



Wiper Blade Test Procedure

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. This standard defines the testing methodology and requirements for validating front and rear wiper blades to GM requirements. Its purpose is to establish a set of common requirements for wiper blades that are used on GM vehicles.

1.2 Applicability. This document is applicable for all car, Multipurpose Passenger Vehicle (MPV), and truck models produced by GM.

1.3 Remarks. This document is the GM Worldwide Wiper Blade Testing Standard. This is a living document and any suggestions or revisions will be reviewed and/or updated annually by the Windshield Wiper Global Subsystem Leadership Team (GSSLT).

2 References

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

2.1 External Standards/Specifications.

ISO 188 SAE J903

2.2 GM Standards/Specifications.

GMW14268 GMW15835

2.3 Additional References.

- Part Number (PN) 9965864 GM-approved Windshield Cleaner
- Standard Wipe Quality Rating Scale (refer to the Subsystem Technical Specifications (SSTS))

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 Thermal chamber large enough to contain three (3) test bucks and capable of -30 °C thru 100 °C with controlled humidity.

3.2.2 Ozone cabinet with temperature control and humidity capability up to 60% Relative Humidity (RH).

3.2.3 Ageing cabinet with temperature control and humidity capability up to 60% RH.

3.2.4 Type 1 laminar air flow heat ageing cabinet (ISO 188).

3.2.5 Body test buck consisting of Body-in-White (BIW), windshield, and front wiper module.

3.2.6 Body test buck consisting of rear liftgate, rear glass, and rear wiper motor.

3.2.7 Water spray equipment/nozzle according to SAE J903 (820 cm³/minute minimum).

3.2.8 Water used shall comply with Table 1.

Table 1: Water Quality Specification

Total Hardness (Calcium Carbonate (CaCO ₃))	200 ppm maximum
Sulfates	50 ppm maximum
Chlorides	25 ppm maximum
pH	6.0 to 8.0
Conductivity	400 micromhos maximum
Total Heavy Metal	Less than 1 ppm
Bacteria Count	1000 parts maximum

3.3 Test Vehicle/Test Piece.

3.3.1 Unless otherwise specified, six (6) samples of components.

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

3.3.3 Glass used for test bucks must be within drawing tolerances and no cracks or known deformities are allowed.

3.4 Test Time. Test time is dependent on the test that is being performed. Each test may take anywhere from three (3) days to 31 days, with a total of 45 days to complete all tests.

3.5 Test Required Information.

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

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

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

4 Procedure

4.1 Preparation.

4.1.1 Properly clean glass before every new test with GM approved Windshield Cleaner (PN 9965864) or equivalent, (i.e., Bon Ami glass cleaner) to assure water sheeting action.

4.1.2 Properly clean blade element before every new test by wiping the element with a cloth soaked in windshield washer solution.

4.1.3 Attack angle and arm load need to be within design specifications on test buck before start of any system level test.

4.2 Conditions.

4.2.1 Environmental Conditions. Unless otherwise specified.

- Ambient temperature: +23 °C ± 3 °C.
- Voltage: 13.5 V ± 0 V at motor terminals.

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.

4.2.3 Parts are to be tested in vehicle orientation unless otherwise specified.

4.3 Instructions.

4.3.1 Test Results.

4.3.1.1 Test reports with supplier letterhead are to be generated by the supplier performing the test and electronically distributed to GM Validation.

4.4 Test Types.

4.4.1 Ozone Resistance.

4.4.1.1 Purpose. The purpose of this test is to confirm that the rubber element of the wiper blade will be able to resist ozone attack and show no cracking and/or ripping along the pivot hinge or the wiping lip. It will also confirm that if a mechanical or chemical change occurs at the wiping lip, the ability of the wiper blade to give a clean and smooth wipe will be unaffected.

4.4.1.2 Test Equipment. See 3.2.

4.4.1.2.1 Flat glass frame fixture with pivot shaft and arm capability (Figure 1).

4.4.1.2.2 Magnification: 10x lens.

4.4.1.3 Test Samples. See 3.3.

Note: Wiper blades being tested must be made from production process in which the rubber element has been through all of the normal manufacturing processes, including the chemical operations for friction reduction and/or the use of anti-friction coatings.

4.4.1.4 Test Preparation. Not applicable.

4.4.1.5 Test Condition. See 4.1.1 thru 4.1.3.

4.4.1.6 Test Procedure. Assemble wiper blades to wiper arms mounted onto the glass frame fixture. Verify wiper arm attack angle is set to +5 degrees and arm tip force is nominal +10% for given blade length. Slightly rotate wiper arms in counterclockwise direction so that the entire blade lip is laying in the same direction, simulating a park position condition.

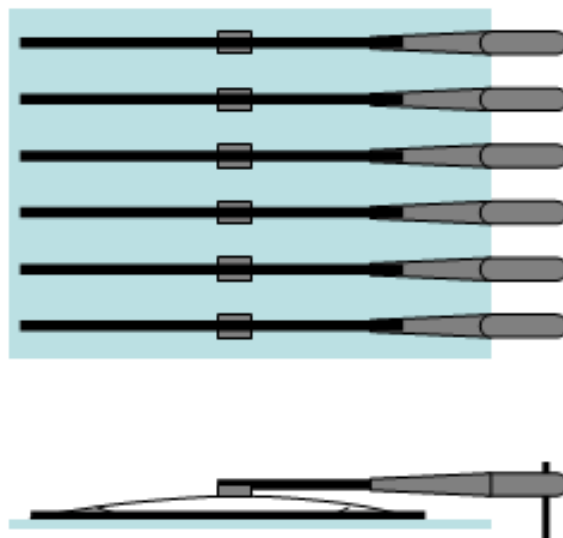


Figure 1: Glass Frame Fixture

4.4.1.6.1 Within 15 minutes after completing 4.1.1.6, place test fixture with wiper blades inside the ozone cabinet. Set ozone concentration to 50 parts per hundred million (pphm) (+0%/-10%), temperature to $40\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$, and RH to $60\% \pm 5\%/-0\%$. Soak parts in cabinet for 72 h checking the ozone cabinet every 24 h to ensure that it is operating to the required standards. Record daily the cabinet conditions for ozone concentration, temperature and RH.

4.4.1.6.2 Remove the test fixture after the required test time in the ozone cabinet has been met. Allow parts to stabilize at room temperature for a minimum of 2 h.

4.4.1.6.3 Carefully inspect parts by lifting the wiper blades perpendicular from the glass surface. Note if the rubber adheres to the glass fixture or if any residue has been left where the rubber wiping lip was in contact with the glass.

4.4.1.6.4 Using a 10x magnification lens, visually inspect the rubber element for microcracking. Particular attention must be observed for failures in the hinge pivot area (especially the side under tension) and on the wiping lip.

4.4.1.6.5 After visual inspections, install blades on appropriate test buck and verify wipe quality requirements.

4.4.1.7 Test Requirement. The rubber element must not stick to the glass fixture after being exposed to the ozone environment.

4.4.1.7.1 The rubber element shall not leave any visible residue on glass fixture after being exposed to the ozone environment.

4.4.1.7.2 There can be no cracks, when viewed with a 10x magnification lens, in any location on the rubber element.

4.4.1.7.3 The wiper blades must provide a smooth wiping operation with a minimum wipe quality rating of seven (7), per the Standard Wipe Quality Rating Scale.

4.4.2 Shelf Ageing Test.

4.4.2.1 Purpose. The purpose of this test is to confirm that the rubber element of the wiper blade will be able to be stored in a hot and humid factory warehouse environment prior to being assembled, and then sitting unused on a new vehicle and still be able to deliver a passing wipe grade rating not leaving any detrimental contamination on the windshield.

4.4.2.2 Test Equipment. See 3.2.

4.4.2.2.1 Microscope capable of a magnification of at least a 60x with picture capability.

4.4.2.3 Test Samples. See 3.3.

Note: Wiper blades being tested must be made from production process in which the rubber element has been through all of the normal manufacturing processes, including the chemical operations for friction reduction and/or the use of antifriction coatings.

4.4.2.4 Test Preparation. Not applicable.

4.4.2.5 Test Condition. See 4.1.1 thru 4.1.3.

4.4.2.6 Test Procedure. Place the wiper blades in the heat ageing oven so that the rubber elements are not touching any other sample or the interior surfaces of the test oven. Insure that the samples are spaced adequately to allow the warm humid air the ability to contact all of the exposed rubber surfaces.

4.4.2.6.1 Set the heat ageing oven to 40 °C ± 3 °C, and the RH to 60% +5%/-0%. Leave the wiper blades in the oven for 15 days.

4.4.2.6.2 Turn off the temperature for the oven, but do not remove the test samples. Allow wiper blade samples to normalize by leaving them in the oven for five (5) days at ambient temperature and humidity with the oven door kept closed.

4.4.2.6.3 Set the heat ageing oven to 30 °C ± 3 °C, and RH to 60% +5%/-0%. Leave the test wiper blades in the oven for ten (10) days.

4.4.2.6.4 Turn off the temperature in the oven, but do not remove the wiper blade test samples. Allow the test samples to reach ambient temperature for one (1) day.

4.4.2.6.5 Within 24 h after removing blades from oven, inspect the test wiper blades with a microscope at 60x power magnification. Carefully inspect the complete rubber element wiper lip cut edge for wax buildup. Do not touch the test wiper blade rubber element in any manner including the use of tools or a cleaning solvent.

4.4.2.6.6 With the use of the microscope, photograph the wiper blade lip slit edge as shown in Figure 2. Record the magnification used and the general location where the photograph was taken.