



Measurement and Evaluation of Clutch Pedal Return Time

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. Recording of the clutch pedal return time and hydraulic pressure return time when slipping off from the clutch pedal. Measurements at various temperature conditions.

1.2 Applicability. For all vehicles with manual transmission and hydraulic clutch apply.

1.3 Remarks. None.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW15628

2.3 Additional References.

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 A room and a cooling chamber with power supply, exhaust gas extraction and level ground.

3.2 Equipment. Data recording device for the following measurement data:

3.2.1 Hydraulic pressure sensor (sampling rate ≥ 5 kHz).

3.2.2 One (1)-axial acceleration sensor at clutch pedal (sampling rate ≥ 5 kHz).

3.2.3 Gearbox oil temperature (sampling rate approximately 1 Hz).

3.3 Test Vehicle/Test Piece. Operable vehicle with representative clutch actuation system (clutch, hydraulic and pedal box).

For standard measurements at cold conditions it is recommended to use a worst case clutch system. It means that the clutch system release force is located at the lower tolerance limit over the whole range of actuation.

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April 2018

Page 1 of 9

3.4 Test Time.

Calendar time:	6 d
Test time:	9 h
Coordination time:	8 h
Analysis	8 h

3.4.1 Coordination Hours Buildup.

Pedal box assembly and reassemble:	2 d
Clutch assembly and reassembly:	16 h
Sensor assembly and reassembly:	3 h

3.4.1.1 Testing at Ambient Temperature (Approximately +25 °C).

Testing:	3 h
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3.4.1.2 Testing at Cold Condition (-30 °C).

Cold chamber cooling:	8 h
Testing:	3 h

3.4.1.3 Testing at Cold Condition (-40 °C).

Cold chamber cooling:	8 h
Testing:	3 h

3.5 Test Required Information. Possible sources are:

- SOR (Statement of Requirements)
- VTS (Vehicle Technical Specifications)
- SSTS (Sub System Technical Specifications)
- Analysis, Development and Validation (ADV) Plan
- Bill of Design (BOD)/Bill of Material (BOM)
- Vehicle Cross Reference Index (VCRI)
- Application Engineer
- Development Groups
- Drawings.

3.5.1 Documentation.**3.5.1.1 General Information/Numbering.**

- Project
- Vehicle Number
- Engine
- Transmission
- Drive
- Date of Measurement
- Mileage of Test Vehicle

3.5.1.2 Clutch Component Measurement.**GM Confidential**

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April 2018

Page 2 of 9

Documents

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- Release force characteristic measured with complete clutch system (pressure plate, clutch disk, flywheel)
- Pressure plate lift off (of system and set)
- Spring deflection of clutch disk
- Free travel of clutch disk

3.5.1.3 Part Numbers of further Components.

- Single Mass Flywheel (SMF)/Dual Mass Flywheel (DMF)
- Clutch disk
- Clutch pressure plate
- Concentric Slave Cylinder (CSC)
- Elbow connector (Peak torque limiter)
- Hydraulic pipe
- Concentric Master Cylinder (CMC)
- Pedal box
- Supporting spring: Type/Mounting

3.6 Personnel/Skills. Test engineer to perform the slipping off from the clutch pedal. Test engineer to evaluate results and to perform a subjective rating of the investigated system. Skilled mechanic is necessary to determine different component characteristics.

4 Procedure

4.1 Preparation.

4.1.1 Check fuel and radiator fluid for cold chamber conditions.

4.1.2 Install hydraulic pressure sensor into hydraulic pipe between Peak Torque Limiter (PTL) adapter element and elbow connector so that the pressure is measured between CSC and PTL. If PTL is included in the elbow connector the following arrangement should be accomplished: Remove PTL from elbow connector and include it into a separate adapter in order to keep the sequence; elbow connector - hydraulic pressure sensor - PTL adapter (see Appendix A, Figure A1).

4.1.3 Remove the clutch pedal rubber.

4.1.4 Install one (1) axial acceleration sensor at side of the clutch pedal arm in direction of vehicle or perpendicular to clutch pedal surface. The installation shall not collide with the carpet or other parts in the surrounding area.

4.1.5 Attach vehicle to exhaust gas extraction.

4.1.6 A system check according to GMW15628 is recommended also with installed equipment for return time measurements.

Note: Pedal travel and pedal force sensors from clutch pedal characteristic measurements have to be detached for the return time measurements.

4.2 Conditions.

4.2.1 Environmental Conditions.

4.2.1.1 Test to be performed at room temperature of (+20 °C to +30 °C) with transmission oil temperature in the range of (+20 °C to +40 °C).

4.2.1.2 Further testing conditions at air and transmission oil temperatures of:

- -40 °C (only static condition with engine off)
- -30 °C

For these conditions the cooling period starting each from a warmed up vehicle at ambient room temperature approximately +20 °C and dry condition needs to be enough to ensure a completely cooled vehicle.

If required measurements at transmission oil temperatures of -25 °C, -20 °C, and 0° can be performed by continuously running the engine at idle starting from measurement at -30 °C.

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April 2018

Page 3 of 9