



Torque Transfer Test of a New Clutch

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. Testing of the torque transfer capability of a complete clutch system fitted with initial sample production parts and in completely new condition.

1.2 Applicability. For all running-dry clutch systems for passenger cars.

1.3 Remarks. The clutch system consisting of the clutch pressure plate, the clutch disc and flywheel (single mass or dual mass flywheel) is subject to the torque transfer test.

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.

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.

3.1.3 The tests shall be performed on a test bench which is capable of performing a clutch start-up / or braking operation (see test set-up in Appendix A, Figure A1).

3.2 Equipment.

3.2.1 Torque measuring shaft.

3.2.2 Flywheel mass or electric brake motor.

3.2.3 Clutch disc speed measurement.

3.2.4 Clutch release system.

3.2.5 Electric motor with drive unit.

3.2.6 Test bench computer.

3.2.7 Thermal couples.

3.3 Test Vehicle/Test Piece. At least 3 clutch pressure plates, 3 clutch discs, and 3 flywheels (single or complete dual mass or secondary flywheel side) from initial sample production.

3.4 Test Time. Not applicable.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

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4 Procedure

4.1 Preparation.

4.1.1 The friction surfaces of the parts shall not be cleaned before the test. The parts should not have been run-in or used in any kind before the test.

4.1.2 Before the test, the clutch pressure plate shall be checked for functional values as well as roughness and initial conicity.

4.1.3 Before the test, the clutch disc shall be measured for functional values.

4.1.4 Before the test, the flywheel (or secondary flywheel side) shall be checked for pot dimensions, roughness and initial conicity.

4.1.5 Thermal couples connected to corresponding measurement equipment shall be installed in the pressure plate and flywheel. The position of these should be on radial mean friction diameter and 4 mm below the friction surface.

4.1.6 A suitable flywheel mass or brake motor on the test bench shall be selected (see paragraph 4.3.1).

4.2 Conditions.

4.2.1 Environmental Conditions. The tests shall be performed at $(+23 \pm 5)^\circ\text{C}$ in an appropriate test chamber.

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 The test bench is set up with its flywheel mass or drive motor in such a way that the starting up or braking action of the clutch causes a specific friction energy of 30 J/cm^2 to be introduced into the clutch system. The rotational drive speed shall be in the range of $(1200 \text{ to } 2000) \text{ min}^{-1}$ during the energy input events. The time period between each energy input is 15 s until a pressure plate temperature of $(+120 \pm 10)^\circ\text{C}$ is reached before 100 events. After that, the time period between each energy input shall be chosen so that a constant pressure plate temperature of $(+120 \pm 10)^\circ\text{C}$ is maintained for the entire remaining test period.

If a temperature of $+120^\circ\text{C}$ cannot be reached before 100 events, consult design responsible engineer.

4.3.2 The entire process shall be repeated according to Table 1.

Table 1: Test Cycle

No. of Energy Events	Controlled Pressure Plate Temperature in $^\circ\text{C}$	Specific Energy in J/cm^2
700	120 ± 10 (before 100 energy events)	30

5 Data

5.1 Calculations. A mean torque is calculated from the measured torque as a function of slip time using the integration method.

For this calculation, the discrete measurement points between starting and ending of the cycle will be used for the integration.

$$\bar{M} = \frac{1}{t_{\text{End}} - t_{\text{Start}}} \times \int_{t_{\text{Start}}}^{t_{\text{End}}} M(t) dt$$

5.2 Interpretation of Results. The clutch torque measured on the tested parts shall be $\geq 1.1 \times$ maximum engine torque and friction coefficient $\mu \geq 0.23$.

Deviations from the evaluation standard criteria above shall have been agreed upon and specified in the SSTs.

5.3 Test Documentation. See Appendix B, Figure B1 for an example representation of the results.

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