

N.^o 05

Elastomeric bearings per AASHTO §14.7.5.3.3: shear strain, step by step

A bearing fails when its rubber layers shear too much. AASHTO puts compression, rotation and displacement into one sum. I explain it from scratch and work it out for a 350×450 mm bearing.

1.

What damages a bearing

Shear in its rubber layers. Three things cause it: the load that squeezes it, the girder rotation and the horizontal movement.

2.

One single sum

AASHTO adds the three strains. Traffic repeats millions of times, so it counts 1.75 times more.

3.

Example bearing

$$S \approx 8.2$$

350 × 450 mm, 5 layers of 12 mm, $G = 0.9$ MPa. The shape factor tells how "flat" each layer is.

4. Result

$$2.3 \leq 5.0$$

Static part ≈ 1.4 plus $1.75 \times$ cyclic part ≈ 0.5 . Passes with margin.

5. Three common mistakes

Putting earthquake in the cyclic part.

Forgetting the separate compression limit (≤ 3.0). Using total height instead of one layer for rotation.

Full note, with equations and tables, at the link on my profile.

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