


<p><b>Name of Test</b> <b>Flow Number Test</b></p>	<p><b>Developer(s)</b> Witczak and Co-workers University of Maryland</p>								
<p><b>Test Method(s)</b> AASHTO T378-17</p>	<p><b>Adoption by Agencies</b> Delaware, California</p>								
<p><b>Description</b> The test is conducted by applying repeated haversine axial compressive loads to a cylinder specimen at a specific test temperature. The test may be conducted with or without confining pressure. For each load cycle, the recoverable strain and permanent strain are recorded. The flow number is determined as the number of load cycles corresponding to the minimum rate of change of permanent strain (i.e., onset of tertiary flow).</p>	<p><b>Photographs/Illustrations</b></p> 								
<p><b>Test Results</b> Flow Number</p>	<p><b>Test Temperature(s)</b> LTPPBind v3.1 98% Reliability High Temperature of the paving location adjusted for a depth of 20 mm from the surface (surface mixes)</p>								
<p><b>Equipment &amp; Approximate Cost</b></p> <table border="0"> <tr> <td>Asphalt Mixture Performance Tester</td> <td>\$100,000</td> </tr> <tr> <td>Core drill</td> <td>\$3,000</td> </tr> <tr> <td>Environmental chamber</td> <td>\$3,000</td> </tr> <tr> <td>Saw for cutting specimens</td> <td>\$6,000</td> </tr> </table>		Asphalt Mixture Performance Tester	\$100,000	Core drill	\$3,000	Environmental chamber	\$3,000	Saw for cutting specimens	\$6,000
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<p><b>Specimen Fabrication</b> Gyratory specimens, 2 cuts, 1 core (3 hours)</p>	<p><b>Number of Replicate Specimens</b> At least 3 specimens</p>								
<p><b>Specimen Conditioning</b> Until a thermocouple in the center of a dummy specimen reaches the target test temperature</p>	<p><b>Testing Time</b> Varies between 30 minutes and 4 hours</p>								
<p><b>Data Analysis Complexity</b> Fair</p>	<p><b>Test Variability</b> High (&gt; 30% COV)</p>								
<p><b>Field Validations</b> Good (pavement sections on FHWA ALF, WesTrack, NCAT Test Track, MnROAD)</p>	<p><b>Overall Practicality for Mix Design and QA</b> Good for Mix Design Poor for QA</p>								
<p><b>Key References</b></p> <ul style="list-style-type: none"> <li>Bonaquist, R.F., Christensen, D.W., and Stump, W. (2003). "Simple Performance Tester for Superpave Mix Design: First Article Development and Evaluation," NCHRP Report 513, Transportation Research Board, Washington, D.C.</li> <li>Witczak, M.W. (2007). "Specification Criteria for Simple Performance Tests for Rutting," NCHRP report 580, Washington, D.C.</li> <li>Willis, J.R., Taylor, A., Tran, N., N., Kvasnak, A., and Copeland, A. (2010) "Correlations Between Flow Number Test Results and Field Performance at the NCAT Pavement Test Track," Paper Submitted to the Transportation Research Board 89th Annual Meeting, Washington, D.C.</li> <li>Bonaquist, R. (2011) "Precision of the Dynamic Modulus and Flow Number Tests Conducted with the Asphalt Mixture Performance Tester," NCHRP Report 702, Washington, D.C.</li> </ul>									