Mettle Ops™
Warfighters Serving Warfighters

Quality Assurance and Control Plan (QACP)

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Contents

I. Acronyms

Acronym	Term
BOM	Bill of Materials
CoC	Certificate of Conformance
DPI	During Production Inspections
FAI	First Article Inspection
FMI	Final Material Inspections
IMI	Incoming Material Inspections
MR	Management Representative
OPI	Outgoing Product Inspections
PM	Program Manager
PPI	Pre-Production Inspection
QACP	Quality Assurance and Control Plan
QAM	Quality Assurance Manager
QAP	Quality Assurance Plan
QI	Quality Inspector
QPI	Quality Product Inspections

Purpose

This Quality Assurance and Control Plan (QACP) establishes the framework for ensuring the delivery of high-quality products and services across all programs within Mettle Ops. It provides guidelines for inspection, testing, and monitoring to ensure compliance with industry standards, customer specifications, and regulatory requirements.

Objective

The following objectives will be met:

- Ensure consistent product quality in all stages of production or service delivery.
- Prevent defects by proactively addressing root causes.
- Monitor and improve quality through regular audits and reviews.
- Meet or exceed customer and regulatory requirements.
- Enhance customer satisfaction by ensuring timely delivery of quality products.

Scope

This plan applies to all projects, programs, and services provided by Mettle Ops within the scope of Manufacturing. It encompasses all departments and processes involved in quality management and will be used as a standard across various projects.

Responsibilities

Quality Assurance Manager (QAM):

Oversee and ensure the consistent quality of a company's products or services. This includes managing QA teams, implementing testing procedures, and ensuring compliance with regulations. They also play a key role in identifying areas for improvement and implementing corrective actions.

Quality Inspector (QI):

Ensure products and materials meet specified quality standards by inspecting, testing, and documenting their characteristics. They identify deviations from specifications, identify non-conformances, recommend corrective actions, and help improve quality control processes.

Quality Engineer (QE):

Ensures products and materials meet specified quality standards by inspecting, testing, and documenting their characteristics. QE ensures the requirements detailed throughout this QACP are being met. They identify deviations from specifications, identify non-conformances, recommend corrective actions, and help improve quality control processes.

Supplier Quality Engineer (SQE):
SQE trains suppliers on inspection requirements detailed throughout this document, as needed. If an issue occurs, SQE works with supplier to ensure Nonconformance and Corrective Action Procedures are being followed.

Program Manager (PM):
Ensures products, processes, or services meet quality standards in collaboration with QI & QAM. Understands and ensure quality assurance standards, plans are meeting Mettle Ops and Customer standards. Aid and support program quality audits, manage risks, and contribute to continuous improvement initiatives. The PM also collaborates with cross-functional teams to ensure compliance and deliver high-quality results.

References

- AS9100 Rev D Standard
- QM-1 Mettle Ops' Quality Manual
- P-870 Control of Nonconforming Outputs
- P-1020 Corrective Actions
- A-QACP-1 TDP List

Developing Program Specific QAP Requirements

Inspection frequency requirements will be defined by Mettle Ops for each program based on criticality and verification level (see A-QACP-1). If the customer has provided a QAP for the TDP, it will be used to establish the baseline for minimum quality inspection frequency. Mettle Ops will ensure the inspection frequency requirements detailed throughout this document meet or exceed customer QAP requirements.

Inspection Types

The following inspections will be completed for each manufacturing program, unless otherwise stated:

- Pre-Production Inspection (PPI): This inspection occurs before the manufacturing process begins. It focuses on the quality of materials and components used in production. It helps to identify potential issues early, allowing for corrective actions before production starts. Depending on the program type and vendor, this inspection requirement may not be applicable.
- Incoming Material Inspection (IMI): Also known as receiving inspection, is a quality control process that verifies the quality and conformance of incoming materials and components against specified QAP requirements. This process is crucial for ensuring that only high-quality materials enter the production line and to prevent potential issues downstream. Incoming material inspections can include:
    - Incoming Raw Material Inspections (If Applicable)

  - Incoming Hardware Inspections (If Applicable)
  - Incoming Component/Product Inspections
- Quality Product Inspections (QPI): Quality inspections involve comparing product received to requirements detailed on drawings or throughout TDP. This inspection type includes First Article Inspections as well as production requirements.
- During Production Inspection (DPI) or In-Process Inspection: This type of inspection occurs while the product is being manufactured. Establishes quality checks at various stages/lots of the manufacturing process. Helps detect defects and deviations from specifications during production, allowing for immediate corrective actions.
- Final Material Inspection (FMI): This inspection is conducted on the finished products before they are shipped or released to the market. Ensures that the products meet the required quality standards and specifications. May involve visual inspections, testing, and measurements to verify product quality.
- Outgoing Product Inspections (OPI): This inspection is conducted once the final product is packaged. This inspection may be completed to ensure packaging requirements are being met.

Inspection Frequency

The inspection frequency for each type of inspection is as follows:

- PPI: Established at supplier award
- IMI: 100% of received materials from sourced suppliers, unless otherwise stated
- QPI: Based on lot size/production sampling method
- DPI: Based on lot size/production sampling method
- FMI: 100% of shipped final deliverables
- OPI: 100% of outgoing product

Inspection Acceptance Criteria

- Dimensional Accuracy: All critical dimensions must be within ± specified tolerances as per engineering drawings and standards called out on drawings. Measurements must be verified using calibrated tools (e.g., micrometers, calipers, CMM). Hole locations and sizes must match the drawing specifications.
- Material Verification: Certificate of Conformance (CoC) identifying material type, classification, standard called out on drawings, and grade that matches the engineering bill of materials (BOM) and drawings. The material certifications (e.g., Mill Test Reports) must be provided and verified. No substitutions without written engineering approval. All materials shall be new, unused, and free from defects, rust, corrosion, damage, or deterioration. Materials must be in first-class condition and conform to applicable specifications. Defective or non-conforming materials will be rejected and returned at supplier's expense.

- Surface Finish/Appearance: Surface roughness must meet the specified Ra values. No visible scratches, dents, rust, or corrosion unless specified. Painted, plated, or coated parts must be uniform, meet cosmetic requirements, and standards on drawing. No burs or sharp edges present.
- Weld Quality (if applicable): Welds must be clean, uniform, and free from cracks, porosity, and undercut. Welds must conform to applicable welding procedures (WPS). NDT (Non-Destructive Testing) results, if required, must pass specified criteria. Weld in accordance with standards listed on drawings. Welders must be certified. Certified welding inspections and weld test coupons may be required depending on program requirements.
- Assembly Requirements: Components must be assembled in accordance with the drawings, work instructions and standards listed on drawings. Fasteners must be torqued to the specification and secured (e.g., lock wire, Loctite) according to specifications listed on the drawings. Moving parts must operate smoothly without obstruction.
- Labeling and Marking: All labels, serial numbers, and part numbers must be present, legible, and in the correct locations in accordance with the drawings. Safety and compliance markings must be included as required (e.g., CE, UL). Stamping/Etching/Engraving must be completed according to the standards listed on drawing. For traceability purposes, markers should be present on each part or packaging. Scannable identifications (such as barcodes) used when available or based on program requirements.
- Functional Testing (if applicable): All parts must pass functional tests as outlined in the inspection plan and specifications listed on the drawing. Electrical, hydraulic, or mechanical systems must operate within the defined range. Test reports must be completed and signed.
- Packaging and Preservation: Parts must be clean and free from debris. Protective packaging (e.g., rust inhibitors, foam, vacuum seal) must be applied where required. Packaging must have sufficient cushioning appropriate for distance / duration / sensitivity of objects. Shipping containers must be labeled correctly and protect parts during transit. Consideration for placement on blocks, pallet, or forklift use container required for shipments greater than 50lbs. Sufficient tie down materials (strapping, blocks, locks, fixtures) IAW requirements or with use of secondary support (blocks, pallet, etc). Packaging is to be completed according to special packaging instructions (SPI) when specified on the drawings. Re-use of packaging materials is acceptable so long as prior labeling is removed or covered, consideration for end recipient. Smaller parts (such as hardware) shall be bagged and labeled with internal counts & docs. Use appropriately regulated containers & labels for liquid or hazardous materials.
- Documentation: Inspection reports must be complete and signed off by quality personnel. The government may have additional documentation requirements depending on contract requirements. Certificates of Conformance must be provided, when required. All deviations must be documented and approved through the proper channels. Traceability is present (batch number, lot number, and serial numbers identified). Shippers, packing lists, BOLs, and receivers are present, as applicable. Protection of documents in clear or sealed packaging during shipment as required or reasonable.
- Shipment Information: Quantity, description and revision level on packing list/shipper matches information stated on Purchase Order. Label requirements for shipping of products are met.

Incoming Material Inspections

Incoming Raw Material Inspections

Inspection Type:
Visual and Dimensional Check

Frequency:
100% inspection upon receipt.

Applicable Inspection Acceptance Criteria (Per Section 9.0):
Dimensional Accuracy
Material Verification
Surface Finish/Appearance
Labeling and Marking
Documentation
Shipment Information

Record Type:
Stamp (initial & date) receiver/packing list/shipper

Incoming Hardware/COTS Inspection

Inspection Type:
Visual and Dimensional

Sampling Method:
Lot Size < 100 units: 100% inspection

Lot Size > 100 units: 10% random sampling, with a minimum of 10 units per inspection

Applicable Inspection Acceptance Criteria (Per Section 9.0):
Dimensional Accuracy (If determined to be critical)
Material Verification
Surface Finish/Appearance
Documentation
Shipment Information

Record Type:
Stamp (initial & date) receiver/packing list/shipper
F-851-004 Inspection Report (If applicable)

Incoming Component/Product Inspection

Inspection Type:
Visual and Dimensional Check

Sampling Method:
100% inspection upon receipt.

Applicable Inspection Acceptance Criteria (Per Section 9.0):
Material Verification
Surface Finish/Appearance
Documentation

Record Type:
Stamp (initial & date) receiver/packing list/shipper

Quality Product/Component Inspections

A First Article Inspection (FAI) will be completed for each product/component before moving to specific sampling methods detailed below. Mettle Ops and government (if applicable) provides vendors with permission to move forward with manufacturing of production components after a successful FAI.

Inspection Type:
First Article Inspection (FAI)

Sampling Method:
Lot Size of 1 unit: 100% inspection

Applicable Inspection Acceptance Criteria (Per Section 9.0):
Visual (color, finish type, etc.)
Dimensional Verification (per drawing)

Record Type:
F-851-008 Part Number Accountability

F-851-009 Product Accountability
F-851-010 Characteristic Accountability

After successful completion of the FAI, the following production QAP will be used:

Inspection Type:
Visual and Dimensional Check

Sampling Method:
See Appendix A.

Applicable Inspection Acceptance Criteria (Per Section 9.0):
Dimensional Accuracy
Material Verification
Surface Finish/Appearance
Weld Quality

Record Type:
F-851-004 Inspection Report

Based on quality inspection results, Sampling Method identified in Appendix A can be changed based on procedure detailed in Appendix B.

During Production Inspections

In Process inspections are completed at defined intervals throughout each manufacturing process and are specific to the program. Verification activities are completed (initial & date) to ensure that assembly is completed in a controlled manner.

Examples of when in process inspections can occur include but are not limited to the following:

- After each step of assembly process
- After completing unique task (e.g. applying Loctite, touch up paint, etc.)
- After completing a critical step in the manufacturing process
- After completing a step in the assembly process that can not be verified at the time of final assembly (e.g. an internal component/weldment)

Inspection Frequency:
Critical Process: Every 10th unit produced.

Non-Critical Process: Once per batch of 100 units.

Applicable Inspection Acceptance Criteria (Per Section 9.0):
Surface Finish
Weld Quality
Assembly Requirements
Dimensional Accuracy
Functional Test

Record Type:
F-851-004 Inspection Report

Final Product Inspections

Inspection Type:
Visual and Functional

Sampling Method:
100% of product to be shipped (before packaging)

Applicable Inspection Acceptance Criteria (Per Section 9.0):
Surface Finish
Dimensional Accuracy
Functional Test (if applicable)
Packaging and Labeling
Documentation

Record Type:
F-851-004 Inspection Report

Outgoing Product Inspections

Inspection Type:
Visual

Inspection Frequency:
100% of products before shipment.

Applicable Inspection Acceptance Criteria (Per Section 9.0):
Documentation
Labeling and Marking

Record Type:
F-851-004 Inspection Report

Non-Conformance Management

Mettle Ops expects suppliers to achieve a quality performance level of 100%, with a minimum acceptable threshold of 90%. Suppliers not meeting this target may be subject to corrective action or re-evaluation.
In accordance with P-870 Control of Nonconforming Outputs, any deviation from specifications or quality requirements identified during inspections or testing must be documented and addressed immediately. In accordance with P-1020 Corrective Actions, root cause analysis will be conducted for all non-conformances. Corrective actions will be implemented, tracked, and verified for effectiveness.

Record Type:
F-870-001 Nonconformance Form
F-840-003 Supplier Corrective Action Request
F-1020-001 Corrective Action Form

Audits and Reviews

A comprehensive internal audit will be conducted periodically to assess compliance with the QACP and identify areas for improvement. Management will review quality metrics, audit results, and customer feedback on a quarterly basis to evaluate the effectiveness of the QACP and identify corrective actions if needed.

Training and Competency

All employees involved in the quality assurance and control process must undergo regular training to ensure competency in quality standards, inspection techniques, and tools. Training records will be maintained for all personnel to ensure ongoing compliance. Suppliers will be trained on QACP requirements, as needed.

Continuous Improvement

Quality performance metrics will be reviewed periodically to identify opportunities for process improvement. Corrective actions will be monitored to ensure they are effective in preventing recurrence of issues.

Document Control and Record Keeping

All inspection reports, audit results, non-conformance records, and corrective action reports will be documented and retained according to company policy. Mettle Ops requires that all TDP issued may have an expiration date, such that at the conclusion of a program that the TDP materials are destroyed, returned, or protected IAW contract requirements

Appendix A

The following inspection requirements will be used throughout production. Attachment A-QACP-1 details the verification level that will be used for the program as well as the criticality of each component.

Table A1: Letter Code Table

Lot Size	Verification Level						
	VII	VI	V	IV	III	II	I
1 – 170	A	A	A	A	A	A	A
171 – 288	A	A	A	A	A	A	B
289 – 544	A	A	A	A	A	B	C
545 – 960	A	A	A	A	B	C	D
961 – 1632	A	A	A	B	C	D	E
1633 – 3072	A	A	B	C	D	E	E
3073 – 5440	A	B	C	D	E	E	E
5441 – 9216	B	C	D	E	E	E	E
9217 – 17408	C	D	E	E	E	E	E
17409 – 30720	D	E	E	E	E	E	E
> 30721	E	E	E	E	E	E	E

Table A2: Sampling Size Table

Letter Code	Verification Level								
	T	VII	VI	V	IV	III	II	I	R
A	3072	1280	512	192	80	32	12	5	3
B	4096	1536	640	256	96	40	16	6	3
C	5120	2048	768	320	128	48	20	8	3
D	6144	2560	1024	384	160	64	24	10	4
E	8192	3072	1280	512	192	80	32	12	5

Table A3: Critical; AQL 0.65% Table

Letter Code	Verification Level																	
	T		VII		VI		V		IV		III		II		I		R	
	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F
A	19	20	8	9	3	4	1	2	0	1	0	1	0	1	0	1	0	1
B	26	27	9	10	4	5	1	2	0	1	0	1	0	1	0	1	0	1
C	33	34	13	14	4	5	2	3	0	1	0	1	0	1	0	1	0	1
D	39	40	16	17	6	7	2	3	1	2	0	1	0	1	0	1	0	1
E	53	54	19	20	8	9	3	4	1	2	0	1	0	1	0	1	0	1

Table A4: Major; AQL 2.5% Table

Letter Code	Verification Level																	
	T		VII		VI		V		IV		III		II		I		R	
	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F
A	76	77	32	32	12	13	4	5	2	2	0	1	0	1	0	1	0	1
B	102	103	38	39	16	16	6	7	2	3	1	1	0	1	0	1	0	1
C	128	128	51	52	19	20	8	8	3	4	1	2	0	1	0	1	0	1
D	153	154	64	64	25	26	9	10	4	4	1	2	0	1	0	1	0	1
E	204	205	76	77	32	32	12	13	4	5	2	2	0	1	0	1	0	1

Table A5: Minor; AQL 4.0% Table

Letter Code	Verification Level																	
	T		VII		VI		V		IV		III		II		I		R	
	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F
A	122	123	51	52	20	21	7	8	3	4	1	2	0	1	0	1	0	1
B	163	164	61	62	25	26	10	11	3	4	1	2	0	1	0	1	0	1
C	204	205	81	82	30	31	12	13	5	6	1	2	0	1	0	1	0	1
D	245	246	102	103	40	41	15	16	6	7	2	3	0	1	0	1	0	1
E	327	328	122	123	51	52	20	21	7	8	3	4	1	2	0	1	0	1

Appendix B

Normal to Tightened Procedure:

When normal inspection process is in place, tightened inspection process shall be instituted when one of the following items occurs:

- 2 lots/runs or batches have been withheld from acceptance within the last 5 or fewer lots

Tightened to Normal Procedure:

When tightened inspection process is in place, normal inspection may be instituted when the following conditions are both satisfied:

- The cause for producing the nonconformance is corrected. (Corrective action was implemented and actions taken to address nonconformances have been effective.)
- 5 consecutive lots/batches are accepted
- No open NCRs/SCAs

Normal to Reduced Procedure:

When normal inspection process is in place, reduced inspection may be instituted when the following conditions are all satisfied:

- First lot/batch are 100% accepted while on normal inspection
- Production is at a steady rate
- Vendor's quality system is considered satisfactory by Mettle Ops
- Reduced inspection is considered desirable by the Government
- No customer complaints or open NCRs

Reduced to Normal Procedure:

When reduced inspection is in place, normal inspection shall be instituted when one of the following occurs:

- A lot/batch is withheld from acceptance
- Production becomes irregular or delayed
- Vendor's quality system is unsatisfactory
- Other conditions warrant that normal inspection be re-instituted