



Accelerating In a Turn (AIT)

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 of this test procedure is to evaluate a vehicle's response accelerating in a turn (AIT) maneuver at test speed on various road surfaces; at 80% of the maximum attainable lateral acceleration on the test surface.

1.2 Applicability. This procedure is applicable to all passenger cars, multi-purpose vehicles and light trucks.

1.3 Remarks. The AIT test procedure is an open loop test procedure. There is no driver intervention beyond the prescribed AIT steering and throttle inputs.

This test procedure establishes a common set of tools to be used for testing Yaw Rate response among all GM regional engineering centers.

Modifications to this procedure may be necessary to comprehend the exact conditions for testing to a particular technical specification, regulation or Best Practice. The test request will specify the details needed to meet the testing requirements of a particular technical specification, regulation or Best Practice.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW15376

2.3 Additional References.

- For all Best Practices, the supplier shall work with the GM responsible engineer to comprehend this requirement.
- Subsystem Technical Specification (SSTS).
- Vehicle Technical Specification (VTS).

3 Resources

3.1 Facilities. See 3.1.3 thru 3.1.5.

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 Laboratory for test vehicle setup and instrumentation installation.

3.1.4 Vehicle test surface of sufficient size to execute the AIT maneuver. Examples of surfaces include wet asphalt, wet jennite, wet epoxy, wet basalt, snow and ice.

3.1.5 Vehicle weighing facilities capable of measuring vehicle weight at each corner.

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3.2 Equipment.

3.2.1 Digital data acquisition system (DAS) capable of 100 Hz scan rate for all data channels.

3.2.2 Longitudinal Speed Measurement Device and Readout. The speed transducer must be capable of reading velocity in excess of the vehicle test speed, a minimum of 150 km/h is recommended. The transducer accuracy must be within 0.5 km/h over the speed range of 5 km/h to 150 km/h.

3.2.3 Lateral Speed Measurement Device and Readout. The speed transducer must be capable of reading velocity in excess of the vehicle test speed, a minimum of 50 km/h is recommended. The transducer accuracy must be within 0.5 km/h over the speed range of -50 km/h to 50 km/h.

3.2.4 Accelerometer Oriented to Measure Longitudinal Acceleration. The accelerometer must be capable of measuring a minimum of 1.2G, with an accuracy of 0.01G.

3.2.5 Accelerometer Oriented to Measure Lateral Acceleration. The accelerometer must be capable of measuring a minimum of 1.2G, with an accuracy of 0.01G.

3.2.6 Angular Rate Sensor Oriented to Measure Yaw Velocity. The angular rate transducer must be capable of measuring at ± 50 degrees/s with an accuracy of 0.01 degrees/s.

3.2.7 Steering Wheel Angle (SWA) transducer equipped with a stopping mechanism which allows the driver to perform step steer inputs to a prescribed steering angle.

3.2.8. Accelerator Pedal Position Transducer. This can be acquired using a string potentiometer or by tapping into the analogue on-vehicle pedal position sensor.

3.2.9 Roll angle transducer (optional).

3.2.10 Sideslip angle transducer (optional).

3.2.11 Appropriate signal conditioning equipment and cabling.

3.2.12 All instrumentation is to be calibrated as required. Instrumentation identification numbers and calibration dates shall be recorded and stored with test information.

3.3 Test Vehicle/Test Piece.

3.3.1 Test vehicle and vehicle modes are to be defined by the requesting engineer with the assistance and guidance of the chassis measurement engineer.

3.3.2 Examples of vehicle modes include traction control on/off, stability control on/off, 4-wheel drive, 2-wheel drive, etc.

3.3.3 It is important to understand all vehicle modes and their interactions with other vehicle systems. For instance, certain vehicles disable traction control when running in 1st gear. The 1st gear is the recommended gear selection for the AIT procedure.

3.4 Test Time.

Calendar time: 1 to 3 days, depending on the number of vehicle modes to tested.

Test time: 3 to 6 hours/vehicle mode. This includes the Maximum Lateral and AIT procedure.

Coordination time: 4 to 8 hours for data processing and analysis.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills.

3.6.1 Chassis test technician capable of installing and configuring all vehicle instrumentation necessary.

3.6.2 Test driver certified for handling test and capable of operating measurement equipment.

3.6.3 Chassis engineer capable of processing acquired test data.

4 Procedure

4.1 Preparation.

4.1.1 Vehicle Preparation.

4.1.1.1 Fill the vehicle gas tank to full capacity.

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