GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW6992

Visual Appearance Assessment

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.

This standard provides a consistent practice for the assessment of visual appearance differences of materials and parts incorporated in the manufacturing of vehicles. Usage includes evaluation of all appearance attributes for match to specified Master standards or targets, as well as appearance changes between control and exposed materials/parts after specified exposure tests. Applicable to Interior, Exterior, Underhood, any material/component with appearance requirements.

1.1 Purpose. This standard describes the recommended practice for controlled lighting, viewing equipment, viewing conditions and examination procedures to be used when evaluating visual match-to and appearance change.

1.2 Foreword. Not applicable.

1.3 Applicability. Not applicable.

2 References

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

2.1 External Standards/Specifications.

SAE J361

2.2 GM Standards/Specifications.

GMW15195 GMW15424

2.3 Additional References.

- Global Document Management (GDM) Database
- GM Appearance Database
- GM Pre Grain Document
- GM Supply Power

2.3.1 Distribution of GM Masters. Thierry Corporation (www.thierry-corp.com).

3 Resources

3.1 Facilities. SAE J361, reference Section 5, Viewing Environment.

3.2 Equipment. Visual color assessment shall be conducted using certified controlled lighting conforming to SAE J361, reference Section 4, Equipment.

3.3 Test Vehicle/Test Piece. Not applicable.

3.4 Test Time. Not applicable.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Color aptitude testing for personnel evaluating Material Color Development and Part Appearance Approval shall be conducted on a biennial basis. Must meet the test ranking for the method required by the GM Region as outlined in Appendix A, Table A1.

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3.7 Sourcing Requirements. As required, at the Sourcing Technical Reviews, prospective suppliers shall provide physical components and/or a plan to show they are capable of meeting the required appearance attributes (color, grain, gloss, overall appearance) with materials and design/manufacturing processes being proposed.

3.8 Communication. The Tier 1 Supplier shall be responsible to address appearance execution to meet GM criteria (including parting line, gating, draft angle, core side read thru, etc.), that affect the overall appearance of the part in the vehicle, including resolution of appearance issues, for the life of part.

4 Procedure

Summary of Test Method. This standard describes the recommended practice for the light sources and intensity, viewing environment, viewing conditions and examination procedures to be used when evaluating visual match and appearance change.

4.1 Preparation. Not applicable.

4.2 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.

4.2.1 Environmental Conditions. Not applicable.

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 Calibration. SAE J361, reference Section 6.4 Calibration and Certification, and Section 6.5 Light Level Balance.

4.3.2 Maintenance. SAE J361, reference Section 6, Maintenance.

4.3.3 Viewing Conditions. SAE J361, reference Section 7.1 Viewing Conditions.

4.3.4 Examination Procedures.

4.3.4.1 Visual Color and Gloss Matching. SAE J361, reference Section 7, Visual Color Evaluation. This is the evaluation of the color match, or color and gloss match of a material/part to a Master standard or target.

4.3.4.1.1 Lighting. SAE J361, reference Section 4, Lighting Unit(s). All specimens shall be viewed under daylight (D65), followed by cool white fluorescent (CWF) and horizon light. Daylight (D65) is the primary lighting source for making visual evaluations. Fluorescent and horizon lighting conditions are used to evaluate metamerism.

4.3.4.1.2 Viewing and Positioning. SAE J361, reference Section 7.2 Viewing and Positioning. For the initial viewing position, the material/part and corresponding standard or target shall be placed on a 30 degree incline examination table at about eye level and centered under the lighting unit(s). They shall be parallel in direction and touching one another on the viewing plane. Reverse them left to right and top to bottom to observe any affects on color due to placement relative to one another. Additional positions and viewing conditions are required dependent on the material/part types.

4.3.4.1.3 Textile Material/Parts. SAE J361, reference Section 7.2.1, Textile Materials.

4.3.4.1.3.1 Textile Flop Matching. SAE J361, reference Section 7.2.1.1, Flop Matching. The material/part along with its corresponding Master standard or target shall be evaluated when both are rotated and evaluated on the same plane; (depending on textile material type, i.e., fabric, carpet, leather, plastic roll goods, etc.,) at 90, 180, and 270 degree points. Additional viewing conditions of the material/part may be positioning the sample not on the same plane as the Master standard or target, to better evaluate the appearance attributes of a flexible sample to the Master standard or target.

4.3.4.1.4 Non-Textile Materials/Parts. SAE J361, reference Section 7.2.2, Painted or Glossy Surfaces, Plastic, Leather or Vinyl Materials, and Section 7.2.3 visually comparing a sample to a Master; Figure 3, Flop and Travel Evaluation.

4.3.4.1.5 Gloss Matching. Samples submitted shall be production intent representative. The material/part shall be visually compared to its corresponding Master standard or target. Gloss shall be visually consistent and uniform across the material/part.

4.4 Pre Grain.

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4.4.1 Grain Source Approval for Etched Grains. Prior to graining the tool, the Grain Source must be approved by a GM Authorized Representative for the specified Grain. Documentation of GM Approved Grain Sources per Grain can be found in the GM Appearance Database.

4.4.2 Pre Grain Instruction. Prior to graining the tool, the Tier 1 Supplier shall be responsible for submission of production tooled parts for Pre Grain Instruction (Grain Mapping) to the GM Authorized Representative and the GM Approved Grain Source. Parts should be black in color or of equal color value. Submit minimum 2 parts per less finish part number, unless otherwise communicated by the GM Authorized Representative.

4.4.2.1 Submission of parts will be accompanied by the GM Pre Grain Document completed by the Supplier**.**

4.4.2.2 Pre Grain Instruction on production tooled parts must be completed no later than Global Vehicle Development Process (GVDP) Milestone Final Approval to Grain (FATG).

4.5 Part Surface Quality Evaluation.

4.5.1 Pre Grain Surface Quality for Etched Grains. Prior to graining the tool, the Tier 1 Supplier shall be responsible for submission of production tooled parts for Surface Quality Evaluation to the GM Authorized Representative. Parts should be black in color or of equal color value. Submit minimum 2 parts per cavity, per less finish part number, unless otherwise communicated by the GM Authorized Representative.

4.5.1.1 Submission of parts will be accompanied by the GM Pre Grain Document completed by the Supplier.

4.5.1.2 Pre Grain Surface Quality Approval of production tooled parts must be completed no later than GVDP Milestone FATG.

4.5.2 Evaluation. Pre and Post Grain Surface Quality assessment should be made without the aid of magnification or silver paint to highlight the surface. Magnification may be used to assist in grain issue resolution, at the discretion of the GM Authorized Representative. Parting Lines are evaluated to GMW15424. Positioning and viewing should be at a normal reading distance, with consideration of how the part is seen in the vehicle.

4.6 Grain Evaluation. The grained raw material (Embossed) or Post Grain part (Etched) shall be visually compared to the Primary Grain Master for appearance, i.e., pattern, repeat, lines, shapes, direction, scale, depth, definition, character. Consideration may be given to the grain appearance/execution of mating parts and location in the vehicle. Evaluation should be made without the aid of magnification or addition of silver paint to highlight the surface. Magnification may be used to assist in grain issue resolution, at the discretion of the GM Authorized Representative. Samples/parts should be black in color or of equal color value. Positioning and viewing should be at a normal reading distance, under artificial light or natural day light conditions.

4.7 Appearance Approval of Production Part. The Tier 1 Supplier shall be responsible for submission of Production Part for Appearance Approval to the GM Authorized Representative. Part must be made using GM Approved materials and colorant sources. Submit minimum 2 parts per color, per cavity as required, unless otherwise communicated by the GM Authorized Representative.

4.7.1 Exterior Whole Fascia parts are to be submitted to assess surface quality for Appearance Approval Report (AAR) in the following Body Color paints that are included in the program production palette:

- White, Black or darkest color, and the lightest metallic color, or as agreed to with the GM Authorized Representative.
- The balance of the Body colors in the Program Production Palette may be submitted for AAR in cut parts as agreed to with the GM Authorized Representative.

4.7.2 Submission of parts will be accompanied by the AAR completed by the Supplier.

4.7.3 GM Match criteria are visual for color, post grain as required, gloss as required, and overall appearance. Visual assessment overrides numerical data. Numerical data may be used to assist in appearance issue resolution, at the discretion of the GM Authorized Representative.

4.7.4 The Tier 1 Supplier will be expected to maintain the appearance requirement attributes (color, grain, gloss, overall appearance) that was GM Approved at the time of Appearance Approval of the Production Part, in accordance with GMW15195 Documentation for Control of Appearance Aesthetic Quality.

4.8 Overall Vehicle Harmony. To insure overall vehicle harmony, parts will be evaluated in vehicle position for part to part harmony of color/gloss, and grain (as required). Evaluation conditions will be under controlled lighting, and/or outside natural daylight (should be conducted between the hours of **10:00 to 14:00,** fair weather conditions). Minor appearance adjustments may be required to materials/parts to obtain Part Appearance Approval and Harmony.

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