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1.0 **PURPOSE**

This purpose of this Avionics document is to define the visual inspection standards used to procure and accept mechanical parts and assemblies. It provides the following:

- Grades of surfaces
- Detailed inspection criteria for a wide variety of materials, surfaces, and characteristics
 - Sheet metal: Powder coat or wet paint; plated; anodized; conversion coated.
 - Printed Information: Silk screen, pad print, rubber stamp.
 - Labels: Screen printing, flexo-graphics, hot stamp.
- Visual aids to assist inspectors in evaluating defects.

2.0 **SCOPE**


This document is applicable for all piece parts under production, as well as receiving and final acceptance inspection of piece parts from all suppliers and all finished assemblies.

The order of precedence is the purchase order, the detailed parts specification/drawing, the product specification, and then CAS-QA-SOP-010 (this document).

This document only addresses defects that affect the cosmetic appeal of a product. Any defect that compromises the effectiveness of the coating is not allowed.

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3.0 REFERENCES

3.1 Military Standards

MIL-DTL-53072	Chemical Agent Resistant Coating (CARC) System Application Procedures and Visual Quality Control Inspection
MIL-DTL-5541	Chemical Conversion Coatings on Aluminum and Aluminum Alloys
MIL-PRF-22750	Coating, Epoxy, High-Solids
MIL-PRF-85285	Coating: Polyurethane, Aircraft and Support Equipment
MIL-PRF-8625	Anodic Coatings for Aluminum and Aluminum Alloy

3.2 Industry Standards

ASTM D16	Standard Terminology for Paint, Related Coatings, Materials, and Applications
SAE-AMS-2404	Plating, Electroless Nickel
SAE-AMS-2408	Plating, Tin
SAE-AMS-2418	Plating, Copper
SAE-AMS-2477	Conversion Coating for Aluminum Alloys Low Electrical Resistance Coating
SAE-AMS-C-26074	Electroless Nickel Coatings
SAE-AMS-STD-595	Colors Used in Government Procurement (formerly FED-STD-595)
SPI AQ-103	Cosmetic Specifications of Injection Molded Parts

4.0 RESPONSIBILITY

The Director of Operations, in coordination with the Director of Quality, have delegated the responsibility of implementing this procedure to the Operations and Quality Personnel.


The Operations Personnel are responsible for ensuring that all aspects are implemented effectively, and any corrective actions are resolved. In addition, the Operations Personnel are responsible for preventive and continuous improvement action items and to insure they are successfully implemented and are effective. Operations Personnel are also responsible for ensuring inspection during production is conducted per this specification.

The Quality Personnel are responsible for ensuring Receiving Inspection and Final Inspection are conducted per this work instruction.

The Director of Quality has the final decision on whether a product will be allowed to pass inspection.

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5.0 **ACRONYMS & DEFINITIONS**

See Table 1 through Table 12.

Table 1. Defect Types for Painted Surfaces

Defect	Description
Abrasion/Scuff	Linear marks in the paint surface that don't catch the fingernail.
Bare Substrate	Voids in the paint exposing bare substrate.
Bleeding/Smearing	Evidence of overlapping or altering another color. Spreading of pigment beyond the intended boundaries. Excess ink or paint in the areas that should be free of ink or paint.
Blister/Bubble	Enclosed raised spot resembling a bubble. Usually caused by entrapped contamination that out gassed or organic contamination. Sometimes will leave crater like impressions. Base metal is not exposed.
Blush/Bloom	An irregular, cloudy discoloration.
Chip/Nick	Areas of surface that have been broken, chipped or missing paint.
Color	Color does not match the approved observational standard as specified on the drawing.
Contamination	Dirt, lint, or other particles, typically embedded in or stuck to the painted surface.
Cracking/Crazing of coating	Hairline breaks in paint film.
Crater, Fish-eye	Small round depressions which may expose underlying substrate.
Discoloration	Any color or shading difference.
Dry Spray	A granular or coarse textured finish with no gloss.
Flow Mark	Waviness of the edge or excessive linear surface texture of the paint layer.
Gloss	Gloss is not consistent from surface to surface or within the same surface or does not match the approved observational standard as specified on the drawing.
Mottle	Blotchy, non-uniform appearance.
Orange Peel	An irregular or rough surface resembling the peel of an orange. Usually this will look like a cluster of small paint voids.
Overspray	Paint or coating in areas where there should not be any. Typically, these areas are masked-off prior to painting. Often the alignment/placement of the masking material is what will allow overspray.
Paint Ridge	An excessive build-up of paint in and on the cavity of tooling mark.

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Paint Run/Sag	A build-up of paint or coating and the uneven flow of excessive paint or coating (generally NOT seen in powder coat processes).
Peeling/Flaking	Lack of paint adhesion usually caused by contamination or poor surface preparation.
Pinhole/Pit	Small pore-like flaws in a coating that extend entirely through the applied film and have the general appearance of pin pricks when viewed by reflected light.
Scratch	Linear marks in the paint surface that catch the fingernail.

Table 1. Defect Types for Painted Surfaces (Continued)


Defect	Description
Solvent Pop	Open topped blisters up to 1 mm in diameter on the surface of the most recently applied paint film.
Texture	Texture is non-consistent from surface to surface or within the same surface, or does not match the approved observational standard as specified on the drawing.
Thin Coating/Under Spray	Coating film is thinner than specified such that the underlying coating is visible and/or color does not match standard.
Tiger Stripe	An uneven distribution of metallic or metal flake in the surface when applying paint that looks like alternating shiny and dull stripes on the painted surface.
Tooling Mark	Marks/impressions due to tooling edges.

Table 2. Defects Types for Plating

Defect	Description
Abrasion/Scuff	Linear marks in the surface that don't catch the fingernail.
Bare Substrate	Voids in the coating exposing bare substrate.
Blister/Bubble	Enclosed raised spot resembling a bubble. Usually caused by entrapped contamination that out gassed or organic contamination. Sometimes will leave crater like impressions. Base metal is not exposed.
Burned Deposit	Rough plating on corners and edges, produced by application of an excessive current.
Burnish Mark	Shiny areas created by rubbing, creating an uneven coating.
Chemical Bleed	Chemical bleed-out is the leaching of plating process chemical, generally from spot-weld seams.

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Chips/Nick	Areas of surface that have been broken, chipped or missing coating.
Contamination	Dirt, lint, or other particles, typically embedded in or stuck to the surface.
Discoloration	Any color, shading, or significant texture difference. Includes stains.
Flatness	Bowed or wavy appearance exceeding drawing or industry standards requirements.
Insufficient Plating	Lack of plating thickness as specified in the drawing.
Nodule	Rough spots on the plating surface.
Peeling/Flaking	Faulty adhesion, usually caused by contamination in the plating process or poor preparation of base metal surface.
Pinhole/Slug Mark/Pit	Small pore-like flaws in a coating that extend entirely through the applied film and have the general appearance of pin pricks when viewed by reflected light.
Porosity	Similar to pinholes, small holes in the plating that can reach to the base substrate
Scratch	Linear marks in the paint surface that catch the fingernail.

Table 3. Defect Types for Conversion Coating and Anodizing

Defect	Description
Abrasion/Scuff	Linear marks on the surface that don't catch the fingernail.
Bare Substrate	Voids in the coating exposing bare substrate.
Chip/Nick	Areas of surface that have been broken, chipped or missing coating.
Color	Color does not match the approved observational standard as specified on the drawing.
Contact Marks	Physical contact marks produced by diodes during the coating / anodization process. Leaves bare metal where the part is being contacted.
Cratering	The formation of small bowl-shaped depressions in a coating film.
Discoloration	Any color, shading, or significant texture difference. Includes stains. *Note
Drag Mark	Clusters of scratches from plastic dragging against mold details when a part travels through or is ejected from a mold.
Insufficient Coating	Lack of coating thickness as specified in the drawing.
Loose Coating	Coating is not properly adhered to surface.
Scratch	Linear marks in the paint surface that catch the fingernail.

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Spotting	Stains of random size and distribution usually caused by poor rinsing after chromate conversion process. Also called Chromate Stains.
Tooling Mark	Marks/impressions due to tooling edges.

Anodizing will produce rack marks, which are acceptable if they are within drawing requirements.

Note: Slight discoloration is allowed for anodizing and conversion coating surfaces.

Table 4. Defect Types for Plastic Molded Parts

Defect	Description
Abrasion/Scuff	Linear marks on the surface that don't catch the fingernail.
Bleeding	Undesired movement of certain materials in a plastic (e.g., plasticizers in vinyl) to the surface of the finished article or into an adjacent material. Also called "Migration." Usually happens in multi-shot molding processes.
Blush/Bloom	An irregular, cloudy, greasy film, or a round discoloration visible in the area of the molding gate.
Burn/Gas Mark	Discoloration or deterioration of a part due to excess heat.
Burrs	Rough/Sharp pieces of debris attached to a part.
Chip/ Nick/Gouge	A small indentation or nick in the surface or edge of a part.
Cold Slug	A small non-uniform area on the part caused by an improperly heated piece of plastic becoming attached to the part.
Color	Color does not match the approved observational standard as specified on the drawing.
Contamination	Surface residue such as dirt, oil, and grease.

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Table 5. Defect Types for Plastic Molded Parts (Continued)

Defect	Description
Crack/crazing	Separation of material through the entire piece, usually at a folded corner.
Delamination	Separation (peeling) of layers of plastic.
Discoloration	Any color, shading, or significant texture difference. Includes stains.
Drag Mark	Clusters of scratches from plastic dragging against mold details when a part travels through or is ejected from a mold.
Flash	Excess molding material usually found around edges cutouts & parting lines.
Flow Mark	Wavy surface appearance of an object molded from thermoplastic resins or metal caused by improper flow of the mold material into the mold.
Flow/Knit/Weld Line	A mark on a molded piece made by the meeting of 2 flow fronts during the molding process.
Gate	Molten plastic or metal, which connects the runner with the die cavity.
Glassing	When glass or other filler is seen on the surface of the part.
Gloss	Gloss is not consistent from surface to surface or within the same surface or does not match the approved observational standard as specified on the drawing.
Haze	Cloudiness on an otherwise transparent part.
Knockout Pin Mark	An unusual mark left on the part by an ejector pin, which is a device that pushes the part from the mold.
Marbling/Streaking	Colored streaks caused by an incomplete mixing of 2 different colored plastics.
Orange Peel	Rippled or mottled appearance viewable as concentric lines. Caused by under-pressurizing. Orange peel is often the first sign of possible sink or shorting.
Parting Line	A mark left on a part where the die halves meet.
Pinhole/Pit	Small craters on the surface.
Place Out	A build-up of fire retardant on the mold surface which causes the surface of the part to become excessively glossy over the area.
Poor Gate Removal	Improper or uneven removal of material at gate location.

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Protrusion	A raised area on a surface (blister, bump, ridge, or gate mark).
Scratch	Linear marks in the paint surface that catch the fingernail.
Short Shot	In injection molding, failure to fill the mold completely.
Sink Mark	A shallow depression or dimple on the surface of an injection molded part due to collapsing of the surface, following local internal shrinkage after the gate seals.
Splay/Streaking	Off-colored streaking. Splay usually appears silver-like. Splay is caused by moisture in the material or thermal degradation of the resin during processing. A similar look can be caused by cold material skipping across the surface during a fast fill.

Table 6. Defect Types for Plastic Molded Parts (Continued)


Defect	Description
Texture	Texture is non-consistent from surface to surface or within the same surface, or does not match the approved observational standard as specified on the drawing.
Warpage/Flatness	Dimensional distortion in a plastic object after molding. This is not a cosmetic issue and should be evaluated by dimensional analysis.

Table 7. Defect Types for Silk Screening and Labeling

Defect	Description
Blister/Bubble	Raised circular spot from excess paint drips or trapped air.
Color	Color does not match the approved observational standard as specified on the drawing.
Contamination	Dirt, lint, or other particles, typically embedded in or stuck to the painted surface.
Crooked	Label/text is not perpendicular/parallel to product edge.
Dog-Eared	Label corners are not fully adhered to surface.
Filled Text	Holes in text are filled with ink. (e.g. an "O" looks like a dot)
Illegible Text/Readability	Text is unreadable from a reasonable distance.
Incomplete Character	Characters that do not contain all defining features.

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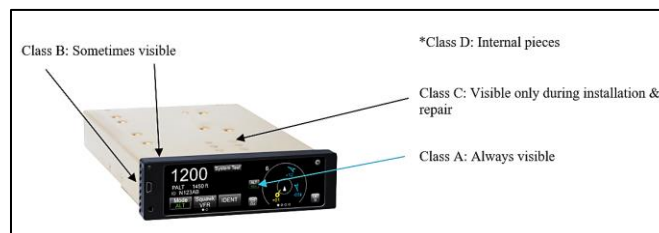
Incorrect Orientation	Label/text is rotated 90 degrees or 180 degrees from what is required.
Ink Non-Opacity	Ink is translucent or not completely opaque.
Loose Label	Label not properly adhered to surface or does not stay in designated location.
Paint Run	The uneven flow of excessive paint or coating.
Pinhole/Pit	Blistering in silkscreen layer resulting in small craters.
Ragged Printed Edges	Print imperfections with ragged profile.
Scratch	Linear marks in the paint surface, caught by fingernail.
Stray Spot	Several circular spots clustered together that are the result of paint splash.
Variable Line Width	Print imperfections with line width variation.

6.0 **GENERAL REQUIREMENTS**

Only the final appearance of a finished part, product, or surface is required to meet these requirements. Cosmetic surfaces are classified according to their final location on the part or assembly and how often it is viewed by end user.

Classifications:

- Class A surfaces are always visible by the customer/user when the unit is installed such as a front surface; they shall be uniform in appearance and free of apparent flaws.
- Class B surfaces typically have lower visibility by the customer/user, such as the top and sides of a product; they do not always require a flawless finish (see Surveillance product images for applicable discrepancies).
- Class C surfaces are seldom viewed by the customer/user during normal operation but are visible during installation and for upgrades or servicing, such as the rear and bottom sides of a product; they do not always require a flawless finish (see Surveillance product images for applicable discrepancies).
- Class D surfaces are typically inside surfaces that are not visible to the customer/user or don't retain any aesthetic value; they do not require a flawless finish.



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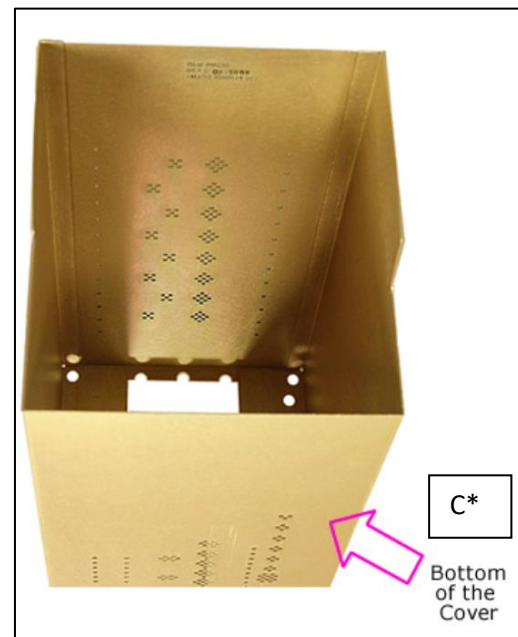
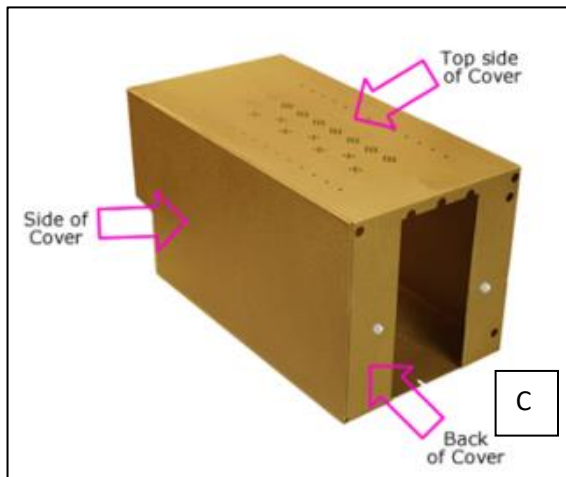
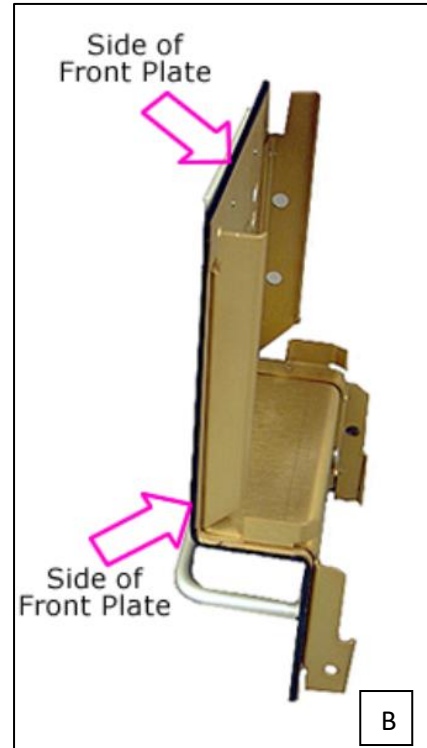
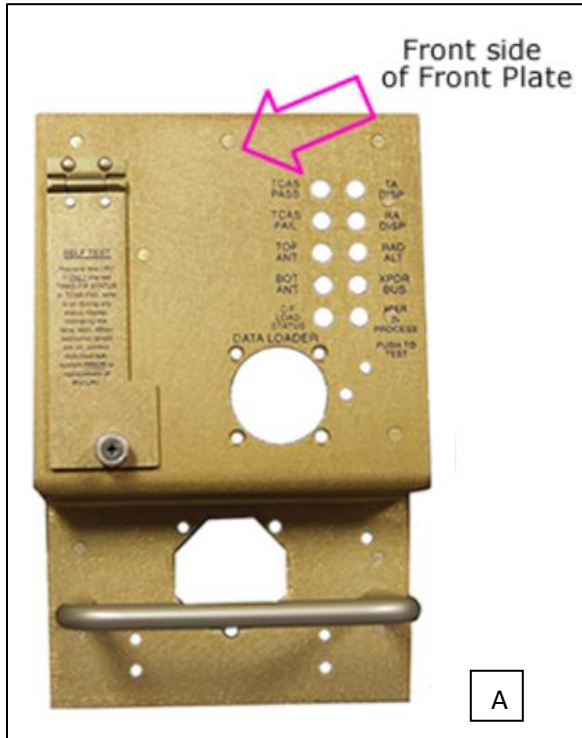


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6.1 Surveillance Product Surfaces



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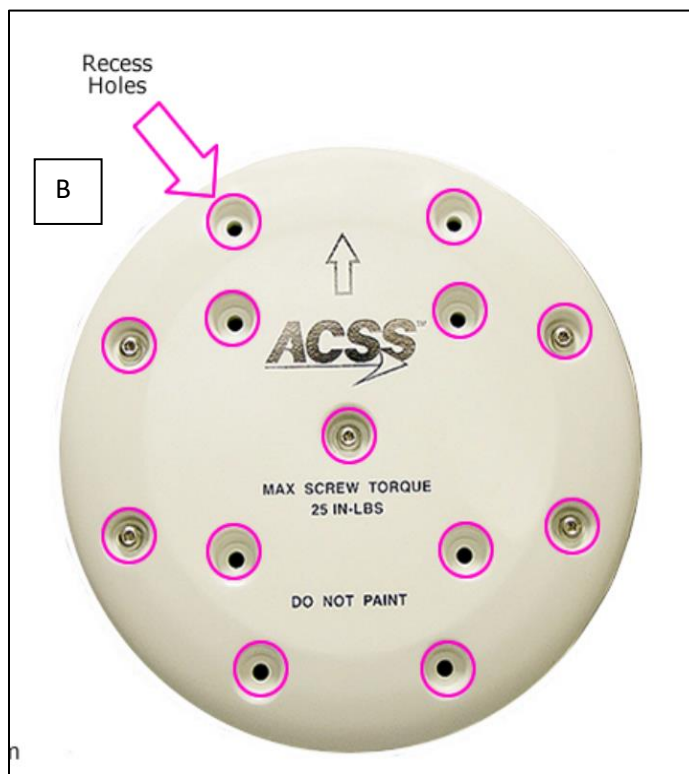
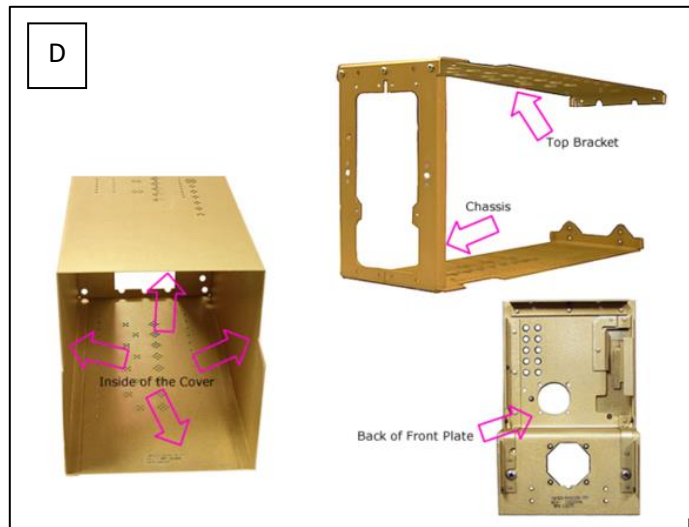
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See Section 9.2 and 9.5 for Surveillance specifications.

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7.0 **PROCEDURE – VISUAL INSPECTION FOR RECEIVING, IN-PROCESS & FINAL**

Rejection of parts shall be based on visual inspection adhering to the following practices:

7.1 **Inspection Sites**

- Should be reasonably clean and free of unnecessary visual distractions.

7.2 **Light Source**

- Light levels are typically not calibrated in manufacturing environments for inspection purposes.
- Lighting levels should however still be 80 foot-candles minimum. These levels can easily be attained at a standard workbench, equipped with two 40 W fluorescent bulbs, positioned at a distance not less than four (4) feet from a viewing area.

7.3 **Recommended Viewing Practices**

- All surfaces should be viewed at a reasonable distance such that the surface can be properly viewed. Arm's length distance is recommended.
- Parts shall be viewed in a continuous manner, one surface at a time, with the inspector not lingering on any one spot for more than a couple seconds.
- The Inspector should view each side one at a time in the order displayed in the drawing to avoid missing sides or edges.
- Magnification is not to be used when inspecting for defects.
- Magnification may be used to investigate the source or cause of a defect once found without the aid of magnification.

7.4 **Colors**

- All paint colors shall conform to SAE-AMS-STD-595

8.0 **COSMETIC CRITERIA FOR TOUCH-UPS**


Touch-ups on products shall meet all specification and drawing requirements and shall be performed in accordance with all relevant documents.

Touch-ups shall be considered functional only on Class B, C, and D surfaces and will not be included in the scope of this document. Nevertheless, touch-ups should be carried out adhering to good workmanship standards and should not be excessive.

Touch-ups on Class A surfaces shall not be observable to the viewer.

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9.0 **ALLOWABLE DEFECTS**

9.1 **Standard for Painted Surfaces**

- All quantity of defects shall be evaluated over a 25 sq. in. area for Class B, C, & D surfaces.
- Class A defects shall be evaluated over entire surface, regardless of size.
- All dimensions listed in the table are to be evaluated as the max distance in any direction unless otherwise specified.

Table 8. Defects Allowed per Classification

Defect Type	Class A	Class B	Class C	Class D
Abrasion/Scuff	None allowed	1 @ .50" No exposed substrate	2 @ .50" No exposed substrate	No exposed substrate
Bare Substrate	None allowed	None allowed	None allowed	None allowed
Bleeding/Smearing	None allowed	None allowed	Acceptable	Acceptable
Blister/Bubble	None allowed	None allowed	None allowed	Acceptable
Blush	None allowed	None allowed	None allowed	Acceptable
Chip/Nick	None allowed	1 @ .040" No exposed substrate	2 @ .060" No exposed substrate	No exposed substrate
Color	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips
Contamination	None allowed	None allowed	2 @ .020" No exposed substrate	10 @ .020" No exposed substrate
Cracking/Crazing of Coating	None allowed	None allowed	None allowed	None allowed
Crater, fish-eye	None allowed	None allowed	None allowed	None allowed
Discoloration	None allowed	None allowed	Acceptable	Acceptable
Flow Mark	None allowed	None allowed	Acceptable	Acceptable
Gloss	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips
Mottle	None allowed	None allowed	None allowed	Acceptable

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Table 6. Defects Allowed per Classification (Continued)

Defect Type	Class A	Class B	Class C	Class D
Orange Peel	None allowed	None allowed	Acceptable	Acceptable
Overspray	None allowed	None allowed	Acceptable	Acceptable
Paint Ridge	None allowed	None allowed	Acceptable	Acceptable
Paint Run/Sag	None allowed	None allowed	Within tolerancing requirements	Within tolerancing requirements
Peeling/Flaking	None allowed	None allowed	None allowed	None allowed
Pinhole/Pit	None allowed	None allowed	None allowed	None allowed
Scratch	None allowed	1 @ .50" x .010" No exposed substrate	2 @ 1.0" x .010" No exposed substrate	No exposed substrate
Texture	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips
Thin Coating/Under Spray	None allowed	None allowed	Acceptable	Acceptable
Tooling Mark	None allowed	None allowed	10 @ .030" No exposed substrate	Acceptable

Note: for additional information, see MIL-DTL-53072, MIL-PRF-85285, MIL-PRF-22750, & ASTM D16.

9.2 Standard for Painted Surfaces of TCAS Surveillance Antennas

- All defects shall be evaluated over entire surface, regardless of size.
- All dimensions listed in the table are to be evaluated as the max distance in any direction unless otherwise specified.

Defect Type	Class A	Class B
Abrasion/Scuff	Allowed 1 @ 0.050" within 4 sq in area	Any
Bare Substrate	None allowed	None allowed
Bleeding/Smearing	None allowed	None allowed
Blister/Bubble	None allowed	None allowed
Blush	None allowed	None allowed

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Chip/Nick	None Allowed	1 @ .060" No exposed substrate
Color	Per spec. & paint chips	Per spec. & paint chips
Contamination	None Allowed If penetrating first surface	None allowed if penetrating first surface
Cracking/Crazing of Coating	None allowed	None allowed
Crater, fish-eye	Allowed 1 within 4 sq in area. No exposed substrate	No more than 3 per recessed hole No exposed substrate
Discoloration	None allowed	None allowed
Flow Mark	None allowed	None allowed
Gloss	Per spec. & paint chips	Per spec. & paint chips
Mottle	None allowed	None allowed

9.3 Standard for Plated Surfaces


- All quantity of defects shall be evaluated over a 25 sq. in. area for Class B, C, & D surfaces.
- Class A defects shall be evaluated over entire surface, regardless of size.
- All dimensions listed in the table are to be evaluated as the max distance in any direction unless otherwise specified.

Table 9. Defects Allowed per Surface Classification

Defect Type	Class A	Class B	Class C	Class D
Abrasion/Scuff	None allowed	1 @ .50" No exposed substrate	2 @ .50" No exposed substrate	Acceptable
Bare Substrate	None allowed	None allowed	None allowed	None allowed
Blister/Bubble	None allowed	None allowed	None allowed	None allowed
Burned Deposit	None allowed	None allowed	None allowed	Acceptable
Burnish Mark	None allowed	None allowed	None allowed	Acceptable

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Chemical Bleed	None allowed	.50" linear or .25" diameter; No exposed substrate	.50" linear or .25" diameter; No exposed substrate	N/A
Chip/Nick	None allowed	1 @ .040" No exposed substrate	2 @ .060" No exposed substrate	Acceptable
Contamination	None allowed	None allowed	None allowed	None allowed

Table 7. Defects Allowed per Surface Classification (Continued)

Defect Type	Class A	Class B	Class C	Class D
Discoloration ⁽¹⁾	None allowed	None allowed	Acceptable	Acceptable
Flatness	Per spec. or drawing	Per spec. or drawing	Per spec. or drawing	Per spec. or drawing
Insufficient Plating	Per spec. or drawing	Per spec. or drawing	Per spec. or drawing	Per spec. or drawing
Nodule	None allowed	None allowed	None allowed	Acceptable
Peeling/Flaking	None allowed	None allowed	None allowed	N/A
Pinhole/Slug Mark/Pit	None allowed	None allowed	None allowed	None allowed
Porosity	None allowed	None allowed	None allowed	None allowed
Scratch	None allowed	1 @ .50" x .010" No exposed substrate	2 @ 1.0" x .010" No exposed substrate	No exposed substrate

⁽¹⁾ Note: Slight discoloration is allowed for plated surfaces. For additional information, see SAE-AMS-2418, SAE-AMS-2404, SAE-AMS-2408, and SAE-AMS-C-26074.

9.4 Standard for Conversion Coating and Anodized Surfaces

- All quantity of defects shall be evaluated over a 25 sq. in. area for class B, C, & D surfaces.
- Class A defects shall be evaluated over entire surface, regardless of size.
- All dimensions listed in the table are to be evaluated as the max distance in any direction, unless otherwise specified.
- This standard includes products subject to the Chem Film process

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Table 10. Defects Allowed per Surface Classification

Defect Type	Class A	Class B	Class C	Class D
Abrasion/Scuff	None allowed	1 @ .50" No exposed substrate	2 @ .50" No exposed substrate	No exposed substrate
Bare Substrate	None allowed	None allowed	None allowed	None allowed
Chip/Nick	None allowed	1 @ .040" No exposed substrate	2 @ .060" No exposed substrate	No exposed substrate
Color	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips
Discoloration ⁽²⁾	(Note)	(Note)	(Note)	(Note)
Drag Mark ⁽³⁾	None allowed	None allowed	(Note)	(Note)
Insufficient Coating	Per spec. or drawing	Per spec. or drawing	Per spec. or drawing	Per spec. or drawing
Loose Coating	None allowed	None allowed	None allowed	None allowed
Pinhole/Pit	None allowed	None allowed	None allowed	No exposed substrate
Scratch	None allowed	1 @ .50" x .010" No exposed substrate	2 @ 1.0" x .010" No exposed substrate	No exposed substrate
Spotting	None allowed	.25" No exposed substrate	.25" No exposed substrate	No exposed substrate
Tooling Mark ⁽³⁾	None allowed	None allowed	(Note)	(Note)

⁽²⁾ Does not apply to discoloration due to brake marks and tool marks on anodized surfaces. Acceptable as long as there is no bare substrate.

⁽²⁾ For conversion coatings, clear/colorless, iridescent yellow, brown, gray, or blue tints are allowed.

⁽²⁾ For anodizing, slight discoloration from dripping or rundown of the sealing solution from designed crevices in a component shall be allowed.

⁽³⁾ Acceptable as long as there is no bare substrate (marks are still coated), marks are not sharp enough to catch a cotton glove and the mark's size doesn't cause the feature-of-size's dimension to be out-of-print.

For additional information, see MIL-DTL-5541, MIL-PRF-8625, & SAE-AMS-2477.

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9.5 Standard for Conversion Coated Surfaces of Surveillance LRU's – Assemblies without Displays. And Antennas (i.e. T3CAS, TCAS, NXT, SurvProc, etc).

- All defects shall be evaluated over entire surface, regardless of size.
- All dimensions listed in the table are to be evaluated as the max distance in any direction, unless otherwise specified.
- The term 'Length of Surface' is to be interpreted as the greater dimension of the surface in which the defect is on.
- This standard includes products subject to the Chem Film process

Defect Type	Class A	Class B	Class C	Class C*	Class D
Abrasion/Scuff	None allowed	2 @ 10% of length of the Surface	2 @ 10% of Length of Surface	Any – No exposed Substrate	No exposed substrate
Bare Substrate	None allowed	None allowed	None allowed	None Allowed	None allowed
Chip/Nick	None allowed	1 @ .060" No exposed substrate	2 @ .10" No exposed substrate	3 @ 0.150" No Exposed Substrate	No exposed substrate
Color	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips	Per Spec & paint chips	Per spec. & paint chips
Discoloration ⁽²⁾	(Note)	(Note)	(Note)	(Note)	(Note)
Drag Mark ⁽³⁾	None allowed	None allowed	(Note)	(Note)	(Note)
Insufficient Coating	Per spec. or drawing	Per spec. or drawing	Per spec. or drawing	Per Spec. or Drawing	Per spec. or drawing
Loose Coating	None allowed	None allowed	None allowed	None Allowed	None allowed
Pinhole/Pit	None allowed	None allowed	None allowed	None Allowed	No exposed substrate
Scratch ⁽⁴⁾	None allowed	2 @ 10% length of surface x .025" wide No exposed substrate	2 @ 10% Length of Surface x 0.025" wide No exposed substrate	3 @ 30% Length of Surface x 0.025" Wide OR 6 @ 10% length of surface x 0.025" wide within a 3 Sq In Area	No exposed substrate

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				No Exposed Substrate	
SPOTTING	None allowed	.25" No exposed substrate	.25" No exposed substrate	.25" No Exposed Substrate	No exposed substrate
TOOLING MARK ⁽³⁾	None allowed	None allowed	(Note)	(Note)	(Note)

⁽²⁾ Does not apply to discoloration due to brake marks and tool marks on anodized surfaces. Acceptable as long as there is no bare substrate.

⁽²⁾ For conversion coatings, clear/colorless, iridescent yellow, brown, gray, or blue tints are allowed.

⁽²⁾ For anodizing, slight discoloration from dripping or rundown of the sealing solution from designed crevices in a component shall be allowed.

⁽³⁾ Acceptable as long as there is no bare substrate (marks are still coated), marks are not sharp enough to catch a cotton glove and the mark's size doesn't cause the feature-of-size's dimension to be out-of-print.

⁽⁴⁾ All scratches shall receive the rework or repair per ACSS Manufacturing Spec M2597539

9.6 Standard for Plastic Molded Parts

- All quantity of defects shall be evaluated over a 25 sq. in. area for Class B, C, & D surfaces.
- Class A defects shall be evaluated over entire surface, regardless of size.
- All dimensions listed in the table are to be evaluated as the max distance in any direction unless otherwise specified.

Table 11. Defects Allowed per Surface Classification

Defect	Class A	Class B	Class C	Class D
Abrasion/Scuff	None allowed	1 @ .50"	2 @ .50"	Acceptable
Bleeding	None allowed	None allowed	Acceptable	Acceptable
Blush/Bloom	None allowed	None allowed	None allowed	Acceptable
Bubble	None allowed	1 @ .020"	3 @ .020"	No exposed substrate
Burn/Gas Mark	None allowed	None allowed	None allowed	Acceptable
Burrs	None allowed	None allowed	None allowed	Acceptable
Chip/ Nick/Gouge	None allowed	3 @ .030"	10 @ .030"	No exposed substrate

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Color	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips
Contamination	None allowed	None allowed	2 @ .020"	10 @ .020"
Cracks	None allowed	None allowed	None allowed	None allowed
Delamination	None allowed	None allowed	None allowed	None allowed
Discoloration	None allowed	None allowed	Acceptable	Acceptable
Drag Marks	None allowed	None allowed	None allowed	None allowed
Flash	None allowed	None allowed	None allowed	None allowed
Flow Marks	Acceptable	Acceptable	Acceptable	Acceptable
Flow/Knit/Weld Lines	None allowed	None allowed	Acceptable	Acceptable

Table 9. Defects Allowed per Surface Classification (Continued)

Defect Type	Class A	Class B	Class C	Class D
Gate Height	Flush or below per Design	Flush or below per Design	Flush or below per Design	Flush or below per Design
Gloss/Shine	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips
Knockout Pin Mark	None allowed	None allowed	Acceptable	Acceptable
Marbling/Streaking	Acceptable	Acceptable	Acceptable	Acceptable
Orange Peel	None allowed	None allowed	Acceptable	Acceptable
Parting Line	None allowed	None allowed	Acceptable	Acceptable
Pinhole/Pit	5 @ .010"	10 @ .010"	20 @ .010"	Acceptable
Place Out	None allowed	None allowed	None allowed	Acceptable
Poor Gate Removal	None allowed	None allowed	None allowed	Acceptable
Protrusion	None allowed	None allowed	None allowed	None allowed
Scratch	None allowed	1 @ .50" x .010"	2 @ 1.0" x .010"	No exposed substrate
Short Shot	None allowed	None allowed	None allowed	Acceptable
Sink Mark	Acceptable	Acceptable	Acceptable	Acceptable
Splay	None allowed	None allowed	None allowed	None allowed
Texture	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips

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Warpage/Flatness	Per spec. or drawing	Per spec. or drawing	Per spec. or drawing	Per spec. or drawing
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For additional information, see SPI AQ-103.

9.7 Standard for Printing Information (Labels & Silk Screening)


- All quantity of defects shall be evaluated over a 25 sq. in. area for Class B, C, & D surfaces
- Class A defects shall be evaluated over entire surface, regardless of size
- All dimensions listed in the table are to be evaluated as the max distance in any direction unless otherwise specified

Table 12. Defects Allowed per Surface Classification

Defect Type	Class A	Class B	Class C	Class D
Blister/Bubble	5 @ .010"	10 @ .010"	20 @ .010"	Acceptable
Color	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips	Per spec. & paint chips
Contamination	None allowed	3 @ .010"	10 @ .020"	Acceptable
Crooked	None allowed	None allowed	Acceptable	Acceptable
Dog-Eared	None allowed	None allowed	None allowed	None allowed
Filled Text	None allowed	None allowed	None allowed	None allowed
Illegible Text/Readability	None allowed	None allowed	None allowed	None allowed
Incomplete Character	None allowed	None allowed	None allowed	None allowed
Incorrect Orientation	None allowed	None allowed	None allowed	None allowed
Ink Non-Opacity	None allowed	None allowed	None allowed	None allowed
Loose Label	None allowed	None allowed	None allowed	None allowed
Paint Run	None allowed	None allowed	None allowed	Acceptable
Pinhole/Pit	5 @ .010"	10 @ .010"	20 @ .010"	Acceptable
Ragged Printed Edge	Not visible at 15" away	Not visible at arm's length	Acceptable	Acceptable

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Scratch	None allowed	3 @ .010"	10 @ .010"	No exposed substrate
Stray Spot	None allowed	3 @ .010"	10 @ .020"	Acceptable
Variable Line Width	<10% of total line width	<10% of total line width	<25% of total line width	Acceptable

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10.0 ATTACHMENTS (VISUAL AIDS)

See Table 13 through Table 17.

- Note: Image quality is best when electronic copy is used.

Table 13. Visual Aides for Specific Defects in Paint

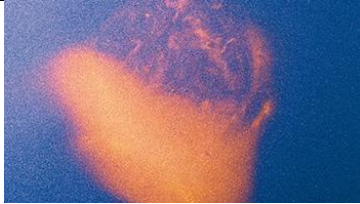









Bleeding/Smearing 	Blister/Bubble 	Blush 
Craters/Fish-eyes 	Cracking/Crazing of coating 	Flow Marks TBD
Mottle 	Orange Peel 	Paint Ridge TBD
Paint Run 	Paint Sag 	Pinhole/Pit 

Image credits: modeltech, BuyersAsk, hmgpaint, BYK Instruments, Glasurit

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Table 14. Visual Aids for Defects in Plating


Blister/Bubble	Burned Deposits	Burnish Marks
	TBD	TBD
Chemical Bleed	Nodules	Porosity
TBD	TBD	TBD

Image credits: steeldata

Table 15. Visual Aids for Defects in Conversion Coating and Anodizing

Spotting
TBD

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Table 16. Visual Aids for Defects in Plastic Molding

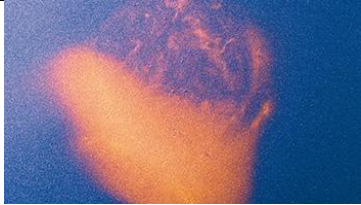



Bleeding 	Blush/Bloom 	Burn/Gas Mark TBD
Burrs TBD	Discoloration 	Flash TBD
Flow Marks TBD	Flow/Knit/Weld Lines TBD	Knockout Pin Mark 
Place Out TBD	Protrusion TBD	Sink Mark TBD


Image credit: College of Saint Benedict and Saint John's University

Table 17. Visual Aids for defects in Silk Screening and Labeling

Ragged Print Edge TBD	Stray Spot TBD	Variable Line Width TBD

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REVISION HISTORY

Revision 1.0	Summary of change: Original issue. This document supersedes, and subsequently obsoletes, 0543Q4. Date: 02-NOV-2023 Authored by: Nate Hadobas, Product Quality Engineer; Rick Evans, Supplier Quality Engineer; Tom Bentley, Product Quality Engineer; Rick Tousignant, Supplier Quality Engineer
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APPROVALS

Wolfgang Niesing, Director of Quality: **Approved** 11/02/23, 10:29 AM ET (Signature on file in SignIt)

Jose Medina, Director of Operations: **Approved** 10/31/23, 12:20 PM ET (Signature on file in SignIt)

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