

# DIN EN 12697-24:2007-10 (E)

## Bituminous mixtures - Test methods for hot mix asphalt - Part 24: Resistance to fatigue (includes Amendment A1:2007)

---

<b>Contents</b>		<b>Page</b>
Foreword .....		5
1	Scope .....	8
2	Normative references .....	8
3	Terms, definitions, symbols and abbreviations .....	8
3.1	General .....	8
3.2	Two-point bending test on trapezoidal specimens .....	9
3.3	Two-point bending test on prismatic shaped specimens .....	10
3.4	Three-point bending test on prismatic shaped specimens .....	13
3.5	Four-point bending test on prismatic shaped specimens .....	14
3.6	Indirect tensile test on cylindrical shaped specimens .....	19
3.6.1	Symbols .....	19
4	Failure .....	20
5	Calculations .....	20
6	Summary of the procedures .....	20
6.1	Two-point bending test on trapezoidal specimens .....	20
6.2	Two-point bending test on prismatic shaped specimens .....	20
6.3	Three-point bending test on prismatic shaped specimens .....	20
6.4	Four-point bending test on prismatic shaped specimens .....	20
6.5	Indirect tensile test on cylindrical shaped specimens .....	21
7	Test report .....	21
Annex A (normative)	Two-point bending test on trapezoidal shaped specimens .....	22
A.1	Principle .....	22
A.1.1	General .....	22
A.1.2	Element test .....	22
A.1.3	Fatigue line .....	23
A.2	Equipment .....	23
A.2.1	Test machine .....	23
A.2.2	Thermostatic chamber .....	23
A.2.3	Measuring equipment .....	24
A.3	Specimen preparation .....	24
A.3.1	Sawing and storing .....	24
A.3.2	Characteristics of the specimens .....	25
A.3.3	Embedding Check .....	25
A.3.4	Stabilisation of the specimens .....	27
A.3.5	Gluing the ends .....	27
A.4	Procedure .....	28
A.4.1	Preparing the test equipment .....	28
A.4.2	Carrying out the fatigue test .....	28
A.4.3	Choice of the strain .....	29
A.4.4	Number of element tests .....	29
A.5	Calculation and expression of results .....	29
A.6	Test report .....	31

<b>A.7</b>	<b>Precision .....</b>	<b>31</b>
<b>Annex B (normative) Two-point bending test on prismatic shaped specimens .....</b>		<b>32</b>
<b>B.1</b>	<b>Principle .....</b>	<b>32</b>
<b>B.2</b>	<b>Equipment .....</b>	<b>32</b>
<b>B.2.1</b>	<b>Test machine .....</b>	<b>32</b>
<b>B.2.2</b>	<b>Thermostatic chamber .....</b>	<b>32</b>
<b>B.2.3</b>	<b>Measuring equipment .....</b>	<b>32</b>
<b>B.3</b>	<b>Specimen preparation .....</b>	<b>33</b>
<b>B.3.1</b>	<b>Sawing and storing .....</b>	<b>33</b>
<b>B.3.2</b>	<b>Characteristics of the specimens .....</b>	<b>33</b>
<b>B.3.3</b>	<b>Stabilisation of the specimens .....</b>	<b>33</b>
<b>B.3.4</b>	<b>Gluing the ends .....</b>	<b>33</b>
<b>B.4</b>	<b>Procedure .....</b>	<b>33</b>
<b>B.4.1</b>	<b>Preparing the test equipment .....</b>	<b>33</b>
<b>B.4.2</b>	<b>Carrying out the fatigue test .....</b>	<b>34</b>
<b>B.4.3</b>	<b>Choice of the tension .....</b>	<b>34</b>
<b>B.5</b>	<b>Calculation and expression of results .....</b>	<b>34</b>
<b>B.6</b>	<b>Test report .....</b>	<b>36</b>
<b>B.7</b>	<b>Precision .....</b>	<b>37</b>
<b>Annex C (normative) Three-point bending test on prismatic shaped specimens .....</b>		<b>38</b>
<b>C.1</b>	<b>Principle .....</b>	<b>38</b>
<b>C.1.1</b>	<b>General .....</b>	<b>38</b>
<b>C.1.2</b>	<b>Element test .....</b>	<b>38</b>
<b>C.1.3</b>	<b>Fatigue line .....</b>	<b>38</b>
<b>C.2</b>	<b>Equipment .....</b>	<b>38</b>
<b>C.2.1</b>	<b>Test machine .....</b>	<b>38</b>
<b>C.2.2</b>	<b>Load cell .....</b>	<b>38</b>
<b>C.2.3</b>	<b>Extensometer and displacement sensor .....</b>	<b>38</b>
<b>C.2.4</b>	<b>Clamping device .....</b>	<b>39</b>
<b>C.2.5</b>	<b>Data acquisition equipment .....</b>	<b>39</b>
<b>C.2.6</b>	<b>Thermostatic chamber .....</b>	<b>39</b>
<b>C.2.7</b>	<b>Other general equipment .....</b>	<b>39</b>
<b>C.2.8</b>	<b>Check on the operation of the complete equipment and the mounting of the specimen ....</b>	<b>39</b>
<b>C.3</b>	<b>Specimen preparation .....</b>	<b>39</b>
<b>C.3.1</b>	<b>Manufacturing and sawing .....</b>	<b>39</b>
<b>C.3.2</b>	<b>Bulk density .....</b>	<b>39</b>
<b>C.3.3</b>	<b>Storing .....</b>	<b>40</b>
<b>C.3.4</b>	<b>Clamping devices preparation .....</b>	<b>40</b>
<b>C.4</b>	<b>Procedure .....</b>	<b>40</b>
<b>C.4.1</b>	<b>Preparing the test equipment .....</b>	<b>40</b>
<b>C.4.2</b>	<b>Carrying out the fatigue test .....</b>	<b>40</b>
<b>C.4.3</b>	<b>Load function, extensometer signal function, and displacement function recording .....</b>	<b>40</b>
<b>C.4.4</b>	<b>End of test .....</b>	<b>41</b>
<b>C.5</b>	<b>Calculation and expression of results .....</b>	<b>41</b>
<b>C.5.1</b>	<b>Calculation of the stress function and the strain function at a cycle .....</b>	<b>41</b>
<b>C.5.2</b>	<b>Calculation of the dynamic modulus, phase difference angle, and density of dissipated energy at one cycle .....</b>	<b>42</b>
<b>C.5.3</b>	<b>Determination of the fatigue law and energy law .....</b>	<b>43</b>
<b>C.6</b>	<b>Test report .....</b>	<b>44</b>
<b>C.7</b>	<b>Precision .....</b>	<b>44</b>
<b>Annex D (normative) Four-point bending test on prismatic shaped specimens .....</b>		<b>45</b>
<b>D.1</b>	<b>Principle .....</b>	<b>45</b>
<b>D.1.1</b>	<b>General .....</b>	<b>45</b>
<b>D.1.2</b>	<b>Element test .....</b>	<b>45</b>
<b>D.1.3</b>	<b>Fatigue line .....</b>	<b>46</b>
<b>D.2</b>	<b>Equipment .....</b>	<b>47</b>

D.2.1	Test machine .....	47
D.2.2	Clamping device .....	47
D.2.3	Thermostatic chamber .....	47
D.2.4	Electronic data registration equipment .....	47
D.2.5	Check on the operation of the complete equipment and the mounting of the specimen ....	48
D.3	Specimen preparation .....	48
D.3.1	Dimensions .....	48
D.3.2	Sawing .....	49
D.3.3	Drying .....	49
D.3.4	Storage .....	49
D.3.5	Condition .....	49
D.3.6	Mounting .....	49
D.4	Procedure .....	50
D.4.1	Preparing the test equipment .....	50
D.4.2	Carrying out the fatigue test .....	50
D.4.3	Choice of test conditions .....	51
D.4.4	Data processing .....	51
D.5	Calculation and expression of results .....	51
D.6	Test report .....	52
D.7	Precision .....	52
<b>Annex E (normative) Indirect tensile test on cylindrical shaped specimens .....</b>		<b>53</b>
E.1	Principle .....	53
E.2	Equipment .....	53
E.2.1	Test machine .....	53
E.2.2	Loading .....	53
E.2.3	Displacement .....	53
E.2.4	Thermostatic chamber .....	53
E.2.5	Recording and measuring system .....	53
E.2.6	Loading frame .....	54
E.2.7	Positioning rig .....	55
E.2.8	Glue .....	55
E.3	Specimen preparation .....	56
E.3.1	Test specimen .....	56
E.3.2	Specimen dimensions .....	56
E.3.3	Position of the deformation and loading strips .....	56
E.3.4	Conditioning .....	57
E.4	Procedure .....	57
E.5	Calculation and reporting of results .....	57
E.6	Test report .....	60
E.7	Precision .....	60
<b>Bibliography .....</b>		<b>61</b>