Standard Method of Test for

Determining the Fatigue Life of Compacted Asphalt Mixtures Subjected to Repeated Flexural Bending

AASHTO Designation: T 321-17 (2021)

Technically Revised: 2017 **Reviewed but Not Updated: 2021** **Editorially Revised: 2021**

Technical Subcommittee: 2d, Proportioning of Asphalt–Aggregate Mixtures

AASHTO

American Association of State Highway and Transportation Officials
555 12th Street NW, Suite 1000
Washington, DC 20004

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

Standard Method of Test for

Determining the Fatigue Life of Compacted Asphalt Mixtures Subjected to Repeated Flexural Bending

AASHTO Designation: T 321-17 (2021)

AASHTO

Technically Revised: 2017 **Reviewed but Not Updated: 2021** **Editorially Revised: 2021**

Technical Subcommittee: 2d, Proportioning of Asphalt–Aggregate Mixtures

1. SCOPE

1.1. This standard provides procedures for determining the fatigue life and fatigue energy of 380 mm long by 50 mm thick by 63 mm wide asphalt mixture beam specimens sawed from laboratory- or field-compacted asphalt mixtures and subjected to repeated flexural bending until failure.

1.2. *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this procedure to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.*

1.3. *The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of R 18 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with R 18 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of R 18 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.*

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- PP 3, Preparing Hot Mix Asphalt (HMA) Specimens by Means of the Rolling Wheel Compactor[1]
- R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
- R 66, Sampling Asphalt Materials
- R 90, Sampling Aggregate Products
- R 97, Sampling Asphalt Mixtures
- T 247, Preparation of Test Specimens of Hot Mix Asphalt (HMA) by Means of California Kneading Compactor
- T 269, Percent Air Voids in Compacted Dense and Open Asphalt Mixtures

2.2. *ASTM Standards*:

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

- D3549/D3549M, Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens
- D5361/D5361M, Standard Practice for Sampling Compacted Asphalt Mixtures for Laboratory Testing
- E29, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

3. TERMINOLOGY

3.1. *Definition*:

3.1.1. *failure point*—the load cycle at which a peak occurs in the plot of stiffness multiplied by load cycles versus load cycles, which is indicative of the formation of a crack in the specimen.

4. SIGNIFICANCE AND USE

4.1. The fatigue life and failure energy determined by this standard can be used to estimate the fatigue life of asphalt mixture pavement layers under repeated traffic loading. The performance of asphalt mixtures can be more accurately predicted when these properties are known.

5. APPARATUS

5.1. *Test System*—The test system shall consist of a loading device, an environmental chamber (optional), and a control and data acquisition system. The test system shall meet the minimum requirements specified in Table 1.

Table 1—Test System Minimum Requirements

Load measurement and control	Range:	0 to 5 kN
	Resolution:	2 N
	Accuracy:	5 N
Displacement measurement and control	Range:	0 to 5 mm
	Resolution:	2 µm
	Accuracy:	5 µm
Frequency measurement and control	Range:	5 to 10 Hz
	Resolution:	0.005 Hz
	Accuracy:	0.01 Hz
Temperature measurement and control	Range:	–10 to 25˚C
	Resolution:	0.25˚C
	Accuracy:	±0.5˚C

5.1.1. *Loading Device*—The test system shall include a closed-loop, computer-controlled loading component that, during each load cycle in response to commands from the data processing and control component, adjusts and applies a load such that the specimen experiences a constant level of strain during each load cycle. The loading device shall be capable of (1) providing repeated sinusoidal loading at a frequency range of 5 to 10 Hz; (2) subjecting specimens to four-point bending with free rotation and horizontal translation at all load and reaction points; and (3) forcing the specimen back to its original position (i.e., zero deflection) at the end of each load pulse. (Figure 1 illustrates the loading conditions.)

5.1.2. *Environmental Chamber (Optional)*—The environmental chamber shall enclose the entire specimen and maintain the specimen at the test temperature ± 0.5°C during testing. An

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