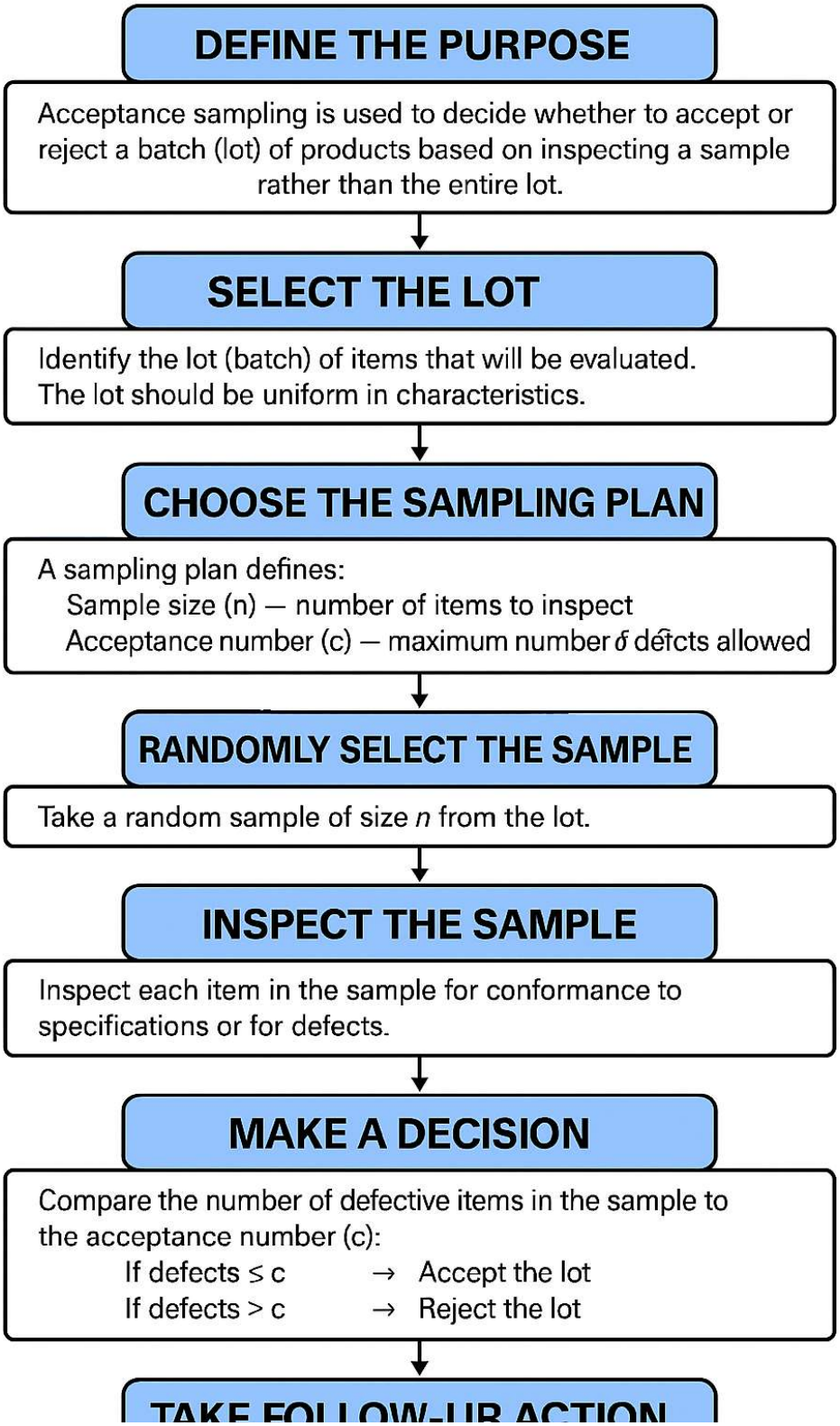
# Acceptance Sampling

A Practical Guide in 7 Steps




Prepared using examples and illustrations from the ChatGPT session.

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## Step 1: Define the Purpose

Acceptance sampling is a quality control method used to decide whether to accept or reject a batch (lot) of products
based on the inspection of a sample rather than the entire lot.

It is typically used when:
- 100% inspection is too costly or time-consuming
- The inspection is destructive (e.g., crash testing, food testing)
- Speed is essential in decision-making

Example:
A company receives a shipment of 20,000 screws from a supplier. Rather than checking each screw, the company decides
to use acceptance sampling to inspect a small portion. If the sample meets the quality standard, the shipment is accepted.
If not, the entire lot is rejected or subjected to further inspection.

## Step 2: Select the Lot

The "lot" is the batch of items from which the sample will be drawn. A well-defined lot is essential for valid sampling.

A lot should be:
- Clearly defined (e.g., quantity, production time, origin)
- Homogeneous (produced under similar conditions)
- Traceable and separated from other lots

Example:
A company manufactures LED light bulbs. On Monday's second shift, the production line completed a lot of 5,000 bulbs.
All were produced using the same materials, machines, and labor.

This batch is now identified as one inspection lot for acceptance sampling. Its uniformity ensures that the sample results
can reliably reflect the quality of the entire lot.

## Step 3: Choose the Sampling Plan

A sampling plan defines how many items to inspect and the criteria for acceptance or rejection. It includes:
- Sample size (n): how many items to inspect
- Acceptance number (c): the maximum number of defects allowed in the sample

The plan is chosen based on:
- Lot size
- Acceptable Quality Level (AQL)
- Inspection level (e.g., General Level II)

Example:
For a lot of 5,000 LED bulbs, the company chooses:
- AQL = 1.5%
- Inspection Level = General II

According to the sampling standard (e.g., ISO 2859-1), the corresponding sampling plan is:
- Sample size: 200 bulbs
- Acceptance number (c): 5

This means: If 5 or fewer defective bulbs are found in the 200, the lot is accepted. If 6 or more are found, the lot is rejected.

📊 Chart Placeholder:
E.g., defect rate comparison or trend chart.

## Step 4: Randomly Select the Sample

Once the sample size is determined, the sample must be selected randomly to ensure it represents the entire lot.

Methods of random selection include:
- Random number generator
- Systematic sampling (e.g., every nth item)
- Physical randomization (e.g., mix and draw)

Example:
From a lot of 5,000 LED bulbs, the sampling plan calls for a sample of 200 bulbs.

Method: Systematic Sampling
- Divide 5,000 by 200 = 25
- Choose a random starting point (e.g., item #13)
- Select every 25th bulb thereafter (13, 38, 63, ...) until 200 bulbs are selected

This method ensures that the sample is evenly spread and unbiased.

## Step 5: Inspect the Sample

Each item in the sample is inspected for defects or nonconformities. The inspection can be visual, functional, or dimensional,
depending on product requirements.

Key inspection types:
- Visual: appearance, cracks, discoloration
- Functional: performance test (e.g., does it work?)
- Dimensional: size, fit, and alignment

Example:
From the sample of 200 LED bulbs:
- 3 bulbs do not light up (functional defect)
- 1 bulb has a cracked glass shell (visual defect)

Total defects found: 4

These are recorded and compared to the acceptance number (c = 5). Since 4 <= 5, the lot is accepted.

📊 Chart Placeholder:
E.g., defect rate comparison or trend chart.

## Step 6: Make a Decision

After inspecting the sample, the number of defects found is compared to the acceptance number (c) in the sampling plan.

Decision Rule:
- If defects <= c: Accept the lot
- If defects > c: Reject the lot

This decision determines whether the entire lot is allowed to move forward (e.g., shipping, production, or storage).

Example:
From the inspected sample of 200 LED bulbs:
- 7 defective bulbs were found
- Acceptance number (c) = 5

Since 7 > 5, the lot is rejected. The batch does not meet the quality standard and must be handled according to company policy.

📊 Chart Placeholder:
E.g., defect rate comparison or trend chart.

## Step 7: Take Follow-up Action

After the decision to accept or reject the lot, appropriate follow-up actions must be taken. These actions ensure that quality issues
are addressed and that only conforming products are delivered or used.

Typical actions include:
- Accepted lot: Proceed with shipping, use in production, or storage
- Rejected lot: Perform 100% inspection, rework, return to supplier, or scrap the lot

Example:
The lot of 5,000 LED bulbs was rejected because 7 defects were found in a sample of 200 (exceeding the acceptance number of 5).

Follow-up action options:
1. 100% inspection: Inspect all 5,000 bulbs and remove defects
2. Rework: Repair defective bulbs and re-inspect
3. Return: Send the lot back to the supplier with a rejection report
4. Scrap or downgrade: Dispose of or sell as lower-grade items

These steps ensure quality is maintained and customers receive reliable products.

📊 Chart Placeholder:
E.g., defect rate comparison or trend chart.