Product Quality Best Practices

SUBJECT
Product Inspection Best Practices

LAST UPDATE
July 2018

APPLIES TO
- Suppliers
- Distributors

FOCUS ON
Quality procedures for product and shipping inspections

QUICK LINKS
- PPAI Corporate Responsibility: www.ppai.org/corporate-responsibility/
- UL: industries.ul.com/premiums-promotional-and-licensed-goods
- Consumer Product Safety Commission: www.cpsc.gov

Intended for intermediate compliance programs

Italic grey text indicates a hyperlink listed in the Online Resources section of this document.

Background

Quality inspections ensure compliance with specifications, manufacturing, aesthetic and performance requirements, regulatory requirements, and any other buyer needs. They also help to mitigate safety risks, identify quality issues, catch problems and infractions upstream, and potentially provide cost savings. They should occur during and after production, and before shipping/importation.

Factors to consider when implementing product inspection procedures may include:

1. Relationship with a vendor
2. Complexity of the product(s)
3. Track record with the vendor
4. Whether a product is new or proven

These factors will determine the type and frequency of inspection criteria to apply.

Vendor Agreements

Vendor agreements define the specifications and requirements for products to be purchased. The agreements should include quality inspections centered upon the factors listed above.

Quality assurance criteria to be outlined in the supplier agreement should include but are not limited to:

- **Supplier Preparation**
  Does the factory have a quality manual in place? Are they prepared to meet the supplier's inspection standards? It is imperative that expectations be clearly set in advance of product inspections to ensure success–factory preparedness and awareness are key to success.
- **Inspection Standards**
  How inspections will be conducted and what standards will be used (e.g. *ANSI/ASQ Z1.4*, Single Sampling for Normal Inspection, General Level II).
  Third-party labs and *ISO 2859-1:1999* may also provide guidance for establishing inspection standards.
- **Sample Size**
  The agreed-upon number of units that will be inspected based on lot size.
- **Acceptable Quality Limits**
  Spells out the expectations for defects and tolerances. There is always a potential for defective product. It is common practice to set a limit on defects with a measurable standard. One way to set limits is by using an *AQL table*. AQL tables can be used for product inspections to determine the number of samples to be inspected based on batch or lot and the suggested acceptable limits for defective products.

Guide for Using Inspection Sampling and AQL Charts

A valuable and successful quality inspection requires gathering some necessary information and determining inspection factors:

1. Determine Your Sample Size For The Inspection:

- Determine the size of the lot, batch or order that will be inspected (for example, an order of 3,600 units);
- Determine how narrow or broad your inspection will be in relation to the number of samples to be included, in accordance with standard sampling sizes as shown in Table 1. The more samples you have inspected, the higher the likelihood that defects will be found among the random samples. Most consumer products companies adhere to one of the three general inspection levels (see Table 1), while other companies may develop special inspection levels if the product is highly complex and has many features to be inspected (e.g., medical or electronic devices);
- Using Table 1, determine your sample size. The most commonly used inspection level in our industry is General

Inspection Level II, shown in the blue column in Table 1. Level II offers a reliable sampling of the goods to be inspected without being too narrow or broad.

- Using the example of a lot size of 3,600 units in your order, you can determine that the Sample Size Code letter that applies to your inspection is L. Adjacent to the code letter, in parentheses, is the suggested sample size that the inspector will compile from randomly selected pieces. In this case, the sample size will be 200 pieces.

2. Determine Your Acceptable Quality Levels (AQL):
The AQL is typically a quantified range of quality defects you would deem to be acceptable in relation to the quantity of samples that will be inspected. The consumer products industry typically grades defects in three categories:

- **Critical Defect:** A defect that would likely present a product safety hazard to the end-user; examples are sharp points or sharp edges that can injure someone.
- **Major Defect:** A defect that is not a safety hazard, but is serious enough to cause the product to be improperly used by the consumer or will negatively affect a buyer's decision to purchase or use the item; examples are holes and scratches, size and weight discrepancies, and serious workmanship problems that affect the function of the item.
- **Minor Defect:** A defect that is a discrepancy from the quality standards for the item, but the product may still be used; examples are poor sewing, untrimmed threads, poor color-matching, poor fit and finish of hard goods, and dirt marks or stains on a product.

Most consumer products companies use an AQL similar to the following:

- Critical: 0.0
- Major 1.5
- Minor: 4.0

Table 1 - Sample Size Code Letters

Lot Or Batch Size	Special Inspection Levels * ( ) = Sample Size * A-R = Sample Size Code Letter				General Inspection Levels		
	S-1	S-2	S-3	S-4	I	II	III
2-8	A (2)	A (2)	A (2)	A (2)	A (2)	A (2)	B (3)
9-15	A (2)	A (2)	A (2)	A (2)	A (2)	B (3)	C (5)
16-25	A (2)	A (2)	B (3)	B (3)	B (3)	C (5)	D (8)
26-50	A (2)	B (3)	B (3)	C (5)	C (5)	D (8)	E (13
51-90	B (3)	B (3)	C (5)	C (5)	C (5)	E (13)	F (20)
91-150	B (3)	B (3)	C (5)	C (5)	C (5)	F (20)	G (32)
151-280	B (3)	C (5)	D (8)	E (13)	E (13)	G (32)	H (50)
281-500	B (3)	C (5)	D (8)	E (13)	F (20)	H (50)	J (80)
501-1,200	C (5)	C (5)	E (13)	F (20)	G (32)	J (80)	K (125)
1,201-3,200	C (5)	D (8)	E (13)	G (32)	H (50)	K (125)	L (200)
3,201-10,000	C (5)	D (8)	F (20)	G (32)	J (80)	L (200)	M (315)
10,001-35,000	C (5)	D (8)	F (20)	H (50)	K (125)	M (315)	N (500)
35,001-150,000	D (8)	E (13)	G (32)	J (80)	L (200)	N (500)	P (800)
150,001-500,000	D (8)	E (13)	G (32)	J (80)	M (315)	P (800)	Q (1,250)
Over 500,001	D (8)	E (13)	H (50)	K (125)	N (500)	Q (1,250)	R (2,000)

3. Determine How Many Samples Can Pass/Fail Using Your AQLs: Using Table 2, you can easily determine how much range you will have for your inspection under the three AQLs described above.

- Using the example of 3,600 units to be inspected, you know that your sample size will be L, which indicates that 200 samples will be picked by the inspector;
- By the row that follows Code L in Table 2, you can determine the following AQLs for major and minor defects:

  - **Critical Defect at AQL of 0:** Although not on the chart, we've already determined that the acceptable limit for critical defects is zero; if one or more critical defects is found by the inspector, the inspection is rejected (i.e., Fail);

  - **Major Defect at AQL of 1.5:** Up to seven major defects are acceptable; eight defects or more results in a rejection of the inspected lot or order;

  - **Minor Defects at AQL of 4.0:** Up to 14 minor defects is acceptable; 15 or more defects results in a rejection of the inspected lot or order.

Most third-party inspectors will reject or fail an inspection if any of the three (3) AQLs is exceeded. As the supplier or distributor, you may waive or override any inspection failure at your discretion, depending on your needs and client expectations.

Inspection Process

Pre-Inspection Procedures

The decision to inspect product prior to shipping is an essential element of any quality assurance program.

Pre-inspection procedures set the parameters for all parties involved. Inspection companies rely on specific, documented instructions from their customers to ensure compliance with all required tasks and desired outcomes.

1. Provide an inspection request form to the inspection coordinator (whether in-house or a third-party inspection company). Include detailed specifications and instructions. In addition, a copy of specifications and instructions should be provided to the factory. All specifications and instructions should be in writing and any changes should only be accepted when provided in writing.

Table 2 - Single Sampling Plans And Acceptable Quality Levels For Normal Inspection

Sample Size Color Code	Sample Size	Acceptable Quality Levels (Normal Inspection)										
		0.065	0.10	0.15	0.25	0.40	0.65	1.0	1.5	2.5	4.0	6.5
		Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re
A	2											
B	3											
C	5											
D	8											
E	13											
F	20											
G	32											
H	50											
J	80											
K	125											
L	200											
M	315											
N	500											
P	800											
Q	1,250											
R	2,000											

= Use first sampling plan below arrow. If sample size equals or exceeds lot or batch size, do 100% inspection.

= Use first sampling plan below arrow.

Ac = Acceptance Number

Re = Rejection Number

2. Confirm the inspection date and other arrangements with the inspector and vendor/factory.

3. Provide sufficient quantity of approved reference samples to the inspection company well in advance of any inspection date. Reference samples should be clearly marked as having been approved by the supplier, importer or distributor.

During Production Inspection (DUPRO)
DUPRO inspections, also known as line or in-process inspections, involve quality checks at specific periods during manufacturing. These checks are generally performed after the start of production, during the production process, and before the order is completed.

DUPRO inspection procedures are recommended to be used in conjunction with the final pre-shipment inspection.

The timing and frequency of DUPRO inspections will be determined by the party responsible for taking ownership of the goods (typically the supplier in the promotional products industry). An example would be DUPRO inspections of finished goods being made when the production stage is at or near 15 percent complete. Products do not need to be packed at this time.

The results of inspections should be discussed, in detail, between the supplier, inspector and the factory management team so that the factory can develop a corrective action plan to addresses any deficiencies found.

Final Pre-Shipment Inspection
Final inspections (often referred to as pre-shipment inspections "PSI" or as final random inspections or "FRI") will assist as a quality check to confirm adherence to upstream inspections. In addition, these inspections will ensure compliance with packaging requirements, proper labeling of product and packaging materials, as well as any additional instructions and specifications.

The final (pre-shipment) inspection should be conducted on finished product when the production is 100 percent complete and between 80 and 100 percent packed and sealed for shipment, unless documentation specifies otherwise.

Loading Inspections
Loading inspections are performed before the product leaves the factory or at the port or warehouse. These inspections review and verify compliance with packing, labeling and quantity requirements.

Reporting
Upon completion of inspections, the inspector should review all findings and results with the factory (and shipper when necessary) and provide a written report of inspection details and results to all involved parties.

Failed inspections will require corrective action procedures or product rejection. A corrective action plan (CAP) should outline all appropriate steps to more fully inspect a batch or shipment and include the resolution actions.

Re-inspections may be necessary in some instances but should be reserved until a defective product or shipment has been fully sorted and reworked. Always anticipate that shipping and in-hand dates will be delayed in the event an inspection fails and rework and a subsequent re-inspection will be needed. Always allow adequate time to prevent missing your in-hand date.

Summary
Quality inspections are a necessary and critical component of the manufacturing and pre-shipping process. Established, well-defined quality inspection procedures will provide higher levels of service, customer satisfaction, mitigate risk and improve costs.

Online Resources:

Export.gov: export.gov
U.S. Customs and Border Protection: www.cbp.gov/trade
ANSI: www.ansi.org/
ISO: www.iso.org/iso/home.html
PPAI Business Partner QIMA: https://www.ppai.org/members/affinity-partners/#8ed9d94d-cb76-488a-9919-c94f8345d123

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