



Vehicle Top Speed

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. The purpose is to measure top speed of a vehicle.

1.2 Applicability. This procedure applies to the following vehicles with any type of transmission.

- Passenger cars.
- Multi-purpose passenger vehicles.
- Light-duty trucks.
- Medium-duty trucks.

1.3 Remarks. This procedure describes the determination of a vehicle's top speed.

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.

- GMPT-E VEC001 (**Note:** The supplier shall work with the responsible GM Engineer to comprehend this requirement.)
- Integration Driven Subsystem Requirements (IDSR)
- Subsystem Technical Specifications (SSTS)
- Vehicle Technical Specifications (VTS)

3 Resources

3.1 Facilities. Road Tests shall be conducted on a recommended road surface as follows:

- a. The road must be dry, clean, smooth and free from undulations. The road surface shall be concrete or rolled asphalt.
- b. The road surface may not exceed 0.5% grade.
- c. Track must be sufficient length to perform test, see (d).
- d. The road should be straight within one degree; a circular track with neutral steer capability up to very high speeds or an oval track (both providing "infinite" track lengths) may be preferable to a straight track due to the required track length to reach a stabilized top speed.
- e. The road/track must allow vehicle speeds up to the individual top speed for the test vehicle. Check with traffic safety for potential arrangements if necessary.

GM Confidential

© Copyright 2014 General Motors Company All Rights Reserved

November 2014

Page 1 of 6

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 Vehicle Speed Measurement Device. There are two methods of measuring top speed. The best method does not require a vehicle speed measurement device; the best practice is based on a simple time measurement. Vehicle speed is then determined by the ratio of distance traveled and required time to cover the distance. See 4.3 for further details.

In case a speed measurement device is used, it is **not** recommended to use a sensor that is mounted outside the vehicle due to the impact on the aerodynamic properties of the test vehicle. However, any speed sensor used, e.g., a Global Positioning System (GPS) sensor, has to fulfill the following requirements:

- **Speed Range:** Select an appropriate sensor according to the expected top speed of the individual test vehicle.
- **Accuracy:** Less than $\pm 0.5\%$.

3.2.2 Engine Tachometer. A tachometer with an accuracy of $\pm 0.15\%$ and a resolution of 10 rpm is required.

3.2.3 Data Acquisition System. A data acquisition system (DAC) capable of recording all the "test parameters", within a time base accuracy of $\pm 0.1\%$ of the total sample time interval is required. The DAC must be capable of storing all the "test parameters" at a minimum rate of ten samples per second for at least 30 minutes.

3.2.4 Vehicle Scales. Scales capable of measuring vehicle weight to an accuracy of ± 3 kg (± 5 lb). Scale must be capable of recording the individual load for all wheels. This has relevance for checking proper weight distribution. A copy of the scale print report should be obtained for reference.

3.2.5 Tire Pressure Gage. Tire pressure gage to measure tire pressure with an accuracy of ± 5 kPa (± 1 psi).

3.2.6 Safety Equipment. Check with the test facility for safety equipment requirements.

Note: All instrumentation shall be calibrated as required. Record instrumentation details and date of calibration on a test data sheet, unless information is otherwise preserved in the testing facility records.

3.3 Test Vehicle/Test Piece.

3.3.1 Engine. Ensure that the engine delivers the rated power in order to be capable to reach target top speed. The engine performance test can either be done on an engine dynamometer or preferably in the test car itself, using GM Powertrain - Europe (GMPT-E) test procedure GMPT-E VEC001 (or respective GMW standard).

3.3.2 Transmission/Drivetrain. The Transmission/Drivetrain should be broken in for a minimum of 500 km.

3.3.3 Brakes/Chassis.

3.3.3.1 Brakes should be inspected prior to testing.

3.3.3.2 Brake drag is very important. It should be within the Subsystem Technical Specifications (STS), Integration Driven Subsystem Requirements (IDSR), and/or Vehicle Technical Specifications (VTS) target range.

3.3.3.3 Chassis engineer should check test vehicle prior to high speed coastdown test.

3.3.3.4 Wheel alignment as well as standing height should be adjusted to nominal values.

3.3.3.5 Vehicle standing heights should be adjusted to nominal values. This affects aero and is a critical contributor to road load at high speeds.

3.3.4 Exterior Trim/Aerodynamics. Record any variations or exceptions to the exterior trim configuration.

3.3.4.1 The test vehicle should be a base vehicle since optional equipment such as large tires, open front grill for vehicles with air conditioning (A/C), spoilers, etc., influences aerodynamic properties. **Note:** Background: User manual guarantees top speed and other vehicle properties for only the base vehicle. It mentions the negative effect of optional equipment regarding vehicle performance as well as fuel economy.

3.3.4.2 The Aerodynamic Department should check the test vehicle prior to top speed tests. Deviation from targeted aero is to be considered during analysis of test data.

3.3.4.3 Measured aero for the individual test vehicle is recommended in order to facilitate analytical adjustments.

GM Confidential

© Copyright 2014 General Motors Company All Rights Reserved

November 2014

Page 2 of 6