

# Guide for Consolidation of Concrete

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*Consolidation is the process of removing entrapped air from freshly placed concrete. Several methods and techniques are available, the choice depending mainly on the workability of the mixture, placing conditions, and degree of air removal desired. Some form of vibration is usually employed.*

*This guide includes information on the mechanism of consolidation and gives recommendations on equipment, characteristics, and procedures for various classes of construction.*

*The paired values stated in inch-pound units and hard SI units are usually not exact equivalents. Therefore, each system is to be used independently of the other. Combining values from the two systems may result in nonconformance with this guide.*

**Keywords:** box out; compaction; consistency; consolidation; placing; rheology; rodding; segregation; spading; tamping; vibration; vibrator; workability.

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## CONTENTS

### Chapter 1—General, p. 309R-2

### Chapter 2—Effect of mixture proportions on consolidation, p. 309R-3

- 2.1—Mixture proportions
- 2.2—Workability and consistency
- 2.3—Workability requirements

### Chapter 3—Methods of consolidation, p. 309R-4

- 3.1—Manual methods
- 3.2—Mechanical methods
- 3.3—Methods used in combination

### Chapter 4—Consolidation of concrete by vibration, p. 309R-5

- 4.1—Vibratory motion
- 4.2—Process of consolidation

### Chapter 5—Equipment for vibration, p. 309R-6

- 5.1—Internal vibrators
- 5.2—Form vibrators
- 5.3—Vibrating tables
- 5.4—Surface vibrators
- 5.5—Vibrator maintenance

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**Chapter 6—Forms, p. 309R-13**

- 6.1—General
- 6.2—Sloping surfaces
- 6.3—Surface blemishes
- 6.4—Form tightness
- 6.5—Forms for external vibration

**Chapter 7—Recommended vibration practices for general construction, p. 309R-15**

- 7.1—General
- 7.2—Procedure for internal vibration
- 7.3—Adequacy of internal vibration
- 7.4—Vibration of reinforcement
- 7.5—Revibration
- 7.6—Form vibration
- 7.7—Consequences of improper vibration

**Chapter 8—Structural concrete, p. 309R-19**

- 8.1—Design and detailing prerequisites
- 8.2—Mixture requirements
- 8.3—Internal vibration
- 8.4—Form vibration
- 8.5—Tunnel linings

**Chapter 9—Mass concrete, p. 309R-20**

- 9.1—Mixture requirements
- 9.2—Vibration equipment
- 9.3—Forms
- 9.4—Vibration practices
- 9.5—Roller-compacted concrete

**Chapter 10—Normal-density concrete floor slabs, p. 309R-22**

- 10.1—Mixture requirements
- 10.2—Equipment
- 10.3—Structural slabs
- 10.4—Slabs on ground
- 10.5—Heavy-duty industrial floors
- 10.6—Vacuum dewatering

**Chapter 11—Pavements, p. 309R-24**

- 11.1—General
- 11.2—Mixture requirements
- 11.3—Equipment
- 11.4—Vibration procedures
- 11.5—Special precautions

**Chapter 12—Precast products, p. 309R-27**

- 12.1—General
- 12.2—Mixture requirements
- 12.3—Forming material
- 12.4—Choice of consolidation method
- 12.5—Placing methods

**Chapter 13—Structural low-density concrete, p. 309R-28**

- 13.1—General
- 13.2—Mixture requirements
- 13.3—Behavior of structural low-density concrete during vibration

- 13.4—Consolidation equipment and procedures
- 13.5—Floors

**Chapter 14—High-density concrete, p. 309R-29**

- 14.1—General
- 14.2—Mixture requirements
- 14.3—Placing techniques

**Chapter 15—Self-consolidating concrete, p. 309R-29**

- 15.1—General

**Chapter 16—Quality control and quality assurance, p. 309R-29**

- 16.1—General
- 16.2—Adequacy equipment and procedures
- 16.3—Checking equipment performance

**Chapter 17—Consolidation of test specimens, p. 309R-31**

- 17.1—Strength
- 17.2—Density
- 17.3—Air content
- 17.4—Consolidating very stiff concrete in laboratory specimens

**Chapter 18—Consolidation in congested areas, p. 309R-32**

- 18.1—Common placing problems
- 18.2—Consolidation techniques

**Chapter 19—References, p. 309R-33**

- 19.1—Referenced standards and reports
- 19.2—Cited references

**Appendix—Fundamentals of vibration, p. 309R-35**

- A.1—Principles of simple harmonic motion
- A.2—Action of a rotary vibrator
- A.3—Vibratory motion in the concrete

**CHAPTER 1—GENERAL**

Freshly placed unconsolidated concrete contains excessive and detrimental entrapped air. If allowed to harden in this condition, the concrete will be porous and poorly bonded to the reinforcement. It will have low strength, high permeability, and poor resistance to deterioration. It may also have a poor appearance. The mixture should be consolidated if it is to have the properties desired and expected of concrete.

Consolidation is the process of inducing a closer arrangement of the solid particles in freshly mixed concrete or mortar during placement by the reduction of voids, usually by vibration, centrifugation (spinning), rodding, spading, tamping, or some combination of these actions.

Stiffer mixtures require greater effort to achieve proper consolidation. By using certain chemical admixtures (ACI 212.3R), consistencies requiring reduced consolidation effort can be achieved at lower water content. As the water content of the concrete is reduced, concrete strength, permeability, and other desirable properties improve, provided that the concrete is properly consolidated. Alternatively, the