G&W JLTV Supplier Quality Manual
ADDENDUM

Scope: The requirements herein provide additional guidance for G&W suppliers of the JLTV program

1. **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 G&W and AM General LLC ("AMG") drawings, specifications and other procurement requirements. This document shall be incorporated by reference into every Order issued by G&W. It is the supplier's responsibility to understand and comply with all the requirements within this document, its supplements, and addendums including http://www.amgeneral.com/suppliers/supplier-resources/#quality-engineering. If the supplier has any questions about this document, please contact your G&W Quality Assurance point of contact or e-mail quality@gandwproducts.com.

2. **Supplier QMS Qualification**

   For Suppliers of JLTV Components: All suppliers at a minimum shall be certified to the requirements of the ISO 9001:2015 or IATF 16949 standards

3. **Sub-tier Supplier QMS Qualification**

   The supplier is responsible for ensuring all sub-tier suppliers comply with all Order requirements. 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 12 months of contract award. This process shall include:
   • All applicable statutory and regulatory requirements and special product and process characteristics shall be flowed down to sub-tier suppliers.
   • Required adherence to the G&W Supplier Quality Manual on all Purchase Orders issued that are related to the manufacturing or processing of G&W 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 G&W.

4. **File Transfer Protocol Access (FTP)**

   JLTV Suppliers are required to use G&W's FTP location to upload quality documentation (i.e. prints, technical specifications, PPAP documentation). If you are a new supplier or do not have access to the FTP, please contact G&W's IT Department at ftp@gandwproducts.com for this program.

   To access this site, click on the link: https://ftp.gandwproducts.com/WebInterface/login.html After accessing the site, you will be asked to enter your username and password. Your username: {user_name}

You will receive a separate email with your password. Once you have entered the site, your files will be located inside the folders containing your company's name. You may then check the box next to the file and select "download" from the column header.
Please notify the G&W Quality Department at quality@g&wproducts.com when you upload documents.

The files will be accessible to you for 7 days. After that time, they will be removed from the site

5. **Advanced Product Quality Planning ("APQP")**

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 JLTV. 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

Reference: *The above manuals can be obtained at www.aiag.org*

6. **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 specifications and 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.

For Retention/Submission Level Requirements, see Table 4.2, of the AIAG PPAP Manual, 4th Edition (Reference PPAP Requirements chart). For all current and future supplied product, internal PPAP's shall be conducted annually and made available upon request. The PPAP submission is **level is 3**. No JLTV component parts may be shipped without PPAP approval.

PPAP Level 3 Requirements

Element	Description	Interim Level 3	Full Level 3	COTS
1	Design Record	X	X	X
2	Authorized Engineering Change Documents	X	X	X
3	Customer Engineering Approval (if required)	X	X	X
4	Design Failure Mode and Effects Analysis (Design FMEA)		X	
5	Process Flow Diagram(s)		X	
6	Process Failure Mode and Effects Analysis (Process FMEA)		X	
7	Control Plan		X	
8	Measurement Systems Analysis (MSA) Studies		X	
9	Dimensional Results	X	X	X
10	Records of Material / Performance Test Results	X	X	X
11	Initial Process Studies		X	
12	Qualified Laboratory Documentation	X	X	
13	Appearance Approval Report (AAR)		X	
14	Sample Production Parts	X	X	X
15	Master Sample (Actual or Picture)	X	X	X
16	Checking Aids	X	X	
17	Customer Specific Requirements, i.e., Component First Article Test (CFAT) Results.		X	X
18	Part Submission Warrant	X	X	X

ARMOR MATERIAL REQUIREMENTS

Traceability of Armor Materials

The supplier shall maintain a program that enables traceability of any armor material (opaque armor and transparent armor) used as a component of system survivability back to its source of supply. At a minimum, the following requirements shall apply:

A. Ballistic Grade Steel and Aluminum:

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.

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.

B. Transparent Armor:

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

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

D. **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 G&W Quality for review and acknowledgement.

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

F. **Ballistics Testing: Ballistic**
Testing shall be conducted with Government approved sources.

G. **Shipment:**
Supplier shall not ship any products that do not have verifiable material certifications without prior approval from G&W.

7. Commercial off the Shelf (COTS) Components

A. Commercial off the Shelf (COTS) Components are items sold in the commercial marketplace. These parts are commercially available, unaltered, and may be procured through distributors. The contractor shall always request the production process documentation prior to receiving the PPAP submittal from vendor. At times the contractor may be unable to attain the data for all 18 elements specified above to include within the PPAP package for COTS components. In these cases, the supplier shall provide the minimum PPAP elements (1, 2, 3, 9, 14, 15, 17, and 18). The sub tier supplier is expected to demonstrate / affirm conformance with supporting PPAP documents or Certificates of Conformance (C of C). In cases when the sub tier supplier does not have the remaining PPAP elements, a C of C shall be attained. The C of C letter shall; affirm the article is commercially available, be on the supplier's company letterhead, include the part number, include the part revision level, be signed by a representative within the contractor's organization that has decision making authority. The C of C letter shall positively affirm that the part meets the requirements within the print (Reference Section 4)

B. "COTS Plus": Parts that are commercially available, but have additional performance requirements, or parts that are deemed important to the JLTV system design (because of the part's application). If the suppliers catalog page does not include all print specifications, the contractor is responsible to complete the remaining testing.

8. JLTV Special Characteristics Requirements

A. **Special Characteristic Definitions and Requirements**: In accordance with the AIAG PPAP Manual (Fourth Edition), special characteristics are defined as product characteristics or manufacturing process parameters which can affect safety or compliance with regulations, fit, function, performance, or subsequent processing of product. There are two types of special characteristics: Critical Characteristics and Significant Characteristics:

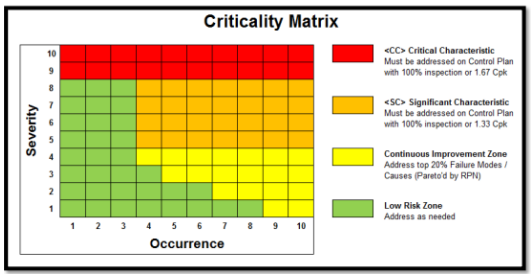
• Critical Characteristic (CC): A product characteristic or process parameter that can potentially affect compliance with government regulations, safe vehicle operation, or safe equipment function.

•Significant Characteristic (SC): A product characteristic or manufacturing process parameter which can affect fit, function, performance, or impact subsequent processing of product.

B. Critical and Significant Characteristics shall be assigned based on the Severity and Occurrence data derived from Process Failure Mode and Effects Analyses (PFMEA). Criteria for assignment of special characteristics shall be in accordance with the Criticality Matrix on the next page. All special characteristics shall be documented on the corresponding control plan.

C. Critical Characteristics shall be identified, recorded, and implemented when a PFMEA Severity Rank of 9 or 10 is identified regardless of the corresponding Occurrence Rank. All items identified as a Critical Characteristic shall demonstrate a minimum CpK (Process Capability Index) of 1.67, shall demonstrate a robust Government approved error-proofing system that ensures product conformance, or be subject to 100% inspection.

D. Significant Characteristics shall be identified, recorded, and implemented when a PFMEA Severity Rank of 5, 6, 7, or 8 is identified with a corresponding Occurrence Rank of 4, 5, 6, 7, 8, 9, or 10. All items identified as a Significant Characteristic shall demonstrate a minimum CpK of 1.33, shall demonstrate a robust Government-approved error proofing system that ensures product conformance, or be subject to 100% inspection.



E. 100% inspection shall be treated as a last resort for the control of special characteristics and shall only be permitted for a period of 6 months from initial implementation. If 100% inspection is employed, the inspection must be performed as a separate inspection task after the specific

assembly, manufacturing, or installation task is complete. 100% inspection shall not be performed by the employee performing the initial assembly, manufacturing, or installation task.

F. Traceability Marking for Components with Special Characteristics

All parts with special characteristics need to be traceable to the lot or date of manufacturing relevant to the special characteristic. They must be marked such that G&W can ensure traceability to the end item produced or installed kit. Marking must include scannable format which could include barcode, QR codes, RFID or agreed upon scanning methodology to ensure G&W can read and store lot or date of manufacturing information.

G. **Assignment of PFMEA Severity Ranks**

a. Assignment of PFMEA Severity Rank values shall be in accordance with PFMEA Severity Rating Scale, respectively. If there is any disagreement between criteria for assignment of Severity Rank in the table, the most severe (highest) rank value shall always be utilized. The following definitions apply:
   i. Primary Function: A function for which loss or degradation:
      1. Incurs a Hardware Mission Failure (HMF) in accordance with the JLTV Failure Definitions and Scoring Criteria (FDSC), or
      2. Results in a Non-Mission Capable (NMC) status, or
      3. Results in failure of the vehicle/item
   ii. Secondary Function: A function for which loss or degradation:
      1. Incurs Essential Function Failure (EFF) in accordance with the JLTV Failure Definitions and Scoring Criteria (FDSC), or
   iii. Tertiary Function: A function for which loss or degradation:
      1. Incurs a Non-Essential Function Failure (NEFF) in accordance with the JLTV Failure Definitions and Scoring Criteria (FDSC),
      2. Results in failure of the vehicle/item to achieve a Tier 3-5 Requirement identified in the JLTV Purchase Description, or
      3. Results in on-condition maintenance actions of consumable items (tires, filters, etc).

PFMEA SEVERITY RATING SCALE			
SEVERITY OF EFFECT: IMPACT TO PRODUCTION	**SEVERITY OF EFFECT: IMPACT TO SHIP PRODUCT**	**SEVERITY OF EFFECT: IMPACT TO END USER**	**RANK**
Failure may result in an acute health and/or safety risk for the manufacturing and assembly worker	Failure may result in an acute health and/or safety risk for the manufacturing and assembly worker	Affects safe operation of the vehicle and/or other vehicles, the health of the driver or passenger(s) or road users or pedestrians.	**10**
Failure may result in in-plant regulatory noncompliance	Failure may result in in-plant regulatory noncompliance	Noncompliance with regulations.	**9**
100% of production run affected may have to scrapped. Failure may result in in-plant regulatory noncompliance or may have a chronic health and/or safety risk for the Manufacturing working or assembly worker	Line shutdown greater than full production shift; stop shipment possible; field repair or replacement required (Assembly to End User) other than for regulatory noncompliance. Failure may result in in-plant regulatory noncompliance or may have a chronic health and/or safety risk for the manufacturing or assembly worker	Loss of primary vehicle function at any time during expected service life.	**8**
Product may have to be sorted and a portion (less than 100%) scrapped; deviation from primary process; decreased line speed or added manpower	Line shutdown from 1 hour up to full production shift; stop shipment possible; field repair or replacement required (Assembly to End User) other than for regulatory noncompliance	Degradation of primary vehicle function at any time during expected service life.	**7**
100% of production run may have to be reworked offline and accepted	Line shutdown up to one hour	Loss of secondary vehicle function.	**6**
A portion of the production run may have to be reworked off line and accepted	Less than 100% of product affected; strong possibility of defective product; sort required; no line shutdown	Degradation of secondary vehicle function.	**5**
100% of production run may have to be reworked in station before it is processed	Defective product triggers significant reaction plan; additional defective products not likely; sort not required	Very objectionable appearance, sound, vibration, harshness, or haptics.	**4**
A portion of the production run may have to be reworked in-station before it is processed	Defective product triggers minor reaction plan; additional defective products not likely; sort not required	Moderately objectionable appearance, sound, vibration, harshness, or haptics.	**3**
Slight inconvenience to process, operation, or operator	Defective product triggers no reaction plan; additional defective products not likely; sort not required; requires feedback to supplier	Slightly objectionable appearance, sound, vibration, harshness, or haptics.	**2**
No discernible effect	No discernible effect or no effect	No discernible effect.	**1**

b. Assignment of PFMEA Occurrence Rank values shall be in accordance with the PFMEA Occurrence Rating Scale table. If there is any disagreement between criteria for assignment of an Occurrence Rank in the table, the most severe (highest) rank value shall always be utilized. When determining occurrence scores, data from all sources shall be considered, including but not limited to the following items:
   i. Test failures and Test Incident Reports (TIR's)
   ii. Defects identified in the production process
   iii. Defects identified during inspection for Government acceptance
   iv. Defects identified after the product has been delivered to the field

PFMEA OCCURRENCE RATING SCALE			
PREDICTION OF FAILURE CAUSE OCCURRING	**PREVENTION CONTROL**	**TYPE OF CONTROL**	**RANK**
Extremely High	No prevention controls.	None	**10**
Very High	Prevention controls will have little effect in preventing failure cause.	Behavioral	**9**
			8
High	Prevention controls somewhat effective in preventing failure cause.	Behavioral or Technical	**7**
			6
Moderate	Prevention controls are effective in preventing failure cause.		**5**
			4
Low	Prevention controls are highly effective in preventing failure cause.	Best Practices: Behavioral or Technical	**3**
Very Low			**2**
Extremely Low	Prevention controls are extremely effective in preventing failure cause from occurring due to design (e.g. part geometry) or process (e.g. fixture or tooling design). The Failure Mode cannot be physically produced due to the Failure Cause.	Technical	**1**
Prevention Control Effectiveness: Consider if prevention controls are technical (rely on machines, tool life, tool material, etc.), or use best practices (fixtures, tool design, calibration procedures, error-proofing verification, preventative maintenance, work instructions, statistical process control charting, process monitoring, product design, etc.) or behavioral (rely on certified or non-certified operators, skilled trades, team leaders, etc.) when determining how effective the prevention controls will be.			

c. Assignment of PFMEA Detection Potential Ranks shall be in accordance with PFMEA Detection Potential Rating Scale. Detection Potential Ranks are not considered in the assignment of special characteristics, but shall be utilized in determining Risk Priority Number (RPN) values.

PFMEA DETECTION POTENTIAL RATING SCALE			
ABILITY TO DETECT	**DETECTION METHOD MATURITY**	**OPPORTUNITY FOR DETECTION**	**RANK**
Very Low	No testing or inspection method has been established or is known.	The failure mode will not or cannot be detected.	**10**
	It is unlikely that the testing or inspection method will detect the failure mode.	The failure mode is not easily detected through random or sporadic audits.	**9**
Low	Test or inspection method has not been proven to be effective and reliable (e.g. plant has little or no experience with method, gauge R&R results marginal on comparable process or this application etc.)	Human inspection (visual, tactile, audible) or use of manual gauging (attribute or variable) that should detect the failure mode or failure cause.	**8**
		Machine-based detection (automated, semi-automated with notification by light, buzzer, etc.) or use of inspection equipment such as coordinate measuring machine that should detect failure mode or failure cause.	**7**
Moderate	Test or inspection method has been proven to be effective and reliable (e.g. plant has experience with method; gauge R&R results are acceptable on comparable process or this application etc.).	Human inspection (visual, tactile, audible) or use of manual gauging (attribute or variable) that will detect the failure mode or failure cause (including product sample checks).	**6**
		Machine-based detection (automated, semi-automated with notification by light, buzzer, etc.) or use of inspection equipment such as coordinate measuring machine that will detect failure mode or failure cause (including product sample checks).	**5**
High	System has been proven to be effective and reliable (e.g. plant has experience with method on identical process or this application), gauge R&R results are acceptable, etc.	Machine-based automated detection method that will detect the failure mode downstream, prevent further processing or system will identify the product as discrepant and allow it to automatically move forward in the process until the designated reject unload area. Discrepant product will be controlled by a robust system that will prevent outflow of the product from the facility.	**4**
		Machine-based automated detection method that will detect the failure mode in-station, prevent further processing or system will identify the product as discrepant and allow it to automatically move forward in the process until the designated reject unload area. Discrepant product will be controlled by a robust system that will prevent outflow of the product from the facility.	**3**
	Detection method has been proven to be effective and reliable (e.g. plant has experience with method, error-proofing, verifications, etc.).	Machine-based detection method will detect the cause and prevent the failure mode (discrepant part) from being produced.	**2**
Very High	Failure mode cannot be physically produced as-designed or processed, or detection method proven to always detect the failure mode or failure cause.		**1**

Rev.	Date	Description of Change
1	01/31/2024	New Release
2	06/28/2024	Added Printed Copy uncontrolled in footer. 1. Removed reference and added “including.” Added “or e-mail quality@gandwproducts.com.”