



Dynamic Fastener Component Slip 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. Procedure used to determine force required to slip one component of an assembled joint relative to another.

1.2 Applicability. Applies to bolted joints on all vehicles.

1.3 Remarks. Not applicable.

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

2.3 Additional References. None.

3 Resources

3.1 Facilities. Approved fastener laboratories; including but not limited to:

- Supplier or supplier laboratory
- GM vehicle or engine plants
- GM transmission plants
- GM component part plants
- Satellite GM 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.

3.2.1 Fixturing of suitable strength to rigidly secure one side of joint under test and permit application of expected slip load to other with minimal deflection.

3.2.2 Fixtures shall be designed such that test load simulates as closely as possible in-service loading conditions of subject joints.

3.2.3 Load frame with sufficient capacity to generate anticipated slip load.

3.2.4 Load cell of sufficient capacity to measure anticipated slip loads.

3.2.5 Linear displacement measuring device(s) with 0.01 mm (0.0004 in) or better resolution.

3.2.6 Amplifiers and signal conditioning equipment as necessary to monitor applied load, relative motion between joint members, and joint clamping force(s), if applicable.

3.2.7 Data recording device capable of making permanent records of all acquired data.

Note: All instrumentation is to be calibrated as required; record instrumentation details and calibration due dates on Instrumentation and Equipment Calibration Details data sheet (see example in Appendix A, Data Sheet A1) unless information is otherwise preserved in testing laboratory records.

3.3 Test Vehicle/Test Piece.

3.3.1 Sample size is to be specified by Test Engineer, unless specific requirements are set by test requestor.

3.3.2 Test components are to be selected and assembled per applicable design layout drawing(s) and/or appropriate Product Assembly Documents. Elements of joint may also be simulated with fixturing or non-design representative parts, contingent upon approval of test requestor.

3.3.3 Instrumented fasteners (if possible) for measurement of joint clamping.

3.4 Test Time.

Calendar time: 7 d

Test time: 24 h

Coordination time: 8 h

3.5 Test Required Information. Test request and/or critical data sheet(s) shall outline specific information and test parameters.

3.6 Personnel/Skills. Technician shall be trained and competent in conducting this test procedure.

4 Procedure

4.1 Preparation.

4.1.1 Rework test parts as required to permit secure attachment to fixturing.

4.1.2 In some cases, additional clearance may have to be machined into parts to allow measurable displacement to occur between components.

4.1.3 Alterations to test parts must not affect characteristics (stiffness, surface finish, contact area, etc.) of joint.

4.1.4 Assemble test components using instrumented fasteners if possible. Verify that clearance is present for parts to move relative to one another in direction in which load(s) will be applied.

4.1.5 Threaded fasteners (if instrumented) are to be tightened to minimum tension specified by test requestor. If not, tighten to minimum torque specified by test requestor unless otherwise directed. Fasteners shall receive an index marking to enable visual detection of loosening when joint slips.

4.1.6 Install assembled test sample in fixturing.

4.1.7 Connect all instrumentation and servo-hydraulic controls. Calibrate full scale values which are relevant to expected test conditions.

4.1.8 Linear displacement transducer(s) must be attached in such a way that movement is measured between test components in as direct a manner as possible, minimizing effect of fixture movement as indicating test component displacement.

4.2 Conditions.

4.2.1 Environmental Conditions. Not applicable.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions.

4.3.1 Applied load, relative displacement, and joint clamp load (if applicable) are to be monitored and recorded during all testing.

4.3.2 Fasteners ARE NOT TO BE RE-TIGHTENED during course of testing each sample.

4.3.3 Loads used should be selected with in-service load environment in mind. Ensure service loads do not fully, partially, or in any way reverse. Potential test part failure modes which may occur at loads lower than those