



Wheel Trim Retention and Noise Evaluation

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 determine wheel trim retention capability to the wheel when the vehicle is subjected to severe braking, severe jolting, severe turning maneuvers, and automatic car wash operations. Also, verify for a noise free wheel-trim to wheel-interface, and capability of the vehicle supplied tools to remove wheel trim.

1.1.1 Method A. European test road facility.

1.1.2 Method B. North American test road facility.

1.1.3 Method C. Australian test road facility.

1.2 Foreword. This procedure has the capability if used in totality to evaluate the following:

1.2.1 Installation and removal characteristics of the vehicle wheel trim.

1.2.2 Heat effects (through brake heat transfer).

1.2.3 Wheel trim generated noise and movement.

1.2.4 Retention under severe maneuvers.

1.2.5 Retention under severe impacts.

1.2.6 Retention under severe road environmental conditions.

1.2.7 Automatic car wash effects.

1.2.8 Curb interference.

1.2.9 Gravel entrapment.

1.2.10 This test attempts to duplicate incidents that may occur through normal or greater than average customer use. If the trim becomes loose, contact the requesting engineer before continuing. This test does not evaluate for effects of corrosion or for police, military, or special vehicle requirements.

1.3 Applicability.

1.3.1 Region. Some regions may have market road systems that do not require evaluation of all test segments stated within this document. Determine the correct test segments to be operated per the Validation Guidelines for the design being evaluated.

1.3.2 Vehicle Applicability. This test procedure is applicable for passenger vehicles, light duty trucks including dual wheel usages, or multipurpose vehicles.

Note: For these tests, the vehicle does not need to be at gross axle mass rating (GAMR); however, the vehicle may be at GAMR for these tests to minimize the unloading and re-loading of ballast.

- 4.3.15 Automatic Car Wash Test
- 4.3.16 Curb Clearance Test
- 4.3.17 Pass-By Noise Evaluation with Wheel Trim – Post Test
- 4.3.18 Trim Removal and Installation – Post Test

1.3.3 Trim Applicability. All trim attachment methods.

1.3.4 Clad Wheel Applicability. All clad wheel attachment methods.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW16333

GMW16590

Note: The Belgian Block schedule that is performed during Vehicle Durability testing has different vehicle speeds. The most noteworthy difference is that the vehicle durability testing uses a vehicle speed of 40 km/h (25 mph) in the turns while this procedure uses 55 km/h (35 mph). Therefore, this procedure generates a greater magnitude of lateral loads than obtained during vehicle durability testing.

2.3 Additional References.

DR.LL.7PCC Police Challenge Course

DR.LL.BB5 Belgian Block Loop

Design Validation Guidelines

Vehicle Tire Placard

3 Resources

3.1 Facilities. Refer to Appendix B, Test Facility Chart.

3.2 Equipment.

3.2.1 Marking Tools. Marker, scribe or equivalent.

3.2.2 Vehicle Ballast. All ballast shall be properly secured to the vehicle prior to testing.

3.2.2.1 Ballast Bags. Use as needed to obtain proper vehicle mass.

3.2.2.2 Ballast Bottles. Use as needed to obtain proper vehicle mass.

Note: Ballast bottles shall be fully evacuated before installation or removal from a vehicle.

Note: Do not lift filled ballast bottles (water babies).

3.2.3 Vehicle Scales. Use to determine front and rear axle weight.

3.2.4 Temperature Measurement Devices. Thermocouple and readouts or **Teletemp**, heat sensitive recording tape may be used as required.

Note: Used only for heat effects evaluation.

3.2.5 Acceleration Measurement Devices. Accelerometer and related hardware, as needed.

3.2.6 Vehicle Speed Measurement Device (Radar Gun). Mount radar gun in vehicle to measure vehicle velocity during various testing (e.g., pothole testing) as needed.

3.2.7 Driver's Safety Equipment. Driver's full safety equipment including helmet and restraint system per local test facility regulations.

3.2.8 Torque Wrench. Use to properly record the service torque value for wheel trim fasteners.

3.2.9 Tire Pressure Gauge. Use to determine proper tire pressure according to vehicle requirements.

3.2.10 Air Inflation Chucks. Use to determine proper access for the various air inflation chucks.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Vehicle. The heaviest model released for a given model line in which the wheel trim is released.

3.3.2 Wheel Trim Tool. Wheel trim installation/removal tool as specified by requester. Since most vehicles are mules, the requester shall supply the proper trim removal tool if not already supplied or stocked.

3.3.3 Wheel Trim.

3.3.3.1 Method A. Use four (4) wheel trim pieces at nominal dimensions.

3.3.3.2 Methods B and C. Four (4) wheel sets of wheel trim (wheel covers, trim rings, hub caps, nut caps, wheel bezels, etc.)

3.3.3.2.1 Two (2) wheel sets of trim shall have minimum retention dimensions in wheel trim retaining areas.

3.3.3.2.2 Two (2) wheel sets of trim shall have maximum retention dimensions in wheel trim retaining areas.

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August 2012

Page 2 of 26

3.3.3.2.3 Identify wheel trim accordingly.

Note: The need for minimum/maximum retention trim may not apply to some trim designs.

3.3.4 Wheels. Four (4) wheels as specified for vehicle selected.

Note: In general, the wheel with the narrowest rim width will produce the most adverse results.

3.3.4.1 Method A. Wheel pieces shall have nominal dimensions.**3.3.4.2 Methods B and C.****3.3.4.2.1** Two (2) wheels shall have minimum retention dimensions in wheel trim retaining area.**3.3.4.2.2** Two (2) wheels shall have maximum retention dimensions in wheel trim retaining areas.**3.3.4.2.3** Identify wheels accordingly.

Note: The need for minimum/maximum retention wheels may not apply to some trim designs.

3.3.5 Tires. Use tires with flange protection beads when released for steel and clad wheels applications. Or, use tires having the greatest lateral traction released for wheel trim evaluated.

3.3.6 Valve Stems and Extensions. Design intent valve stems and extensions, as specified.**3.4 Test Time.****3.4.1 Method A.**

Calendar time: 1 day

Test hours: 3 hours

Coordination hours: 3 hours

3.4.2 Methods B and C.

Calendar time: 5 days

Test hours: 28 hours

Coordination hours: 12 hours

3.5 Test Required Information. The test requester shall provide all test information, material, and special tools.

3.5.1 Test Material Information. Record all information for the test vehicle, wheel trim tool, wheel trim, wheels, tires, and valve stems on Data Sheet A1, section 3.5, Appendix A.

3.5.1.1 Record test vehicle mass, curb and/or Gross Vehicle Mass Rating (GVMR), for test.

3.5.1.2 Record the method used for removal/installation of trim.

3.5.1.3 For bolt-on wheel trim, record special nut cap service torque specifications (i.e., hand-tighten snug plus one-quarter ($\frac{1}{4}$) turn, 5 Nm, etc.) using production intent tools, or wrench.

3.5.1.4 Record tire pressures to be used in test. Use value specified on the test request or if unstated, use the maximum pressure specified on tire placard.

3.5.1.5 Determine if air chuck(s) have proper trim/wheel clearance for tire inflation.

3.5.2 Wheel/Trim Test Combinations. The requester shall determine the test combinations and vehicle locations. For Methods B and C review note in paragraph 4.1.5.

3.5.3 Tests to Run. Determine which tests are to be completed and record on the data sheets.

3.5.4 Special Test Considerations.

3.5.4.1 Heat Effect Test. Reference section 4.3.3 of Data Sheet A1, Appendix A.

3.5.4.1.1 Determine if traditional high-temperature test shall be performed. It may not be required if wheel trim does not contain plastic tension or styling components.

3.5.4.1.2 Determine if only maximum temperatures are to be measured and recorded. Then determine if **Teletemp** stickers (maximum temperature only devices) or thermocouples are to be used. Infrared (IR) thermometers may also be used.

3.5.4.1.3 Determine and record location of expected wheel and wheel trim high temperature for placement of thermocouples or **Teletemp** stickers. Locations may vary depending on wheel trim design.

3.5.4.2 Police, Military, or Special Vehicle Use Trim. Wheel trim released for police, military, or special vehicle use may require different methods of producing heat to stimulate higher temperatures found during use. Determine methods for generating heat in the Heat Effects test that would simulate expected temperatures.

3.5.4.3 Optional. Determine if the 4.3.1.5 Automatic Car Wash Test is to be performed. It may be eliminated if testing has been or will be performed using GMW16333. If the 4.3.1.5 Auto Wash Test is selected, note that due to limited repetitions of the auto wash cycle, additional lab testing may need to be performed for fatigue modes related to multiple cycles (i.e., wear of painted surfaces due to brush components, etc., if applicable).

3.6 Personnel/Skills.

3.6.1 Drivers must be certified based on local test site requirements.

Note: For Milford Proving Grounds, driver/vehicle-operator must have completed the Full Road Orientation, Advance Driver Training, the North/South Straightaway Orientation, and the High G Driver Training.

3.6.2 Persons performing noise evaluation must have reasonable (normal) unaided hearing.

4 Procedure

4.1 Preparation.

4.1.1 Ballast Vehicle. Ballast vehicle to GAMR or curb mass (as specified in each test event).

4.1.2 Test Piece Requirements.

4.1.2.1 Method A.

4.1.2.1.1 Obtain four (4) wheels and wheel trim components with nominal retention dimensions.

4.1.2.2 Methods B and C.

4.1.2.2.1 Obtain two (2) **minimum retention** wheels and two (2) **maximum retention** wheels. Additionally obtain two (2) **minimum retention** wheel trim pieces and two (2) **maximum retention** wheel trim pieces, unless otherwise directed by the requesting engineer.

4.1.3 Temperature Measurement Devices. If necessary, install the following if specified by the requesting engineer. Infrared (IR) thermometers are also allowed.

4.1.3.1 Teletemp stickers on each front wheel trim inner surface at location as specified. It may be needed to identify the location of the sticker on the outside of the trim in order to optimize heat soak positioning.

4.1.3.2 Thermocouples as specified by the requesting engineer.

4.1.4 Tire and Wheel Assembly Preparation. Mount tires on the test wheels. Inflate and balance as required. Inflate to the specified tire pressure.

4.1.5 Wheel Mounting Setup. Install wheel(s) onto vehicle.

Note: If using retention sensitive wheels, install the minimum retention wheels on the left-front and right-rear positions. Install the maximum retention wheels on the right-front and left-rear positions, unless otherwise directed by the requesting engineer.

4.1.6 Miscellaneous Hardware Assembly. Install valve stem extensions, if applicable.

4.1.7 Trim Mounting Setup. Install wheel trim onto vehicle by centering the trim about the valve stem, as best as possible. Tighten trim nut caps, if applicable, per specified tightening process. Then using a torque wrench, measure and record the audit torque values for only the right side wheels, in section 4.3.2 of Data Sheet A1, Appendix A. Left side wheels are measured per section 4.3.2.3.2.

Note: If using retention sensitive wheel trim components, install the maximum retention wheel trim on the maximum retention wheels and the minimum retention wheel trim on the minimum retention wheels using the specified tool, as needed.

Note: All wheel trim (both sides of vehicle) must be properly seated with no foreign material in the attachment. Scribe or mark wheel trim relative to each wheel to determine if any position change occurs during testing.

Note: If nut cap torque value is not specified tighten with a torque wrench to 5 Nm.

4.2 Conditions.

4.2.1 Environmental Conditions. Ambient temperature shall be above 10 °C (50 °F), unless otherwise specified.

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 Initial Noise Evaluation.

4.3.1.1 Perform Noise Evaluation. While driving vehicle slowly in garage or parking area, have a person stand outside the vehicle to listen for trim noise, both straight line and with steering wheel input. Additional, road surfaces may also be used (e.g., chatter bumps, broken concrete, etc.) Record observations in section 4.3.1 of Data Sheet A1, Appendix A.

4.3.2 Trim Removal and Installation Pre-Test (GAMR).

4.3.2.1 Level Vehicle. Place vehicle on level ground.

4.3.2.2 Remove/Install Wheel Trim.

4.3.2.2.1 Method A.

4.3.2.2.1.1 Remove/install each wheel trim, on the driver's side (left side) only, one (1) time with the tool(s) and method specified by requester. If trim has nut caps, use service torque procedure to tighten.

4.3.2.2.2 Methods B and C.

4.3.2.2.2.1 Remove/install each wheel trim, on the driver's side (left side) only, ten (10) times with the tool(s) and method specified by requester. If trim has nut caps, use service torque procedure to tighten.

4.3.2.2.3 Record. Record the following observations in section 4.3.2 of Data Sheet A1, Appendix A.

- Ease or difficulty in installation or removal of wheel trim.
- Can wheel trim with alignment features be improperly aligned?
- Visual damage to wheel or wheel trim.
- All difficulties, interference, including wheel weights, contact/damage to air valve or air valve extensions.

4.3.2.2.4 Center the trim about the valve stem as best as possible. If gap between wheel trim and valve stem is less than or equal to 2 mm (0.080 in), measure and record the value on Data Sheet A1, Appendix A, as applicable. Measure gap by sweeping a pin gage around the valve stem holding the pin gage parallel to the valve stem axis.

4.3.2.3 Deflate Left Front Tire.

4.3.2.3.1 Method A. Not applicable.

4.3.2.3.2 Methods B and C.

4.3.2.3.2.1 Deflate Left Front Tire. Remove wheel trim one (1) time with tool(s) and method specified by the requester. Record ease or difficulty in removal and if any damage occurs to wheel trim in section 4.3.2 of Data Sheet A1, Appendix A.

4.3.2.3.2.2 Re-inflate Tire. Re-inflate tire to maximum pressure. Re-install wheel trim. Trim must be properly seated with no foreign material in the attachment zone. Center the trim about the valve stem as best as possible. Tighten trim nut caps, if applicable, per specified tightening process. Then measure and record, on Data Sheet A1, Appendix A the audit torque values using a torque wrench. If gap between wheel trim and valve stem is less than or equal to 2 mm (0.080 in), measure and record the value on Data Sheet A1, Appendix A as applicable. Measure gap by sweeping a pin gage around the valve stem holding the pin gage parallel to the valve stem axis. Scribe or mark wheel trim relative to wheel to determine if any change in position occurs during testing. Identify all interferences or problems with air supply nozzle when attempting to inflate tires. Record observations in section 4.3.2 of Data Sheet A1, Appendix A.

4.3.2.3.2.3 If front and rear wheel, wheel trims are different, repeat paragraphs 4.3.2.3.2.1 through 4.3.2.3.2.2 for Left Rear Tire.

4.3.3 Heat Effect Test at Beginning of Test (GAMR).

Note: Testing methods for wheel trim evaluation used in police, military, or special-use packages may be different than those shown below.

4.3.3.1 Traditional Test.

Note: This is the original high temperature test. This test is used primarily to evaluate parts made of plastic.

4.3.3.1.1 Proceed to Straightaway Test Track. For Milford Proving Grounds (MPG) drive to the North/South Straightaway.

4.3.3.1.2 Perform Test. Perform 15 brake stops from 95 km/h (60 mph) at 5 m/s² (15 ft/s²) deceleration. Stop intervals are 0.6 km (0.4 mi). To reduce cooling effects, finish stops at or near a heat soak area.

4.3.3.1.3 Vehicle Heat Soak. Park vehicle in an appropriate area and heat soak for 30 minutes.

Note: On some trim designs it may be necessary to park the vehicle so that **Teletemp** stickers or thermocouples are adjacent to or vertically above the brake caliper on at least one (1) wheel. This has been shown to produce the highest temperatures due to the caliper mass acting as a heat sink.

4.3.3.1.4 Evaluate Trim - Post Heat Soak. After soak, quickly do the following:

4.3.3.1.4.1 Record ambient temperature, on Data Sheet A1, Appendix A.

4.3.3.1.4.2 If using thermocouple or IR thermometer, record wheel and wheel trim maximum temperatures at each front wheel position in section 4.3.3 of Data Sheet A1, Appendix A.

Note: If using **Teletemp** stickers, wait until Paragraph 4.3.18 to record readings.

4.3.3.1.4.3 Record maximum front strut tower temperatures on Data Sheet A1, Appendix A.

4.3.3.1.4.4 Visually inspect wheel trim for rotation, cracks and inspect for looseness using a light touch of the hand. Record observations on Data Sheet A1, Appendix A.

Note: If trim or nut caps are loose after this test, operator should drive back to the garage area and contact the requester before proceeding with remainder of test.

4.3.3.1.5 Exit Test Track. Exit the Straightaway Test Track area and return to garage for inspection.

4.3.3.1.6 Inspect Vehicle. Inspect the front and rear brake linings and replace as required.

4.3.4 Pass-By Noise Evaluation with Wheel Trim – Post Heat Effect (GAMR).

Note: Additional specific road surfaces/equipment are available at the Milford Proving Grounds (MPG) within the Fenn Holden Test Area, Interior Noise Road, and the MPG Road Simulator or equivalent when additional wheel trim noise investigations are necessary.

4.3.4.1 Trim Adjust. Adjust wheel trim, as necessary, to assure proper seating and alignment with scribed line.

4.3.4.2 Proceed to Test Track. For Milford Proving Grounds drive to the Pontiac Trail Access Road in the Fenn Holden Test Area.

4.3.4.2.1 Perform Test - Smooth Road Input. Drive the vehicle parallel to the sound reflecting wall. About halfway along the wall add left-right steering wheel inputs. Travel at speeds of 10 km/h, 15 km/h, and 25 km/h (5 mph, 10 mph, and 15 mph) with the vehicle windows down and all accessories off. Determine if noises are due to wheel trim. Include noises observed during turnaround maneuver after each pass.

Note: Add only enough steering wheel input to impute some additional wheel flex, but remain within your road lane.

4.3.4.2.2 Perform Test - Rough Road Input.

4.3.4.2.2.1 Drive the vehicle over the broken concrete roadway (washboard) road surface. Additional road test areas include Pot Hole Test Area, Chatter Bumps and Ride and Handling Loop Test Area (left lane), as needed.

4.3.4.2.2.1.1 Perform Test. Proceed at speeds of 10 km/h, 15 km/h, and 25 km/h (5 mph, 10 mph, and 15 mph) with the vehicle windows down and accessories off. Additional road test area speeds: 40 km/h, 48 km/h and 56 km/h (25 mph, 30 mph and 35 mph) may be used. Determine if noises are due to wheel trim. Include noises observed during turnaround maneuver after each pass.

4.3.4.3 Exit Test Track. Exit the sound reflecting track area to an appropriate viewing area.

4.3.4.4 Evaluate Trim. Attempt to locate the contact point in which the trim emanates noise. Additionally, visually inspect wheel trim for rotation and inspect for looseness using a light touch of the hand and record observations in section 4.3.4 of Data Sheet A1, Appendix A.

Note: If trim or nut caps are loose after this test, operator should drive back to the garage area and contact the requester before proceeding with remainder of test.

4.3.5 Elevated Speed Wear Ring Retention (Curb Mass or GAMR).

4.3.5.1 Trim Adjust. Adjust wheel trim, as necessary, to assure proper seating and alignment with scribed/marked lines.

4.3.5.2 Proceed to Test Track. For Milford Proving Grounds, drive to the Circle Track test area. Drive the vehicle onto the Circle Track.

4.3.5.3 Perform Test. Once on the Circle Track, bring vehicle up to the specified speed. If speed is not specified, the speed shall be 130 km/h (80 mph). Drive the vehicle in the appropriate lane for one (1) lap, no less than 7 km (4 mi).

4.3.5.4 Exit Test Track. Exit the Circle Track area to an appropriate viewing area.

4.3.5.5 Evaluate Trim. Visually inspect wheel trim for rotation and also inspect for looseness using a light touch of the hand. Record observations in section 4.3.5 of Data Sheet A1, Appendix A.

Note: If trim or nut caps are loose after this test, operator should drive back to the garage area and contact the requester before proceeding with remainder of test.

Note: Do not remove wheel trim at this time; removal will occur during paragraph 4.3.18. Record observations in section 4.3.5 of Data Sheet A1, Appendix A.

Note: If trim **wear ring** is loose, visible or missing after this test, test operator should drive back to the garage area and contact the requester before proceeding with remainder of test.

4.3.6 Rough Track Bump Tests (Curb Mass or GAMR).

4.3.6.1 Square Blocks Bump Test (Curb Mass or GAMR).

4.3.6.1.1 Trim Adjust. Adjust wheel trim, as necessary, to assure proper seating and alignment with scribed/marked lines.

4.3.6.1.2 Method C Only. Special vehicle modifications.

4.3.6.1.2.1 Removal of left rear damper or oil from left rear damper may be requested.

4.3.6.1.3 Proceed to Test Track.

4.3.6.1.3.1 Method A.

4.3.6.1.3.1.1 Drive to an appropriate test area. For General Motors Europe (GME), the surface is identified as the Pferdsfeld test rough road area.

4.3.6.1.3.1.2 Perform Test. Drive the vehicle on the square blocks at a speed that produces maximum wheel displacement (wheel hop) for each road section. This is done using judgment by varying vehicle speed. It may be necessary to do one (1) pass to establish the correct speed and then do a second pass approaching at the correct speed since the test section is very short.

4.3.6.1.3.1.3 When maximum wheel hop is reached, perform a hard brake application $5 \text{ m/s}^2 \pm 1 \text{ m/s}^2$ ($15 \text{ ft/s}^2 \pm 3 \text{ ft/s}^2$). Make sure the vehicle comes to a complete stop while still on the square blocks.

Example: From 50 km/h (30 mph) to 0 km/h in 3 s or from 65 km/h (40 mph) to 0 km/h in 4 s).

4.3.6.1.3.2 Method B.

4.3.6.1.3.2.1 Drive to the Rough Track, Square Block Track or equivalent (For Milford Proving Grounds, the road course is located within the Fenn Holden Test Area (right lane, 0.629 Hop Bumps).

4.3.6.1.3.2.2 Perform Test. Drive the vehicle on the square blocks (far right lane) at a speed that produces maximum wheel displacement (wheel hop) for each road section. This is done using judgment by varying vehicle speed. It may be necessary to do one (1) pass to establish the correct speed and then do a second pass approaching at the correct speed since the test section is very short.

4.3.6.1.3.2.3 When maximum wheel hop is reached, perform a hard brake application at $5 \text{ m/s}^2 \pm 1 \text{ m/s}^2$ ($15 \text{ ft/s}^2 \pm 3 \text{ ft/s}^2$). Make sure the vehicle comes to a complete stop while still on the square blocks.

Example: From 50 km/h (30 mph) to 0 km/h in 3 s or from 65 km/h (40 mph) to 0 km/h in 4 s.

4.3.6.1.3.3 Method C.

4.3.6.1.3.3.1 Drive to the Rough Track, Square Block Track or equivalent (For General Motors Holden (GMH) Lang Lang Proving Grounds (LLG) use Concrete Multiple Pothole Section located at the dust road entry area). Potholes are to be cleaned out before use.

4.3.6.1.3.3.2 Perform Test. Drive the vehicle on the Concrete Multiple Pothole Section at a speed typically around 60 km/h to 65 km/h, or as judged to produce maximum wheel hop for this road section for ten (10) passes. Vary vehicle speed as needed to obtain maximum wheel hop.

4.3.6.1.4 Exit Test Track. Exit the Rough Track area to an appropriate viewing area.

4.3.6.1.5 Evaluate Trim. Visually inspect wheel trim for rotation. Also inspect for looseness using a light touch of the hand, record vehicle speed and observations in section 4.3.6.1 of Data Sheet A1, Appendix A.

Note: If trim or nut caps are loose after this test, operator should drive back to the garage area and contact the requester before proceeding with remainder of test.

4.3.6.2 Method B (Only). Rough Track 0.550 Hop Bumps Test (Curb Mass or GAMR).

Note: $F = \text{km/h} \times 0.885 \text{ bumps (mph} \times 0.550) \text{ bumps}$, respectively at wheel hop for each section of bumps.

4.3.6.2.1 Trim Adjust. Adjust wheel trim, if necessary, to assure proper seating and alignment with scribed lines.

4.3.6.2.2 Proceed to Test Track.

4.3.6.2.2.1 Drive to the 0.550 Hop Bumps Track, or equivalent (For Milford Proving Grounds the road course is located within the Fenn Holden Test Area, left lane).

4.3.6.2.2.2 Perform test. Drive the vehicle on the undulated track bumps (For Milford Proving Grounds use the far left lane) at a speed that produces maximum wheel hop for 0.550 road section. This is done using judgment by varying vehicle speed. It may be necessary to do one (1) pass to establish the correct speeds and then do a second pass approaching at the correct speeds since the test sections are short.

4.3.6.2.2.3 When maximum wheel hop is reached, perform a hard brake application at $5 \text{ m/s}^2 \pm 1 \text{ m/s}^2$ ($15 \text{ ft/s}^2 \pm 3 \text{ ft/s}^2$). Make sure the vehicle comes to a complete stop while still on the square blocks.

Example: From 50 km/h (30 mph) to 0 km/h in 3 s or from 65 km/h (40 mph) to 0 km/h in 4 s.

4.3.6.2.3 Exit Test Track. Exit the Rough Track area to an appropriate viewing area.

4.3.6.2.4 Evaluate Trim. Visually inspect wheel trim for rotation. Also inspect for looseness using a light touch of the hand, record vehicle speed and observations in section 4.3.6.2 of Data Sheet A1, Appendix A.

Note: If trim or nut caps are loose after this test, operator should drive back to the garage area and contact the requester before proceeding with remainder of test.

4.3.7 Seven Sisters/Sporty Driving Road Test (Curb Mass or GAMR).

Note: Seven Sisters test is for testing rim attached trim only and is not needed for center attachment schemes.

Note: Warning: Trucks, vans, sport utility vehicles, crossovers, etc., shall be evaluated on the Seven Sisters road course, only by special engineering request with modified (reduced) road speed values. These vehicles shall only be evaluated at Curb Mass.

Note: On vehicles with exceptional handling abilities such as Corvette, a pass at 40 km/h, 50 km/h, and 55 km/h (25 mph, 30 mph, and 35 mph) should be substituted, since these vehicles may not reach their highest lateral loading at 50 km/h (30 mph).

Note: If evaluated at the Milford Proving Grounds, permission from Traffic Safety must be obtained if attempting these higher than normal lateral loading speeds.

4.3.7.1 Method A.

4.3.7.1.1 Trim Adjust. Adjust wheel trim, if necessary, to assure proper seating and alignment with scribed lines.

4.3.7.1.2 Vehicle Setup. Ballast the vehicle to a four passenger condition. Inflate the tires to nominal tire pressure, reduced by 70 kPa (10 psi). For **Run Flat** tires, if applicable, deflate tire to nominal tire pressure reduced by 70 kPa (10 psi) for the first test. Then repeat section 4.3.7 without tire pressure and without tire air valve stem core.

4.3.7.1.3 Proceed to Test Track. Drive to an appropriate flat surface test area. For GME the surface is identified as the Pferdsfeld Handling test area.

4.3.7.1.4 Perform Test.

4.3.7.1.4.1 Standard Tires. Conduct two (2) passes of approximately 12 km (7.5 mi) handling loop including slaloms with maximum speed of 120 km/h (74 mph).

4.3.7.1.4.2 Run Flat Tires. Conduct three (3) passes of approximately 12 km (7.5 mi) handling loop including slaloms with a maximum speed of 80 km/h (50 mph) at $G < 0.35$.

Note: Sporty driving is encouraged; however, no maximum handling, braking, or steering.

4.3.7.1.5 Exit Test Track. Exit the Pferdsfeld Handling Test Area/Sporty Road Track Area to an appropriate viewing area.