



Title: Pegasus® Supplier Inspection Requirements

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1. Scope

This document establishes the general requirements applicable to a method of statistical product acceptance to reduce inspection costs while still assuring acceptable quality. Products which are eligible for the methods defined in this standard include, but are not limited to: end items, cast, forged, wrought, machined, fabricated, plastic, molded, powdered metal, or stamped components and raw material; electronic, electrical, and mechanical components.

2. Production, Monitoring and Measurement of Product and Process

Onboard Systems Engineering designs products with the end goal of meeting product performance and reliability requirements throughout the life of the product. To attain this goal manufacturing process should be aligned such as producing the product occurs under controlled conditions which are typically defined in lots, small batches or in a single piece manufacturing process. Products may be accepted either by inspecting 100% percent or using sampling procedures with high probability of success. It is imperative that the measurement system is suitable for its use to ensure proper acceptability of the product

Standards AS9103 and AS9138 provide guidance and requirements. AS9102 provides requirements for First Article Inspection.

Suppliers shall select monitoring and measuring equipment with a minimum accuracy ratio of 4 to 1 (product tolerance to equipment tolerance) unless otherwise specified.

Suppliers shall perform Measurement System Analysis (MSA) on all measurement systems used to measure Product Key Characteristics (KCs) as defined in AS9103.

When determining critical features (characteristics), suppliers should refer to Onboard Systems Critical Part Requirements on Drawings and Specifications. Additional information can be found on Onboard Systems Document RC-9000 and AS9138.

AS9102 First Article Inspection and FAIR Report must be approved by Onboard Systems and must accompany the delivery of products. This requirement is independent of other inspection reports required under the sample plan.

“Performing” Suppliers are suppliers that have an acceptable quality level and that are experienced in the manufacturing process of the commodities for which they have been selected by Onboard Systems H&W Sourcing Board. Suppliers with the “Performing” or higher rating are exempt from implementing the AS9138 requirement of 100% inspection before switching to Inspection by sampling. Suppliers are allowed to follow appendix 1 Sample Inspection for minimum guidance on inspection requirements.

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3. Inspection Sampling

Suppliers shall comply with the requirements of AS9138 C= 0 as required when no sampling plan is identified on appendix 1 or on any other Onboard Systems documents.

Safety or critical characteristics shall be 100% inspected, except as directed by the design authority or under the authorization of Onboard Systems Engineering Hoist and Winch

Product acceptance inspection shall be as per appendix 1 for all characteristics listed for “Performing” suppliers. A supplier with a lower level of performance is required to inspect 100% of parts in the lot for three consecutive lots in order to assess supplier’s quality level

The Inspection Sampling Level in appendix 1 is a Special Inspection Level S-2 per ANSI ASQ Z1.4 C=0. This sample size allows for the use of larger lots of up to 150 pieces with a level of risk that can be tolerated by the program. Each unit in the lot or batch shall be manufactured under the same design requirements and manufacturing conditions.

Sampling Plans with Acceptance C=0 means that, any nonconformance rate found in a lot would require its rejection and handling such that none of the lot’s nonconformances escape.

If a non-conformance is found during sampling inspection at Supplier, the entire lot must be screened, non-conforming parts removed, and either reworked or scrapped. The number of escapes in the delivered lot to Onboard Systems must be equals to 0.

If a non-conformance is detected after delivery by the buyer- Hoist and Winch, this event would be considered a supplier escape and a corrective action plan from supplier would be required.

- If the Supplier escape did not significantly affect its Performing Level, the Corrective action plan will include containment activities such as 100% inspection for three consecutive lots for the noted characteristics where non-conformities where found.
- In the case when the supplier falls below “Performing level” due to found defective lots or when the Supplier that the buyer placed the order with is not at Performing Level, then three consecutive lots are to be inspected 100% without defect before for the supplier can be exempt from AS9138 requirement of 100% Inspection as per paragraph No 2.

Approval of alternate inspection frequency plans shall be obtained from Onboard Systems

To help illustrate the process of selecting the inspection plan, please see flowchart - Selection of Inspection Plan.



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4. General Requirements and Definitions

Safety/Critical Characteristics: Any characteristics identified in the design documentation as “safety” or “critical” characteristics shall not be accepted using statistical product acceptance methods, unless prior written authorization is granted from the customer (e.g., a customer- approved procedure) such as when the method for acceptance is defined in the design documentation.

Lot [e.g. Batch, Grouping]: A defined quantity of some product, material, or service collected and submitted together for acceptance.

NOTE: It is often expected that a lot be homogeneous in its manufacturing conditions. A lot for product acceptance purposes is not necessarily the same as a lot formed for purposes of a contract, shipment, or anything other than acceptance.

Homogeneity (also referred to as Homogeneous): When applied to a process, homogeneity is where there is repetitive production running under the same conditions with similar behavior.

One Hundred Percent (100%) Inspection: Inspection of every item of product or service.

Quality Parameter: A statistical technique for product acceptance shall have a quality parameter that controls the probability of conformance of delivered product.

When engineering or Quality specifications require an AQL, the consumer protection quality parameter shall be an AOQL.

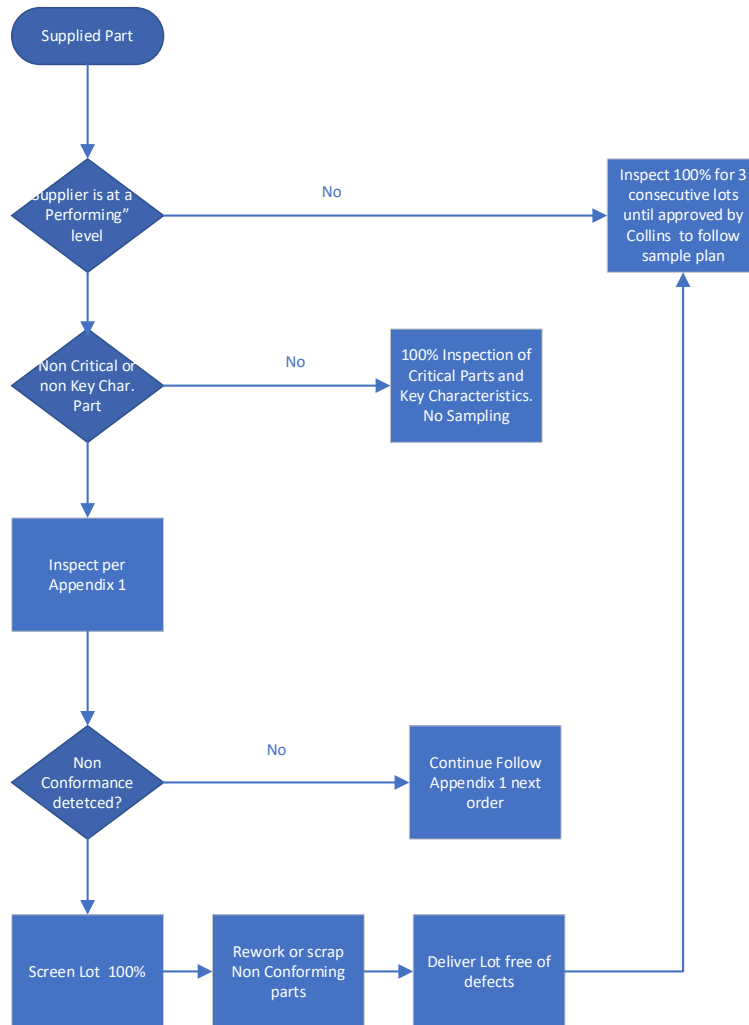
NOTE: The column headings in many existing sampling tables are indexed by the AQL; however, the AQL is not a measure of protection for the customer. AQL figures must not be construed as allowing a nonconforming part to be delivered.

Below is a relationship between AQL and AOQL.

AQL	1.00%	2.50%	4.00%
AOQL	1.22%	2.90%	4.94%

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5. Selection of Inspection Plan



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6. Appendix 1. Inspection Sampling Plan

Part, Process, Characteristic, or Mechanical Requirements	Required Inspection Plan	Sample size Lot Size Up to 150	Additional Requirements
Parts:			
Machined parts (general features, except as noted under mechanical characteristics below)	AQL 4.0	3	
Machined parts special applications (e.g., key characteristics, Critical to Safety , location holes < .001)	100%	All	Inspection Report Required. May use AS9102 Form 3 or equivalent
Conformance of Mechanical Assemblies Configuration (brakes, clutches, hydraulic modules)	100%	All	
Conformance of Electrical control boxes, pendants, electrical motor configuration and functionality	100%	All	
Harnesses visual	100%	All	
Composite part –fairings	AQL 1.0	13	If Lot is less than 13, then inspect all
Electrical Filter Assembly (integrity)- visual	100%	All	
Wire Rope Assembly, Cable (rope reel test)	100%	1 per reel	Test Data required. Lot certification required. For the bulk wire rope, compliant to the requirements of MIL-DTL-83140
Connector assemblies- Visual (no defects per Spec Class 3)	100%	All	
Printed circuit boards Visual (no defects per Spec Class 3)	100%	All	
Conformance of printed circuit board configuration to drawing	AQL 1.0	13	If Lot is less than 13, then inspect all
Mechanical and Electronic Assemblies Workmanship	100%	All	
Processes:			
Sheet metal fabrication	AQL 4.0	3	
Heat Treat process	AQL 4.0	Lot	Lot Certification required

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Part, Process, Characteristic, or Mechanical Requirements	Required Inspection Plan	Sample size Lot Size Up to 150	Additional Requirements
Nondestructive Testing (NDT), where permitted	AQL 1.0	13	Lot Certification required
Paint, alodine, anodize, and plating	AQL 4.0	Lot	Lot Certification required
Electrical wire assembly, wrapping	AQL 4.0	3	
Soldering, Cleanliness, conversion coat process for printed circuit boards 97%	AQL 4.0	3	
Test (Electrical, ATP, MTP)	100%	All	Test Data required
Mechanical Characteristics:			
Fastener hole diameter tolerances 0.001 inch/0.025 mm or less	100%	All	Inspection Report Required. May use AS9102 Form 3 or equivalent
Fastener hole diameters tolerances ≥ 0.001 inch/0.025 mm,	AQL 1.0	13	If Lot is less than 13, then inspect all
location on non-locating holes of $> \pm 0.01$ inch/0.25 mm linear or equivalent true position diametral tolerance	AQL 4.0	3	
Thickness with tolerance of ± 0.005 inch/0.127 mm or less 95%	AQL 2.5	5	
Thickness with tolerance of $> \pm 0.005$ inch/0.127 mm 92%	AQL 4.0	3	
Linear dimension tolerance $\leq \pm 0.001$ inch	AQL 1.0	13	If Lot is less than 13, then inspect all
Linear dimension tolerance $0.001 \geq 0.01$ inch/0.25 mm 95%	AQL 2.5	5	
Linear dimension tolerance $> \pm 0.01$ inch/0.25 mm	AQL 4.0	3	
Radii total tolerance range ≥ 0.02 inch/0.51 mm 97%	AQL 4.0	3	
Position of locating holes of $< \pm 0.01$ inch/0.25 mm	AQL 1.0	13	CMM report of First and Last piece in the lot. ID part with number for First and Last ran off the machine.
Angle total tolerance range $\leq \pm 0.5^\circ$ 97%	AQL 2.5	5	
Angle total tolerance range $> \pm 0.5^\circ$ 92%	AQL 4.0	3	

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Part, Process, Characteristic, or Mechanical Requirements	Required Inspection Plan	Sample size Lot Size Up to 150	Additional Requirements
Concentricity, non-controlled contours, diameter, or fillet radius tolerances > ±0.01 inch/0.25 mm; flatness, straightness, parallelism, perpendicularity, and profile	AQL 4.0	3	
Surface Hardness	AQL 1.0	13	If Lot is less than 13, then inspect all
Torque, running, breakaway special applications (e.g. Brake running, toque, clutch slip torque, binding LevelWind)	100%	All	
Torque general (hardware)	AQL 4.0	3	
Controlled contour [e.g., Master Dimension Definition (MDD), Master Dimension Surface (MDS)], diameter or fillet radius tolerances ≤±0.01 inch/0.25 mm	AQL 2.5	5	
Clearance, gap tolerance ≤ .005	100%	All	
Surface finish roughness (Ra) < 32 µin or 0.8 micron	AQL 1.0	13	If Lot is less than 13, then inspect all
Surface finish roughness (Ra) ≥32 µin or 0.8 micron	AQL 4.0	3	
Flatness	AQL 1.0	13	If Lot is less than 13, then inspect all
General note for ≥ 62 surface roughness General note for ≥.010 max edge break Size tolerances ≥ .010 total Location tolerances ≥ .015 true position Angle tolerances ≥ 1 degree Flatness / perpendicularity tolerance ≥.010 Runout tolerance ≥ .010 Profile tolerance ≥.010	AQL 4.0	3	
Threaded parts:			
Internal profile pre-load locking, Insert installation	AQL 1.0	13	If Lot is less than 13, then inspect all
Straight screw threads –total tolerance on pitch diameter	AQL 1.0	13	If Lot is less than 13, then inspect all

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Part, Process, Characteristic, or Mechanical Requirements	Required Inspection Plan	Sample size Lot Size Up to 150	Additional Requirements
Standard electrical connectors [e.g., US Military Standards (MS) part numbers]	AQL 4.0	3	
All other thread applications/characteristics unless specified on drawings with a special characteristic symbol	AQL 4.0	3	
Gears and splines (all characteristics) not key or critical	AQL 1.0	13	If Lot is less than 13, then inspect all
Dimensions with only maximum or minimum values which directly control material thickness of weldments, castings, or forgings; and at least one surface is machined	AQL 1.0	13	If Lot is less than 13, then inspect all
Spring rate, when specified by Engineering	AQL 1.0	13	If Lot is less than 13, then inspect all