



Audit Torque 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 the audit torque (also defined as static torque) necessary to rotate the driven threaded fastener after dynamic tightening.

1.2 Applicability. This procedure applies to joints using threaded fasteners.

1.3 Remarks. Unless otherwise specified, this procedure shall be performed within 5 minutes of the initial tightening event of all joints using threaded fasteners with new thread and bearing surfaces and new clamped members. Testing within 5 minutes will reduce the risk of obtaining erroneous torque values due to thread adhesive curing.

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

3 Resources

3.1 Facilities. General Motors 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. Calibrated digital direct read manual torque wrench (non-click style) with capability of capturing maximum torque values. The resolution and measuring range/metering capacity of the wrench should be suited for the expected torque scale. The use of flexible sockets or flexible extension bars is not permitted (alteration on the result due to non-perpendicularity). Extension bar shall be preferably short to reduce torsional wrap-up.

3.3 Test Vehicle/Test Piece.

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

3.3.2 To support the statistical significance of results, unless otherwise specified, a minimum of 8 samples are to be used for this procedure.

3.4 Test Time.

Calendar time: 2 days

Test time: Typical: < 1 day

Coordination time: 2 h

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3.5 Test Required Information. Test request documentation should include specific information and test parameters in a format similar to Appendix A, Data Sheet A1 example.

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

4 Procedure

4.1 Preparation.

4.1.1 Unless otherwise specified in the test request, samples are to be tested in the 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 the test request, that may affect test results are to be documented in the test notes. All test configurations, parts and noted deviations to be approved prior to executing test.

4.2 Conditions.

4.2.1 Environmental Conditions. Unless otherwise specified, test conditions shall be outlined in the test request documentation.

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 Tighten all fasteners to be audited to the specified tightening strategy according to Test Request documentation or Master Process Document (MPD).

4.3.4 Place a calibrated digital direct read manual torque wrench on the fastener to be audited. Make sure that the torque wrench and the fastener are properly aligned, and that the handle of the torque wrench is perpendicular to the fastener. Hold all non-driven members stationary to prevent rotation.

4.3.5 Apply force to the handle of the torque wrench in the direction of fastener tightening. Proceed in a slow, steady manner until the fastener rotates. Rotation should be sufficient to be perceivable but not excessive as to significantly increase torque and tension (approximately 5 degrees; for joints with longer grip length additional rotation may be needed). If possible, draw a line on the fastener or the socket used to drive the fastener in order to make rotation more visible.

4.3.6 Stop when fastener rotation is detected.

4.3.7 Record the maximum torque. Complete measurement of all fasteners to be audited in order of the tightening sequence, if specified.

4.3.8 Summarize results according to requirements in Section 5 of this procedure.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Acceptability of the results relative to product requirements is dependent on fastener application and load conditions. Pass/fail criteria should be stated in the evaluation request.

5.3 Test Documentation.

5.3.1 Summary of Results.

5.3.1.1 Audit torques and test incidents should be recorded on a Test Data Log Sheet similar to that shown in Appendix B, Data Sheet B1 example.

5.3.1.2 Other results as specified in Test Request documentation.

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