Telephone : 011-2301 3191
फैक्स/Fax : 011- 2301 7362
ईमेल/email : hq.dgaqa@nic.in

सभी पत्र व्यवहार महानिदेशक, वैमानिक गुणवत्ता आश्वासन के नाम से करें, किसी अधिकारी के नाम से नहीं ;
All correspondence should be addressed to the Director General, Aeronautical Quality Assurance and not to any officer by name.

Directorate General of
Aeronautical Quality Assurance
वैमानिक गुणवत्ता आश्वासन महानिदेशालय
D.G.A.Q.A.
रक्षा मंत्रालय, भारत सरकार
Ministry of Defence, Govt. of India
नई दिल्ली - 110011
New Delhi - 110011

No.1405/Directives/DGAQA/Tech Coord Dated: 15 Oct, 2018

To,

ADG (N&CZ)
ADG (SZ)
ADG (Nasik)
ADG (Koraput)

Release of AQA Directives 06/2018 on guidelines for Kit Inspection of electronics, mechanical Components and consumables for Airborne LRUs/Modules

It has been decided by this HQ to issue the Aeronautical Quality Assurance Directives (AQAD) on the subject essential for Quality Assurance (QA) in military aviation. The aim of issuing such AQA directives is to have continual improvements in Quality Management System in Indian Military Aviation as well as to set clear-cut guidelines/requirement which needed to be adhered / ensured during discharging the respective duties of stakeholders.

2. Accordingly, in the series of issuing such AQADs, fifth AQA directive is hereby issued which is to be implemented with immediate effect. This document has been prepared by Director (Armt) HQ, DGAQA after obtaining the feedback from all the groups of this HQrs and FEs.

3. The objective of guidelines for Kit Inspection for Electronics, Mechanical Components and consumables for Airborne Electrical, Electronics LRUs/Modules is to ascertain the system meeting the desired specifications, thereby mitigating the risk of defects or other inadequacies throughout the operational life of Project / Equipment. The intention of this guideline is set uniform procedure, based on the most professional yet pragmatic approach.

4. It is suggested to give wide publicity of the document within our organization as well as all stake holders for awareness and compliance. To facilitate this, a soft copy of the document is uploaded on DGAQA website and can be accessed from website www.dgaeroqa.gov.in through technical (main menu).

(V Arumugam)
Additional Director General
For Director General, AQA

Encl: As stated

Copy To: -

All Field Establishment	:	For information and needful action as stated in the text above.

Internal Copy to: -

PPS to DG, AQA	:	For kind information please.
All Technical Directorates	:	For information and needful action as stated in the text above.
IT Section	:	With a request to upload the document on DGAQA website.

वी एल राजा
महानिदेशक

भारत सरकार
रक्षा मंत्रालय
वैमानिक गुणवत्ता आश्वासन महानिदेशालय
'एच' ब्लाक, नयी दिल्ली -110011
GOVERNMENT OF INDIA
MINISTRY OF DEFENCE
DIRECTORATE GENERAL OF
AERONAUTICAL QUALITY ASSURANCE
'H' BLOCK, NEW DELHI – 110011
TEL: 011-23011783, FAX: 011-23014395
e-mail: hq.dgaqa@nic.in

PREFACE

1. To accomplish the Directorate General of Aeronautical Quality Assurance missions, vision and values, DGAQA and its FEs are responsible for the management and supervision of QA functions at work centers.

2. Introduction of this document by DGAQA for carrying out QA activities in military aviation which will improve the Quality Management System of aviation stores, further leading to improve quality and reliability of aircraft. Kit/Input material inspection is the process performed after receiving the components from IG / Holding Stores before the Kit is moved to Assembly. Kit inspection is required to meet product and assembly process requirement as per approved Bill of Material (BOM)/specification.

3. It is pertinent that controlling the input is a better method of Quality Assurance than post process inspection (Assembly Inspection) in which the incorrect/spurious components may not get noticed.

4. This Quality Directive is issued to specify the uniform procedure across all field establishments under DGAQA for Kit Inspection of Electrical, Electronics, Mechanical Components and Consumables for Airborne LRUs/Modules.

वी एल राजा
महानिदेशक
वै.गु.आ.मनि

AQA DIRECTIVE ON KIT INSPECTION FOR ELECTRONICS, MECHANICAL COMPONENTS AND CONSUMABLES FOR AIRBORNE LRUs/MODULE

भारत सरकार, रक्षा मंत्रालय
वैमानिक गुणवत्ता आश्वासन महानिदेशालय / तकनिकी समन्वय अनुभाग
'एच' ब्लाक, नयी दिल्ली -110011
GOVERNMENT OF INDIA, MINISTRY OF DEFENCE
DIRECTORATE GENERAL OF AERONAUTICAL QUALITY ASSURANCE
'H' BLOCK, NEW DELHI – 110011
TEL: 011-23011783, FAX: 011-23014395
www.dgaeroqa.gov.in, e-mail: hq.dgaqa@nic.in

TABLE OF CONTENTS

Sl. No.	Contents	Page From	Page To
1.	Introduction	4	4
2.	Definitions	5	6
3.	QA Activities	7	8
4.	Safety & Handling Instructions and Assembly Preparation	8	9
5.	Conclusion	10	10
6.	Annexure	11	13

AQA DIRECTIVE
ON KIT INSPECTION FOR ELECTRICAL, ELECTRONICS, MECHANICAL COMPONENTS AND CONSUMABLES FOR AIRBORNE LRUs / MODULE

INTRODUCTION

Kit is a list of components drawn from IG/Holding Stores used for assembly of LRUs/Modules. Kit/Input material inspection is the process performed after receiving the Components from IG/Holding Stores before the Kit is moved to Assembly. Kit inspection is required to meet product and assembly process requirement as per approved Bill of Material (BOM)/specification.

It has been observed during Kit/Input material inspection that spurious/Incorrect components have been detected during assembly and testing of the modules/LRUs. These defects/inadequacies lead to the re-work of modules/boards which reduces the reliability of the LRUs and affect the Quality of the product. Hence, it is more important that controlling the input material is a better method of Quality Assurance than post process inspection (Assembly Inspection).

DEFINITIONS

1. GOODS RECEIPT NUMBER (GR)

A Goods Receipt is a document issued to acknowledge the receipt of the items listed in it.

2. ELECTROSTATIC SENSITIVE DEVICE (ESD)

ESD is any component which can be damaged by common static charges, which build up on people, tools and other non-conductor or semiconductors. Common Electronics Sensitive Device includes: MOSFET (Metal Oxide Semiconductor Field Effect Transistor), CMOS (Complementary Metal Oxide Semiconductor), PCBs Laser diodes, Resistors, IC's etc.

3. MOISTURE SENSITIVE DEVICES (MSDs)

MSD are electronics components encapsulated with plastic components and other organic materials. Moisture from atmospheric humidity enters permeable packaging materials by diffusion and collects at the interfaces of dissimilar material.

4. ORIGINAL EQUIPMENT MANUFACTURER (OEM)

OEM refers to the company who manufacture the components.

5. RESTRICTION OF HAZARDOUS SUBSTANCES (ROHS)

ROHS is the restriction of the use of certain hazardous substances in electrical and electronic equipment. The melting temperature of Non-ROHS component is 183^0 C which are the combination of alloy Sn63 and Pb37. The melting temperature of ROHS component is 217^0 C, which is Lead (Pb) free component. These parameters are very important to fix the reflow soldering profile.

6. LEAD TINNED/GOLD PLATED

Components procured with pins gold plated, while carrying out soldering operation these gold plating are to be removed (De-Golding) by dipping in molten lead bath (melted at 355^0 C) that means tinning (The pins are covered with lead tin). This is because of better solderibility.

7. CERTIFICATE OF CONFORMANCE (COC)

COC is a document issued by OEM or its authorised Dealer/Supplier which certifies that the supplied goods or service meets the required specification.

8. DATE CODE / BATCH CODE

Date code refers to the date and year of manufacturing. Batch code refers to the batch of production of the component. If date code of the component is greater than 5 years or as defined by OEM, whichever is earlier, solderability tests to be carried out.

9. TEMPERATURE GRADE

Operating temperature is the temperature at which an electrical or mechanical device operates.

Broadly accepted grades are:

- Commercial Grade : 0^0 C to + 70^0 C
- Industrial Grade : - 40^0 C to + 85^0 C
- Military Grade : -55^0 C to + 125^0 C

However each manufacturer defines its own temperature as given below. Designer must pay attention to actual data sheet specification.

- Commercial Grade : 0^0 C to + 70^0 C
- Industrial Grade : - 40^0 C to + 100^0 C
- Automotive Grade : - 40^0 C to + 125^0 C
- Extended Grade : - 40^0 C to + 125^0 C
- Military Grade : - 55^0 C to + 125^0 C

QA Activities

1. Activities performed by QC/QM during Kit Inspection

The required information for Kit Inspection shall be filled as per the standard Format attached with this document as Annexure 'A', 'B', 'C' & 'D'. Following activities shall also be performed during Kit Inspection:

(a) Visual Inspection - Check the components/PCBs visually with suitable magnifying glass for the following defects:

(i) Dent
(ii) Decolourisation of leads
(iii) Cracks
(iv) PCB track damage
(v) Blisters in bare PCB surface
(vi) Surface finish/damage of chassis etc.
(vii) Marking on components w.r.t original packing cover/ Catalogue /Data sheet. etc

(b) Compliance to approved BOM - Check the details of the components as per approved BOM.

(c) Certificate of Conformity (CoC) - Check the availability of CoC for each component/item. The Certificate of Conformity (COC) shall be accepted issued by the Original Equipment Manufacturer (OEM) or its authorized rep stating the conformance to the standards/Grade of the components as per Bill of material (BOM) /Specification.

(d) Electrical Testing - The electrical testing for passive components may be carried out on sample basis, if required.

(e) MSD and ROHS Components - The details of MSD and ROHS components shall be verified for compliance.

(f) Dimension of ICs - The fine pitch ICs are to be checked for dimensions of the pins with respect to Data Sheet and Purchase Part Drawing (PP). This information is required for matching up the footprints of ICs on PCBs.

2. Acceptance criteria for bare PCBs

In addition to the above information given in the Kit Inspection Format following additional parameters also to be verified:

- Bare Board Test Report
- Group A Test Report
- Group B Test Report

3. Generate Inspection Report and submitted to ORDAQA for audit/re-verification.

Safety & Handling Instructions and Assembly Preparation

1. ESD Precautions

- Wrist strap to be used by the persons handles the components and this strap shall be connected to a common ground point. The proper grounding of the person with wrist strap to be checked daily.
- Antistatic gloves to be used while handle.
- Head cap, apron and antistatic footwear to be used while handle/work.
- The work area floor to be fitted with static dissipative mat.
- The work table to be fitted with antistatic mat and connected to common ground points.
- ESD grounding measurement to be carried out and shall meet the specification (i.e. 10E6-10E9Ω). The record of this measurement shall be maintained.

2. MSD (J-STD-033B01) Procedure

For different moisture level floor life is as mentioned in table below shall be followed: -

Level	Floor life
1	Unlimited at ≤ 30^0 C 85% RH
2	1 Year
2a	4 Weeks
3	7 Days
4	3 Days
5	2 Days
5a	1 Days
6	Mandatory bake before use. After bake, must be reflowed within the specified time limit.

3. Lead tinning/Gold plating procedure

Gold plating often is being used in electronics to provide a corrosion resistant, electrically conductive layer on copper, typically in electrical connectors and printed circuit boards. Importance of gold plating is listed below:

(a) High Reliability
(b) Corrosive resistive environments etc.

4. Forming of Fine Pitch ICs

Fine pitch ICs which are required to be formed during assembly shall be carried out by approved tool/fixtures as per process sheet.

Note: All Non Mil/Non QML components (COTS) shall be screened as per document JSG 0667:2006. The same was reaffirmed on 2011 as per the CEMILAC letter no. CEMILAC/3059/GDS/ASSC dated 03rd March, 2016. This is applicable only for components being used for Airborne applications and shall be mentioned in the BOM as a Note.

CONCLUSION

The document has brought out systemic procedures / practices that will help all the stakeholders in the Kit/Input material QA activities to ensure with documentary evidence that specified quality requirements have been met. Though, the primary responsibility of ensuring the quality of the outgoing product will continue to rest with the main contractor. These procedures will enhance the quality of final product. Strict adherence to these procedures is expected to further enhance the confidence of our esteemed customers in Armed Forces for keeping our flying machines in the highest order of operational readiness.

NOTE: Suggestions for further improvement/amendment in this document are welcome and may be addressed to the following;

Directorate General of Aeronautical Quality Assurance
(Attention: Director / Tech coord)
"H" Block, New Delhi-110 011
E-mail: hq.dgaqa@nic.in

Annexure 'A'

KIT INSPECTION FORMAT (ELECTRICAL/ELECTRONICS)

REQUIREMENT AS PER BILL OF MATERIAL (BOM)							
BOM Sl. No	Part No. / Type No.	Description	OEM / Manufacturer Part No.	Qty. / Set	Lead Finish	Component Category (MIL / QML / QPL / LCSO / Industrial / Automotive	Component grade / Operational Temp and Storage

Annexure 'B'

KIT INSPECTION FORMAT FOR ELECTRONICS COMPONENTS

Data of received part																	
GR No	Manufacturer	Manufacturer Part No. marking on the item/ Pack/ COC	On item marking	Date code/ batch code	COC (OEM/ OEM Franchises	Test reports/ Material Analysis Report	Qty. / offered/checked	Expiry Date	ESD or Non ESD	MSD of Non MSD	ROHS or Non ROHS	Pack. Type	Lead Finish/ Solder coated/ Gold plated / Surface Finish and Thickness	Nos. of Pins	Visual Inspection / Testing at MI Visual Inspection / Corrosion / rust / pitting / scratches / cracks	Dimension /Size	Remarks

Annexure 'C'

KIT INSPECTION FORMAT (MECHANICAL)

Raw Material Batch No.	Material Specification / Material Code	Spectrometric Verification of Material	Manufacturing Process of Items	Heat Treatment /brazing annealing/ forging etc. of the item, Process and Batch No.	Mechanical properties test on samples (heat treatment)	Non Destructive Testing on the components	Micrometric Examination	Surface Treatment	Functional / Fitment Test	Any special test	Final acceptance / Itemization / Tag Generation	Preservation Details / Tag Endorsement	Visual Inspection before assembly / detail part inspection for assembly	Remarks

Annexure 'D'

KIT INSPECTION FORMAT (CONSUMABLES)

Raw Material Batch No.	Material Specification / Material Code	Part No.	Nomenclature	Date of Manufacturing	Shelf life/Date of Expiry	Qty per packing	Total packed Qty	Storage Conditions