Manufacturing Criteria for Painting, Touch Up, Rework of Paint, and Powder Coat

Work Instruction – Level III
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Requirements: NA

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PURPOSE & SCOPE

This work instruction establishes the manufacturing criteria that will be used for painting new parts and assemblies at L3 Communication Systems – West (CSW) Salt Lake City facilities. This document also establishes manufacturing criteria for paint touch up and rework of damaged paint and powder coat. This document may also be used as a guideline for suppliers but shall not take precedence over specific contract or drawing requirements given to the supplier.

Damage requiring paint rework shall be documented as a nonconformance. Unless otherwise specified, the rework processes herein do not require Material Review Board (MRB) approval.

WORK INSTRUCTION

1. TERMS AND DEFINITIONS

1.1. **Definitions**: Unless otherwise specified, the following definitions shall be used in the interpretation of prints, specifications, procedures, or other work instructions.

1.1.1. Hole: A round hole with a uniform diameter. A hole has no countersink, counter bore, threads, or other details in the hole. Round part features with a diameter more than 20 times greater than depth (or material thickness) are not considered holes.

1.1.2. Countersink: A hole starting with a tapered section designed to accommodate a flat head fastener such as a screw or rivet. Round details with a tapered edge not designed to accommodate a tapered fastener or connector are not considered countersinks.

1.1.3. Counter bore: A hole starting with a larger diameter followed by a flat shoulder to accommodate a fastener or connector. A round detail with a step not designed to accommodate a fastener or connector is not considered a counter bore.

1.2. **Acronyms**

CARC	Chemical Agent Resistant Coating
CSW	L3 Communication Systems – West
SAP ME	SAP Manufacturing Execution
ESD	Electrostatic Discharge
EHS	Environment, Health and Safety
GSE	Ground Support Equipment
HVLP	High Volume Low Pressure
JHA	Job Hazard Analysis
MPE	Manufacturing Process Engineer
SDS	Safety Data Sheet
PPE	Personal Protective Equipment

2. FORMS

SLC-8951	Respirator Inspection Document
SLC-8964	Paint Usage Log

3. SUPPLIES AND MATERIALS

Other supplies and materials may be used as prescribed in SAP ME.

Table 1: Paints and Primers

Specification or Part Number	Type of Material	Typical Use	Description	L3 Material Number
MIL-DTL-64159, Type II	Polyurethane	ARMY or Other GSE	Water-borne CARC, packaged as two components.	7917998-XXX
MIL-DTL-53039	Polyurethane	ARMY or Other GSE	Solvent-borne CARC, packaged as one component	7175495-XXX
MIL-PRF-85285, Type I	Polyurethane	Airborne Chassis	Solvent-borne paint, packaged as two components	7912239-XXX
MIL-PRF-22750	Epoxy Topcoat	Shipboard and some Sheltered Airborne	Solvent-borne paint, packaged as two components	7175883-XXX
MIL-DTL-24441/20	Epoxy Primer	Shipboard	Solvent-borne primer, packaged as two components used with specific topcoat (see below)	MIL-P-24441/20
MIL-DTL-24441/21	Epoxy Topcoat	Shipboard	Most common primer for the exterior of U.S. NAVY ships. Two-part solvent-born primer used with specific primer (see above).	MIL-P-24441/21
MIL-PRF-23377	Epoxy Primer	Aircraft Primer	Most common primer used on CSW products. Two-part solvent-born hex-chrome free.	40010343-000
DOD-P-15328	Etching Wash Primer	ALL Branches	Used for pretreatment on PTFE. This formulation is used only where necessary because it contains hexavalent chrome.	DOD-P-15328
TT-C-490 TYPE III	Non-Chrome Etching Wash Primer	Pretreatment for paint	Used, typically on metals, to prepare for primer application. This material contains no hexavalent chrome.	1000198759
CA7650	Sand-able Primer	Carbon Composites	Spray-able Primer used to fill minor imperfections while also priming the carbon composite surface.	40010015-000/-001

Table 2: Cleaners and Surface Treatments

Material	L3 Material Number or Vendor P/N	Description
Pre-paint cleaner	7192649-000, -001, -002	Solvent designed to be used as a final clean of bare metal prior to paint (do not use on plastic or composite)
Rust Mort	40006900-000	Converts rust to hard insoluble protective coating. Provides an ideal foundation for primer and paint.
Adhesion Promoter	40008513-001	Clear adhesion promoter used for plastics and painted surfaces. (Bulldog)
Conversion Coating (non-immersion touch up application)	MIL-DTL-5541	A chemical which reacts with the surface of aluminum producing a corrosion resistant and adhesion promoting coating
Filler	40001059-000, -001	Compound used for filling voids or irregularities in a surface prior to applying finish. (Bondo)
Spot Putty	7192625-000, -001	Compound used for filling small voids to provide a smooth surface.
Caulking	7192654-000	General purpose paintable automotive sealant
Rust Bullet	1000381595	Pre-treatment for lightly rusted steel. Converts the rust to provide acceptable adhesion.
SPOT-PUTTY-560, 3M **Dynatron Putty-Coat, 3M** **Metal Glaze Ultra** **2214 Epoxy** **Acrylic Green Putty** **3M Scotch Weld**	Vend, 70008003561 Vend, 7008003553 Vend, 100425 Vend, 62-2214-2930-1 Vend, 05096 Vend, 2216	Applied to composite surfaces to fill voids and uneven surfaces in preparation for paint. NOTE: these parts may NOT be used at L3Harris facility unless company hazardous material part number is assigned through approval process in P-197.

4. PAINTING

4.1. All preparation, mixing, application and cure requirements from applicable specification and data sheet shall be adhered to. The data sheet used shall be from the paint manufacturer and refer to the manufacturer part number of paint being used.

4.2. Surface Preparation

4.2.1. See W-603, Abrasive Blast of PTFE (Teflon) to Prepare Surface for Paint, for instructions for surface preparations for PTFE (Teflon). All surfaces to be coated must be thoroughly cleaned to remove oils, oxides, dust, or mold release prior to applying coating.

4.2.2. Typical surface preparation methods can be found in Table 3, other methods may be used as directed in SAP ME.

Table 3: Typical Surface Preparation

Substrate	Prep Material	Method of Preparation
Aluminum	• Conversion coating per MIL-DTL-5541 • Wash primer 1000198759	Preferred treatment is conversion coating per MIL-DTL-5541 to be applied by emersion. Alternate is wash primer 1000198759 to be applied by spray and cured per data sheet.
Steel	Wash primer 1000198759	Apply wash primer by spray in booth immediately prior to primer application.
Composite, Resin/Fiber	Abrade, solvent wipe per SAP ME	Wipe thoroughly all surfaces to be coated using lint free cloth, use a minimal amount of solvent.
Plastics	See work instructions in shop order	Wipe thoroughly all surfaces to be coated using lint free cloth
PTFE (Teflon)	See W-603	See W-603
Anodized Aluminum, Unsealed	Apply primer directly (should be painted as soon as possible after anodize)	Apply primer in typical fashion as soon as possible after anodize application. Do not expose surface to contaminants.
Stainless	Wash primer 1000198759	Apply wash primer by spray in booth immediately prior to primer application.

Substrate	Prep Material	Method of Preparation
Gold Plated	Scuff very lightly using grey scotch brite (must mask wearing gloves). Wash primer 1000198759.	Scuff very lightly using grey scotch brite (must mask wearing gloves). Apply wash primer by spray in booth immediately prior to primer application.
Painted surface, defective paint	Paint Stripper 40010112-000, Sandpaper or Media Blaster	Remove paint using chemical or abrasive materials. All surface preparations must be re-applied.
Painted surface, re-workable paint	Sandpaper, scotch brite	Sand or scuff without removing all paint, apply paint or primer and paint
Metals, needing filler	Bondo, 40001059-000, -001	Used to fill dents and make repairs
	Spot Putty 7192625-000, -001	Used for surface imperfections
	Aluminum Putty 7956164-000	Use as filler where conductivity is required
Composite, needing filler	Primer40010015-000, -001	Wipe thoroughly all surface to be coated

4.3. Masking

Standard masking materials are not listed in the operation. Typical masking materials include standard masking tape, vinyl masking tape, masking paper, plastic sheeting, aluminum foil, solder mask, adhesive stencil sheet and rubber plugs and caps. If specific or special masking material is required, they will be listed in the masking operation.

4.4. Mixing Paint

CAUTION: Epoxy paints shall not be shaken for more than one 3-minute cycle to avoid excessive heat generation.

4.4.1. Recommended shake times:

- CARC Paint, 10 min
- Other polyurethane, acrylic and epoxy paints, and primers, 3 min

4.4.2. Unless otherwise specified in paint operation or data sheet, multiple component paints should be mixed by hand. Adjusting the tint, gloss, and color of MIL-PRF-85285 is acceptable. Pigment to binder (resin) ratio must remain unchanged.

4.4.3. Pot life expiration time of catalyzed paint shall be recorded on the container. Paint being used in the booth on the current batch does not need pot-life recorded. For example, all touch up paint shall have pot life recorded on the container. Mixed catalyzed paint shall not be used after manufacturer specified pot life has expired.

4.5. Prime and Paint

4.5.1. Parts are hung from racks or laid out on tables. Parts being hung should be wired or chained through existing holes. Rack marks may be touched up after paint. If special racking or fixtures are required, they will be provided in the painting operations in SAP ME.

4.5.2. All items in the paint booth shall be solvent wiped prior to being painted.

4.5.3. Industrial HVLP spray equipment shall be used when performing conventional spray application.

4.6. Paint Cure

4.6.1. All paints and primers can be cured at ambient temperature or may receive an accelerated cure. Typical accelerated cure times and temperatures are listed below. Accelerated cure is intended to produce non-tacky finish and does not produce fully cured finish.

4.6.2. Primers, all, 40 minutes at 150 deg F

4.6.3. Paint, all, inter-coat accelerated cure 30 minutes at 150 deg F

4.6.4. Final coat accelerated cure to “dry to touch” 20 minutes at 150 deg F

4.7. All painted parts shall be sufficiently cured to allow handling and packaging prior to leaving the paint shop.

4.8. Remove Masking

4.8.1. Remove masking with care not to damage the finished coating.

4.8.2. Whenever possible, soft tools such as wood and plastic should be used to remove masking.

4.8.3. CAUTION: The paint is not fully cured when masking is removed. The partially cured paint can be easily damaged.

4.8.4. Dispose of masking material according to EHS Requirement (ref P-090, Hazardous Waste Control and Disposal).

5. PAINT TOUCH UP OUTSIDE OF PAINT SHOP BY APPROVED NON-PAINT SHOP PERSONNEL

CAUTION: Industrial paint is hazardous material and is more hazardous than typical household paint

5.1. The following safety precautions must be followed

5.1.1. Refer to the SDS (MSDS) of all hazardous materials being used determine required PPE and other safety precautions.

5.1.2. No quantity of paint greater than 2 oz. shall be used.

5.1.3. Paint shall be handled as hazardous material per P-197.

5.1.4. Paint shall be disposed of per P-090 when the pot life has expired or when no longer needed.

5.2. Personnel performing touch up must have been trained in the paint shop and have "W-018 Touch up paint" OJT.

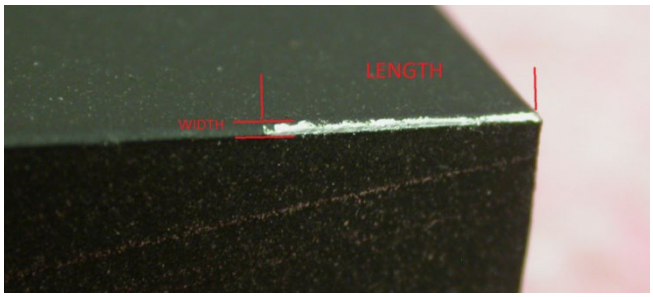
5.3. Inspectors with the required OJT may perform paint touch up per this section on NC's identified in their work center by giving a "REWORK" disposition to the NC.

5.4. Paint touch up operations shall be methodized for operations work centers and shall not to be methodized for inspection work centers.

5.5. If any of the following conditions exist, paint rework is preferably performed by paint shop personnel in the paint shop, if transportation is reasonable. Certified personnel may perform the touch up only if they have the appropriate training and tools to complete the job. This also applies to sub-steps 5.5.1-5.5.6 below.

5.5.1. If damage is more than 0.1 inch wide (see image below), the shop order may be sent to the paint shop. For large systems in the TMET Compound such as trailers, vehicles, and palletized equipment damage larger than 0.12 inches wide may be sent to the paint shop. If any touch up will be obvious or have a poor appearance it should be sent to the paint shop for rework.

5.5.2. If paint peeling, flaking, blistering, or easily removed by IPA, the shop order may be sent to the paint shop.



5.5.3. If touch up paint will be highly visible, for example touch up in the center of an egress panel with semi-gloss or gloss paint, the shop order may be sent to the paint shop.

5.5.4. If the part number of the paint is not on the parts list, drawing, data sheet or a lower-level parts list, the shop order may be sent to the paint shop (COTS items should be sent to the paint shop).

5.5.5. If there is rust on steel or chalky white corrosion on aluminum, the shop order may be sent to the paint shop.

5.5.6. If high priority shop orders require accelerated cured with heat, the shop order may be sent to the paint shop.

5.6. Touch up process

5.6.1. Determine paint type and color from parts list or print. Then obtain paint from the paint shop.

5.6.2. Verify paint is within pot life on label (typically 3 hours from mixing).

5.6.3. Clean area to be touched up.

5.6.4. Touch up finish on bare aluminum per W-294, Alodine Touch-Up/ Rework Procedure for Aluminum Alloy Surfaces.

5.6.5. Touch up paint throughout the assembly using a 000-size brush obtained from the paint shop. Do not repeatedly brush the touch up area, this will increase the visibility of brush marks.

5.6.6. Allow to cure thoroughly, 24 hours at 70°F is sufficient for typical touch up. Paint will cure more quickly at higher temperatures and may be adequately cured for further processing in less than 24 hours. Paint will remain soft for several days after application and should be handled with care.

5.6.7. A label or placard may be used to indicate when the assembly may be handled, packaged, or moved to the next work center.

6. REWORK OF PAINT AND POWDER COAT BY PAINT SHOP PERSONNEL

6.1. Refer to SAP ME for rework instructions. Damage requiring rework of paint shall be documented as a non-conformance, NC.

6.2. Paint touch up should be done using the same paint type gloss and color where specified.

6.3. For paint touch up on procured items where paint type is not specified on L3 drawing or manufacturer data sheet, use closest paint type color and gloss match.

6.4. If metal surfaces have been abraded or scrapped, pretreatments such as conversion coating shall be touched up prior to application of primer.

6.5. Primer touch up is not required for small chips and scratches.

6.6. Typical rework processes

6.6.1. Scratches, chips, or blemishes

6.6.2. Remove loose paint/powder coat in and around affected area

6.6.3. Rework surface preparation per print and SAP ME work instructions (see Table 3.)

6.6.4. Removal of Ding/Dent

6.6.4.1. Remove loose paint/powder coat in and around affected area.

6.6.4.2. Fill as required to produce smooth finish (see Table 2). This step may be performed before or after rework of surface preparation depending on filler used and extent of rework.

6.6.4.3. Rework surface preparation per print and SAP ME work instructions (see Table 3.)

6.6.5. Dings and dents in composite surfaces or other non-metallic material

Refer to methods given in SAP ME.

6.6.6. Corroded metal surfaces

6.6.6.1. Abrade or blast surface to remove corrosion and peeling paint.

6.6.6.2. Thoroughly clean rework areas.

6.6.6.3. Rework surface preparation per print and SAP ME work instructions (see Table 3).

6.6.7. Paint Film failure (wrinkling, checking, blistering, pealing, etc.)

6.6.7.1. If paint adhesion is acceptable, sand or scuff to prepare for additional coat of paint.

6.6.7.2. If adhesion failure of any kind is identified, remove all paint from affected area and rework all surface preparation.

6.7. Touch up of Paint and Powder Coat

6.7.1. Powder coat rework requiring repaint of an area shall be evaluated by MPE and documented in SAP ME work instructions.

6.7.2. Powder coat touch up shall be performed using paint matching color and gloss as specified in SAP ME work instructions.

6.7.3. Application of touch up paint may be performed using spray, brush, or roller.

7. EHS REQUIREMENTS

7.1. Safety

7.1.1. Mixing equipment, Spray guns and associated equipment shall be grounded and use conductive air hose when conveying or mixing flammable paints (Reference P-197, Hazardous Chemical Control, Handling & Storage).

7.1.2. During operation, spray and sanding booths must provide at least 100 FPM of continuous air exhaust averaged over the booth open filter face. This requirement shall be monitored by EHS.

7.1.3. A three-foot access way must be maintained around the paint booth. The three-foot-wide area around the booth shall not be used for storage and shall be free of combustible construction.

7.2. Health: Prime and Paint

7.2.1. Information on PPE requirements and use is found in applicable JHA and SDS.

7.2.2. When painting in the booth personnel must wear a full body spray suit and appropriate rubber gloves.

7.2.3. When painting in the booth, a full face, supplied air respirator is required (See P-480, Respirator Program).

7.2.4. Additional training is required for employees working with Hexavalent Chromium.

7.2.5. All industrial painters shall be enrolled in the “Painters Certification NESHAP 6H” training upon initial job assignment and recertified once every 5 years.

Table 4: PPE

PPE	Material Number
Air Filtering Mask – Dust	7913950-000
Air Supplied Mask	
Dust Air Filtering Mask – N95	7913950-002
Ear Plugs	7191618-000
ESD Glove (extra-large)	C100664-000
ESD Glove (large)	C100242-000
ESD Glove (medium)	C100241-000
Gloves (chemical resistant) Blue Unlined	40007211-002
Leather Work Glove	C100714-000

PPE	Material Number
Nitrile Dipped Nylon Glove	40007190-003
Nitrile Clean Room Gloves (small)	7191713-000
Nitrile Clean Room Gloves (medium)	7191713-001
Nitrile Clean Room Gloves (large)	7191713-002
Nitrile Clean Room Gloves (Extra Large)	7191713-003
Plano Safety Glasses	7191954-000
Work Glove Hynit Nitrile Perforated	C100836-000

7.3. Hazardous Materials

7.3.1. Paint facility shall keep monthly paint usage log on form SLC-8964.

7.3.2. Flammable material in the paint shop shall be stored in containers of 5 gallons or less.

RECORDS

Identification	1) SLC-8951, Respirator Inspection Document 2) SLC-8964, Paint Usage Log
Storage	1) Kept by the Paint Facility Office 2) EHS Department manages storage of this record
Protection	1) Records will be stored in Paint Shop office which is locked when Paint Shop is not manned.
Retrieval	Contact Paint Shop to obtain respirator inspection form.
Retention Time	Retained for minimum of 1 year
Disposition	The paint shop shall be responsible destruction of records.

END OF DOCUMENT

DOCUMENT INFORMATION

Responsible Organization: Operations

Function/Sub-function: Manufacturing Process Engineering

Governing Document(s): WS-000, Workmanship Standards Introduction

Subordinate Document(s): SLC-8951, Respirator Inspection Document
SLC-8964, Paint Usage Log

Related Document(s): Y-090, Environment, Safety, and Health (EHS) Compliance Policy
P-491, Air Emission Program
P-090, Hazardous Waste Control and Disposal
P-134, Work Measurements, Time Standards Development, and Nonconformance Analysis
P-195, Wastewater Discharge Program
P-197, Hazardous Chemical Control, Handling & Storage
P-200, Personal Protective Equipment
P-206, Hazardous Waste and Hazardous Waste Contingency Spill Response
P-419, Hexavalent Chromium Sanding Safety Procedure
P-480, Respirator Program
W-527, Cleaning in Preparation for Paint
W-603, Abrasive Blast of PTFE (Teflon) to Prepare Surface for Paint
W-294, Alodine Touch-Up/ Rework Procedure for Aluminum Alloy Surfaces

Related Training: N/A

Approval Requirements: Manager, Metal Fabrication

Review Requirements: Machine Shop Inspection
EHS Representative

Revision History Summary

Revision #	Description of Change	Date
New – 07	Initial Release through revision 07	Various
08	Added Section 5, Paint Rework Outside of Paint Shop by Approved Non-Paint Shop Personnel, and updated title for Section 6. Changed MSDS to SDS throughout. Re-wrote section 6.6.7.1. Changed "touch up" to "rework" in section 6.6.7.2.	11/11/2016
N/A	Deleted P-296 and P-297 in list of related documents. No revision upgrade necessary.	12/12/2016
09	Removed references to form SLC-8962, Permit for Painting Outside Paint Booth throughout; form is no longer required.	02/07/2018
N/A	Specified Salt Lake City facilities in Purpose and Scope. No revision upgrade necessary.	04/17/2018
10	Added "For large systems in the TMET Compound such as trailers, vehicles, and palletized equipment damage larger than 0.12 inches wide. If any touch up will be very obvious or have a poor appearance it should be sent to the paint shop for rework." To section 5.5.1.	9/24/2019
11	Updated description for DOD-P-15328 and added row for TT-C-490 TYPE III in Table 1. Added list of materials and vendor numbers for filling voids and uneven surfaces in preparation for paint on composite surfaces to Table 2. Updates made to Table 3 for typical surface preparation. Changed "adhesive stencil material" to "adhesive stencil sheet" in section 4.3. Removed refrigeration information from section 4.4.3. Modified statement regarding special racking or fixture requirements in section 4.5.1. Changed "paint part number" to "paint type and color" and added "or print" in section 5.6.1. Added "on label" in section 5.6.2 for clarification.	10/1/2020
NA	Updated point of contact. No revision upgrade necessary.	4/27/2022
12	Paint touch up has been added to the title and Purpose & Scope. "Rework" has been updated to "touch up" throughout section 5.	6/28/2023
13	Changed "shall" to "preferably" in section 5.5. Changed ".05 inch" to ".1 inch" and "shall" to "may" and added "may be sent to the paint shop" in section 5.5.1. Changed "JSA" to "JHA" and updated link to JHAs in section 7.1.2.	9/16/2024
NA	Updated point of contact. No revision upgrade necessary.	10/14/2024