

Manual Slack Adjuster Test Procedure

1. Scope—This SAE Recommended Practice is intended for testing of manual slack adjusters as they are used in service, emergency, or parking brake systems for vehicles that can be licensed for on-road use.

1.1 Purpose—This document establishes an accelerated laboratory test procedure for manual slack adjusters to determine their integrity and durability in various functional modes and environmental conditions.

2. References

2.1 Applicable Publication—The following publication forms a part of this specification to the extent specified herein.

2.1.1 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 117—Practice for Operating Salt Spray (Fog) Apparatus

3. Functional Test—At ambient temperature of $27^{\circ}\text{C} \pm 11^{\circ}\text{C}$ ($80^{\circ}\text{F} \pm 20^{\circ}\text{F}$), the following functional tests should be performed.

3.1 Adjusting Torque—Per the manufacturer's recommendations, rotate the adjusting shaft with a torque wrench a sufficient number of turns such that the worm wheel rotates one revolution in each direction. Record the maximum torque.

3.2 Backlash—Mount a slack adjuster in an appropriate rigid fixture so that no movement is allowed between the fixture and the worm wheel. Measure and record the free movement of the slack adjuster arm at a distance of 152.4 mm (6 in) from the center of the worm wheel by applying a torque of $6.78\text{ Nm} \pm 0.34\text{ Nm}$ (60 in-lb $\pm 3\text{ in-lb}$) in each direction. Rotate adjusting shaft such that the worm wheel rotates to a new position of $72^{\circ} \pm 3^{\circ}$ from the previous position and make the backlash check. Repeat this procedure until 5 measurements have been made covering the worm wheel circumference.

Measurements may be taken at any arm length; however, the data shall be factored in terms of 152.4 mm (6in) arm length.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2003 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER:

Tel: 877-606-7323 (inside USA and Canada)
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: custsvc@sae.org
<http://www.sae.org>

SAE WEB ADDRESS:

4. Corrosion Resistance—Test unit(s) must be exposed to a continuous salt spray test for 96 h per ASTM B 117. Then they must air dry for 72 h at ambient temperature of $27^{\circ}\text{C} \pm 11^{\circ}\text{C}$ ($80^{\circ}\text{F} \pm 20^{\circ}\text{F}$).

4.1 Per the manufacturer's recommendations, rotate adjusting shaft until worm wheel has made one complete revolution each direction. Record the maximum torque in each direction.

4.2 Check and record the adjustment retaining function as recommended by the manufacturer.

5. Durability—Conduct this test at ambient temperature of $27^{\circ}\text{C} \pm 11^{\circ}\text{C}$ ($80^{\circ}\text{F} \pm 20^{\circ}\text{F}$).

5.1 General Test Setup

5.1.1 Position the slack adjuster so that the area of the manual adjustment mechanism is in compression or tension, as shown in Figure 1, as recommended by the manufacturer, during the application of a load to the slack adjuster lever arm. Bidirectional slack adjusters, those that can be used in either compression or tension mode as explained in Figure 1, shall be tested in each mode with separate slack adjusters.

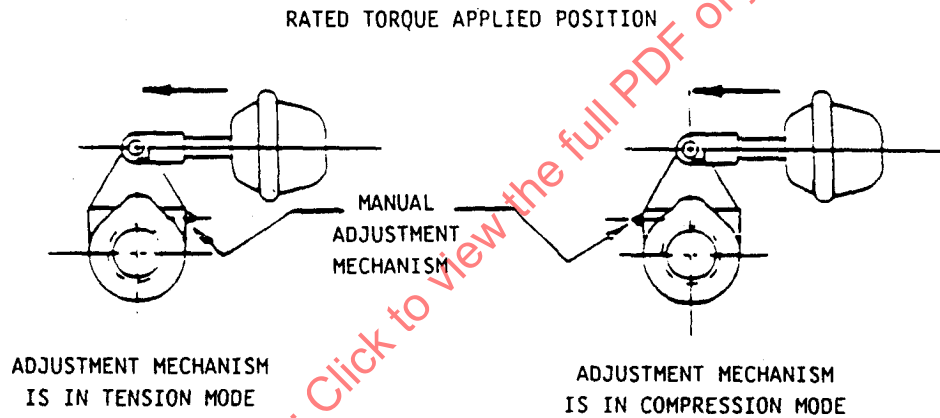


FIGURE 1—MANUAL SLACK ADJUSTER TEST PROCEDURE—TENSION VERSUS COMPRESSION MODE

5.1.2 Adjust the unit so that with the rated torque (manufacturer's recommended load X effective lever length) applied, the actuator push rod is perpendicular ($90^{\circ} \pm 3^{\circ}$) to the effective lever arm.

5.1.3 Establish a residual torque of $22.6 \text{ Nm} \pm 11.3 \text{ Nm}$ ($200 \text{ in-lb} \pm 100 \text{ in-lb}$) on the slack adjuster. This simulates internal brake frictions and brake return springs (where applicable).

5.1.4 With the rated torque applied and the unit adjusted to the previous requirements, position a shut-off device so that an equivalent overstroke of 6.4 mm (0.25 in) maximum at 152.4 mm (6 in) lever length will discontinue the test.

5.1.5 Apply the test torque per 5.2.2 against a resisting force, resulting in a total deflection rate of 15 to 30 degrees min per 113 Nm (1000 in-lb) torque.

5.1.6 Establish the necessary time cycle controls to obtain the torque application and release requirements per the following:

- a. Total Cycle Time: 4.0 s
- b. Maximum Application Time: 1.0 s
- c. Minimum Dwell Time: 1.0 s
- d. Release to residual torque for balance of cycle time

5.2 Gear Set Integrity Test

5.2.1 Provide a reference mark on the adjusting shaft and worm wheel to assure return to original position after torque check per 5.2.3.

5.2.2 The slack adjuster test cycle shall be run in the sequence as in Table 1:

TABLE 1—SLACK ADJUSTMENT TEST CYCLES

Number of Cycles	Percent of Rated Torque
155 000	40
35 000	60
8 500	80
1 500	100

5.2.3 Measure and record the adjustment torque per the following schedule of Number of Cycles:

Number of Cycles
 50 000
 100 000
 155 000
 190 000
 198 500
 200 000

To measure adjustment torque, record the maximum torque required to turn the adjusting shaft five turns clockwise and ten turns counter-clockwise. Return the adjusting shaft to the original position and continue the test.

5.3 Housing Integrity Test

5.3.1 After completion of 5.2.3, continue cycling at rated torque for 30 000 cycles. Repositioning or replacing of the gear set or its equivalent is permissible at any time during the housing test.

5.3.2 Inspect for visible structural fractures through the use of dye penetrant and record the findings.

PREPARED BY THE SAE TRUCK AND BUS FOUNDATION BRAKE SUBCOMMITTEE
 OF THE SAE TRUCK AND BUS BRAKE COMMITTEE