



Susceptibility to Chloride Stress Corrosion Cracking

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/Material Description. This standard is an aggressive characterization of the susceptibility of a plastic component to stress corrosion cracking. It accomplishes this by exposing it to different artificial environments with the presence of chlorides. It requires that an appropriate stress level be imparted on the component. The tests are not a direct comparison to field exposure and can only indicate whether the component is susceptible to attack at the stress level that was induced on it.

The two chlorides identified in this standard are calcium chloride and zinc chloride. Calcium chloride is a common chemical used in deicing solutions and gravel road dust control. Zinc chloride only occurs from a reaction of zinc and other chlorides, e.g., sodium or calcium.

It is not recommended to directly fasten any plastic component which is susceptible to chloride stress corrosion cracking directly to a zinc surface.

1.2 Symbols. Not applicable.

1.3 Applicability. Testing is recommended for certain polymers, as defined in Table 1, exposed to the underbody and lower underhood atmosphere in critical applications. If the polymer is not identified within the Table 1, GM Materials Engineering shall be consulted to determine the appropriate disposition.

Table 1: Material List

Testing Recommended	Testing Not Recommended: Materials Inherently Chloride Resistant	Testing Not Recommended: Materials Susceptible to Chloride Attack
• Polyamide (PA) - (including but not limited to, PA6, PA12, PA46, PA66, PA612) • Polyphthalamide (PPA) • Polyketone (PK)	• Polyethylene (PE) • Polypropylene (PP) • Polyester (PBT or PET) • Polyphenylene Sulfide (PPS)	• Acetal (POM)

1.4 Remarks. The chloride tests are intended to be a determination of the susceptibility of the plastic component to stress corrosion cracking. Evidence of cracking, crazing, or other damage should be a strong indication that the component is not adequately stress crack resistant

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

GMW14270

3 Test Preparation and Evaluation

3.1 Resources.

3.1.1 Facilities. Temperature controlled material test laboratory.

3.1.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.1.2 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.

3.1.2 Equipment.

3.1.2.1 Container. Recommended material for the container is high density polyethylene or austenitic stainless steel.

3.1.2.2 Deflection Fixture. Recommended deflection fixture should be made out of austenitic stainless steel.

3.1.2.3 Scale. To prepare the test fluids. See 3.2.1.

3.1.2.4 Magnification Device (10X). To examine the test pieces.

3.1.2.5 Fresh Water. To rise the test fluid off the test pieces.

3.1.3 Test Piece. Test pieces shall be the production intent plastic components. Prototype components can be substituted if determined to be sufficiently similar to production. In the case where the component would contain fluid, the area that would contain fluid shall be sealed off preferably with the production intent connectors. Any electrical ports shall also be sealed with the appropriate production intent connector. Exposed metal components of an assembly could have an adverse effect on the solution and/or the remaining structure and should not be included in the test of the plastic component if possible.

3.1.4 Test Time.

Calendar time:	17 d
Test time:	≤ 400 h
Coordination time:	4 h

3.1.5 Test Required Information.

3.1.5.1 Deflection representative of the parts usage in the assembly

3.1.5.2 Documentation defining the test requirement and the test solution.

3.1.6 Personnel/Skills. Person familiar with using calcium chloride and zinc chloride test fluids and the test equipment in 3.1.2.

3.2 Preparation.

3.2.1 Calcium Chloride Test Fluid. Mix a 50% aqueous solution (by weight) of calcium chloride in water.

3.2.2 Zinc Chloride Test Fluid. Mix a 50% aqueous solution (by weight) of zinc chloride in water.

3.3 Conditions. See Section 4.

3.3.1 Environmental Conditions. Test at laboratory ambient, 23 °C ± 2 °C.

3.3.2 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.

3.4 Instructions. Depending on documented component requirement or agreement on test applicability and test solution, follow 4.1 and/or 4.2.

3.5 Data. Not applicable.

3.6 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.