



**SUPPLIER QUALITY GUIDELINES**

**QUALITY ASSURANCE REQUIREMENTS**

**AM GENERAL FM1261-1**

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**AM GENERAL, LLC**  
**SUPPLIER QUALITY GUIDELINES**  
**QUALITY ASSURANCE REQUIREMENTS**  
**AM GENERAL FM1261-1**

**1.0 General Information**

This document establishes quality requirements and defines supplier responsibilities for ensuring that purchased items conform to AM General drawings, specifications and procurement requirements. This document shall be incorporated by reference into every purchase order issued by AM General.

**JLTV BRV-O® Specific Quality Requirements Addendum:** In addition to the requirements and supplements of FM1261-1, program specific requirements are in the FM1261-1 “JLTV BRV-O® Specific Quality Requirements” addendum.

It is the supplier’s responsibility to read and comply with all the requirements within this document, its supplements and addendum(s).

If there is any part of this document that is not fully understood, contact your AM General Supply Chain Management Representative.

**2.0 Quality Management System**

**2.1 Quality Management System:** AM General requires our suppliers, as a minimum, to be compliant to the requirements of the ISO 9001:2008 or ISO/TS16949:2009 standards. The quality system and manual shall follow the guidelines within ISO 9004:2009. It is recommended that the Supplier’s location is registered by a third party registrar as well. Effective March 31, 2014, all suppliers to AM General are required to be ISO 9001:2008 or ISO/TS16949:2009 registered by an accredited third party registrar or to have a plan in place to accomplish this registration. This plan shall address specific actions and timing.

At a minimum, the Supplier should possess all AIAG (Automotive Industry Action Group) Core Quality Tool Manuals – latest editions. The reference AIAG Manuals are 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](http://www.aiag.org)

**2.2 Advanced Product Quality Planning:** Product Quality Planning is a structured method of defining and establishing the steps necessary to ensure that a product satisfies the customer. The Supplier shall establish a structured approach to implement new

processes utilizing the AIAG Advanced Product Quality Planning and Control Plan manual as a guide. This structured approach to new product planning will enable the Supplier to effectively launch new products and ensure controls are established to achieve the highest levels of Quality.

**2.3 Sub-tier Supplier Quality Assurance:** The Supplier is responsible for communication of all purchase order requirements to all sub-tier suppliers.

**2.3.1 Sub-tier Supplier Quality Assurance Procedure:** The Supplier shall have a process in place to ensure that all sub-tier Suppliers have and maintain a system to provide conforming product and services in accordance with AM General requirements. This process shall include but is not limited to the following elements;

- Require adherence to FM1261-1 on all PO's issued that are related to the manufacturing or processing of AM General 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 AM General.

**2.4 Sampling:** For some parts, sampling is required as designated on specific drawings. Where sampling is not designated, a supplier may use a statistically significant sampling plan for acceptance of material. Examples of acceptable sampling plans include MIL-STD-1916, "DoD Preferred Methods for Acceptance of Product" (available online at <http://assist.daps.dla.mil>), or ANSI/ASQ Z1.4, "Sampling Procedures and Tables for Inspection by Attributes" (available online at [www.asq.org](http://www.asq.org)). Use of MIL-STD-105E is acceptable when specifically designated [as in a Quality Assurance Provision (QAP)].

**2.5 Special Characteristics:** Any part having special characteristics including but not limited to <SC> (Safety Critical), <FF> (Fit/Function), Critical Safety Item (CSI), Regulated [R], Major or Minor Characteristics, must have the following submitted with the First Piece Sample Submission:

- **Process Flow Chart** showing links to Process Failure Modes and Effects Analysis (PFMEA) and Control Plan. The format and content shall be in accordance with AIAG Advanced Product Quality Planning and Control Plan.
- **Process Failure Modes and Effects Analysis** with the format and content in accordance with AIAG Potential Failure Mode and Effects Analysis.
- **Control Plan** addressing how the supplier is going to monitor, control and document compliance. This control plan format and content shall be in accordance with AIAG Advanced Product Quality Planning and Control Plan. The control plan should specifically address the individual special characteristics as defined on the drawing or in the QAP with each characteristic having its own line on the control plan.

- **SPC, Control Test, Certificates and Measurements** for first piece sample approval and at specified frequencies.
- For each special characteristic, identify critical manufacturing processes and calculate the **process capability index** (Cpk) for each critical process. For processes with insufficient data to determine capability, data from similar in-factory processes can be used to estimate Cpk or perform 100% inspection or test of key characteristics.
  - After initial sample submission, capability for critical processes shall be tracked and improvement actions instituted for processes with low yields or unacceptable variation. Critical Safety characteristics shall maintain a Cpk index equal or greater than 1.66 and Major Characteristics shall maintain a Cpk index equal to or greater than 1.33. As an alternate control method, the supplier may perform 100% inspection or test of key characteristics.

Upon initial sample submission and part approval by AM General Quality Assurance, part designs containing special characteristics as well as their associated approved manufacturing processes cannot be changed or modified in any respect without prior approval of AM General Quality Assurance. Such changes require a full re-submittal of samples and submission data for approval by AM General Quality Assurance prior to delivery of product.

**2.6 Measurement System Analysis and Calibration:** For monitoring and measuring equipment listed on a special characteristics control plan, a Measurement System Analysis is required that complies with TS16949:2009 paragraphs 7.6.1 and 7.6.2. The format and content shall be in accordance with AIAG Measurement Systems Analysis (MSA) manual.

**2.7 Specific Requirements for Fasteners and Hardware:** Requirements are specified in Supplement 1 of this document. Objective evidence of compliance to these requirements must be included with the First Piece Sample Submission required in 4.0 et al. These requirements apply to all suppliers furnishing any product with fasteners included as a component of the purchased part.

**2.8 Nonconforming Product:**

**2.8.1 Nonconforming Definition:** Product with unidentified or suspect status shall be classified as nonconforming product, including counterfeit product.

**2.8.1.1 Counterfeit Product Definition:** 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.

- 2.8.2 **Control of Nonconforming Product:** The supplier must have a documented procedure for control of nonconforming material. This procedure must provide for the implementation of appropriate actions to correct recurring or repetitive nonconformities. The supplier shall take prompt and effective action to correct conditions which have resulted or could result in the submission of items in a defective or non-conforming condition.
- 2.8.3 **Reporting a Discrepancy:** AM General Quality Assurance and Supply Chain Management shall be notified immediately upon discovery of any deviation from drawings, specifications or procurement requirements. Suppliers shall immediately implement containment actions to prevent the supply of additional nonconforming material.
- 2.8.4 **Nonconforming Material Disposition:** Disposition of any nonconforming material other than by reworking to conformance with the applicable requirements or by scrapping the nonconforming material at the expense of the supplier must be approved in writing by AM General.
- 2.9 **Quality Records:** The supplier is responsible for maintaining quality records of inspections and outgoing product quality of all lots of material shipped to AM General. 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 five (5) years after completion of the purchase order, unless otherwise relieved by AM General. The supplier shall advise AM General in advance of any intended disposition of such records. This requirement must be imposed by the supplier on any sub-suppliers.
- 2.9.1 **Record Retention and Storage Procedure:** The supplier shall have a documented procedure or workflow which describes how and where quality records will be retained and what process will be used to prevent premature destruction of required records.
- 2.10 **Changes:** 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 AM General through the Purchase Order Change (POC) process. Authorization, in writing, must be obtained prior to implementation of any change including those listed in Section 4.1.

The supplier must communicate all change requests utilizing the Process Change Notification/Request (PCN) form. This form must be submitted as soon as possible but at least 12 weeks prior to the planned change implementation. The form is available on the AM General website at <http://www.amgeneral.com/support/supply-chain/military.php>. The completed forms shall be sent to the AM General Supply Chain Management Representative via electronic transmittal.

A First Piece Sample Submission in accordance with paragraph 4.0 must be submitted and approved prior to implementation of any change into production or service part builds. AM General may require additional testing to ensure changes have no impact on intended use or long term durability. This testing may be above the technical data

package requirements (drawings and other quality provisions) in your possession but may be deemed necessary to ensure AM General's customer's requirements will continue to be met. Submission of parts manufactured to the requested change configuration prior to production implementation of parts may also be required.

## 2.11 Identification and Packaging Requirements:

2.11.1 **Shipment Identification:** Identification requirements for each shipment are as follows: Part Number, Rev. Level, Part Name, P.O. Number, Manufacturer's Identification, Lot or Date Code and Quantity. This information must be included on shipping paperwork and package labels. Individual parts are to be identified in accordance with drawing requirements unless exempted by purchase order.

2.11.2 **Identification of Shelf Life Material:** For items that have a shelf life requirement, the supplier must identify the shelf life of material for each item, package or container with its cure or manufacture date, expiration date and special storage and handling conditions in addition to the standard identification requirements. The supplier shall have a process in place to ensure that items provided to AM General are not past the expiration date.

2.11.3 **Marking of Tools, Molds and Test Equipment:** Supplier must permanently mark AM General owned tools, molds and test equipment with the applicable part number, dash and revision number as stated on the purchase order. If a mold contains more than one cavity producing the same part number, each cavity is to be numbered.

2.11.4 **Packing and Packaging:** Supplier is responsible to ensure that all items are adequately packed and packaged to prevent damage or contamination.

## 3.0 Access to Supplier's Facilities

3.1 **AM General and Government Audits:** Government Quality Assurance Representative(s) will conduct joint periodic audits of supplier 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:

- Evidence of inspection to assure adherence to applicable drawings and/or specifications and revisions thereto.
- Periodic calibration of inspection equipment and control of certification records per ISO 9001:2008 or ISO/TS 16949:2009.
- Test data records of all qualifications and acceptance tests performed.
- Certification of personnel and processes such as heat treating, plating, anodizing, magnetic particle inspection, etc., when required by specification or contract.

- Failure analysis and corrective action reports.

3.2 **Source Inspection and Surveillance:** AM General and/or the Government may also send a representative to 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 facility before shipment.
- Source Surveillance: All items are subject to surveillance by AM General Quality Assurance personnel. This may include the review of the supplier's inspection system, procedures and quality or test records during the production run to ensure conformance to drawing, specification and supplier procedure requirements.

4.0 **First Piece Sample Submission:** AM General's First Piece Sample Submission is similar to the AIAG Production Part Approval Process. While a supplier is expected to develop and maintain on file all the data and objective evidence noted below, AM General Supplier Quality will identify specific items that shall be submitted for review and approval.

The supplier shall not ship parts to AM General prior to approval of the First Piece Sample Submission, unless authorized by AM General Supplier Quality. Documented results of the review by AM General Supplier Quality will be provided to the supplier indicating approval or rejection of the submitted sample.

Documentation will be submitted to AM General Supplier Quality Assurance using AM General's Sample Inspection Report which can be downloaded from the following location; <http://www.amgeneral.com/support/supply-chain/sample.php>. An alternate form may be used if it provides the same information. This data should be sent via email to [submission.data@amgeneral.com](mailto:submission.data@amgeneral.com).

4.1 **Conditions Requiring First Piece Sample Submission:** A Process Change Notification/Request (PCN) Form and First Piece Sample Submission shall be completed when the following events occur:

- Initial submission (PCN not required)
- AM General driven Engineering change (PCN not required)
- Supplier driven Engineering change
- Tooling transfer, replacement or refurbishment. For parts produced with prototype tooling, another submittal is required once the hard or production tooling has been implemented. Final approval will not be granted until the production tooled sample has been approved.
- Correction of a discrepancy
- Changing to optional construction material
- Sub-supplier or material source change
- Change in part processing
- Parts produced at an additional location
- When requested by AM General

4.2 **Sample Submission Requirements:** The supplier shall develop a first production part inspection record containing 100% dimensional inspection for all characteristics, notes, tests, specifications and/or special instructions noted on the purchase order or on the associated drawings. This data shall include all data for the final assembly drawing as



well as all subassembly or individual components that comprise the final purchased part number as indicated on AM General drawings. First Piece Sample submissions shall include the following when specified by AM General Supplier Quality:

Note: Each of these documents shall also have the date that the activity or operation was performed.

4.2.1 **Dimensional inspection Results:** Complete dimensional inspection results including reference to AM General generated and distributed design record. AM General design records may include drawings or CAD models. All dimensions and notes shall be numbered and cross-referenced against the design record and documented on the layout form in the submission package (i.e. ballooned drawing).

If CAD or other electronic data are used to produce a product, objective evidence must be provided to demonstrate conformance to the math model. The objective evidence shall include a comparison of actual measured values compared with all dimensions identified in the model.

This complete inspection must be performed on a minimum of one of the first ten parts unless otherwise specified. When requested, a process capability study must be performed to demonstrate the supplier's ability to consistently provide conforming goods or services.

4.2.2 **Certificate of Compliance (C of C) / Part Submission Warrant (PSW):** A C of C or PSW must be supplied with the First Piece Sample Submission. The C of C or PSW must be supported by inspection and test data, material analysis or certification from the raw material producer/processor. Such information must be submitted to AM General for any specifications covering raw material, processed material and processes. C of C form 1AF2500 can be found in the electronic sample submission file located on AM General's website (<http://www.amgeneral.com/support/supply-chain/sample.php>).

4.2.3 **Process Flows and Control Plans:** Process Flows and Control Plans in accordance with paragraph 2.5 Special Characteristics and 4.2.10 SQAP/QAR/QAP/Drawing Inspection Report Supplemental Information.

4.2.4 **Test Reports:** Testing such as chemical, physical, functional, environmental, durability, non-destructive, etc. must be performed by a qualified laboratory (ex. an accredited laboratory or one whose quality management system complies with an industry recognized standard such as ISO 17025 or ISO/TS16949).

All chemical and physical test reports must contain the following:

- Report number
- Date of test
- Part number
- Method of test as defined on the drawing or specification
- Actual test values
- Comparison of the actual values to the requirements
- Determination regarding conformance to specification / requirements

- Signature and title of the authorized representative of the agency performing the test
- 4.2.5 **Process and Material Certification:** Processes such as heat treating, welding, soldering, surface preparation and treatment and conformal coating require the completion of a Process and Material Certificate. The Process and Material Certificate shall include the following as a minimum:
- Process or material supplied
  - Purchase order number
  - Specification to which process or material conforms
  - Name of the agency that tested the process or material (if other than the supplier).
  - Signature and title of the authorized representative approving the information.
- 4.2.6 **Catalog or Commercial off the Shelf (COTS) Items:** Include one legible and reproducible copy of applicable specifications, drawings and catalogs. In addition, provide a copy of a purchase order or other evidence that the parts were procured from the indentified source.
- 4.2.7 **Proof of Tool Compliance:** Tooling and dimensional samples must conform to the engineering drawings and specifications stated on the purchase order. Unless AM General Quality Assurance personnel direct otherwise, the inspection of tooling and/or dimensional samples shall be at the supplier's facilities. Dimensional samples are to be identified by tool numbers.
- 4.2.8 **Traceability:** Traceability shall be in compliance with ISO 9001:2008 or TS-16949:2009 and records will be made available to AM General Supplier Quality upon request. For armor materials, traceability shall also comply with Supplement 4.
- 4.2.9 **Radiographic Inspection:** Personnel performing film interpretation must be certified in accordance with the specification required by the drawing or procurement specification. Copies of any interpretations and personnel certifications must be included in the first piece inspection record.
- 4.2.10 **SQAP/QAR/QAP/Drawing Inspection Report Supplemental Information:** Supplementary Quality Assurance Provisions (SQAP) or Quality Assurance Requirements (QAR), Quality Assurance Provisions (QAP), Procurement Specifications, performance qualifications or any other specifications may be identified on the drawings. In such cases, the supplier must provide documentation showing compliance with these requirements to AM General Supplier Quality Assurance. Dimensional and test values, and evidence of compliance to all requirements, must be identified and may include the following.
- 4.2.10.1 **Initial Production Approval (IPA) / Initial Production Inspection (IPI):** Samples shall be selected as initial production items in accordance with individual IPA/IPI requirements and shall be subjected

to examinations and tests by the supplier or an approved outside laboratory. Items tested shall be produced under manufacturing methods to be used in production. Initial production approval shall be accomplished to determine conformance to all requirements of drawing(s) and characteristics as specified by SQAP, QAR, or QAP.

4.2.10.2 **Pre-Production Approval (PPA):** A sample(s) of parts produced using a new configuration must be inspected and tested as applicable before proceeding with the production run. Actual dimensions or quantitative data for all blueprint or test characteristics must be recorded, including environmental and dynamic testing. Inspection records must be submitted and approved by AM General Quality Assurance prior to production.

4.2.10.3 **Control Tests (CT):** When Control Tests are specified, the supplier shall perform the required Control Tests as defined in the SQAP/QAR/QAP or drawings. A copy of the test report shall be submitted to AM General Quality Assurance for approval before parts representative of the Control Testing are shipped to AM General.

4.2.11 **Welding Requirements:** Welding procedures, machine and operator qualifications and minimum quality weld samples for all classes and types of welds shall be submitted to AM General Supplier Quality Assurance for review and acknowledgement by AM General and/or the Government, in accordance with the AM General Supplier Weld Procedure Guidelines contained in Supplement 2 of this document.

4.2.12 **Coating and Other Finish Requirements:** Verification that all cleaning and coating requirements specified on drawings, specifications or other documentation must be included in the first piece inspection record in accordance with Supplement 3 of this document.

4.2.13 **Armor Material Requirements:** The supplier shall maintain a program that provides traceability of all armor materials in accordance with Supplement 4 of this document.

# SUPPLEMENT 1 TO AM GENERAL FM1261-1 FASTENER QUALITY ASSURANCE REQUIREMENTS

- 1.0 Scope:** This Supplement establishes quality assurance 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:** Suppliers subject to this Supplement shall document, implement and maintain a fastener quality management system 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, (see <https://assist.daps.dla.mil/quicksearch/>).
  - 1.1.3 Changes:** Changes described in paragraph 2.10 of the FM1261-1 main document must be reviewed, approved and authorized in writing by AM General 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 2.4 of the FM1261-1 main document 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 (ex. an accredited laboratory or one whose quality management system complies with an industry recognized standard such as ISO 17025 or ISO/TS16949).

# SUPPLEMENT 2 TO AM GENERAL FM1261-1 WELD REQUIREMENTS

## FIRST PIECE WELD SAMPLE SUBMISSION

- 1.0 Classes and Types of Welds:** ALL CLASSES and TYPES of welds shall be submitted to the AM General Supplier Quality Assurance for review. Supplier remains responsible for compliance and ensuring weld procedure specification (WPS) / procedure qualification records (PQRs) are compliant with applicable 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 AM General Supplier Technical Visits, Source Audits, or at any time when weld quality issues are identified by AM General, the suspect welding procedure(s) or welder(s)/welding operator(s) shall be submitted for review.
- 2.0 Records:** Following AM General's review / acknowledgement of supplier's of procedures, control plans and weld samples, all records shall be maintained and made available to AM General for review upon request. See paragraph 2.9 of the FM1261-1 main document for further requirements.
- 3.0 First Piece Sample 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 AM General's Supplier Quality representative signature to indicate acknowledgement of the Welding Sample Submission.
- 3.2 Welding procedures (PQR/WPS)**
- 3.3 Shielding Gas:** Proof of Weld Quality in accordance with AWS A5.32.
- 3.4 Weld Repair Procedure**
- 3.5 Weld Samples:** Digital (preferred) or Cut/Etched and Preserved
- 3.6 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.

**3.7 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:

**3.7.1 Digital Submittals (preferred):**

- A drawing of the part showing the removal location(s) for each sample.
- 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 AM General Quality Assurance.
- 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.

**3.7.2 Physical Submittals:**

- A drawing of the part showing the removal location(s) for each sample.
- 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 AM General Quality Assurance.
- Identification of each sample shall be clearly marked on the sample, on an attached tag or label, or be noted on an envelope or bag containing the sample.
- Each sample shall include a full cross-section of the welded joint, plus at least  $\frac{1}{4}$ " of adjacent base metal on each side, if possible.
- The weld cross-section shall be polished and etched with a suitable etchant so that the weld is clearly visible.
- 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 AM General Quality Assurance.

# SUPPLEMENT 3 TO AMG FM1261-1 GENERAL PAINT REQUIREMENTS

**This requirement does not supersede the paint requirements designated on drawings. This Supplement is strictly for the use of HMMWV Military and Commercial parts and components or any other non-JLTV related parts.**

- 1.0 Coating Process Control Documentation:** All coating systems utilized shall have documented procedures detailing how the coating system is 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 CARC coatings are being utilized, these procedures shall be submitted to AM General Supplier Quality Assurance for review and acknowledgement.
- 2.0 Contract exclusion/exceptions:**
- 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 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:
- (1) 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.
  - (2) The appearance of a powdery pretreatment (heavy coating) is acceptable provided the pretreatment product will be Electrocoat primed per MIL-P-53084.
  - (3) A powdery pretreatment (heavy coating) is unacceptable if a solvent borne primer such as MIL-P-53022 or MIL-P-53030 is used.
  - (4) 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.
  - (5) 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:** The following cleaning, 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 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.
  - 2.2.5.2 All cleaning and conversion coatings prior to powder coating of surfaces and quality inspection shall be IAW MIL-DTL-53072D.
  - 2.2.5.3 Cleaning and pretreatment shall be IAW TT-C-490D that addresses the substrate being used.
- 2.2.6 E-Coating (Electrocoat Primer):** Shall be IAW MIL-DTL-53084
- 2.2.6.1 E-coat application shall be done IAW written instructions from the E-coat QPL or QDP supplier unless otherwise approved by TACOM.
  - 2.2.6.2 Ferrous and zinc/zinc alloy coated surfaces shall be cleaned and pretreated with a Type I zinc phosphate coating IAW Fed spec TT-C-490D plus any additional requirements from the e-coat QPL or QPD supplier.
  - 2.2.6.3 All pre-production e-coat test panels shall be scribed IAW ASTM D1654- 92, section 4.1 or 4.2 and then undergo 1000 hours of salt spray ASTM B117 for non-galvanized surfaces, or 40 cycles of SAE J2334 or GMW14782 on galvanized surfaces.
  - 2.2.6.4 Once samples are approved and production has begun: The coating contractor shall, on a monthly basis or as agreed upon, perform a corrosion audit by e-coating two (2) test panels through the actual production line. The test panels shall then be scribed IAW ASTM D1654- 92, section 4.1 or 4.2 and be tested for a period of 1000 hours IAW ASTM B117 neutral salt fog test, or 40 cycles of SAE J2334 or GMW14782 for galvanized surfaces.
  - 2.2.6.5 After corrosion testing, all samples shall pass the requirements of:
    - 2.2.6.5.1 ASTM D3359- 09: Standard Test Method for Measuring Adhesion by Tape Test. Adhesion rating shall be no greater than classification 3B, 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, 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- 92: 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 not be greater than rating number 9 of Table 2.

**3.0 Government / AM General Approval:** TT-C-490D Type I and V require government 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-490D Type I and V pre-treatment approvals. Suppliers shall use only TACOM approved TT-C-490D or later revision Type I or V pre-treatment facilities.

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

- 3.1.1 **Preproduction Corrosion Testing:** Production corrosion test will be performed per the requirements of TT-C-490D and MIL-DTL-53072D except for the following:
  - 3.1.1.1 The paint supplier shall coat fifteen (15) panels (see 4.2.2 of TT-C-490D) by the proposed zinc phosphate coating procedure outlined for use.
    - 3.1.1.1.1 Three of the fifteen panels shall be tested for coating weights and shall report the results of this test showing compliance to the requirement per Para. 3.5.3.1 of TT-C-490D.
  - 3.1.1.2 Nine of the fifteen panels with zinc phosphate only will be primed with the primer to be used in production meeting the requirements of MIL-DTL-53072D. The primer dry film thickness shall be a thickness of 1.5 (+/- 0.2 mils).
    - 3.1.1.2.1 Three of the nine panels shall be subjected to salt spray test for the number of hours indicated in Table II in Para. 6.9.2 of TT-C-490D and shall report the results of this test showing compliance to the requirement.
  - 3.1.1.3 The remaining nine panels, three zinc phosphate only, three zinc phosphate and primer and three zinc phosphate, primer and top coat shall be properly packaged and sent to AM General, Supplier Quality Assurance.

- 3.1.1.4 When sending the remaining nine panels to AMG, supplier shall provide the procedures and process controls which detail the processes used to clean, pre-treat, prime and topcoat that is used in production and was used to process the panels. The panels shall be submitted to AMG Supplier Quality Assurance for approval prior to production.
- 3.1.1.5 AM General Supplier Quality Assurance will review the test results for each test, the procedures and control plan submitted. AMG Supplier Quality Assurance will perform test on panels submitted, as it deems necessary, and notify TACOM of the approval of acceptable test results, procedures and control plans.
- 3.1.1.6 Any changes to this approved procedure shall be resubmitted for testing and approval by AM General Supplier Quality Assurance and the TACOM IAW Para. 3.1 of this document.
- 3.1.1.7 Any previously government approved paint suppliers of TT-C-490D or later revision IAW section 3 of TT-C-490D 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 testing of pretreatment systems for galvanized substrates shall be performed using Accelerated Corrosion Test protocol contained in GMW 14872 or SAE J2334 rather than ASTM B117 salt spray or GM 9540P Method B.
- 3.1.2.2 Test coupons with primer only shall be cured for seven days and scribed through the primer per ASTM D1654- 92, section 4.1 or 4.2.
- 3.1.2.3 The coupons shall be tested for 40 cycles per GMW 14872 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 GM9511P for 10 cycles (See Para 3.2.1).
- 3.1.2.4 Due to the update to GM9540P, GMW 14872 may be used and tested to the 40 cycles
- 3.1.2.5 Due to the update to GM9511P, GMW 15288 may be used and tested to the 10 cycles.

### 3.1.3 Production Ongoing Corrosion Testing

3.1.3.1 Corrosion resistance tests shall be conducted on a monthly basis by e-coating (2) test coupons through the actual process that has been found to be in statistical control. Test coupons shall then be scribed IAW ASTM D1654-92, section 4.1 or 4. 2.

**3.2 TT-C-490D Documentation Submittal:** Submit all TT-C-490D paragraph 3.0 or later revision documentation along with the system documented procedures to AM General Supplier Quality Assurance for review and approval. Please include any previous letter of government approval to Revision D or later along with this submission.

**3.3 Prior Government Approval:** If the system has prior government approval to Revision D or later with no change in chemicals or process, the supplier shall submit to AM General Supplier Quality Assurance 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 AM General Supplier Quality Assurance in accordance with the changes section of this document, paragraph 2.10 of the FM1261-1 main 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 paragraph 2.9 of the FM1261-1 main 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 AM General Supplier Quality Assurance.

# SUPPLEMENT 4 TO AMG FM1261-1

## 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. These 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 AM General Supplier Quality for review and acknowledgement.

**1.5 Records:** Records of traceability must be retained in accordance with the record retention requirements of your contract.

**1.6 Ballistics Testing:** Ballistic testing shall be conducted with Government approved sources recognized by AM General's contract with the Government.

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

# ADDENDUM TO AM GENERAL FM1261-1

## JLTV BRV-O® Specific Quality Requirements

This addendum is intended for suppliers of materials, parts and services (i.e., cleaning/pretreating/coating/plating//heat treating, etc.) for AM General's JLTV BRV-O. These program specific requirements either supersede or are in addition to those listed in the FM1261-1 main document (and its supplements).

### 1.0 JLTV Supplier Quality Management System:

1.1 AM General's Joint Light Tactical Vehicle (JLTV) Supplier Quality Assurance program requires the supplier to have an active Quality Management System (QMS) certificate of registration to either ISO 9001:2008 or ISO/TS 16949 for the site where customer-specified parts, for production and/or service are manufactured.

1.2 The supplier shall comply with the following ISO/TS 16949:2009 Quality Management Systems clauses (current edition):

1.2.1 7.3.1.1 *Multidisciplinary Approach*

1.2.2 7.3.2.3 *Special Characteristics*

1.2.3 7.3.3.1 *Product design outputs – Supplemental (for design responsible suppliers)*

1.2.4 7.3.3.2 *Manufacturing process design output*

1.2.5 7.5.1.1 *Control Plan*

1.2.6 7.5.1.2 *Work Instructions*

### 2.0 JLTV Advanced Product Quality Planning (APQP)

2.1 The supplier shall use current editions of "Advanced Product Quality Planning and Control Plan"\* and "Potential Failure Mode and Effects Analysis"\* manuals published by Automotive Industry Action Group (AIAG), as guides for format and content of:

2.1.1 Quality Plan

2.1.2 Process Flow

2.1.3 Design Failure Modes and Effects Analysis (DFMEA - for design responsible suppliers)

2.1.4 Process Failure Modes and Effects Analysis (PFMEA)

2.1.5 Control Plans

### **3.0 JLTV Supplier Product Approval Process:**

- 3.1** The supplier shall use the current edition of the “Production Part Approval Process (PPAP)”\* manual published by AIAG for requirements and associated processes used for submission and approval of PPAPs.
- 3.2** The supplier shall use Level 3 as the default level for all PPAP submissions unless otherwise specified by the authorized customer representative.

\*For more information go to Automotive Industry Action Group at <https://www.aiag.org/scriptcontent/index.cfm>

### **4.0 JLTV Weld Requirements:**

- 4.1** The supplier shall comply with requirements in “FM1261-1 Supplier Quality Guidelines, Supplement 2 Weld Requirements” and submit welding procedures for pre-qualified weld joints as specified in American Welding Society (AWS) D1.1.
- 4.2** The supplier shall develop and maintain a welding equipment calibration program. This program shall consist of, as a minimum, an annual comparison check of the machine output with certified instrumentation that is calibrated using standards traceable to the National Institute of Standards and Technology (NIST).
- 4.3** Welding procedures that have been previously qualified under another AM General or Department of Defense contract for a supplier to meet the requirements of other standards, specifications, codes or earlier versions of the standard(s), may be used by the supplier to support a Weld Procedure Specification (WPS) under this contract.
- 4.4** The supplier shall submit a written request to the AM General Supplier Quality Assurance representative for approval prior to prototyping or build.
- 4.5** All essential variables specified in the applicable welding standard(s) shall be included on the Procedure Qualification Record(s) (PQRs).
- 4.6** The following requirements shall be met and documentation shall be provided:
- 4.7** The weld procedure was qualified by destructive testing and approved on a previous DOD contract and the essential variables are within the tolerance as specified in the applicable welding standard(s) for the current contract.
- 4.8** The Contractor has certified welders and equipment to the qualified procedures in accordance with the applicable welding standard(s).

- 4.9 There was no break in production for more than six months at the facility where the procedures were used.
- 4.10 A favorable quality history with regards to weld quality on the previous contract where the procedures were used.
- 4.11 Suppliers shall have qualified weld inspectors to perform inspection functions used for the verification of weld quality, and the qualification shall be in accordance with at least one of the following conditions:
- 4.12 Current certification in accordance with the American Welding Society (AWS), Certified Welding Inspector (CWI) or Senior Certified Welding Inspector (SCWI), qualified and certified in accordance with provisions of AWS QC1.
- 4.13 Current certified welding inspectors qualified by the Canadian Welding Bureau (CWB) to Level II or the Level III requirements of the Canadian Standards Association (CSA) Standard W 178.2 Certification of Welding Inspectors

## 5.0 Paint Requirements:

**These requirements do not supersede the paint requirements designated on drawings. The requirements as shown in this addendum are specific to the JLTV program and are beyond the requirements of FM1261-1 Supplement 3. This addendum applies to suppliers and sub tier suppliers that coat/finish parts and components for JLTV BRV-O®**

- 5.1 Supplier shall be responsible for itself and its sub tier suppliers to produce and maintain detailed process control and quality control testing and test reports. These documents shall be available to AM General Supplier Quality Assurance and our customer upon request.
  - 5.1.1 Each cleaning method shall be treated as a separate step in the process documentation.
- 5.2 The Gage Repeatability and Reproducibility (Gage R&R) error shall be less than 30 percent for all process and product measurement systems.
- 5.3 CARC primer and CARC topcoat shall not be applied directly to bare metal or plastic, except as provided for in MIL-DTL-53072
- 5.4 If the drawing specifies application of CARC materials over a non-CARC coating, then both CARC primer and CARC topcoat are required. The complete coating system shall meet the requirements for CARC defined in TT-C-490.
- 5.5 Products with Hexavalent Chromium shall not be used. Topcoats with siliceous additives to control gloss are prohibited.

- 5.6 The supplier shall notify AM General Supplier Quality Assurance of any failure to meet pre-production and production requirements

## 6.0 Coating Process Control Documentation:

- 6.1 All coating systems utilized shall have documented procedures detailing how the coating system is 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 CARC coatings are being utilized, these procedures shall be submitted to AM General Supplier Quality Assurance for review and acknowledgement.

- 6.2 Parts and components offered under this purchase order are required to meet the requirement of MIL-DTL-53072E and TT-C-490F Amendment 1.

6.2.1 Parts and components shall be cleaned, pretreated, primed and top coated IAW MIL-DTL-53072E using primer MIL-DTL-53030, MIL-DTL-53084, A-A-52474, or an QPD approved powder coat.

6.2.2 Parts and components shall be top coated with a MIL-DTL-64159 Type II CARC top coat.

6.2.3 For A-A-52474 primer, apply a top coat dry film thickness that is greater than or equal to 2.0 mils and less than or equal to 2.5 mils.

## 6.3 Pre-Production Approval Clarifications

- 6.3.1 Pre-production testing shall include:

6.3.1.1 Thickness of each layer of the coating system

6.3.1.2 Coating system adhesion

6.3.1.3 Salt Spray performance; and

6.3.2 For phosphate pre-treatments, the phosphate coating weight, crystal size and shape and scanning electron microscope photos of the phosphate coating at 500X and 1000X magnification.

6.3.3 Pre-production test samples shall be from the material used in production parts, pieces cut from production representative parts or production representative parts. Standardized test coupons **shall not** be used.

6.3.4 Nine samples shall be produced for the required testing and shall include: three cleaned and pre-treated test samples, three samples with the complete paint system and depending on the CARC paint



system, either three samples with pre-treatment plus primer or three samples with metal-rich primer plus primer.

- 6.3.5 One or more ISO 17025 laboratories shall conduct pre-production testing on the nine test samples in accordance with (IAW) the applicable test method accreditations. The applicable ISO 17025 test method accreditations include ASTM B117 Salt Spray, ASTM B244 Thickness of Non Conductive Coatings on Non- Magnetic Metals, ASTM B487 Measurement of Metal and Oxide Coating Thickness, ASTM B499 Thickness of Non-Conductive Coatings on Magnetic Metals and ASTM D3359 Measuring Adhesion by Tape Test. The latest revision of each stated specification shall be used.
- 6.3.6 Test procedures shall be submitted IAW DI-NDTI-80603 documenting Pre-treatment and Chemical Agent Resistant Coating procedures for required Pre-production test.
- 6.3.7 Test reports from an ISO 17025 accredited labs shall be submitted for Pre-treatment and Chemical Agent Resistant Coating testing as specified in paragraph 6.2.1.8, IAW DI-NDTI-80809.

#### **6.4 Production Testing Clarification Testing**

- 6.4.1 At a minimum, ongoing production quality tests shall be conducted and recorded daily for coating adhesion and coating thickness and monthly for salt spray testing. Use of ISO accredited laboratories is optional for these ongoing tests of production parts. Standardized test coupons shall not be used.
- 6.4.2 Production parts or pieces cut from production parts shall be used for ongoing production quality testing. Standardized test coupons shall not be used.
- 6.4.3 Unless specified, the CARC coating system applied to Hot or Cold Rolled Steel shall meet the minimum of 336 hours of neutral salt spray resistant IAW ASTM B117 unless otherwise is specified.

#### **6.5 Test Data and Procedures Submittal:**

- 6.5.1 All required tests and procedural test documentation, as required in paragraph 6.3.6 and 6.3.7 above shall be submitted to AM General Supplier Quality Assurance for review, acknowledgement and submittal to our customer as required.

#### **6.6 Changes:**

- 6.6.1 Prior to making any changes to chemicals, processes or procedures, the supplier must notify AM General Supplier Quality Assurance in

accordance with the changes section of this document, paragraph 2.10 of the FM1261-1 main document for further requirements.