



Wheel Nut Cap Torque

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. Assess wheel nut cap installation torque and establish performance during ultimate torque conditions.

1.2 Applicability.

1.2.1 Procedure applies to decorative and functional wheel nut caps that thread onto externally threaded wheel nuts.

1.2.2 This test procedure is applicable for wheel nut caps intended for normal highway use for passenger car vehicles, light duty trucks including dual wheel usages, or multipurpose vehicles.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW16590

2.3 Additional References.

- Sourcing Documents

3 Resources

3.1 Facilities. Not applicable.

3.2 Equipment.

3.2.1 Torque tension machine or torque wrench capable of applying 50 N·m full scale.

3.2.2 Data acquisition system configured to record torque versus time and produce hard copy print out of measurements.

3.3 Test Vehicle/Test Piece. Thirty (30) new wheel nut caps, thirty (30) new wheel nuts, enough wheel covers to provide thirty (30) test holes (varies with number of bolt holes on wheel and cover), wheel and bolts/studs related to nut cap trim stack up. All test pieces shall be mounted in vehicle position and mounting interfaces shall be new.

3.4 Test Time.

Calendar time: 0.5 day

Test hours: 3 hours

Coordination hours: 0.5 hour

3.5 Test Required Information. Not applicable.

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3.6 Personnel/Skills. Test operator shall be qualified on the basis of appropriate education, training, experience, and/or demonstrated skills.

4 Procedure

4.1 Preparation.

Note: Test can be conducted on the torque tension machine or with a torque wrench depending on requestor.

4.1.1 When Conducted with Torque Tension Machine.

4.1.1.1 Install new wheel bolts.

4.1.1.2 Install wheel in the upright position vehicle orientation. (Wheel does not have to be new. Verify that stack up does not allow stud to protrude more than design intention. This could damage nut cap and invalidate the test).

4.1.1.3 Install new wheel nut. Tighten fastener to approximately 50 N·m, using a torque wrench.

4.1.1.4 Set electric motor speed at 10 rpm $\pm$ 5 rpm.

4.1.2 When Conducted with Torque Wrench.

4.1.2.1 Install new bolts in the appropriate bolt pattern adaptor and place in upright vehicle position. (Wheel does not have to be new. Verify that stack up does not allow stud to protrude more than design intention. This could damage nut cap or invalidate the test.) Setup can be ran in the trim drop machine or in any area where wheel is secured in vehicle position.

4.1.2.2 Install new wheel nut. Tighten fastener to approximately 50 N·m, using a torque wrench.

4.1.2.3 A torque wrench with a 20 N·m range is to be used for the nut caps to be tested.

4.2 Conditions.

4.2.1 Environmental Conditions. Room temperature: 24 °C $\pm$ 14 °C (75 °F $\pm$ 25 °F), unless otherwise specified by requestor.

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 If testing functional wheel nut cap, first install wheel cover/hubcap on wheel using new wheel nut cap and fresh (untested) mating pocket in cover. Partially engage wheel nut cap on wheel nut.

4.3.2 If testing decorative wheel nut cap, do not install a wheel cover/hubcap. Partially engage wheel nut cap on wheel nut.

4.3.3 Recording.

4.3.3.1 When Running with Torque Tension Machine. Start the recording of wheel nut cap torque data (estimate time at 180 s, but may need to be adjusted to capture entire event). Tighten wheel nut cap with electric motor until nut cap breaks or thread jump occurs.

4.3.3.1.1 If thread jump occurs, continue tightening for five (5) jumps. Stop recording nut torque. Record number of thread jumps on Data Sheet A1 (Appendix A).

4.3.3.1.2 Loosen and inspect wheel nut cap for fracture (cracks).

4.3.3.1.3 If wheel nut cap fractures, Report out fracture in Data Sheet A1 (Appendix A). Select a new wheel nut cap from test samples and repeat 4.3.3.1 thru 4.3.3.1.6. If more than two (2) nut caps fracture, terminate and review with requestor for next steps.

4.3.3.1.4 If wheel nut cap does not fracture, then make snug-tight by hand with hand held socket. Start recording torque data (estimate time at 300 s, but may need to be adjusted to capture entire event). Using hand held ratchet wrench, tighten cap in one-quarter ($\frac{1}{4}$) turn increments until thread jump (6th thread jump). Print out hard copy of torque recordings. Indicate on print out each one-quarter ($\frac{1}{4}$) turn increment. Estimate amount of last turn increment if thread jump occurs before one-quarter ($\frac{1}{4}$) turn and mark on print out and Data Sheet A1 (Appendix A).

4.3.3.1.5 Remove tested wheel nut cap and nut and permanently mark test sample number on wheel nut cap.

4.3.3.1.6 Repeat for a total of twenty (20) samples, not including fractured samples.

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