PLAINTIFF'S EXHIBIT

UC-3969

Resin-Grade Asbestos Improves Thixotropic Properties of Highway Marker Adhesive

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By specifying resin-grade asbestos as the viscosity control agent for epoxy-based adhesives used to affix button lane markers on California highways, the state's Division of Highways eliminated an adhesive storage stability problem that had prevailed with previous thixotropes.

In California, pavement markers are installed on most state highways in accordance with a state law enacted a number of years ago. Designed to replace striping, the raised markers are used to delineate traffic lanes, especially at night and during wet weather. Since every ninth marker is reflectorized, lane differentiation is accomplished primarily by visual means. The raised markers also give an audible sound as a vehicle rides over them.

An average of 30 grams of adhesive is used per button, but the amount varies depending upon marker shape — round or square — and on the type and condition of the pavement. Although about three million button markers were applied in 1968, the program will continue for several more years before all California roads will be equipped as prescribed.

All adhesives used are pre-tested by the highway division's test laboratory, placed in specific inventory, and released to contractors by state inspectors at the time of application. In many instances, storage time is quite extensive, sometimes under temperatures that reach 115° F. or higher. Under these circumstances, the viscosity and thixotropy achieved by the use of colloidal silica in the "A" or epoxy resin component is unstable and loss is excessive and quite rapid. When this instability occurred it resulted in adhesive rejects or in critical runoff during application that left insufficient resin to assure a proper bond.

To improve these characteristics, the state highway division sought a thixotrope that would extend shelf life without any effect on adhesive performance or structural strength.

After testing several different materials, the laboratory found that a resin-grade asbestos, such as Union Carbide Corporation's Calidria Asbestos, Type R-G 144, best met the storage stability requirements stipulated in state specifications covering pavement markers and their adhesives. Under these regulations, the adhesive could not change in viscosity and shear index by more than plus or minus 15 per cent when stored for two weeks in closed containers at 115° F., ± 3° F.

Resin-grade asbestos proved acceptable in all oven-aged stability tests and in all viscosity and thixotropy measurement tests. The results showed little or no drop in viscosity, resulting in a highly stable adhesive that had an excellent shelf life.

Significant processing advantages also are offered. For example, the asbestos is less costly than other thixotropes, with an average reduction of about 60 to 70 cents per pound. Processing costs also are lower because comparatively smaller amounts of asbestos are required. In addition, resin-grade asbestos is easier to store, handle and disperse. Its excellent shear strength eliminated the need for polar additives. Because of these improvements, processors are now assured of producing adhesives with consistent viscosities that do not drop even after prolonged storage under high heat.



On the left a predetermined amount of adhesive is applied to specific locations on road surface with truck-mounted meter-mix and dispense equipment. On the right a button marker is hand applied on the prepared spot. The thixotropic properties of resin-grade asbestos keep adhesive viscosity constant, assuring no runoff during application.

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