HANDBOOK ON MECHANICAL PROPERTIES OF ROCKS

VOLUME IV

R. D. [illegible] · V. S. VUTUKURI

SERIES ON ROCK AND SOIL MECHANICS

TRANS TECH PUBLICATIONS

Series on Rock and Soil Mechanics
Vol. 3 (1978) No. 3

HANDBOOK ON MECHANICAL PROPERTIES OF ROCKS

– Testing Techniques and Results –

Volume IV

by

R. D. Lama
CSIRO
Division of Applied Geomechanics
Australia

V. S. Vutukuri
Department of Mining Engineering
Broken Hill Division
University of New South Wales
Australia

First Printing
1978

TRANS TECH PUBLICATIONS

Distributed by
TRANS TECH S. A.
CH-4711 Aedermannsdorf, Switzerland

International Standard Book Number

ISBN O-87849-023-X

Printed in Germany
by Druckerei E. Jungfer, Herzberg

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FOREWORD

The subject of rock mechanics has gained increasing acceptance as a necessary input in the design of mining and civil engineering works. In addition of these traditional fields of application, changing political and economic conditions have resulted in the need to store oil and other materials underground, to dispose of nuclear waste materials and to develop underground factories and carparks in order to preserve the surface environment.

These ever growing demands have created an urgent need for the development of a variety of design methods and practical solutions in rock mechanics and these needs have generated a demand for information on all aspects of the behaviour of rock and rock masses. This information is currently scattered throughout the scientific and technical literature and the design engineer or research worker is faced with the formidable task of locating such information before embarking upon a specific study.

The authors of the four volumes of the "Handbook on Mechanical Properties of Rocks" have done a commendable service in bringing together a significant proportion of the available information on rock and rock mass behaviour. This compilation of data is all the more useful because the authors have not attempted to impose too many of their own interpretations upon the information but have presented data accompanied by a range of possible theoretical explanations. This approach makes these volumes useful as a starting point for the research worker or for the design engineer who does not wish to rely on the few standard text book solutions which are available.

This volume, containing discussions on the mechanical behaviour of jointed rock and the classification of rock, touches on the very heart of practical rock mechanics which is more concerned with the response of the rock mass than with the behaviour of laboratory specimens. Because of the practical difficulty and enormous expense of full scale in situ tests on rock mass behaviour, the understanding of this subject has been built up from model studies on equivalent materials and from theoretical models of the interaction of the elements which form the rock mass. The major studies which have contributed to this field of knowledge have been summarised in this volume and it is hoped that this summary will encourage others to carry out further work to enhance our understanding of this important subject.

February 1978

DR. EVERT HOEK
Principal, Golder Associates Ltd.
(Formerly Professor of Rock Mechanics,
Imperial College, London).

Series on Rock and Soil Mechanics
Vol. 2 (1974/77) No. 3

PROCEEDINGS FIRST CONFERENCE ON ACOUSTIC EMISSION/MICROSEISMIC ACTIVITY IN GEOLOGIC STRUCTURES AND MATERIALS

By **H. Reginald Hardy, jr., and Frederick W. Leighton**

1977, 490 pages, 235 figures, 480 references, US Dollar 40.00 (sFr. 100.00)

The rationale for organizing this conference developed from the feelings of the conference co-chairmen that the time had come to bring together the ideas and experiences of various workers involved in the application of acoustic emission/microseismic activity in the geomechanics area. It was clear that there were a considerable number of persons, throughout the world, who were actively engaged in basic and applied research in this area including, amongst others, those involved in such widely varying interests as the following:

- **Rock Burst Mechanics**
- **Underground Gas Storage Reservoir Stability**
- **Stability of Earth Filled Dams**
- **Earthquake Mechanics**
- **Hydrofracturing Research**
- **Slope Stability Monitoring**
- **Fundamental Behavior of Geologic Materials**
- **Strata Control in Coal and Hardrock Mines**
- **Comminution**

The proceedings include an introductory section presenting an historical review of the subject, the full text of all papers presented at the conference, general concluding remarks, a master bibliography, and a list of the conference participants and their affiliations. The proceedings represent the most comprehensive review of the subject published to date. In all a total of 25 papers are included. These deal with a wide range of laboratory, field and analytical aspects of acoustic emission/microseismic activity in the areas of **mining, petroleum,** and **civil engineering,** and in **geology** and **geophysics.**

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Series on Rock and Soil Mechanics
Vol. 2 (1974/77) No. 5

SOIL MECHANICS FOR OFF-ROAD VEHICLE ENGINEERING

By **Leslie L. Karafiath,** Grumman Aerospace Corporation, Bethpage, New York, and **Edward A. Nowatzki,** University of Arizona, Tuscon, Arizona

1978, 520 pages, 204 figs, US Dollar 54.00 (sFr. 135.00)

The ability to move vehicles over natural terrain is of paramount importance to a wide variety of disciplines, for example, automotive, military, mechanical, aerospace, construction and agricultural engineering. Workers in these disciplines would have to evaluate an enormous quantity of soil mechanics publications to extract the information that is useful for them. Recognizing this difficulty, the authors attempt to assess the value of published soil mechanics and other retlated literature from the viewpoint of off-road locomotion and to present a balanced discussion of the most important ideas.

Because the field of off-road vehicle engineering is expanding so rapidly, this book is not the final word on the topic. It is, however, the first to bring together in one place the results of efforts in a wide variety of disciplines and to present the latest technically sound concepts on the subject. In short, it provides a rational basis for the analysis of off-road locomotion problems and, as such, is a "must" for workers in the field of vehicle mobility. Because of this departure from some of the more conventional methods of soil-structure analysis it is also recommended for workers in the field of soil mechanics.

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Trans Tech House **CH-4711 Aedermannsdorf** **Switzerland**

Series on Rock & Soil Mechanics
Vol. 2 (1974/77) No. 4

THE PRESSUREMETER AND FOUNDATION ENGINEERING

by **F. BAGUELIN, J. F. JÉZÉQUEL, D. H. SHIELDS,** France and Canada

January 1978, 624 pages, 314 figs, US Dollar 52.00 (or sFr. 130.00) cloth

PREFACE

The design and construction of foundations require a thorough knowledge of the behaviour of soils and rocks in the field. Since even elaborate laboratory tests on large subsurface samples can at best only approximate the field conditions, in-situ tests are often preferable. The pressuremeter is probably the most versatile in-situ testing device available at present for investigating static and cyclic strength and deformation properties of soils and rocks.

Based on the authors' comparisons between the results of standardized pressuremeter tests and both static and standard penetration tests under different site conditions, the merits and limitations of the various methods of field investigations can readily be assessed. At the same time the extensive experience gained by these reliable, practical and semi-empirical methods of using pressuremeter data becomes available to other types of field investigations to their mutual benefit. These approaches require mature engineering judgment and sound experience based on performance observations on structures during and after construction. In this way pressuremeter tests can lead to safe and economical solutions to many geotechnical problems, as shown in this warmly recommended book.

G. G. MEYERHOF

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Series on Rock and Soil Mechanics
Vol. 1 (1971/74) No. 2

The Science of Rock Mechanics

PART 1
STRENGTH PROPERTIES OF ROCKS

By Prof. Dr. **W. Dreyer,** Technical University Clausthal, Germany

1972, reprinted 1973, 500 pages, 200 references, 86 tables, 137 figures,
price: US $ 30.00 hard cover

International Standard Book Number: 0-87849-002-7.
Library of Congress Catalog Card Number: 78-149276.

The present volume is the first – in itself complete – part of the monography "The Science of Rock Mechanics". It comprises primarily the relationship between state of stress, strength of rocks and their determining textural data. As the description of the mechanical behavior of rocks under compressive load is extremely incomplete without adequate consideration of the petrographic parameters such as mineral composition, mineral interlocking, granulation, grain density and porosity, the author has treated the mineral content of all investigated rock samples quantitatively and formulated them mathematically.

The operation of caverns in salt deposits for the purpose of storage requires intimate knowledge of stability and convergence behavior of an underground system. The solution to this highly complex rock mechanics problem is discussed in a special chapter.

"Originality in its true and good sense of the word is the great advantage of this book. Here, a professor has not written a seventh book out of six others, but a researcher has presented his field of interest and especially the results of his own studies, extending over almost two decades, among them many to be published for the first time."

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