Pumice Pozzolan: The Original Pozz

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 pozzolan that significantly enhances concrete durability and performs consistently, pour after pour.

HessPozz 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 StandardPozz and 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

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.

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 un-reinforced concrete dome.
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 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 HessPozz proves what the Romans already knew: a fine-grained natural pumice pozzolan gives incredible long-term strength and durability to ordinary concrete. 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.

Availability
We offer two pozz grades: Hess StandardPozz (DS-325) and Hess UltraPozz (NCS-3) 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)

<table>
<thead>
<tr>
<th>MIXTURE</th>
<th>ASR % LENGTH CHANGE</th>
<th>RATING</th>
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</thead>
<tbody>
<tr>
<td>100C 25%Glass</td>
<td>0.699</td>
<td>Deleterious Expansion</td>
</tr>
<tr>
<td>80C20DS325 25%Glass</td>
<td>0.029</td>
<td>Acceptable Expansion</td>
</tr>
<tr>
<td>70C30DS325 25%Glass</td>
<td>0.011</td>
<td>Acceptable Expansion</td>
</tr>
<tr>
<td>80C20Ultra 25%Glass</td>
<td>0.017</td>
<td>Acceptable Expansion</td>
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ACTIVITY INDEX
Determined in accordance with C935 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)

<table>
<thead>
<tr>
<th>MIXTURE</th>
<th>ACTIVITY INDEX</th>
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<tr>
<td>100C</td>
<td>131.2</td>
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<tr>
<td>70C30DS325</td>
<td>92.4</td>
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<tr>
<td>80C20DS325</td>
<td>69.8</td>
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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 C611. 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)

<table>
<thead>
<tr>
<th>MIXTURE</th>
<th>14 DAYS</th>
<th>24 DAYS</th>
<th>58 DAYS</th>
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<tr>
<td>100C</td>
<td>4.1</td>
<td>4.6</td>
<td>6.8</td>
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<tr>
<td>80C20DS325</td>
<td>4.3</td>
<td>5.5</td>
<td>15.7</td>
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<tr>
<td>70C30DS325</td>
<td>4.3</td>
<td>6.3</td>
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<tr>
<td>80C20Ultra</td>
<td>5.1</td>
<td>10.5</td>
<td>33.8</td>
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</tbody>
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