



Torque to Slip Evaluation of Fastened Joints

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. To determine torque required to slip mating rotational components of a fastened joint. Examples of joints where this procedure may be used would include:

- Crankshaft balancer (damper) to crankshaft
- Accessory drive belt tensioner attachments
- Flywheels/flex plates

1.2 Applicability. Unless otherwise specified, this procedure applies to initial tightening event of joints using threaded fasteners with new thread and bearing surfaces and new clamped members.

1.2.1 Limitations. This procedure does not apply to Pulse tools.

1.2.2 Unless otherwise specified, any requirements or direction provided in test request documentation will supercede this test procedure.

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. GM approved laboratory or location for this test procedure.

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 Torque angle transducer.

3.2.2 Data acquisition system capable of collecting data at a sampling rate of at least 1000 Hz, plotting data at user specified scales, and identifying data at all points on curve.

3.2.3 Tightening tool.

3.2.4 Appropriate fixtures, bedplate, or slotted table.

3.2.5 Strain indicator.

3.2.6 Strain-gaged fastener, force washer, or fastener prepared for ultrasonic measurement.

3.3 Test Vehicle/Test Piece.

3.3.1 A complete bill of materials of required test pieces will be specified in test request documentation.

3.3.2 Unless otherwise specified, a minimum of eight (8) samples are to be used for this procedure. If fewer samples are tested due to material availability, it will be noted in report.

3.4 Test Time.

Calendar time: 6 d to 8d

Test time: 24 h

Coordination time: 24 h

3.5 Test Required Information. Test request documentation shall outline specific information and test parameters (reference Appendix A, Data Sheet A1 or use similar format).

3.6 Personnel/Skills. Test Technician shall be qualified on basis of appropriate education, training, experience, and/or demonstrated skills.

4 Procedure

4.1 Preparation.

4.1.1 Unless otherwise specified in test request, samples are to be tested in as-received condition. This excludes any condition specifically caused by material storage or configuration (e.g., if debris falls into a threaded hole from laboratory rework, it is acceptable to blow debris out of holes).

4.1.2 Any modifications to parts, not specifically requested in test request that may affect test results, are to be documented in test notes. All test configurations, parts and noted deviations to be approved prior to executing test.

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 Review part quantities and condition.

4.3.2 Secure test part to T slot table or fixture.

4.3.3 Select proper tool, torque-angle transducer, and prepared fastener for clamp load measurement.

4.3.4 If applicable, configure Ultrasonic measurement device to capture tension values.

Note: Ultrasonic measurement and strain gaged fasteners are not suitable for determination of tension in plastic area.

4.3.5 Configure tooling to reproduce requested tightening strategy of fastener.

4.3.6 Align tool and torque transducer to prevent side loading.

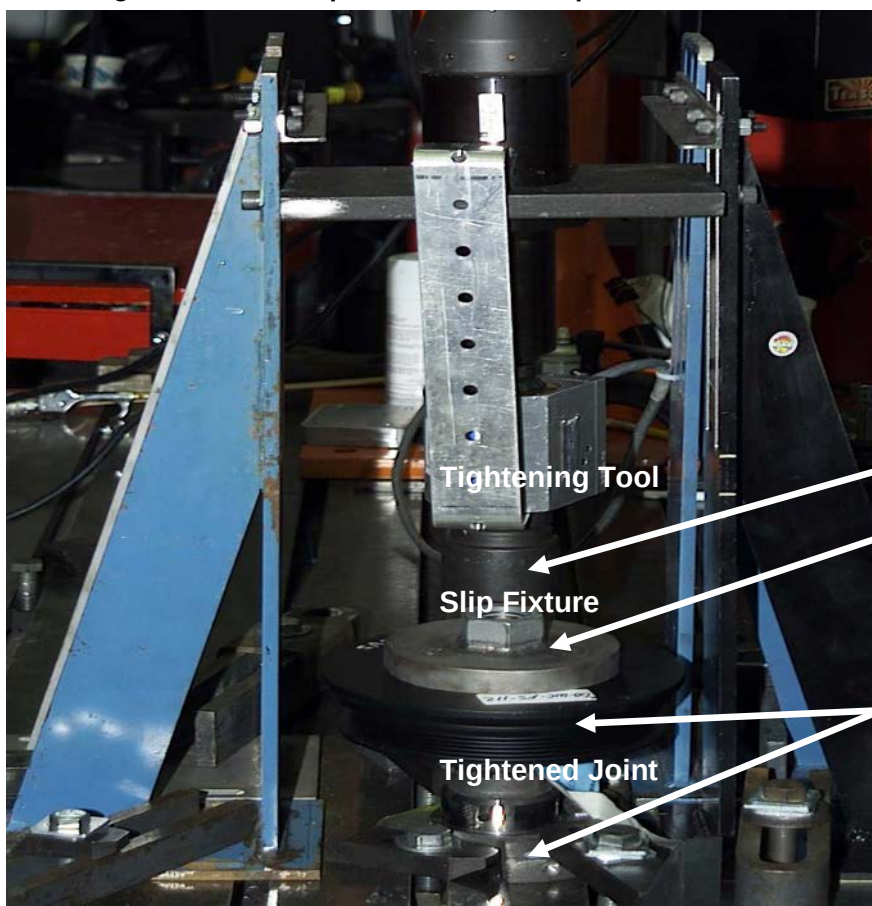
4.3.7 Unless otherwise specified, test requestor is to approve test setup.

4.3.8 Take photograph or digital image of test configuration.

4.3.9 Unless otherwise specified, tighten first sample according to tightening specification, recording peak installation torque, tension, and angle.

4.3.10 Apply slip torque (reference Figure 1 or use similar setup) to desired member while recording torque and angle. Continue applying torque until components slip relative to one another.

Figure 1: Test Setup with Fixture to Slip Rotational Joint



4.3.11 Review with requestor and receive approval prior to proceeding.

4.3.12 Repeat 4.3.9 and 4.3.10 for remaining test pieces.

4.3.13 Summarize all results according to requirements of Section 5.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation.

5.3.1 Summary of Results - Required.

5.3.1.1 Provide detail of failure modes consisting of, but not limited to, fastener fracture, component fracture, component distortion or internal or external thread stripping (if applicable).

5.3.1.2 Test incidents to be recorded on Appendix B, Data Sheet B1 or use similar format.

5.3.1.3 Test data summarization to be on Appendix C, Data Sheet C1 or use similar format.

5.3.1.4 Required plots and tabular data tables include items shown in Table 1.