



Fatigue Test for Rebound Bumpers of Hydraulic Vibration Dampers

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. Test of service life of rebound bumpers under installation conditions.

1.2 Applicability. For all hydraulic vibration dampers with rebound bumpers.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

3 Resources

3.1 Facilities. A closed-loop controlled pneumatic or servo-hydraulic test stand capable of inputting forces at frequencies of $0.8 \text{ Hz} \pm 0.2 \text{ Hz}$ is required. For mounting of the test sample, see Figure 1.

Cylinder tube to be fixtured to ensure only axial loading of rebound stop. Cylinder tube to be open to oil supply unit, otherwise sealed.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.1.2.1 Approval for alternate method and facilities to be reviewed and approved with GM Validation Engineering.

3.2 Equipment.

3.2.1 Pneumatic or hydraulic cylinder, load cell with amplifier and recorder, test container with mount for test sample and original damper components.

3.2.1.1 Controls for test system should be capable of monitoring for loss of part rate, load or function with operating limit parameters.

3.2.2 Oil supply unit with recirculation pump, heater and thermostat.

3.2.3 Heating cabinet, container with mount for test samples and medium.

3.2.4 Rate Test Equipment for Bumper.

3.2.4.1 Must be capable of accommodating interfacing damper components, or fixtures that represent internal and external diameters, and loading surface interfaces.

3.2.4.2 Load application and recording up to 12 kN minimum.

3.2.5 Original Damper Components. Piston rod with stop ring, rod guide and cylinder tube.

3.2.6 Original Damper Fluid. Production-intent damper fluid should be used.

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Page 1 of 4

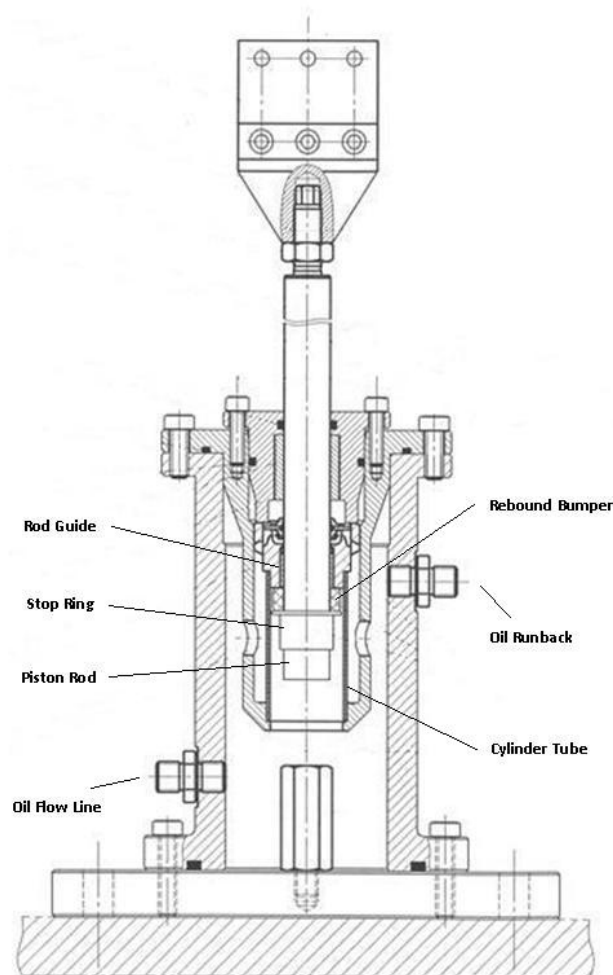


Figure 1: Typical Test Setup

3.3 Test Vehicle/Test Piece. A minimum number of samples to meet the reliability and confidence for validation should be tested. Typically six (6) parts should be tested.

3.4 Test Time.

Calendar time: 3 to 6 days
 Test hours: 72 hours to 144 hours
 Coordination hours: 6 hours

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Operators shall be experienced with using a servo-hydraulic testing machine and capable to do light mechanical work.

4 Procedure

4.1 Preparation.

4.1.1 Test samples to be aged in the original damper fluid for 70 h to 72 h at $100\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ prior to the fatigue test.

4.1.2 Test samples to be rate checked to a minimum 65% compression of the bumper. Load deflection curve and load at compression to be recorded.

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Page 2 of 4