

# 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.*

## Description

Society widely “rediscovered” the benefits of pozzolanic 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, it works as a replacement pozzolan, but the original is even better. HessPozz is the same natural, sustainable pumice pozzolan the Romans used—but more carefully refined—resulting in a pozz that significantly enhances concrete durability and performs consistently, pour after pour.

Hess UltraPozz is made by precisely refining a clean, pure pumice—an amorphous white silica created by volcanic events millennia ago. It 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.

**Green Stuff.** Naturally calcined, pure and health-safe for use in toothpaste and exfoliants, pumice pozz is effective, abundant and green! In some applications, Hess UltraPozz can replace up to 50% of the Portland cement typically needed, thus reducing, on a pound for pound basis, the colossal carbon footprint standard cement leaves behind.

**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 deleterious effect on the concrete’s long-term performance, and even its appearance. Adding a high-purity natural pumice pozzolan to the concrete formulation mitigates or completely eliminates the CH problem. In fact, the pumice pozzolan turns the CH into additional CSH, densifying the concrete and making it nearly impermeable.

While chemical resistance is perhaps the biggest benefit to adding pumice pozzolan to concrete formulations, it is by no means the only gained advantage. The benefits below have been documented via extensive (and on-going) studies by the University of Utah, UT-Austin, Washington University, Clemson University and others.

## Benefits of Pumice Pozzolan

Specifically, research documents that using Hess UltraPozz in concrete formulations—

- Enhances Compressive Strength
- Fortifies Against Chloride Attack
- Resistant to Sulfate Attack
- Mitigates or Eliminates Destructive ASR
- Reduces Heat of Hydration
- Increases Abrasion Resistance
- Greatly Reduces Permeability
- Improves Durability

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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 is still the world’s largest unreinforced concrete dome.



## HESS ULTRAPOZZ

### Hess UltraPozz NCS-5

#### PARTICLE SIZE SPECIFICATION

Dx	Micron Size
D50	3 - 6

## 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.

**Hess** | **POZZ**  
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**Strength and Beauty.** Not only is Hess UltraPozz 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 light color and visual appeal is important—including, but not limited to—cast statuary, GFRC panels, architectural elements, and manufactured stone veneer.

### Performance Research

Recent concrete-performance research using Hess UltraPozz proves what the Romans already knew: a fine-grained natural pumice pozzolan gives incredible long-term strength, chemical resistance, and durability to ordinary concrete. Check out the information found on our website at [www.hesspozz.com](http://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.

### Availability

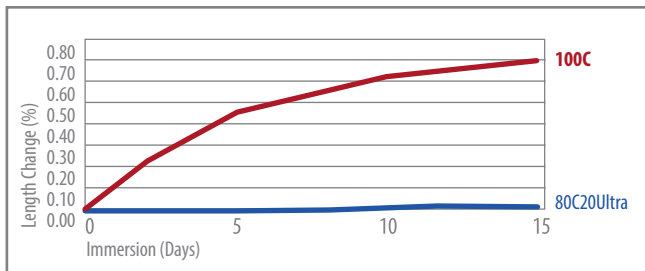
Hess UltraPozz is mined and refined in Southeast Idaho, USA. Our extensive logistical expertise means we can then ship it anywhere on the planet—packaged in 44 lb/20kg bags, 1-ton super sacks, or in bulk pneumatic rail cars and tanker trucks.

**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
80C20Ultra 25%Glass	0.017		Acceptable Expansion



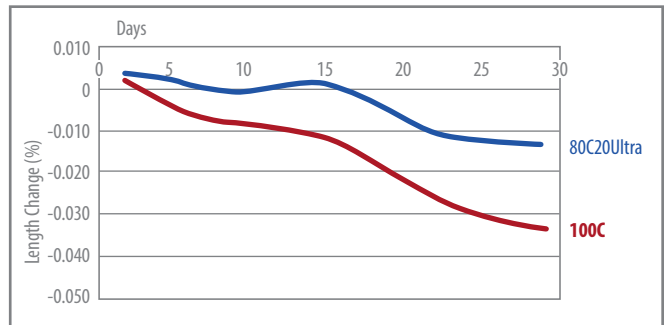
### ACTIVITY INDEX

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
70C30Ultra	122.2

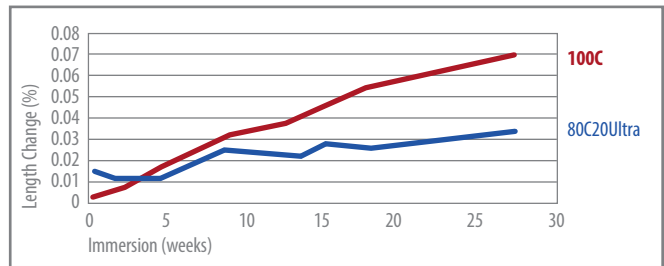
### SHRINKAGE

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

Following the procedures of ASTM C1012, mortar mixture designs were tested for sulfate resistance through 6 months. The mixtures containing pumice are classified as HS (High sulfate resistant cement) since 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
80C20Ultra	5.1	10.5	33.8

