



**SUBCONTRACTOR ASSEMBLY FACILITY  
REQUIREMENTS FLOW-DOWN PER ELECTRONIC  
COMPONENT MANAGEMENT PLAN  
FOR  
KORRY ELECTRONICS CO.**

CONTRACT NO. N/A

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Prepared for:  
Internal Use

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RECORD OF REVIEW AND HISTORY

REV	DESCRIPTION	APPROVED	
		DATE (YYYY-MM-DD)	BY (Finitial/Lname)
-	Initial release from updated WI35524SFD on ECO0125803	2014-05-16	R. Kelly
A	Update to para. 7-Lead Free Control Plan Move current to 7.1 Add 7.2 records retention for replating Add 7.3 records retention verification of conformal coat coverage and gap spacing on fine pitch components Per ECO0131200	2015-02-11	R. Kelly
B	Update document format to Korry standard. Address findings from 2021 ECMP audit by adding detail to section 4.3 Component Application to flow down requirements to the subcontractor for x-ray sensitive and moisture sensitive electronic components. Add the lead free control plan standard references to section 4.3 and 7 as an improvement to be more complete. Per ECO0157109	2021-07-02	H. Guldberg

Initiated by Rick Kelly, Component Engineer

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## 1. INTRODUCTION

### 1.1 Scope

This document defines Korry’s flow down of requirements to subcontractors as part of Korry’s Electronic Component Management Plan (ECMP), prepared in accordance with IEC/TS 62239-1.

The subcontractor shall either demonstrate compliance to this plan or shall develop its own ECMP, and the information shall be accessible to Korry or Korry directed third parties.

### 1.2 IEC/TS 62239-1, Clause 4 Process Objectives

This ECMP defines the structures to assure customers and regulatory agencies that all of the electronic components used in aerospace and other high reliability equipment produced for Korry by contract manufactures are selected and applied in controlled processes, to accomplish all of the IEC/TS 62239-1 Clause 4 objectives:

Clause 4 Objectives	Contract Manufacturer Obligation	Korry Design Authority Obligation
component selection	No	Yes
component application	No	Yes
component qualification	No	Yes
component quality assurance	Yes	Yes
component dependability	No	Yes
component compatibility with the equipment manufacturing process	Yes	Yes
component data	Yes	Yes
configuration control	Yes	Yes

For purposes of this ECMP, Korry is the plan owner and the subcontractor is the equipment manufacturer.

## 2. APPLICABLE DOCUMENTS

### 2.1 Government Documents

(None)

## 2.2 Non-Government Documents

The following documents form a part of this document to the extent specified herein.

Table I. Korry Documents

Document	Title
<a href="#">D41247</a>	Lead Free Control Plan
<a href="#">D48054</a>	Obsolescence Management Plan
<a href="#">D48055</a>	Counterfeit Parts Control Plan

Table II. Industry Standards

Document	Title
IEC/TS 62239-1	Process management for avionics – Management plan – Part 1: Preparation and maintenance of an electronic components management plan
IPC-A-610	Acceptability of Electronic Assemblies
J-STD-001	Requirements for Soldered Electrical and Electronic Assemblies
J-STD-020	Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices
J-STD-033	Handling, Packing, Shipping, and Use of Moisture/Reflow and/or Process Sensitive Components
GEIA-STD-0005-1	Performance Standard for Aerospace and High Performance Electronic Systems Containing Lead-free Solder
GEIA-STD-0005-2	Standard for Mitigating the Effects of Tin Whiskers in Aerospace and High Performance Electronic Systems
GEIA-STD-0005-3	Performance Testing for Aerospace and High Performance Electronic Interconnects Containing Pb-free Solder and Finishes

### **3. TERMS DEFINITIONS AND ABBREVIATIONS**

#### **3.1 Terms and Definitions**

Terms and definitions are per 3.1 of IEC/TS 62239-1 and as follows:

## 3.2 Abbreviations

Abbreviations are per 3.2 of IEC/TS 62239-1 and as follows:

AHP	Aerospace and High Performance
BOM	Bill of Material
CAD	Computer Aided Design
CCA	Circuit Card Assembly
CIN	Configuration Information Notice
COTS	Commercial Off The Shelf
DRC	Design Rule Check
DSCC	Defense Supply Center Columbus
ECO	Engineering Change Order
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
ESR	Effective Series Resistance
ESS	Environmental Stress Screening
FHA	Functional Hazard Analysis
FPGA	Field programmable Gate Array
GSE	Ground Support Equipment
IHS	IHS Inc.
JFET	Junction Field Effect Transistor
LED	Light-Emitting Diode
MOSFET	Metal Oxide Semiconductor Field Effect Transistor
MTBUR	Mean Time Between Unscheduled Removal
OMP	Obsolescence Management Plan
PLM	Product Lifecycle Management
PWB	Printed Wiring Board
QA	Quality Assurance
RFI	Radio Frequency Interference
SEB	Single Event Burnout
SEL	Single Event Latch-up



SEU	Single Event Upset
SSA	System Safety Assessment
STE	Special Test Equipment
TID	Total Ionizing Dose

## 4. TECHNICAL REQUIREMENTS

### 4.1 General

This plan documents applicable requirements of IEC/TC 62239-1 clause 4.

Each applicable paragraph in section 4 herein includes:

- a. Details of each requirement being flowed to the subcontractor;
- b. How compliance to the plan is demonstrated; and
- c. The evidence that is available to show that the requirements have been accomplished.

This document is applicable to subcontracted work subject to ECMP. The subcontractor may either

- a. Comply with this document when ECMP is invoked in the contract; or
- b. Implement an ECMP conforming to IEC/TC 62239-1 or an equivalent standard (for subcontractor-controlled designs).

### 4.2 Component Selection

(This section is not applicable to subcontractors.)

### 4.3 Component Application

#### 4.3.1 General

##### 4.3.1.1 Application Processes

##### 4.3.1.2 Design Review

(This section is not applicable to subcontractors)

##### 4.3.1.3 Electromagnetic Compatibility

(This section is not applicable to subcontractors)

## **4.3.2 Electromagnetic Compatibility (EMC)**

(This section is not applicable to subcontractors)

## **4.3.3 Derating and Stress Analysis**

(This section is not applicable to subcontractors)

## **4.3.4 Thermal Analysis**

(This section is not applicable to subcontractors)

## **4.3.5 Mechanical Analysis**

(This section is not applicable to subcontractors)

## **4.3.6 Testing, Testability, and Maintainability**

Subcontractor shall implement plans and procedures to ensure component verification per Korry documentation for the application.

## **4.3.7 Avionics Radiation Environment**

### **4.3.7.1 General**

Subcontractor shall implement a method of monitoring and controlling all active electronic component exposure to radiation during all assembly operations where radiation exposure may be present at the electronic component level.

### **4.3.7.2 Induced Radiation**

Subcontractor shall ensure all x-ray sensitive electronic components are exposed to less than 50 rad cumulative level across all subcontractor processes. Identification of x-ray sensitivity will be through the special handling x-ray sensitivity notes per Korry design data documentation.

## **4.3.8 Management Of Lead-Free Termination Finish And Soldering**

Subcontractor shall implement a lead-free control plan in accordance to Section 7. Lead Free Control Plan.

## **4.3.9 Counterfeited, Fraudulent, And Recycled Component Avoidance**

Subcontractor shall implement a counterfeit electronic component plan in accordance to Section 8. Counterfeit Part Control Plan.

## **4.3.10 Moisture And Corrosion**

Subcontractor shall document and implement a moisture control process to ensure electronic components moisture exposure level is maintained at or below their moisture sensitivity levels defined by the original electronic component manufacturer.

## **4.4 Component Qualification**

### **4.4.1 General**

As part of Korry's ongoing qualification of components, some Korry requirements shall be flowed down to the subcontractor's sources of supply and some subcontractor component data is required to be shared with Korry, as detailed below.

### **4.4.2 General Component Qualification Requirements**

(This section is not applicable to subcontractors.)

### **4.4.3 Component Manufacturer Quality Management**

#### **4.4.3.1 Quality System**

(This section is only included because of references in 4.4.7 regarding distribution, and does not otherwise apply to subcontractors)

The component manufacturer shall have a quality system assessed to the relevant parts of the ISO 9000 series or equivalent. The documented quality management system of component manufacturers selected by the subcontractor is a major part of the Korry verification.

#### **4.4.3.2 Quality system assessment**

(This section is only included because of references in 4.4.7 regarding distribution, and does not otherwise apply to subcontractors)

Where the component manufacturer is not assessed in accordance with 4.4.3.1 above or an approved existing scheme, then the subcontractor shall demonstrate how the quality management system of the component manufacturer shall be maintained. Where the subcontractor conducts or enables an audit on the component manufacturing facility, then the audit shall be conducted by suitably trained auditors in accordance with the relevant standards of the ISO 9000 series or equivalent system.

### **4.4.4 Component Manufacturer Process Management Approval**

(This section is not applicable to subcontractors.)

### **4.4.5 Demonstration of Component Qualification**

(This section is not applicable to subcontractors.)

### **4.4.6 Qualification of Components from a Supplier that is Not Qualified**

(This section is not applicable to subcontractors.)

## 4.4.7 Distributor Process Management Approval

The subcontractor shall verify that distributors have a documented quality management system.

The distributor quality management system shall be assessed according to 4.4.3.1 or 4.4.3.2 and applicable to distributors. The distributor shall have an ISO 9000 series or equivalent approved process management system for all its activities including storage, component handling, traceability, testing, shipment, information and technical data handling

If the distributor supplies parts other than from a franchised manufacturer then written approval must be provided by Korry.

When the distributor accepts returned stock from customers, these parts may not be used in Korry product without approval by Korry.

## 4.4.8 Subcontractor assembly facility quality and process management approval

The subcontractor shall have a documented quality management system in accordance with AS/EN/JISQ 9100 or equivalent, where specific attention is made to the following requirements for avionics plan owners.

- 1.) Component traceability is maintained to the original manufacturer.
- 2.) Component substitutions shall be approved by the plan owner.
- 3.) The requirements of 4.7 are met.

## 4.5 Continuous component quality assurance

### 4.5.1 General quality assurance requirements

(This section is not applicable to subcontractors.)

### 4.5.2 On-Going Component Quality Assurance

(This section is not applicable to subcontractors.)

### 4.5.3 Subcontractor in-house continuous monitoring

A process of identification, recovery and recording of component removals or replacements during in-house processing and testing shall be documented. Significant component replacement trends shall be investigated to determine the root cause, and be reported to Korry.

#### 4.5.4 Component design and manufacturing process change monitoring

Component manufacturers' process change data shall be communicated to Korry. For the purposes of this document a process change is defined as a change in manufacturing source(s), process(es), inspection method(s), location of manufacture, tooling or materials, that can potentially affect fit, form or function.

#### 4.6 Component availability and associated risk assessment

(This section is not applicable to subcontractors.)

#### 4.7 Component Compatibility with the Equipment Manufacturing Process

The documented processes shall assure that the component is compatible with equipment manufacturing processes (without any quality or reliability impact) throughout.

- Component shipping, handling, and storage (short and long term).
- Equipment manufacturing, assembly, shipping, handling, long term storage, test, repair and rework by equipment manufacturer.
- Protection of components from electrostatic discharge (ESD) damage during component storage and handling, during each step of the equipment assembly process. Use of the relevant sections of MIL-HDBK-263, IEC 61340-5-1, and IEC/TR 61340-5-2 will aid in controlling ESD damage.
- (This bullet applies to lead-free solder processes, and does not apply to Korry subcontractors at this time.)
- Avoidance of moisture sensitivity damage (MSL) during each step of the equipment assembly process in accordance with IPC/JEDEC J-STD-20.

The documented processes shall identify the key manufacturing, assembly, shipping, handling, storage, test, repair and rework processes by the subcontractor, and the subcontractor shall describe how their impact on components is identified, documented, and controlled.

#### 4.8 Component Data

(This section is not applicable to subcontractors.)

#### 4.9 Configuration Control

(This section is not applicable to subcontractors.)

### 5. PLAN ADMINISTRATION REQUIREMENTS

#### 5.1 Using Components Outside the Manufacturer's Specified Temperature Range

(This section is not applicable to subcontractors.)

## 5.2 Plan Organization

(This section is not applicable to subcontractors.)

## 5.3 Plan Terms and Definitions

(This section is not applicable to subcontractors.)

## 5.4 Plan Focal Point

(This section is not applicable to subcontractors.)

## 5.5 Plan References

(This section is not applicable to subcontractors.)

## 5.6 Plan Applicability

This ECMP applies to the following component types:

- a. Microcircuits and semiconductor devices;
- b. Electro-optical devices ([LEDs](#), photodetectors, photosensors, LCD, VF, and other display devices, etc.)
- c. Resistors (fixed or variable);
- d. Capacitors (fixed or variable);
- e. Magnetic components (transformers, inductors, ferrites, and filters);
- f. Electrical switches, encoders, and relays;
- g. Electrical connectors, terminals, pins, and sockets;
- h. Thermoelectric coolers.

ECMP applicability to equipment design is defined in 1.1 herein.

## 5.7 Plan Implementation

(This section is not applicable to subcontractors.)

## 5.8 Plan Acceptance

(This section is not applicable to subcontractors.)

## 5.9 Plan maintenance

(This section is not applicable to subcontractors.)

## 6. PLAN OWNER NOTES

(This section is not applicable to subcontractors.)

## 7. LEAD FREE CONTROL PLAN (LFCP)

Korry allocates the lead free control level to subcontractors. Subcontractors shall use the applicable guidance in GEIA-STD-0005-1, GEIA-STD-0005-2, GEIA-STD-0005-3 when subcontracting for Korry. Best practice will be a collaborative review of the subcontractor lead free plan prior to start of work.

### 7.1 Korry Lead free plating approvals

Approval of Lead Free plating and finish is indicated in the component definitions supplied by Korry in the technical data packages for each purchase order. Approval of lead free plating and finish is based on GEIA-STD-0005-1.

### 7.2 Re-plating process record retention

Supplier is to retain records related to verification of the re-plating of component termination finishes specified in Korry drawings. Supplier is to provide copy of records upon request.

### 7.3 Conformal Coat process record retention

Supplier to retain records related to conformal coat process controls for coverage and lead gap spacing per Korry [D41247](#) (LFCP), section B.4.2. (reproduced in 7.3.1 below) Supplier is to provide copy of records upon request.

#### 7.3.1 Verification of Conformal Coat Coverage and Lead Gap Spacing

For components with small lead spacing (not to be confused with pitch), the conformal coat on these parts may entirely fill the space providing a direct path for tin whisker growth between leads. Figure 1 illustrates the definition of edge-to-edge lead spacing, pitch and conformal coating thickness. As a result, the conformal coating selected should have a maximum thickness no greater than 1/3 of the edge-to-edge lead spacing.

- The thickest conformal coat that can be typically expected for UR/AR type coating is approx. 0.006", so the minimum lead spacing is set at 0.018" unless the part is granted deviation from this requirement by Korry, after taking into account the suitability of SAC finishes in the application, large lead spacing, special ball grid array (BGA) mitigations, and part criticality in the design.
- The thickest conformal coat that can be typically expected for X-Y type coating is approx. 0.002", so the minimum lead spacing is set at 0.0059" unless the part is granted deviation from this requirement by Korry, after taking into account the suitability of SAC finishes in the application, large lead spacing, special ball grid array (BGA) mitigations, and part criticality in the design.

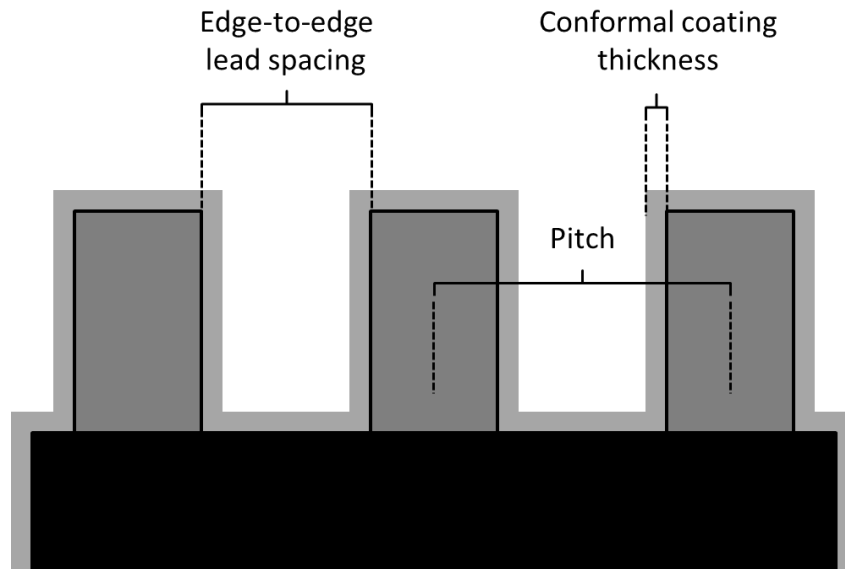


Figure 1: Diagram of conformal coated part geometries (from 41247 LFCP Figure 2)

## 8. COUNTERFEIT PART CONTROL PLAN (CPCP)

Contract manufacture shall maintain a counterfeit part control plan that complies with the applicable provisions on SAE-AS5553.

## 9. OBSOLESCENCE MANAGEMENT PLAN (OMP)

Contract manufacturer shall forward Product Change Notices (PCN) per purchase order Q-Note 15.