

Pumice Pozzolan: The Original Pozz

For over 2000 years, the sprawling Roman Empire of Concrete—the piers, aqueducts, temples, coliseums, roads and statuary—has withstood the relentless assault of time. The secret: Pumice Pozzolan.

SOCIETY WIDELY “REDISCOVERED” THE BENEFITS of pozzolanic-charged concrete when the coal-fired power generation industry was looking for a market to use the fly ash they were scrubbing from their stacks. Yes, fly ash works as a replacement pozzolan, but the original pozz—pumice—is consistently better.

Anciently, the Romans used fine-grained pumice to greatly enhance the strength and durability of their concrete—and the evidence of their concrete wisdom still stands some 2000 years later. The amazing benefits of the pumice-ignited pozzolanic charge have been reaffirmed by modern research, detailing how HessPozz significantly improves concrete density, strength, and durability. Additionally, thanks to modern refining processes, those benefits are consistent and predictable, pour after pour.

HessPozz is made by precisely refining a clean, pure pumice—an amorphous white silica created by volcanic events millennia ago. Pumice pozzolan is not a by-product of pollution control processes. It contains no hazardous materials. It is a natural pozzolan, born in the bowels of Nature’s most fearsome monuments: volcanoes.

Amping the Performance of Standard Concrete. Almost as soon as standard concrete is placed, the process of degradation begins. Recent studies suggest that only about 75% of the cement powder is converted to Calcium Silicate Hydrate (CSH), the binder that glues concrete together. Most of the remaining 25% is converted to Calcium Hydroxide (CH), a by-product of the hydration reaction between water and cement—a by-product that has a tendency to create a host of problems that have a frustrating effect on the long-term performance, even appearance, of concrete. Adding a high-purity natural pumice pozzolan to the concrete formulation mitigates or completely eliminates the CH problem. In fact, the pozzolanic reaction ignited by the pumice converts the deleterious CH into additional CSH, strengthening and densifying the concrete—essentially *consuming the problem and repurposing it* to amplify and enhance desirable performance.

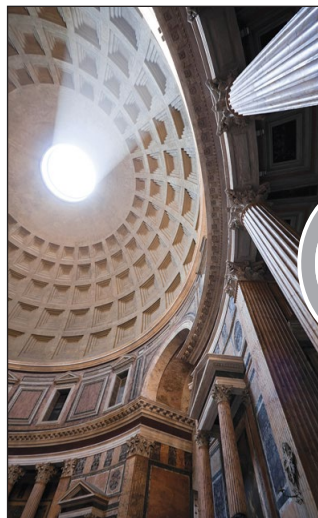
Benefits of Pumice Pozzolan

Specifically, ASTM-standards research documents that using Hess StandardPozz and UltraPozz in concrete formulations—

- Enhances Compressive Strength
- Fortifies Against Chloride Attack
- Increases Resistance to Sulfate Attack
- Significantly Mitigates or Eliminates ASR
- Reduces Heat of Hydration Cracking
- Augments Abrasion Resistance
- Greatly Reduces Permeability
- Improves Durability and Appearance

Strength and Beauty. Not only is HessPozz ideal for projects that call for high-performance, long-lasting concrete, but our high-quality, white pumice pozzolan (84 GE Brightness) is also used for all forms of precast concrete whenever consistent color and visual appeal is important—including, but not limited to—

Completed in 126 AD, the enduring Pantheon in Rome, and in particular the dome, was constructed with pumice aggregate and pumice pozzolan-enhanced concrete. Almost 2000 years later, the Pantheon still boasts the world’s largest unreinforced concrete dome.



HESS POZZ GRADES

Hess StandardPozz DS-325

PARTICLE SIZE SPECIFICATION

Dx	Micron Size
D50	14-16

Hess UltraPozz NCS-3

PARTICLE SIZE SPECIFICATION

Dx	Micron Size
D50	2 - 4

CHEMICAL COMPOSITION

Common Name: Pumice
Chemical Name: Amorphous Aluminum Silicate
Silicon Dioxide - 76.2%
Aluminum Oxide - 13.5%
Ferric Oxide - 1.1%
Ferrous Oxide - 0.1%
Sodium Oxide - 1.6%
Potassium Oxide - 1.8%
Calcium Oxide - 0.9%
Titanium Oxide - 0.2%
Sulfate - 0.0043%
Magnesium Oxide - 0.05%
Water - <1.0%

Have specific questions?
Want to do in-house testing in
your own lab? Contact us.

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cast statuary, GFRC panels, tilt-up panels, architectural elements, and manufactured stone veneer.

Performance Research

These benefits have been documented via extensive (and on-going) studies by the University of Utah, UT-Austin, Washington University, Clemson University and others. Check out the information found on our website at www.hesspozz.com

Environmental, Health and Safety

Recent studies corroborated previous test data indicating that natural pumice pozzolans are free of Crystalline Silica and other hazardous materials. Hess pozzolans are so safe they are also used as a mild abrasive to clean teeth and as an exfoliation agent in skin creams. While by-product pozzolans struggle with regulated contaminants, Hess Natural Pozzolan is an environmentally safe, health-friendly choice.

Green Stuff. Naturally calcined, pumice pozz is effective, abundant and green! In some applications, HessPozz can replace up to 40% of the Portland cement typically needed, thus reducing, on a pound for pound basis, the colossal carbon footprint standard cement leaves behind while, *at the same time*, amplifying concrete performance in terms of durability, strength, and appearance.

Availability

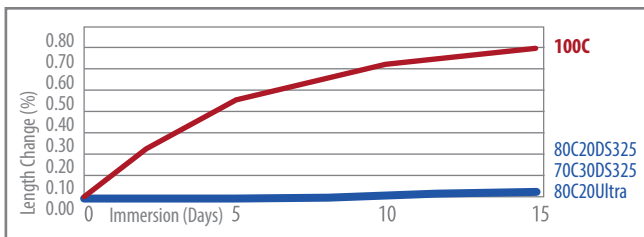
Mined and refined in Southeast Idaho, USA, we offer two pozz grades: Hess StandardPozz (DS-325) and Hess UltraPozz (NCS-3). Our extensive logistical expertise means we can then ship it anywhere on the planet—packaged in 44 lb/20kg bags, 1-ton super sacks, or in bulk pneumatic rail cars and tanker trucks.

Reliable Supply. Hess has been a family-owned company delivering reliable service for more than five decades. The company promise of “On-spec, On-time” has given customers confidence for equally as long. ■

MITIGATING ALKALI SILICA REACTION

Mortar mix designs tested according to a modified ASTM C1567 procedure using Type 1 cement and 25% replacement of fine aggregate with ground cullet glass. The percent length change for “acceptable expansion” is less than 0.10% at fourteen days with reactive aggregates. (U of Utah Study)

MIXTURE	ASR %	LENGTH CHANGE	RATING
100C 25%Glass	0.699		Deleterious Expansion
80C20DS325 25%Glass	0.029		Acceptable Expansion
70C30DS325 25%Glass	0.011		Acceptable Expansion
80C20Ultra 25%Glass	0.017		Acceptable Expansion



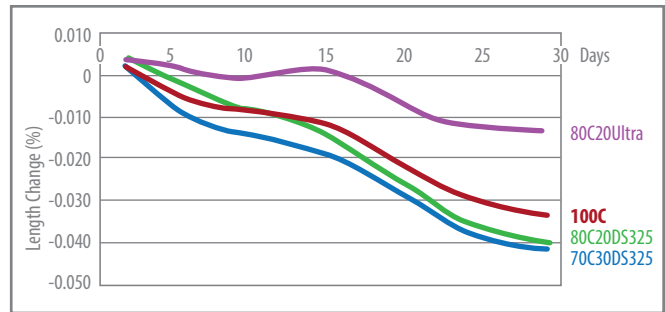
ACTIVITY INDEX

Determined in accordance with C595 Annex A1. Activity Index is calculated by dividing the average compressive strength of test mixture cubes with average compressive strength of control mixture cubes. (U of Utah Study)

MIXTURE	ACTIVITY INDEX
100C	
80C20Ultra	131.2
70C30DS325	92.4
80C20DS325	69.8

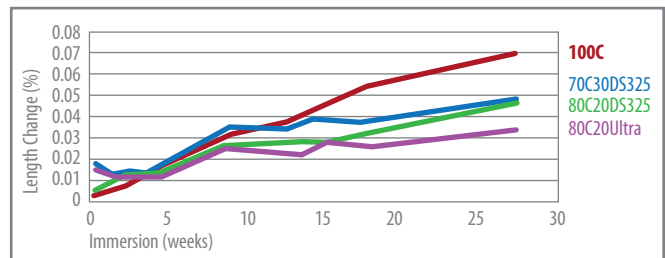
SHRINKAGE

Mixture designs were tested for length change in 6"x12" cylinder concrete specimens. The addition of ultrafine pumice reduced the length change (shrinkage) compared to 100% cement. (U of Utah Study)



SULFATE MITIGATION

Per ASTM C1012, mortar mixture designs were tested for sulfate resistance through 6 months. Mixtures containing pumice are classified as HS (High sulfate resistant cement) as the length change is less than 0.05% after 26 weeks. (U of Utah Study)



RESISTIVITY AT DIFFERENT TIME INTERVAL IN kΩ-cm

ASTM C192 procedure was followed to make 6"x12" cylinders and moist cured according to ASTM C511. Resistivity increases over time for the mixture with pozzolans whereas it remains relatively constant for the mixture with 100% portland cement. (U of Utah Study)

MIXTURE	14 DAYS	24 DAYS	58 DAYS
100C	4.1	4.6	6.8
80C20DS325	4.3	5.5	15.7
70C30DS325	4.3	6.3	19.2
80C20Ultra	5.1	10.5	33.8

