



Steering Tie Rod Buckling Load Test

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.

1.1.1 To determine if Permissible Compression Force, $F_{k\text{ perm}}$, of the tie rod assembly is sufficient for the intended application.

1.1.2 To determine/measure Maximum Buckling Force, $F_{k\text{ max}}$.

1.2 Applicability. This test procedure applies to all vehicles with tie rod assemblies, which have ball joints on both ends.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW15861

3 Resources

3.1 Facilities.

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. Load machine which fulfills the following conditions (see also Figure 1):

- Allows fixation of the tie rod at each end according to vehicle condition. Mating parts on the load machine shall represent vehicle mating parts.
- Capable of applying sufficient load in order to buckle/bend the tie rod assembly.
- Capable of applying sufficient stroke in order to buckle/bend the tie rod assembly ($\geq 30\text{ mm}$).
- Capable of applying the stroke with a speed of $25\text{ mm/minute} \pm 5\text{ mm/minute}$.
- Capable of recording the applied load and stroke in a way to allow data processing for storing and displaying of diagrams with load vs. stroke. See Appendix A, Section A1.
- Secures load vector application in line with the two (2) pivot points of the ball joints.

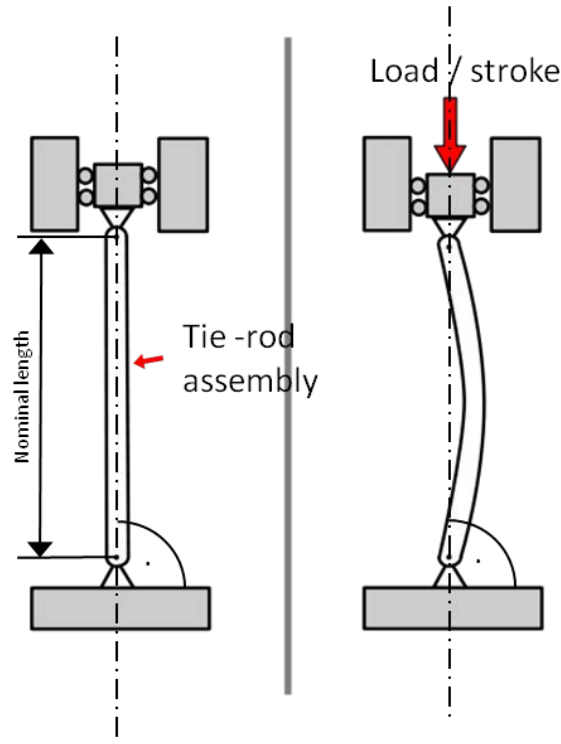


Figure 1: Schematics of Load Machine including Tie Rod Assembly

3.3 Test Vehicle/Test Piece. At least six (6) tie rod assemblies (including Inner Tie Rod (ITR), Outer Tie Rod (OTR), jam nut and fastener).

3.4 Test Time.

Calendar time: 1 days
 Test time: 8 hours
 Coordination time: 2 hours

3.5 Test Required Information.

- Fastener tightening information.
- Maximum tie rod compression load achieved according to GMW15861.
- Nominal length of the tie rod assembly (distance between two (2) pivot points of the ball joints).

3.6 Personnel/Skills. The test technician should be familiar with the test machine and the instrumentation required to obtain test data.

4 Procedure

4.1 Preparation.

4.1.1 Prepare the test machine to apply the load at a stroke rate of 25 mm/minute.

4.1.2 The fixture which holds the tie rod assembly must provide clearance to allow deflection (bending) of the tie rod assembly during buckling. The setup of the test must secure load vector application in line with the two pivot points of the ball joints.

4.1.3 Prepare data acquisition to record a load vs. stroke curve.