



Standard Equipment Jack and Spare Tire, Vehicle Test

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 standard is to evaluate:

- Vehicle jacking instructions, stowage, and effort.
- Any vehicle damage after jacking and from falling off jack.
- Jack/spare retention during 48 km/h (30 mph) barrier.
- Jack/spare noise generated while stowed.

1.2 Applicability. This procedure applies to all passenger cars, light-duty trucks, and multipurpose passenger vehicles.

1.3 Remarks. This procedure evaluates the effects standard equipment jacks have on the total vehicle. These tests include:

- Evaluation of jacking instructions and effort.
- Evaluation of equipment access.
- Evaluation of equipment storage.
- Evaluation of vehicle damage from falling off jack.
- Evaluation of vehicle damage such as panel buckling, chipped paint, interference, etc. during and after jacking.
- Evaluation of strength of spare/jacking hardware stowage during a 48 km/h (30 mph) front barrier.
- Noise evaluation of spare wheel and tool storage provisions.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW8518

GMW14264

GMW14337

GMW16590

2.3 Additional References.

- Body Specification Manual.
- Product Description Manual (PDM).
- Vehicle Owner's Manual.

3 Resources

3.1 Facilities. Use facilities having the test equipment described in 3.2 for the test(s) being run. To conduct the test in 4.3.5 for noise evaluation, use the facilities described in GMW8518 Dynamic On-Road Evaluation Instruction or Temperature Testing on Dynamic Road Simulator.

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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 Compressed air supply used for tire inflation.

3.2.2 Tire gauge used for tire inflation.

3.2.3 Nine hundred (900) mm (3 ft) steel scale.

3.2.4 Stopwatch.

3.2.5 Force gauge, with a 2500 N (562 lb) capacity.

3.2.6 A 0 Nm to 300 Nm (221 lb ft) torque wrench for passenger cars and a 400 Nm (300 lb ft) torque wrench for trucks.

3.2.7 Platform scales, each with a capacity of approximately 1360 kg (3000 lb) for passenger cars, and 2700 kg (6000 lb) for trucks. These are used to measure the individual wheel, or vehicle corner weights.

Note: All instrumentation is to be calibrated as required. Record the instrumentation details and date of calibration on Data Sheet A1 in Appendix A unless the information is otherwise preserved in the testing facility records.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Vehicle. Select the vehicle as appropriate for each individual test. This would be the heaviest Gross Axle Weight Rating (GAWR) for each model line.

3.3.2 Test Material.

3.3.2.1 The released wheel changing equipment.

3.3.2.2 The released equipment storage provisions in vehicle.

3.4 Test Time.

Calendar time: 3 d

Test time: 8 h

Coordination time: 16 h

3.5 Test Required Information. The vehicle manufacturer recommended tire inflation pressure.

3.6 Personnel/Skills. Test technician with jack and tools background.

4 Procedure

4.1 Preparation.

4.1.1 Record the vehicle and jack data on Data Sheet A2 in Appendix A.

4.1.2 Vehicle is to be tested at the vehicle mass indicated for each separate test.

4.1.3 For jacks that contact bumper only, check bumper alignment and adjust to specifications if required. Tighten all bumper mounting bolts to the minimum specified torque.

4.1.4 Determine the largest diameter released wheel and tire combination by considering the optional and spare wheel and tire combinations. Determine the radial distance from the center of the wheel to the tangent of the inflated and unloaded tire. Record the distance on Data Sheet A2 in Appendix A.

4.1.5 Inflate the tires to the vehicle manufacturer's specifications. Record the pressures on Data Sheet A2 in Appendix A.

4.1.6 Tighten all wheel nuts to 14 Nm (10 lb ft) above the maximum specified torque. Record the torque on Data Sheet A2 in Appendix A.

4.2 Conditions.

4.2.1 Environmental Conditions.

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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 Wheel Changing Effort and Instruction Evaluation.

Note: Jacking clearance is validated in GMW14337, Standard Equipment Jack - Hardware Tests.

4.3.1.1 Vehicle Ballasting.

4.3.1.1.1 On vehicles where the front GAWR plus the rear GAWR equals the Gross Vehicle Weight Rating (GVWR), load each axle to GAWR.

4.3.1.1.2 On vehicles where the front GAWR plus the rear GAWR exceeds the GVWR, ballast the vehicle to GVWR, with the axle being jacked set at GAWR. Record each wheel, or vehicle corner weight on Data Sheet A2 in Appendix A.

4.3.1.2 Follow the instructions per the owner manual or jack usage label(s) when performing this test. Record part number(s) of user information. These include jack, vehicle, and caution label(s). Record the owner's manual issue number on Data Sheet A2 in Appendix A.

4.3.1.3 Park the vehicle on a level surface. Deflate one (1) rear tire.

4.3.1.4 Remove the jack, tools, and spare tire from the storage area. Comment on accessibility and any discrepancies in the instructions on Data Sheet A2 in Appendix A.

4.3.1.5 Install wheel blocks per the owner's manual instructions if supplied as standard equipment for the model tested.

4.3.1.6 Loosen the wheel nuts, using only the tool(s) provided. Record the force required and clearances, i.e., handle to body, etc., available on Data Sheet A3 in Appendix A.

4.3.1.7 Raise the center of the wheel to a height which results in a 50 mm (2 in) greater distance than determined in 4.1.4, or the maximum jack travel if less.

4.3.1.8 Remove the deflated tire/wheel. Install the spare using only the tools provided. Comment on the effort required and clearances. Record on Data Sheet A3 in Appendix A.

4.3.1.9 Lower the vehicle and tighten the wheel nuts using only the tool(s) provided. Record any comments on Data Sheet A3 in Appendix A.

4.3.1.10 If the spare is a different design than the original tire/wheel, then:

- Re-inflate the original tire.
- Jack vehicle to the height reached in 4.3.1.7.
- Reinstall the original tire.
- Lower the vehicle.

4.3.1.11 Repeat 4.3.1.4 through 4.3.1.9 for the one (1) front wheel.

4.3.1.12 Install the deflated tire/wheel and tools into the stowage area. Comment on ease of stowability and any discrepancies in the stowage instructions on Data Sheet A4 in Appendix A.

4.3.1.13 Repeat 4.3.1.12 with the spare.

4.3.1.14 Record any discrepancies in the owner's manual or jack usage label(s) for jack positioning, jack instructions, etc., that were not previously recorded. Record on Data Sheet A4 in Appendix A.

4.3.2 Vehicle Body Damage During and After Jacking.

4.3.2.1 Vehicle Ballasting.

4.3.2.1.1 On vehicles where the front GAWR plus the rear GAWR equals the GVWR, load each axle to the GAWR.

4.3.2.1.2 On vehicles where the front GAWR plus the rear GAWR exceeds the GVWR, load per the following: ballast vehicle to the GVWR, with the axle being jacked set at the GAWR.

Record the vehicle weight on each wheel, or the vehicle corner, on Data Sheet A5 in Appendix A.

4.3.2.2 Vehicle Inspection and Adjustment.

Note: The adjustments outlined in 4.3.2.2.1 through 4.3.2.2.6 should be made with the use of the proper reference manual, i.e., the Product Description Manual (PDM) or Body Specification Manual.

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4.3.2.2.1 For jacks that contact bumper only, check headlamp aim. Adjust to specifications if required, and record on Data Sheet A5 in Appendix A.

4.3.2.2.2 For jacks that contact bumper only, record bumper-to-body vertical clearance on Data Sheet A5 in Appendix A.

4.3.2.2.3 Check hood, door, rear compartment lid, tailgate, cargo door, roof tops, etc., for alignment and proper operation. Adjust to specifications if required and record the dimensions on Data Sheet A5 in Appendix A. Remove roof tops, panels, or lower convertible tops to obtain the weakest roof structure.

4.3.2.2.4 Torque body/pickup box to chassis, attaching fasteners to minimum specifications if applicable.

4.3.2.2.5 Check for pretest dents, scratches, paint chips, buckles, etc., at potential damage areas. Mark locations on the vehicle with a grease pencil. Record on Data Sheet A5 in Appendix A.

4.3.2.2.6 Check for pretest damage to brake and fuel lines, park brake cables, steering components, etc., in areas to be lifted. Record on Data Sheet A5 in Appendix A.

4.3.2.3 Position the jack at the initial test location. Raise the vehicle to give a 50 mm (2 in) tire to ground clearance. Record if the ground clearance is < 50 mm at the maximum jack travel.

4.3.2.4 Inspect the vehicle as in 4.3.2.4.1 and 4.3.2.4.2.

4.3.2.4.1 Open and close doors, hood, rear compartment lid, tailgate, cargo doors, etc. Record observations on Data Sheet A6 in Appendix A.

4.3.2.4.2 Check for buckling or interference of body panels, spoilers (air dams), valance panels, or pickup box. Pay particular attention to sail and quarter panels. On bumper tests, check bumper to body contact. Record the results on Data Sheet A6 in Appendix A.

4.3.2.5 Lower vehicle to the ground.

4.3.2.6 Inspect the vehicle as in 4.3.2.6.1 through 4.3.2.6.5 and record the results on Data Sheet A6 in Appendix A.

4.3.2.6.1 Check and record the headlamp aim if the front bumper was part of the test.

4.3.2.6.2 Check for permanent sheet metal or body panel buckling or interference, bumper set if applicable, and paint damage. Record the results on Data Sheet A6 in Appendix A.

4.3.2.6.3 On bumper tests, check for damage to the lamps. Record the results.

4.3.2.6.4 Check for damage to brake and fuel lines, park brake cables, steering gear, etc. in the area of lift. Record the results on Data Sheet A6 in Appendix A.

4.3.2.6.5 Check for damage at the lifted point. Record the results.

4.3.2.7 Repeat 4.3.2.3 through 4.3.2.6 for the remaining jacking locations. Use Data Sheet A7, Data Sheet A8, or Data Sheet A9 in Appendix A.

4.3.3 Vehicle Damage from Falling Off Jack.

Note: This section evaluates possible damage that may result if the jack is improperly used, i.e., the vehicle falling off the jack. When selecting the front and rear locations, consider fuel line routing, gas tank location, etc., for the most adverse jacking position. If the most adverse condition cannot be assessed, then all jacking positions should be evaluated.

4.3.3.1 Vehicle Ballasting.

4.3.3.1.1 On vehicles where the front GAWR plus the rear GAWR equals the GVWR, load each axle to the GAWR.

4.3.3.1.2 On vehicles where the front GAWR plus the rear GAWR exceeds the GVWR, load per the following. Ballast the vehicle to the GVWR, with the axle being jacked set at the GAWR.

Conduct the test with the service and parking brakes off, transmission in neutral. Record each wheel, or vehicle corner weight, on Data Sheet A10 in Appendix A.

4.3.3.2 With the vehicle on a level surface, position the jack at a front jack position. Deflate the tire nearest the jack position. Raise the vehicle to the height determined in 4.3.1.7.

4.3.3.3 Apply a force to the front-of-vehicle parallel to the ground in a rearward, longitudinal direction. The force should be great enough to push the vehicle off the jack. Record the push-off force using a force gauge or load

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cell, also record if any damage occurred to the vehicle or jack. Use photographs if necessary. Record if the jack would be reusable. Re-inflate the tire. See Data Sheet A10 in Appendix A.

4.3.3.4 Repeat 4.3.3.3 with a new jack if required, but apply the force to the rear of vehicle in a forward direction. See Data Sheet A10 in Appendix A.

4.3.3.5 With a new jack, repeat 4.3.3.2 through 4.3.3.4 at a rear location. See Data Sheet A11 in Appendix A.

4.3.3.6 Mark all jacks to prevent reuse.

4.3.4 Spare Tire/Wheel and Tool Stowage Strength Test.

4.3.4.1 The test engineer should determine if this section is run.

4.3.4.2 Ballast the vehicle to the front barrier requirements for the particular model being run.

4.3.4.3 When a 48 km/h (30 mph) frontal barrier impact test is to be conducted as required for Federal Motor Vehicle Safety Standard (FMVSS) testing, install the spare tire and tools per the stowage instruction label.

Optional: Spare tire and tool storage may also be evaluated using the impact sled, simulating a front barrier.

4.3.4.4 Record the condition of the spare tire and tool stowage provisions at the end of the test.

4.3.5 Spare Tire/Wheel and Tool Storage Noise Evaluation.

4.3.5.1 Use GMW8518 to subjectively identify and rate the squeak and rattle noise performance. Include the following elements:

- Conduct the test with the vehicle at curb mass.
- Install the spare tire/wheel and tools per the stowage instruction label.
- Have the observer sit in a designated seating position closest to the jack/tools/spare tire.

4.3.5.2 Noise evaluation can be performed one of two ways, depending on the facilities available:

- Temperature Testing on Dynamic Road Simulator of GMW8518 using road types five (5), six (6), seven (7), eight (8), and nine (9) identified in the appendix of GMW8518.
- Dynamic on Road Evaluation Instruction of GMW8518 using a four (4) post road simulator and performing the appropriate audit file comprised of the general input road types five (5), six (6), seven (7), eight (8), and nine (9) identified in the appendix of GMW8518.

4.3.5.3 The minimum subjective rating under all conditions is eight (8) per GMW14264. Record the observations and rating on Data Sheet A12 in Appendix A.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Visually inspect vehicle for damage and document.

5.3 Test Documentation. The test results documentation should include the following:

- Test results report header, generated by Global Tire-Wheel Test System (GTWTS) if submitting Extensible Markup Language (XML) files.
- Completed data sheets or as uploaded from the Jack Test System software.
- Photographs.

Example Datasheet A1 thru Data Sheet A12 are given in Appendix A and an example report header is given in Figure B1: Vehicle Test Report in Appendix B.

Note: For data being loaded into the Global Tire-Wheel Test System (GTWTS), submit electronically the test results data files (XML format) with other supporting files. GMW16590 defines the electronic file details, e.g., file types, file naming convention, and detailed file formats, for the GTWTS.

6 Safety

This Engineering Standard may involve safety requirements for hazardous materials, the method of operations and equipment. This standard does not propose to address all the safety issues associated with its use. It is the responsibility of the user of this standard to ensure compliance with all appropriate safety and health practices. This would include any specific training that may be required. The safety and health standards include site

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specific rules and procedures, company rules and procedures, and Government Standards. Contact shall be made with the appropriate site Safety and Health personnel for further direction and guidance in these matters.

7 Notes

7.1 Glossary. Not applicable.

7.2 Acronyms, Abbreviations, and Symbols.

FMVSS	Federal Motor Vehicle Safety Standard
GAWR	Gross Axle Weight Rating
GTWTS	Global Tire-Wheel Test System
GVWR	Gross Vehicle Weight Rating
ID	Identification
LF	Left Front
LR	Left Rear
P/N	Part Number
PDM	Product Description Manual
PQMS	Performance and Quality Management System
RF	Right Front
RR	Right Rear
Spec	Specification
TIP	Test Improvement Process
XML	Extensible Markup Language

8 Coding System

This standard shall be referenced in other documents, drawings, etc., as follows:

Test to GMW15005

9 Release and Revisions

This standard was originated in January 2006. It was first approved by the Wheel, Tire, and Chassis Group in August 2006. It was first published in January 2007.

Issue	Publication Date	Description (Organization)
1	JAN 2007	Initial publication.
2	SEP 2012	Revise to current template. Revised Sections: 1.3, 2.2, 4.1.1, 4.1.4, 4.1.5, 4.1.6, 4.3.1.1.2, 4.3.1.2, 4.3.1.4, 4.3.3.1.2, 4.3.3.3, 4.3.3.4, 4.3.3.5, 5.3, 7.1, Appendix B. (Global Chassis Tools GSSLT).
3	JUN 2018	Revised to current template. (Chassis - Tire and Wheel Systems)

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