

# Overview

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This book stems from the fifth in a series of symposia on masonry sponsored by ASTM Committees C-7 on Lime, C-12 on Mortars for Unit Masonry, and C-15 on Manufactured Masonry Units. Like those that have preceded it, this symposium provided a forum for the dissemination and exchange of information and experiences related to masonry construction.

Three of the four preceding symposia were also published by ASTM:

*STP 589—Masonry: Past and Present*, published in August 1975, was the first in this series. It provided the basis for future symposia by reviewing the specifications and test methods from a historical perspective. Research and new developments in the field of masonry construction were also covered.

*STP 778—Masonry: Materials, Properties, and Performance*, published in September 1982, covered the third symposium on masonry. This publication presented a forum for research on masonry units, mortar and grout (including their components), and masonry assemblages.

*STP 871—Masonry: Research, Application, and Problems*, published in April 1985, covered the fourth symposium. The objective of this symposium was to cover field applications, end-use problems, and research.

The second symposium in this series was not published except for several papers appearing in ASTM's *Journal of Testing and Evaluation*. The scope of this symposium was similar to that of the first.

For the current symposium, *Masonry: Materials, Design, Construction, and Maintenance*, papers dealing with current technology in each of these four major areas of masonry were requested. The areas were selected to provide general coverage of current developments in the industry and thus provide an update to previous publications on this subject.

## Materials

The first three papers relate to testing procedures and properties of masonry materials and assemblages. New test procedures are described and data presented on bond and shear strengths of masonry assemblages. These papers will provide new guidelines for writing future specifications and codes for masonry materials.

Robinson and Brown examine the existing C 270 requirements (ASTM Specification for Mortar for Unit Masonry) for mortar and its shortcomings. Test data on the bond strengths of several C 270 mortars are offered as a basis of writing a new performance specification.

Johal and Anderson have evaluated masonry cement mortars when used in the construction of shear-wall specimens. Both static and cyclic load tests were conducted in this investigation of concrete masonry block and clay brick walls.

Ribar and Dubovoy have explored the surface characteristics of brick. A new technique for measuring surface characteristics provides important new insights into factors controlling bond and shear strengths. Additional research on surface characteristics may provide a means of evaluating the performance of each material in a masonry assemblage.

## Design

Design of masonry construction is dealt with in the next five papers. Subjects range from the detailing of tie systems to the testing of assemblages under various types of simulated loading.

This important work will provide the means for better and safer construction even under the extreme conditions found during an earthquake.

Raths has presented a preconstruction testing program for the selection of materials used in a brick-veneer cavity wall. The program uses ASTM standards to evaluate materials and their compatibility as a means of preventing both construction problems and unsatisfactory performance.

Gensert and Bretnall have documented the construction and performance of a masonry structure by means of photography and computer graphics. Methods of analyzing architectural details and the interactions between masonry and structural frame works are shown.

Chin et al. have examined the relative stiffness between brick veneer and metal studs and its effects upon wall design. This paper shows that, by using shorter length metal studs, critical flexural bond stresses do not exist on typical brick veneer/metal stud walls under designed loading conditions.

Arnold et al. compare two methods of analysis for the design of brick spandrel panels. Torsion stresses during placement were of particular interest in this study.

Chen and Shah have studied methods of improving seismic design of masonry structures by testing masonry single pier models. The behavior of these piers was studied under dynamic shaking and slowly applied cyclic loading.

### **Construction**

The section on construction provides a direct link between the researcher and field application. Three papers are offered in this category, each dealing with a different subject but all of value to both the university laboratory as well as the masonry contractor.

Grimm's first paper is a review of methods for sampling and statistical data reduction for brick masonry. Based on the techniques described, a concept of structural reliability is introduced.

Matthys et al. present data on extended life or ready-mix mortars. The paper describes a study in optimizing a mix to achieve specific strength and setting characteristics. The optimized mix is then compared to standard portland cement lime Type N mortar for mechanical properties.

Coney and Stockbridge address water leakage problems through a study of waterproofing coatings, surface grouting, and tuckpointing. Field studies were conducted prior to and during the repairs of a building.

### **Maintenance**

The preservation of our national heritage is gaining greater interest year by year, and the most outstanding symbols of our past are found in masonry structures. To this end we devoted the final section of this symposium to maintenance and rehabilitation. The four papers presented here cover unique reviews of major rehabilitation projects. Details are presented on the materials and methods used, where and how failures in the original construction occurred, and how failures were corrected. These papers will be of great interest and value to those involved in this area of masonry work.

Thomasen and Searls describe the deterioration of terra-cotta claddings and their repair. Special emphasis is given to the cause of glaze spalling as related to repair and prevention measures.

Manmohan et al. have studied the compressive stresses in terra-cotta cladding due to frame shorting. Methods of relieving these stresses by cutting the bed and head joints are described.

Sourlis presents a detailed review of the restoration of a 100-year-old historical masonry structure. All aspects of the project from bidding the job to final cleanup and landscape repairs are described.

Grimm's second paper is a study of masonry cracks and how they affect the performance of a masonry structure. The various types of cracks are described and their causes and method for repair are given.

This publication is the result of the combined efforts of many people. I want to thank the members of my subcommittee and those assisting with the presentation and review of papers. A special thanks to those on the ASTM staff who helped guide me through the many stages of this process from conception to final publication.

*Harry A. Harris*

Ash Grove Cement Co., Kansas City, KS  
66103; symposium chairman and editor.