

REFERENCE

GENERAL DYNAMICS MISSION

SYSTEMS–CANADA

QUALITY ASSURANCE CLAUSES

Prepared by:

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RELEASE RECORD

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**Electronically Approved by Change Notice No.: CNCA00027964
on 24 February 2021:**

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REVISION STATUS SHEET

Revision	Date	Comments
977209	27 January 2006	Initial Capture of all known Standard Quality Clauses used by the Company. Major source of information came from the MRP system. This document is the official baseline of current Procurement Quality Assurance Clauses.
977209-A	16 August, 2006	First revamp of QA Clauses to better align with commodity types.
977209-B	3 April, 2007	Updated Quality Clause Section 11 document as it pertains to the purchase of PCBs and was made necessary due to technology advancements and some corrections to the original document.
977209-C	22 July 2008	Updated as per meeting held 25-March-2008 and from Review comments. Incorporated a new QA Clause for high reliability components (leaded content), QAC7002, and modified QAC7001 to call for verification by GDMS-C on a sample basis.
977209-D	30 July 2009	Update to section 5.9 clarifying labelling requirements for components, and adding section 5.32 defining reel and MSD packaging labelling requirements. Update to section 16.22 identifying notification of change requirement. Update section 18.2, 18.3 to a fixed sampling plan. Update to 12.1 related to Source Verification of Display Parts. Change SCM approval from Kim White to Andre Beaudet
977209-E	25 August 2011	Revise paragraph 11.1 to align Checklist L-QCN-008 with Document 992431 paragraph 3.7 (a)
977209-F	31 August 2012	Revise Para.1.1, Deleted para. 2.3 pictorial Grouping of Quality Clauses by Commodity Added Para. 3.0 to highlight Standard Quality Clauses to be hard coded on all generated Purchase Orders and Para. 4.0 Specialty Quality Clauses. Revise QAC 1019 as specialty clause to support AWACs requirements.
977209-G	May 14, 2013	Update Quality Clause and delete non-relevant ones.
977209-H	August 13, 2013	Minor change just to indicate QAC 1016 and QAC 1104 have been obsoleted.
977209-J	February, 2014	Added commodity table and Xref to Standard Quality Clauses.
977209-K	25 June, 2014	Added QAC 1233 & 5012 added – general update.
977209-L	22 March, 2016	Revise Para 5.56 to modify clause language.
977209-M	04 May, 2016	Added QAC 1407 – No Change and changed title for QAC-6020
977209-N	01 October 2018	Minor changes to clarify language, update of referenced specifications

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Revision	Date	Comments
977209-P	08 August 2019	Added language to contact Buyer in QAC 5008 & 5009. Removed requirement for QAC 1231 for Circuit Card Assemblies. QAC-1222 modified to clarify requirement for one continuous length. Removed Section 5.9 QAC-1019 Repair of Defective Goods duplication of Section 5.7. Addition of QAC6021, QAC6023, QAC6024. QAC-1102 updated to correct ISO version.
977209-R	03 March 2020	Designated QAC 1107 and QAC 1108 as legacy clauses. Added new QAC 1116 to clarify FAIR format when AS9102 forms are not used (reference GDMS-C CAR #2141); QAC 1116 for AS9102 FAIR format; QAC 1118 for GDLS FAIR format; and QAC 1119 for tightened criteria for FAI conduct.
977209-T	05 March 2020	Corrected reference to QAC1107 (now QAC1115) in the FAI clauses QAC1116, QAC1118, and QAC1119
977209-U	09 October 2020	Designated QAC 1115 as a Standard clause.
977209-V	18 February 2021	Update QAC1222 to include multi-conductor cables, sleeving and tubing. QAC1222 also updated to remove allowable breaks on spools and modified length and weight limits.

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1. INTRODUCTION

This document contains a description of all known and approved procurement Quality Assurance clauses used by General Dynamics Mission Systems–Canada (GDMS-C) in all of its procurement activities.

The intent of this document is to define the expectations of the Quality Clauses as captured on a GDMS-C Purchase Order.

No employee shall be authorized to add or modify the text of any of these clauses without approval by the Quality Manager.

2. CRITICAL ELEMENTS OF QA CLAUSES

Quality Assurance Clauses are developed to address the following requirements areas:

- a. Workmanship Standards – IPC-A-610/IPC-A-620-Class 3;
- b. Customer Specific Requirements;
- c. Packaging, Shipping and Handling requirements;
- d. Safety and Environmental Concerns;
- e. Product Development Requirements; and
- f. First Article Inspection Requirements.

3. KEY GROUPS FOR MAINTENANCE AND REVIEW OF QA CLAUSES

Key stakeholders for the maintenance, review and approval of all General Dynamics Mission Systems–Canada Quality Assurance Clauses are as follows:

- a. Supply Chain Management – For Material Supply-Base Expertise and Best Practices;
- b. Component Engineering - For Technical Requirements;
- c. Business Area & Project Teams – for Product Specific Expertise;
- d. Manufacturing Engineering – For Process Related and Product Specific Requirements;
- e. Quality Control – For Quality Control, Best Practices; and
- f. Quality Engineering – For Consistency, Workmanship and Continuous Improvements.

4. STANDARD QUALITY CLAUSES

Based on the examples listed in the commodity, the applicable Standard Quality Clauses shall apply. Any Specific Quality Clause will be referenced on the PO line with the item number.

COMMODITIES	QAC 1000	QAC 1200	QAC 1005	QAC 1006	QAC 1012	QAC 1018	QAC 1020	QAC 1102	QAC 1105	QAC 1109	QAC 1022	QAC 1111	QAC 1115	QAC 1117	QAC 1203	QAC 1204	QAC 1206	QAC 1209	QAC 1212	QAC 1222	QAC 1231	QAC 1233	QAC 1403	QAC 1407	QAC 3000
COTS																									
Components																									
Batteries																									
Solder Paste																									
Heat Sinks																									
Data recorders																									
Removable Hard Drives																									
Keyboards / Keypads	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x	x		x	x	x	x	
Lamps / lenses/Indicators																									
Major BOP's																									
Motors																									
CPU's																									
Headset / Handsets																									
Radio equipment																									
Test Equipment																									
OPTICS AND DISPLAYS																									
Optically Bonded Assembly																									
Ruggedized displays																									
LCD light guides																									
Optical films	x	x	x	x	x	x	x	x	x	x			x	x	x	x					x		x	x	
Laminated LCD's																									
Touch panels																									
Custom EMI Filters / custom heaters																									
MECHANICAL																									
Machined																									
Sheet Metal																									
Injection Molding																									
Custom Fabricated Parts																									
Investment / Die casted	x	x	x	x	x	x	x	x	x	x			x	x	x								x	x	
Custom gaskets / EMI shielding																									
Heat pipes																									
Heat sinks																									

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COMMODITIES	QAC 1000	QAC 1200	QAC 1005	QAC 1006	QAC 1012	QAC 1018	QAC 1020	QAC 1102	QAC 1105	QAC 1109	QAC 1022	QAC 1111	QAC 1115	QAC 1117	QAC 1203	QAC 1204	QAC 1206	QAC 1209	QAC 1212	QAC 1222	QAC 1231	QAC 1233	QAC 1403	QAC 1407	QAC 3000
PCBs																									
PWB (bare)																									
Flex Circuits	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x			x		x	x	x
Backplane																									
CIRCUIT CARD ASSEMBLIES																									
CCA's	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x					x		x
BROKERS																									
Brokers	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x		x	x	x
ELECTRICAL DISTRIBUTION																									
LCD OEM																									
Connector Manufacturer	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x			x	x		x	
Circuit Breakers																									
OPERATING SUPPLIES																									
Touch Paint																									
Adhesives																									
Sealing																									
Chemicals	x	x	x	x	x	x	x	x	x	x		x	x						x		x		x	x	
Inks / Dyes																									
Gases																									
Lubricates																									
Consumables																									
POWER SUPPLY UNITS																									
Custom built																									
Off the Shelf Power Supplies	x	x	x	x	x	x	x	x	x	x		x	x	x	x						x		x	x	
Power Supply Units																									
INTEGRATED SWITCH PANELS																									
Switch Panels	x	x	x	x	x	x	x	x	x	x		x	x	x	x						x		x	x	
Membranes																									

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4.1 QAC 1000 – Terms of Acceptance

By acceptance of this purchase order, the Supplier and Sub-Contractors warrants that all supplies furnished under the purchase order shall:

- a. Be free from defects in material and workmanship;
- b. Conform to the applicable specifications, drawings, bill of materials, relevant samples and/or descriptions referenced in the purchase order;
- c. Be free from defects in design except to the degree such supplies are manufactured to the buyer's design; and
- d. Be new and not salvaged, refurbished or reconditioned.

4.2 QAC 1022 – Counterfeit Parts

This QAC has been obsoleted.

4.3 QAC 1200 – Certificate of Compliance

Shipments made against this purchase order shall contain a Certificate of Compliance by the Supplier's or Sub-Contractor's quality assurance activity verifying that all applicable tests and inspections have been performed and the specified requirements have been met per the Purchase Order. For electronic components, the Certificate of Compliance shall also certify compliance to the current Material Declaration for that component. The Certificate of Compliance must reference the purchase order number, part number, part name and revision (if applicable) and must be signed by authorized quality representative.

4.4 QAC 1003 – Non-Disclosure Agreement

This QAC has been obsoleted

4.5 QAC 1005 – Retention of Quality Records

All Quality Records shall be maintained for a minimum of 7 years from the date of fulfilment of the Purchase Order unless specified otherwise on the Purchase Order. Records are to be stored in a controlled environment that will protect against damage, misuse, theft or loss.

4.6 QAC 1006 – General Dynamics Mission Systems–Canada Quality Assurance Audit

The Supplier's/Sub Contractor's quality system, engineering procedures and manufacturing processes may be subject to auditing by General Dynamic's representative during the performance period of this Purchase Order.

4.7 QAC 1012 – Flow Down to Subcontractors

Whenever the Supplier subcontracts any part of the work required by this purchase order (including parts or all of the manufacturing processes) it shall be the Supplier's responsibility to flow down all the applicable contractual requirements invoked on this purchase order to the Supplier's subcontractors.

4.8 QAC 1016 – Measurement and Data Sheet Requirements

This QAC has been obsoleted.

4.9 QAC 1018 – Supplier Production Location Warranty

As part of its Quality Control Program General Dynamics Mission Systems–Canada has inspected and approved certain Supplier facilities. If the General Dynamics Mission Systems–Canada Purchase Order (PO) states the facility at which the purchased item shall be produced, the Supplier warrants and certifies that all production of the purchased item(s) shall be done at the facility stated in the PO. Production of purchased items shall not be done at any other facility of the Supplier or affiliate without the prior written approval of General Dynamics Mission Systems–Canada.

General Dynamics Mission Systems–Canada may reject any purchased items not produced at the stated facility.

Supplier shall be responsible for and shall indemnify General Dynamics Mission Systems–Canada for all costs incurred and shall be responsible for all damages arising from the supply of purchased items from any facility other than the stated facility.

4.10 QAC 1020 – Repair and Overhaul

The Supplier shall implement and maintain processes and procedures for review and analysis of field failures and returned products. Records shall be made available to GDMS-C upon request and the supplier shall provide corrective and preventive action reports to GDMS-C.

4.11 QAC1102 – Use of Calibrated Equipment

The Supplier shall ensure all test equipment, meters and gauges used for inspection acceptance are appropriately calibrated and traceable to national standards. The calibration system shall conform to ISO 10012-2003 or equivalent.

4.12 QAC 1104 – Measurement and Data Sheet Requirements

This QAC has been obsoleted.

4.13 QAC 1105 – Test and Inspection Data

The Supplier shall perform test and/or inspections and supply data required by the drawings, statement of work, and applicable test procedures specified on the purchase order.

Test/inspection data must be identified with the part number, serial number or other suitable identification of the items being supplied, and shall relate readily with the data items specified on the purchase order. Actual readings are to be supplied for all quantitative measurements. Notations that readings are within specification limits or that tests have been satisfactorily performed will be acceptable only for those tests performed on go/no go equipment lacking quantitative readout capability.

4.14 QAC1109 – Use of Nonconforming Materials by the Supplier

Materials which do not completely conform to all drawings and specifications, both electrical and mechanical, or other contractual requirements, and which cannot be reprocessed to achieve such conformance, shall not be used on this order without a written approval from General Dynamics Mission Systems–Canada. Such approval can only be granted through the General Dynamics Mission Systems–Canada Advance Deviation Request (ADR) process (refer to QAC 1117).

4.15 QAC 1111 – Workmanship Standard

Acceptable criteria for Circuit Card Assembly workmanship shall be per the latest IPC-A-610 class 3 specifications; and latest IPC-A-620 class 3 for Cables and Harnesses; unless specified as Class 2 on the drawing or Source Control Drawing for Commercial parts.

4.16 QAC 1115 – First Article Inspection

A First Article Inspection (FAI) is required before delivery of the first production unit. The Supplier shall notify General Dynamics Mission Systems–Canada at least five (5) days in advance of the FAI readiness. FAI is a joint activity between the Supplier and General Dynamics Mission Systems–Canada conducted on a ready-to-ship unit which is acceptable to General Dynamics Mission Systems–Canada. All inspection measurement and/or test data must be recorded using the Supplier format unless the format is otherwise specified by GDMS-C. Inspected items shall be identifiable on the inspection report.

If Supplier format is used, the Supplier First Article Inspection Report (FAIR) shall provide evidence that all engineering, design and specification requirements are correctly understood, accounted for, verified and recorded to assure all required attributes are satisfied.

Alternatively, Supplier may use AS9102 forms or GDMS AS9102 format forms (QA-FRM-001, QA-FRM-002, and QA-FRM-003) to be requested from the Buyer.

FAI approval is considered extended by General Dynamics from one purchase order to the next provided that:

- a. No configuration changes have occurred.
- b. The part is manufactured at the same facility.
- c. The manufacturing process has remained the same.
- d. There has been no more than a two (2) year break in production.
- e. No formal corrective action has been required.
- f. The sub-tier Suppliers and special processors have not changed.
- g. No changes in numerical control program or translation to another media have occurred that can potentially affect fit, form, or function.
- h. No natural or man-made events, which may adversely affect the manufacturing process, have occurred.

4.17 QAC 1117 – General Use of Advance Deviation Request

The Supplier shall submit an Advance Deviation Request (ADR) form (QA-FRM-023) with a detailed description of any non-conformance to a Purchase Order and the recommended solution for the non-conformity in advance of any shipment of a non-conforming material to General Dynamics Mission Systems–Canada. The ADR may be supplemented by the Supplier's material review report or equivalent. The Supplier must receive an ADR approval prior to shipment of the identified non-conformance.

4.18 QAC 1203 – Equipment and Material Packaging

If not covered by specific instructions, all materials shall be protected against corrosion, contamination, deterioration or other spoilage during transit. All materials shall be packaged with suitable protection so as to prevent damage through handling, in transit and during storage prior to usage. Packaging will be in accordance with "best commercial practice" unless otherwise stated.

4.19 QAC 1204 – ESD Sensitive Materials

All materials that are ESD sensitive shall be handled in locations that are ESD protected. ESD wrist strap shall be used when handling these products. Components shall be packaged in an ESD protective packaging.

4.20 QAC1206 – Electronic Sensitive Materials Packaging

All semi-conductors, resistors and capacitors shall be delivered in a tape and reel packaging. No loose parts shall be accepted by General Dynamics Mission Systems–Canada.

4.21 QAC1209 – Electronic Component Reel & MSD Packaging Marking

The Supplier shall identify all reels and Moisture Sensitive Device MSD Packaging with the appropriate identification numbers, descriptions and traceability information; minimum data per label shall be:

- a. Supplier Traceability (e.g. name, logo);
- b. Commercial Part Number;
- c. Part Description;
- d. Customer Item Number;
- e. Customer PO Number;
- f. Quantity;
- g. Lot Number (if applicable);
- h. Date Code (based on date of Manufacture);
- i. MSD Sensitivity Level; and
- j. Label Requirements per QAC7001 (if applicable).

4.22 QAC 1212 – Age Sensitive Material

Age sensitive material shall not be accepted if the remaining shelf life is less than 75% of the total shelf life when delivered to the General Dynamics Mission Systems–Canada receiving dock. All age sensitive material must be shipped with expiry dates provided on each item and marked on the package or reel.

4.23 QAC1222 – Limits on Reels (Spools)

The following shall apply to single conductor wires, multi-conductor, RF Coaxial, Sleeving, and Tubing:

Single Conductor Wire

Wire shall be one continuous length on the reel; should the entire purchase quantity not be available in one continuous length the total length shall be split onto new reels for each continuous length.

8 AWG and lower: wire reels are not to exceed 30 lbs (14 kg).

10 to 18 AWG: wire reels are not to exceed 20 lbs (9 kg). The total length of wire on a single reel shall not exceed 1500 ft.

20 AWG and higher: wire reels are not to exceed 15 lbs (7 kg). The total length of wire on a single reel shall not exceed 3000 ft.

Multi-Conductor and RF Coaxial

All Multi-Conductor and RF Coaxial cable shall be one continuous length. Cable must be supplied on a reel for lengths greater than 50 ft.

Sleeving

All Sleeving shall be one continuous length on a reel as per manufacturer's minimum order quantity.

Tubing

All Tubing cable shall be one continuous length. Tubing must be supplied on a cardboard reel for lengths greater than 50 ft.

4.24 QAC 1231 – Moisture Sensitive Material

- a. Moisture sensitive devices shall be vacuum sealed in ESD protective packaging with desiccant. The sealed package shall be labeled per IPC/JEDEC J-STD-033. The Supplier shall identify the moisture sensitivity level, the time to mount the component and the sealing date.
- b. Repackaged moisture sensitive devices shall be vacuum sealed in ESD protective packaging with desiccant. The sealed package shall be labeled per IPC/JEDEC J-STD-033. The Supplier shall identify the moisture sensitivity level and the time to mount the component and the sealing date.

4.25 QAC 3000 – Printed Wiring Board

Printed Wiring Board requirements are defined in document no. 992431. Supplier can request a copy of 992431 from the buyer.

4.26 QAC1403 – Obsolescence Notice – 2 Years

This purchase order requires the Supplier to provide at least two years notice on last buy to General Dynamics Mission Systems–Canada.

4.27 QAC1407 – No Change

Seller shall make no change in design, materials, manufacturing location, manufacturing processes, or sources of supply, after buyer's acceptance of the first production test item or after acceptance of the first completed end item, without the written approval of the buyer.

4.28 QAC1233 – Certificate of Calibration

The Supplier shall provide certificates of calibration for all test equipment, meters and gauges, traceable to national standards. The calibration system shall conform to ISO 10012-1 or equivalent.

5. CONTRACTUAL SPECIFIC CLAUSES

5.1 QAC 1007 – Source Inspection

General Dynamics Mission Systems–Canada Source inspection may be required prior to shipment from the Supplier's plant. The Supplier shall notify General Dynamics Mission Systems–Canada ten (10) working days in advance of the date when material is ready for inspection.

5.2 QAC 1010 – Government Quality Assurance

Government Quality Assurance (GQA) is a requirement of this order. The Supplier shall be contacted by GQA representative should government quality assurance surveillance or source inspection need to be completed prior to shipment release authorization.

5.3 QAC 1015 – Material Review Board Authority

Unless otherwise specified on the Purchase Order, General Dynamics Mission Systems–Canada shall retain Material Review Board (MRB) authority on non-conforming materials which have been dispositioned as repair or use-as-is. The Supplier shall not exercise material review authority without written approval by General Dynamics Mission Systems–Canada.

5.4 QAC 6022 – Notification of Change

Once the first article has been approved by General Dynamics Mission Systems–Canada, the Supplier shall notify GDMS-C buyer of any intended significant changes to process, methods, material or product and obtain approval prior to implementation, even if form, fit or function is not affected. Samples and documentation may be required as part of the approval process.

5.5 QAC 1019 – Repair Of Defective Goods

The Supplier shall perform failure analysis on all repairs (including warranty repairs). A failure analysis should be specific and address the root cause of the failure and corrective actions taken. In the case where no fault is found (NFF), the Supplier must describe the testing performed to arrive at the NFF conclusion. A Repair Report is required for each item repaired or upgraded. The Supplier shall supply an itemized listing of all reworked or replaced items by part number, name and quantity. The Supplier shall also describe the verification and/or inspection performed to verify the repairable item has been repaired as per specification.

5.6 QAC1002 – National Defence Requirement

This is a rated purchase order certified for National Defence use. The Supplier shall comply with all the provisions of the Defence Priorities and Allocations System regulation (15 CFR 700).

5.7 QAC1101 – Material and Process Control

The Supplier must have physical and chemical test reports of raw materials used on the order. Processes such as; welding, X-ray, magnetic particle inspection, penetrant inspection, heat treating, plating, and anodizing must satisfy the requirements of the specifications. This includes, where applicable, the certification of process personnel. Records substantiating the foregoing shall be available for examination by General Dynamics Mission Systems–Canada if requested.

5.8 QAC1103 – Test Procedures

Test procedures are required for General Dynamics Mission Systems–Canada approval thirty (30) days before the shipment of any goods. This procedure shall contain sufficient tests to verify all performance characteristics in the applicable specifications and shall cross-reference to the applicable paragraphs/ characteristics being tested. General Dynamics Mission Systems–Canada reserves the right to request additional/modified tests when, in their opinion, the proposed tests do not provide adequate assurance of performance. Acceptance of test procedures or acceptance of goods subjected to such test procedures by General Dynamics Mission Systems–Canada does not diminish the Supplier's responsibility with respect to supplying fully compliant goods.

5.9 QAC1112 – No Solder-dip on Gold Plated Leads

The Supplier **shall not** solder-dip parts with gold plated leads delivered under this Purchase Order.

5.10 QAC1113 – Solder-Dip Material Required

The Supplier **shall** hot solder-dip the parts delivered under this line item of the Purchase Order.

5.11 QAC1114 – No Solder Dipping Required

The Supplier **shall not** solder dip any material delivered against this line item in the purchase order.

5.12 QAC 1116 – First Article Inspection – AS9102 FAIR

The requirements of QAC 1115 shall apply with the addition of the following:

- 1) Supplier shall use AS9102 forms or GDMS AS9102 format forms (QA-FRM-001, QA-FRM-002, and QA-FRM-003) to be requested from the Buyer

5.13 QAC 1118 – First Article Inspection – GDLS reporting Format

The requirements of QAC 1115 shall apply with the addition of the following:

- 1) Supplier shall use the General Dynamics Land Systems (GDLS) First Piece Inspection Form QCS-16 Worksheet available from <https://www.gdls.com/suppliers/quality.html>.
- 2) FAI approval is considered extended by General Dynamics from one purchase order to the next provided that:
 - a. There has been no more than a one (1) year break in production.

5.14 QAC 1119 – First Article Inspection – Tightened Criteria

The requirements of QAC 1115 shall apply with the addition of the following:

- 1) FAI approval is considered extended by General Dynamics from one purchase order to the next provided that:
 - a. There has been no more than a six (6) month break in production.

5.15 QAC1201 – Government Qualified Products Lists

Each shipment of material supplied in satisfaction of this Purchase Order shall be accompanied by a certification that the material is listed or approved for listing on a government Qualified Products Lists (QPL).

5.16 QAC1232 – Component Age for Resistors, Capacitors and Inductors

As RoHS compliant Passive Component's solderability degrades over time, Suppliers shall not deliver:

- a. RoHS compliant components aged greater than (>) one (1) year from date of manufacture.
- b. Tin-Lead (Pb >3%) bearing leads of components aged greater than (>) one (1) year from date of manufacture.

5.17 QAC1301 – Health and Safety Data Sheet

The Supplier shall provide a Material Health and Safety Data Sheet (MH&SDS) in advance of, or, as a minimum, with the shipment. Shipments received without the MH&SDS will not be processed for payment until the properly completed MH&SDSs are provided.

5.18 QAC1401 – Control of Materials by Lots

The Supplier is required to define control of material by lots. All actions/records (e.g., operations, inspections and tests) related to all material, including the requirements defined herein the Purchase Order shall be documented and traceable to the lot defined by the Supplier. Records for each lot shall indicate lot size and Supplier's lot identification code.

5.19 QAC1402 – Sampling Requirement

Supplier shall specify the Sampling Inspection applied to their products. Data shall be maintained to justify any changes to the defined Acceptable Quality Level.

5.20 QAC1404 – Obsolescence Notice – 3 Years

This purchase order requires the Supplier to provide at least three years notice on last buy to General Dynamics Mission Systems–Canada.

5.21 QAC1406 – Labelling of RoHS Compliant or Lead-Free Equipment

RoHS compliant or Lead-Free equipment shall be clearly labelled per IPC 1066 and J-STD-609.

5.22 QAC1500 – Screening Test Results

Component temperature screening test results shall be shipped with all parts.

5.23 QAC5000 – Mechanical Requirements

The Supplier shall verify with the buyer on General Dynamics Mission Systems–Canada latest requirements for products in this category.

5.24 QAC5001 – Parts

The Supplier shall mark all deliverable products and documents in accordance with the purchase order and engineering drawing. When a part number is specified on the purchase order and the details on part marking are not provided on the drawing, the Supplier shall apply that part number to all deliverable. The Supplier shall use non-nutrient indelible stamping ink for part identification.

5.25 QAC5002 – Part Marking

The Supplier shall mark all deliverable products and documents in accordance with the Purchase Order and Engineering Drawing. When a part number is specified on the purchase order, the Supplier shall apply that part number to all deliverable products per the applicable program specification. The Supplier shall use non-nutrient indelible stamping ink for part identification.

5.26 QAC5003 – Finishes (Powdered, Chemical, and Painted)

Industrial powder coat ASA61 Grey shall be used on all surfaces. All surfaces shall be sanded or filled as necessary to smooth surface defects on surfaces to be painted. Finished painted surfaces shall be free of scratches, bubbles, inclusions, runs, drips, colour variations or porosity visible from more than 1 meter away in daylight. Coating application including surface preparation, thickness and cure/dry times to be in accordance with coating manufacturer's instructions for outdoor industrial use.

5.27 QAC5004 – Sharp Edges

The Supplier shall break all corners and sharp edges. All exposed sharp edges and corners shall be rounded / chamfered to a minimum of 0.75 mm (0.03 in) radius. Sharp edges and corners that present a personal safety hazard or potential damage to equipment during usage shall be suitably protected or rounded to a minimum radius of 13 mm (0.5 in).

5.28 QAC5006 – Raw Material

Raw materials, procured by the Supplier, to be used in material delivered on this purchase order shall have objective evidence that applicable raw material specifications have been met. The Supplier shall have recorded data at their plant demonstrating applicable chemical and physical testing required by the material specification has been satisfied. The reports shall be directly traceable to the raw material used and shall be made available for review upon request.

Supplier shall include with each end item shipment a copy of the raw material certification, which was provided by the original manufacturer.

5.29 QAC5008 – Prohibited Materials

The Supplier shall comply with the General Dynamics Mission Systems–Canada Specification on Prohibited Materials. Supplier can request a copy from the buyer.

5.30 QAC5009 – Toxic Chemicals, Hazardous Substances and Ozone Depleting Chemicals

The Supplier shall comply with the General Dynamics Mission Systems–Canada Specification on toxic chemicals, hazardous substances and ozone depleting materials (ODCs). Supplier can request a copy from the buyer.

5.31 QAC5010 – Special Process

Unless otherwise specified in the purchase order, special process shall be conducted by an approved General Dynamics Mission Systems–Canada Supplier. Special processes include but are not limited to: welding, heat treating, cleaning, plating, anodizing, chemical film, brazing, soldering, painting, electro polish and non-destructive testing. The special process shall meet the applicable specifications indicated on the drawing, purchase order and/or statement of work. The use of General Dynamics Mission Systems–Canada approved sources in no way relieves the Supplier of the responsibility of furnishing parts of acceptable quality.

The Supplier shall provide a test panel and/or gauge block representative of the processed parts. Mask a portion of the panel or gauge prior to processing so that the base material can be accurately measured with a micrometer.

In addition the Supplier must reference the Purchase Order and part number on their certification of conformance.

5.32 QAC5011 – Manufacturability and Quality Control Plan

The Supplier shall have a Product and Process Control Plan (PPCP) in Supplier format, for all significant process parameters and significant product and inspection characteristics. A single PPCP may apply to a family of products produced by the same process provided that all unique areas are delineated. The Supplier's PPCP shall include the applications of related commercial or military specifications/standards used as guidance. The PPCP shall be submitted to the buyer for review and/or approval.

Supplier shall submit a copy of the Manufacturing/Quality Control plan for the material to be produced on this order. The plan shall show all operations, including inspection/test points, special processes, storage and transfer steps, process control points, special packaging etc., all in their normal sequence of occurrence leading to a finished article. Controlling documents such as drawings, process specifications, operation sheets, inspection plan, test plan, etc. and the type of manufacture, inspection, and/or test at each point must be identified. The plan shall be submitted to the buyer not less than three (3) weeks prior to the start of manufacture of the material. All changes to the plan shall be submitted to the buyer for approval.

General Dynamics Mission Systems–Canada retains all its rights to approve or disapprove the plan; and may at its discretion specify additional changes to the plan.

5.33 QAC5012 – Chemical Agent Resistant Coatings

This component or assembly is considered Chemical Agent Resistant Coating (CARC) and shall be processed in accordance with Mil-DTL-53072. Where the QPL approved finish Suppliers written recommendations conflicts with Mil-DTL-53072 the GDMS-C buyer shall be notified and manufacturer's recommendations shall be used for processing. In all cases, the process shall be validated as per the aforementioned Mil-DTL-53072.

Process certification is required by a completed GDLS-C-4707 form with each shipment. Please contact Buyer for a copy.

5.34 QAC5200 – Cable and Harness Requirements

The Supplier shall verify with the buyer on General Dynamics Mission Systems–Canada latest requirements for products in this category.

The manufacturing and testing requirements contained in the latest version of GDMS-C specification 763795 apply to Connectors, Cables and Harnesses supplied against this order. Supplier can request a copy of 763795 from the buyer.

5.35 QAC6000 – Sub-Assembly Clauses

The Supplier shall verify with the buyer on General Dynamics Mission Systems–Canada latest requirements for products in this category. The design, manufacturing, quality, inspection and testing requirements as specified in the referenced engineering drawing(s), Source Control Drawing and/or Product Function Specification shall apply.

5.36 QAC6001 – Processes, Materials and Parts Selection

Processes, materials and parts shall be selected to meet the reliability requirements and environmental conditions specified in the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.37 QAC6002 – Hazardous Materials

Materials, processes and parts shall be selected to eliminate or reduce health hazards during operation, maintenance and disposal of the product.

5.38 QAC6003 – Mechanical Properties

Mechanical properties shall be as specified in the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.39 QAC6004 – Finishes and Colours

All external surfaces shall be finished as specified in the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.40 QAC6005 – Marking and Identification

Marking and identification shall be in accordance with the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification, or applicable standards.

5.41 QAC6006 – Workmanship

Workmanship shall meet the requirements specified in the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.42 QAC6007 – Reliability

Reliability shall be in accordance with the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.43 QAC6008 – Maintainability

Maintainability shall be in accordance with the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.44 QAC6009 – Material Substitution

Material substitution shall be in accordance with the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.45 QAC6010 – Safety

Safety requirements shall be in accordance with the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.46 QAC6011 – Human Engineering

Human engineering requirements shall be as specified in the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.47 QAC6012 – Environmental Conditions

Environmental operating requirements (temperature, humidity, thermal shock, shock, vibration, altitude, fungus, moisture, salt spray, dust, etc., as applicable) shall be met as defined in the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.48 QAC6013 – Shelf Life

Shelf Life requirements shall be met as defined in the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.49 QAC6014 – Responsibility for Tests

Unless otherwise specified in the contract, the Supplier shall be responsible for the performance of all tests as specified in the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.50 QAC6015 – Qualification Testing

Qualification testing requirements shall be met as defined in the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.51 QAC6016 – Environmental Stress Screening

Environmental Stress Screening (ESS) shall be performed in accordance with the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.52 QAC6017 – Functional Acceptance Test

Following ESS (if applied), a functional acceptance test shall be performed to verify that the specified functional requirements defined in the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification are met.

5.53 QAC6018 – Visual Examination

Each deliverable shall be inspected for workmanship and compliance to the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification.

5.54 QAC6019 – Deviations

Deviations to the applicable engineering drawing(s), Source Control Drawing and/or Product Function Specification, which affect form, fit, or function of the product, shall be submitted to General Dynamics Mission Systems–Canada for approval.

5.55 QAC6020 – No Change

Seller shall make no change in design, materials, manufacturing location, manufacturing processes, or sources of supply, after buyer's acceptance of the first production test item or after acceptance of the first completed end item, without the written approval of the buyer.

5.56 QAC6021 – Certificate of Compliance for Airworthiness Requirements

Seller shall provide a Certificate of Compliance verifying that all applicable tests and inspections have been performed and the specified requirements have been met per the Purchase Order (with the exception of the deficiencies detailed in the record).

For electronic components, the Certificate of Compliance shall also certify compliance to the current Material Declaration for that component.

The Certificate of Compliance must contain;

- Date of submission
- Manufacturers address
- A Reference to the Purchase Order Number
- Part Name, Part Number, Revision, Model Number, and Serial Number, if applicable
- Identification of the lot or batch number, and cure date/ shelf life, if applicable
- List all approved variations from the approved design, including production deviations and waivers
- Have a signature block with
 - Suppliers QA and/or Chief Engineer identified (printed)
 - Suppliers QA and/or Chief Engineer signature

Seller shall provide a **OEM** Certificate of Compliance verifying that all applicable tests and inspections have been performed and the specified requirements have been met per the Purchase Order (with the exception of the deficiencies detailed in the record).

For electronic components, the Certificate of Compliance shall also certify compliance to the current Material Declaration for that component.

The OEM Certificate of Compliance must contain;

- Date of submission
- Manufacturers address
- A Reference to the Purchase Order Number
- Part Name, Part Number, Revision, Model Number, and Serial Number, if applicable
- Identification of the lot or batch number, and cure date/ shelf life, if applicable
- List all approved variations from the approved design, including production deviations and waivers
- Have a signature block with
 - Suppliers QA and/or Chief Engineer identified (printed)
 - Suppliers QA and/or Chief Engineer signature

5.57 QAC6023 – Government Property US & FMS Terms and Conditions

Seller shall comply with the General Dynamics Mission Systems–Canada Specification on Handling for Government Property. Supplier can request a copy from the buyer.

5.58 QAC 6024 Process Capability (CP, CPK)

Processes unable to demonstrate a CPK of 1.33 minimum shall be subject to 100% inspection. For characteristics identified by GDMS-Canada *as a critical process* unable to demonstrate a CPK of 1.67 minimum shall be subject to 100% inspection.

**5.59 QAC7000 – Material Composition Declaration –
IPC Standard 1752.2**

Identification of lead-free components is a requirement for this Purchase Order. The Supplier shall identify all lead-free materials and components by completing the IPC Standard Material Declaration form – IPC Standard 1752.2.

**5.60 QAC7001 – Labelling of Restriction of Hazardous Substances
Compliant or Lead Free Components - IPC-1066 and JESD-97**

Restriction of Hazardous Substances (RoHS) Compliant or Lead Free components shall be clearly labelled per IPC-1066 and J-STD-609 for second level interconnect material finish or solder ball material to distinguish them from tin/lead components. GDMS-C reserves the right to verify through quantitative elemental analysis a sample or all parts if required to ensure that the parts have terminations that are RoHS compliant.

**5.61 QAC7002 – High Reliability / High Lead Content Material
Composition Declaration – IPC Standard 1752.2**

Identification of components containing high lead content (not in compliance with RoHS) is a requirement for this Purchase Order. The Supplier shall identify all materials and components with high lead content by completing the IPC Standard Material Declaration form – IPC Standard 1752.2. GDMS-C reserves the right to verify through quantitative elemental analysis a sample or all parts if required to ensure that the parts have terminations having a finish containing > 3% lead.

6. LEGACY CLAUSES

These clauses are NOT to be used on new Purchase Orders from the date of issue of revision Q of this document, 977209.

6.1 QAC 1107 – *First Piece Inspection Data from Supplier*

It is the Supplier's responsibility to conduct an internal First Piece Inspection (FPI) on one of the first five pieces delivered against the PO. Upon completion of the inspection the Supplier shall notify the General Dynamics Supplier Quality Engineer by submitting a First Piece Inspection Request. A five (5) day notice shall be required for scheduling verification. General Dynamics approval of the FPI is required prior to shipment of product. The purpose of the requirement is to assure the Supplier has reviewed the product against the Purchase Order and all supporting documentation for all characteristics and found them conforming. It is also the Supplier's responsibility to verify and document 100% conformance of all Dimensional, Physical, Chemical, Process and Test requirements as specified as part of the order. The requirement may be satisfied by objective evidence available in the Supplier's normal system such as in-process operational process controls, final inspection records, test reports, certifications, SPC data etc. FPI approval is considered extended by General Dynamics from one purchase order to the next provided that:

- 1) No configuration changes have occurred.
- 2) The part is manufactured at the same facility.
- 3) The manufacturing process has remained the same.
- 4) There has been no more than a one (1) year break in production.
- 5) No formal corrective action has been required.
- 6) The sub-tier Suppliers and special processors have not changed.

6.2 QAC 1108 – *First Article Configuration Inspection*

A First Article Configuration Inspection (FACI) is required before delivery of the first production unit. The Supplier shall notify General Dynamics Mission Systems–Canada at least five (5) days in advance of the FACI readiness. FACI is a joint activity between the Supplier and General Dynamics Mission Systems–Canada conducted on a ready-to-ship unit which is acceptable to General Dynamics Mission Systems–Canada. All inspection measurement and/or test data must be recorded using the Supplier format unless the format is otherwise specified by GDMS-C. Inspected items shall be identifiable on the inspection report.

For Purchase Orders that require FAI in accordance with AS9102, Supplier shall visit <http://standards.sae.org/as9102b>.

7. NOTES

7.1 *Acronyms and Abbreviations*

ADR	Advanced Deviation Request
AMLCD	Active Matrix Liquid Crystal Display
BOM	Bill of Materials
BOP	Bought-Out Part
CARC	Chemical Agent Resistant Coating
CCA	Circuit Card Assembly
CFR	Code of Federal Regulations
CMM	Coordinate Measuring Machine
COTS	Commercial off the Shelf
ESD	Electro-Static Discharge
ESS	Environmental Stress Screening
FACI	First Article Configuration Inspection
FPI	First Piece Inspection
GDMS-C	General Dynamics Mission Systems–Canada
GQA	Government Quality Assurance
JANTX	Joint Army-Navy Technical Exchange
LCD	Liquid Crystal Display
MH&SDS	Material Health and Safety Data Sheet
MIL	Military
MRB	Material Review Board
MRP	Material Resource Planning
MSD	Moisture Sensitive Device
NFF	No Fault Found
OEM	Original Equipment Manufacturer
PCB	Printed Circuit Board
PFS	Product Function Specification
PO	Purchase Order
PWB	Printed Wire Board
QA	Quality Assurance
QAC	Quality Assurance Clause
QPL	Qualified Product Lists
RFQ	Request For Quotation
SCD	Source Control Drawings

PROPRIETARY

General Dynamics Mission Systems–Canada

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