



Quick Connector Test Procedures

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. To validate the quick connector using a standardized test procedure.

1.2 Applicability. All usage of a quick connector system for sunroof drain hoses and wiper washer systems. This procedure applies to all passenger cars and light duty trucks.

1.3 Remarks. This document is the GM Worldwide Sunroof and Wiper Washer Testing Standard. Its purpose is to establish a common test methodology for Quick Connector systems (refer to Figure A1 in Appendix A) to ensure that a high quality world class system is consistently developed and produced. This is a living document and any suggestions or revisions will be reviewed and/or updated annually by the Roof Closure Global Subsystem Leadership Team (GSSLT) or the Wiper/Washer GSSLT.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3059 GMW3600

2.3 Additional References.

- CG180 5-Phase Template Document (ID).
- GM Security Guidelines. <https://gmweb.gm.com/HR/Security/Pages/FutureGuide.aspx>.
- Program specific Component Technical Specification (CTS).
- Subsystem Technical Specifications (SSTS).

(ID) = This document is limited to internal use within General Motors and shall not be accessed outside this company. Contact the GM Lead Engineer for further instructions.

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.

3.2 Equipment.

3.2.1 Personal Protection Equipment (PPE).

3.2.2 Long Handle Tongs.

3.2.3 Digital Camera.

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3.2.4 Thermal Chamber. Thermal chamber large enough to contain fully assembled sunroof system and capable of -40 °C to 105 °C with controlled humidity. Thermal Chamber large enough to minimally contain one (1) test buck the chamber should also meet the following:

- Temperature range -40 °C to +95 °C and continuously adjustable.
- Controlled humidity.
- Recirculating air temperature cabinet.
- Test room, suitable for the execution of the test.
- Permissible temperature accuracy: ± 3 °C.
- Explosion proof.

3.2.5 Instron or similar tensile machine with the following:

- Load capacity of 250 N.
- Speed range of 50 mm/minute to 100 mm/minute.
- Test Area suitable for the required tests.

3.2.6 Pressure pump.

- Capable of using air, washer fluid and water.
- Capable of producing pressures up to 1.724 MPa (250 psi).

3.3 Test Vehicle/Test Piece. Test samples shall be of production intent design and material for design validation (DV); or, production intent design and materials manufactured with production processes (home line) for product validation (PV). Any changes to the components or material, e.g., design, fit, form, function, properties, manufacturing process, and/or location of manufacture require revalidation. GM shall approve validation methods for product/process changes before the supplier is committed to the change. Refer to GMW3600.

Unless otherwise specified, three samples of components or systems shall be tested.

All components/systems used in testing shall be within drawing specifications and have supporting data prior to start of test.

3.4 Test Time.

Calendar time: 3 d
Test time: 30 h
Coordination time: 4 h

3.5 Test Required Information.

3.5.1 Notification GM Validation is to be notified of test failures within 24 h period of occurrence.

3.5.2 Five (5) Phase. Supplier to develop five phase document for all test failures.

3.5.3 Product Security. Security protocol for the test vehicle must be followed per GM Security Guidelines.

3.6 Personnel/Skills. Prior experience in setting up and running similar tests. Experience in the use of the referenced test equipment.

4 Procedure

4.1 Preparation.

4.1.1 Read the proper requirement from the program specific SSTs and this GMW thoroughly.

4.1.2 Ensure that all parts meet design requirements prior to testing.

4.1.3 Ensure that proper PPE is used during set up and testing.

4.1.4 Ensure that the materials are in compliance to GMW3059 and any regulatory requirements for country of sales.

4.2 Conditions.

4.2.1 Environmental Conditions. Refer to each test for 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 Insertion Force Procedure.

4.3.1.1 Purpose. To ensure that the installation of the quick connectors meet the program specific requirements or ergonomic requirements

4.3.1.2 Test Equipment. See 3.2.

4.3.1.3 Test Samples. 20 minimum.

4.3.1.4 Test Time. 8 h.

4.3.1.5 Test Preparation. See 4.1.

4.3.1.6 Test Conditions. See 4.2.

4.3.1.7 Test Procedure.

4.3.1.7.1 Allow 10 samples to soak at room temperature for 4 h at 24 °C.

4.3.1.7.2 Place 10 samples in Instron or fixture for use with handheld gauge and photograph test setup.

4.3.1.7.3 Apply force at a speed of 50 mm/minute along axis of connector sufficient to fully engage male side of connector and female side of connection.

4.3.1.7.4 Place 10 new samples in a thermal chamber and soak for 4 h at 40 °C and 85% RH.

4.3.1.7.5 Repeat 4.3.1.7.2 through 4.3.2.7.3.

4.3.1.7.6 Document the results for all samples. Include the average and standard deviation of the results in each condition. Include a picture of the test setup.

4.3.1.8 Acceptance Criteria. Must meet program specific requirements for installation and ergonomics.

4.3.2 Hose Installation Force.

4.3.2.1 Purpose. to ensure the connection of the hose to the connector meets program and ergonomic requirements. Only applies to GM hose to connector applications.

4.3.2.2 Test Equipment. See 3.2.

4.3.2.2.1 Holding fixture.

4.3.2.2.2 Force gauge.

4.3.2.2.3 Instron.

4.3.2.3 Test Samples. 6 samples.

4.3.2.4 Test Preparation. See 4.1.

4.3.2.5 Test Conditions. See 4.2.

4.3.2.6 Procedure.

4.3.2.6.1 Soak the test samples for 4 h at 24 °C.

4.3.2.6.2 Place one end of the connection in a holding fixture.

4.3.2.6.3 Using a force gauge or similar apply a force to connect the hose to the connector.

4.3.2.6.4 Repeat 3 times.

4.3.2.6.5 Calculate the average.

4.3.2.6.6 Document the maximum, minimum and average force required to secure the connection.

4.3.2.6.7 Repeat 4.3.2.6.1 through 4.3.2.6.5 for each of the 6 samples.

4.3.2.6.8 Repeat 4.3.2.6.2 through 4.3.2.6.7 for each of the 6 samples.

4.3.2.7 Acceptance Criteria.

4.3.2.7.1 The washer tubing assembly connections shall meet the assembly plant ergonomics requirements (target 45 N (10 lb) for a thumb/finger pinch grip).

4.3.2.7.2 Must meet program specific requirements.

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