High Speed Coastdown Road Load Determination

1 Scope

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 measure the high speed road load (up to ≈ 10 km/h below top speed) of a vehicle by recording vehicle speed and deceleration vs. time.

1.2 Foreword.

1.2.1 This standard describes the determination of a vehicle's high-speed road load. These values are required to be able to:

1.2.1.1 Simulate high-speed fuel consumption.

1.2.1.2 Accurately predict top speed and acceleration behavior in the high speed area close to top speed.

1.2.1.3 Calculate back on engine torque at the flywheel when additional in-gear acceleration data (among others) are available.

Important: Do not confuse this Test Procedure with GMW15007, "Global Regulatory Coastdown Procedures." GMW15007 defines procedures for measuring roadload per various government regulations for use in dynos that are conducting emission testing and (if applicable) fuel economy testing. There are differences in test setup, instrumentation, vehicle prep, test execution, etc.

1.3 Applicability. As follows:

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

with any kind of transmission.

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 Road Tests shall be performed on the following recommended road surface as follows:

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3.1.3.1 The road must be dry, clean, smooth and free from undulations. The road surface shall be concrete or rolled asphalt.

3.1.3.2 The road surface may not exceed 0.5 % grade.

3.1.3.3 The road should be straight within 1°; a circular track with neutral steer capability up to very high speeds might even be better due to the required track length (infinite for a circular track).

3.1.3.4 Track shall be sufficient length to perform test (see paragraph 3.1.3.3).

3.1.3.5 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.

3.1.4 GME conducts tests at the GME Proving Ground in Dudenhofen. Altitude is ≈ 100 m above sea level.

3.1.5 GMB conducts tests at CAPG in Indaiatuba. Altitude is ≈ 570 m above sea level.

3.2 Equipment.

3.2.1 Vehicle Speed Measurement Device. A speed measurement device (i.e., calibrated fifth wheel, a hub-mounted pulse generator or an optical sensor) shall be securely mounted to the vehicle.

- Speed Range: (0.5 to 400) km/h
- Distance resolution: 2.2 mm
- Measurement deviation: < ± 0.1 %

3.2.2 Accelerometer Assembly. An accelerometer with a minimum range of ± 1.0 G, an accuracy of ± 1.0 % and a resolution of 0.005 G is required. The accelerometer shall be able to be adjusted in line with the longitudinal axis of the vehicle. A leveling bubble may be used as a visual indication for leveling the plate in the horizontal plane.

3.2.3 Engine Tachometer. A tachometer with an accuracy of ± 0.15 % and a resolution of 10 min^{-1} is required.

3.2.4 Data Acquisition System. A data acquisition system (DAC) capable of recording all the "test parameters," within a time base accuracy of ± 0.1 % of the total sample time interval is required. The DAC shall be capable of storing all the "test parameters" at a minimum rate of 100 samples per second for 3 minutes.

3.2.5 Vehicle Scales. Scales capable of measuring vehicle weight to an accuracy of ± 3 kg (or 5 lb) are required. A copy of the scale print report should be obtained for reference.

3.2.6 Tire Pressure Gage. A tire pressure gage to measure tire pressure with an accuracy of ± 5 kPa (or 1 psi) is required.

3.2.7 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 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 is close to rated power in order to be capable of accelerating the test vehicle close to targeted top speed.

3.3.2 Transmission/Drivetrain. Transmission and Drivetrain should be broken in for a minimum mileage 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 SSTS/IDSR/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.

3.3.4.1 Record any variations or exceptions to the exterior trim configuration.

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