GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW17083

Substrate Surface Stress Test for molded ABS and ABS/PC

1 Scope

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 describes the evaluation of ABS and ABS/PC molded parts for surface stress, molding defects (hardening) and internal stress.

This test is only for qualitative judgment and gives indications of faults in the molded substrate prior to plating. A quantitative measurement using this method is not possible.

1.2 Foreword. Not applicable.

1.3 Applicability. Molded ABS and ABS/PC parts for chrome plating according GMW14668.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW14668

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.

3.2.2 Glass or plastic container large enough to dip the complete part (for ABS and ABS/PC parts).

3.2.3 Thermostat to maintain the test temperature (for ABS and ABS/PC parts).

3.2.4 Glacial acetic acid (water free, chemically pure, CAS 64-19-7) (for ABS parts only).

3.2.5 Isopropanol (CAS 67-63-0) (for ABS/PC parts only).

3.2.6 Acetone (CAS 67-64-1) (for ABS/PC parts only).

3.2.7 Organic red dye, e.g. Sanodal Red B3LW (for ABS/PC parts only).

3.3 Test Vehicle/Test Piece. Complete samples as molded.

3.4 Test Time. Not applicable.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

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4 Procedure

4.1 Preparation. As specified for the relevant test in paragraph 4.3.

4.2 Conditions.

4.2.1 Environmental Conditions. As specified for the relevant test in paragraph 4.3.

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 ABS (Glacial Acetic Acid).

4.3.1.1 Test Instructions.

a Ensure that the part is completely dry prior to submerging in acid.
b The part shall be dipped 30 s at (+24 ± 3) °C in acetic acid.
c After dipping, the part shall be rinsed and dried at (+24 ± 3) °C (room temperature).
d The part shall be evaluated for surface stress (see paragraph 4.3.1.2, item a) and hardening (see paragraph 4.3.1.2 item b).
e The dried part shall be dipped 2 minutes at (+24 ± 3) °C in the acetic acid again.
f Afterwards, the part shall be rinsed and dried at room temperature again.
g The part shall again be evaluated for internal stress (see paragraph 4.3.1.2, item c).

4.3.1.2 Evaluation.

a Whitening of the surface (dense patterns) can be an indication of surface stress. The more dense the pattern, the higher the stress (see Note 1).
b Hardening of the surface is indicated by discoloration. Proper molding surfaces show a uniform white surface. Poor molding surfaces show white areas and dark, shiny areas on the same part, indicating nonuniform distribution of the butadiene over the molding surface (see Note 2).
c Cracks in the plastic material are an indication of very high stress levels in the part. The severity of the cracking indicates the severity of the stress.

Note 1: The use of slightly colored grey resins often provides a greater degree of contrast in examination.

Note 2: Weld lines, areas new gates and surfaces at the end of flow are typically more prone to stress.

4.3.2 Test Procedure for ABS/PC (Organic Dye).

4.3.2.1 Test Solution. The test solution is made up consisting of Isopropanol 750 ml/l, Acetone 250 ml/l and an organic compatible red dye 0.08 g/l.

4.3.2.2 Test Instructions.

a Immerse the part in the red dye solution for the appropriate amount of time (typically (5 to 10) minutes, dependent on material).
b Immediately rinse part in running water to remove excess dye, and blow part dry using cool air.
c Evaluate the part for surface stress (see paragraph 4.3.2.3).

4.2.3 Evaluation.

a Pink or reddish coloration variations are an indication of surface stress.
b If the color change is minimal, the part may not be etched or the test material may require changing.
c If the variation in color change across the surface of the component is extensive, the degree of etching may also mirror this change. The subsequent adhesion of the electrodeposit may be compromised due to the variation in stress of the base material and its ability to be evenly etched.
d Dyes tend to penetrate faster in areas of lower stress. This test may also indicate that stress levels are so high that stratification of the resin has occurred. And, poor adhesion and potential delamination may result.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. If any stress is detected by stress test for ABS or ABS/PC tooling and molding parameter changes should be made to eliminate as best possible any surface or internal stresses in the part prior to plating.

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