



COSMETIC SPECIFICATION

1. PURPOSE:

The purpose of this document is to establish the acceptance criteria for the cosmetic aspect of Molex's components and assemblies. This document does not apply where there is a concern for mechanical or electrical functionality.

2. APPLICATION:

This specification applies to all products produced by the Commercial Products Division and Transportation Product Division. The examples included are intended to establish a baseline for customer acceptance and are not limited to the examples shown. Contact Molex product marketing for additional clarification.

In cases where product drawing notes conflict with this specification, the drawing notes take precedence.

3. REFERENCE DOCUMENTS:

3.1. None

4. DEFINITIONS:

4.1. Surface Classification: (To be identified on part drawing by responsible engineer)

4.1.1 Class A (Highly decorative surface)

Any surface in constant view of the end customer, **or**

Any surface that directly affects a direct customer's ability to process Molex's connectors.

4.1.2 Class B (Moderately decorative surface)

Any surface in occasional view of the end customer without moving or disassembling the unit, **or**

Any surface that has a minimal impact on a direct customer's ability to process Molex's connectors.

4.1.3 Class C (Non decorative surface)

Any surface not readily visible to the end customer except when unit is moved or disassembled, **or**

Any surface that has no impact on a direct customer's ability to process Molex's connectors.

4.2. End Customer – The end user of the Molex product (original equipment manufacturer, etc.)

4.3. Direct Customer – The “ship to” customer (contract manufacturer, distributor, etc.)

4.4. Descriptions of Cosmetic Conditions:

4.4.1 Blisters: Areas of local air entrapment or non-adhesion.

4.4.2 Blush / Sheen Variation: Inconsistency in the gloss or luminance of a surface or fingerprints within the same part.

4.4.3 Color Variation: Variation of the surface color intensity or shade across parts. Intensity or shade is uniform within parts.

4.4.4 Contamination/Dirt/Smudge: Foreign substances inadvertently adhered/attached to a part surface that requires a special cleaning process.

4.4.5 Debris - Lint/ Grit/ Speck: Any unintended non-metallic substance on a surface that is easily removed.

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- 4.4.6 Dents: Local material depressions.
- 4.4.7 Discoloration: Change from original color or inconsistent color within the same part.
- 4.4.8 Flash / Parting Line Mismatch: A visible line and/or raised surface formed at the intersection of two mating surfaces of the mold or part.
- 4.4.9 Flow Marks/ Splay: Wavy or streaked appearance of a surface.
- 4.4.10 Gouge: Visible lines that can be felt with a thumbnail.
- 4.4.11 Heat Checking: Raise veins of material due to small cracks in the surface of molds and dies.
- 4.4.12 Internal Speck: Any unintended substance visible within a molded part.
- 4.4.13 Knit / Weld Lines: A visible line formed at the intersection of material flow.
- 4.4.14 Nick: a small notch or chip.
- 4.4.15 Orange Peel: Stress lines or crinkled appearance generally located near areas that are formed.
- 4.4.16 Oxidation: A natural chemical process that produces metal oxides on the surface of base metals.
- 4.4.17 Paint Runs: Caused by excessive paint in local area not drying uniformly.
- 4.4.18 Pits: Small craters on a surface.
- 4.4.19 Protrusion: A raised area on a surface (bump, ridge, or gate mark).
- 4.4.20 Scratches: Shallow grooves forming lines on the surface that cannot be felt with a thumbnail.
- 4.4.21 Short-fill: An area not completely formed during the molding process.
- 4.4.22 Sink: Depressions on the surface.
- 4.4.23 Texture Variation: Variation of the surface appearance due to surface roughness either within the part or across parts.
- 4.4.24 Tool Marks: A mark created by the manufacturing process - typically consistent on all parts from that process.
- 4.4.25 Burn & Splay Marks: Surface defects created by Laser Spot Welding
- 4.4.26 Missing/Peeling Plating: Surface area that is no longer plated/coated due to poor adhesion.
- 4.4.27 Debris – Flakes: Any unintended metallic substance on a surface that is easily removed.

5. RECORDS AND REPORTS

5.1 None

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6. PROCEDURE:

6.1 Viewing Magnification:

- Class A – view with the unaided eye (no magnification).
- Class B – view with the unaided eye (no magnification).
- Class C – view with the unaided eye (no magnification).

6.2 Viewing Distance:

- Class A – 450 mm / 18 inches
- Class B – 450 mm / 18 inches
- Class C – 600 mm / 24 inches

6.3 Viewing Time:

- Class A – 10 seconds
- Class B – 5 seconds
- Class C – 3 seconds

6.4 Viewing Angle:

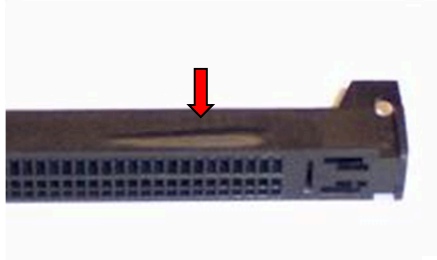
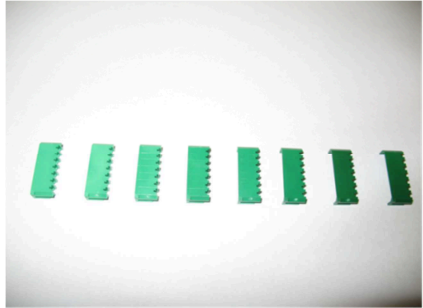
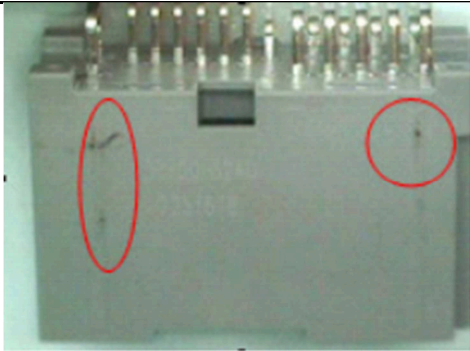
- Class A – 45 degrees from the light source and with 80-100 foot candles of illumination.
- Class B – 45 degrees from the light source and with 80-100 foot candles of illumination.
- Class C – 45 degrees from the light source and with 80-100 foot candles of illumination.

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6.5 Evaluation Criteria per Unit – Non-Plated Plastic Parts

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Blisters		Not Acceptable	Not Acceptable	Not Acceptable
Color Variation		Acceptable only within defined range using measurable means such as color chips	Acceptable if color is recognizable	Acceptable
Contamination/Dirt/Smudge		Not Acceptable	Not Acceptable	Maximum .020"/0.51mm square – 4 locations per surface

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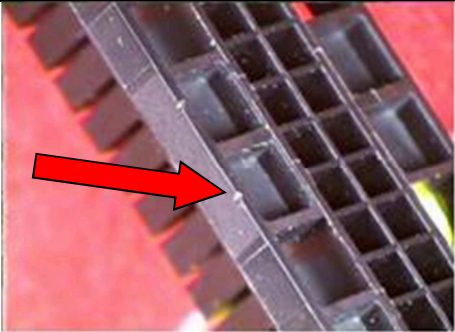
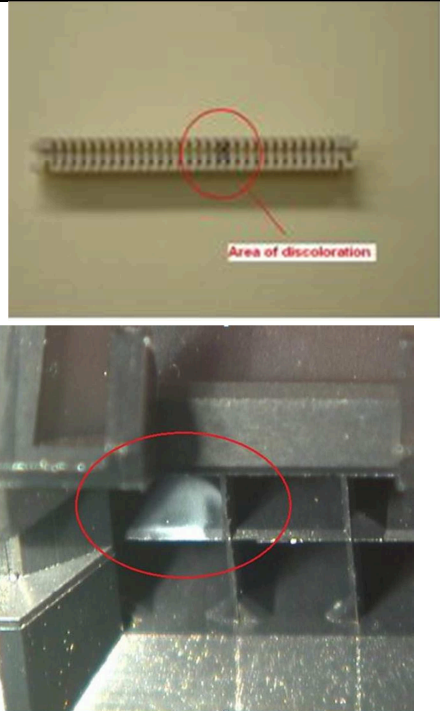
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COSMETIC SPECIFICATION

6.5 Evaluation Criteria per Unit – Non-Plated Plastics (continued)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Dents/Nicks		Not Acceptable	.060"/1.52mm wide x .015"/0.38mm deep -- 4 locations	Acceptable
Discoloration		Not Acceptable	Maximum .100"/2.54mm square -- 4 locations	Acceptable

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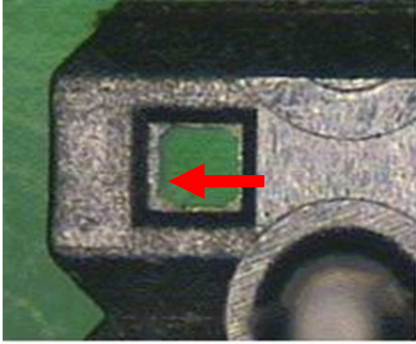
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COSMETIC SPECIFICATION

6.5 Evaluation Criteria per Unit – Non-Plated Plastics (continued)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Flash / Parting Line Mismatch		Not Acceptable	Maximum protrusions or mismatch .010"/0.254 mm -- 2 locations	Maximum protrusions or mismatch .020"/0.508 mm -- 8 locations

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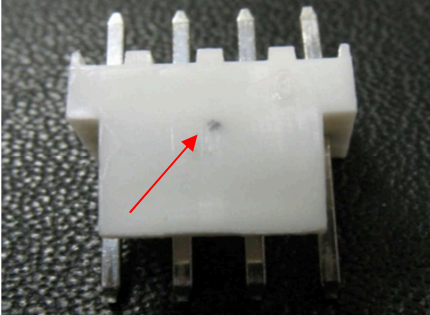
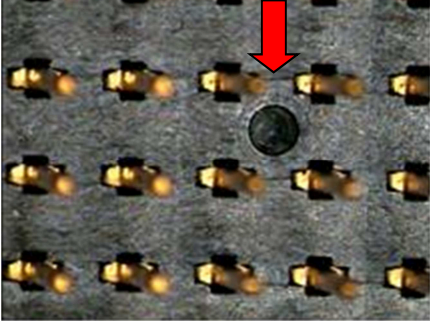
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6.5 Evaluation Criteria per Unit – Non-Plated Plastics (continued)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Flow Marks/ Splay		Not Acceptable	Acceptable	Acceptable
Internal Speck		Not Acceptable	Maximum .020"/0.51mm square -- 8 locations	Acceptable
Knit / Weld Lines		Not Acceptable	Maximum width .002"/0.051mm -- 2 locations	Acceptable

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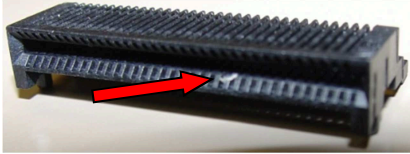
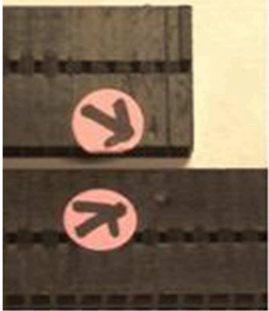
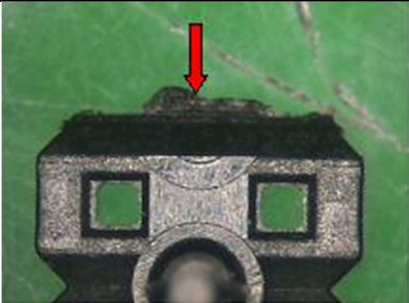
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6.5 Evaluation Criteria per Unit – Non-Plated Plastics (continued)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Lint / Grit / Speck		Not Acceptable	Maximum .060"/1.52mm x .015"/0.38mm thick -- 4 locations	Acceptable
Pits		Not Acceptable	.060"/1.52mm wide x .015"/0.38mm deep -- 4 locations	Acceptable
Protrusion		Not Acceptable	Maximum protrusions .010"/0.254 mm square area x .015"/0.38mm high -- 2 locations	Maximum protrusions .020"/0.508 mm square area x .015"/0.38mm high -- 8 locations

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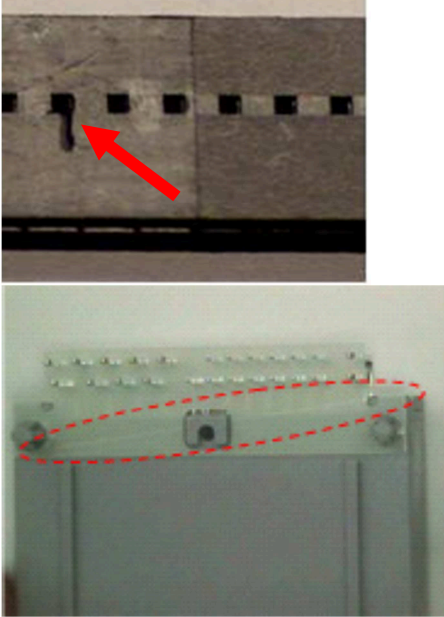
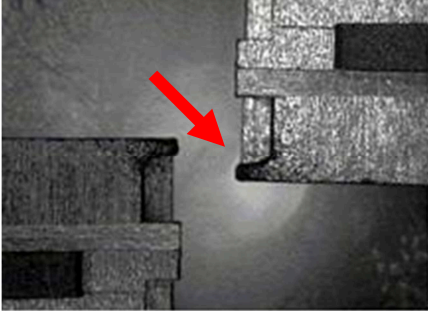
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COSMETIC SPECIFICATION

6.5 Evaluation Criteria per Unit – Non-Plated Plastics (continued)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Scratches/Gouges		Not Acceptable	.250"/6.35mm long x .020"/0.508mm wide -- 4 locations	Acceptable
Short Fill		Not Acceptable	Not Acceptable	Acceptable

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6.5 Evaluation Criteria per Unit – Non-Plated Plastics (continued)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Sink		Not Acceptable	Maximum depth .005"/0.127mm -- 2 locations	Acceptable
Texture Variations		Not Acceptable	Acceptable	Acceptable

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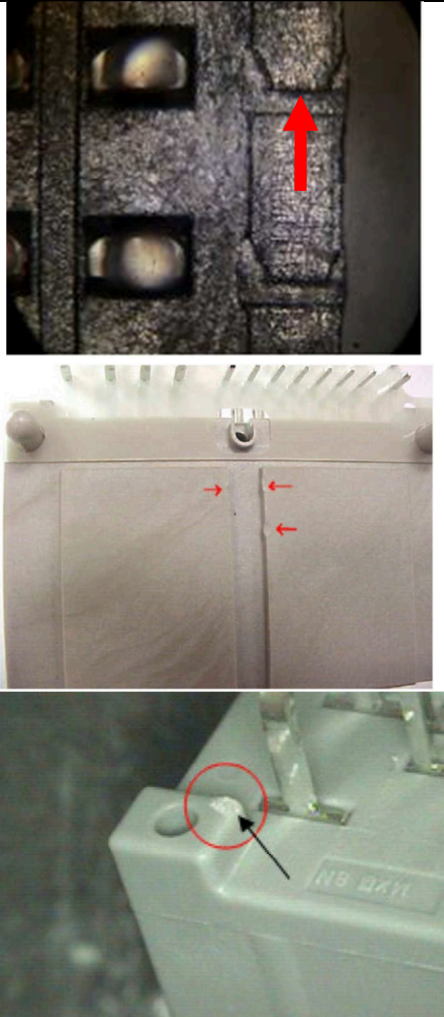
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6.5 Evaluation Criteria per Unit – Non-Plated Plastics (continued)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Tool Marks		Not Acceptable	Acceptable	Acceptable

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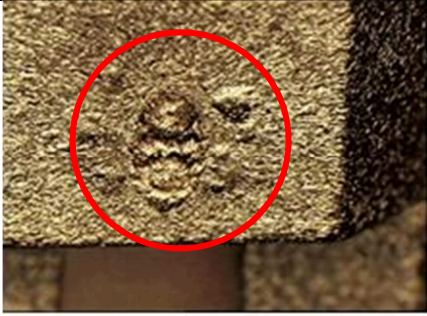

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6.6 Evaluation Criteria per Unit – Plated Plastic Parts (See Non-Plated Plastics for Additional Criteria)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Blisters		Not Acceptable	Not Acceptable	Not Acceptable
Blush		Not Acceptable	Acceptable	Acceptable

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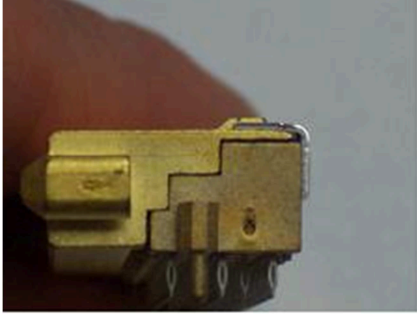
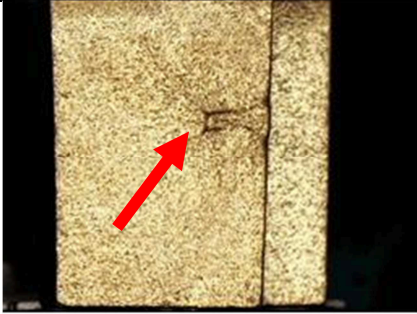
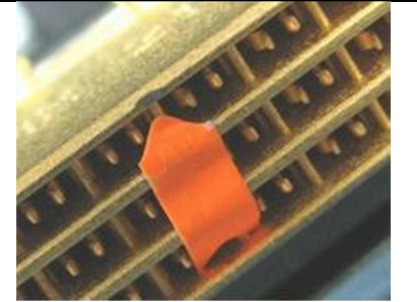
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6.6 Evaluation Criteria per Unit – Plated Plastics (See Non-Plated Plastics for Additional Criteria) (continued)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Discoloration		Not Acceptable	Acceptable	Acceptable
Knit / Weld Lines		Not Acceptable	Maximum width .002"/0.051mm -- 2 locations	Acceptable
Dents/Nicks		Not Acceptable	.060"/1.52mm wide x .015"/0.38mm deep -- 4 locations	Acceptable

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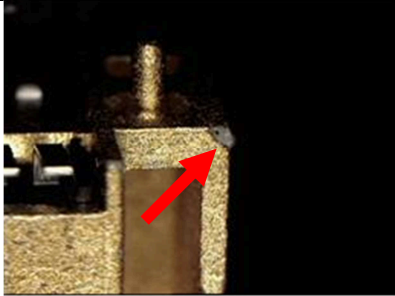
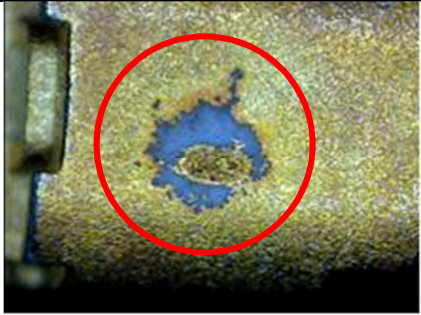
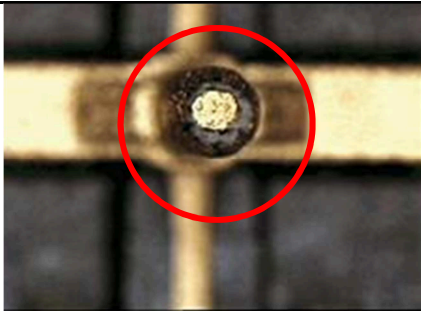
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6.6 Evaluation Criteria per Unit – Plated Plastics (See Non-Plated Plastics for Additional Criteria) (continued)

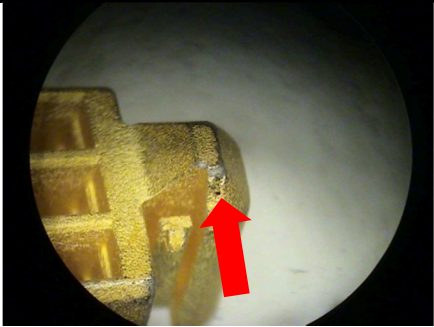

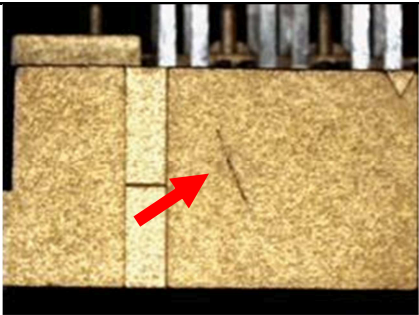
Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Dents/Nicks (continued)		Not Acceptable	.060"/1.52mm wide x .015"/0.38mm deep -- 4 locations	Acceptable
Missing Plating		Not Acceptable	Maximum diameter .150"/3.81mm – around gate	Maximum diameter .150"/3.81mm – around gate
			Maximum diameter .050"/1.27mm on all features protruding from main body -- 2 locations	Maximum diameter .050"/1.27mm on all features protruding from main body -- 4 locations

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6.6 Evaluation Criteria per Unit – Plated Plastics (See Non-Plated Plastics for Additional Criteria) (continued)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Pits		Not Acceptable	.060"/1.52mm wide x .015"/0.38mm deep -- 4 locations	Acceptable
Protrusion		Not Acceptable	Maximum protrusions .010"/0.254 mm square area x .015"/0.38mm high -- 2 locations	Maximum protrusions .020"/0.508 mm square area x .015"/0.38mm high -- 8 locations
Scratches/Gouges		Not Acceptable	.250"/6.35mm long x .020"/0.508mm wide -- 4 locations	Acceptable

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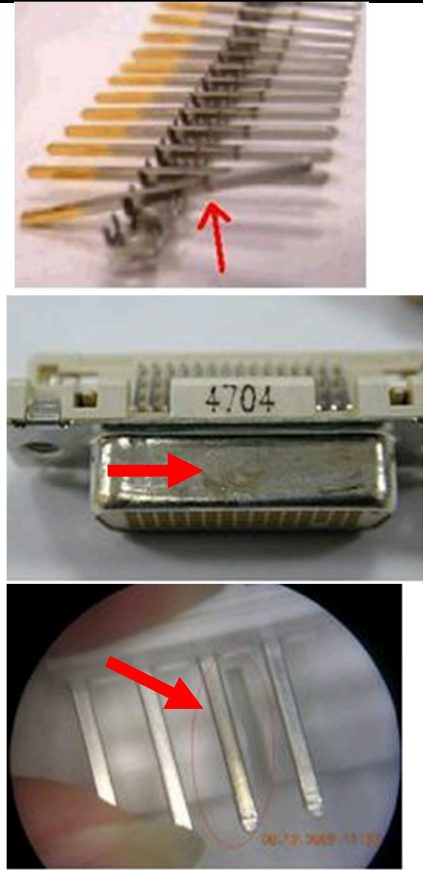
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COSMETIC SPECIFICATION

6.7 Evaluation Criteria per Unit – Stamped, Rolled, and Screw Machined Metal Parts (Finished or Un-Finished)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Blush		Not Acceptable	Acceptable	Acceptable
Dents / Pits		Not Acceptable	.060"/1.52mm x .010"/0.25mm deep -- 4 locations	Acceptable
Discoloration		Not Acceptable	Maximum .060"/1.52mm square -- 4 locations	Acceptable

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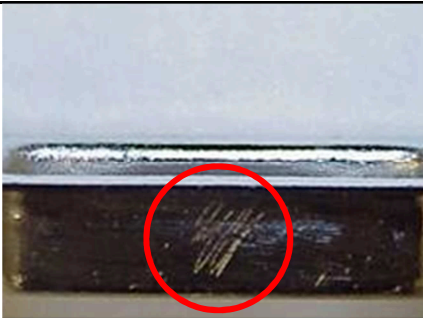
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COSMETIC SPECIFICATION

6.7 Evaluation Criteria per Unit – Stamped, Rolled, and Screw Machined Metal Parts (Finished or Un-Finished) (continued)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Gouge		Not Acceptable	The equivalent of 2 marks .100"/2.54mm long	The equivalent of 4 marks .200"/5.08mm long
Lint / Grit / Speck		Not Acceptable	Maximum .020"/0.51mm x .005"/0.13mm thick -- 4 locations	Acceptable
Orange Peel		Not Acceptable	Acceptable	Acceptable
Oxidation		Not Acceptable	Acceptable	Acceptable
Scratches		Not Acceptable	The equivalent of 2 marks .100"/2.54mm long	Acceptable

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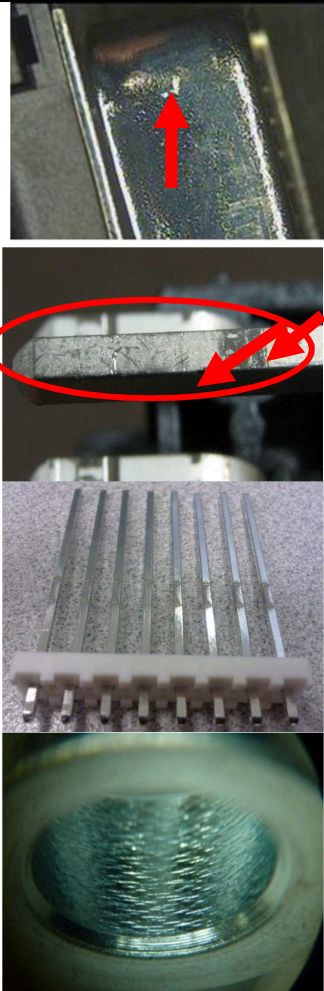
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COSMETIC SPECIFICATION

6.7 Evaluation Criteria per Unit – Stamped, Rolled, and Screw Machined Metal Parts (Finished or Un-Finished) (continued)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Texture Variations		Not Acceptable	Acceptable	Acceptable

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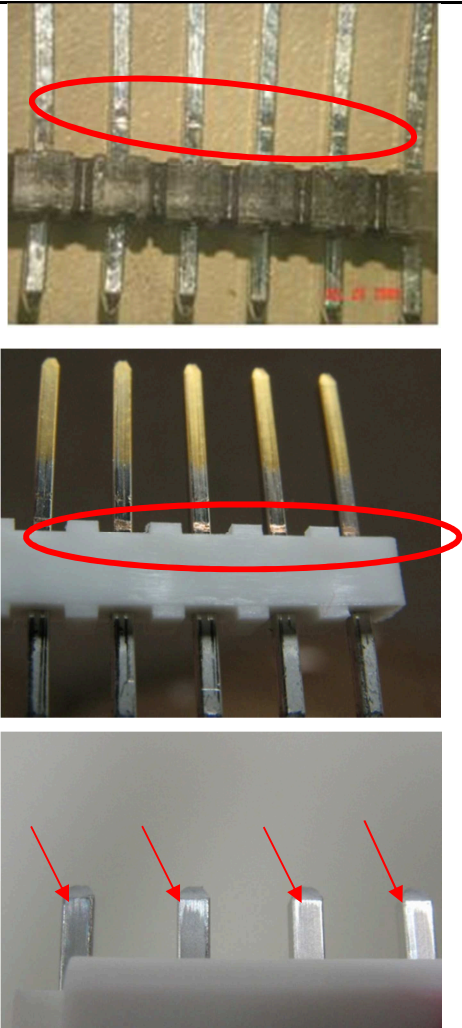
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Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Tool Marks		Not Acceptable	Acceptable	Acceptable

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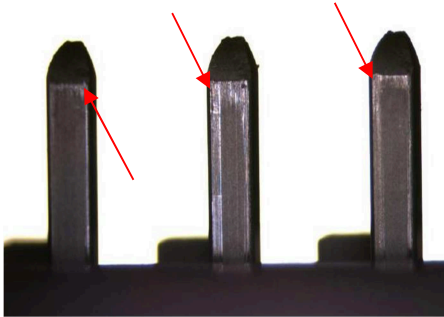
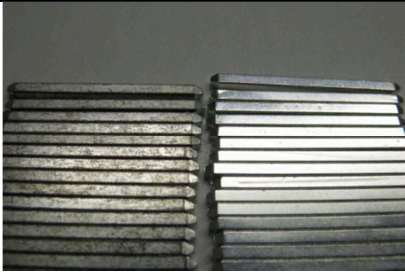
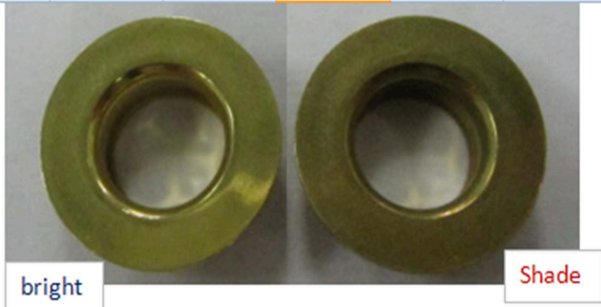
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Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Tool Marks Continued		Not Acceptable	Acceptable	Acceptable
Sheen Variation		Not Acceptable	Acceptable	Acceptable
Color Variation		Acceptable only within defined range using measurable means such as color chips	Acceptable if color is recognizable and without variation within the same lot of parts	Acceptable

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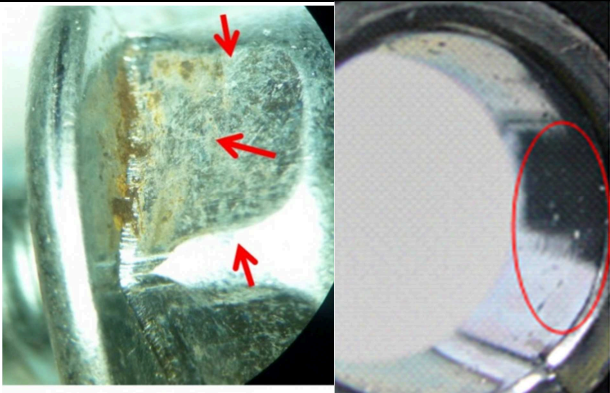
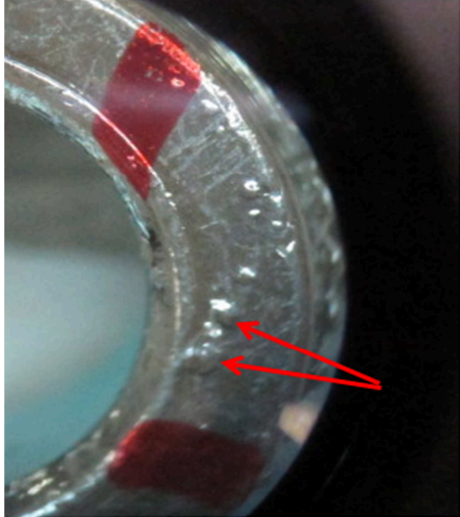
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Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Contamination/Dirt/Smudge		Not Acceptable	Not Acceptable	Maximum .020"/0.51mm square – 4 locations per surface
Blisters		Not Acceptable	Not Acceptable	Maximum .020"/0.51mm square – 4 locations per surface

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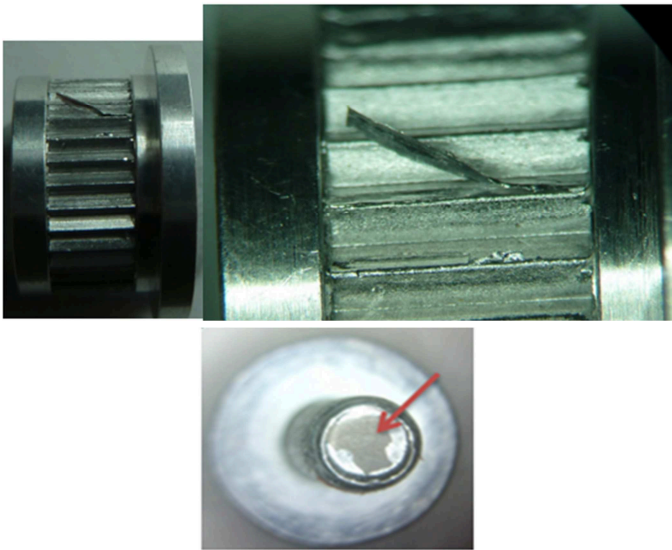
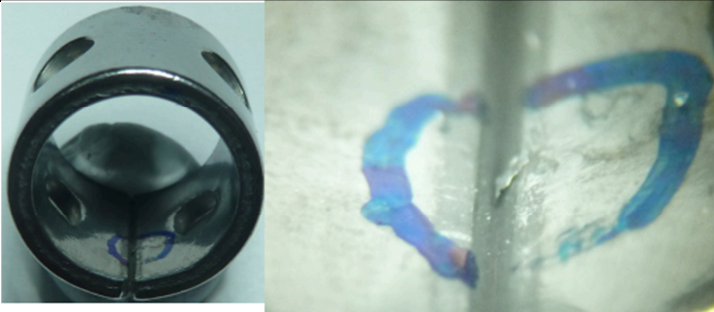
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COSMETIC SPECIFICATION

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Missing / Peeling Plating		Not Acceptable	Not Acceptable *Does not apply to tooling or “bando” marks. See above	Not Acceptable *Does not apply to tooling or “bando” marks. See above
Plating Flake		Not Acceptable	Maximum length 0.5mm	Maximum length 0.5mm

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6.8 Evaluation Criteria per unit – Die Cast parts with or without coatings (not hermetically sealed)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Blisters		Not Acceptable	Not Acceptable	Not Acceptable
Dents / Pits		Not Acceptable	.060"/1.52mm x .015"/0.38mm deep -- 4 locations	Acceptable
Discoloration		Not Acceptable	Maximum .020"/0.51mm square -- 4 locations	Acceptable
Flash / Parting Line Mismatch		Not Acceptable	Maximum protrusions or mismatch .010"/0.254 mm - - 2 locations	Maximum protrusions or mismatch .020"/0.508 mm - - 8 locations
Flow Marks		Not Acceptable	Acceptable	Acceptable
Gouge		Not Acceptable	The equivalent of 2 marks .100"/2.54mm long	The equivalent of 4 marks .200"/5.08mm long
Heat Checking		Not Acceptable	Not Acceptable	Maximum .030"/0.76mm deep -- 4 locations

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COSMETIC SPECIFICATION

6.8 Evaluation Criteria per Unit – Die Cast parts with or without coatings (not hermetically sealed) (continued)

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Knit / Weld Lines		Not Acceptable	Maximum width .008"/0.20mm -- 4 locations	Acceptable
Lint / Grit / Speck		Not Acceptable	Maximum .050"/1.27mm x .015"/0.38mm thick -- 4 locations	Acceptable
Oxidation		Not Acceptable	Not Acceptable	Acceptable
Protrusion		Not Acceptable	Maximum protrusions .010"/0.254 mm -- 2 locations	Maximum protrusions .020"/0.508 mm -- 8 locations
Scratches		Not Acceptable	.250"/6.35mm x .020"/0.51mm wide -- 4 locations	Acceptable
Short Fill		Not Acceptable	Not Acceptable	Acceptable
Sink		Not Acceptable	Maximum depth .030"/0.76mm -- 4 locations	Acceptable
Texture Variations		Not Acceptable	Acceptable	Acceptable
Tool Marks		Not Acceptable	Acceptable	Acceptable

6.9 For Die-Cast parts with hermetically sealed surfaces, see ES-31232-000.

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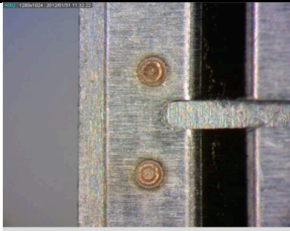
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6.10 Evaluation Criteria per Unit – Laser Spot Weld of Stamped Metal Assemblies

Condition	Illustration	Class A Surfaces	Class B Surfaces	Class C Surfaces
Burn & Splay		Not Acceptable	Not Acceptable	Acceptable
Discoloration		Not Acceptable	Acceptable	Acceptable
Base Metal Exposure		Acceptable	Acceptable	Acceptable

7. VERIFICATION / MANAGEMENT REVIEW

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		<u>APPROVED BY:</u> FSMITH-ROEMER	



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8. REVISION HISTORY

Revision	Approval / Date	Description of Change
A	Skip Fry 06 / 28 / 2006	Pending release.
B	Skip Fry 08/23/2006	Add 7.3 Tool Marks
C	Mibarra 09/12/2007	Modify Plated Plastic Criteria
D	Mibarra 12/10/2007	Rearrange Tables
E	Mkipper 02/09/2011	Add Sheen Variation to Definition 4.4.2, and Criteria 6.7.
E1	MMSTROH 10/12/2011	Add tool mark and texture variation pictures (section 6.7) and added picture for internal speck (section 6.5)
F	JKACHLIC 01/31/2012	Add section 4.4.25 for Burn and Splay Marks and section 6.10 for Laser Spot Welding of Stamped Metal Assemblies
F1	MKIPPER 06/07/2012	Add picture to texture variation (section 6.7)
F2	APROFFITT 12/21/12	Added additional cosmetic conditions to section 6.7 and descriptions to section 4.
F3	MKIPPER 2/11/2013	Change Discoloration and Internal Speck requirements for Class B Surface (section 6.5), add picture.

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