



## **Fatigue Test of Hydraulic Shock Absorbers**

### **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 to service life during loading similar to operating conditions.

**1.2 Applicability.** For all hydraulic shock absorbers.

### **2 References**

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

#### **2.1 External Standards/Specifications.**

None

#### **2.2 GM Standards/Specifications.**

|          |          |          |          |
|----------|----------|----------|----------|
| GMW3425  | GMW14264 | GMW15462 | GMW15741 |
| GMW3428  | GMW14540 | GMW15729 | GMW15980 |
| GMW14243 | GMW14804 |          |          |

#### **2.3 Additional References.**

Vehicle Technical Specifications (VTS)

### **3 Resources**

**3.1 Facilities.** Servo hydraulic vibration damper testing machine. Test specimen holder, see Figure 1.

**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.

#### **3.2 Equipment.**

**3.2.1** Calibrated measuring instruments (permissible tolerance is 1% for machines and measuring devices) for recording the test specimen temperature and damping force during the durability test.

**3.2.2** Cooling device for cooling the test specimens during the durability test:

**3.2.2.1** Cooling fluid: Chilled coolant (ethylene glycol or other) and/or water recommended to enable uptime in test sequence.

**3.2.2.2** Cooling jacket cooling water outlet: In the vicinity of the piston rod guide.

**3.2.2.3** Cooling jacket water inlet: In the vicinity of the base valve, or bottom of the shock.

**3.2.2.4** A cooling jacket shall be placed around the test specimen reservoir tube.

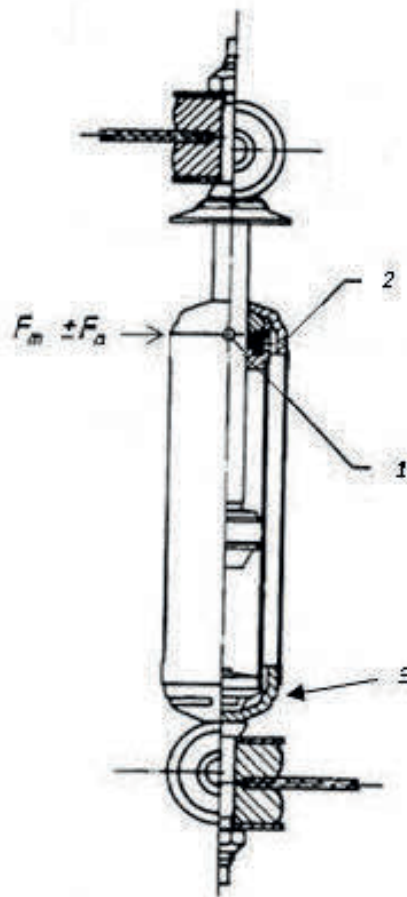
**3.2.3** If the damper is part of a coil-over shock module or has known significant side load in its application, the test specimen shall be subjected to a lateral force of  $F_s = F_m \pm F_a$  in the vicinity of the piston rod guide. Therefore a side load fixture will be required. See Figure 1.

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**Note:**

- 1 = Center of rod guide.
- 2 = Temperature measuring point, Monotube shock.
- 3 = Temperature measuring point, Twin-Tube shock.

**Figure 1: Test Setup**

**3.3 Test Vehicle/Test Piece.** A minimum number of samples to meet the reliability and confidence for validation (i.e., 99% reliability with 50% confidence) should be tested for validation purposes. At least six samples are recommended.

#### 3.4 Test Time.

Calendar time: 12 days to 14 days  
 Test hours: 280 hours to 300 hours  
 Coordination hours: 1 hour

**3.5 Test Required Information.** Use program specific side load magnitudes (if available).

**3.6 Personnel/Skills.** Operators shall be experienced with using a servo hydraulic vibration testing machine.

**3.6.1 Design responsible engineer.** Grade classification is dependent on vehicle parameters and is determined by the design responsible engineer.

## 4 Procedure

### 4.1 Preparation.

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