



## TECHNICAL BULLETIN CP-15

# LATEX BONDING AGENTS FOR CONCRETE

Bonding agents are natural, compounded or synthetic materials used to enhance the joining of individual members of a structure without employing mechanical fasteners. These products are often used in repair applications such as the bonding of fresh concrete, sprayed concrete or sand/cement repair mortar to hardened concrete.

Two of the critical factors affecting the bonding between new and old concrete, provided sound concrete practices are followed, are the strength and integrity of the old surface and the cleanliness of the old surface. When a weak layer of concrete (laitance) exists on the old surface or when the old surface is dirty, bond will be poor. The surface condition plays a critical role in bond development, although the strength of the bond depends on other factors such as proper compaction of the new concrete and proper surface preparation that takes into account the density of the base concrete. For sound base concrete, for example, acid etching may suffice, while mechanical preparation will be essential if the old concrete contains a weak or deteriorated surface.

There are a variety of applications for latex emulsions used as bonding agents. Some have a greater degree of water resistance than others. The latex emulsions generally used in cementitious compositions are the oil-in-water type, and sometimes contain more than 50% water. They are generally stable in the cement/water system. However, not all emulsions are compatible with cement, and the selection of an appropriate product for a given application requires an understanding of its chemistry or, alternatively, consultation with the manufacturer.

Three methods can be used to modify a latex to make it a useful bonding agent:

- Prepare a neat cement slurry utilizing the latex as part of the mixing water;
- Use a 1:1 water:latex diluted material;
- Use a re-emulsifiable latex, which can be softened and rewetted upon contact with water.

The use of the 1:1 water/latex method is discouraged because of the lack of bonding encountered in field applications (corroborated by laboratory studies). The use of the latex without any cement in the mix produces a failure plane because of the lack of film formation at the bond interface.

Three types of latex bonding agents are using in concrete applications.

- Styrene Butadiene (SBR)

Styrene butadiene (SBR) latex, which is compatible with cementitious compounds, is a co-polymer. SBR latex may coagulate if subjected to high temperatures, freezing temperatures, or severe mechanical action for prolonged periods of time.

- Polyvinyl Acetate Latex (PVA)

Two main types of PVAs are used in repair: non-re-emulsifiable and emulsifiable. Non-re-emulsifiable



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PVA forms a film that offers good water resistance, ultraviolet stability, and aging characteristics. Because of its compatibility with cement, it is widely used as a bonding agent and as a binder for cementitious water-based paints and waterproofing coatings. Emulsifiable PVA produces a film that can be softened and rewetted with water. This type of latex permits the application of a film to a surface long before the subsequent application of a water-based overlay. Its use is limited to specific applications where the possible infiltration of moisture to the bond line is precluded. It is most widely used as a bonding agent for plaster, and to bond finish or base-coat gypsum, or Portland cement plaster, to interior surfaces of cured cast-in-place concrete.

- Acrylic Latex

Acrylic ester resins are polymers and copolymers of the esters of acrylic and methacrylic acids. Their physical properties range from soft elastomers to hard plastics. This type of emulsion is used in cementitious compounds in much the same manner as SBR latex.