



SUPPLIER QUALITY MANUAL

Table of Contents

1. General Information
2. Quality Management System
 - 2.1. Quality System Certification Requirements
3. Sub-tier Supplier Quality Management
 - 3.1. Sub-tier Supplier QMS Qualification
4. Supplier Site Assessment and Audit
 - 4.1. AM General and Government Audits
 - 4.2. AM General Special Process Audits
 - 4.3. Source Inspection and Surveillance
5. Record Retention
 - 5.1. Quality Records
 - 5.1.1. Record Retention and Storage Procedure
6. Pre-Award Assessment Survey
7. Advance Product Quality Planning (APQP)
 - 7.1. Advanced Product Quality Planning Requirements
 - 7.1.1. Team Feasibility Commitment
 - 7.2. Production Part Approval Process (PPAP)
 - 7.3. Additional Customer Requirements and Supplements
8. Process and Product Change Notifications
 - 8.1. Supplier Change Notification
 - 8.2. Supplier Initiated Changes (When PCN and PPAP Required)
 - 8.3. AM General Initated Changes (PCN Not Required)
9. Supplier Performance Monitoring
 - 9.1. Scorecard
 - 9.2. Supplier Performance Classifications
10. Supplier Performance Requirements
 - 10.1. Consequences of Below 'Satisfactory' Classification
 - 10.2. Consequences of 'Poor' Classification
11. Non-Conforming Product
 - 11.1. Non-Conforming Definition
 - 11.2. Counterfeit Electronic Part Definition
 - 11.3. Customer Notification
 - 11.4. Corrective Action Request (CAR) Issuance
 - 11.5. Supplier Responsiveness Requirements
 - 11.6. Controlled Shipping
 - 11.7. Cost Recovery Process

SUPPLEMENTS / ADDENDUMS

- Supplement 1 - PPAP Requirements
- Supplement 2 - Fastener Requirements
- Supplement 3 - Welding Requirements
- Supplement 4 - General Paint/Coating Requirements
- Supplement 5 - Armor Material Requirements

AM GENERAL LLC
SUPPLIER QUALITY MANUAL
QUALITY ASSURANCE REQUIREMENTS AND PERFORMANCE EXPECTATIONS
(For use with ISO 2015/IATF 16949)

1.0 General Information:

This document establishes quality requirements and defines the supplier's responsibilities for ensuring that all Goods (e.g. purchased materials for the direct production of finished goods, a.k.a. 'direct material' and service materials) all conform to AM General LLC ("AMG") drawings, specifications and other procurement requirements. This document shall be incorporated by reference into every Order issued by AMG.

It is the supplier's responsibility to understand and comply with all the requirements within this document, its supplements, and addendums.

If supplier has any questions about this document, please contact your AMG Supply Chain Management or Quality Assurance point of contact.

All capitalized terms that are not defined in this document have the meanings given to them in the then-current version of the AM General LLC Standard Terms and Conditions of Purchase (the "Terms and Conditions") unless the context clearly requires otherwise. All references to "supplier" or "Supplier" shall be deemed to be references to "Seller" as defined in the Terms and Conditions and all reference to AMG shall be deemed to be references to "Buyer" as defined in the Terms and Conditions.

This document is supplemental to, and does not otherwise modify or amend the Terms and Conditions.

2.0 Quality Management System ("QMS"):

2.1 Quality System Certification Requirements: AMG requires all suppliers, at a minimum, to be compliant to the requirements of the ISO 9001 or IATF 16949 standards. The quality system and manual shall follow the guidelines within ISO 9004. Effective February 1, 2019, all current and new suppliers to AMG are required to be ISO 9001 or IATF16949 registered by an accredited third party registrar or to have an AMG approved plan to achieve registration.

Suppliers providing Goods or Services that have special characteristics including, but not limited to, <SC> (Safety Critical), <FF> (Fit/Function), Critical Safety Item (CSI), Regulated [R], Major or Minor Characteristics or other safety important criteria must be ISO 9001 or IATF16949 registered by an accredited third party to deliver production approved parts to AMG.

3.0 Sub-Tier Supplier Quality Management:

The supplier is responsible for ensuring all sub-tier suppliers comply with all Order requirements.

3.1 Sub-tier Supplier QMS Qualification: The supplier shall have a process in place to ensure that all sub-tier suppliers maintain or achieve a Quality Management System (“QMS”) that is compliant to the requirements of the ISO 9001 or IATF 16949 standards. The QMS compliance plan should target completion within 18 months of contract award. This process shall include:

- Required adherence to the AM General Supplier Quality Manual on all Purchase Orders issued that are related to the manufacturing or processing of AMG components and assemblies.
- A documented procedure or workflow which describes how parts are qualified and approved for use within the supplier’s facility. This procedure or workflow shall address how sub-tier process changes will be communicated to the supplier and in turn submitted to AMG.

4.0 Supplier Site Assessment and Audit:

4.1 AMG and Government Audits:

AMG's or the Government's quality assurance representative(s) or third party resources may conduct joint periodic audits of the supplier's and/or sub-tier facilities Quality Management System to include product, process and manufacturing systems. Upon request, records and documentation shall be made available for audit. The list of records and documentation may include but are not limited to:

- Inspection evidence assuring product adherence to design records and revisions.
- Material/Performance and acceptance test results.
- Production processes, standard work and manufacturing records.
- Training of personnel and Certifications for special processes such as heat treating, plating, anodizing, magnetic particle inspection, etc.
- Periodic calibration of inspection equipment and control of certification records.
- Documentation of changes to process inputs and communication to AMG.
- Failure analysis and corrective action reports.

4.2 AM General Special Process Audits:

AMG and/or third party resources may conduct individual or joint periodic audits of the supplier's and/or the sub-tier supplier's specialized processes (e.g. weld, coatings, etc.). All suppliers with specialized processes are required to conduct yearly special process audits using the AM General AIAG CQI (Continuous Quality Improvement) format or other special process audit formats as required by AM General. These audits may include but are not limited to:

- CQI-9 Heat Treat Assessment
- CQI-11 Plating System Assessment
- CQI-12 Coating System Assessment

- CQI-15 Welding System Assessment
- CQI-17 Soldering System Assessment
- CQI-23 Molding System Assessment
- CQI-27 Casting System Assessment

4.3 Source Inspection and Surveillance: AMG and/or the Government may also send a representative to the supplier's and/or sub-tier supplier's facilities to perform any of the following activities:

- Source Inspection (mechanical, visual inspection and/or test): All items and tests may be subject to inspection/witness at the supplier's and/or sub-tier supplier's facility before shipment.
- Source Surveillance: All items are subject to surveillance by AMG quality assurance personnel. This may include the review of the supplier's and/or sub-tier supplier's inspection system, procedures and quality or test records during the production run to ensure conformance to drawing, specification and supplier procedure requirements.

5.0 Record Retention:

5.1 Quality Records:

The supplier is responsible for maintaining quality records of inspections and outgoing product quality for all lots of material shipped to AMG. These records include but are not limited to inspection records, certificates of compliance and control test reports. The supplier is required to maintain these records for a minimum of ten (10) years after completion of the Order unless otherwise agreed in writing by AMG. The supplier shall advise AMG in advance of any intended disposition of such records. The supplier is responsible for ensuring all sub-suppliers comply with this requirement.

5.1.1 Record Retention and Storage Procedure: The supplier shall have a documented procedure or workflow which describes how records are controlled including retention, security and disposition.

6.0 Pre-Award Assessment Survey:

Prior to contract award, new suppliers to AMG will be required to complete and return AMG' "Supplier Assessment Survey" that assesses the supplier's Quality Management System and production capability. The supplier must create action plans to correct any assessed gaps and deficiencies. AMG may require an on-site facility and process review audit to verify the assessment prior to contract award.

7.0 Advanced Product Quality Planning (“APQP”):

7.1 Advanced Product Quality Planning Requirements:

APQP is defined process or methodology as documented by the Automotive Industry Action Group (“AIAG”) to develop products or services.

The supplier shall adopt this structured methodology for any new or revised process/part utilizing the AIAG’s APQP and Control Plan manual for all parts produced for AMG. This structured approach to new and revised product planning will enable the supplier to effectively launch new and revised products and ensure controls are established to achieve quality standards and customer satisfaction.

The supplier should possess the latest edition of all AIAG Core Quality Tool Manuals including the AIAG manuals listed below::

APQP – Advanced Product Quality Planning and Control Plans
PPAP – Production Part Approval Process
FMEA – Failure Modes Effects Analysis
SPC – Statistical Process Control
MSA – Measurement Systems Analysis

The above manuals can be obtained at www.aiag.org

7.1.1 Team Feasibility Commitment: At the technical review stage of the supplier selection or Engineering Change Notice (“ECN”) process, the supplier’s product planning team shall assess requirements, resolve concerns and commit that they can produce products to consistently meet requirements set forth in the design drawing and AMGs Purchase Document. The Supplier Team Feasibility Commitment form is found within the AMG PPAP Workbook and is a required PPAP submission element.

7.2 Production Part Approval Process (“PPAP”):

PPAP defines the common requirements and process for how production parts are approved. The purpose of PPAP is to determine if all customer engineering design record and specification requirements are properly understood by the supplier and that the manufacturing process has been verified to produce product consistently meeting these requirements during an actual production run.

PPAP shall apply to internal and external organizational sites supplying production parts, service parts, production materials or bulk materials.

The process requirements may include Process Flows, FMEA’s, Control Plans, and other AIAG core tools listed in section 7.1 for any new PPAP submission. The appropriate AMG Supplier Quality representative (“SQE”) will guide supplier in the submission requirements. Requirements may vary in the discretion of the SQE, depending on the AMG production site or program. All suppliers submitting parts for AMG programs will provide PPAP submissions for part approvals. The supplier shall not ship parts to AMG without PPAP approval, unless authorized by AMG Supplier Quality. For further details on AMGs PPAP requirements refer to Supplement 1. Contact your SQE for when PPAP is required. Refer to section 8.2 of this document

and Section 3 of the AIAG PPAP manual for additional detail and guidance on when a PPAP submission is required. For all current and future supplied product, internal PPAP's shall be conducted annually and made available upon request.

7.3 Additional Customer Requirements and Supplements:

For some components, certain processes or design requirements may require that additional levels of control or documentation be provided with the PPAP submission such as, for example, fasteners, welded components, parts with paint or finish requirements, and armored material components. Specific supplements are provided to define additional customer requirements beyond those standards listed under the PPAP requirements. Refer to the following supplements for additional detail:

- Supplement 2 – Fastener Requirements
- Supplement 3 – Welding Requirements
- Supplement 4 – General Paint/Coatings Requirements
- Supplement 5 – Armor Material Requirements

Any questions with regards to submission requirements or applicability of any of these supplements should be directed to your AMG SQE.

8.0 Process / Product Change Notifications:

8.1 Supplier Change Notification:

Suppliers may propose design or process changes to help reduce cost, improve quality, increase reliability and process capability of the product. All proposed design changes or modifications, whether permanent or temporary, including proprietary designs, must be reviewed, approved and authorized by AMG through the Order Change process and otherwise in accordance with the Terms and Conditions. Authorization, in writing or electronic, must be obtained prior to implementation of any change including those listed in Section 8.0. Any change implemented by the supplier without AMGs authorization may, in AMGs sole discretion, be classified as a breach of such supplier's obligations under the applicable Order.

The supplier must communicate all change requests utilizing the Process Change Notification/Request ("PCN") form. The PCN form must be submitted as soon as possible, but in all cases at least 12 weeks prior to the targeted change implementation. The form is available on the AM General website at <http://www.amgeneral.com/our-suppliers/military-programs-resources/>. The completed forms must be sent to the AMGs Supply Chain Management Representative via electronic transmittal.

A PPAP submission in accordance with Section 7 must be made and approved prior to implementation of any change in production or service part builds. With any PPAP submission approval, the supplier must continue to supply the same version/revision of the part in accordance with the approved requirements. Any changes described in Section 8.2 could require a resubmittal of the PPAP associated with the change content.

8.2 Supplier Initiated Changes (when PCN and PPAP Required): The following changes require a PCN and PPAP:

- Supplier driven engineering change;
- Tooling transfer, replacement or refurbishment. (Note: For parts produced with prototype “soft” tooling, another submittal is required following adoption of the production “hard” tooling. Final PPAP approval will not be granted until the production tool and process is validated.);
- Correction of a discrepancy;
- Changing to optional material;
- Sub-supplier or material source change;
- Change in part processing;
- Parts produced at an additional location;
- Change of ownership;
- Changes that impact the Performance Test method or results as defined on the drawing or within required specifications. (At times referred to as a First Article Test (FAT) or Component First Article Test (CFAT)); and
- Significant production rate changes.

Contact your SQE or buyer for questions concerning when a PCN and resulting PPAP is required. Refer to Section 3 of the AIAG PPAP manual for additional detail and guidance.

8.3 AMG Initiated Changes (PCN Not Required): AMG initiated changes do not required a PCN including, without limitation, the following changes:

- AM General initiated Engineering change; and
- At request of AM General.

9.0 Supplier Performance Monitoring:

The purpose of Supplier Performance Monitoring is to ensure the supplier’s conformance to AMG standards and requirements. Supplier performance will be continuously monitored and reported at a defined frequency from AMG using a supplier scorecard. Supplier Performance Monitoring is scheduled to roll out in the 1st quarter of 2019.

9.1 Scorecard: Individual supplier performance will be measured and reported with an AMG provided supplier scorecard. This scorecard will include a Total Performance Score comprised of the following five Key Performance Indicators (KPI):

- On-time Delivery (%)
- Defect Rate (Parts Per Million - PPM)
- Disruptions
- Cost Reduction
- Financial Health

9.1.1 On-time Delivery: This measurement is the percentage of planned deliveries of direct materials to the appropriate AMG delivery dock that are delivered on-time (as defined by AMG's Materials Department).

9.1.2 Defect Rate: Parts Per Million (PPM) is a measure of the supplier's actual non-conforming material rate as a ratio applied to a million parts. PPM is calculated using the following formula:

$$(\text{Total Nonconforming Quantity} / \text{Total Receipt Quantity}) \times 1 \text{ million} = \text{PPM}$$

9.1.3 Disruptions: The Disruption score measures the number of distinct production disruption events that occurred at AMG that were the result of non-conforming parts and missed/late deliveries. The Disruption score is weighted based on the degree of disruption caused by events directly associated with Corrective Actions Request (CARs), Cost Recovery, and Controlled Shipping.

9.1.4 Cost Reduction: This measurement evaluates the supplier's performance in proactively implementing cost reduction and continuous improvement projects and sharing the benefit of those projects with AMG (through AMG's Supply Chain Management Department) via reductions in the piece price cost.

9.1.5 Financial Health: This measurement uses financial data from Dun & Bradstreet (D&B) to evaluate the supplier's overall financial performance.

9.1.6 Total Performance Score: This measurement uses a weighted average of the five individual KPI's to produce a single score.

9.2 Supplier Performance Classifications: For the Supplier Total Performance Score and the five individual KPI's there are five classification categories based off of the results of the scorecards. Suppliers will be given a rating from one of the following four classifications and these classifications will assist with AM General in the monitoring and sourcing of suppliers.

- **Preferred:** Supplier meets all expectations and should be looked upon as being a better (preferred) choice for new business.
- **Satisfactory:** Supplier generally meets expectations and should be looked at as being acceptable for new business.
- **Marginal:** Supplier meets some, but not all expectations and will need to have a credible improvement plan in place before being considered for new business.
- **Poor:** Supplier does not meet expectations and, unless the supplier implements a credible action plan, the supplier should be looked at as a candidate for exit, resourcing or a new business hold.

10.0 Supplier Performance Requirements:

10.1 Consequences of a Below 'Satisfactory' Classification:

Suppliers not meeting at least a 'Satisfactory' classification in all Scorecard performance monitoring categories will be required to submit remedial action plans in order to return the required performance to a Satisfactory status.

A credible remedial action plan should, at a minimum, include a detailed plan to return the supplier to 'Satisfactory' status in all areas and the timing for the completion of the plan.

Failure to comply with these requirements may lead to one or all of the following:

- Termination of any applicable Order for default
- New Business Hold

10.2 Consequences of 'Poor' Classification:

A supplier that receives a 'Poor' classification in one or more Scorecard monitoring categories may, in AMG's sole discretion, be classified as being in breach of such supplier's obligations under the Order and AMG may terminate the Order for default.

11.0 Nonconforming Product:

11.1 Nonconforming Product Definition: Product (i) known, or suspected, to not meet design record specification and requirements, (ii) that fails to conform to fit, form, or function design record specifications and requirements, (iii) that is derived in any way from non-approved sources (including from sub-tier suppliers not approved in writing by AMG), (iv) that is counterfeit; or (v) does not meet the other requirements of the Order, in each case, shall be classified as nonconforming product.

11.2 Counterfeit Electronic Part Definition: The U.S. Department of Defense (DOD) definition for a Counterfeit Electronic Part is as follows: An unlawful or unauthorized reproduction, substitution, or alteration that has been knowingly mismarked, misidentified, or otherwise misrepresented to be an authentic, unmodified electronic part from the original manufacturer, or a source with the express written authority of the original manufacturer or current design activity, including an authorized aftermarket manufacturer. Unlawful or unauthorized substitution includes used electronic parts represented as new, or the false identification of grade, serial number, lot number, date code, or performance characteristics.

11.3 Customer Notification: Suppliers must notify AMG Materials Planning and Supplier Quality functions when there is a potential quality disruption to AMG's facilities. If the material may have been shipped, the supplier must immediately initiate a Quality Alert to the AMG Supplier Quality Engineer and initiate appropriate containment actions.

11.4 Corrective Action Request (“CAR”) Issuance:

11.4.1 Supplier Performance Notification: AMG may issue CARs for the receipt of non-conforming, mis-identified and or damaged product caused by the supplier and for other performance discrepancies that lead to disruptions or are related to Customer Satisfaction. However, CARs will not be issued in those instances where suppliers notified AMG in advance of non-conforming material reaching any portion of the AMG assembly process where enough conforming material is found available to not cause disruption. A failure by AMG to issue a CAR is not a waiver of any right or remedy by AMG.

11.4.2 Problem Identification: CARs will include the following information:

- CAR Number
- Issue Date
- Vendor Number
- Originator
- Part Number
- Part Description
- Quantity
- Problem Definition (Sort requirement will be indicated as needed.)

11.4.3 Return Material Authorization: AMG may notify the supplier of known and suspect nonconforming material and, if AMG notifies the supplier, AMG will request a Return Material Authorization (RMA). The supplier will have 24 hours to provide an RMA to avoid potential scrapping of the material by the plant.

11.5 Supplier Response Requirements:

11.5.1 Supplier Initial Response: With every CAR issuance the supplier must consider and analyze the entire delivery chain to identify all locations where suspect material may be located (e.g. Customer, Supplier, Sub-Tier, AFTC, In-Transit). Using the issued CAR, the supplier must provide written response within one business day that summarizes activities, findings, and quantifies how many parts were contained, sorted, reworked, and confirmed as either conforming or non-conforming. The supplier’s response must include, but is not limited to, the following:

- **Containment at Customer Site:** The supplier must effect the immediate containment, sorting, and reworking of parts at AMG’s Military Assembly Plant and Aftermarket Fulfillment and Training Center (“AFTC”) Customer sites. The supplier’s “reaction plan” response representatives will be required on site within two (2) hours of notification. This may be accomplished in one of the three following ways:
 - Identify a Quality resource from your organization that can be on-site within two hours.
 - Maintain an on-site Quality representative who holds an AMG Non-Employee, Non-Escort badge. This badge may be obtained through application form CHF5002.

- Secure the services of the AM General approved third-party sort resource, Sustained Quality. (<http://www.sustained-quality.com/>)

Once your reaction plan has been confirmed, please provide your chosen method and confirmation of primary and secondary contacts along with their complete contact information to AMG Supplier Quality. AMG will only be using e-mail (manual or system generated) to inform your designated contacts of the need to sort and will no longer be attempting to communicate this information with repeated calling efforts. All sorts not responded to within the 2- hour requirement will immediately default to AMG internal standard sort charges.

- **Containment at supplier site:** Initiate immediate and ongoing containment actions to prevent further shipment of nonconforming material. Containment activities and results shall be documented and shall remain in place at the supplier's location until permanent corrective action has been implemented and proven effective. The supplier must provide ongoing internal containment data as partial supporting documentation for CAR closure.
- **Product Status:** 100% identification of all product verified as conforming must be utilized. Marking method and location for containers and parts must be agreed to at the discretion of the CAR Issuing SQE (e.g. signage, paint dot, mark, stamp, etc.). The chosen identification method will also be implemented at the supplier's site.
- **Certified Material:** The supplier must identify the date of the next shipment of conforming parts including how it will be identified. The conforming material ship date should apply to all customer locations including service.

Customer Satisfaction of Initial Response: Customer Satisfaction CARs may be issued for Initial Response not received within one business day.

11.5.2 Root Cause Analysis and Corrective Action: The supplier must submit the Final CAR response within 14 days. The supplier is permitted to use an alternative CAR 3x5 WHY 8D format. The CAR, utilizing any 3x5 WHY 8D format response, must include:

- Containment Response actions taken and summary of findings;
- Contact/Team information for those assigned action responsibility;
- Problem Description Clarified, Background information (indicate sub-tier supplier responsibility, if applicable);
- Interim/Short Term Corrective Action;
- 3X5 WHY Root Cause (Why made? Why shipped? What caused the system failure?) including root-cause verification. (Turn it on, turn it off);
- Corrective and Preventive Action Plans/Timing;
- Implemented Corrective and Preventive Actions taken, with verification of effectiveness;
- Systemic Read across to other like parts and processes; and
- Provide supporting documentation to include updates to key control documents, verification data, training verification, etc.

Customer Satisfaction of Final Response: Customer Satisfaction CARs may be issued for Final Response not received within 14 days. Final Response time extension may be obtained with prior notification and agreement by the reviewing SQE.

11.6 Controlled Shipping. Controlled Shipping is applied by AMG when a supplier's specific value add process and/or Quality Operating System has proven to be consistently ineffective in delivering quality product to AMG.

11.6.1 Controlled Shipping includes:

- Redundant inspection processes located downstream after failed process.
- Data gathered at redundant inspection for feedback upstream to failed process and to Customer as required.
- Corrective Actions taken to bring redundant inspection results to Zero Defects.

11.6.2 Levels:

Controlled Shipping Level 1: Includes redundant inspection processes, data gathered at redundant inspection, and resultant corrective action. Supplier employees who are outside of the normal failed process are specially trained to conduct the redundant inspection and data gathering process at supplier's location.

Controlled Shipping Level 2: Includes the same process as Level 1 with an added layer of third party inspection representing AMG's interest. The third party is to be: Paid by the supplier, selected by the supplier or AMG, and agreed by AMG if selected by supplier. In special cases, the Level 2 inspection may be required to be performed outside the supplier's facilities at a facility deemed appropriate by AMG.

11.6.3 Exiting Controlled Shipping: The supplier may exit Controlled Shipping by meeting the following criteria:

- The AMG SQE provides on site approval of supplier corrective action that is supported by point of cause/escape/systemic verification as identified in 11.5.2, and accompanied by Controlled Shipping data achieving zero defects over a duration agreed to by the AMG SQE.
- The AMG SQE provides approval of re-PPAP Submission or validation to complete design record specification and requirements.

11.7 Cost Recovery Process: For all CARs issued, AMG recovers costs for supplier-caused waste resulting from the receipt of non-conforming materials and late deliveries. Accordingly, upon the issuance of a CAR, the supplier will be liable to AMG for the below amounts (as applicable). Notwithstanding the amounts set forth below, supplier will be responsible for all costs imposed on AMG pursuant to a Customer and/or Government mandated CAR.

11.7.1 Defective Material Processing Cost Recovery Flat Rate: Defective materials (DMR) processing waste are those costs incurred by AMG pursuant to the verification process for confirming supplier was the cause of the non-conformance and CAR issuance. This process typically includes: lineside investigation, specification retrieval and review, lab analysis, photographic documentation, system defect entry, material handling, issuance of corrective action, and ongoing communication with supplier. Flat rate defective material processing cost recovery will be standardized and applied consistently.

For the avoidance of doubt, defective material processing costs are independent of any costs related to in-plant containment, sort, re-work labor, downtime costs, or field warranty related costs that would be recovered using Cost Recovery Form 1AF0001.

11.7.2 In-plant Cost Recovery: Requests may include adequate supporting documentation, as summarized on Cost Recovery Request Form 1AF0001, as well as supporting departmental raw data regarding the issue. Typically, labor hours, downtime, number of vehicles, or units impacted, investigation costs, travel expenses and various administrative costs may be used to calculate the amount of cost recovery.

11.7.3 Field or Warranty Cost Recovery: Requests may include adequate supporting documentation, as summarized on Cost Recovery Request Form 1AF0001, as well as supporting raw data regarding the issue. Typically, part cost, service mark-up, standard labor hours, investigative costs, travel expenses and various administrative costs may be used, along with the total number of claims, to calculate the amount of cost recovery.

11.7.4 Cost Recovery Appeal Process: The supplier may appeal a Cost Recovery request as follows:

- Appeal should be directed at the AMG Supply Chain Management (SCM) Manager, and copied to the AMG Supplier Quality Manager.
 - The supplier shall initiate any appeal within 14 calendar days of the Cost Recovery request by contacting the SCM Manager.
- All appeals should strive for resolution within the month the Cost Recovery was incurred.

SUPPLEMENT 1 TO AM GENERAL SUPPLIER QUALITY MANUAL

PPAP REQUIREMENTS

1.0 General PPAP Requirements and guidelines:

- 1.1 The general guidelines for Production Part Approval Process will be the AIAG PPAP Manual, Fourth Edition (March 2006) or latest (IE. AIAG PPAP Manual).
- 1.2 PPAP forms and the AM General PPAP Workbook will be available on the AM General Homepage at <http://www.amgeneral.com/our-suppliers/military-programs-resources/>.
- 1.3 PPAP Submission Requirements will be agreed upon and defined on the AM General PPAP Submission Requirements page which is part of the PPAP workbook. The PPAP Submission Requirements page will define the PPAP submission level, submission method and any additional submission instructions or deviations allowed.
- 1.4 At any time, AMG has the right to modify the submission level or requirements to be submitted with a PPAP submission due to unforeseen component risk, or other risk assessment.
- 1.5 PPAP process requirements and definitions are set forth in Section 2 of the AIAG PPAP manual.
- 1.6 Upon approval of a PPAP submission, AM General will provide written approval of the PPAP package using the AM General Part Submission Warrant (PSW) found within the PPAP Workbook.
- 1.7 Written approval from AM General is required prior to the supplier shipping any production products to AM General production or aftermarket part facilities unless authorized by AMG Supplier Quality.
- 1.8 Interim PPAP approvals may be granted in order to grant a supplier permission to ship for a limited period of time, or a in a limited quantity. Interim approvals require action plans in place to meet full production PPAP approval, and must be agreed to by AMG Supplier Quality
 - 1.8.1 Supplier must submit both a PSW and an Interim Recovery Worksheet for materials in need of Interim approval.
 - 1.8.2 Interim approval will only be granted up to an expiration date or a maximum quantity of parts or material. Interim approval will expire upon the occurrence of the specified expiration date or the shipment of the specified maximum quantity. Supplier must closely track Interim approval expiration and must cease shipment of interim product pending full PPAP approval.

1.9 PPAP submissions must be submitted via e-mail to submission.data@amgeneral.com or hardcopy provided to and at the discretion of the appropriate AM General Supplier Quality representative.

2.0 **PPAP Submission Levels:** Refer to AMG PPAP Workbook Submission Requirements Page 0b.

3.0 **PPAP Submission Content:**

3.1 PPAP submission content shall be defined in accordance with the AIAG PPAP manual, Section 2, PPAP Process Requirements.

3.2 PPAP submission content shall be provided using the AM General PPAP workbook, or supplier equivalent PPAP forms. Supplier forms must be reviewed and approved by AMG Supplier Quality prior to submission. This is to ensure that AMG can perform a clear, thorough, and efficient review of the PPAP content.

3.3 PPAP content requirements shall be adhered to in accordance with AIAG PPAP Manual, Fourth Edition. Further clarification of some requirements as well as some definitions are provided below.

3.3.1 **Design Record, Print, Specification**

3.3.1.1 All notes, dimensional features, and callouts shall be numerically identified on a ballooned print and accounted for within dimensional, material and performance test results.

3.3.2 **FMEA**

3.3.2.1 All notes, dimensional features, and callouts shall be accounted for within the FMEA. The FMEA shall match process and operation steps with the flow diagram and control plan.

3.3.3 **Control Plan**

3.3.3.1 All notes, dimensional features, and callouts numerically identified on the ballooned print shall be accounted for on the control plan. Inspection methods and inspection frequencies must be statistically supported and agreed upon by the approving SQE. Such as gage selection, destruct test frequency, performance test frequency, gage calibration, etc.

3.3.4 **Measurement System Analysis and Calibration**

3.3.4.1 Supplier shall conduct and have applicable MSA studies for all new or modified gages, measurement and test equipment.

3.3.4.2 Devices used within control plans should also have appropriate MSA studies completed.

3.3.4.3 Reference AIAG MSA Book as suggested in Section 6.1 for additional guidance.

3.3.4.4 Reference AMG PPAP Workbook requirements for AMG MSA requirements.

3.3.5 Dimensional Results

- 3.3.5.1** Requires a 6 piece sample evaluation or as required by SQE.
- 3.3.5.2** For parts produced from more than one cavity, mold, tool, die, pattern or production process, the supplier shall provide a group sample dimensional evaluation from each.

3.3.6 Material / Performance Test Results

- 3.3.6.1** Material Test Results shall be performed for all parts and product materials where chemical, physical or metallurgical requirements are specified by the design record or Control plan.
 - 3.3.6.1.1** Armor materials: reference Supplement 5 to AM General Supplier Quality Manual for detailed requirements.
- 3.3.6.2** Performance Test Results shall be performed when performance or functional requirements are specified by the design record or Control Plan.
 - 3.3.6.2.1** Weld performance: The supplier will have documented evidence of weld validation in accordance with the welding standards called out in the design record, or through approved general welding guidelines. For additional welding requirements, refer to Supplement 3 of the AM General Supplier Quality Manual.
 - 3.3.6.2.2** Functional Performance: the supplier must show documented evidence of performance to functional requirements stated on the design record.
 - 3.3.6.2.3** Paint Performance: the supplier must show that coatings/paints/other finishes conform to the requirements of the design record. For additional requirements which may apply, refer to Supplement 4 of the AM General Supplier Quality Manual.

3.3.7 Process Capability Studies

- 3.3.7.1** Process capability studies shall be required for all special characteristics identified in the design record and shall be determined to be acceptable prior to submission to AMG.
- 3.3.7.2** Where no special characteristics have been identified on the design record, AMG reserves the right to require demonstration of capability on other characteristics based off of identified risk.
- 3.3.7.3** Capability studies will be performed on a sample size to be determined with your AMG SQE.
- 3.3.7.4** Requirements for process capability indices:
 - 3.3.7.4.1** Critical Safety Characteristics <SC> or (CSI) shall maintain a Cpk index equal to or greater than 1.67 and inspection results be supplied to the SQE for each lot/shipment of material.

- 3.3.7.4.2** Major characteristics will be agreed to with AMG and shall maintain a Cpk index equal to or greater than 1.33.
- 3.3.7.4.3** All other Fit/Function or Minor characteristics must maintain a Cpk of 1.0 or greater.
- 3.3.7.4.4** QAP or other design record requirements may override these general process capability requirements.
- 3.3.7.5** In lieu of process capability studies, 100% inspection may be utilized with AMG's approval and inspection results are to be supplied to the SQE for each lot/shipment of material.
- 3.3.7.6** Upon PPAP or sample submission approval by AMG, supplier is not to modify requirements or processes without a full re-submittal of samples and submission data for approval.

3.3.8 Special Characteristics

- 3.3.8.1** Any part having special characteristics, including but not limited to <SC> Safety Critical; <FF> Fit/Function; (CSI) Critical Safety Item; [R] Regulated, Major or Minor Characteristics, must have the following submitted with the submission: Process Flow, PFMEA, Control Plan.
- 3.3.8.2** Reference section 3.3.4 for process capability requirements for Special Characteristics

3.3.9 PPAP Master Samples

- 3.3.9.1** As part of a PPAP submission, AMG may request PPAP Samples. These samples will be sent to the attention of the appropriate Supplier Quality Engineer, and marked as PPAP Samples per the labeling provided in the PPAP Workbook. The standard sample request is 6 pieces unless otherwise agreed to by AMG. The sample request may be waived, in AMG's discretion, due to size or other considerations.
- 3.3.9.2** Paint / Coating / Welding, or other samples from PPAP testing may also be requested as part of a PPAP submission, contact the appropriate SQE for guidance and requirements.

3.3.10 Customer Specific Requirements (CSR)

- 3.3.10.1** It is the responsibility of the supplier to contact AMG to understand whether there are any Customer Specific Requirements in addition to the design record which may be applicable for a PPAP submission.
- 3.3.10.2** AMG reserves the right, based off of part/process risk to require other specific requirements which may not be listed either in this Supplement, or the AIAG PPAP Manual.

- 3.3.10.3** Supplier shall have records of compliance to all Customer Specific Requirements.
- 3.3.10.4** Sampling: for some parts, sampling may be required per the design record. Examples of acceptable sampling plans include MIL-STD-1916, "DoD Preferred Methods for Acceptance of Product", or ANSI/ASQ Z1.4, "Sampling Procedures and Tables for Inspection by Attributes". Verify with AMG Supplier Quality as to whether Sampling is required as a CSR.
- 3.3.10.5** Reference the additional AM General Supplier Quality Manual supplements provided to ensure compliance.

3.3.11 Part Submission Warrant

- 3.3.11.1** Supplier shall complete a Part Submission Warrant for each customer part number unless otherwise agreed to by AMG Supplier Quality.
- 3.3.11.2** Components from varying molds, dies, etc... shall be identified appropriately on the PSW, or in a separate attachment.
- 3.3.11.3** The supplier's submission of a Part Submission Warrant will be the supplier's representation and warranty to AMG that the part meets all required specifications, quality requirements, and warranties required by AMG in this Supplier Quality Requirements manual and in the Order.

SUPPLEMENT 2 TO AM GENERAL SUPPLIER QUALITY MANUAL FASTENER REQUIREMENTS

- 1.0 Scope:** This Supplement establishes Supplier Quality requirements for all threaded steel fasteners of Grade 5 and higher (as defined by SAE-J429) and metric fasteners with strength designations of 8.8 and higher (as defined by SAE-J1199).
- 1.1 Quality Management System (QMS):** Suppliers subject to this supplement shall document, implement and maintain a fastener QMS which:
- 1.1.1 Homogeneity:** Assures the homogeneity of fastener lots. A homogeneous fastener lot is defined as a quantity of parts produced from the same heat of steel, using the same production process, and where applicable, heat treated and plated/coated at the same time.
 - 1.1.2 Manufacturing Symbol:** Assures that individual fasteners are identified by a fastener manufacturer symbol (logo). The manufacturer's symbol (logo) shall be listed in MIL-HDBK 57.
 - 1.1.3 Changes:** Changes described in paragraph 2.10 of the AM General Supplier Quality Manual main document must be reviewed, approved and authorized in writing by AMG through Purchase Order Change (POC). Consumable tooling used to manufacture fasteners is exempt from additional sample submissions.
- 1.2 Supplier inspection:** Sampling plans per paragraph 3.3.7.4 of Supplement 1 PPAP Requirements may be used to support supplier inspection processes. In addition to these standards, fastener suppliers may use ASTM F1470 or ASME B18.18.
- 1.2.1** Fastener dimensions shall be inspected to assure conformity to requirements.
 - 1.2.2** Plating/coating (when specified) shall be inspected to assure complete coverage.
 - 1.2.3** The grade and manufacturer symbol (logo) for each bolt in the lot sample shall be the same.
- 1.3 Qualified laboratory documentation:** Inspections shall be performed by a qualified laboratory (an accredited laboratory or one whose QMS complies with an industry recognized standard such as ISO 17025).

SUPPLEMENT 3 TO AM GENERAL SUPPLIER QUALITY MANUAL WELD REQUIREMENTS

- 1.0 Weld Processes, Classes and Types of Welds:** ALL Weld Processes (e.g., SMAW, GMAW, GTAW), Classes (Class 1, 2 and 3) and TYPES (e.g., Fillet, groove) of welds shall be submitted to AMG Supplier Quality for review. The supplier remains responsible for compliance and ensuring weld procedure specification (WPS) / procedure qualification records (PQRs) are compliant with applicable American Welding Society (AWS) welding standards. Submittal is required as follows:
- PRIOR to production, at time of sample submission.
 - When drawing revisions occur that affect welding requirements.
 - When welding procedure revisions occur.
 - When during AMG Supplier Technical Visits, Source Audits, or at any time when weld quality issues are identified by AMG, the suspect welding procedure(s) or welder(s)/welding operator(s) shall be submitted for review.
- 2.0 Records:** Following AMGs review/acknowledgement of the supplier's procedures, control plans and weld samples, all records shall be maintained and made available to AMG for review upon request. See paragraph 5.0 of the AM General Supplier Quality Manual main document for further requirements.
- 3.0 Arc Welding Process Submissions shall include:**
- 3.1 Cover Sheet:**
- Part drawing and revision number(s).
 - Applicable AWS standard, latest revision in effect at the time of contract or later if specified.
 - Date of weld sample submittal.
 - Signature of the supplier's Certified Weld Inspector (CWI), Quality or other Authorized Representative showing submittal packet has been reviewed for completeness/accuracy and approved.
 - A space for AMGs Supplier Quality representative's signature to indicate acknowledgement of the Welding Sample submission.
- 3.2 Welding Procedures (PQR/WPS):** Equal To or Greater Than AWS D1.1 Annex N Form N-1
- 3.3 Shielding Gas:** Welding gas certificate of material in accordance with AWS A5.32.
- 3.4 Weld Repair Procedure:** Per AWS D1.1 6.26 Repairs or MIL-12479550A 5.15 Repair.
- 3.5 Control Plan:**
- Production Control Plan per AIAG APQP and Control Plan manual including, as a minimum:
 - Types of welds inspected.
 - Frequency of visual inspection and cut/etch weld sampling.
 - Control Plan shall directly reference documentation for welders qualified for the job.

- All welds found to be non-conforming **SHALL** be brought back into control and confirmed by cut and etch.

3.6 **Cut and Etch Samples:** Supplier shall cut and etch sample(s) of each type of weld on the part. It is recommended that suppliers be capable of preparing any required samples in-house. However, sample removal, sectioning, preparation and etching may be performed by a qualified outside source. The sample(s) shall exhibit the minimum acceptable weld quality per the applicable code and shall be prepared as follows:

3.6.1 **Sample Submittals:**

- A drawing of the part showing the removal location(s) for each sample (cut location drawing).
- Samples shall be removed from an actual production part. In cases where the cost of the part(s) is prohibitive, this requirement may be waived if prior approval is granted by AMG Supplier Quality.
- Identification of each sample shall be clearly identified in the supplied images.
- Each sample shall include a full cross-section of the welded joint.
- The weld cross-section shall be polished and etched with a suitable etchant so that the weld is clearly visible, showing sharp contrast between the parent metal and fusion depth.
- Suppliers shall use appropriate equipment for proper measuring, magnification and storage of cut and etch samples.
- Cut and etch photos shall include superimposed dimensional references to show conformance to minimum weld size.
- For retention of physical samples as required: Once prepared and etched, the sample shall be thoroughly dried and coated with a thin layer of clear lacquer or other suitable preservative that will both protect the etched cross-section and permit visual examination by AMG Supplier Quality.
- Physical Samples shall be retained and preserved for life of the contract plus 5 years

3.7 **Welder/Welding Operator Qualification Records:**

- Manual weld operations shall have the welding operators certified for all types of welding performed and required for the product. And shall maintain the certification for the duration of production.
- Certification of welding operators shall be attained by using an approved third party source for the specific type of weld being performed or in-house CWI.
- Records shall be provided with the PPAP submission and maintained at the source.
- Similar to AWS D1.1 Annex N Form N-4.
- Qualification records for welding operator changes after PPAP shall be kept on file at the supplier for review upon request of AM General.

4.0 Resistance Weld Process Submissions shall include:

4.1 Cover sheet (same as Arc Process):

- Part drawing and revision number(s).
- Applicable AWS standard, latest revision in effect at the time of contract or later if specified.
- Date of weld sample submittal.
- Signature of the supplier's Certified Weld Inspector (CWI), Quality or other Authorized Representative showing submittal packet has been reviewed for completeness/accuracy and approved.
- A space for AMG's Supplier Quality representative's signature to indicate acknowledgement of the Welding Sample submission.

4.2 Resistance Weld Data Sheet:

- Equal to or Greater than AWS C1.1M/C1.1:2000, fig 34 pg. 99.

4.3 Control Plan:

- Production Control Plan per AIAG APQP and Control Plan manual including, as a minimum.
- Types of welds inspected.
- Frequency of visual inspection and destructive weld sampling.
- Control Plan shall directly reference documentation for welders qualified for the job.
- All welds found to be non-conforming SHALL be brought back into control and confirmed by destructive testing or other means of industry standard non destructive testing (NDT) method.

4.4 Sample Submittal:

- A drawing of the part showing the removal location(s) for each sample (nugget tearout location drawing).
- Samples shall be removed from an actual production part. In cases where the cost of the part(s) is prohibitive, this requirement may be waived if prior approval is granted by AMG Supplier Quality.
- Identification of each sample shall be clearly identified in the supplied images.
- Suppliers shall use appropriate equipment for proper measuring (nugget tearout size or force testing equipment).
- Dimensional Report.
- When required, submittal photos shall include superimposed dimensional references to show conformance to minimum weld size.

4.5 Dimensional Report:

- For Spot Welding: Button/Nugget dimensional size report for all spot welds.
- For Projection Welding: Button/Nugget dimensional size report for all projection welds, and/or Force Test for all projection welds

SUPPLEMENT 4 TO AM GENERAL SUPPLIER QUALITY MANUAL

GENERAL PAINT/COATINGS REQUIREMENTS

This requirement does not supersede the paint/coating requirements designated on drawings. This Supplement is strictly for the use of HMMWV Military and Commercial parts.

1.0 Coating Process Control Documentation: All paint/coating systems utilized shall have documented procedures detailing how the processes are controlled and verified to assure compliance to the drawing requirements of the parts or components. These procedures shall be made available to AMG or its customers when requested. When Chemical Agent Resistant Coatings (“CARC”) are used, these procedures shall be submitted to AMG Supplier Quality for review and approval.

2.0 Contract Requirements:

2.1 Exclusion: On Type III systems, the use of vinyl wash primer (DOD-P15328) and MIL-C-8514 containing Hexavalent Chromium is prohibited when used on Stainless Steel Substrates.

2.2 Requirements and Exceptions:

2.2.1 MIL-DTL-81706 Type I or Type II Class 1A is allowed in lieu of MIL-DTL-5541. Applications, quality assurance, and coating requirements in MIL-DTL-81706 shall be IAW spec MIL-DTL-5541 Chemical Conversion Coatings on Aluminum and Aluminum Alloys.

2.2.2 The use of 5200 or 5700 Alodine is approved per TACOM letter concerning the “Qualification Limits for Alodine 5200/5700 Pretreatment Process” dated July 30, 2007.

2.2.2.1 Qualification Limits are as follows:

- The required coating weight for 5000 and 6000 series aluminum alloys is 5 to 59 mg per square foot. The low coating weight value only applies to those processes not employing a deoxidizer step. For processes employing a deoxidizer step, the minimum coating weight is 15 mg per square foot.
- The appearance of a powdery pretreatment (heavy coating) is acceptable provided the pretreatment product will be electrocoat primed per MIL-DTL-53084.
- A powdery pretreatment (heavy coating) is unacceptable if a solvent borne primer such as MIL-DTL-53022 or MIL-DTL-53030 is used.
- The coating weight test must be performed by x-ray spectrograph. Testing shall be performed for five consecutive days showing compliance to the requirements.

After the five consecutive days of compliant tests, the frequency can be reduced to monthly.

- The process must be monitored to assure that drag in of cleaning products into the Alodine product does not occur.

2.2.3 Anodize – Anodic coatings shall be IAW MIL-A-8625 anodic coatings for aluminum and aluminum alloys.

2.2.4 Stainless Steel Pretreatment: Stainless steel surfaces shall be pretreated using one of the following methods:

2.3.4.1 Mechanical Blasting IAW SSPC-10. Note: Mechanical blasting may not be suitable for thin sheet stainless steel.

2.3.4.2 Conversion Coatings: A non-hexavalent chromium substitute that meets the performance of DOD-P-15328 may be used.

2.3.4.3 Passivation to ASTM 380 or to the drawing requirement.

2.2.5 Powder Coat (Primer) Selection, Application and QC Requirements:

2.2.5.1 All cleaning and conversion coatings prior to powder coating of surfaces and quality inspection shall be IAW MIL-DTL-53072D.

2.2.5.2 Cleaning and pretreatment shall be IAW TT-C-490 that addresses the substrate being used.

2.2.5.3 Powder coat primer shall be selected from the qualified products list or qualified products database for MIL-PRF-32348 or MIL-PRF-24712 Type I or meets the performance requirements of MIL-PRF-24712.

2.2.6 Electrocoat Primer (“E-Coat”): Shall be per IAW MIL-DTL-53084

2.2.6.1 Ferrous and zinc/zinc alloy coated surfaces shall be cleaned and pretreated with a Type I zinc phosphate coating per IAW Fed spec TT-C-490E plus any additional requirements from the cleaner/chemical QPL or QPD Supplier.

2.2.6.2 E-Coat application shall be done per IAW written instructions from the E-Coat QPL or QDP Supplier unless otherwise approved by TACOM.

2.2.6.3 All pre-production E-Coat test panels shall be scribed per ASTM D1654- 08, Section 5 and then undergo 1000 hours of salt spray per ASTM B117 for non-galvanized surfaces or 40 cycles of SAE J2334 or GMW14782 for galvanized surfaces.

2.2.6.4 Once samples are approved and production has begun, the finishing contractor shall, on a monthly basis, perform a corrosion audit by E-Coating two (2) test panels through the actual production line. The test panels shall then be tested as listed in 2.2.6.3.

- 2.2.6.5 After corrosion testing, all samples shall pass the requirements of:
- 2.2.6.5.1 ASTM D3359- 17: Standard Test Method for Rating Adhesion by Tape Test. Adhesion rating shall be a minimum of rating 3B per Fig. 1.
 - 2.2.6.5.2 ASTM D610- 08: Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces. Rust Ratings shall be no lower than grade 9 per Table1.
 - 2.2.6.5.3 ASTM D714-02: Standard Test Method for Evaluating Degree of Blistering of Paints. Blistering of paint, shall be no greater than Few, Blister size 4 Fig. 2 and no more than 5 blisters per 24 in square.
 - 2.2.6.5.4 ASTM D1654-08: Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments. Creepage from the scribe shall be no greater than Rating 6 of Table 1. Evaluation of unscribed area shall be no greater than rating number 9 of Table 2.

3.0 Government / AMG Approval: TT-C-490 Type I and V require TACOM or AMG approval of pre-treatment systems prior to coating production parts. Painting shall be IAW the Chemical Agent Resistant Coatings (“CARC”) Application Procedures and Quality Control Inspection specification MIL-DTL-53072D or later revision as it pertains to TT-C-490 Type I and V pre-treatment approvals. Suppliers shall use only TACOM or AMG approved TT-C-490E or later revision Type I or V pre-treatment facilities.

3.1 Pre-Production Testing for Type I and V Pretreatment: Pre-production testing of pretreatment will be performed as specified in TT-C-490F and MIL-DTL-53072D.

- 3.1.1 Preproduction Corrosion Testing:** Preproduction corrosion test will be performed per the requirements of TT-C-490F and MIL-DTL-53072D except for the following:
- The paint supplier shall coat fifteen (15) panels (see 3.2.2 of TT-C-490F) with the proposed zinc phosphate coating procedure outlined for use.
 - Three (3) of the fifteen (15) panels shall be tested for coating weights and the results of this test submitted showing compliance to the requirement per paragraph 3.4.1 of TT-C-490F.
 - Three (3) of the fifteen (15) panels with zinc phosphate only will be coated with the primer to be used in production and meeting the requirements of MIL-DTL-53072D. The primer dry film thickness shall be per Table III of TT-C-490F. These three (3) panels shall be subjected to salt spray testing for the number of hours indicated in Table III of TT-C-490F and the results of this test submitted showing compliance to the requirement.
 - The remaining nine (9) panels, three (3) zinc phosphate only, three (3) zinc phosphate and primer and three (3) zinc phosphate, primer and top

coat shall be properly packaged and sent to AMG Supplier Quality. When sending the remaining nine (9) panels to AMG, the supplier shall provide the procedures and process controls detailing the processes used for cleaning, pre-treating, priming, and topcoating used in production to process the panels. The panels must be submitted to AMG Supplier Quality for approval prior to production.

- AMG Supplier Quality will review the test results, procedures, and control plan submitted. AMG Supplier Quality will test the panels submitted as it deems necessary, and notify TACOM of the approval of acceptable test results, procedures, and control plans.
- Any changes to this approved procedure shall be resubmitted for testing and approval by AMG Supplier Quality and the TACOM IAW paragraph 3.1 of this document.
- Any previously government approved paint suppliers of TT-C-490E or later are approved for this contract as long as there are no changes to the written procedures or products being used within the system.

3.1.2 Pre-production Corrosion Testing of Pretreatment Systems for Galvanized Substrates

- 3.1.2.1 Pre-production corrosion testing of pretreatment systems for galvanized substrates shall be performed using Laboratory Cyclic Corrosion Test per GMW14872 or Cyclic Corrosion Laboratory Test per SAE J2334.
- 3.1.2.2 Test coupons with primer only shall be aged for seven days and scribed through the primer per ASTM D1654- 08, Section 5
- 3.1.2.3 The coupons shall be tested for 40 cycles per GMW14872 or SAE J2334.
 - 3.1.2.3.1 After 40 cycle test exposure, the test coupons shall be scraped at a 30 degree contact angle (approximate) with a one inch (approximate) metal blade, such as a flexible putty knife, both parallel and perpendicular to the scribe.
 - 3.1.2.3.2 There shall be no more than 3mm of rust creep (zinc corrosion products), blistering or loss of paint adhesion from the scribe line and no more than 5 blisters in the field with none greater than 1mm.
 - 3.1.2.3.3 This test shall be performed at two month intervals (two test coupons) to ensure that the process is in control.
 - 3.1.2.3.4 An alternative test for verifying process control is GMW15288 Scab Corrosion Creepback of Paint Systems on Metal Substrates.

3.1.3 Production Ongoing Corrosion Testing

- 3.1.3.1 Corrosion resistance tests shall be conducted on a monthly basis by E-Coating two (2) test coupons through the actual process that has been found to be in statistical control. Test coupons shall then

be described in accordance with Section 5 of IAW ASTM D1654-08.

- 3.2 TT-C-490 Documentation Submittal:** Submit all TT-C-490 documentation, along with the system documented procedures, to AMG Supplier Quality for review and approval. Please include any previous letter of government approval to Revision E or later along with this submission.
- 3.3 Prior Government Approval:** If the system has prior government approval to Revision E or later with no change in chemicals or process, the supplier shall submit to AMG Supplier Quality those approved procedures, letter of approval and the system documented procedures for our review and acknowledgement. This acknowledgement does not relieve the supplier of their responsibility to meet all requirements of the drawings and applicable specifications.
- 4.0 Changes:** Prior to making any changes to chemicals, processes or procedures, the supplier must notify AMG Supplier Quality in accordance with the changes section of this document, see section 8 of the AM General Supplier Quality Manual document for further requirements.
- 5.0 Test Data and Records:** All test data records shall be available upon request for any and all test required by this supplement. See section 5 of the AM General Supplier Quality Manual document for further requirements.

COMMERCIAL FINISHES

- 6.0** Parts supplied by Purchase Order number prefixed by the letters "COM" requiring prime or topcoat paint application must meet the quality acceptance criteria determined by AMG Supplier Quality.

SUPPLEMENT 5 TO AM GENERAL SUPPLIER QUALITY MANUAL

ARMOR MATERIAL REQUIREMENTS

1.0 Traceability of Armor Materials: The supplier shall maintain a program that enables traceability of any armor material used as a component of system survivability back to its source of supply. At a minimum, the following requirements shall apply:

1.1 Ballistic Grade Steel and Aluminum:

1.1.1 **Traceability:** The supplier shall ensure all materials are traceable from the heat and plate lot acceptance and ballistic test report through processing such as cutting, blanking or other operations resulting in the final part configuration. Traceability up to the point of the plate cutting does not release the supplier from the responsibility that the final system meets all the specifications of the drawing.

1.1.2 **Hardness Testing:** For steel armored components, hardness testing to the applicable specification must be completed prior to cutting, blanking or other operations resulting in the final part configuration. Test results must be included with the traceability record.

1.2 Transparent Armor:

1.2.1 **Traceability:** The supplier shall ensure that all materials are traceable to the manufacturing lot and ballistic test results from the source of supply.

1.3 Composite Armor:

1.3.1 **Traceability:** The supplier shall ensure that all materials are traceable to the manufacturing lot and ballistic test as defined on the drawing or specification.

1.4 Control Plan: A control plan per AIAG APQP and Control Plan Manual that defines the process to control, document traceability and testing of these materials must be submitted to AMG Supplier Quality for review and acknowledgement.

1.5 Records: Records of traceability must be retained in accordance with the record retention requirements of the Purchase Order.

1.6 Ballistics Testing: Ballistic testing shall be conducted with Government approved sources recognized by AMGs contract with the Government.

1.7 Shipment: Supplier shall not ship any products that do not have verifiable material certifications without prior approval from AMG Supplier Quality.