Applications of Polymer Concrete

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REFERENCE: Fowler, D. W. and Kukacka, L. E., Eds., Applications of Polymer Concrete, SP-69, American Concrete Institute, Detroit, 1981, members $25.75, nonmembers $32.25.

Polymer concrete can be divided into three categories: (1) polymer-portland cement concrete (PPCC), (2) polymer impregnated concrete (PIC), and (3) polymer concrete (PC). With PPCC, generally a dispersed polymer (polymer latexes) is incorporated into a portland cement mix during fabrication, and a polymer network is formed during curing. With PCI, previous cured concrete is impregnated with a monomer which is subsequently polymerized in situ. With PC, portland cement is replaced as a binder by a polymer.

Considerable development has occurred in the last 20 years with these new polymer concrete materials. To evaluate these developments, the American Concrete Institute formed Committee 548, Polymer Concrete in 1971. The committee has sponsored three symposia including this one. The two prior ones (ACI SP-40 and ACI SP-58) mainly dealt with mechanical, physical, and chemical properties; formulations; and technology in the laboratory and a few small-scale applications.

The distinguishing feature of this book is that it synthesizes the latest achievements in research and applications with PPCC, PIC, and PC. The applications of these materials in various types of construction (transportation, hydraulic, electric power industries, and military) are documented.

The book is a collection of fourteen papers, eleven presented during the symposium in San Juan, Puerto Rico in 1980, plus three additional ones. These papers cover the following:

1. Paper SP69-1 presents an excellent overview of current research and the state of the art of development of PPCC, PIC, and PC materials.

2. Papers SP69-2, 69-6, 69-7, 69-8, and 69-13 summarize and demonstrate use of polymer concrete materials in transportation structures for overlays, patching materials, pavement repairs, and bridge decks. Potential solutions for improving the strength of PC to develop a rapid repair method for airport runways is the subject of Paper 69-7 while use of latex-modified overlays is discussed in 69-8.

3. Use of PIC, PPCC, and PC and fiber-reinforced concrete to repair hydraulic structures is discussed in Paper SP69-3. Advantages of these materials in improving erosion and cavitation resistance are compared.

4. Applications of PC for electric power industries are reported in Papers SP69-6 and SP69-0. A variation of PC appears to have necessary characteristics to replace a large proportion of insulation (for example, electrical porcelain) presently in use. Other uses of PC include: foundations for transformers, waterproof troughs for control cables, transmission poles, and for turbogenerators.

5. The use of PC for geothermal wells is discussed in SP69-5. It is shown that economics of geothermal power can be improved by using PC as a well cementing material because of its durability against hot brine and steam.

6. The evaluations of various mold releasing agents for polyester resin concrete (PC) are discussed in Paper SP69-12.

In summary, the two editors, who themselves have made significant contributions in developments of polymer concrete materials, have done an excellent job of compiling this timely proceedings volume.