


<p>Name of Test Flexural Bending Beam Fatigue Test</p>	<p>Developer(s) Monismith and co-workers University of California at Berkeley</p>										
<p>Test Method(s) AASHTO T 321-17 / ASTM D8273-18</p>	<p>Adoption by Agencies California, Iowa, New Jersey, Ohio, Pennsylvania</p>										
<p>Description Beam specimen is held by four equally-spaced clamps and a sinusoidal controlled-deflection mode of loading is applied at the two inner clamps. The loading frequency is typically 10 Hz. The magnitude of the load applied by the actuator and the deflection measured at center of beam is recorded and used to calculate the flexural stiffness, cumulative dissipated energy, and the cycles to failure (i.e., the point at which the product of the specimen stiffness and loading cycles is a maximum). Multiple peak-to-peak strain levels are often used to characterize the fatigue behavior of asphalt mixtures.</p>	<p>Photographs/Illustrations</p> 										
<p>Test Results Number of cycles to failure (fatigue life), N_f</p>	<p>Test Temperature(s) $20 \pm 0.5^\circ\text{C}$</p>										
<p>Equipment & Approximate Cost</p> <table border="0"> <tr> <td>Loading device and data acquisition system</td> <td>\$50,000</td> </tr> <tr> <td>Environmental chamber</td> <td>\$20,000</td> </tr> <tr> <td>Beam fatigue device</td> <td>\$34,000</td> </tr> <tr> <td>Slab compactor</td> <td>\$70,000</td> </tr> <tr> <td>Saw for cutting specimens</td> <td>\$6,000</td> </tr> </table>		Loading device and data acquisition system	\$50,000	Environmental chamber	\$20,000	Beam fatigue device	\$34,000	Slab compactor	\$70,000	Saw for cutting specimens	\$6,000
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<p>Specimen Fabrication Slab specimen, 4 cuts, gluing gage points (1 day)</p>	<p>Number of Replicate Specimens 3 specimens per strain level</p>										
<p>Specimen Conditioning Conditioning for 2 hours at 20°C</p>	<p>Testing Time Hours to weeks depending on strain level and mix quality</p>										
<p>Data Analysis Complexity Simple</p>	<p>Test Variability High (40-50% COV)</p>										
<p>Field Validations Good (inputs to AI and AASHTOWare Pavement ME Design)</p>	<p>Overall Practicality for Mix Design and QA Fair for Mix Design Poor for QA</p>										
<p>Key References</p> <ul style="list-style-type: none"> Tayebali, A.A., J.A. Deacon, J.S. Coplantz, J.T. Harvey, and C.L. Monismith (1994). Fatigue Response of Asphalt-Aggregate Mixes, SHRP-A-404, National Research Council, Washington D.C. Prowell, B., E. Brown, R. Anderson, J. Daniel, A. Swamy, H. Quintus, S. Shen, S. Carpenter, S. Bhattacharjee, and S. Maghsoodloo (2010). Validating the Fatigue Endurance Limit for Hot Mix Asphalt, NCHRP Report 646, National Academies Press. 											