
BOOK REVIEW

Membranes in Ground Engineering

Reviewed by J. R. Bell, professor of civil engineering, Oregon State University, Corvallis, OR.

REFERENCE: Rankilior, P. R., *Membranes in Ground Engineering*, John Wiley and Sons, Ltd., Chichester, United Kingdom, 1981, ISBN 0471-27808-4, \$55.00.

This book treats all types of synthetic permeable membranes including those known as filter fabrics, engineering fabrics, and geotextiles. The author states that his objectives are to outline his views of current design procedures, provide a concise reference of many commercially available membranes, and show how to install membranes and set up adequate testing facilities to ensure that the correct product and quality are received. The text is organized into three sections: general aspects of membranes, design with membranes, and laboratory testing. The book is copiously illustrated.

The section on general aspects of membranes begins with a short interesting history followed by brief discussions of some principles of soil mechanics, functions of membranes in the soil, and membrane-soil interactions. The functions of separation, filtration, and reinforcement are described. A rather extensive discussion of the effects of exposure of membrane materials to soils is given. The durability of membranes in the ground is very important, and this discussion is the most complete I have seen in a readily available source. Finally, membranes are described with respect to the materials of which they are made and the processes by which they are formed into woven, nonwoven, and other membrane structures. There is a discussion of how these various materials and structures influence the properties and performance of membranes.

The author presents data and photographs for more than 130 individual membranes from over 30 suppliers. The technical data are presented as provided by the suppliers. This creates difficulties because different manufacturers use different formats, tests, and

units, and therefore, considerable work and knowledge are required to compare different membranes. Also, the reader in the United States will be frustrated because common fabrics may not be indicated by their American trade names. Instead they are keyed to sources in Europe.

The section on design treats drain filters, river defenses, marine defenses, land reclamation, and permanent and temporary road construction. For each, there are discussions of design, construction, and specifications. Many illustrations are used to show construction and design details. Most design methods have been compiled from the literature of membrane suppliers and many from a single source. This literature is referenced in the text. Again the use of figures, charts, and tables from many sources in their original forms creates problems of interpreting different styles, formats, and so forth. This is, however, one of the few single sources of specific design recommendations that covers such a range of applications.

The chapter on the design of drain filters for one-way water flow is the best one in the book. The author has analyzed the research and recommendations of several sources and synthesized them into a very useful form. The sections on river and marine defenses are also useful. The chapters on land reclamation and road construction are by their nature more general and qualitative. The design methods presented have limitations, but this is less a criticism of the book than a statement of the state of the art. If the methods presented are used with good judgment, they will produce satisfactory designs.

The section on testing is brief. It does not address the problems of geotextile testing for design parameters, but it meets the stated purpose of the author.

This book provides an introduction to permeable membranes and their uses in geotechnical engineering and presents photographs and technical data for a wide range of membranes. It gives basic design procedures, construction techniques, and design details which, if used with judgment, will yield satisfactory designs. *Membranes in Ground Engineering* will be a valuable addition to the library of many engineers working with permeable membranes.