



Chrome Plated Steel Bumper Cold Vibration 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 procedure is to determine if a chrome plated steel bumper meets the corrosion performance requirements of the Subsystem Technical Specifications (SSTS) after it is subjected to extreme cold temperature and vehicle representative road induced vertical loads.

1.2 Applicability. This test procedure is to be used for body on frame (BOF) chrome plated steel bumpers.

2 References

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

2.1 External Standards/Specifications.

ISO 9227

2.2 GM Standards/Specifications.

GMW3221

GMW14458

GMW14672

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 Environmental Chamber. An environmental chamber large enough to accommodate the test bumper and capable of maintaining the specified temperature.

3.2.2 Vibration Table. A vibration table with the ability to represent road induced vertical loads.

3.2.3 CASS Chamber. A Copper-Accelerated Acetic Acid Salt Spray (CASS) chamber per ISO 9227.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Piece. The bumper assemblies are to be production representative parts.

3.3.2 Test Piece Quantity. Three (3) test pieces are required for initial approval.

3.3.3 Test Piece Nickel Hardness. The nickel hardness of the test pieces must meet the specification of GMW14672.

3.3.4 Conditioning. Condition to GMW3221, Code A.

3.4 Test Time.

Calendar time: 3 d

Test hours: 72 h

Coordination hours: 3 h

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3.5 Test Required Information.

3.5.1 Plating Thickness Measurements. Thickness measurements are to be taken at plating thickness points (P-points) prior to start of test.

3.5.2 Part Photographs. Take photographs of the part to be tested as installed before, during and after cold soak, vertical load and CASS tests.

3.6 Personnel/Skills. Prior experience in setting up and running similar tests and experience in the use of the referenced test equipment are critical to achieving the estimated times in 3.4.

4 Procedure

4.1 Preparation.

4.1.1 Test Piece Constraints. Bumper assembly is to be securely constrained to a test fixture representing all vehicle attachments and the correct vehicle orientation. Test fixture must have resonance below 250 Hz.

4.1.2 Accelerometer. The accelerometer needs to be placed on the fixture surface near one of the bumper assembly mounting locations.

4.2 Conditions.

4.2.1 Environmental Conditions.

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 Cold Cycle. Place test fixture and bumper assembly in the environmental chamber and adjust the temperature to $-30\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$. Once chamber temperature reaches $-30\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$, maintain the specified temperature for $3\text{ h} \pm 10\text{ minutes}$. Remove fixture from chamber.

4.3.2 Vertical Loading. Within 15 minutes of removing from cold chamber, secure the test fixture and bumper assembly to a vibration table in a room with a temperature of $22\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$. Turn on vibration table and excite the bumper assembly in the z-direction to achieve the random vibration profile per Appendix A for $3\text{ h} \pm 10\text{ minutes}$. See Figure 1.



Figure 1: Bumper on Electro Dynamic Vertical Shaker Table

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