Key Points for Acceptance of Three-Level Distribution Box Samples

Overview

A curve pertains to a specific plan, that is, a combination of n (sample size) and c (acceptance level).

Key Takeaways

Acceptance of three-level distribution box samples relies on proper sampling plans, defined acceptance criteria, and statistical evaluation of defects to ensure lot quality.1. Sampling Plan Selection

The first step is to choose an appropriate sampling plan based on the lot size and inspection objectives. Common plans include single, double, and multiple sampling, where a predetermined number of units are randomly selected from the lot for inspection. For three-level distribution boxes, double or multiple sampling may be preferred to balance inspection cost and accuracy, especially if destructive testing is involved .

2. Determining Sample Size and Acceptance Number
• Sample size (n): The number of boxes to inspect should be statistically sufficient to represent the lot. Larger sample sizes improve the accuracy of quality assessment .

• Acceptance number (c): The maximum number of defective units allowed in the sample for the lot to be accepted. A lower acceptance number increases the likelihood of rejecting poor-quality lots, while a higher number allows more defects .

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• The combination of n and c defines the operating characteristic (OC) curve, which shows the probability of accepting lots at different defect levels .
3. Defining Defects and Quality Limits
• Defect classification: Items are classified as conforming or non-conforming based on functional, safety, and regulatory requirements .

• Acceptance Quality Limit (AQL): The maximum percentage of defective units considered acceptable in a lot. For critical components like distribution boxes, a low AQL is recommended to ensure reliability .

• Lot Tolerance Percent Defective (LTPD): Defines the defect level at which the lot is likely to be rejected, protecting the consumer from poor-quality lots .
4. Inspection Methodology
• Random selection: Units must be randomly chosen to avoid bias and ensure representativeness .

• Attribute inspection: Typically, a go/no-go evaluation is used for electrical and mechanical features.

• Destructive testing: If testing damages the unit, acceptance sampling allows evaluation of a fraction of the lot without inspecting all units .
5. Decision Rules
• Acceptance: If the number of defective units in the sample is less than or equal to c, the lot is accepted.

• Rejection: If defects exceed c, the lot is rejected or subjected to 100% inspection .

• Sequential or multiple sampling: Additional samples may be drawn if initial results are inconclusive, improving decision accuracy .
6. Maintaining Sample Integrity
• Ensure proper handling, labeling, and storage of sampled units to prevent damage or contamination before testing .

• Record all inspection results accurately to support traceability and quality audits.
7. Documentation and Compliance
• Maintain inspection records, OC curves, and acceptance criteria for regulatory compliance and quality assurance.

• Follow relevant standards such as ANSI/ASQ Z1.4 or MIL-STD-105E for attribute sampling plans . By following these key points, manufacturers and quality engineers can reliably determine whether a batch of three-level distribution boxes meets quality standards while minimizing inspection costs and risks.

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