

**Guide for Design and Construction
with Autoclaved Aerated
Concrete Panels**

Reported by ACI Committee 523



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Guide for Design and Construction with Autoclaved Aerated Concrete Panels

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Guide for Design and Construction with Autoclaved Aerated Concrete Panels

Reported by ACI Committee 523

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This guide is intended for use by architects, engineers, contractors, building officials, and manufacturers. Its purpose is to present, in a single source, information that can help those individuals design, specify, and construct with factory-reinforced panels of autoclaved aerated concrete (AAC). In this guide, introductory information on AAC is first presented, followed by a description of its manufacture, guidance on structural design using reinforced panels, and guidance on construction with such panels. The body of this guide ends with an extensive background chapter on the material characteristics of AAC, and the structural behavior and design of AAC elements.

Keywords: autoclaved aerated concrete; construction; design; panels; reinforced panels.

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CONTENTS

Foreword, p. 523.4R-2

Chapter 1—Introduction, p. 523.4R-2

- 1.1—Definition of autoclaved aerated concrete
- 1.2—Typical mechanical and thermal characteristics of AAC
- 1.3—Historical background of AAC
- 1.4—Applications of AAC panels
- 1.5—Scope and objectives

Chapter 2—Notations and definitions, p. 523.4R-3

- 2.1—Notation
- 2.2—Definitions

Chapter 3—Typical materials and manufacture of AAC, p. 523.4R-4

- 3.1—Materials used in AAC
- 3.2—Manufacture of AAC
- 3.3—Typical dimensions of AAC units
- 3.4—Dimensional tolerances
- 3.5—Identification and marking of AAC units

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Chapter 4—Structural design of reinforced AAC panels, p. 523.4R-6

- 4.1—Introductory remarks regarding design provisions
- 4.2—Proposed design provisions for reinforced AAC panels

Chapter 5—Handling, erection, and construction with AAC panels, p. 523.4R-8

- 5.1—Handling of AAC panels
- 5.2—Erection of AAC wall panels
- 5.3—Erection of AAC floor and roof panels
- 5.4—Electrical and plumbing installations in AAC
- 5.5—Exterior finishes for AAC
- 5.6—Interior finishes for AAC panels

Chapter 6—Typical construction details for AAC panels, p. 523.4R-9

- 6.1—Cladding wall panel systems
- 6.2—Load-bearing vertical wall panel systems
- 6.3—Floor and roof details

Chapter 7—Technical justification for proposed design provisions, p. 523.4R-19

- 7.1—Key mechanical characteristics of AAC
- 7.2—Bond strength between factory-installed wire reinforcement and AAC
- 7.3—Flexural design of AAC beam elements
- 7.4—Control of deflections
- 7.5—Shear design of AAC beam elements
- 7.6—Shear design of AAC shear walls
- 7.7—Special provisions to avoid longitudinal cracking at locations of vertical reinforcement
- 7.8—Design of AAC diaphragms
- 7.9—Strength-reduction factors

Chapter 8—References, p. 523.4R-59

- 8.1—Referenced standards and reports
- 8.2—Cited references

Appendix A—Proposed design provisions, p. 524.3R-61

Appendix B—Commentary on proposed design provisions, p. 523.4R-67

Appendix C—Design examples, p. 523.4R-72

- Example 1: Design of an AAC floor panel
- Example 2: Design of an AAC shear wall
- Example 3: Design of an AAC diaphragm
- Example 4: Design of load-bearing vertical wall panel

FOREWORD

This guide is intended for use by architects, engineers, contractors, building officials, and manufacturers. Its purpose is to present, in a single source, information that can help those individuals design, specify and construct with factory-reinforced panels of autoclaved aerated concrete (AAC). In this guide, introductory information on AAC is first presented, followed by a description of its manufacture, guidance on structural design using reinforced panels, and guidance on construction with such panels. The body of this

guide ends with an extensive background chapter on the material characteristics of AAC, and the structural behavior and design of AAC elements.

Because design and construction provisions already exist for AAC masonry made from masonry-type units without factory-installed reinforcement, this guide touches only briefly on AAC masonry. This guide addresses design, specification, and construction needs for factory-reinforced panels for which comparable design and construction provisions do not yet exist. It does this through a combination of background material and design guidance, written in nonmandatory format.

This guide is intended as a starting point for the development of mandatory-language design provisions, under the mandate of ACI 318 or other committee so designated by ACI. To facilitate that process, the design provisions proposed in this guide, though written in nonmandatory language as required by ACI, are arranged to follow the format of ACI 318-05.

CHAPTER 1—INTRODUCTION

1.1—Definition of autoclaved aerated concrete

Autoclaved aerated concrete (AAC), a form of cellular concrete, is a low-density cementitious product of calcium silicate hydrates in which the low density is obtained by the formation of macroscopic air bubbles, mainly by chemical reactions within the mass during the liquid or plastic phase. The air bubbles are uniformly distributed and are retained in the matrix on setting, hardening, and subsequent curing with high-pressure steam in an autoclave to produce a homogeneous structure of macroscopic voids, or cells (Fig. 1.1). Material specifications for this product are prescribed in ASTM C1386.

1.2—Typical mechanical and thermal characteristics of AAC

In Table 1.1, typical mechanical and thermal characteristics of AAC are compared with those of conventional concrete, including conventional concrete made with lightweight aggregates. AAC typically has one-sixth to one-third the density of conventional concrete, and about the same ratio of compressive strength, making it suitable for cladding and infill panels and for bearing-wall components of low- to medium-rise structures. Throughout this guide, “density” is defined consistently with ASTM C1386, because AAC is defined by C1386. In C1386, what is referred to as “density” is actually a unit weight, with units of lb/ft³ (U.S. customary) and units of kgf/m³ (old metric). This definition is not strictly correct, nor is it consistent with ACI policy for SI units. It is maintained herein for consistency with ASTM C1386.

The thermal conductivity of AAC is 6 to 7.5% that of conventional concrete, making it energy-efficient. Its fire rating is slightly longer than that of conventional concrete of the same thickness, making it useful in applications where fire resistance is important.

AAC has excellent acoustical properties. Because of its characteristic high internal porosity, AAC has very high sound absorption. Because of its lower density, AAC is not as resistant to sound transmission as conventional concrete of the