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INTERNATIONAL STANDARD

Quality assessment systems –
Part 2: Selection and use of sampling plans for inspection of electronic components and packages

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International Standard IEC 61193-2 has been prepared by IEC technical committee 91: Electronics assembly technology.

The text of this standard is based on the following documents:

FDIS	Report on voting
91/690/FDIS	91/723/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 61193 series, under the general title *Quality assessment systems*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

To obtain a high quality level of products, process controls like 100 % testing of significant characteristics and statistical methods are needed to stabilize, monitor, and improve processes.

Sampling inspection is one of the methods to verify

- whether the process control is effective, and
- the quality level of a supplier's product by a customer or third party.

Today the quality level of products for use in electric and electronic equipment is expected to be equal or close to zero defects. But, the assessment of a quality level close to zero defects by sampling only would lead to an unreasonable increase of cost for inspection. A combination of process control and zero acceptance number sampling plans is indispensable.

This standard provides a sampling system and plans for the inspection of electronic components, packages and modules, manufactured under suitable process control, which prevents the outflow of nonconforming products.

NOTE The sampling system provided by this standard is extracted from ISO 2859-1, and is intended to be used for the inspection of final products, either by the manufacturer, a customer, or a third party.

QUALITY ASSESSMENT SYSTEMS –

Part 2: Selection and use of sampling plans for inspection of electronic components and packages

1 Scope

This part of IEC 61193 applies to the inspection of electronic components, packages, and also modules (referred to as “products” in this standard) for use in electronic and electric equipment. It specifies sampling plans for inspection by attributes on the assumption that the acceptance number is zero (Ac = 0), including criteria for sample selection and procedures.

The zero acceptance number sampling plans provided by this standard apply to the inspection of products, that are manufactured under suitable process control with the target of a “zero-defect” quality level before sampling inspection.

In addition, this standard provides a method for the calculation of the expected value of the statistical verified quality limit (SVQL) at a confidence level of 60 %. Amongst other things, this method can be used to verify the effectiveness of the supplier’s process control.

NOTE In this standard the term “module” is used for products which are modules according to the definition in IEC 60194.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60194: *Printed board design, manufacture and assembly – Terms and definitions*

ISO 2859-1:1999, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 3534-2:2006, *Statistics – Vocabulary and symbols – Part 2: Applied statistics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60194, ISO 2859-1 and ISO 3534-2, as well as the following, apply.

3.1
electronic component
individual component which includes electronic, optoelectronic and/or micro-electro-mechanical systems (MEMS) element

3.2
electronic package
individual electronic element or elements in a container which protects the contents to assure the reliability and provides terminals to interconnect the container to an outer circuit

3.3
electronic module
functional block which contains individual electronic elements and /or electronic packages, to be used in a next level assembly

3.4
inspection level
IL
level to define sample size for lot size

NOTE Sample size of lots depends on the severity of inspection level.

3.5
nonconforming item
item with one or more nonconformities

NOTE A nonconforming item is a product which cannot satisfy the requirement (visual examination or electrical performance, etc.) in the lot-by-lot inspection or periodic test, etc.

3.6
structurally similar products
products manufactured by the same manufacturer with the same materials, manufacturing processes and methods

NOTE Products are structurally similar, even when there are differences e.g. in case size and rated values. Results from designated tests conducted on items of one lot of these products can be accumulated with results of other lots in the same group of structural similarity.

4 Sampling system

The procedure and sampling plans described in this clause are based on an acceptance number zero (Ac = 0).

4.1 Formation and identification of lots

The products shall be assembled into identifiable lots or sub-lots. Each lot shall, as far as practicable, consist of items of a single type, grade, class, size and composition, manufactured under uniform conditions at essentially the same time.

4.2 Drawing of samples

4.2.1 Selection of sample items

The items selected for the sample shall be drawn from the lot by simple random sampling (see 3.1.3.4 in ISO 3534-2). However, when the lot consists of sub-lots or strata, identified by some rational criterion, stratified sampling shall be used in such a way that the size of the subsample from each sublot or stratum is proportional to the size of that sublot or stratum.

4.2.2 Process of sampling

Samples may be drawn after the lot has been produced, or during production of the lot.

4.3 Sampling plans

4.3.1 Inspection level

The inspection level designates the relative severity of inspection. Three inspection levels, I, II and III, are given for general use. Unless otherwise specified, level II shall be used. Level I may be used when less discrimination is needed or level III when greater discrimination is required. Four additional special levels, S-1, S-2, S-3 and S-4 may be used where relatively

small sizes are necessary and larger sampling risks can be tolerated, such as destructive inspection or valuable products.

The inspection level shall be specified in accordance with the detail specification or an agreement with a supplier and a user.

4.3.2 Sampling plan for normal inspection

Unless otherwise specified in the detail specification, single sampling plans for normal inspection according to Table 1 of this standard shall be applied (see also Annex B).

NOTE Table 1 is adapted from ISO 2859-1.

Table 1 – Sample size

Lot size	Special inspection levels				General inspection levels		
	S-1	S-2	S-3	S-4	I	II	III
2 to 8	2	2	2	2	2	2	3
9 to 15	2	2	2	2	2	3	5
16 to 25	2	2	3	3	3	5	8
26 to 50	2	3	3	5	5	8	13
51 to 90	3	3	5	5	5	13	20
91 to 150	3	3	5	8	8	20	32
151 to 280	3	5	8	13	13	32	50
281 to 500	3	5	8	13	20	50	80
501 to 1 200	5	5	13	20	32	80	125
1 201 to 3 200	5	8	13	32	50	125	200
3 201 to 10 000	5	8	20	32	80	200	315
10 001 to 35 000	5	8	20	50	125	315	500
35 001 to 150 000	8	13	32	80	200	500	800
150 001 to 500 000	8	13	32	80	315	800	1 250
≥ 500 001	8	13	50	125	500	1 250	2 000

4.3.3 Acceptance number

The acceptance number (Ac) shall be zero and the rejection number (Re) shall be 1.

4.3.4 Tightened or reduced inspection

When tightened inspection or reduced inspection is applied, Table 2 shall be used to select the applicable code letter for the particular lot size and the prescribed inspection level (see ISO 2859-1, Table 1). Then, sample size shall be determined from ISO 2859-1, Table 2-B (tightened inspection) or Table 2–C (reduced inspection) by the corresponding sample size code letter.

Table 2 – Sample size code letters

Lot size	Special inspection levels				General inspection levels		
	S-1	S-2	S-3	S-4	I	II	III
2 to 8	A	A	A	A	A	A	B
9 to 15	A	A	A	A	A	B	C
16 to 25	A	A	B	B	B	C	D
26 to 50	A	B	B	C	C	D	E
51 to 90	B	B	C	C	C	E	F
91 to 150	B	B	C	D	D	F	G
151 to 280	B	C	D	E	E	G	H
281 to 500	B	C	D	E	F	H	J
501 to 1 200	C	C	E	F	G	J	K
1 201 to 3 200	C	D	E	G	H	K	L
3 201 to 10 000	C	D	F	G	J	L	M
10 001 to 35 000	C	D	F	H	K	M	N
35 001 to 150 000	D	E	G	J	L	N	P
150 001 to 500 000	D	E	G	J	M	P	Q
≥ 500 001	D	E	H	K	N	Q	R

5 Acceptance and rejection

5.1 Acceptability criteria

The lot shall be accepted only if no nonconforming items are found upon inspection according to Clause 4.

5.2 Disposition of rejected lots

The responsible authority of the manufacturer shall decide how the rejected lots should be disposed. Such lots may be scrapped, sorted (with or without nonconforming items being replaced), reworked, re-evaluated against more specific usability criteria, or held for additional information, etc.

When the inspection results are used to calculate the statistical verified quality limit (SVQL) according to Clause 6, the complete sample shall be inspected to obtain correct statistical data.

NOTE Nonconforming lots indicate weak points in process control. The cause of nonconformities should be determined and appropriate corrective action implemented.

6 Statistical verified quality limit (SVQL)

6.1 General

The observation of zero nonconformities in a sample does not imply that the population has no nonconformities. The following method describes how to estimate the average production quality with a certain statistical probability (confidence level).

NOTE Though SVQL is calculated by accumulating the inspection results, including rejected lots, these rejected lots including nonconforming items in sample are not shipped. Thus the defect rate perceived by a customer is far below the values calculated as statistical verified quality limit.

Verification of the outgoing quality in nonconforming items per million ($\times 10^{-6}$) to customers is hard to be obtained by sampling inspection of single lots. For that reason the quality level

needs to be demonstrated for a series of outgoing products by using accumulated lot-by-lot sampling inspection data.

This statistical verified quality limit (SVQL) in nonconforming items per million ($\times 10^{-6}$) is applicable primarily to mass-manufacturing products. It shall be calculated by accumulating inspection data for a multiple number of lots of structurally similar products.

When accumulating the inspection results of lots, the inspection results of a sufficient number of lots (at least three lots) shall be accumulated. For accumulation data of all inspected lots, including rejected lots, shall be used.

The inspection results may be accumulated

- over a certain period of time, or
- over a certain number of lots or shipments, or
- up to a certain number of nonconforming items, or
- any other method agreed between supplier and customer.

6.2 Calculation of the SVQL

The statistical verified quality level in nonconforming items per million ($\times 10^{-6}$) is calculated by use of the following equation:

$$\text{SVQL } (\times 10^{-6}) = \text{ Coefficient } C_L \times \frac{\text{Accumulated number of nonconforming items}}{\text{Accumulated sample size}} \times 10^6$$

where, coefficient C_L stands for the coefficient of applicable statistical confidence level.

Table 3 gives the coefficients for the widely use confidence level 60 %.

Table 3 – Coefficients for confidence level 60 % (see also A.5)

Accumulated number of nonconforming items	0	1	2	3	4	5	6	7	8	9	10
Coefficient	(0,916)[a]	2,02	1,55	1,39	1,31	1,26	1,22	1,20	1,18	1,16	1,15
NOTE When the accumulated number of nonconforming items exceeds 10, the correct coefficient may be calculated by Poisson distribution function (see Annex A) or it may be calculated as described in Clause A.4.											
[a] When the accumulated number of nonconforming items is zero, 0,916 is used as value for “coefficient x accumulated number of nonconforming items”.											

Annex A
(informative)

Estimation of the statistical verified quality limit (SVQL) in nonconforming items per million ($\times 10^{-6}$) at a confidence limit 60 %

This Annex describes a procedure to estimate the expected value of the statistical verified quality limit in nonconforming items per million ($\times 10^{-6}$) with a confidence limit of 60 %.

A.1 Estimation of statistical verified quality limit

In order to gather the data needed to select the respective SVQL values from Table A.1, the supplier shall accumulate the results for a sufficient number of lots (at least three lots) of structurally similar products, from all lots inspected including rejected lots.

The respective SVQL value can be obtained from Table A.1 by one of the following methods:

a) Determine SVQL from accumulated sample inspection results

   Select the row with the nearest accumulated sample size (n), go right to the column showing the accumulated number of nonconforming items and read the respective SVQL value from the column header.

b) Determine minimum accumulated sample size for a given SVQL and number of nonconforming items

   Select the required SVQL, go down this column to the first row showing the number of nonconforming items found, go left in this row and read the minimum value for accumulated sample size from the row header, which is needed to determine the SVQL with a confidence level of 60 %.

EXAMPLE To confirm an SVQL of 10 ($\times$ 10^{-6}), the minimum accumulated sample size is 140 000, provided no nonconforming items occur.

A.2 Inspection lot

Lots for inspection shall be sampled continuously. In the initial stage, however, if the lots sampled continuously are too small, the manufacturer may increase the accumulated number of inspected items by increasing the sample size, taking the balance between time loss and economy into account.

A.3 Data accumulation

All results, including those of rejected lots, shall be accumulated. However, the results of re-inspected lots shall be omitted in order to avoid redundant calculation.

A.4 Measures to be taken when the accumulated number of nonconforming items exceeds 10

When the accumulated number of nonconforming items exceeds 10, and an eleventh nonconforming item is found, the supplier shall discard inspection data for the lot in which the first nonconforming item was found (i.e. the oldest inspection data in which nonconforming item was found) and all previous data, in order to make the accumulated number of nonconforming items to be equal or less than 10.

Subsequently, the supplier shall define a new outgoing quality level based on the new accumulated number of inspected items and accumulated number of nonconforming items.

Table A.1 – Statistical verified quality limits in nonconforming items per million ($\times 10^{-6}$)

Accumulated sample size	SVQL by accumulated number of nonconforming items, confidence limit of 60 %										
	0,15 %	**0,1 %**	**0,065 %**	**0,04 %**	**0,025 %**	**0,015 %**	**0,01 %**	**0,0065 %**	**0,004 %**	**0,0025 %**	**0,0015 %**
n≥	1 500 ($\times 10^{-6}$)	1 000 ($\times 10^{-6}$)	650 ($\times 10^{-6}$)	400 ($\times 10^{-6}$)	250 ($\times 10^{-6}$)	150 ($\times 10^{-6}$)	100 ($\times 10^{-6}$)	65 ($\times 10^{-6}$)	40 ($\times 10^{-6}$)	25 ($\times 10^{-6}$)	15 ($\times 10^{-6}$)
1 000	0										
1 500	1	0									
2 500	2	1	0								
3 000	3	2	1	0							
3 500	3	2	1	0							
4 200	5	3	1	0							
5 000	6	4	2	1	0						
5 500	7	4	2	1	0						
6 000	8	4	2	1	0						
6 500	8	5	3	1	0						
7 000	9	5	3	1	0						
7 500	9	6	3	1	0						
8 000	10	7	4	2	1	0					
9 000		7	4	2	1	0					
10 000		8	5	3	1	0					
11 200		9	6	3	1	0					
12 500		10	7	4	2	0					
14 000			8	4	2	1	0				
16 000			9	5	3	1	0				
18 000			10	6	3	1	0				
20 000				6	4	2	1	0			
22 500				7	4	2	1	0			
25 000				8	5	2	1	0			
28 000				9	5	3	1	0			
31 500				10	6	3	2	1	0		
35 000					7	4	2	1	0		
40 000					8	5	3	1	0		
45 000					9	5	3	1	0		
50 000					10	6	4	2	1	0	
56 000						7	4	2	1	0	
63 000						8	5	3	1	0	
71 000						9	6	3	1	0	
80 000						10	7	4	2	0	0
90 000							7	4	2	1	0
100 000							8	5	3	1	0
112 000							9	6	3	1	0
125 000							10	7	4	2	0
140 000								8	4	2	1
160 000								9	5	3	1
180 000								10	6	3	1
200 000									6	4	2
224 000									7	4	2
250 000									8	5	2
280 000									9	5	3
315 000									10	6	3
350 000										7	4
400 000										8	5
450 000										9	5
500 000										10	6
560 000											7
630 000											8
710 000											9
800 000											10
900 000											
1 000 000											

Table A.1 *(continued)*

Accumulated sample size n≥	SVQL by accumulated number of nonconforming items, confidence limit of 60 %										
	0,001 %	**0,000 7 %**	**0,000 4 %**	**0,000 3 %**	**0,000 2 %**	**0,000 1 %**	**7E-05 %**	**4E-05 %**	**3E-05 %**	**2E-05 %**	**1E-05 %**
	10 ($\times 10^{-6}$)	**6,5** ($\times 10^{-6}$)	**4** ($\times 10^{-6}$)	**2,5** ($\times 10^{-6}$)	**1,5** ($\times 10^{-6}$)	**1** ($\times 10^{-6}$)	**0,65** ($\times 10^{-6}$)	**0,4** ($\times 10^{-6}$)	**0,25** ($\times 10^{-6}$)	**0,15** ($\times 10^{-6}$)	**0,1** ($\times 10^{-6}$)
112 000											
125 000											
140 000	0										
160 000	0										
180 000	0										
200 000	1	0									
224 000	1	0									
250 000	1	0									
280 000	1	0									
315 000	2	1	0								
350 000	2	1	0								
400 000	3	1	0								
450 000	3	1	0								
500 000	4	2	1	0							
560 000	4	2	1	0							
630 000	5	3	1	0							
710 000	6	3	1	0							
800 000	7	4	2	1	0						
900 000	8	4	2	1	0						
1 000 000	9	5	3	1	0						
1 120 000	10	6	3	1	0						
1 250 000		7	4	2	0						
1 400 000		8	4	2	1	0					
1 600 000		9	5	3	1	0					
1 800 000		10	6	3	1	0					
2 000 000			6	4	2	1	0				
2 240 000			7	4	2	1	0				
2 500 000			8	5	2	1	0				
2 800 000			9	5	3	1	0				
3 150 000			10	6	3	2	1	0			
3 500 000				7	4	2	1	0			
4 000 000				8	5	3	1	0			
4 500 000				9	5	3	1	0			
5 000 000				10	6	4	2	1	0		
5 600 000					7	4	2	1	0		
6 300 000					8	5	3	1	0		
7 100 000					9	6	3	1	0		
8 000 000					10	7	4	2	1	0	
9 000 000						8	4	2	1	0	
10 000 000						9	5	3	1	0	
11 200 000						10	6	3	1	0	
12 500 000							7	4	2	1	0
14 000 000							8	4	2	1	0
16 000 000							9	5	3	1	0
18 000 000							10	6	3	1	0
20 000 000								6	4	2	1
22 400 000								7	4	2	1
25 000 000								8	5	2	1
28 000 000								9	5	3	1
31 500 000								10	6	3	2
35 000 000									7	4	2
40 000 000									8	5	3
45 000 000									9	5	3
50 000 000									10	6	4
56 000 000										7	4

NOTE This table is based on Poisson distribution function and calculated from the values for confidence limit of 60 % (see Clause A.5). More information can be found in Tables 1, 8 and 9 of MIL-STD-690C.

A.5 Method for calculation of the values in Table A.1

The figures in Table A.1 are calculated by use of the Poisson distribution function in the following way: $L(p) = \sum_{r=0}^{c} e^{-np} (np)^r / r!$ ... [Poisson distribution]

The values of *np* are calculated from *c* = 0 to 10 for a confidence limit of 60 %:

1 - β =0,6, i.e. β = *L(p)* = 0,40.

Table A.2 – np with confidence limit of 60 % for accumulated number of non-conforming items and coefficient C_L

Number of non-conforming items c	np with confidence limit of 60 %	Coefficient (np/c except c = 0)
0	0,916	0,916
1	2,02	2,02
2	3,11	1,55
3	4,18	1,39
4	5,24	1,31
5	6,29	1,26
6	7,35	1,22
7	8,39	1,20
8	9,43	1,18
9	10,48	1,16
10	11,52	1,15

The statistical verified quality level is calculated from SVQL = *np* / accumulated sample size for each accumulated number of nonconformities.

Consequently, these calculated values become approximately equal to the values for the SVQL in Table A.1.

Annex B
(informative)

Relationship between this standard and ISO 2859-1

This annex describes the relationship between this standard and ISO 2859-1.

Table B.1 – Sampling plans corresponding to Table 2-A of ISO 2859-1

Sample size code letter	Sample size	Corresponding AQL															
		0,01	0,015	0,025	0,04	0,065	0,1	0,15	0,25	0,4	0,65	1	1,5	2,5	4	6,5	10
		Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re
A	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0/1	-
B	3	-	-	-	-	-	-	-	-	-	-	-	-	-	0/1	-	-
C	5	-	-	-	-	-	-	-	-	-	-	-	-	0/1	0/1	-	-
D	8	-	-	-	-	-	-	-	-	-	-	-	0/1	0/1	-	-	-
E	13	-	-	-	-	-	-	-	-	-	-	0/1	0/1	-	-	-	-
F	20	-	-	-	-	-	-	-	-	-	0/1	0/1	-	-	-	-	-
G	32	-	-	-	-	-	-	-	-	0/1	0/1	-	-	-	-	-	-
H	50	-	-	-	-	-	-	-	0/1	0/1	-	-	-	-	-	-	-
J	80	-	-	-	-	-	-	0/1	0/1	-	-	-	-	-	-	-	-
K	125	-	-	-	-	-	0/1	0/1	-	-	-	-	-	-	-	-	-
L	200	-	-	-	-	0/1	0/1	-	-	-	-	-	-	-	-	-	-
M	315	-	-	-	0/1	0/1	-	-	-	-	-	-	-	-	-	-	-
N	500	-	-	0/1	0/1	-	-	-	-	-	-	-	-	-	-	-	-
P	800	-	0/1	0/1	-	-	-	-	-	-	-	-	-	-	-	-	-
Q	1250	0/1	0/1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R	2000	0/1	0/1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTE 1 Numbers in Table B.1 show acceptance number (Ac) and rejection number (Re).
NOTE 2 Only one column of Table 2 of ISO 2859-1 in which acceptance/rejection is 0/1 is applied.

When this standard is applied to someone using the sampling plan of ISO 2859-1, the same inspection level and sample size can be used. In this case, since only one column of Table 2 of ISO 2859-1 in which Ac/Re is 0/1 is applied, it is ensured that the new consumer's risk becomes smaller than the old one. But the producer's risk becomes larger than the old one. If the new consumer and producer's risks are not suitable, the user of the sampling plan of this standard may change the inspection level.

B.1 Values for operating characteristic curves

Table B.2 shows the values for operating characteristic curves for single sampling plans with an acceptance number equal to zero.

Table B.2 – Tabulated values for operating characteristic curves (p: per cent nonconforming)

Sample size	Probability of acceptance %						
	10	25	50	75	90	95	99
	p (in per cent nonconforming)						
2	68,4	50,0	29,3	13,4	5,13	2,53	0,501
3	53,6	37,0	20,6	9,14	3,45	1,70	0,334
5	36,9	24,2	12,9	5,59	2,09	1,02	0,201
8	25,0	15,9	8,30	3,53	1,31	0,639	0,126
13	16,2	10,1	5,19	2,19	0,807	0,394	0,077 3
20	10,9	6,70	3,41	1,43	0,525	0,256	0,050 2
32	6,94	4,24	2,14	0,895	0,329	0,160	0,031 4
50	4,50	2,73	1,38	0,574	0,210	0,103	0,020 1
80	2,84	1,72	0,863	0,359	0,132	0,064 1	0,012 6
125	1,83	1,10	0,553	0,230	0,084 3	0,041 0	0,008 0
200	1,14	0,691	0,346	0,144	0,052 7	0,025 6	0,005 0
315	0,728	0,439	0,220	0,0913	0,033 4	0,016 3	0,003 2
500	0,459	0,277	0,139	0,0575	0,021 1	0,010 3	0,002 0
800	0,287	0,173	0,0866	0,0360	0,013 2	0,006 4	0,001 3
1 250	0,184	0,111	0,0554	0,0230	0,008 4	0,004 1	0,000 8
2 000	0,115	0,069 3	0,0347	0,014 4	0,005 3	0,002 6	0,000 5

NOTE Values of per cent nonconforming are based on the Binomial distribution.

Annex C
(informative)

Example of application of this standard (lot-by-lot inspection of assessment level EZ in IEC/TC 40)

Table C.1 – Lot-by-lot inspection of assessment level EZ – IEC/TC 40

Inspection subgroup	Subclause number and test [1]	Inspection level *IL* [3]	Sample size *n* [3]	Acceptance number *c* [3]
Group A (lot-by-lot) Subgroup A0	4.3.2 Capacitance 4.3.3 Tangent of loss angle(tan δ) 4.3.1 Voltage proof (test A) 4.3.4 Insulation resistance (test A)	100% [4]		0
Subgroup A1	4.2.1 Visual inspection	S-4	[2]	0
Subgroup A2	4.2 Dimension [5]	S-3	[2]	0
Group B (lot-by-lot) Subgroup B1	4.7 Solderability	S-3	[2]	0
Subgroup B2	4.14 Solvent resistance of the marking	S-3	[2]	0

[1] Subclause numbers of tests and performance requirements refer to the sectional specification.

[2] The sample size shall be determined by directly allotting the code letter for inspection level/lot size selected from Table 1 to Table 2-A in ISO 2859-1 (IEC 60410) (see 4.3).

[3] Codes in this table refer to ISO 2859-1 (IEC 60410).

[4] This inspection shall be performed after removal of nonconforming items by 100 % testing during the manufacturing process. Whether the lot was accepted or not, all samples for sampling inspection shall be inspected in order to monitor outgoing quality level by nonconforming items per million ($x10^{-6}$). The sampling level shall be established by the manufacturer.

In case one or more nonconforming items occur in a sample, this lot shall be rejected but all nonconforming items shall be counted for the calculation of quality level values. Outgoing quality level by nonconforming items per million ($\times 10^{-6}$) values shall be calculated by accumulating inspection data.

[5] This test may be replaced by in-production testing if the manufacturer installs statistical process control (SPC) on dimensional measurements, or other mechanisms, to avoid components exceeding the limits.

Bibliography

IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*

IEC 62421:2007, *Electronic modules – Generic standard*

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