	• Specific Gravity: 2.2
• Moisture: <1.0%	• Reactivity: Inert
• Crystalline SiO <sub>2</sub> : None Detected	(except in the presence of calcium hydroxide or hydrofluoric acid)

## DESCRIPTION

Amorphous (non-crystalline) in structure and composed primarily of aluminum silicate, pumice is a naturally calcined volcanic glass foam consisting of highly vesicular strands permeated with tiny air bubbles. It is these frothy, friable glass vesicles that, when carefully refined to various grades, give pumice its unique and infinitely useful qualities.

## NOTES

- Chemical analysis and physical properties provided are common to all raw Hess pumice grades.
- **Grade Variety.** The natural, hard-yet-friable character of our pumice combined with our crushing and screening expertise allow us to offer pumice grades and grade blends down to 3 microns.
- **Safe to Use.** No hazardous crystalline structure: testing for crystalline silica (airborne particles of respirable size) finds no measurable Crystalline Silica (SiO<sub>2</sub>) present. Free of heavy metals, pesticides, nano-particles, allergens. Certified organic input material.
- **Purity:** As the result of centuries of wave action from a now-extinct inland sea, our pumice is remarkably pure. Our mine grades are typically comprised of 98% pumice and 2% other igneous minerals, which are not removed through our mining processes.
- **Storage:** Keep dry and protected from the elements until use.



*Pumice is a foamed glass stone naturally expanded by explosive volcanic eruption.*

# Hess Grade: 7

## PARTICLE SIZE SPECIFICATION GRADE 7

SIZE			ALLOWABLE PERCENT PASSING
MICRON	MM	U.S. MESH	
2380	2.38	8	99.5-100
2000	2.0	10	80-100
1400	1.4	14	55-75
600	0.6	30	0-9

TEST METHOD: ASTM C136-06

## LOOSE BULK DENSITY GRADE 7

**46 lb/per cubic foot [736.8 kg/per cubic meter]** (ASTM C29)



**Left:** HP Grade number 7. **Right:** Grade used for as an aggressive filtration media (replacing or supplementing sand, zeolite, or diatomaceous earth) in commercial and residential pool filtration systems.

## GRADE APPLICATIONS

- Metal polishing abrasive
- Lightweight snow/ice traction aid
- Water filtration media in pool-filtration and other tank-type filter systems

## PACKAGING OPTIONS

- 1 or 2 lb resealable bags
- 20 lb [9 kg] box
- 35 lb [15.8 kg] bags
- 900 lb [408 kg] super sacks (palletted)
- 1800 lb [816 kg] super sacks (palletted)
- Bulk shipped in rail car or tractor trailer

## ORDER

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# Hess Pumice Technical Data

## CHEMICAL ANALYSIS AND PHYSICAL PROPERTIES

**Chemical Name:** Amorphous Aluminum Silicate

TYPICAL ANALYSIS	GENERAL PROPERTIES
• Silicon Dioxide: 76.2%	• Appearance: White powder
• Aluminum Oxide: 13.5%	• Hardness (MOHS): 6
• Ferric Oxide: 1.1%	• pH: 7.2
• Ferrous Oxide: 0.1%	• Radioactivity: None
• Sodium Oxide: 1.6%	• Softening Point: 900 degrees C
• Potassium Oxide: 1.8%	• Water Soluble Substances: 0.15%
• Calcium Oxide: 0.8%	• Loss on Ignition - 5%
• Titanium Oxide: 0.2%	• GE Brightness: 84
• Magnesium Oxide: .05%	• Specific Gravity: 2.2
• Moisture: <1.0%	• Reactivity: Inert
• Crystalline SiO <sub>2</sub> : None Detected	(except in the presence of calcium hydroxide or hydrofluoric acid)

## DESCRIPTION

Amorphous (non-crystalline) in structure and composed primarily of aluminum silicate, pumice is a naturally calcined volcanic glass foam consisting of highly vesicular strands permeated with tiny air bubbles. It is these frothy, friable glass vesicles that, when carefully refined to various grades, give pumice its unique and infinitely useful qualities.

## NOTES

- Chemical analysis and physical properties provided are common to all raw Hess pumice grades.
- **Grade Variety.** The natural, hard-yet-friable character of our pumice combined with our crushing and screening expertise allow us to offer pumice grades and grade blends down to 3 microns.
- **Safe to Use.** No hazardous crystalline structure: testing for crystalline silica (airborne particles of respirable size) finds no measurable Crystalline Silica (SiO<sub>2</sub>) present. Free of heavy metals, pesticides, nano-particles, allergens. Certified organic input material.
- **Purity:** As the result of centuries of wave action from a now-extinct inland sea, our pumice is remarkably pure. Our mine grades are typically comprised of 98% pumice and 2% other igneous minerals, which are not removed through our mining processes.
- **Storage:** Keep dry and protected from the elements until use.



*Pumice is a foamed glass stone naturally expanded by explosive volcanic eruption.*



**1. Product Name**

Direct Colors Concrete Pigments

**2. Manufacturer**

Direct Colors, Inc. (DCI)  
 430 East 10th Street  
 Shawnee, OK 74801  
 (877) 255-2656  
 (405) 275-6657  
 Fax: (405) 275-2815  
 E-mail: [info@directcolors.com](mailto:info@directcolors.com)  
[www.directcolors.com](http://www.directcolors.com)

**3. Product Description**

**BASIC USE**

Direct Colors Concrete Pigment, also known as Integral Color, is designed to color concrete, stucco, plaster, mortar, grout, overlay and other cementitious materials. Integral Colors have been used in thousands of different commercial and residential applications to create beautiful and unique surfaces.

DCI Concrete, Inc. (DCI) concrete pigments can be used to add color to concrete floors, countertops, cultured and architectural stone, statuary and an assortment of other garden decor items.

DCI Concrete pigments are also used to tint concrete sealers and liquid release agents to over 30 translucent colors for use in both indoor and outdoor flooring applications. Additionally, DCI acetone-based concrete dyes, made with concrete pigments, can be applied to existing concrete surfaces for even, consistent coloration and are especially valuable for floors that cannot be acid stained or colored by any other means.

**COMPOSITION & MATERIALS**

Direct Colors Pigments are made from metal oxides of iron, chromium, cobalt or titanium. They are man-made, synthetic, inorganic pigments that are tested to and meet ASTM C979 standards. They do not contain carbon black, or other materials that may be unstable or non-lightfast in many cementitious applications.

**SIZES**

Direct Colors Concrete Pigments are available in 1 lb (0.5 kg), 5 lb (2 kg), 10 lb (4.5 kg), 20 lb (9 kg),



1835 Pigment in Stamped Concrete (Photo Courtesy of Decocrete)

50 lb (23 kg), 500 lb (227 kg) and 2000 lb (907 kg) quantities. Custom batch quantities are also available.

**COLOR**

Direct Colors Concrete Pigments deliver superior uniformity in color, strength and lightfastness and are available in over 100 colors. See Tables 1 and 2. Accurate traceability is provided by use of batch identification codes. View visual color representations online at [www.directcolors.com](http://www.directcolors.com).

**BENEFITS**

- High quality pigments at an affordable price
- Wide range and variety of colors available
- Superior customer service and technical support
- Free freight in the lower 48 states

**ACCESSORIES**

- Concrete sealers
- Multipurpose wax
- Concrete dyes
- DCI overlays
- Liquid Colored Antique
- Decorative aggregates
- Stamps and stencils

**LIMITATIONS**

- Direct Colors, Inc., color charts for integral color/concrete pigments are intended to match what can generally be expected from a final color as closely as possible. However, the color and condition of preexisting concrete will affect the final result of the new concrete color, so color samples are approximations only

- Efflorescence, a naturally occurring deposit found on the surface of concrete, is more noticeable on dark colors because of its whitish appearance. Although it will eventually cease, there is no known method to achieve 100% prevention. Efflorescence can quickly be removed by acid washing, but over time, natural weathering will achieve the same effect. See "Reducing Efflorescence" under "Installation" for techniques to help reduce the occurrence of efflorescence

**4. Technical Data**

**APPLICABLE STANDARDS**

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

**APPROVALS**

Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR 1910.1200

**PHYSICAL/CHEMICAL PROPERTIES**

- Lightfast
- Alkali and weather resistant
- UV stable
- Non-hazardous
- Color consistent
- Chemically inert
- Insoluble in water
- Inorganic
- Synthetic
- Specific gravity - Heavier than water
- Evaporation rate - None
- Reddish-brown appearance
- Odorless



**TABLE 1 INTEGRAL COLOR CHART, GRAY CEMENT BASE, TO ASTM C979**

Color mixture	Brick Red	Sun Dried Tomato	Merlot	Evening Shadow	Terra Cotta
Pigment type	1835	1835	126	126	560
Pound rating	4 lb	1 lb	3 lb	1 lb	5 lb
Color mixture	Majestic Sunrise	Dawn	Earthen Red	Desert Rouge	Desert Vista
Pigment type	1830	1830	1115	1115	560
Pound rating	4 lb	1 lb	3 lb	1 lb	3 lb
Color mixture	Navajo	Uplands	Caramel	San Juan	Frontier Buff
Pigment type	543	543	543	543	533
Pound rating	5 lb	3 lb	2 lb	1 lb	1 lb
Color mixture	Burnished Copper	Sandstone	Canyon Brown	Santa Fe Tan	Smokestack
Pigment type	553	553	553	533	230
Pound rating	4 lb	1 lb	5 lb	3 lb	5 lb
Color mixture	Weathered Tin	Deep Bronze	Milk Chocolate	Rattan	Golden Buff
Pigment type	230	680	680	609	609
Pound rating	1 lb	3 lb	1 lb	4 lb	2 lb
Color mixture	Cocoa Brown	Walnut	Petrified Wood	Mint Green	Briar Buff
Pigment type	653	649	649	5376	500
Pound rating	3 lb	4 lb	2 lb	3 lb	3 lb
Color mixture	Taupe	Pecan	Maple	Rocky Crag	Wildwood Buff
Pigment type	653	627	627	623	500
Pound rating	1 lb	3 lb	1 lb	3 lb	2 lb
Color mixture	Wheat Buff	Winterfield Buff	Mocha	Tarnished Brass	Sunray
Pigment type	500	1198	623	1311	1311
Pound rating	1 lb	1 lb	1 lb	3 lb	1 lb
Color mixture	Venetian Red	Umber	Slate Blue	Prussian Blue	Sapphire
Pigment type	1880	1880	5151	5151	15.3
Pound rating	5 lb	3 lb	1 lb	3 lb	5 lb
Color mixture	Midnight Blue	Mint Green	Forest Green		
Pigment type	15.3	5376	5376		
Pound rating	5 lb	3 lb	5 lb		



Colors cast in Gray Cement

**FIRE PERFORMANCE**

Direct Colors Concrete Pigments are non-flammable, noncombustible and nonexplosive.

**5. Installation**

**PREPARATORY WORK**

Store materials in an area protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

Verify that site conditions are acceptable for installation. Do not proceed with installation until unacceptable conditions are corrected.

**TABLE 2 INTEGRAL COLOR CHART, WHITE CEMENT BASE, TO ASTM C979**

Color mixture	Cayenne	Blush	Sequoia	Plum	Fire Rose
Pigment type	1830	1830	126	126	1115
Pound rating	3 lb	1 lb	3 lb	1 lb	3 lb
Color mixture	Morning Mist	Dusty Rose	Wildflower	Terran	Peach
Pigment type	1115	1835	1835	553	553
Pound rating	1 lb	3 lb	1 lb	3 lb	1 lb
Color mixture	Autumn	Leaf Fall	Pumpkin	Sun Dust	October Bronze
Pigment type	560	560	543	543	533
Pound rating	3 lb	1 lb	3 lb	1 lb	3 lb
Color mixture	Sunwashed Clay	New Bark	Everland Buff	Cake Buff	Beachfront Buff
Pigment type	533	623	623	609	609
Pound rating	1 lb	3 lb	1 lb	3 lb	1 lb
Color mixture	Canyon Wall	Cinnamon	Espresso	Pebble	Camel
Pigment type	627	627	653	653	500
Pound rating	3 lb	1 lb	3 lb	1 lb	3 lb
Color mixture	Sunset Tan	Tawny	Cream Beige	Café	Cottage Brown
Pigment type	500	1198	1198	649	649
Pound rating	1 lb	3 lb	1 lb	3 lb	1 lb
Color mixture	Malayan Buff	Lotus Pond	Crème Mint	Hunter Green	Vineyard
Pigment type	1311	5376	5376	5376	1880
Pound rating	1 lb	3 lb	1 lb	5 lb	5 lb
Color mixture	Vineyard	Mouve	Tea Rose	Prairie Blue	Skye Blue
Pigment type	1880	1880	1880	5151	5151
Pound rating	5 lb	3 lb	1 lb	1 lb	3 lb
Color mixture	Electric Blue	Ultramarine	Hunter Green		
Pigment type	15.3	15.3	5376		
Pound rating	3 lb	5 lb	5 lb		



Colors cast in White Cement

**METHODS**

**Mixing**

Color charts and codes are based on pounds of pigment per 94 lb (43 kg) of cement material, including Portland cement, silica fume, fly ash and lime. Sand and aggregates are not used in this ratio. The maximum level of pigment to cement is 10% by weight. Using less than 1% pigment can result in a washed-out appearance. Blue pigments should be mixed dry with any cement-based material to ensure even color distribution.

When an exact color match is required, complete a test pour, mixing the exact ingredients and ratios that will be used onsite. When custom blends are made for countertops, ready mixes, overlays, curbing, mortar, grouts and other concrete based products, the colors hold true within an acceptable range to most users, especially when the mixture has been adjusted to meet the specific needs of the mix and the project application.

**Truck Pours**

For a standard mix, the simplest method to convert the values on the color chart to a specific pour is to multiply the poundage on the chart by 5 to determine how much pigment per yard is needed. Consistency with the pigment per yard ratio is critical in achieving matching pours. The water level and mix ratios in each load are critical as well. It is essential to know how much concrete is in the truck, not just how much will be poured.



Stamped walkway colored with 230 and 1830 Concrete Pigments (Photo Courtesy of Mark Douglass)



Swim-up pool bar countertop colored with 1311 Concrete Pigment, English Red Acid Stain and Coffee Brown Deco Gel (Photo Courtesy of Susan Turfle)

Dispense the pigment in the back of the truck, using the hose to clean the fins and ensuring that no loose pigment remains to cause streaking. Spinning the mix for 10 - 15 minutes is generally sufficient to properly disperse the pigment. Place and work the concrete as normal.

As the concrete sets, the color will appear to fade. This is caused by the concrete dispensing powder on the surface and will be resolved by sealing this in the same way as a decorative concrete would be sealed. Once sealed, the color should be stable and considerably darker than at first appearance pre-seal.

**Color Calculator**

Color calculators and measurement examples are available at [www.directcolors.com](http://www.directcolors.com) to measure required pigment per yard and per custom batch of concrete.

**PRECAUTIONS**

**Safety**

- To avoid inhaling dust and contact with face and eyes, wear full face mask, eye protection and rubber gloves
- Avoid contact with inorganic acids
- Wash with soap and water after exposure. Chronic overexposure can cause slight skin irritation

**Performance**

- For optimal results, use the same brand of cement, aggregates and sand, as well as the same cement to pigment ratio, until project completion

- In order to avoid undesired discoloration, do not use calcium chloride as a set accelerator
- Difference in slump may produce a noticeable difference in color between batches
- Use local exhaust or baghouse for ventilation
- If material is released or spilled, scoop or vacuum the floor and wash with water
- To avoid color variation, be consistent in all stages of the batching, mixing, forming/ placing and hardening of concrete

**Reducing Efflorescence**

- Ensure that the aggregate-cement ratio is sufficient to enable the cement paste to completely fill the voids between the aggregate particles after compaction
- To minimize air voids that remain after complete cement hydration, add to the concrete mix only the minimum amount of water needed to achieve required workability
- Select sands and aggregates for the mix design carefully, as appropriate particle size and shape can help to improve mechanical compaction, effectively squeezing air voids and allowing them to be replaced with the cement paste
- There is some evidence that certain cement additives and chemical admixtures can help to inhibit efflorescence. Consult Direct Colors, Inc., for more information





Stamped concrete colored with Direct Colors Concrete Pigment dispersed in Antique Release and Tinted Sealer (Photo Courtesy of Decocrete)

- Ensure concrete cures sufficiently to achieve not only strength, durability and reduced cracking, but surfaces that are as dense as possible to limit the concrete's ability to absorb water
- A variety of concrete coatings, including water and solvent based concrete sealers offered by Direct Colors, are available for application to the surface, blocking pores and forming an impermeable barrier at the concrete's exposed surface. This prevents

the movement of water to the surface, restricting the migration of efflorescence forming compounds. Consult Direct Colors, Inc., for more information.

**BUILDING CODES**

Installation and waste disposal must comply with the requirements of all applicable local, state and federal code jurisdictions.

**6. Availability & Cost**

**AVAILABILITY**

Products can be purchased at [www.directcolors.com](http://www.directcolors.com), or by calling (877) 255-2656. Products are also available from certified distributors. Contact the manufacturer or check online at [www.directcolors.com](http://www.directcolors.com) for local availability information.

**COST**

Current pricing is available online at [www.directcolors.com](http://www.directcolors.com).

**7. Warranty**

The conditions of use and application of concrete pigment products are beyond the control of Direct Colors, Inc. Direct Colors makes no warranty regarding workmanship and other variables that do not involve the performance of pigments. Buyer's sole remedy shall be the purchase price paid by the user or buyer for the quantity of the Direct Colors product involved. For details, consult Direct Colors, Inc.

**8. Maintenance**

None required.

**9. Technical Services**

Technical assistance, including more detailed information, product literature, test results, project lists, assistance in preparing project specifications and arrangements for application supervision, is available by contacting Direct Colors, Inc. For questions or custom solutions, call (877)-255-2656 or email [info@directcolors.com](mailto:info@directcolors.com).

**10. Filing Systems**

- SmartBuilding Index
- MANU-SPEC®
- Additional product information is available from the manufacturer upon request.



Close-up of stamped concrete walkway as shown above (Photo Courtesy of Decocrete)



3	03 30 00	Cast-in-Place Concrete
	03 40 00	Precast Concrete
4	03 70 00	Mass Concrete
	04 05 16	Masonry Grouting



# MasterGlenium® 7500

## Full-Range Water-Reducing Admixture

### Description

MasterGlenium 7500 full-range water-reducing admixture is very effective in producing concrete mixtures with different levels of workability including applications that require self-consolidating concrete (SCC).

MasterGlenium 7500 admixture meets ASTM C 494/C 494M compliance requirements for Type A, water-reducing, and Type F, high-range water-reducing, admixtures.

### Applications

Recommended for use in:

- Concrete with varying water reduction requirements (5-40%)
- Concrete where control of workability and setting time is critical
- Concrete where high flowability, increased stability, high-early and ultimate strengths, and improved durability are needed
- Producing self-consolidating concrete (SCC)
- Strength-on-demand concrete, such as 4x4™ Concrete
- Pervious concrete

### Features

MasterGlenium 7500 full-range water-reducing admixture is based on the next generation of polycarboxylate technology found in all of the MasterGlenium 7000 series products. This technology combines state-of-the-art molecular engineering with a precise understanding of regional cements to provide specific and exceptional value to all phases of the concrete construction process.

- Dosage flexibility for normal, mid-range and high-range applications
- Excellent early strength development
- Controls setting characteristics
- Optimizes slump retention/setting relationship
- Consistent air entrainment

### Benefits

- Faster turnover of forms due to accelerated early strength development
- Reduces finishing labor costs due to optimized set times
- Use in fast track construction
- Minimizes the need for slump adjustments at the jobsite
- Less jobsite QC support required
- Fewer rejected loads
- Optimizes concrete mixture costs

### Performance Characteristics

Concrete produced with MasterGlenium 7500 admixture achieves significantly higher early age strength than first generation polycarboxylate high-range water-reducing admixtures. MasterGlenium 7500 admixture also strikes the perfect balance between workability retention and setting characteristics in order to provide efficiency in placing and finishing concrete. The dosage flexibility of MasterGlenium 7500 allows it to be used as a normal, mid-range, and high-range water reducer.

## Guidelines for Use

**Dosage:** MasterGlenium 7500 admixture has a recommended dosage range of 2-15 fl oz/cwt (130-975 mL/100 kg) of cementitious materials. For most mid- to high-range applications, dosages in the range of 5-8 fl oz/cwt (325-520 mL/100 kg) will provide excellent performance. For high performance and producing self-consolidating concrete mixtures, dosages of up to 12 fl oz/cwt (780 mL/100 kg) of cementitious materials can be utilized. Because of variations in concrete materials, jobsite conditions and/or applications, dosages outside of the recommended range may be required. In such cases, contact your local sales representative.

**Mixing:** MasterGlenium 7500 admixture can be added with the initial batch water or as a delayed addition. However, optimum water reduction is generally obtained with a delayed addition.

## Product Notes

**Corrosivity – Non-Chloride, Non-Corrosive:** MasterGlenium 7500 admixture will neither initiate nor promote corrosion of reinforcing steel embedded in concrete, prestressing steel or of galvanized steel floor and roof systems. Neither calcium chloride nor other chloride-based ingredients are used in the manufacture of MasterGlenium 7500 admixture.

**Compatibility:** MasterGlenium 7500 admixture is compatible with most admixtures used in the production of quality concrete, including normal, mid-range and high-range water-reducing admixtures, air-entrainers, accelerators, retarders, extended set control admixtures, corrosion inhibitors, and shrinkage reducers.

**Do not use MasterGlenium 7500 admixture with admixtures containing beta-naphthalene sulfonate. Erratic behaviors in slump, workability retention and pumpability may be experienced.**

## Storage and Handling

**Storage Temperature:** MasterGlenium 7500 admixture must be stored at temperatures above 40 °F (5 °C). If MasterGlenium 7500 admixture freezes, thaw and reconstitute by mechanical agitation.

**Shelf Life:** MasterGlenium 7500 admixture has a minimum shelf life of 9 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterGlenium 7500 admixture has been exceeded.

## Packaging

MasterGlenium 7500 admixture is supplied in 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

## Related Documents

Safety Data Sheets: MasterGlenium 7500 admixture

## Additional Information

For additional information on MasterGlenium 7500 admixture or on its use in developing concrete mixtures with special performance characteristics, contact your local sales representative.

*Master Builders Solutions, a brand of MBCC Group, is a global leader of innovative chemistry systems and formulations for construction, maintenance, repair and restoration of structures. The Admixture Systems business provides advanced products, solutions and expertise that improve durability, water resistance, energy efficiency, safety, sustainability and aesthetics of concrete structures, above and below ground, helping customers to achieve reduced operating costs, improved efficiency and enhanced finished products.*

*Utilizing worldwide resources, the Master Builders Solutions community of experts are passionate about providing solutions to challenges within all stages of construction, as well as the life cycle of a structure. At Master Builders Solutions we create sustainable solutions for construction around the globe.*

## Limited Warranty Notice

Master Builders Solutions Admixtures US, LLC (“Master Builders Solutions”) warrants this product to be free from manufacturing defects and to meet the technical properties on the current Technical Data Guide, if used as directed within shelf life. Satisfactory results depend not only on quality products but also upon many factors beyond our control. MASTER BUILDERS SOLUTIONS MAKES NO OTHER WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ITS PRODUCTS. The sole and exclusive remedy of Purchaser for any claim concerning this product, including but not limited to, claims alleging breach of warranty, negligence, strict liability or otherwise, is shipment to purchaser of product equal to the amount of product that fails to meet this warranty or refund of the original purchase price of product that fails to meet this warranty, at the sole option of Master Builders Solutions. Any claims concerning this product must be received in writing within one (1) year from the date of shipment and any claims not presented within that period are waived by Purchaser. MASTER BUILDERS SOLUTIONS WILL NOT BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFITS) OR PUNITIVE DAMAGES OF ANY KIND.

Purchaser must determine the suitability of the products for the intended use and assumes all risks and liabilities in connection therewith. This information and all further technical advice are based on Master Builders Solutions' present knowledge and experience. However, Master Builders Solutions assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. Master Builders Solutions reserves the right to make any changes according to technological progress or further developments. The Purchaser of the Product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with a full application of the product(s). Performance of the product described herein should be verified by testing and carried out by qualified experts.



03 30 00	Cast-in-Place Concrete
03 40 00	Precast Concrete
03 70 00	Mass Concrete

# MasterSet<sup>®</sup> DELVO

## Hydration Controlling Admixture

### Description

MasterSet DELVO ready-to-use, liquid admixture is used for making more uniform and predictable high-performance concrete. MasterSet DELVO admixture retards setting time by controlling the hydration of portland cement and other cementitious materials while facilitating placing and finishing operations. MasterSet DELVO admixture meets ASTM C 494/C 494M requirements for Type B, retarding, and Type D, water-reducing and retarding, admixtures.

### Applications

Recommended for use in:

- Stabilization of concrete washwater
- Stabilization of returned plastic concrete
- Stabilization of freshly batched concrete for long hauls
- 4x4<sup>™</sup> Concrete
- Pumped concrete, shotcrete (wet mix) and conventionally-placed concrete
- Plain, reinforced, precast, prestressed, lightweight and normal weight concrete
- Pervious concrete

### Features

- Reduced water content required for a given workability
- Retarded setting time characteristics
- Improved workability

### Benefits

- Provides flexibility in the scheduling of placing and finishing operations
- Offsets the effects of slump loss during extended delays between mixing and placing
- Reduces waste associated with concrete washwater and returned concrete
- Increased strength – compressive and flexural

### Performance Characteristics

**Rate of Hardening:** The temperature of a concrete mixture and the ambient temperature (forms, earth, air, etc.) affect the hardening rate of concrete. At higher temperatures, concrete hardens more rapidly which may cause problems with placing and finishing.

One of the functions of MasterSet DELVO admixture is to retard the set of concrete. Within the normal dosage range, it will generally extend the working and setting times of concrete containing normal portland cement, fly ash, slag cement and silica fume approximately 1 hour to 5 hours compared to a plain concrete mixture. This depends on job materials and temperatures. Trial mixtures should be made under approximate job conditions to determine the dosage required.

**Compressive Strength:** Concrete produced with MasterSet DELVO admixture will develop higher early (within 24 hours) and higher ultimate strengths than plain concrete when used within the recommended dosage range and under normal, comparable curing conditions. When MasterSet DELVO admixture is used in heat-cured concrete, the length of the preheating period should be increased until the initial set of the concrete is achieved. The actual heat-curing period is then reduced accordingly to maintain existing production cycles without sacrificing early or ultimate strengths.

## Guidelines for Use

**Dosage:** MasterSet DELVO admixture is recommended for use at a dosage of  $4 \pm 1$  fl oz/cwt ( $260 \pm 65$  mL/100 kg) of cementitious materials for most concrete mixtures using average concrete ingredients. For long time-to-discharge applications, such as long hauls, dosages higher than the recommended range may be required. Specifically, for shotcrete applications, MasterSet DELVO admixture is recommended for use at a dosage of 1.5 fl oz/cwt to 25 fl oz/cwt (100 mL/100 kg to 1,500 mL/100 kg) of cementitious materials. Because of variations in job conditions and concrete materials, dosages other than the recommended amounts may be required. In such cases, contact your local sales representative. For concrete washwater and returned concrete stabilization, utilize MasterSet DELVO charts to determine the appropriate dosage rates.

## Product Notes

**Corrosivity – Non-Chloride, Non-Corrosive:** MasterSet DELVO admixture will neither initiate nor promote corrosion of reinforcing steel in concrete. This admixture does not contain intentionally-added calcium chloride or other chloride-based ingredients.

**Compatibility:** MasterSet DELVO admixture may be used in combination with any Master Builders Solutions admixture. When used in conjunction with another admixture, each admixture must be dispensed separately into the mixture.

**CAUTION:** While MasterSet DELVO and MasterLife CI 30 admixtures are compatible in the same concrete mixture when added separately, these two admixtures are NOT compatible in the same STORAGE TANK OR CONTAINER, in any ratio, as potentially harmful gas may result from blending the two. Contact a Master Builders Solutions representative if there are any questions regarding admixture storage or admixture compatibility.

## Storage and Handling

**Storage Temperature:** MasterSet DELVO admixture should be stored above freezing temperatures. If MasterSet DELVO admixture freezes, thaw at 35 °F (2 °C) or above and completely reconstitute by mild mechanical agitation. Do not use pressurized air for agitation.

**Shelf Life:** MasterSet DELVO admixture has a minimum shelf life of 12 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterSet DELVO admixture has been exceeded.

## Packaging

MasterSet DELVO admixture is supplied in specially designed 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

## Related Documents

Safety Data Sheets: MasterSet DELVO admixture

## Additional Information

For more information on MasterSet DELVO admixture, contact your local sales representative.

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*Utilizing worldwide resources, the Master Builders Solutions community of experts are passionate about providing solutions to challenges within all stages of construction, as well as the life cycle of a structure. At Master Builders Solutions we create sustainable solutions for construction around the globe.*

## Limited Warranty Notice

Master Builders Solutions Admixtures US, LLC (“Master Builders Solutions”) warrants this product to be free from manufacturing defects and to meet the technical properties on the current Technical Data Guide, if used as directed within shelf life. Satisfactory results depend not only on quality products but also upon many factors beyond our control. MASTER BUILDERS SOLUTIONS MAKES NO OTHER WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ITS PRODUCTS. The sole and exclusive remedy of Purchaser for any claim concerning this product, including but not limited to, claims alleging breach of warranty, negligence, strict liability or otherwise, is shipment to purchaser of product equal to the amount of product that fails to meet this warranty or refund of the original purchase price of product that fails to meet this warranty, at the sole option of Master Builders Solutions. Any claims concerning this product must be received in writing within one (1) year from the date of shipment and any claims not presented within that period are waived by Purchaser. MASTER BUILDERS SOLUTIONS WILL NOT BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFITS) OR PUNITIVE DAMAGES OF ANY KIND.

Purchaser must determine the suitability of the products for the intended use and assumes all risks and liabilities in connection therewith. This information and all further technical advice are based on Master Builders Solutions' present knowledge and experience. However, Master Builders Solutions assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. Master Builders Solutions reserves the right to make any changes according to technological progress or further developments. The Purchaser of the Product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with a full application of the product(s). Performance of the product described herein should be verified by testing and carried out by qualified experts.





## PRODUCT DATA SHEET

# SikaColor®-430 Elements®

A low odor, low VOC, water-based concrete stain capable of providing translucent color variations similar to reactive acid stain

### PRODUCT DESCRIPTION

SikaColor®-430 Elements® is a low odor, water-based, environmentally and user-friendly concrete stain with low VOC. SikaColor®-430 Elements® represents the latest in nanopigment technology. It is formulated to readily permeate a properly prepared concrete surface and create translucent color variations similar to reactive acid stain. It is an excellent substitute for reactive chemical stains on substrates that are minimally reactive with acid stains or when a color is desired that cannot be produced by an acid stain.

### USES

- Applied as the primary coloring material over uncolored concrete and other compatible substrates
- Can be applied over integrally colored concrete, color hardened concrete, stamped or stenciled concrete, cementitious overlays, and reactive chemical stains once neutralized
- Interior concrete floors and exterior concrete hardscapes

### CHARACTERISTICS / ADVANTAGES

- Must be applied with HVLP or pneumatic airless sprayer
- Low VOC, low odor
- Creates translucent mottled color
- Expanded color range compared to chemical stain
- Soap and water clean-up
- Does not contain acid
- Multiple colors may be used for a more creative effect
- Most colors are resistant to fading from sunlight (see LIMITATIONS section)
- Can be blended with other colors to create a unique color palette

### PRODUCT INFORMATION

<b>Chemical Base</b>	Water-Based
<b>Packaging</b>	32 oz. (946.4 ml) fill in 32 oz. (946.4 ml) plastic bottle
<b>Shelf Life</b>	24 months
<b>Storage Conditions</b>	Store in original, unopened containers, in dry storage, between 60-80°F (16-27°C). Do not freeze.
<b>Appearance / Color</b>	Available in 18 standard colors

## APPLICATION INFORMATION

### Coverage

200-400 sq./ft. (concentrate mixed with 96 oz. potable water)

Coverage will vary widely depending on the porosity and texture of the surface, application method, desired color intensity, and number of applications. Two applications may be required on very porous concrete. Greater color intensity may be achieved with multiple applications. Each application must penetrate and be absorbed by the concrete surface.

## BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

## LIMITATIONS

SikaColor®-430 Elements® must be applied to clean structurally sound concrete, cured (28 days), free from laitance, dust, film forming curing compounds, and other contamination that will prevent penetration. **Non-porous surfaces shall be cleaned with Sika® CHO™ Concrete Cleaner and neutralized before applying SikaColor®-430 Elements®.** SikaCem® cementitious overlays should cure for a minimum of 72 hours at 70°F (21°C) before applying SikaColor®-430 Elements®. Do not apply when substrate, product or ambient temperatures are below 50°F (10°C) or above 85°F (29°C) or relative humidity is above 85% or when such temperatures are expected within 72 hours following application. Do not apply to wet, damp, or frozen surfaces. Do not use material if it has been frozen. SikaColor®-430 Elements® should not be used in areas subject to vehicular traffic. Excessive applications of SikaColor®-430 Elements® that are allowed to form a film and harden on the concrete surface may delaminate or peel.

Do not use ELE124 Red or ELE127 Purple for exterior or interior applications exposed to sunlight.

All surfaces colored with SikaColor®-430 Elements® must be sealed with SikaCem®-100 Clear Guard®, SikaCem®-100 PRO 350®, or a SikaCem® water-based sealer. Do not use SikaCem®-102 First Seal®. The colorations produced are translucent. Do not use SikaColor®-430 Elements® to hide surface blemishes or construction problems. Any variations in the substrate, such as construction errors, patching, and differences in color or texture will likely be noticeable after the application of SikaColor®-430 Elements®. SikaColor®-430 Elements® will not color exposed sand or aggregate. Do not use on vinyl, asphalt rubber, glazed tile or similar materials. **Note: SikaColor®-430 Elements® is not recommended**

**for high traffic areas, areas subject to abrasion, or areas subject to immersion.**

All furniture used on SikaColor®-430 Elements® stained surfaces must be affixed with some form of floor protection pads. Do not subject SikaColor®-430 Elements® stained surfaces to construction equipment and/or machinery.

## ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

## APPLICATION INSTRUCTIONS

Cast a job site mock-up prior to the installation for approval of color and finish. Utilize all materials, tools, and techniques from the actual job in the mock-up. Consistent batching, pouring, finishing, curing, sealing, and preparation techniques, will ensure the uniformity of architectural concrete. Verify adequate wet and dry slip resistance. Maintenance requirements should also be discussed.

## SUBSTRATE PREPARATION

The substrate must be free from liquid release agent, powder release agent, curing compounds, sealers, oil, dirt, and other contamination that would impede the penetration of SikaColor®-430 Elements®. Hard-troweled concrete, self-leveling overlays, or similarly dense surfaces require preparation by rotary sanding with a 60-80 grit mesh-sanding screen or grit rotary brush. Avoid sanding too deeply and exposing the aggregate, which will change the surface color and texture. Demonstrate the effects of sanding upon color and texture with a mock-up panel prior to starting the installation. Test the surface with water. Random drops of water should quickly penetrate and darken the substrate. If not, additional sanding is necessary.



Once the concrete is clean, sound and contaminant free, non-porous substrates shall be washed with Sika® CHO™ Concrete Cleaner. Available in 1 lb. (0.5 kg) and 5 lb. (2.3 kg) containers jars. Mix 1 lb. (0.5 kg) of Sika® CHO™ Concrete Cleaner with 1 gal. (3.8 L) of clean water. 1 gal. (3.8 L) of the solution will clean approximately 100-150 sq. ft. in a single application. Spray or brush the solution onto the surface and then scrub with a stiff bristled brush or a white pad mounted on a rotary floor machine. Depending on the porosity/density of the concrete, multiple applications of Sika® CHO™ Concrete Cleaner or mechanical abrasion may be necessary. Do not allow the cleaning solution to dry on the surface. After cleaning with Sika® CHO™ Concrete Cleaner, neutralize the surface by brushing and washing with a solution of either 1 cup (236.6 ml) ammonia and 5 gal. (18.9 L) of water or 1 lb. (0.5 kg) of baking soda and 5 gal. (18.9 L) of water. Do not allow the neutralizing solution to dry on the surface. Flush and wet vacuum the residue. Thoroughly remove residues from the neutralizing and cleaning solutions from the surface. Neutralize and rinse the surface with water until a pH of 7 is achieved. Wet mopping alone will not adequately remove the neutralizing solution. The substrate must be completely dry before applying stains, coatings, and overlays.

Cleaning with muriatic acid is not recommended. The substrate must be dry before applying SikaColor®-430 Elements®.

## MIXING

Shake the concentrated 32 oz. (946.4 ml) plastic bottle of SikaColor®-430 Elements® and then pour into a clean plastic pail. Then add 96 oz. (2.8 L) of potable water into the pail by filling the emptied 32 oz. (946.4 ml) plastic bottle three times. Ensure that all color concentrate is rinsed from the bottle. Consistently measure the water to ensure color accuracy and coverage. Do not use concentrate without diluting with potable water. Do not add any other liquid or chemical to the product. Mix SikaColor®-430 Elements® by hand or with a drill mounted paddle. Once mixed, the working time is indefinite. Periodically agitate the mixed material during the application.

## APPLICATION METHOD / TOOLS

**Apply SikaColor®-430 Elements® with a clean high volume, low-pressure (HVLP) sprayer. Spray evenly over**

**the prepared substrate in a circular or random motion. For larger applications, a pneumatic airless sprayer with a .011 tip may be used. A pump up sprayer is not an acceptable applicator.**

## APPLICATION

The concrete surface and joints must be thoroughly dry before application of SikaColor®-430 Elements®. Cover and protect adjacent surfaces with plastic during mixing and application. Overspray and spills are difficult to remove.

Periodically agitate the product in the mixing pail and sprayer reservoir, as settlement will occur. A shallow saw cut is recommended for effectively separating different colors. More than one application of SikaColor®-430 Elements® may be required on very porous concrete to achieve the desired coloration.

Do not allow material to puddle and dry on the surface or in joints. Depending on surface density and porosity, the substrate will eventually reject excess material. Excess material should be redistributed or wiped up with a clean cloth before it dries, otherwise it will require a more thorough clean up before sealing. If the material appears wet for longer than 1 minute, do not attempt to apply more product. If multiple applications are necessary, the surface may be lightly walked on after the previous application is dry to the touch or tack free. Do not walk on the dry stained surface for approximately 8 hours after the final application. Protect the stained surface from water and other liquids for 36 hours after application.

## CLEANING OF TOOLS

Application tools and equipment can be cleaned with soap and water.

## SEALING

After SikaColor®-430 Elements® has dried for 24 hours, apply SikaCem®-100 Clear Guard®, SikaCem®-100 PRO 350®, or a SikaCem® water-based sealer. Do not use SikaCem®-102 First Seal®.

## MAINTENANCE

Periodically inspect sealed surfaces for wear or damage. All concrete sealing compounds will eventually exhibit the effects of weathering and traffic. For maximum

coating life and performance, wipe up all chemical solvent or petroleum spills as soon as possible. Remove abrasive debris by sweeping or vacuuming. Do not drag, drop or place sharp edges on sealed surfaces.

Periodic washings with mild detergents will help maintain surface luster. Do not use solvent or acid-based cleaning materials for general cleaning. Hot car tires or turning tires while car is standing may damage the sealer. Surfaces that will be subjected to car traffic, de-icing salts or chemical exposure, must receive minimally, two applications of SikaCem®-100 Clear Guard® or SikaCem®-100 PRO 350®. Porous surfaces may require multiple application of a sealer to ensure protection of the underlying substrate.

Prior to re-coating, the surface and joints must be clean, dry, free from cleaning product residue, other contamination, or loose materials, which will affect the adhesion of SikaCem®-100 Clear Guard®, SikaCem®-100 PRO 350®, or SikaCem® water-based sealers. When recoating a non-hard troweled surface with SikaCem®-100 Clear Guard® or SikaCem®-100 PRO 350®, SikaCem®-100 Slip-Resistant Additive may be added to the sealer.

### Interior Floors

Regularly clean by dry and wet mopping. Periodically machine scrub, rinse, and wet vacuum the surface. Apply a maintenance wax or slip resistant wax as directed by the wax manufacturer. This type of periodic maintenance will greatly enhance the appearance of the floor and minimize the need to strip and/or reapply the sealer.

## OTHER RESTRICTIONS

See Legal Disclaimer.

## LEGAL DISCLAIMER

- KEEP CONTAINER TIGHTLY CLOSED
- KEEP OUT OF REACH OF CHILDREN
- NOT FOR INTERNAL CONSUMPTION
- FOR INDUSTRIAL USE ONLY
- FOR PROFESSIONAL USE ONLY

Prior to each use of any product of Sika Corporation, its subsidiaries or affiliates ("SIKA"), the user must always read and follow the warnings and instructions on the product's most current product label, Product Data

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### Product Data Sheet

SikaColor®-430 Elements®  
April 2022, Version 02.01  
021405071000000117

Sheet and Safety Data Sheet which are available at [usa.sika.com](http://usa.sika.com) or by calling SIKA's Technical Service Department at 1-800-933-7452. Nothing contained in any SIKA literature or materials relieves the user of the obligation to read and follow the warnings and instructions for each SIKA product as set forth in the current product label, Product Data Sheet and Safety Data Sheet prior to use of the SIKA product.

SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

Sale of SIKA products are subject to the Terms and Conditions of Sale which are available at <https://usa.sika.com/en/group/SikaCorp/termsandconditions.html> or by calling 1-800-933-7452.

SikaColor-430Elements-en-US-(04-2022)-2-1.pdf





# ChemMasters®

## Crystal Clear

Highest Gloss, Longest Lasting,  
Sealer & Curing Compound  
for Concrete

SPECIALTY CONSTRUCTION PRODUCTS

### P R O D U C T D A T A

#### DESCRIPTION

**Crystal Clear** is a state of the art proprietary formulation which creates the highest gloss possible on concrete. This premium quality, super high gloss, non yellowing, curing and sealing compound coats concrete with a chemically bonded siliconized acrylic film that deepens the color and enhances the look of pigmented or decorative concrete. **Crystal Clear** completely resists discoloration from ultraviolet light exposure and keeps its high gloss finish much longer than standard concrete sealers. **Crystal Clear** will retard efflorescence while resisting oil, grease and food stains. **Crystal Clear** eliminates concrete dusting, while protecting concrete against salt and water penetration.

#### USES

- Cure freshly poured exterior plain, colored, stamped or exposed aggregate concrete to ASTM C309 where superior curing efficiency is required.
- Seal, harden, and dustproof existing concrete particularly architectural or residential concrete exposed to freeze-thaw or ultra violet light.
- Enhance the color and gloss of pigmented or stamped concrete.

#### ADVANTAGES

- **Crystal Clear** is much tougher than traditional acrylic sealers. The high gloss created by **Crystal Clear** lasts up to 70% longer.
- **Crystal Clear** completely resists discoloration from ultraviolet light exposure.
- **Crystal Clear** cures concrete to ASTM C1315 standards to minimize cracking and increase the strength of concrete.
- Protects surfaces against deicing chemicals, fertilizers, salts, grease, oil, alkalies, mild acids and detergents.

- ASTM C309, Type 1, Class A & B (upon request 1D & 2) *Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete*
- AASHTO M-148, Type 1, Class A & B (upon request 1D & 2) *Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.*
- Complies with National Volatile Organic Compound (V.O.C.) Emission Standards for Architectural Coatings, Federal EPA Regulation 40 CFR Part 59 and lower V.O.C. regulations @ < 700 g/L
- Meets USDA requirements for incidental food contact when fully cured
- Version to meet U.S. Army Corps of Engineers CRD-C-300 available upon request.

#### Gloss Retention 1,000 hours QUV Exposure All panels begin with Gloss Rating = 95

Product	Gloss Rating E.O.T.	% of Initial
<b>Crystal Clear</b>	89.8	95
Moisture Cure Urethane	79.1	83
Pure Acrylic	73.6	77
Styrene Acrylic	55.4	58

#### Yellowing Index 1,000 QUV Exposure, Simulates approximately 10 yrs of Florida Sunlight. Visible yellowing begins at 3.0 Index

Product	Yellowing E.O.T.
Initial Rating All Products	0
<b>Crystal Clear</b>	0
Moisture Cure Urethane	3.0
Pure Acrylic	4.77
Styrene Acrylic	9.48

#### Packaging Product Number

5 gal (18.9L)	36 per pallet	F1335.05
55 gal (208L)	4 per pallet	F1335.55

#### TECHNICAL DATA

- ASTM C1315, Type I, Class A, (upon request ID & II) *Standard Specification for Liquid Membrane-Forming Compounds for Curing and Sealing Concrete*



### ChemMasters®

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### Physical Properties

ASTM C156 Moisture Retention	0.035 g/cm <sup>2</sup>
PMCC Flash point °F (°C)	100 (38)
V.O.C. Content	<700 g/L
Drying Time @ 70°F (21°C) Tack Free Light foot traffic Maximum hardness	2 hours 8 hours 7 days

### Estimating Guide

Coverage rates vary with concrete condition

	ft <sup>2</sup> /gallon	m <sup>2</sup> /liter
Curing	300	7
Sealing/dustproof	350	8
Optional 2nd Coat	450	11

### DIRECTIONS

**Mixing:** Do not dilute. **CRYSTAL CLEAR** is packaged ready to use. Gently stir or agitate prior to use.

**Surface Preparation:** If using to cure fresh concrete, apply when application will not mar the surface within two hours of bleed water dissipation.

If applying as a sealer for older concrete, clean thoroughly with high-pressure water and allow the concrete to thoroughly dry. Surface must be clean and free from dirt, dust, laitance, oil, grease, paints, curing agents, tilt up bond breakers, or other contaminants that would prevent proper adhesion. Joints to receive joint sealant should be masked or taped off prior to application.

**Application:** Apply uniformly leaving no pinholes or gaps. Do not allow the material to puddle.

**Spray Apply:** Use a low pressure, solvent resistant, airless sprayer equipped with a fan nozzle or solvent resistant hand pressurized sprayer with a 'Cats Eye' nozzle with an orifice of 0.030 to 0.035" at 1 g.p.m. The optimum spray pattern is an 8 to 12 inch fan. Hold sprayer tip 8 to 12 inches from the surface of the concrete.

**Roller Apply:** Use a short nap (1/4" max) solvent resistant roller.

An optional second coat may be applied to a tack free surface at right angles to the first. Coating breathability will be reduced as film thickness increases. Thinner coats have improved aesthetic qualities.

### CLEANUP

Clean tools immediately after use with **POLYSEAL SOLVENT™** or xylene.

### STORAGE

Store tightly sealed containers in cool, dry area away from direct sunlight and sources of heat.

Shelf life is three years from date of manufacture. Store locked up.

### LIMITATIONS

- **Crystal Clear** is not for use on interior surfaces.
- Do not use on surfaces to receive concrete overlays or toppings. Always test for compatibility and adhesion.
- Do not use as a bond breaker for tilt wall construction or on surfaces requiring rubbing.
- Do not apply to joints or channels scheduled to receive elastomeric caulks.
- Do not use if ambient or substrate temperature is below 40°F (4°C). For best results condition material to a minimum of 50°F (10°C) prior to application.
- Do not apply in the presence of foodstuffs. USDA compliance pertains to fully cured coating.
- Coating may be softened and lifted by gasoline or other strong organic solvents such as xylene, toluene, or lacquer thinner. Solvent, gasoline, hydraulic fluids, peanut oil, and cooking oils must be cleaned quickly to prevent damage.
- Safety Data Sheet and all label precautions must be fully understood before using product.
- Quality curing or sealing compounds may darken or highlight the color variations naturally pre-sent in concrete.

### PRECAUTIONS: Not for indoor use.

**Use outdoors only in a well ventilated area.**

**Danger:** Flammable Liquid and Vapor. Harmful if inhaled. May cause respiratory irritation. May cause drowsiness or dizziness. May be fatal if swallowed and enters airways. Toxic to aquatic life with long lasting effects. **Precautionary Statements:** Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Ground and bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use non-sparking tools. Take action to prevent static discharges. Avoid breathing dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.

**All label precautions and Safety Data Sheet must be fully understood before using this product.**

**Keep out of reach of children.**

### This Product is Formulated and Labeled for Industrial and Commercial Use Only

FOR BEST RESULTS AND SAFEST USAGE, USER IS SPECIFICALLY DIRECTED TO CONSULT THE CURRENT PRODUCT & SAFETY DATA SHEETS AND PACKAGE LABEL FOR THIS PRODUCT. We warrant our products to meet our published specifications and to be free from defects in materials and workmanship to the acceptable quality levels defined in these specifications. If acceptable quality levels are not specified, the acceptable quality levels will be those normally supplied by us for the product. We make no guarantee of the results to be obtained from the use of our products. The determination as to the adaptability of any of our products to the specific needs of the Buyer is solely Buyer's prerogative and responsibility. We are glad to offer suggestions on the use of our products. Nevertheless, there are no warranties given except such expresses warranties offered in connection with the sale of a particular product. Our liability shall be limited to replacement of, or refund of an amount not to exceed the purchase price attributed to, the goods as to which such claim is made. Our selection of one of these alternatives shall be Buyer's exclusive remedy. IN NO CASE SHALL WE BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGES, EVEN IF WE HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, GUARANTEES, CO-CONDITIONS AND REPRESENTATIONS, EITHER EXPRESSED OR IMPLIED, WHETHER ARISING UNDER ANY STATUTE, COMMON LAW, USAGE OR TRADE, COURSE OF DEALING OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.