

## **ALKALI ACTIVATED CEMENTS AND CBPC BASED COATINGS FOR GEOTECHNICAL AND STRUCTURAL APPLICATIONS**

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### **Mineral Shield Fire/Corrosion - CBPC Based Inorganic Coating:**



An Acidic medium reacts with an alkaline medium to produce salt. This chemical reaction is termed as neutralization reaction. This simple mechanism was extensively exploited by researchers which lead to the evolution of a different class of cementitious compounds termed as Acid-Base Cements. The initial studies on the Acid-Base cements go back to the mid-19th century (Wilson and Nicholson, 1993). The alkaline medium is mostly oxide or hydroxide of di or trivalent metals. These Acid-Base cements are a class within chemically bonded products (Wagh, 2013). One such class of chemically bonded cementitious products, the formation of which relates to the above mentioned chemical reaction mechanism with phosphate based acidic raw material is called chemically bonded phosphate ceramics (CBPCs). Extensive research on the development of CBPCs were carried out by Wagh et al for the stabilization of radioactive wastes. Mineral Shield Fire/Corrosion, a water based two component inorganic suspension coating which derives its roots along the lines of CBPCs, is produced with a phosphate based acidic component and magnesium based basic material. Mineral Shield coating which has cure time of less than 5 minutes is known to exhibit good fire protection and corrosion resistance properties. The same principle of CBPC formation is tapped to produce a mortar type mix called Mineral Shield Restore V1, which is a fast set Gunnite type material that can be used for concrete restoration type applications under dry and moist environments.

All substrates (steel, concrete, plaster, drywall or wood) require a level of preparation before coating. Contact Prime Resins for approved levels of preparation for a given substrate. Large area sprays can be done with specially designed plural high pressure (airless atomization) pumps, PDPC pumps with static mixing at outlet, Gunnite machines and for complex designs or repair, plural cartridge/static mix hand held systems can be used. Because of better than average flame spread resistance, this material can be used in

common living areas, elevator shafts, stairways, HVAC/utility rooms or to stop corrosion, any steel substrate (properly prepared).

**Mineral Shield Restore - Alkali activated Mortar:**

The process of matrix formation follows the fundamental principle of alkali activation of fly-ash. The silicate based compounds in the fly ash (or any pozzolanic material) can be activated under basic environment to react and form polymeric bonds resulting in a complex multi-dimensional structure to possess high early strengths and low shrinkage. It is to be noted that the process of alkali activation does not involve the use of Portland cement. Mineral shield restore V2, a class of fly ash based alkali activated mortar is specially designed for applications that require high early strengths. Mineral shield restore is a Gunnite type mortar which primarily uses Gunnite type delivery system.

Mineral shield can be predominantly used for fast repair/return to service of bridge repair, road repair, seawalls, pylons or architectural pre-cast items. For high build areas we have found the best delivery method is with a Gunnite system to apply material after proper preparation of substrate. Or mold/form repair pour of proper design mix for a given application.