

ANSI/ASQ Z1.9-2003 계량형 샘플링 검사
 (Sampling Procedures for Inspection By Variables : ANSI/ASQ
 Z1.9-2003)

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Abstract

This paper discusses the features of the ANSI/ASQ Z1.9-2003, Sampling Procedures and Tables for Inspection by Variables. This system is based on the MIL-STD-414.

Keywords: By Variables, Z1.9-2003

1. Introduction

1.1 Inspection by Variables [2]

Plan	Distribution	Criteria	Key Features
MIL-STD-414 ANSI/ASQC Z1.9	Normal	Acceptance Quality Limit	Provides lot evaluation to a specified AQL.
Single sampling	Normal	Percent defective	Provides sample size and acceptance values for defined risks.
H108	Exponential	Mean life	Provides lot evaluation, with and without replacement of failed items.
MIL-STD-690	Exponential	Failure rate	Provides tables for process rather than lot evaluation.

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MIL-STD-781	Exponential	Mean life	Provides process and lot evaluation.
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1.2 General Description of Z1.9-2003 [1]

1.2.1 AQL (Acceptance Quality Limit) vs Specification Limit

- : AQL Conversion Table
- : Single, Double Specification Limit
- : Normality Assumption

1.2.2 Inspection Level vs Sample Size

Special(S3, S4), General(I , II, III)

1.2.3 Sampling Plan : B, C, D Methods

1.2.4 Switching Procedures

(1) Normal to Tightened

When normal inspection is in effect, tightened inspection shall be instituted when two out of five consecutive lots or batches have been rejected on original inspection(that is, ignoring resubmitted lots or batches for this procedure).

(2) Tightened to Normal

When tightened inspection is in effect, normal inspection shall be instituted when five consecutive lots or batches have been considered acceptable on original inspection.

(3) Normal to Reduced

When normal inspection is in effect, reduced inspection shall be instituted providing that all of the following conditions are satisfied:

- a. The preceding 10 lots or batches have been on normal inspection and none has been rejected; and
- b. Production is at a steady state; and
- c. Reduced inspection is considered desirable by the responsible authority and is permitted by the contract or specification.

(4) Reduced to Normal

When reduced inspection is in effect, normal inspection shall be instituted if any of the following occur on original inspection:

- a. A lot or batch is rejected; or
- b. Production becomes irregular or delayed; or
- c. Other conditions warrant that normal inspection shall be instituted.

(5) Discontinuation of Inspection

If the cumulative number of lots not accepted in a sequence of consecutive lots on tightened inspection reaches 5, the acceptance procedures of this standard shall be discontinued. Inspection under the provisions of this standard shall not be resumed until corrective action has been taken. Tightened inspection shall then be used as if A10.3.1 had been invoked.

2. B Method [1]

2.1 B-1 Method

Single Specification Limit-Form 1

Variability Unknown-Standard Deviation Method

2.2 B-2 Method

Single Specification Limit-Form 2

Variability Unknown-Standard Deviation Method

2.3 B-3 Method

Double Specification Limit

Variability Unknown-Standard Deviation Method

One AQL Value for Both Upper and Lower Specification Limit Combined

2.4 B-4 Method

Double Specification Limit

Variability Unknown-Standard Deviation Method

Different AQL Value for Both Upper and Lower Specification Limits

3. C Method

Single Specification Limit-Form 1
Variability Unknown-Standard Deviation Method

3.1 C-1 Method

Single Specification Limit-Form 1
Variability Unknown-Range Method

3.2 C-2 Method

Single Specification Limit-Form 2
Variability Unknown-Range Method

3.3 C-3 Method

Double Specification Limit
Variability Unknown-Average Range Method
One AQL Value for Both Upper and Lower Specification Limit Combined

3.4 C-4 Method

Double Specification Limit
Variability Unknown-Average Range Method
Different AQL Value for Both Upper and Lower Specification Limits

4. D Method [1]

4.1 D-1 Method

Single Specification Limit-Form 1
Variability Known

4.2 D-2 Method

Single Specification Limit-Form 2
Variability Known

4.3 D-3A Method

Double Specification Limit

Variability Known

One AQL Value for Both Upper and Lower Specification Limit Combined

4.4 D-3B Method

Double Specification Limit

Variability Known

One AQL Value for Both Upper and Lower Specification Limit Combined

6. Summary

- AQL : Specification Limit, Normality Assumption
- Inspection Level : Special (S3,S4), General(I ,II,III)
- Sampling Plan : B(B-1,2,3,4), C(C-1,2,3,4), D(D-1,2,3A,3B,4)
- Switching Procedures: Normal, Tightened, and Reduced Inspection

References

1. ANSI/ASQ Z1.9-2003 American National Standard, ASQ, Milwaukee, WI, 2003,
2. B.Wortman, CQE Primer, 7th ed. , Quality Council of Indiana, 2005.