ACI 350.1-10

# Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures (ACI 350.1-10) and Commentary

Reported by ACI Committee 350

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# Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures (ACI 350.1-10) and Commentary

An ACI Standard

Reported by ACI Committee 350

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*Subcommittee members who produced this specification.
The committee would like to thank David Poole, Paul Hedli, and Kyle Loyd for their contributions to this specification.

*These test methods give procedures and criteria for tightness testing of environmental engineering concrete structures. They are applicable to liquid and gas containment structures constructed with concrete or a combination of concrete and other materials. This document includes hydrostatic, surcharged hydrostatic, and pneumatic [illegible].*

*These test methods may involve hazardous materials, operations, and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices and determine the applicability of regulatory limitations before use.*

**Keywords:** containment structures; hydrostatic; leakage; pneumatic; reservoirs; tests; tightness; tightness criteria.



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*(mandatory portion follows)*



ACI 350.1-10 supersedes 350.1-01, was adopted October 25, 2010, and published January 2011.

## *COMMENTARY*

## *SPECIFICATION*

### SECTION 1—GENERAL REQUIREMENTS

### 1.1—Scope

**1.1.1** *Work specified*—This Specification covers tightness testing of liquid and gaseous environmental containment structures designed to resist liquid or gaseous loads. Provisions of this Specification shall govern except where other provisions are specified in Contract Documents.

**1.1.1.1** These test methods are for the tightness testing of concrete environmental engineering liquid and gaseous containment structures. The included tests are:

(a) Hydrostatic tightness test for open or covered containment structures.

(b) Surcharged hydrostatic tightness test for closed containment structures.

(c) Pneumatic tightness test for closed containment structures.

(d) Combination hydrostatic-pneumatic tightness test for closed containment structures.

**1.1.1.2** The tightness testing procedures and requirements contained herein are applicable to reservoirs, basins, and tanks constructed of concrete or a combination of concrete and other materials. Preparatory items indicated are required, unless otherwise specified, but the waiver of such items shall not change the test criteria.

**1.1.1.3** Each cell of multi-cell containment structures shall be considered a single containment structure and tested individually unless otherwise permitted.

**1.1.1.4** The hydrostatic tightness testing procedures and requirements herein are also applicable for tightness testing of open concrete liquid transmission structures such as cast-in-place concrete channels and conduits.

**1.1.1.5** The hydrostatic tightness testing procedures and requirements herein, where applicable, can be used for tightness testing of concrete paved structures, such as channels and impoundments.

**1.1.2** *Work not specified*—These provisions are not intended for hazardous material primary or secondary containment structures, cryogenic storage structures, high-pressure gas tanks, or miscellaneous precast concrete structures such as culverts, pipes, and manholes.

### 1.2—Definitions

**accepted**—determined to be satisfactory by Architect/Engineer.

**Architect/Engineer**—the Architect, Engineer, architectural firm or engineering firm, developing Contract Documents, or administering the Work under Contract Documents, or both.

**containment structure**—a basin, reservoir, channel, or conduit to be tightness tested regardless of whether it has a closed or open top or is constructed partially or entirely of concrete.

**containment structure, closed**—a containment structure where the roof or cover is used to prevent the escape of the contents, including gases emanating from the contents, to the outside atmosphere.

**containment structure, covered**—a containment structure where the contents are protected from exterior contamination by the presence of a cover or roof over the top of the containment structure.

**containment structure, open**—a containment structure where the top surface of the containment structure's contents is exposed to the atmosphere.

**Contract Documents**—a set of documents supplied by Owner to Contractor as the basis for construction; these documents contain contract forms, contract conditions, specifications, drawings, addenda, and contract changes.

**Contractor**—the person, firm, or entity under contract for construction of the Work.

**environmental engineering concrete structures**—as used in this Specification, concrete structures intended for conveying, storing, or treating water, wastewater, or other nonhazardous liquids.

**fitting**—an object that passes through the concrete or is embedded in the concrete to facilitate a connection to the containment structure.

**Owner**—the corporation, association, partnership, individual, public body, or authority for whom the Work is constructed.

**permitted**—accepted by or acceptable to Architect/Engineer, usually pertaining to a request by Contractor, or where specified in Contract Documents.

**Project Drawings**—graphic presentation of project requirements.

**Project Specifications**—the written documents that detail requirements for the Work in accordance with service parameters and other specific criteria.

**Reference Specification**—a specification that is intended to be a reference standard for Contractor to use in the construction of the Work.

**reference standards**—standards of a technical society, organization, or association, including the codes of local or state authorities, which are referenced in Contract Documents.

**required**—mandatory in this Specification or Contract Documents.

**soap suds**—water impregnated with soap or synthetic detergent used to indicate air passage through joints or defects by the formation of soap bubbles.

**submit**—provide to Architect/Engineer for review or acceptance.

**submittal**—document or material provided to Architect/Engineer for review or acceptance.

**vacuum box**—a box with a transparent top, open bottom, and air sealing bottom edges used in conjunction with an air pump capable of creating at least a 3 psi vacuum within the box.

**Work**—the entire construction or separately identifiable parts thereof required to be furnished under Contract Documents.

### 1.3—Description

**1.3.1** The structural adequacy of the containment structure shall be verified for the test pressure or pressures to be applied. One type of test shall not be substituted for another type of test without acceptance of the Architect/Engineer.