



POLYBUTADIENE POLYMER CONCRETE FOR SPECIAL APPLICATIONS (ALNEC-PC)

ALNEC-PC is an advanced polymer concrete that uses polybutadiene — a polymer from the liquid rubber family — as the binding material for the various aggregates to form what is essentially rubber concrete. **ALNEC-PC** contains no cement as a binder so that **ALNEC-PC** has elastic properties and it is extremely resistant to aggressive chemicals, highly repellant to water and has a remarkable compression strength. It does not exhibit the common failure mechanisms of conventional concrete such as cracking and flaking, freeze and thaw, and it resists vibrations making it an ideal pad material for pumps and compressors. Furthermore, it coats reinforcing rods making the rods impenetrable to water, hence arresting corrosion.

ALNEC-PC can be fabricated in different colors and it has a rough surface to prevent slipping.



Application

ALNEC-PC's outstanding properties have a multitude of applications surpassing the boundaries that limit conventional cementitious concrete. The following applications represent only a fraction of the numerous possibilities.



- **Industrial Flooring** — ALNEC-PC's exceptional resistance to a wide range of corrosive chemicals — from acids to alkalis (unlike other products which resist only acids or bases but not both) — defines its usefulness in industrial floorings. Floors in factories, chemical laboratories, manufacturing plants, *etc.* will reap the benefits of ALNEC-PC by eliminating the need to resurface or replace.
- **Pickling, Galvanic, Electrolysis, Plating Baths, etc.** ALNEC-PC effectively provides added wear resistance to equipment and structures operating in aggressive media. Pickling, galvanic and electrolysis baths are some of the processes that can benefit from ALNEC-PC.
- **Containment Structures** .Concrete vaults used to contain radioactive waste and burial containers for toxic wastes can be constructed of ALNEC-PC providing increased resistance to corrosive materials and chemicals.
- **Seismic Reinforcement.** /ALNEC-PC's high elasticity makes for a most impressive material in structures threatened by seismic activity. Where conventional concrete is brittle and tends to crack easily, ALNEC-PC's unique rubber like binder offers a very high deflection rate equipping the material with the freedom of movement necessary to rebound from seismic activity. As a result, highways, bridges, high-rise buildings, underground pipes, protective structures, *etc.*, constructed out of ALNEC-PC have favorable odds against earthquake demolition in comparison to conventional concrete structures.
- **Support Foundations.** Stability, support, and flexibility are necessary standards for foundations that support tractable machinery. For example, pumps used to move massive amounts of liquids and solids require a foundation that will support its weight and movement. While conventional concrete provides support, it does not allow for



flexibility in movement. **ALNEC-PC**'s unique elastic properties satisfy both criteria.

- **Climate Variations.** **ALNEC-PC** offers added endurance to structures battered by harsh weather conditions. Structures such as roadways, bridges, *etc.*, are adversely affected by temperature fluctuations and are in constant need of repairs. Once again, **ALNEC-PC**'s favorable elastic property proves advantageous. Allowing for movement, **ALNEC-PC** can help to control structural cracking as a result of thermal stress brought about by constant shrinkage and expansion as materials conform molecularly to hot and cold temperatures. Laboratory testing on **ALNEC-PC** samples revealed that after 1000 cycles of freezing and thawing, no cracks or weight loss could be reported. Even the finest cement concrete can withstand no more than 500 cycles.
- **Overlay Applications** — In addition to its elasticity, **ALNEC-PC** is highly repellent to water. In fact, laboratory tests report that **ALNEC-PC** can be used as an overlay in structures, dams, highways and bridge decks providing a durable wearing surface that is waterproof and therefore impervious to salt water penetration.
- **Underground Structures.** **ALNEC-PC** effectively offers protection against erosion caused by underground water. Minerals, acids and alkalis found in underground water will aggressively attach individual components eventually
- **Decomposing** the structure. **ALNEC-PC** provides considerable increase in longevity to concrete pipes (for example, it can prevent crown corrosion), underground foundations, *etc.*, as decomposition is slowed due to **ALNEC-PC**'s water-repellant and chemical resistant properties.
- **Ties (Sleepers) for High-Speed Railways .** **ALNEC-PC** can greatly extend the lifetime of concrete rail ties (sleepers) on high-speed railways offering increased strength, vibration –absorbing and shock-resistant properties.

Properties of polybutadiene polymer concrete (ALNEC-PC)

Property	Units	Data Based on Polybutadiene from a Russian Source	Data Based on Polybutadiene from a German Source
Density	kg/m ³	2100-2200	2100-2200
Strength at: • Compression • Bending • Tension	MPa MPa MPa	80 -95 25 -30 15 -19	70 - 85 20 - 25 12 - 15
Modules of Elasticity	MPa x 10 ⁴	2.0 - 0.27	1.5 - 2.5
Poison's Ratio	-	0.26 - 0.28	0.24 - 0.28
Thermal Conductivity Coefficient	W/m/°C	0.3 - 0.5	0.3 - 0.5
Wear	kg/m ² x10 ⁻³	2 - 3	2 - 3
Specific Toughness	J/m ² x10 ³	3.5 - 4.5	2.5 - 3.5
Water Absorption	%	0.05 - 0.06	0.05 - 0.06
Coefficient of Chemical Resistance at 20°C (based on 360 days of exposure): • 20% H ₂ SO ₄ • 10% Lactic Acid • 20% Caustic Potash • 35% H ₃ PO ₄ • Water • Salt Water	---	0.97 - 0.98 0.95 - 0.96 0.97 - 0.98 0.96 - 0.98 0.99 - 0.995 1.00 - 1.05	0.97 - 0.98 0.95 - 0.96 0.96 - 0.97 0.95 - 0.97 0.99 - 1.00 1.00 - 1.05