TECHNICAL REPORT

ISO/TR 16475

First edition
2011-08-01

Guidelines for the repair of water-leakage cracks in concrete structures

Lignes directrices pour la réparation des fissures dues à l'eau dans les structures en béton

Reference number
ISO/TR 16475:2011(E)

Documents
Document Sharing Hub

© ISO 2011

Full document details: ISO_TR 16475_2011

COPYRIGHT PROTECTED DOCUMENT

© ISO 2011

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

© ISO 2011 – All rights reserved

Documents
Document Sharing Hub

Full document details: ISO_TR 16475_2011

Contents

Page

Foreword iv
Introduction v
1 Scope 1
2 Normative references 2
3 Terms and definitions 2
4 Conditions of water-leakage cracks 3
4.1 Types of water-leakage cracks 3
4.2 Environmental conditions of water-leakage cracks 3
5 Performance requirements for repair materials 5
5.1 Performance requirements for chemical conditions 5
5.2 Performance requirements for physical (mechanical) conditions 5
6 Grout materials for repair 6
6.1 Acrylic grouts (water-based acrylic gel grout) 6
6.2 Cementitious grouts (water-based mixture of cement grout) 7
6.3 Hydrophilic epoxy resin grout 7
6.4 Polyurethane grouts 8
6.5 Synthetic rubber polymerised gel grout 8
6.6 Other material 8
7 Procedures applied to select the appropriate repair materials 8
7.1 Selection process of repair materials (grouts) 8
7.2 Test for performance requirements 9
8 Execution of different types of repair methods 11
8.1 Grouting injection methods 11
8.2 Injection method for reforming a waterproofing layer 13
9 Performance assessments of repaired structures 13
9.1 Inspection of repairs 13
9.2 Evaluation of repairs 14
10 Data collection (record keeping) 14
Bibliography 15

© ISO 2011 – All rights reserved

Documents
Document Sharing Hub
Full document details: ISO_TR 16475_2011

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 16475 was prepared by Technical Committee ISO/TC 71, *Concrete, reinforced concrete and pre-stressed concrete*, Subcommittee SC 7, *Maintenance and repair of concrete structures.*

© ISO 2011 – All rights reserved
Documents
Document Sharing Hub
Full document details: ISO_TR 16475_2011

Introduction

This Technical Report attempts to draw out a successful and effective plan for repairing water-leakage cracks. In general, there are two types of cracks that form within a concrete structure: dry cracks and water-leakage cracks. Dry cracks vary in their depth and width, and are known to cause instability to the foundation and durability of concrete structures. Water-leakage cracks arise from a combination of several environmental factors (chemical and physical or mechanical influences) that surround the buildings or concrete structures. They not only further the negative effects of dry cracks, but also cause additional problems, such as lingering humidity and wetness in building operations, which sometimes renders the buildings and the structures unable to carry out their designated performance, purposes and duties.

It has been assumed that the reason why it is difficult to find a proper method for repairing water leakage cracks is an insufficient knowledge and understanding of the negative factors (i.e. environmental conditions, the influences of various human activities, etc.) that cause the formation of the cracks and also in the selection of the repair materials and methods. Various types of repair techniques have been carried out in order to mend these different types of cracks, mainly the water-leakage types. However, the required conditions for sealing the water-leakage cracks have often proven to be extremely difficult to satisfy due to the wet and humid environment (which in most cases is the initial reason why the cracks have formed in the first place). This lack of a reliable and stable source of information regarding the water leakage cracks has caused unnecessarily high costs of repair in the field of construction and architecture and still continues to be a problem today.

Past records related to remedial action taken for these cracks have shown numerous results; some have shown failure, some have had minor success and some have managed to find an adequate solution that met the structures' needs so that they are able to continue performing their designed purposes. But rarely has a global, standardized and consistent solution been implemented for these problems. When all the aforementioned problems are taken into consideration, it is evident that there is a strong need for a standardized guideline on how to select the appropriate materials and methods in accordance with the different types of environmental conditions and factors that lead to water-leakage cracks. It is highly anticipated that a newly proposed awareness and understanding of these issues will prevent further unnecessary use of high budgets and expensive repair materials that do not serve its intended purpose and additionally will help avoid manual and possibly dangerous repair projects when dealing with water leakage cracks.

This Technical Report attempts to create a reliable consistency for future cases of water-leakage cracks so that there will no longer be a need for obscure and insecure solutions that rarely remedy these types of problems with concrete structures. This Technical Report was developed for countries that do not currently have existing general guidelines on this subject and for local regulatory authorities worldwide. It is eagerly anticipated that there will be further development and cooperation by the authorities in each country for the principle of further augmenting knowledge about concrete and the understanding of concrete structures and architectural construction.

© ISO 2011 – All rights reserved

Documents
Document Sharing Hub
Full document details: ISO_TR 16475_2011

Documents
Document Sharing Hub

Full document details: ISO_TR 16475_2011

Guidelines for the repair of water-leakage cracks in concrete structures

1 Scope

This Technical Report gives guidelines for the selection of a proper grout material to repair water leakage through cracks and other discontinuities in concrete structures including the following:

— conditions of water-leakage cracks;

— performance requirements for repair materials;

— different types of repair materials (grouts);

— procedures followed to select the appropriate repair materials;

— execution of different types of repair methods;

— performance assessments of applied materials and methods;

— data collection.

This Technical Report does not include a focused section about the repair of dry cracks and the causes or the origins of cracks. The details on dry crack repairs are covered in ISO 16311-4[1)].

A flow chart for maintenance of water-leakage cracks is shown in Figure 1.

1) To be published.

© ISO 2011 – All rights reserved

Documents
Document Sharing Hub
Full document details: ISO_TR 16475_2011