ACI 228.2R-13

Report on Nondestructive Test Methods for Evaluation of Concrete in Structures

Reported by ACI Committee 228

American Concrete Institute®

First Printing
June 2013

American Concrete Institute®
Advancing concrete knowledge

Report on Nondestructive Test Methods for Evaluation of Concrete in Structures

The technical committees responsible for ACI committee reports and standards strive to avoid ambiguities, omissions, and errors in these documents. In spite of these efforts, the users of ACI documents occasionally find information or requirements that may be subject to more than one interpretation or may be incomplete or incorrect. Users who have suggestions for the improvement of ACI documents are requested to contact ACI via the errata website at www.concrete.org/committees/errata.asp. Proper use of this document includes periodically checking for errata for the most up-to-date revisions.

ACI committee documents are intended for the use of individuals who are competent to evaluate the significance and limitations of its content and recommendations and who will accept responsibility for the application of the material it contains. Individuals who use this publication in any way assume all risk and accept total responsibility for the application and use of this information.

All information in this publication is provided "as is" without warranty of any kind, either express or implied, including but not limited to, the implied warranties of merchantability, fitness for a particular purpose or non-infringement.

ACI and its members disclaim liability for damages of any kind, including any special, indirect, incidental, or consequential damages, including without limitation, lost revenues or lost profits, which may result from the use of this publication.

It is the responsibility of the user of this document to establish health and safety practices appropriate to the specific circumstances involved with its use. ACI does not make any representations with regard to health and safety issues and the use of this document. The user must determine the applicability of all regulatory limitations before applying the document and must comply with all applicable laws and regulations, including but not limited to, United States Occupational Safety and Health Administration (OSHA) health and safety standards.

Participation by governmental representatives in the work of the American Concrete Institute and in the development of Institute standards does not constitute governmental endorsement of ACI or the standards that it develops.

Order information: ACI documents are available in print, by download, on CD-ROM, through electronic subscription, or reprint and may be obtained by contacting ACI.

Most ACI standards and committee reports are gathered together in the annually revised *ACI Manual of Concrete Practice* (MCP).

American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331
U.S.A.
Phone: 248-848-3700
Fax: 248-848-3701

www.concrete.org

ISBN-13: 978-0-87031-820-7
ISBN: 0-87031-820-9

ACI 228.2R-13

Report on Nondestructive Test Methods for Evaluation of Concrete in Structures

Reported by ACI Committee 228

Michael C. Forde, Chair

Bernard H. Hertlein, Secretary

Muhammed P. A. Basheer
Jacob K. Bice
Andrew J. Boyd
Honggang Cao
Nicholas J. Carino
William Ciggelakis
Neil A. Cumming
Ethan. C. Dodge
Boris Dragunsky
Christopher C. Ferraro
Frederick D. Heidbrink
Kal R. Hindo
Robert S. Jenkins
Keith E. Kesner
H. S. Lew
Malcolm K. Lim
Kenneth M. Lozen
Larry D. Olson
Stephen Pessiki
John S. Popovics
Randall W. Poston
Paul L. Siwek
Patrick J. E. Sullivan

Consulting members
[illegible] H. Bungey
[illegible]ermenegildo Caratin
Gerardo G. Clemena
Al Ghorbanpoor
Alexander M. Leshchinsky
V. M. Malhotra
Claus G. Petersen
George V. Teodoro

Allen. G. Davis (deceased) made many contributions to this report.

A review is presented of nondestructive test (NDT) methods for evaluating the condition of concrete and steel reinforcement in structures. Methods discussed include visual inspection, stress-wave, nuclear, measurement of fluid transport properties, magnetic and electrical, infrared thermography, and ground-penetrating radar. The principle of each method is discussed and the typical instrumentation described. Testing procedures are summarized and the data analysis methods explained. The advantages and limitations of the methods are highlighted. This report concludes with a discussion of planning a NDT program. General information is provided for those faced with the task of evaluating the condition of a concrete structure and who are considering the applicability of NDT methods to aid in that evaluation.

Keywords: covermeter; deep foundations; half-cell potential; infrared thermography; nondestructive testing; polarization resistance; radar; radiography; radiometry; stress-wave methods; transport properties; visual inspection.

CONTENTS

ACI 228.2R-13 supersedes ACI 228.2R-98(04) and was adopted and published June 2013.