

Civil Construction

ECOBOND GSP

Cracking of cemented gravels used in road construction have historical limited their use to specific applications; whereas if the cracking can be reduced or eliminated, their use could be extended to a much wider range of applications. Based on the proven use of polymers in specialized structural concrete, TECHNOKOTES have developed a polymer to modify cement ECOBOND GSP to be used in combination with traditional cementitious stabilizing agents that are currently used in road construction. The goal was to overcome the shortcomings and improve properties of using cementitious materials alone. TECHNOKOTE's GSP, not only reduces shrinkage cracking but can also provide increased compressive strength and reduced water demand.

Hardened conventional cement paste has mainly an agglomerated structure of calcium silicate hydrates and calcium hydroxide bound together by the weak intermolecular forces. Consequently, micro cracks occur easily in the cured material under stress. That is why ordinary cement mortar and concrete have poor tensile strength and fracture toughness. On the other side, in the polymer modified cement, it appears that the micro cracks are bridged by the polymer films which prevent crack propagation, and simultaneously, a strong cement hydrate-aggregate bond is developed.

ECOBOND GSP also has a sealing effect to the formed structure and thus provide a considerable increase in toughness, waterproofing characteristics, resistance to chemical penetration, and freeze-thaw durability. Depending on traffic volumes, gravel characteristics and environmental conditions at the time, ECOBOND GSP blend pavements can generally be trafficked immediately after final compaction; and once cured, provides a durable temporary running surface for construction traffic without the risk of suffering from degree of saturation failures that occur with unbound gravels. On larger projects, we can also formulate our additive to meet project specific requirements with regard to setting times.

The binder should be added in sufficient quantity to balance both strength and shrinkage requirements to produce a bound material with significant toughness and fatigue strength to carry the design traffic loading. In most cases, cementitious contents for ECOBOND GSP polymer mix designs are limited to 2 to 3%. Even at these low dosages, we have found 28 day UCS results for some gravels to be in excess of 5MPa. Our testing has also found that depending on the gravel characteristics, the results achieved by ECOBOND GSP with cement exceeds that sum of individual UCS test results of the cement and polymer alone thereby indicating that cross-linking of the cementitious binder and polymer has occurred.

Our testing has also found that the GSP acts in a similar way to a water reducing agent in structural concrete

Benefits

Benefits of ECOBOND GSP modified cement when compared to conventional cement stabilized or treated pavements include:

- Significantly reduced or eliminated shrinkage cracking
- Rapid curing at ambient temperatures
- Higher tensile, flexural, and compressive strengths for the same cement content
- Improved vibration dampening
- Improved adhesion to most surfacing
- Improved long-term durability with respect to freeze and thaw cycles
- Lower permeability to water and aggressive solutions
- Improved chemical resistance Improved workability i.e. requires less compaction effort for a given depth of compaction and can be compacted in greater single lifts.