**Standard Method of Test for** 

# Evaluation of Adhesive Anchors in Concrete under Sustained Loading Conditions

AASHTO Designation: TP 84-11 (2017)<sup>1</sup> Technical Section: 4c, Markings and Coatings Release: Group 2 (June 2017)



American Association of State Highway and Transportation Officials 444 North Capitol Street N.W., Suite 249 Washington, D.C. 20001

This is a preview. Click here to purchase the full publication.

# **Evaluation of Adhesive Anchors in Concrete under Sustained Loading Conditions**

AASHTO Designation: TP 84-11 (2017)<sup>1</sup>



**Technical Section: 4c, Markings and Coatings** 

Release: Group 2 (June 2017)

# INTRODUCTION

Adhesive anchor systems have widespread use in transportation structures such as bridge widening, concrete repair and rehabilitation, barrier retrofitting, utility installation on existing structures, and tunneling. These systems are used to anchor threaded rod and reinforcing bars in concrete. This test method determines an adhesive anchor's ability to withstand sustained tensile loads under normal conditions.

# 1. SCOPE

- 1.1. This test method applies to structures used in AASHTO applications and is applicable to adhesive anchor systems with steel anchors in predrilled holes in concrete.
- **1.2.** This test method determines the time to failure for adhesive anchors in concrete at various levels of sustained loading.
- **1.3.** The static load test is developed from ASTM E488 and the sustained load (creep) test is modified from ASTM E1512 and ICC-ES AC308.
- 1.4. This test method only addresses the effect of sustained loads on adhesive anchors. Numerous other factors affect the load capacity of adhesive anchors and a complete battery of tests is essential to evaluate an adhesive anchor. Refer to ICC-ES AC308 for a listing of some of the many factors and related test methods that apply to adhesive anchors.

## 2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards*:
  - T 22, Compressive Strength of Cylindrical Concrete Specimens
  - T 23, Making and Curing Concrete Test Specimens in the Field
  - T 24M/T 24, Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

### **2.2**. *ASTM Standards*:

- A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
- D907, Standard Terminology of Adhesives
- E488/E488M, Standard Test Methods for Strength of Anchors in Concrete Elements

- E1512, Standard Test Methods for Testing Bond Performance of Bonded Anchors
- 2.3. International Code Council Standard:
  ICC-ES AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements

#### 3. TERMINOLOGY

- **3.1.** Refer to ASTM D907 for a complete listing of terminology related to adhesives.
- **3.2**. Definitions of Terms Specific to This Standard:
- **3.2.1**. *adhesive anchor*—a post-installed anchor that transfers load to concrete through an adhesive compound embedded in a hole in hardened concrete. The adhesive materials used include epoxy, cementitious material, polyester resin, and others.
- **3.2.2.** *adhesive anchor system*—for the purposes of this standard, the adhesive anchor system is composed of the following components: adhesive anchor; proprietary adhesive compounds in combination with a mixing and delivery system; accessories for cleaning the drilled hole, such as wire brushes, air nozzles, etc.; and printed instructions for the adhesive anchor installation, including hole preparation, injection, and cure.
- 3.2.3. *creep*—the deformation or displacement of an adhesive over time due to stress.
- **3.2.4**. *embedment depth*—distance from the surface of the structural member to the end of the installed anchor.
- **3.2.5**. *linear variable differential transformer (LVDT)*—an electronic instrumentation device used for measuring displacement.
- **3.2.6**. *static load test*—a test in which a load is slowly applied at a specified rate for one cycle until failure.
- **3.2.7**. *sustained load (creep) test*—a test in which a constant load is continuously applied until failure due to creep.
- 3.2.8. *test specimen*—the structural member, anchor rod, and adhesive.

#### **3.2.9**. *Symbols*:

- $\blacksquare$  d = nominal anchor diameter, in. (mm)
- **\square**  $d_o$  = nominal diameter of drilled hole in concrete, in. (mm)
- $f'_c$  = specified compressive strength of concrete, psi (MPa)
- $h_{ef}$  = effective depth of embedment of an anchor, in. (mm)

### 4. SIGNIFICANCE AND USE

- **4.1**. *This test method provides a means of:*
- 4.1.1. Determining the mean static load of an adhesive anchor,
- 4.1.2. Determining acceptable loads to apply to an adhesive anchor based on the lifetime of the structure, and

TS-4c	TP 84-2	AASHTO
	This is a preview. Click here to purchase the full publication.	