ORACLE

IQC/DTS Minimum Expected Specification

Document Number and Revision: 914-1756 Rev 03

Overview

This document defines the requirements for the Incoming Quality Control (IQC) and Dock To Stock (DTS) processes applicable to the components, sub-assemblies and assemblies, electronics or mechanical parts received by Oracle's Joint Development Manufacturer (JDM)/External Manufacturer (EM)/Original Design Manufacturer (ODM) partners to manufacture final assembly products for Oracle.

This specification defines the criteria for when, what and how the two processes are performed and the audit requirements to meet Oracle's expectations. It also describes how to change a component/sub-assembly or assembly's status from a required IQC to a DTS in accordance with Oracle's approval.

Audience

This document is for Oracle employees, contractors, and suppliers' employees responsible for manufacturing and testing Oracle products or assemblies.

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Introduction

Oracle systems and assemblies are subject to the IQC requirements outlined in this document when the IQC/DTS Minimum Expected Specification document accompanies any of the following:

- Purchase Order (PO)
- Quality Exhibit
- Master Supply Agreement (MSA)

The IQC process ensures that materials received into JDM/EM/ODM's production process meet the requirements of Oracle Quality Exhibit. The delivered material continues to meet customers' requirements as sub-tier defects are continually inspected during process control and outgoing quality assurance (OQA) checks.

This document contains the criteria by which a component, sub-assembly or assembly can achieve a DTS status and bypass the normal IQC inspections.

Clarification of terms in this procedure:

1. The term EM implies a JDM, EM or ODM
2. Any reference to the sub-tier relates to the EM's supplier.
3. Direct the resolution of any questions relating to this document to Oracle Supplier Engineering (SE).

Applicable Specifications and Documents

Oracle Documents

- Printed Circuit Board Assembly Workmanship Standards, 910-1021-xx
- Global Cosmetics Quality and Workmanship Standards, 923-2001-xx

Oracle Specifications

- Fabrication Specification – Printed Wiring Boards, 950-1009-xx
- Part Identification Label Specification, 950-1419-xx
- Identification, Labeling, and Bar-coding Standards for Assemblies, 950-4477-xx

Industry Standards or Reference

ISO standards are:

- ISO 9000 family for quality management
- ISO 14000 family for environmental management

IPC Standards

- Acceptability of PCB*, IPC-A-600*
- Acceptability of Electronic Assemblies*, IPC-A-610*
- Test Methods Manual*, IPC-TM-650*
- Moisture/Reflow Sensitivity Classification for Non-Hermetic Solid State Surface Mount Devices*, IPC/JEDEC J-STD-020B*
- Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices*, IPC/JEDEC J-STD-033A*
- Qualification and Performance of Permanent Solder Mask, IPC-SM-840

Others

Sampling Procedures and Tables for Inspection by Attributes, MIL-STD-105

1 Big Rules

The Big Rules are:

1. The EM IQC and DTS procedure is documented and controlled to reflect best practice in accordance with the appropriate industrial standard(s). The industrial standards reflect ISO documentation requirements. The EM IQC and DTS procedure is subjected to Oracle's SE's auditing process. Non-conformities against the procedure are **not** allowed.

There must be a process flow chart/map that shows the real-time IQC operation for each case.

2. The IQC process applies to all incoming materials for both Oracle's sustaining products, and NPI products from EMs on the approved vendor list only.
3. EMs perform the incoming inspection that satisfies the Quality Agreement signed by Oracle and the EM.
4. EM engineering must clearly document and approve the EM IQC inspection standard/instructions for all incoming materials. EM engineering also must approve and document any exceptions.
5. EMs verify the sub-tier's OQA report and Certificate of Conformance (CoC), to confirm that the material meets its specification. EM engineering authorize and document any exception in the OQA/COC report, provided that the material meets its specification.
6. EMs document the type of functional materials check that is to be performed at sub-tier manufacturing production process and/or in EM's IQC process. EMs establish a mutually agreed return material authorization (RMA) process flow with the sub-tier.
7. IQC inspection must be performed on all different date codes and lot codes in the same shipment. The IQC sampling plan must be defined clearly against each related standard.

8. EMs retain IQC records for a minimum of 10 years.
9. EMs verify the restriction of hazardous substances (RoHS) compliance of incoming materials.
10. All supplied parts must have an approved first article inspection (FAI) signed off by the appropriate engineering authority and a demonstrated ongoing Cpk of 1.33 or greater, where applicable.
11. All packages that are to be shipped must be inspected and be free of physical damage, see Section 4.6, **Error! Reference source not found.**, on page 9, and must meet Oracle's packaging standards.
12. All regulatory requirements (UL, CSA, TUV, and so on) must be satisfied by an accompanying CoC.
13. EM Goods Receiving must be electromagnetic compatibility (EMC) compliant.

2 IQC Requirements

EM engineers use the following criteria when considering whether parts are to be considered for IQC:

1. The part is for a New Product Introduction (NPI) where insufficient data exists for a DTS decision to be made.
2. The in-process performance of the part exceeds its agreed defects per million (DPM) goal.
3. The field performance though early life failure (ELF), Voice Of Customer, and dead on arrival (DOA) has exceeded the agreed goal.
4. The sub-tier's in-process control levels are violated.
5. A specific customer escalates an issue.
6. Sub-tier's system/process audit score is below EM's minimum acceptable score.
7. Inability to demonstrate an ongoing capability at the sub-tier
8. A new or alternative process /tooling/ manufacturing site is to be used.

3 DTS Requirements

1. EMs define and document the DTS criteria and the acceptance/rejection criteria.
2. EMs identify the DTS materials that ship directly to Oracle's customers. EMs maintain a tracked record of these materials for Oracle's review and approval.
3. EMs complete periodical audits to DTS materials to ensure continuous conformity of material quality.

4. The EM's DTS procedure must define the number of parts, consecutive deliveries, or time span that must be achieved defect free before a part can be moved to DTS. Non-conformities to the procedure are **not** allowed. Parts are considered for DTS under the following criteria:
    a. EM's IQC performance of a component, sub-assembly, or assembly
    b. EM's in-process performance of a component, sub-assembly or assembly meet the defined quality goal
    c. EM's field performance of a component, sub assembly or assembly in terms of annualized return rate (ARR) and annualized failure rate (AFR) in defect parts per million (DPPM) meet the defined quality goal

4 IQC Typical Requirements

4.1 Mechanical Parts and Assemblies

The equipment used to perform dimensional verification must be sufficiently capable and accurate to measure to the stated tolerances and be subject to the EM calibration process. There must be a clear definition of inspection requirements at sub-tier's sites where source inspection or on-site inspection is applied.

Parts subjected to IQC must be inspected, but not exclusively, to the criteria contained in the Geometric Tolerance Stack Up Analysis Report. The EM retains a tolerance stack-up analysis report against a mechanical assembly drawing of those critical to feature (CTF) dimensions identified in the drawings. The EM periodically updates the report in accordance with the contractual agreement. The report is subject to Oracle's audit. Any major process change, PPCN or a site transfer in the sub-tier’s facility requires an update to this report to document the new process capability.

4.2 Oracle’s Common Requirements

Oracle's common requirements must be applied to all:

- Electronics components
- Assembles
- Sub-assemblies (CPU, ASIC, and RISC)
- Critical IC controllers
- Discrete electronics components
- Key components
- Field Replaceable Units (FRU)
- Customer Replaceable Units (CRU)

The common requirements are defined in the subsections that follow

4.2.1 Reliability Mean Time Between Failure (MTBF) Data or Evidence

EMs must have, as a minimum, a quality management contract with their sub-tier, which requests the sub-tier to provide evidence of component MTBF hours or relevant reliability data upon request within a defined timescale.

4.2.2 Product or Process Change Notice (PPCN)

EMs must initiate a PPCN when any critical manufacturing/fabrication process is to be changed at the sub-tier.

4.2.3 Traceability

EMs must record the date or lot code in their IQC database for future traceability. Every lot or date code must be recorded for First In First Out (FIFO) inventory management.

4.2.4 Firmware or BIOS Version/Revision Validation

EMs use the IQC process to validate and verify firmware versions or revisions of the incoming electronics controller/drivers, unless the EM has the in-process firmware/BIOS version checking/testing capability.

The EM validates the manufacturing model number.

EMs shall take measures to ensure product that has aged longer than 90 days after passing server-level functional test is re-run through server-level functional test again prior to integration into a rack or shipment to a customer to ensure the product is refreshed with the latest firmware.

4.2.5 Electronics Components Moisture Control

All sealed electronics components, for example IC/ASIC/RISC in Ball Grid Array (BGA) or Quad Flat Pack (QFP) package, must comply with the IPC moisture sensitive component management and control standards.

4.3 Electronics Components, Sub-assemblies or Assemblies

4.3.1 CPU, ASIC, RISC, DRAM, External Cache and Critical IC Controllers

EMs must use the generic Oracle common requirements to perform the IQC inspection, see Section 4.2, **Error! Reference source not found.**, on page 5.

4.3.2 Discrete Electronics Component

EMs must use the generic Oracle common requirements to perform the IQC inspection, see Section 4.2, **Error! Reference source not found.**, on page **Error! Bookmark not defined.**.

4.4 Key Component, FRU or CRU

4.4.1 System Power Supply Unit (SPSU)

EMs must use the generic Oracle common requirements to perform the IQC inspection, see Section 4.2, **Error! Reference source not found.**, on page 5.

EMs perform any functional test in accordance with contractual requirement, for example, wattage measurement validation. A typical required IQC procedure is:

- Validate the manufacturing model number
- Validate the pre-applied Oracle required FRU part number, and then serialize the number barcode label, if applicable
- Validate the revision number
- Verify the safety and compliance label
- Verify the AC warning label if it is the server's SPSU

4.4.2 Hard Disk Drive (HDD) and Solid State Drive (SDD) Storage Devices

EMs must use the generic Oracle common requirements to perform the IQC inspection, see Section 4.2, **Error! Reference source not found.**, on page 5. A typical required IQC procedure is:

- Validate the manufacturing model number
- Validate the pre-applied Oracle required FRU part number, and then serialize the number barcode label, if applicable
- Validate the Firmware version
- Validate capacity for FRU parts

4.4.3 Printed Circuit Board (PCB) and PCBA

EMs must use the generic Oracle common requirements to perform the IQC inspection, see Section 4.2, **Error! Reference source not found.**, on page 5.

EMs inspect any incoming PCB, using the IQC inspection rules, for the following typical requirements:

- Via hole and layer stack-up cross section specimen for each Oracle PCB supplier deliverable.
- Via hole and layer stack-up cross section photocopy.
- Impedance measurement and cleanliness measurement results from the PCB supplier in accordance with the Oracle PWB specification Fabrication Specification – Printed Wiring Boards, 950-1009-xx.

Any incoming PCBA shall follow a typical IQC required procedure either at 100 percent for NPI product or by sampling plan for sustaining product, for example:

- Validate the pre-applied Oracle required FRU part number, and then the serial number barcode label, if applicable.
- Validate the Firmware and BIOS version labels for all devices.
- Validate all jumper settings.
- Inspect all devices for any physical defect.
- Verify that the ESD warning label is present.

4.4.4 Fan or CPU Fan Sink

EMs must use the generic Oracle common requirements to perform the IQC inspection, see Section 4.2, **Error! Reference source not found.**, on page **Error! Bookmark not defined.**.

EMs perform a typical power on test either at 100 percent for NPI product or by sampling plan for sustaining product, for example:

- Perform power on plug in and power off plug off for fan functional validation
- Perform RPM speed validation in accordance with the contractual agreement

4.4.5 Wire, Cable, Cable Assemblies or Connector

EMs must use the generic Oracle common requirements to perform the IQC inspection, see Section 4.2, **Error! Reference source not found.**, on page **Error! Bookmark not defined.**.

EMs perform a typical required IQC procedure:

- Inspect for any physical defect to the wire, cable, or cable assembly
- Inspect for any bent pin or missing pin in the connector
- Validate the manufacturer's part number or revision number, if applicable
- Validate the cable length against the cable drawing, if applicable
- Validate the wire or cable gauge size

Ensure that there is a UL certificate for the incoming wire or cable

4.5 Process Material

EMs must perform the typical required IQC inspection, for example:

- The material package is sealed as specified
- The material is packaged in accordance with the required protection packaging requirements, as defined by the EM and/or sub-tier
- Inspect aging material with effective shelf life in accordance with the engineering specification, as defined by the EM and/pr the sub-tier
- If solder paste, solder wire, or solder bar process material is used, EM define the required solderability test that is performed in accordance with the Industry Standard guidelines

- If solder paste is used, EM ensures that the material is received in correct storage and shipping packaging, as defined in the Industry Standard guidelines agreed by the EM and/or the sub-tier

4.6 Final System, FRU or X-Option Carton Box Package Materials

EMs must perform the typical required IQC inspection. For example:

- The material dimensions are designed and fabricated in accordance with the design drawings
    - Ensure that all artwork screen print is high quality (see Global Cosmetics Quality and Workmanship Standards, 923-2001-xx). For example, there are no:
        - Smears
        - Bad or incomplete silkscreen printing
        - Missing prints
        - Incorrect icons

5 Oracle's Audit Expectations

EMs must plan and execute, in accordance with the documented audit schedule, all audits to the:

- Sub-tiers' quality system
- In-process control and outgoing quality control in accordance with the sub-tiers' Process/Product Management plan

    EMs retain records of sub-tier audits and root cause corrective action (RCCA) for each audit finding. Oracle reserves the right to perform periodic audits on an EM's sub- tier:

- Quality management system
- Related contractual required records
- In conjunction with EMs, to perform on-site audits at the sub-tier's facility to ensure the contractual requirements are met

Related Information

Reference Documents and Records

REFERENCE DOCUMENTS AND RECORDS	
Printed Circuit Board Assembly Workmanship Standards	910-1021
Global Cosmetics Quality and Workmanship Standards	923-2001

Document History

Rev	*Date*	*Description of Change*	*Originator*
01	31 Mar 2005	Initial Release	N/A
02	25 Aug 2014	Update from Sun to Oracle	N/A
03	10 Aug 2022	Update title. Update to Oracle Redwood format. Removed italics throughout. Added re-test requirement to section 4.2.4. Corrected title of 910-2010. From section 4.2.5 removed second paragraph/requirement for PCBAs with moisture sensitive devices being also subject to the moisture control process. Added SDD and a requirement to validate capacity for FRU parts to 4.4.2. Remove Optical Storage (4.4.3) section.	N/A

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