

SUPPLIERS/SUB-CONTRACTORS—QUALITY REQUIREMENTS

1. General

This document sets out the quality requirements applying to products, materials and services provided for Horizon Electronics Ltd. This document will be referenced in every procurement order issued by Horizon Ltd. and the supplier/sub-contractor/service provider must undertake to meet all provisions of the document relevant to their field of activity.

Should the order also contain other quality documents, the following is the order of priorities: Special notes in the order; particular documents such as drawings/sketches; Spec, SOW; individual QA instructions; the present procedure.

2. Quality Management System

The supplier is required to be qualified and maintain a quality management system complying with the provisions of ISO9001:2015 or AS9100 in their latest version and consistent with the nature of the service or product supplied and approved by a recognised and authorised qualification organisation. The calibration laboratory is required to be qualified under ISO17025. Apparatus used for testing and confirming functionality shall be calibrated at a laboratory qualified under ISO17025.

3. Environmental Protection

The supplier is required to comply with all legal requirements and state and local authority regulations relating to environmental quality and be prepared to produce appropriate certificates on demand.

4. Configuration Control

4.1 Items Manufactured to Horizon Specs.

- 4.1.1 No modifications may be made to materials, parts, design, or production processes or sites without the advance approval of the Horizon QA Manager.
- 4.1.2 Any request for a change shall be submitted in writing with details of the proposed modification, its reasons and justification establishing that it will have no detrimental effect on the functionality, reliability or other property of the item.

4.2 Items Manufactured to Supplier's Spec.—COTS (Commercial-off-the-Shelf) Items

- 4.2.1 The supplier bears the obligation of giving notice prior to changing any parameter set in the specification or data sheet, materials, parts, design details, production processes (including specified tests) of the supplied items affecting **FFF (Form, Fit, Function)**, safety, or reliability. The change note must be received by Horizon Ltd. at least 10 days prior to delivery of the items affected by the change. The supplier is required to verify receipt of the notice by the QA Manager.

5. Quality Records

Every consignment delivered to Horizon Ltd. must be accompanied by the documentation required under the specific quality requirements indicated in the order or in this document. In the absence of such requirements an original manufacturer's COC (Certificate of Compliance), at least, must be attached. The supplier is required to save the quality records as specified in this document for a period of 7 years starting from the date of completion of the contract with Horizon.

6. Testing

The supplier bears the obligation of planning and conducting all tests and inspections necessary for ensuring full compliance of the purchased product with the order.

6.1 Source Testing

The Horizon QA representative is entitled to require participation in the performance of tests and inspections before the items are dispatched. The supplier shall provide free access to the locations where these activities are carried out as well as to all records applying to the implementation of the order. The supplier shall give at least a week's advance notice of the relevant date. Horizon records pertaining to the testing shall be attached to the order delivery. Failure to carry out source testing will not exempt the supplier from responsibility for the quality of the delivered goods.

6.2 Production Process Validation—FAI (First Article Inspection)

For parts/products made by the supplier for the first time, or following a 24 month break in production, or following a modification in the manufacturing processes, the first item produced shall be tested under the supplier's responsibility in coordination with Horizon QA in compliance with AS9102. The supplier is required to submit to Horizon the FAI report and the applicable records together with the items attached for acceptance testing.

6.3 Acceptance Testing

Horizon Ltd. reserves the right to conduct sample acceptance testing on all batches delivered to an AQL (Acceptance Quality Level) of 1% and Acceptance Number '0'.

7. Non-conforming Output Control

Should a non-conformance be identified in an item prior to its delivery to Horizon, the supplier is required to submit an application for approval of the non-conformance with full details of its nature. A non-conforming product may not be supplied without receiving written approval in advance from Horizon QA, a copy of which is to be attached to the delivery documents. Material provided following approval of the deviation will be reviewed on receipt by Horizon under the normal acceptance procedures.

Material Review Committee

The authority of a supplier not having responsibility over the design of the material procured is restricted to the following decisions: "For Return to Supplier"; "For Reworking to Specification Requirements"; "Reject". Other decisions require Horizon approval. Records of Material Review Committee decisions shall be subjected to review by Horizon.

8. Controlled Materials—Expiry in Storage

Materials with a limited lifetime in storage shall be supplied such that the minimum remaining lifetime on arrival at Horizon is 75% of their original shelf life.

9. Prevention of Forgeries

The supplier shall ensure that counterfeit components/materials as defined in AS5553 and AS6174 are not delivered to Horizon. The supplier shall draw up and maintain a programme for the prevention and control of counterfeit components to AS6174 and/or AS5553. The programme shall be presented to Horizon QA representatives on demand. Items suspected of being counterfeit will not be returned to the supplier. In the event of items being verified as counterfeit, the supplier shall be charged with the expenses associated with compensation for the cost, testing and scrapping of the components involved.

10. Prevention of FOD (Foreign Object Damage)

The supplier shall ensure that products or items containing foreign objects are not delivered to Horizon. The supplier shall draw up and maintain a programme for the prevention of FOD to NAS-412 or AS9146. The programme shall be presented to Horizon QA representatives on demand.

11. Conflict Minerals

The supplier shall report on the use of conflict minerals—tin, tantalum, tungsten and gold—in the products supplied to Horizon, and indicate whether their source is in the Democratic Republic of the Congo or surrounding countries (Angola, Burundi, the Central African Republic, Rwanda, Southern Sudan, Uganda and Zambia) in the CMRT Report format in its latest version.

12. Packing, Labelling and Dispatch

The supplier shall pack, label and dispatch the goods specified in this order/contract in accordance with the applicable regulations, ensure their protection from damage to the best professional standards as practised in this market sector as well as availing himself of suitable shipping services. Horizon shall be entitled to compensation by the supplier on account of any expense incurred to Horizon as a result of unsuitable protection, packing, labelling, or delivery method. The supplier is required to attach to his consignments a delivery note indicating the order or contract no., order line, part no., quantities, serial numbers and batch numbers/production date/work order. Each package is to be marked with the order no. Every expense associated with the shipping borne by the supplier and to be refunded to him by agreement shall be shown on the invoice attached to the copy of the delivery note as a separate charge item.

Note: Special attention shall be paid to protecting electronic components from damage caused by ESD (Electrostatic Discharge) and moisture. ESDS (Electrostatic Discharge Sensitive) items shall be transported between Horizon and her sub-contractors and suppliers inside shielded packages.

13. Fitness and Awareness

The supplier shall verify that employees working under its supervision are aware of:

Their contribution to meeting the requirements of the product/service;

Their contribution to product safety—the supplier shall establish processes for ensuring product safety by managing special requirements, critical items and key specifications laid down by the customer and derived from the supplier's risk management process. The supplier shall draw the employees' attention to the safety impact of the product and update the customer regarding factors liable to affect product safety.

The supplier shall establish, maintain and communicate ethical conduct rules pertaining to his field of activity and the effect of those rules on the products, processes and services supplied to the customer.

14. Audits

The company reserves the right to conduct, with advance coordination, audits of the supplier's quality system and process. A periodical quality meeting shall be held between the supplier and Horizon. The supplier undertakes to carry out corrective actions derived from the audit findings within the period specified in the audit.

15. Special Processes

Operation of supplier's sub-contractors for special processes shall be based on those included in a suppliers' list approved by Horizon, or alternatively, following advance written approval by Horizon QA.

- See Appendix 1 on following pages for specific QA requirements pertaining to various manufacturing technologies and types of supplier.

APPENDIX 1: ADDITIONAL REQUIREMENTS BASED ON MANUFACTURING TECHNOLOGIES

PCB Assembly

1. Printed circuits shall be assembled to approved production documents received solely from the Horizon Documentation Department. No modifications may be made to materials, parts, design, or production processes without advance approval in writing from the Horizon Documentation Department.
2. Any proposal for a change shall be submitted in writing with details of the proposed modification, its reasons and justification establishing that it will have no detrimental effect on the functionality, reliability or other property of the item. Modifications initiated by Horizon shall be received in writing only from the Horizon Documentation Department. The change approval/request shall be attached to the items delivered under the order.
3. The supplier shall carry out acceptance inspections of packaging and production folders on receipt of them at his plant before the work proceeds. The inspection shall cover verification of the items supplied against the parts list provided by Horizon, including manufacturers' approved part and batch numbers for each item. The supplier shall notify Horizon of any non-conformance. Horizon bears the responsibility for clearing and/or resolving any non-conformance.
4. Circuits shall be marked with a serial number as per the Horizon serial number procedure. The supplier shall ensure full traceability between the circuit assembled and the batches of the components mounted—the traceability quality records shall match the production batch and comply with Section 5 - the quality records.
5. The supplier shall carry out the operation as specified in the assembly drawing and the instructions included in the order. In the absence of other instructions, the work shall be performed as follows:
 - 5.1 Assembly, soldering, card cleaning and all processes and materials employed by the supplier shall comply with J-STD-001 Class3.
 - 5.2 Final quality inspection of the work to IPC 610 Class 3, latest version.
 - 5.3 Handling and drying of moisture-sensitive components according to J-STD-033.
 - 5.4 Temperature profiling to IPC 7530, subject to the solder paste manufacturer's recommendations.
 - 5.5 All components and materials adapted for work in a No Lead Free work environment, unless explicitly stated otherwise in the assembly instructions.
 - 5.6 The supplier shall comply with the ESD requirements specified in ESD TR20.20 and Section 3 of IPC610 at all stages of the work.
 - 5.7 ESDS (Electrostatic Discharge Sensitive) items shall be transported between Horizon and its sub-contractors and suppliers inside shielded packages.
 - 5.8 Repairs/non-conformances—defects may be repaired solely at the rework level (repairs following which the item meets all requirements as per the drawing and appropriate specifications). Such repairs are permitted prior to performance of the FAI review of the product.
 - 5.9 If wave/reflow soldering is employed, only a single re-pass of the machine may be performed.
 - 5.10 In the event of a fault or defect that cannot be cleared by reworking, the supplier shall apply in writing to the Horizon Plant QA Manager for approval, including the proposed salvage method or rejection, "as-is" usage, and implementation of a change note by Horizon.
 - 5.11 All items involved shall be delivered accompanied by documentation of the approved irregularity as aforesaid.
6. The supplier shall produce a valid certificate testifying to its specific qualification to conduct the special processes undertaken by him, for approval by Horizon QA.
7. If work is carried out by a sub-contractor of the Horizon supplier, sub-contractors for special processes shall bear the responsibility of adapting the processes to the applicable specifications. The supplier is required to attach to each production batch a COC (Certificate of Compliance), signed by the QA entity of the party performing the operation, indicating the party responsible, date of operation and applicable specifications.
8. Each manually assembled PCB shall be subjected by the supplier to a full (100%) inspection of the assembly, soldering and cleaning.
9. For PCBs assembled automatically or semi-automatically in a continuous process, the supplier is permitted to carry out sample inspection (min. AQL 1%), provided statistical process control is in place approved by Horizon QA.
10. An X-ray test shall be carried out on each card for the LLP, BTC, BGA (bottom pad), SMT connectors components as required in the drawing and the IPC 610 model manufacturing specification.

11. When starting series production an X-ray test shall be carried out to a sample check under MIL-STD-105 with an AQL of 1%.
12. The supplier bears the responsibility of verifying the acceptability of the findings, indicating performance of the test by affixing an X-ray sticker to an unoccupied part of the PCB or to the component itself. Should irregular findings appear in the production batch, the information must be brought to Horizon's attention.
13. For parts/products made by the supplier for the first time, the first item produced shall be tested under the supplier's responsibility in coordination with Horizon QA in compliance with AS9102. The supplier is required to submit to Horizon the first item test report and the applicable records, with emphasis on PCBs.
14. Handling and packing—special attention shall be paid to protecting electronic components from damage caused by ESD and moisture.
15. The items shall be delivered accompanied by the following documentation:
 - 15.1 A COC shall be attached to each batch, signed by the supplier's QC Manager. This document constitutes an undertaking that the item has been manufactured, processed and tested in compliance with all drawings and specifications/standards applicable to the order and all of its requirements.
 - 15.2 Each PCB shall be accompanied by the supplier's process tag, signed and verified by the party executing each of the relevant clauses. The implementation clauses intended for the supplier in the Horizon process tag shall also be signed.
 - 15.3 Details of manufacturer's batches of components mounted on assembled PCB.
 - 15.4 COC for following special processes.
 - 15.5 Inspection and applicable functionality test reports.
 - 15.6 Horizon approvals for irregularities (if required).

Manufacture and Processing of Mechanical Parts, Painting and Coating Processes

1. Materials of the quality specified in the part drawing are to be used.
2. The supplier is required to verify compliance of the raw material with the requirements of the part drawing and show evidence of such compliance from the quality records provided with the parts.
3. The supplier shall ensure full traceability between the raw materials and the items delivered, including production version traceability.
4. Operation of supplier's sub-contractors for special processes (such as painting, coating, welding, hot soldering, heat treatment, non-destructive testing, chemical conversion coatings (alodine) etc.) shall be based on those included in a suppliers' list approved by Horizon, or alternatively, following advance written approval by Horizon QA.
5. Special processes conducted by the supplier - the supplier shall produce a valid certificate testifying to his specific qualification to conduct the process in question, for approval by Horizon QA.
6. The supplier is also required to attach to each production batch a COC for special processes, signed by the QA entity of the party performing the operation, indicating the party responsible, date of operation and applicable specification.
7. Materials with a limited lifetime are not to be used after their expiry date.
8. FAI—for parts/products made by the supplier for the first time, or following a 24 month break in production, or following a modification in the manufacturing processes, a FAI shall be performed under the supplier's responsibility in coordination with Horizon QA in compliance with AS9102. The supplier is required to submit to Horizon Acceptance Testing the FAI report and the applicable records.
9. The items shall be supplied accompanied by the following documentation:
 - 9.1 A COC shall be attached to each item or item package, signed by the supplier's QC Manager. This document constitutes an undertaking that the item has been manufactured, processed and tested in compliance with all drawings and specifications/standards applicable to the order and all of its requirements.
 - 9.2 COT for raw materials used to produce parts.
 - 9.3 COC for following special processes (signed by party conducting the process).
 - 9.4 Inspection and applicable functionality test reports.
 - 9.5 Horizon approvals for irregularities (if required).

- 9.6 In cases where the raw material is designated in the drawing as critical, the supplier shall verify the raw materials supplier's test results. An express instruction will be received from Horizon depending on the nature of the product and will appear on the product drawing.
- 9.7 Sampling requirements—the supplier bears the obligation of meeting all applicable requirements. Horizon allows the supplier to conduct sample tests to an AQL of 1.5% and '0' Acceptance Number— Squeglia Plan.
- 9.8 Painting and coating contractors shall supply a detailed report of the process followed including the raw materials batch and their validity. The report shall also contain the requirement set out in the drawing opposite the inspection results achieved in practice such as paint shade and thickness etc.

Manufacture of Black PCBs

1. In-process QC and final inspection to be carried out exclusively by inspectors authorised under IPC-600.
2. PCBs shall always be manufactured to IPC6012 Class3.
3. Each PCB production batch shall have the accompanying paperwork attached and a cross-section report according to IPC6012 Class3.

Calibration Services

1. The calibration laboratory shall be qualified under ISO17025. The calibration or verification shall be performed in accordance with the laboratory's qualification.
2. The calibration report shall include numerical data relating to the test performed with conclusions and the significance of compliance or otherwise with the specification or applicable standard.
3. Calibration reports shall include the date of the subsequent calibration as agreed with Horizon QA.

Component Suppliers

1. Moisture sensitive components shall be handled in accordance with JSTD-033 and JSTD-020.
2. Components shall be delivered accompanied by a manufacturer's or authorised distributor's COC complete with original manufacturer's traceability data.
3. The distributor's quality system shall meet the requirements of ISO9001 or AS9100 in their latest version.