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PARTS 38–41 [RESERVED]

PART 42—STANDARDS FOR CONDITION OF FOOD CONTAINERS

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AUTHORITY: Secs. 203, 205, 60 Stat. 1087, as amended, 1090, as amended (7 U.S.C. 1622, 1624).

Subpart A—Definitions

§ 42.101 Meaning of words.

Words used in this part in the singular form shall be considered to import the plural, or vice versa, as the case may demand.

[31 FR 4687, Mar. 19, 1966; 31 FR 4949, Mar. 25, 1966; Redesignated at 42 FR 32514, June 27, 1977 and at 46 FR 63203, Dec. 31, 1981]

§ 42.102 Definitions, general.

For the purpose of this part, unless the context otherwise requires, the following terms shall be construed, respectively, to mean:

Acceptable Quality Level (AQL). The maximum number of defects per hundred units (DHU) which is acceptable as a process average. Lots, or portions of production, having a quality level equal to a specified AQL will be accepted approximately 95 percent of the time when using the sampling plans prescribed for the AQL.

Acceptance Number (Ac). The number in a sampling plan that indicates the maximum number of defects permitted in a sample in order to consider a lot as meeting a specific requirement.

Administrator. The Administrator of the Agricultural Marketing Service (AMS) of the Department or any other officer or employee of the Agency to whom there has heretofore been delegated, or to whom there may hereafter

be delegated, the authority to act in his stead.

Basic Inspection Period. A specified period of consecutive production designated for on-line inspection (e.g., one shift's production, one day's production, etc.).

Condition. The degree of acceptability of the container with respect to freedom from defects which affect the serviceability, including appearance as well as usability, of the container for its intended purpose.

Cumulative Sum Sampling (CuSum) Plan. An on-line sampling plan that accumulates the number of defects which exceed the subgroup tolerance (''T'') in a series of consecutive subgroups. Terms specified to the CuSum sampling plans are:

(a) *Acceptance Limit (''L'')*. The maximum accumulation of defects allowed to exceed the subgroup tolerance (''T'') in any subgroup or consecutive subgroups.

(b) *CuSum value*. The accumulated number of defects that exceed the subgroup tolerance (''T'').

(c) *Subgroup tolerance (''T'')*. The allowable number of defects in any subgroup.

(d) *Starting value (''S'')*. The initial CuSum value used to begin a CuSum sampling plan.

Defect. Any nonconformance of a container from specified requirements.

Defect classifications. The terms used to denote the severity of a defect. The terms are as follows:

(a) *Critical defect*. A defect that seriously affects, or is likely to seriously affect, the usability of the container for its intended purpose.

(b) *Major defect*. A defect that materially affects, or is likely to materially affect, the usability of the container for its intended purpose.

(c) *Minor defect*. A defect that materially affects the appearance of the container but is not likely to affect the usability of the container for its intended purpose.

(d) *Insignificant defect*. A flaw in the container that does not materially affect the appearance and does not affect usability of the container for its intended purpose. When performing examinations, insignificant defects shall not be recorded.

Defective. A container which has one or more defects.

Department. The U.S. Department of Agriculture.

Double sampling. A sampling scheme which involves use of two independently drawn but related samples, a first sample and a second sample which is added to the first to form a total sample size. A double sampling plan consists of first and total sample sizes with associated acceptance and rejection criteria. The first sample must be inspected first, and if possible, a decision as to acceptance or rejection of the lot made before a second sample is inspected. When the decision cannot be made on the first sample, a second sample is inspected; the decision to accept or reject is based on the total sample size.

Lot. A collection of filled food containers of the same size, type, and style. The term shall mean ''inspection lot,'' i.e., a collection of units of product from which a sample is to be drawn and inspected to determine conformance with the applicable acceptance criteria. An inspection lot may differ from a collection of units designated as a lot for other purposes (e.g., production lot, shipping lot, etc.).

On-line sampling. The random selection of samples from a production line.

Operating Characteristic Curve (OC Curve). A curve that gives the probability of acceptance as a function of the quality level of the lot or the quality level of the portion of production. It shows the discriminatory power of a sampling plan, i.e., how the probability of accepting a lot, or portion of production, varies with the quality of the containers offered for inspection.

Origin inspection. An inspection made at any location where the filled containers are examined prior to shipment or transfer to the purchaser.

Primary container. The immediate container in which the product is packaged and which serves to protect, preserve, and maintain the condition of the product. It may be metal, glass, fiber, wood, textile, plastic, paper, or any other suitable type of material and may be supplemented by liners, overwraps, or other protective materials.

Probability of acceptance—(a) *For stationary lot sampling*. The chance that a lot with a given level of quality will be accepted. Probability of acceptance is synonymous with ''Percent of Lots Expected to be Accepted.'' The probability of acceptance is normally designated as ''Pa'' but is designated as ''Pas'' when referring to skip lot sampling and inspection.

(b) *For On-line Sampling*. The chance that a portion of production with a given level of quality will be accepted. Probability of acceptance is synonymous with ''Percent of Production Expected to be Accepted.'' The probability of acceptance is normally designated as ''Pa.'' In on-line sampling inspection, the probability of acceptance of any portion of production depends on the sample results obtained from the preceding portions. The probability of acceptance values associated with these procedures are the values which would be expected if a large number of samples are to be inspected. For the CuSum plans referenced in this standard, the probability of acceptance at the Acceptable Quality Level (AQL) is approximately 95 percent. The starting value (''S'') associated with each CuSum plan helps to make the probability of acceptance of the first portions of production of a basic inspection period as close as possible to 95 percent.

Random sampling. A process of selecting a sample from a lot, or portion of production, whereby each unit in the lot of portion of production, has an equal chance of being chosen.

Rejection number (Re). The number in a sampling plan that indicates the minimum number of defects in a sample that will cause a lot to fail a specific requirement.

Sample. Any number of sample units which are to be used for inspection.

Sample size (n). The number of sample units which are to be included in the sample.

Sample unit. The individual container including any component parts.

Sampling plan. Any plan stating the number of sample units to be included in the sample as well as the corresponding plan parameters used to make acceptance and rejection decisions.

Secondary container. The container in which one or more primary containers are packed. For example, a shipping case containing canned product.

Shipping case. The container in which the product or primary containers of the product are placed to protect, preserve, and maintain the condition of the product during transit or storage. The shipping case may include strapping, liners or other protective material.

Single sampling. A sampling scheme where the decision to accept or reject an inspection lot with respect to a specified requirement is made after the inspection of a single sample. A single sampling plan consists of a single sample size with associated acceptance and rejection criteria.

Stationary lot sampling. The process of randomly selecting sample units from a lot whose production has been completed. This type of lot is usually stored in a warehouse or in some other storage area and is offered ''in toto'' for inspection.

Subgroup. A group of sample units representing a portion of production.

Total defects. The sum of critical, major, and minor defects.

User. The person or agency at whose request inspection is conducted.

[31 FR 4687, Mar. 19, 1966, as amended at 36 FR 18456, Sept. 15, 1971; 41 FR 42639, Sept. 28, 1976. Redesignated at 42 FR 32514, June 27, 1977, and further amended at 45 FR 69423, Oct. 21, 1980. Redesignated at 46 FR 63203, Dec. 31, 1981]

Subpart B—Procedures for Stationary Lot Sampling and Inspection

§ 42.103 Purpose and scope.

(a) This subpart outlines the procedure to be used to establish the condition of containers in stationary lots of packaged foods. This subpart shall be used to determine the acceptability of a lot based on specified acceptable quality levels and defects referenced in § 42.104 or any alternative plan which is approved by the Administrator. In addition, any other sampling plan in the tables with a larger first sample size than that indicated by the lot size range may be specified when approved by the Administrator. This subpart or

approved alternative plan will be applied when a Government agency or private user of the inspection or grading services requests that filled primary containers or shipping cases, or both, be certified for condition. Unless the request for certification specifically asks that only the primary container or only the shipping case be examined, both containers will be examined.

(b) Unless otherwise specified by the user of service, this subpart will not apply to inspection lots of less than 50 shipping cases or to inspection lots of less than 300 primary containers. When the primary container is the shipping case, the shipping case limit will apply. When the lot size exceeds either the 50 shipping case limit or the 300 primary container limit or both, the provisions of paragraph (a) of this section will apply.

(c) Under certain conditions, special procedures (Skip Lot Sampling and Inspection) may be used to determine the condition of containers in stationary lots of packaged foods. Subpart C sets forth the requirements and procedures for Skip Lot Sampling and Inspection.

[31 FR 4687, Mar. 19, 1966, as amended at 36 FR 18456, Sept. 15, 1971; 41 FR 42639, Sept. 28, 1976. Redesignated at 42 FR 32514, June 27, 1977, and further amended at 45 FR 69424, Oct. 21, 1980. Redesignated at 46 FR 63203, Dec. 31, 1981]

§ 42.104 Sampling plans and defects.

(a) *Sampling plans.* Sections 42.109 through 42.111 show the number of containers to examine for condition in relation to lot size ranges. The tables provide acceptance (Ac) and rejection (Re) numbers for lot acceptance (or rejection) based on the number, class, and type of defects present in the sample.

(b) *Defects.* The tables in § 42.112 enumerate and classify defects according to the degree to which the individual defect affects the serviceability, including appearance as well as usability, of the container for its intended purpose. The table in § 42.113 enumerates and classifies defects of the label, marking, or code.

[31 FR 4687, Mar. 19, 1966, as amended at 36 FR 18456, Sept. 15, 1971. Redesignated at 42 FR 32514, June 27, 1977 and 46 FR 63203, Dec. 31, 1981]

§ 42.105 Basis for selection of sample.

(a) *Identification of lot.* Selection of proper samples requires sufficient information to identify the lot; such information includes, but is not limited to:

(1) The lot size (see § 42.103 for restriction on small lots);

(2) The type and size of container;

(3) The code marks or other identification marks and the number of containers represented by each mark.

(4) The history of the lot regarding previous inspections; and

(5) The inspection status (normal, tightened, or reduced).

(b) *Preliminary scanning.* Prior to drawing the sample, the lot should be scanned to determine if any segments or portions are abnormal with respect to wet cases, blown cans, top layer rust, leaking bags, etc. If such segments or portions noted are of any consequence, the lot may be rejected for condition of containers without sampling.

(c) *Sample size.* Determination of the number of containers to check for condition:

(1) Refer to the table in §§ 42.109 through 42.111 (sampling plans) and find where the lot size (number of individual containers) fits into the column headed ''Lot Size Ranges.''

(i) Tables I-A (normal), II-A (tightened), or III-A (reduced), as applicable, will apply to origin inspections, unless the contractor requests that corresponding single sampling plans be used.

(ii) The appropriate double sampling plans in Table I will apply to other than origin inspections, unless the contractor requests that corresponding single sampling plans be used.

(2) Select the appropriate sample size for the corresponding lot size range as indicated in the appropriate column headed ''Sample Size.''

(3) Lots rejected for unsatisfactory condition of containers may be subsequently sampled after being reconditioned or reworked. Such lots or resulting portion of a lot may be sampled as a reoffered lot providing the reoffered portion is separately identifiable. When making such inspections, the appropriate sampling plan for tightened inspection shall be used. Except in the case of an appeal inspection, it is not permissible to reinspect a previously rejected lot until it has been reconditioned or reworked.

(d) *Sample selection*. Select samples from the lot presented in accordance with either of the following two procedures as may be applicable. (A lot offered for inspection will be accepted or rejected in its entirety with either sampling procedure used to select the sample.)

(1) *Proportional random sampling*. When the number of codes or other identifying marks within the lot and the approximate number of cases or containers per code are known, select sample units at random within each mark and in a number proportionate to the number of containers represented by such mark.

(2) *Simple random sampling*. When there are no code or other identifying marks, or when the number of codes or identifying marks within the lot and/or approximate number of cases or containers per mark are not known, select sample units at random from the entire lot.

(e) *Maximum sample units per case*. If the lot is cased, predetermine the number of containers to draw from each sampled case as well as the position within the case. Do not restrict the sampling to the top or bottom layers or to the corners. The best sample is one selected from all the various positions in the shipping case. It is desirable but not mandatory to limit the number of sample units to a single container from any one case. Multiple sample units may be taken from a single case but not in excess of the following plan:

(1) When containers are packed 12 or less to a case, draw a maximum of 6 sample units from any one case; and

(2) When containers are packed more than 12 to a case but not more than 60, draw a maximum of 12 sample units from any one case; and

(3) When containers are packed more than 60 to a case but not more than 250, draw a maximum of 16 sample units from any one case; and

(4) When containers are packed more than 250 in a case, draw a maximum of 24 sample units from any one case.

[31 FR 4687, Mar. 19, 1966, as amended at 36 FR 18456, Sept. 15, 1971. Redesignated at 42 FR 32514, June 27, 1977 and 46 FR 63203, Dec. 31, 1981]

§ 42.106 Classifying and recording defects.

(a) *Classifying defects*. Examine each sample unit for the applicable type of defects listed in the table covering the container being inspected in §§ 42.112 and 42.113. Other defects, not specifically listed, shall be classified according to their effect on the intended use of the container.

(1) Related defects are defects on a single container that are related to a single cause. If the initial incident causing one of the defects had not occurred, none of the other related defects on the container would be present. As an example of related defects, a can may be a leaker and the exterior may also be seriously rusted due to the leakage of the contents. In this case, the container is scored only once for these two defects since the rust condition can be atributed to the leak. Score the container according to whichever condition is the most serious. In this example, score as a ''leaker'' (a critical defect) and not as ''pitted rust'' (a major defect).

(2) Unrelated defects are defects on a single container that result from separate causes. If the incident that caused one of the defects had not occurred, the other unrelated defects on the container would still be present. As an example of unrelated defects, a can may be seriously rusted, may have a bad dent along the seam, and the label may also be detached from the can because of improper gluing. In this case it is unlikely that any of the three defects exist because of a common cause. Therefore, they are considered unrelated defects and should be scored as three defects.

(3) The lot acceptance portion of this procedure is based on the number of defects per 100 containers. It is necessary to determine if the defects on any one container are ''related'' defects or ''unrelated'' defects. A container is scored for the most serious of related defects, and is also scored for each unrelated defect.

(b) *Recording defects*. Record on a worksheet the number, type, and class (critical, major, or minor) of defects on each sample unit.

(c) *Totaling defects*. Add the number of defects in each class, then add the number of minor, major, and critical defects to obtain the total defects.

[31 FR 4687, Mar. 19, 1966, as amended at 36 FR 18456, Sept. 15, 1971. Redesignated at 42 FR 32514, June 27, 1977 and 46 FR 63203, Dec. 31, 1981]

§ 42.107 Lot acceptance criteria.

(a) The acceptability of the lot is determined by relating the number and class of defects enumerated on the worksheet to the acceptance and rejection numbers shown in §§ 42.109 through 42.111 for the respective sample size and Acceptable Quality Level (AQL).

(b) Unless otherwise specified, use the following AQL's for the respective class of defects:

Defect class	AQL at origin inspection	AQL at other than origin inspection
Critical	0.25	0.25
Major	1.5	2.5
Total	6.5	10.0

(c) Refer to the appropriate sample size and AQL and compare the number of defects found in the sample with the acceptance (Ac) and rejection (Re) numbers in the sampling plan.

(1) Accept the lot after examining the single sample or first sample of a double sampling plan when all of the following conditions are met:

(i) The number of critical defects does not exceed the applicable acceptance number (Ac) for critical defects, and

(ii) The number of major defects does not exceed the applicable acceptance number (Ac) for major defects, and

(iii) The total number of critical, major, and minor defects does not exceed the applicable acceptance number (Ac) for total defects.

(2) Reject the lot after examining the single sample or first sample of a double sampling plan when any one or more of the following conditions occur:

(i) The number of critical defects equals or exceeds the applicable rejection number (Re) for critical defects, or

(ii) The number of major defects equals or exceeds the applicable rejection number (Re) for major defects, or

(iii) The total number of critical, major, and minor defects equals or exceeds the applicable rejection number (Re) for total defects.

(3) If the lot can neither be accepted nor rejected on the first sample, when a double sampling plan is used, select and examine the prescribed second sample. Accept the lot if the accumulated defects of the first and second sample meet conditions of paragraph (c)(1) of this section, otherwise, reject the lot.

[31 FR 4687, Mar. 19, 1966, as amended at 36 FR 18456, Sept. 15, 1971. Redesignated at 42 FR 32514, June 27, 1977 and 46 FR 63203, Dec. 31, 1981]

§ 42.108 Normal, tightened, or reduced inspection.

(a) *Normal inspection*. Sampling plans for normal inspection are those in Tables I and I-A. These plans shall be used except when the history of inspection permits reduced inspection or requires tightened inspection.

(b) *Tightened inspection*. Sampling plans for tightened inspection are those in Tables II and II-A.

(c) *Reduced inspection*. Sampling plans for reduced inspection are those in Tables III and III-A.

(d) *Switching rules*. The normal inspection procedure shall be followed except when conditions in paragraph (d) (1) or (3) of this section are applicable or unless otherwise specified. Application of the following switching rules will be restricted to the inspection of lots for one applicant at a single location (plant, warehouse, etc.), and will be based upon records of original inspections of lots (excluding resubmitted lots) at that same location.

(1) *Normal inspection to reduced inspection*. When normal inspection is in effect, reduced inspection shall be instituted providing that reduced inspection is considered desirable by the Administrator and further provided that all of the following conditions are satisfied for each class of defect:

(i) The preceding 10 inspection lots (or more, as indicated by the note to Table III-B) which have been inspected within the preceding 6 months have been on normal inspection and none has been rejected on original inspection; and

(ii) The total number of defects in the samples from the preceding 10 inspection lots (or such other number of lots used for condition in paragraph (d)(1)(i) of this section) is equal to or less than the applicable number given in Table III-B. If a double sampling plan is used, all samples inspected should be included, not ''first'' samples only; and

(2) *Reduced inspection to normal inspection*. When reduced inspection is in effect, normal inspection shall be reinstituted if any of the following occur:

(i) An inspection lot is rejected on original inspection; or

(ii) Production becomes irregular (delayed or accelerated); or

(iii) Other valid conditions warrant that normal inspection shall be reinstituted.

(3) *Normal inspection to tightened inspection*. When normal inspection is in effect, tightened inspection shall be instituted when 2 out of 5 consecutive inspection lots have been rejected on original inspection.

(4) *Tightened inspection to normal inspection*. When tightened inspection is in effect, normal inspection shall be reinstituted when five consecutive inspection lots have been considered acceptable on original inspection.

(e) When the rules require a switch in the inspection status because of one or more classes of defects, all classes of defects shall be inspected under the new inspection criteria. At the option of the user of the service and when approved by the Administrator, such user may elect to remain on normal inspection when qualified for reduced inspection, or on tightened inspection when qualified for normal inspection.

(f) *Appeal inspection*—(1) *Appeal request*. Any interested party who is not satisfied with the results of a condition inspection on packaged food containers, as stated on an official certificate, may request an appeal inspection.

(2) *How to file an appeal*. A request for an appeal inspection may be made orally or in writing. If made orally, written confirmation may be required. The applicant shall clearly state the reasons for requesting the appeal service and a description of the product to be appealed.

(3) *When an application for an appeal inspection may be refused*. When it appears that: (i) The reasons given in the request are frivolous or not substantial; or (ii) the condition of the containers has undergone a material change since the original inspection; or (iii) the original lot is no longer intact, the applicant's request for the appeal inspection may be refused. In such case, the applicant shall be promptly notified of the reason(s) for such refusal.

(4) *Who shall perform the appeal*. An appeal inspection shall be performed by a person(s) other than the person who made the inspection being appealed.

(5) *Sampling procedures*. The sampling plan for an appeal inspection shall be the next larger sampling plan from the plan in the table used in the original inspection.

(6) *Appeal certificate*. Immediately after an appeal inspection is completed, an appeal certificate shall be issued to show that the original inspection was sustained or was not sustained. Such certificate shall supersede any previously issued certificate for the inspection involved and shall clearly identify the number and date of the superseded certificate. The issuance of the appeal certificate may be withheld until the previously issued certificate and all copies have been returned when such action is deemed necessary to protect the interest of the Government.

[31 FR 4687, Mar. 19, 1966, as amended at 36 FR 18456, Sept. 15, 1971. Redesignated at 42 FR 32514, June 27, 1977 and 46 FR 63203, Dec. 31, 1981]

§ 42.109 Sampling plans for normal condition of container inspection, Tables I and I-A.

TABLE I—SAMPLING PLANS FOR NORMAL CONDITION OF CONTAINER INSPECTION

Code	Lot size ranges—Number of containers in lot	Type of plan	AQL 0.15						Other acceptable quality levels															
			Sample size		Ac	Re	Sample size		0.25		0.50		1.0		1.5		2.5		4.0		6.5		10.0	
									Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re
CA	6,000 or less	Single		126	0	1		84	0	1	1	2	2	3	3	4	4	5	6	7	9	10	13	14
		Double					1st	36	(*)	(*)	0	2	0	3	0	4	0	4	0	5	2	7	3	9
CB	6,001–12,000	Single		264	1	2		168	1	2	2	3	4	5	5	6	7	8	11	12	16	17	23	24
		Double	1st	174	0	3	1st	120	0	2	0	3	2	5	2	6	3	7	6	10	10	14	14	19
			2d	162			2d	60																
			Total	336	1	2	Total	180	1	2	2	3	4	5	5	6	8	9	12	13	17	18	25	26
CC	12,001–36,000	Single		500	2	3		315	2	3	3	4	6	7	8	9	13	14	19	20	28	29	41	42
		Double	1st	252	0	3	1st	168	0	3	0	4	1	5	2	7	5	10	7	13	12	18	19	26
			2d	288			2d	180																
			Total	540	2	3	Total	348	2	3	3	4	7	8	9	10	14	15	21	22	31	32	45	46
CD	Over 36,000	Single		800	3	4		500	3	4	5	6	9	10	12	13	18	19	28	29	42	43	62	63
		Double	1st	456	0	4	1st	228	0	3	0	5	2	7	3	9	5	11	8	17	15	24	23	34
			2d	408			2d	288																
			Total	864	3	4	Total	516	3	4	5	6	9	10	12	13	19	20	29	30	43	44	64	65
CE		Single		1,250	4	5		800	4	5	7	8	13	14	18	19	27	28	42	43	64	65	95	96

Ac=Acceptance number.
Re=Rejection number.
(*)=Reject on one or more defects. These plans are less preferable than those with numbers listed under Ac and Re.

TABLE I-A—SAMPLING PLANS OF SELECTED AQL'S FOR NORMAL CONDITION OF CONTAINER INSPECTION

Code	Lot size ranges—No. of containers in lot	Type of plan	Sample size		Acceptable quality levels					
					0.25		1.5		6.5	
					Ac	Re	Ac	Re	Ac	Re
CA	6,000 or less	Double	1st	36	(*)	(*)	0	4	2	7
			2d	60						
			Total	96	(*)	(*)	3	4	10	11
CB	6,001–12,000	Double	1st	120	0	2	2	6	10	14
			2d	60						
			Total	180	1	2	5	6	17	18
CC	12,001–36,000	Double	1st	168	0	3	2	7	12	18
			2d	180						
			Total	348	2	3	9	10	31	32
CD	Over 36,000	Double	1st	228	0	3	3	9	15	24
			2d	288						
			Total	516	3	4	12	13	43	44

(*)=Reject on one or more defects.

[31 FR 4637, Mar. 19, 1966, as amended at 36 FR 18457, Sept. 15, 1971. Redesignated at 42 FR 32514, June 27, 1977 and 46 FR 63203, Dec. 31, 1981]

§ 42.110 Sampling plans for tightened condition of container inspection; Tables II and II-A.

TABLE II—SAMPLING PLANS FOR TIGHTENED CONDITION OF CONTAINER INSPECTION

Code	Lot size ranges—Number of containers in lot	Type of plan	AQL 0.15						Other acceptable quality levels															
			Sample size		Ac	Re	Sample size		0.25		0.50		1.0		1.5		2.5		4.0		6.5		10.0	
									Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re
CB	6,000 or less	Single	.....	264	0	1	.....	168	0	1	1	2	2	3	4	5	5	6	7	8	11	12	16	17
		Double	1st	1st	....	.....	.....	120	(*)	(*)	0	2	0	3	2	5	2	6	3	7	6	10	10	14
			2d	.....	....	.....	2d	60																
			Total	.....	....	.....	Total	180	(*)	(*)	1	2	2	3	4	5	5	6	8	9	12	13	17	18
CC	6,001–12,000 ...	Single	.....	500	1	2	.....	315	1	2	2	3	3	4	6	7	8	9	13	14	19	20	28	29
		Double	1st	360	0	2	1st	168	0	2	0	3	0	4	1	5	2	7	5	10	7	13	12	18
			2d	156	....	.....	2d	180																
			Total	516	1	2	Total	348	1	2	2	3	3	4	7	8	9	10	14	15	21	22	31	32
CD	12,001–36,000	Single	.....	800	2	3	.....	500	2	3	3	4	5	6	9	10	12	13	18	19	28	29	42	43
		Double	1st	456	0	3	1st	228	0	3	0	3	0	5	2	7	3	9	5	11	8	17	15	24
			2d	408	....	.....	2d	288																
			Total	864	2	3	Total	516	2	3	3	4	5	6	9	10	12	13	19	20	29	30	43	44
CE	Over 36,000	Single	.....	1,250	3	4	.....	800	3	4	4	5	7	8	13	14	18	19	27	28	42	43	64	65
		Double	1st	.....	....	.....	1st	456	0	4	1	5	2	6	5	10	8	13	12	19	21	28	32	41
			2d	.....	....	.....	2d	408																
			Total	.....	....	.....	Total	864	3	4	4	5	8	9	14	15	19	20	29	30	44	45	69	70
CF	.....	Single	.....	1,250	3	4	.....	1,250	4	5	7	6	10	11	19	20	26	27	41	42	63	64	96	97

(*) Reject on one or more defects.

TABLE II-A—SAMPLING PLANS OF SELECTED AQL'S FOR TIGHTENED CONDITION OF CONTAINER INSPECTION

Code	Lot size ranges—No. of containers in lot	Type of plan	Sample size		Acceptable quality levels					
					0.25		1.5		6.5	
					Ac	Re	Ac	Re	Ac	Re
CB	6,000 or less	Double	1st	120	(*)	(*)	2	5	6	10
			2d	60						
			Total	180	(*)	(*)	4	5	12	13
CC	6,001–12,000	Double	1st	168	0	2	1	5	7	13
			2d	180						
			Total	348	1	2	7	8	21	22
CD	12,001–36,000	Double	1st	228	0	3	2	7	8	17
			2d	288						
			Total	516	2	3	9	10	29	30
CE	Over 36,000	Double	1st	456	0	4	5	10	21	28
			2d	408						
			Total	864	3	4	14	15	44	45

(*) Reject on one or more defects.

[31 FR 4687, Mar. 19, 1966, as amended at 36 FR 18457, Sept. 15, 1971. Redesignated at 42 FR 32514, June 27, 1977 and 46 FR 63203, Dec. 31, 1981]

§ 42.111 Sampling plans for reduced condition of container inspection, Tables III and III-A; and limit number for reduced inspection, Table III-B.

TABLE III—SAMPLING PLANS FOR REDUCED CONDITION OF CONTAINER INSPECTION

Code	Lot size ranges—Number of containers in lot	Type of plan	Sample size		Acceptable quality levels																	
					0.15		0.25		0.50		1.0		1.5		2.5		4.0		6.5		10.0	
					Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re
CAA	6,000 or less	Single		29	1	2	1	2	1	2	1	2	1	2	2	3	3	4	4	5	5	6
		Double	1st	18	0	2	0	2	0	2	0	2	0	2	0	3	1	3	1	4	2	5
			2d	18																		
			Total	36	1	2	1	2	1	2	1	2	1	2	2	3	4	5	5	6	6	7
CA	6,001–36,000	Single		84	1	2	1	2	1	2	2	3	3	4	4	5	6	7	9	10	13	14
		Double	1st	36	0	2	0	2	0	2	0	3	0	4	0	4	0	5	2	7	3	
			2d	60																		
			Total	96	1	2	1	2	1	2	2	3	3	4	4	5	7	8	10	11	15	16
CB	Over 36,000	Single		168	1	2	1	2	2	3	4	5	5	6	7	8	11	12	16	17	23	24
		Double	1st	120	0	2	0	2	0	3	2	5	2	6	3	7	6	10	10	14	14	19
			2d	60																		
			Total	180	1	2	1	2	2	3	4	5	5	6	8	9	12	13	17	18	25	26
CC		Single		315	1	2	2	3	3	4	6	7	8	9	13	14	19	20	28	29	41	42

TABLE III-A—SAMPLING PLANS FOR REDUCED CONDITION OF CONTAINER INSPECTION

Code	Lot size ranges—No. of containers in lot	Type of plan	Sample size		Acceptable quality levels					
					0.25		1.5		6.5	
					Ac	Re	Ac	Re	Ac	Re
CAA	6,000 or less	Double	1st	18	0	2	0	2	1	4
			2d	18						
			Total	36	1	2	1	2	5	6
CA	6,001–36,000	Double	1st	36	0	2	0	4	2	7
			2d	60						
			Total	96	1	2	3	4	10	11
CB	Over 36,000	Double	1st	120	0	2	2	6	10	14
			2d	60						
			Total	180	1	2	5	6	17	18

TABLE III-B—LIMIT NUMBERS FOR REDUCED INSPECTION

Number of sample units from last 10 lots inspected within 6 months	Acceptable quality level								
	0.15	0.25	0.5	1.0	1.5	2.5	4.0	6.5	10.0
320–499	(*)	(*)	(*)	0	1	4	8	14	24
500–799	(*)	(*)	0	2	3	7	14	25	40
800–1,249	(*)	0	1	4	7	14	24	42	68
1,250–1,999	0	0	3	7	13	24	40	69	110
2,000–3,149	0	2	6	14	22	40	68	115	181
3,150–4,999	1	4	10	24	38	67	111	186	293
5,000–7,999	3	7	18	40	63	110	181	302	472
8,000–12,499	7	14	31	68	105	181	297	491	765
12,500–19,999	13	24	52	110	169	290	471	777	1,207

*Denotes that the number of sample units from the last 10 inspection lots is not sufficient for reduced inspection for this AQL. In this instance more than 10 inspection lots may be used for the calculations if the inspection lots used are the most recent ones in sequence within the last 6 months, they have all been on normal inspection, and none has been rejected on original inspection.

[31 FR 4687, Mar. 19, 1966, as amended at 36 FR 18457, Sept. 15, 1971; 41 FR 42639, Sept. 28, 1976. Redesignated at 42 FR 32514, June 27, 1977 and 46 FR 63203, Dec. 31, 1981]

§42.112 Defects of containers: Tables IV, V, VI, and VII.

TABLE IV—METAL CONTAINERS

Defects	Categories		
	Critical	Major	Minor
Type or size of container or component parts not as specified	(1)	(1)	(1)
Closure incomplete, not located correctly or not sealed, crimped, or fitted properly		101	
Dirty, stained or smeared container			201
Key opening metal containers (when required):			
(a) Key missing		102	
(b) Key does not fit tab		103	
(c) Tab of opening band insufficient to provide accessibility to key		104	
(d) Improper scoring (band would not be removed in one continuous strip)		105	
Open top with plastic overcap (when required):			
(a) Plastic overcap missing		106	
(b) Plastic overcap warped (making opening or reapplication difficult)		107	
Outside tinplate or coating (when required):			
(a) Missing or incomplete			202
(b) Blistered, flaked, sagged, or wrinkled			203
(c) Scratched or scored			204
(d) Fine cracks			205
Rust (rust stain confined to the top or bottom double seam or rust that can be removed with a soft cloth is not scored a defect):			
(a) Rust stain (nonmilitary purchases)			206
(b) Rust stain (military purchases)		108	
(c) Pitted rust		109	
Wet cans (excluding refrigerated containers)			207

TABLE IV—METAL CONTAINERS—Continued

Defects	Categories		
	Critical	Major	Minor
Dent:			
(a) Materially affecting appearance but not usability			208
(b) Materially affecting usability		110	
Buckle:			
(a) Not involving end seam			209
(b) Extending into the end seam		111	
Collapsed container		112	
Paneled side materially affecting appearance but not usability			210
Solder missing when required		113	
Cable cut exposing seam		114	
Improper side seam		115	
Swell, springer, or flipper (not applicable to gas or pressure packed product nor frozen products)	1		
Leaker or blown container	2		
Frozen products only:			
(a) Bulging ends 3/16″ to 1/4″ beyond lip			211
(b) Bulging ends more than 1/4″ beyond lip		116	

[1] None permitted.

TABLE V—GLASS CONTAINERS

Defects	Categories		
	Critical	Major	Minor
Type or size of container or component parts not as specified	(1)	(1)	(1)
Closure not sealed, crimped, or fitted properly		101	
Dirty, stained, or smeared container			201
Chip in glass			202
Stone (unmelted material) in glass			203
Pits in surface of glass			204
Sagging surface			205
Bead (bubble within glass):			
(a) 1/8″ to 1/16″ in diameter			206
(b) Exceeding 1/8″ in diameter		102	
Checked		103	
Thin spot in glass		104	
Blister (structural defect)		105	
Bird swing (glass appendage inside container)	1		
Broken or leaking container	2		
Cap (nonheat processed):			
(a) Cross-threaded			207
(b) Loose but not leaking			208
(c) Pitted rust		106	
Cap (heat processed):			
(a) Cross-threaded or loose	3		
(b) Pitted rust		107	
Sealing tape or cello band (when required):			
(a) Improperly placed			209
(b) Not covering juncture of cap and glass		108	
(c) Ends overlap by less than 1/2″		109	
(d) Loose or deteriorating		110	

[1] None permitted.

TABLE VI—RIGID AND SEMIRIGID CONTAINERS—CORRUGATED OR SOLID FIBERBOARD, CHIPBOARD, WOOD, ETC. (EXCLUDING GLASS AND METAL)

Defects	Categories		
	Critical	Major	Minor
Type or size of container or component parts not as specified	(1)	(1)	(1)
Component part missing		101	
Closure not sealed, crimped, or fitted properly:			
(a) Primary container		102	
(b) Other than primary container			201
Dirty, stained, or smeared container			202
Wet or damp (excluding ice packs):			
(a) Materially affecting appearance but not usability			203

TABLE VI—RIGID AND SEMIRIGID CONTAINERS—CORRUGATED OR SOLID FIBERBOARD, CHIPBOARD, WOOD, ETC. (EXCLUDING GLASS AND METAL)—Continued

Defects	Categories		
	Critical	Major	Minor
(b) Materially affecting usability		103	
Moldy area	1		
Crushed or torn area:			
(a) Materially affecting appearance but not usability			204
(b) Materially affecting usability		104	
Separation of lamination (corrugated fiberboard):			
(a) Materially affecting appearance but not usability			205
(b) Materially affecting usability		105	
Product sifting or leaking		106	
Nails or staples (when required):			
(a) Not as required, insufficient number or improperly positioned			206
(b) Nails or staples protruding		107	
Glue or adhesive (when required); not holding properly not covering area specified, or not covering sufficient area to hold properly:			
(a) Primary container		108	
(b) Other than primary container			207
Flap:			
(a) Projects beyond edge of container more than ¼ inch			208
(b) Does not meet properly, allowing space of more than ¼ inch			209
Sealing tape or strapping (when required):			
(a) Missing		109	
(b) Improperly placed or applied			210

[1] None permitted.

TABLE VII—FLEXIBLE CONTAINERS (PLASTIC, CELLO, PAPER, TEXTILE, ETC.)

Defects	Categories		
	Critical	Major	Minor
Type or size of container or component parts not as specified	(1)	(1)	(1)
Closure not sealed, crimped, stitched, or fitted properly:			
(a) Primary container		101	
(b) Other than primary container			201
Dirty, stained, or smeared container			202
Unmelted gels in plastic			203
Torn container:			
(a) Materially affecting appearance but not usability			204
(b) Materially affecting usability		102	
Product sifting or leaking		103	
Moldy area	1		
Individual packages sticking together or to shipping case (tear when separated)		104	
Not fully covering product		105	
Wet or damp (excluding ice packs):			
(a) Materially affecting appearance but not usability			205
(b) Materially affecting usability		106	
Overwrap (when required):			
(a) Missing		107	
(b) Loose, not sealed or closed			206
(c) Improperly applied			207
Sealing tape, strapping or adhesives (when required):			
(a) Missing		108	
(b) Improperly placed, applied, torn, or wrinkled			208
Tape over bottom and top closures (when required):			
(a) Not covering stitching		109	
(b) Torn (exposing stitching)		110	
(c) Wrinkled (exposing stitching)		111	
(d) Not adhering to bag:			
1. Exposing stitching		112	
2. Not exposing stitching			209
(e) Improper placement			210

[1] None permitted.

[31 FR 4687 Mar. 19, 1966, as amended at 36 FR 18457, Sept. 15, 1971; 41 FR 42639, Sept. 28, 1976. Redesignated at 42 FR 32514, June 27, 1977 and 46 FR 63203, Dec. 31, 1981]

§ 42.113 Defects of label, marking, or code; Table VIII.

TABLE VIII—LABEL, MARKING, OR CODE

Defects	Categories	
	Major	Minor
Not specified method	101	
Missing (when required)	102	
Loose or improperly applied	.....	201
Torn or mutilated	.....	202
Text illegible or incomplete (military purchases)	103	
Text illegible or incomplete	.....	203
Incorrect	104	
In wrong location	.....	204

[49 FR 5602, Feb. 14, 1984]

Subpart C—Skip Lot Sampling and Inspection Procedures

SOURCE: 41 FR 42639, Sept. 28, 1976, unless otherwise noted. Redesignated at 42 FR 32514, June 27, 1977, and further redesignated at 46 FR 63203, Dec. 31, 1981.

§ 42.120 Description and qualification.

Skip lot sampling and inspection are special procedures for inspecting stationary lots in which only one-half or one-fourth of the lots offered for inspection are formally inspected. Skip lot sampling and inspection procedures may be instituted only when all of the following conditions are met:

(a) When authorized by the Administrator and acceptable to the user and producer, if different from the user.

(b) When inspection is origin inspection (see § 42.102).

(c) When all lots can be expected to be of essentially the same quality.

(d) When lots from the producer are currently on, or eligible to be on, either normal or reduced inspection.

§ 42.121 Sampling and inspection procedures.

(a) Following skip lot procedure authorization, inspect every lot consecutively offered for inspection using normal inspection procedures as set forth in Subpart B of this part. When 10 consecutive lots are acceptable, inspect only one-half of the lots offered for inspection using normal inspection procedures. While on the one-half inspection rate, when 10 consecutively inspected lots are acceptable, inspect only one-fourth of the lots offered for inspection using normal inspection procedures. While on the one-half or one-fourth inspection rate, if any formally inspected lot is unacceptable, revert immediately to the inspection of every lot using normal inspection procedures and recommence the above procedure. See § 42.123 for a flow diagram of the skip lot sampling plan.

(b) Two exceptions to the procedures in paragraph (a) of this section are as follows:

(1) The skip lot sampling and inspection rate of one-half can be instituted immediately if the lots from the producer are currently on, or eligible to be on, reduced inspection and all other conditions in § 42.120 are met. After skip lot sampling and inspection begins, however, only normal inspection is permitted.

(2) While inspecting every lot consecutively as offered for inspection, i.e., while not on the one-half or one-fourth sampling and inspection rate, if requirements for switching from normal to tightened inspection are met as specified in § 42.108 then skip lot procedures terminate, tightened inspection is initiated, and stationary lot sampling and inspection procedures in Subpart B are instituted. Skip lot procedures may be instituted again only when all conditions of § 42.120 are met.

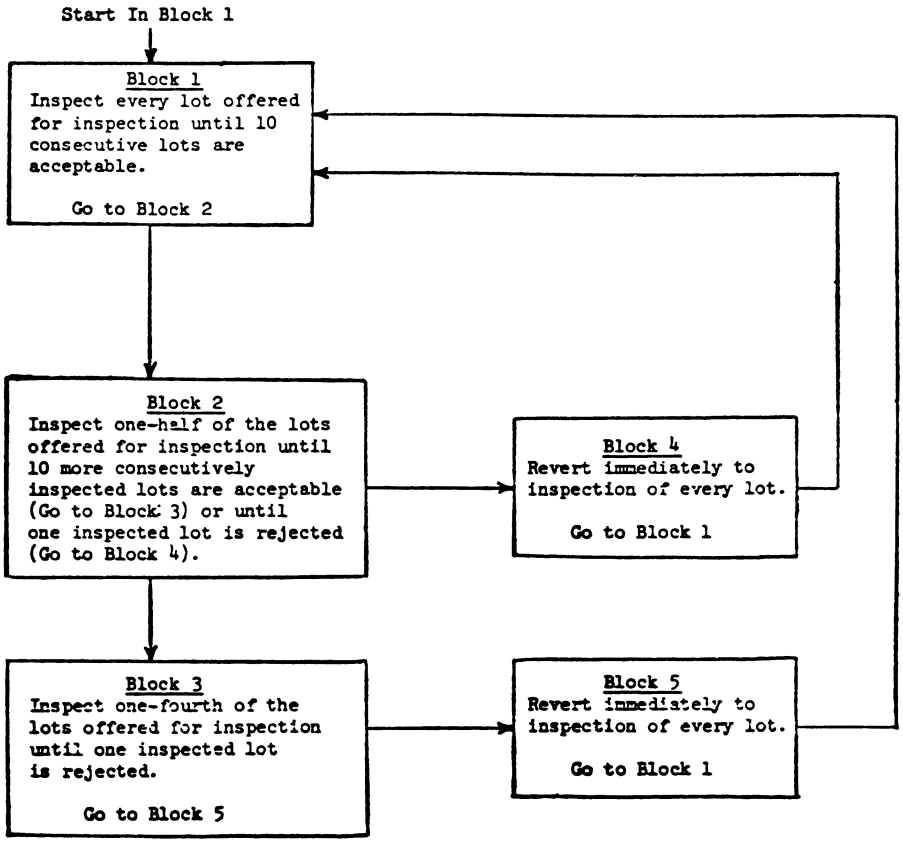
(c) All lot selections for the one-half and one-fourth inspection rates must be strictly random (for example, not every other lot or every fourth lot). Use of random number tables, coin flipping, or numbered cards is encouraged.

(d) Preliminary scanning procedures (see § 42.105) shall be used on all lots scheduled for formal inspection and also shall be used on lots not scheduled for inspection (''skipped'' lots) whenever the inspector feels such action is prudent to further insure the acceptability of such lots.

§ 42.122 Applicability of other procedures.

Whenever appropriate, the procedures for classifying and recording defects in § 42.106 and for appeal inspections in § 42.108 also apply to skip lot sampling and inspection.

§42.123 Flow diagram for skip lot sampling and inspection.



NOTES: 1. Only normal inspection is permitted.

2. All lot selections for the one-half and one-fourth sampling rates must be strictly random (for example, not every other lot or every fourth lot).

3. Two exceptions to the procedures shown above are as follows:

(a) The skip lot sampling and inspection rate of one-half can be instituted immediately if the lots from the producer are currently on, or eligible to be on, reduced inspection and all other conditions in §42.120 are met. When skip lot inspection begins, however, only normal inspection is permitted.

(b) While inspecting every lot consecutively as offered for inspection, i.e., while not on the one-half or one-fourth rate, if requirements for switching from normal to tightened inspection are met as specified in §42.108 then skip lot procedures terminate, tightened inspection is initiated, and stationary lot sampling and inspection procedures in Subpart B are instituted. Skip lot procedures may be instituted again only when all conditions of §42.120 are met.

Subpart D—On-Line Sampling and Inspection Procedures

AUTHORITY: Sec. 203, 205, 60 Stat. 1087, as amended, 1090, as amended (7 U.S.C. 1622, 1624).

SOURCE: 45 FR 69428, Oct. 21, 1980, unless otherwise noted. Redesignated at 46 FR 63203, Dec. 31, 1981.

§ 42.130 Description and qualifications.

(a) In many instances, food containers are loaded directly into carriers immediately after final packaging. This situation makes stationary lot sampling and inspection impractical. For such circumstances, the optional procedure for on-line sampling and inspection using cumulative sum sampling plans is provided. On-line sampling and inspection is a procedure in which subgroups of sampling units are selected randomly from predesignated portions of production. The acceptability of the portions of production is determined by inspecting, at the time of the sampling, the subgroups which represent these portions. On-line sampling and inspection contrasts with stationary lot procedures in which sample units are selected randomly and inspected and lot acceptability determinations are made only after lot production is completed.

(b) On-line sampling and inspection procedures may be instituted only when all of the following conditions are met:

(1) When authorized by the Administrator and acceptable to the user and producer, if different from the user.

(2) When inspection is origin inspection (see § 42.102).

(3) When previous production lots from the producer are currently on, or eligible to be on, either normal or reduced inspection. (When shifting from stationary lot sampling and inspection to on-line sampling and inspection, normal on-line inspection shall be initially used.)

(4) When inspection of the containers is performed at a point after which all condition of container related characteristics are fixed and will not be subject to change during final handling.

§ 42.131 Selection of samples.

(a) Prior to commencement of on-line sampling and inspection, the total amount of production for a given day or shift is predicted and is then subdivided into conveniently designated portions of production approximately equal in size. Portions may be designated by sequential numbers (e.g., containers 1 through 500 are portion 1, containers 501 through 1000 are portion 2, etc.) or by time intervals (e.g., the first half hour of production is portion 1, the second half hour of production is portion 2, etc.) during which the containers are identified by individual production codes for each time interval.

(b) Determine the number of sample units in a subgroup as follows:

Type of Inspection and Number of Sample Units

Normal—25
Tightened—50
Reduced—13

(c) Subgroups are drawn randomly from portions of production throughout the production process and are inspected for defects. The drawing of sampling units may be done in either of two ways: (1) The number of sample units (13, 25 or 50) comprising a subgroup may be drawn at the same time from a randomly chosen point in the production of each portion, or (2) sample units may be drawn individually, but in a random manner, throughout the production of each portion. At least 6 subgroups must be obtained during each basic inspection period regardless of the system used to designate portions of production.

(d) A shift to on-line sampling plans from stationary lot sampling plans (or vice versa) during a basic inspection period is not permitted.

§ 42.132 Determining cumulative sum values.

(a) The parameters for the on-line cumulative sum sampling plans for AQL's applicable to origin inspection are as follows:

Acceptable quality levels	Type of inspection								
	Normal			Tightened			Reduced		
	T	L	S	T	L	S	T	L	S
0.25	0.05	0.95	0.35	0.1	0.9	0.3	0	0	0
1.5	0.5	2	1	0.8	1.6	0.4	0.5	0.5	0
6.5	2	3	1	2.5	3	1	.....	2	1

(b) At the beginning of the basic inspection period, the CuSum value is set equal to the starting value (''S'') for the specified CuSum plan. The CuSum value is then determined for each consecutive subgroup as follows:

(1) Add the number of defects for the present subgroup to the CuSum value of the previous subgroup.

(2) Subtract the subgroup tolerance (''T'').

(3) The CuSum value is reset in the following situations; however, determine portion of production acceptability (see § 42.133) prior to resetting the CuSum value:

(i) Reset the CuSum value to zero (0) if the CuSum value is less than zero (0).

(ii) Reset the CuSum value to the acceptance limit (''L'') if the CuSum value exceeds the acceptance limit (''L'').

§ 42.133 Portion of production acceptance criteria.

(a) The acceptability of a portion of production is determined by comparing the calculated CuSum value with the acceptance limit (''L'') for the specified AQL.

(b) A portion of production is acceptable if the CuSum value, calculated from the subgroup representing that portion, is equal to or less than the acceptance limit (''L'') for all classes of defects.

(c) A portion of production is rejected if the CuSum value, calculated from the subgroup representing that portion, exceeds the acceptance limit (''L'') for one or more classes of defects.

§ 42.134 Disposition of rejected portions of production.

Rejected portions of production from the same basic inspection period may be reworked, combined together to form a lot, and resubmitted for inspection under the criteria for tightened inspection using stationary lot sampling procedures described in subpart B of this part.

§ 42.135 Normal, tightened or reduced on-line inspection.

(a) Normal, tightened and reduced on-line sampling plans are specified in § 42.132 (Determining cumulative sum values). Normal plans shall be used except when the history of inspection permits reduced inspection or requires tightened inspection.

(b) Switching rules: Normal on-line inspection procedures shall be followed except when conditions in paragraph (b) (1) or (3) of this section are applicable or unless otherwise specified. Application of the following switching rules will be restricted to the inspection of production for one applicant at a single production location and will be based upon records of original inspections of production (excluding resubmitted portions previously rejected and reworked) at that same location.

(1) *Normal inspection to reduced inspection*. When normal inspection is in effect, reduced inspection shall be instituted provided that reduced inspection is considered desirable by the Administrator and further provided that all of the following conditions are satisfied for each class of defect:

(i) The preceding 40 consecutive portions of production have been on normal inspection and no more than one of these portions has been rejected on original inspection; and

(ii) The total number of defects in the subgroups (1000 sample units) from these preceding 40 consecutive portions of production is less than or equal to the following limit numbers for the specified AQL's:

Acceptable quality levels	Limit No.
0.25	0
1.5	9
6.5	54

(2) *Reduced inspection to normal inspection*. When reduced inspection is in effect, normal inspection shall be reinstituted if any of the following occurs:

(i) More than one portion of production in any 40 consecutive portions of production is rejected on original inspection; or

(ii) Production becomes irregular (delayed or accelerated); or

(iii) Other valid conditions warrant that normal inspection shall be reinstituted.

(3) *Normal inspection to tightened inspection*. When normal inspection is in

effect, tightened inspection shall be instituted when two out of five consecutive portions of production have been rejected.

(4) *Tightened inspection to normal inspection.* When tightened inspection is in effect, normal inspection shall be reinstituted when five consecutive portions of production have been considered acceptable.

(c) When the rules require a switch in the inspection status because of one or more classes of defects, all classes of defects shall be inspected under the new inspection criteria. At the option of the user of the service, and when approved by the Administrator, such user may elect to remain on normal inspection when qualified for reduced inspection, or on tightened inspection when qualified for normal inspection.

§ 42.136 Applicability of other procedures.

When appropriate, the procedures for classifying and recording defects in § 42.106 and for appeal inspections in § 42.108 also apply to on-line sampling and inspection.

Subpart E—Miscellaneous

AUTHORITY: Agricultural Marketing Act of 1946, as amended (7 U.S.C. 1621 *et seq.)*.

§ 42.140 Operating Characteristic (OC) curves for on-line sampling and inspection.

(a) This section contains the Operating Characteristic (OC) curve for each of the sampling plans given in Tables I, I-A, II, II-A, III, and III-A. The OC curve and the corresponding sampling plans are listed by AQL.

(b) Different acceptance and rejection criteria are provided for each AQL. The criteria for each AQL must be obtained from the applicable sampling plan tables.

(c) The curves show the ability of the various sampling plans to distinguish between good and bad lots. This can be illustrated by examining OC curve 6 for an AQL of 0.25 defects per hundred units in the Reduced and Normal Inspection Plans. If the quality of the lots submitted for inspection is poorer than the AQL of 0.25 defects per hundred units, fewer lots will be accepted. For example, OC curve 6 shows that when the quality of lots submitted for inspection is 1.0 defects per hundred units, only 26 percent of the lots are expected to be accepted. Conversely when the quality of the lots submitted for inspection is better than the AQL of 0.25 defects per hundred units, most lots are expected to be accepted. For example, the same OC curve 6 shows that when the quality of lots submitted for inspection is 0.10 defects per hundred units, about 99 percent of the lots are expected to be accepted.

(d) The table of sampling plans that correspond to OC curve 6 can be found over the curves for an AQL of 0.25 defects per hundred units in the Reduced and Normal Inspection Plan. An examination of this table reveals that there is one single and one double sampling plan that have OC curves comparable to OC curve 6. The first plan listed is a single plan requiring the inspection of 500 individual containers. Under this plan the lot is accepted as meeting the requirements for an AQL of 0.25 if there are 3 or less defects in the sample or rejected if there are 4 or more defects in the sample.

(e) The next plan that is listed in the column headed 6 for an AQL of 0.25 is a double sampling plan that requires the initial inspection of 228 individual containers. The lot will be accepted as meeting the requirements of an AQL of 0.25 if there are no defects in the sample, and rejected if there are 3 or more defects in the sample. In the event that the number of defects is between the acceptance (0) and rejection (3) numbers, additional containers must be inspected. In this case, the table indicates that a total of 516 containers must be inspected before a decision can be made to either accept or reject the lot. This will require the inspection of 288 more containers (516 − 228 = 288).

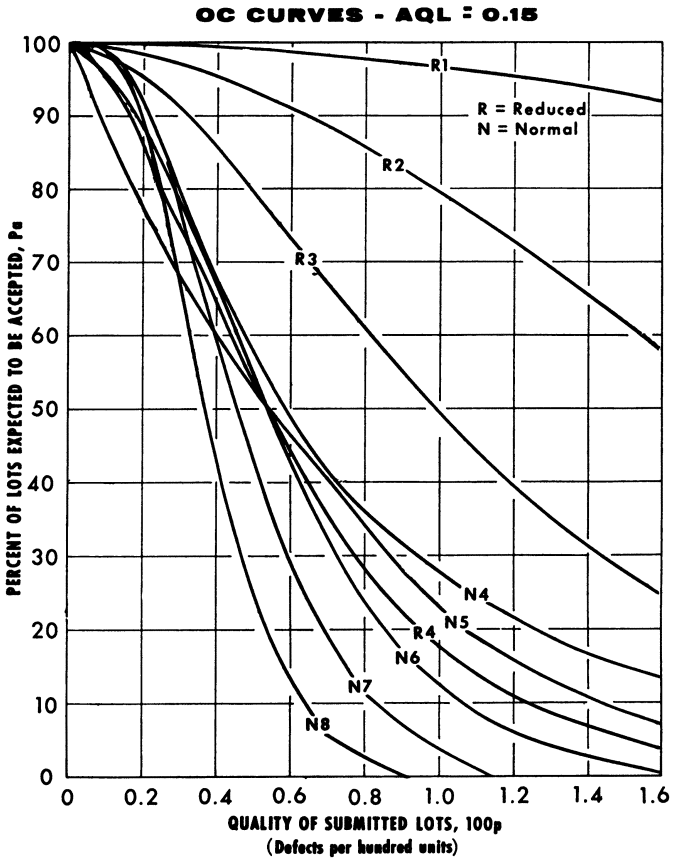
If there are 3 or less defects in the total sample, the lot will be accepted. If there are 4 or more defects in the total sample, the lot will be rejected. The other double sampling plans operate in a similar manner with the only differences being the sample sizes and acceptance and rejection numbers.

REDUCED AND NORMAL INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=0.15 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=0.15]

Comparable sampling plans	Identification number of OC curve																										
	R1			R2			R3			R4			N4			N5			N6			N7			N8		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	29	1	2	84	1	2	126	0	1	315	1	2	168	1	2	264	1	2	500	2	3	800	3	4	1,250	4	5
Double	18 36	0 1	2 2	36 96	0 1	2 2	....	....	....	....	....	....	120 180	0 1	2 2	174 336	0 1	2 2	252 540	0 2	3 3	456 864	0 3	4 4			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



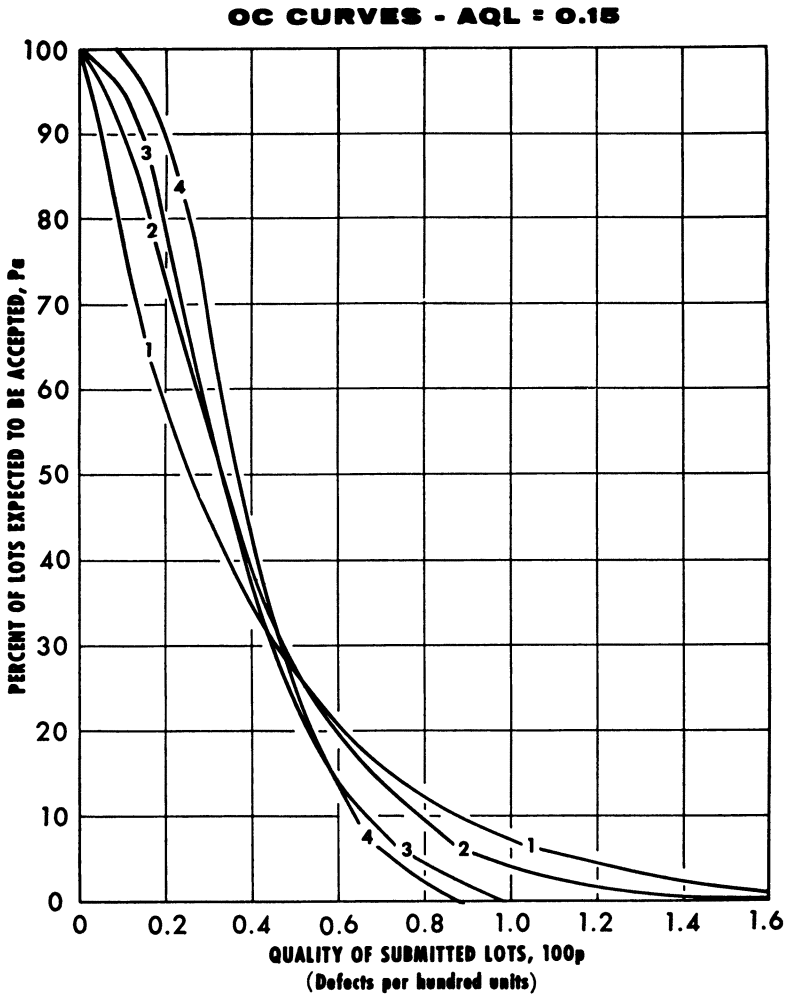
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 119–70 (9) AGRICULTURAL MARKETING SERVICE

TIGHTENED INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=0.15 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=0.15]

Comparable sampling plans	Identification number of OC curves											
	1			2			3			4		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	264	0	1	500	1	2	800	2	3	1,250	3	4
Double	.....	.....	.....	360	0	2	456	0	3	576	0	3
	.....	.....	.....	516	1	2	864	2	3	1,296	3	4

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



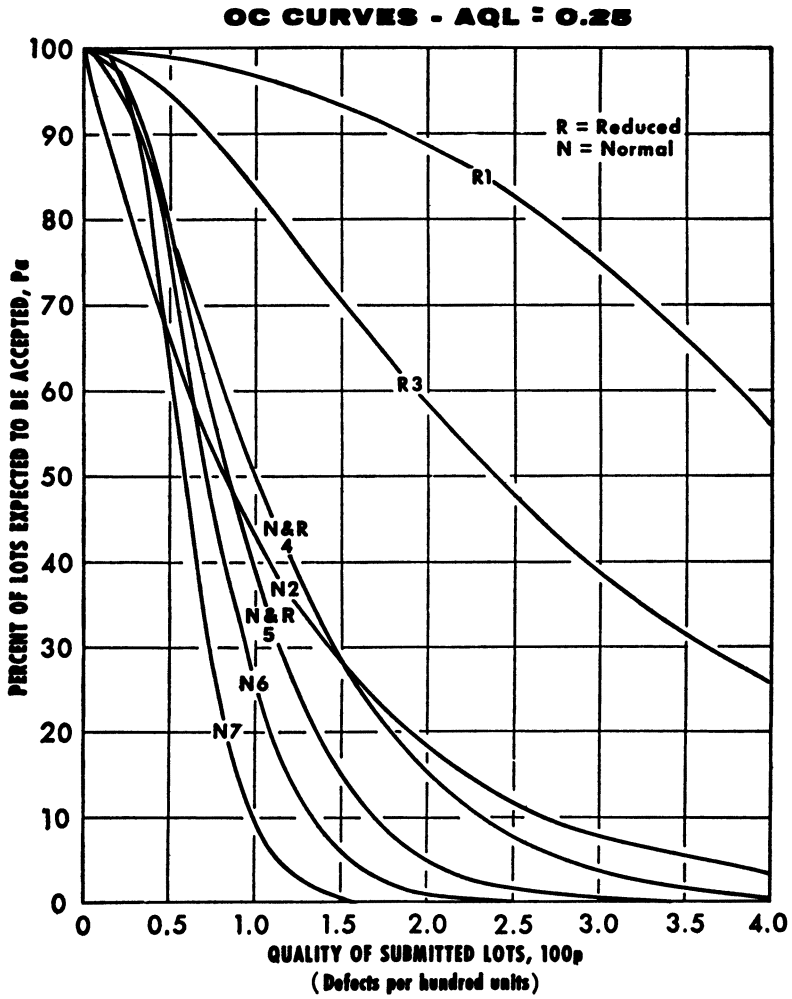
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 118–65 (12) AGRICULTURAL MARKETING SERVICE

REDUCED AND NORMAL INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=0.25 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=0.25]

Comparable sampling plans	Identification number OC curves																				
	R1			N2			R3			N and R4			N and R5			N6			N7		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	29	1	2	84	0	1	84	1	2	168	1	2	315	2	3	500	3	4	800	4	5
Double	18	0	2	....	36	0	2	120	0	2	168	0	3	228	0	3					
	18	1	2	....	96	1	2	180	1	2	348	2	3	516	3	4					

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



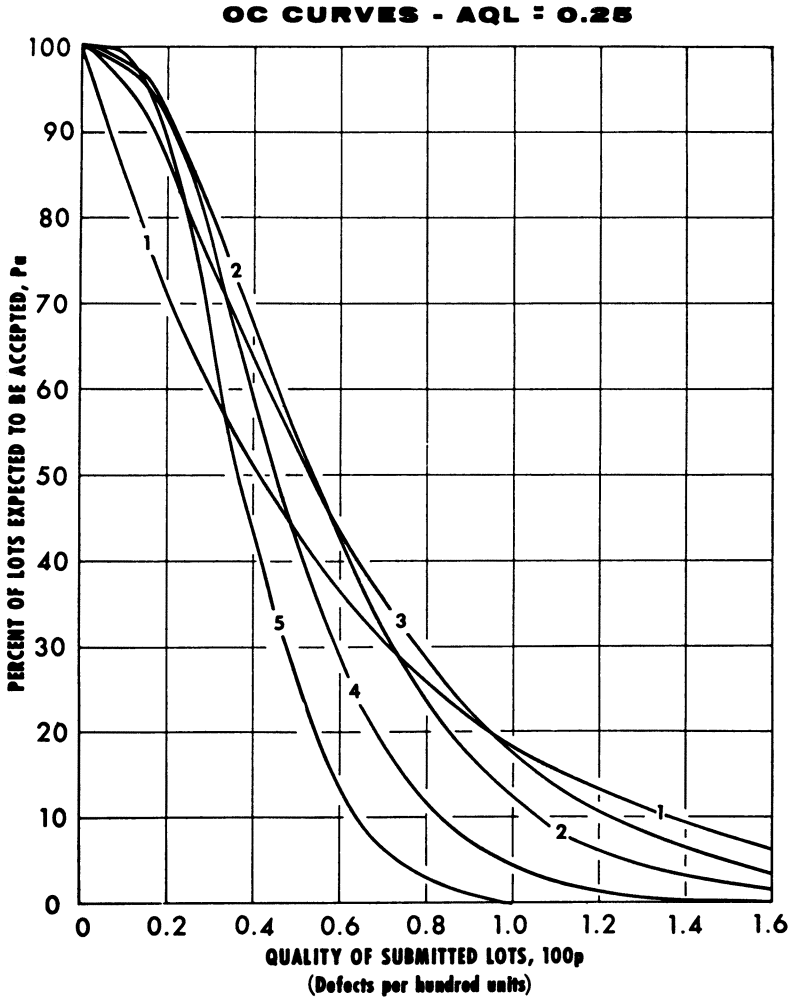
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 128–65 (12) AGRICULTURAL MARKETING SERVICE

TIGHTENED INSPECTION PLANS—SAMPLING PLANS AND OPERATION CHARACTERISTICS (OC) CURVES FOR AQL=0.25 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=0.25]

Comparable sampling plans	Identification number of OC curves														
	1			2			3			4			5		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	168	0	1	315	1	2	500	2	3	800	3	4	1,250	4	5
Double	.....	....	....	168	0	2	228	0	3	456	0	4			
	.....	....	....	348	1	2	516	2	3	864	3	4			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



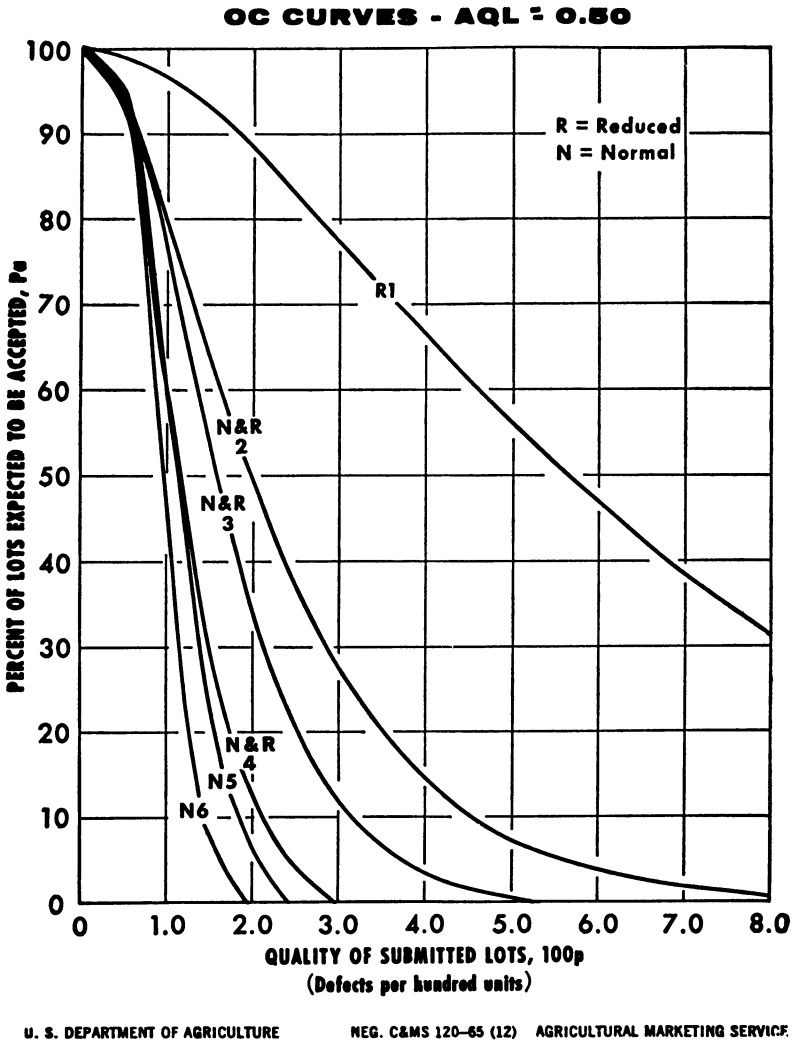
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 117-65 (12) AGRICULTURAL MARKETING SERVICE

REDUCED AND NORMAL INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=0.50 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=0.50]

Comparable sampling plans	Identification number of OC curves																	
	R1			N and R2			N and R3			N and R4			N5			N6		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	29	1	2	84	1	2	168	2	3	315	3	4	500	5	6	800	7	8
Double	18 36	0 1	2 2	36 96	0 1	2 2	120 180	0 2	3 3	168 348	0 3	4 4	228 516	0 5	5 6			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.

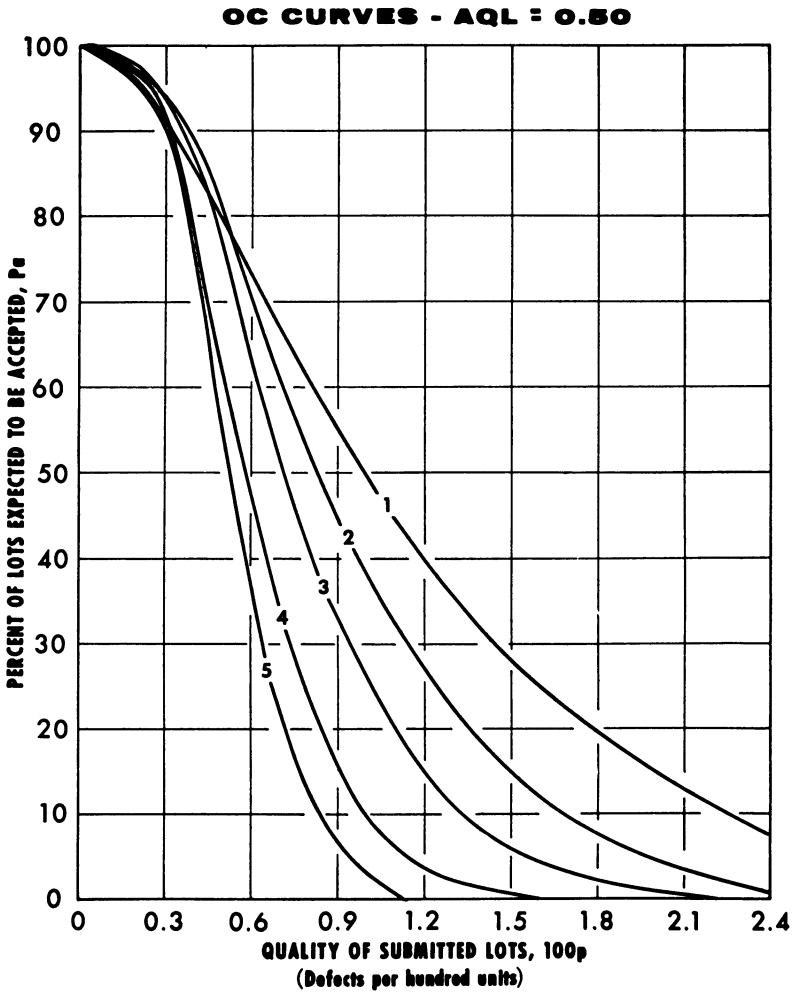


TIGHTENED INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=0.50 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=0.50]

Comparable sampling plans	Identification number of OC curves														
	1			2			3			4			5		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	168	1	2	315	2	3	500	3	4	800	4	5	1,250	6	7
Double	120 180	0 1	2 2	168 348	0 2	3 3	228 516	0 3	3 4	456 864	1 4	5 5			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



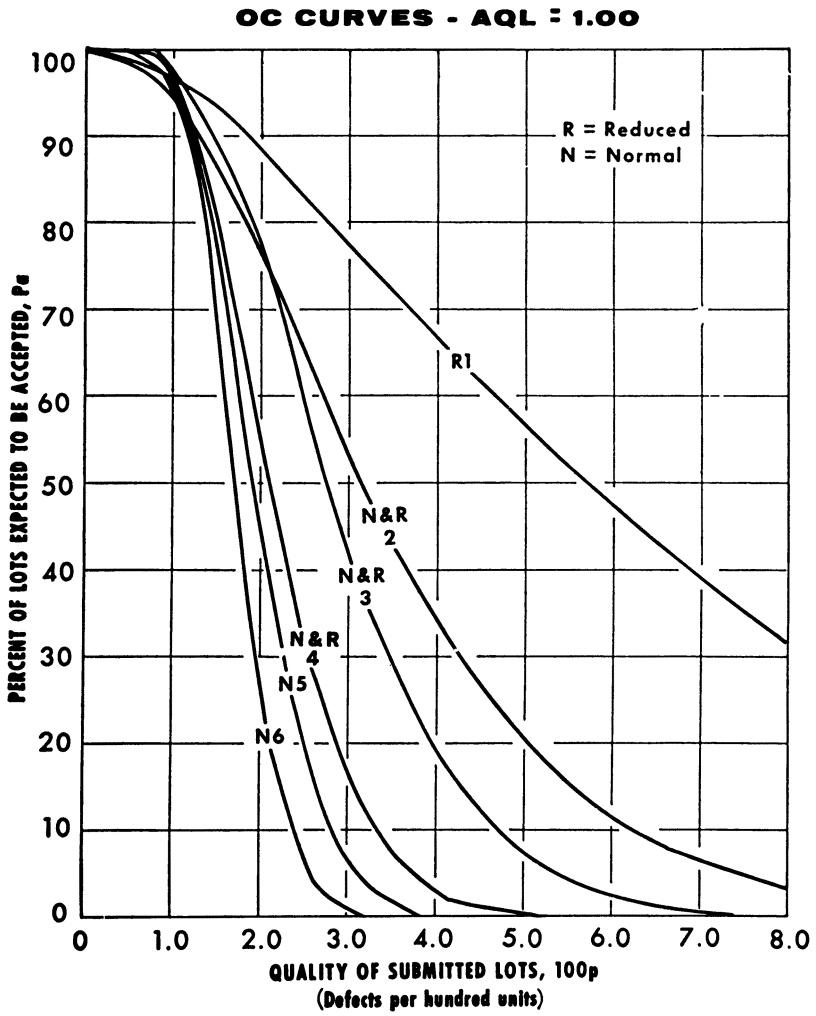
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 131-65 (12) AGRICULTURAL MARKETING SERVICE

REDUCED AND NORMAL INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=1.00 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=1.00]

Comparable sampling plans	Identification number of OC curves																	
	R1			N and R2			N and R3			N and R4			N5			N6		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	29	1	2	84	2	3	168	4	5	315	6	7	500	9	10	800	13	14
Double	18 36	0 1	2 2	36 96	0 2	3 3	120 180	2 4	5 5	168 348	1 7	5 8	228 516	2 9	7 10			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



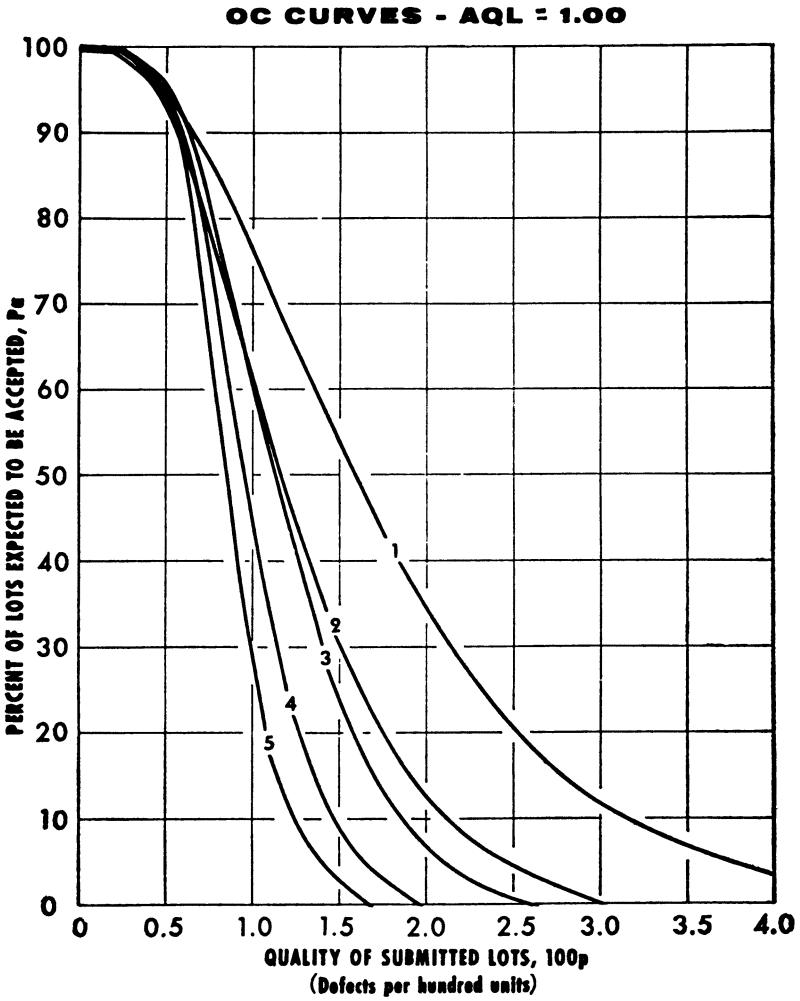
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 116–65 (12) AGRICULTURAL MARKETING SERVICE

TIGHTENED INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=1.00 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=1.00]

Comparable sampling plans	Identification number of OC curves														
	1			2			3			4			5		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	168	2	3	315	3	4	500	5	6	800	7	8	1,250	10	11
Double	120 180	0 2	3 3	168 348	0 3	4 4	228 516	0 5	5 6	456 864	2 8	6 9			

n_c=Cumulative sample size Ac=Acceptance number. Re=Rejection number.



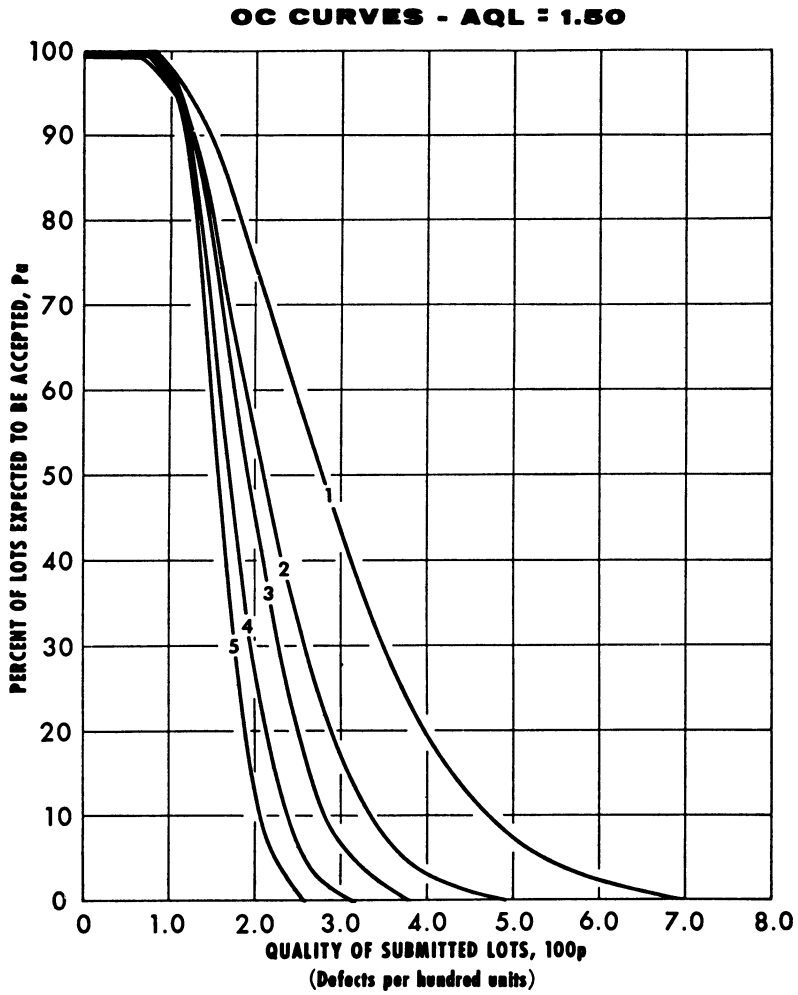
U.S. DEPARTMENT OF AGRICULTURE REG. C&MS 132-65 (12) AGRICULTURAL MARKETING SERVICE

REDUCED AND NORMAL INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=1.50 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=1.50]

Comparable sampling plans	Identification number of OC curves																	
	R1			N and R2			N and R3			N and R4			N5			N6		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	29	1	2	84	3	4	168	5	6	315	8	9	500	12	13	800	18	19
Double	18 36	0 1	2 2	36 96	0 3	4 4	120 180	2 5	6 6	168 348	2 9	7 10	228 516	3 12	9 13			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



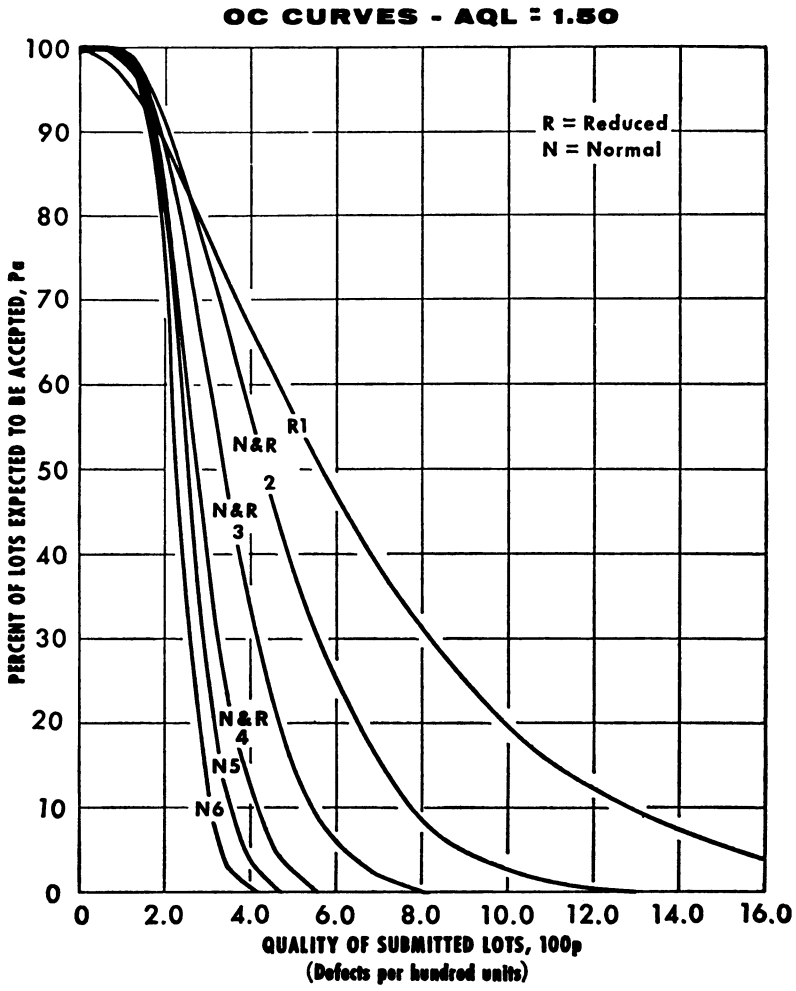
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 130–65 (12) AGRICULTURAL MARKETING SERVICE

TIGHTENED INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=1.50 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=1.50]

Comparable sampling plans	Identification number of OC curves														
	1			2			3			4			5		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	168	4	5	315	6	7	500	9	10	800	13	14	1,250	19	20
Double	120 180	2 4	5 5	168 348	1 7	5 8	228 516	2 9	7 10	456 864	5 14	10 15			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



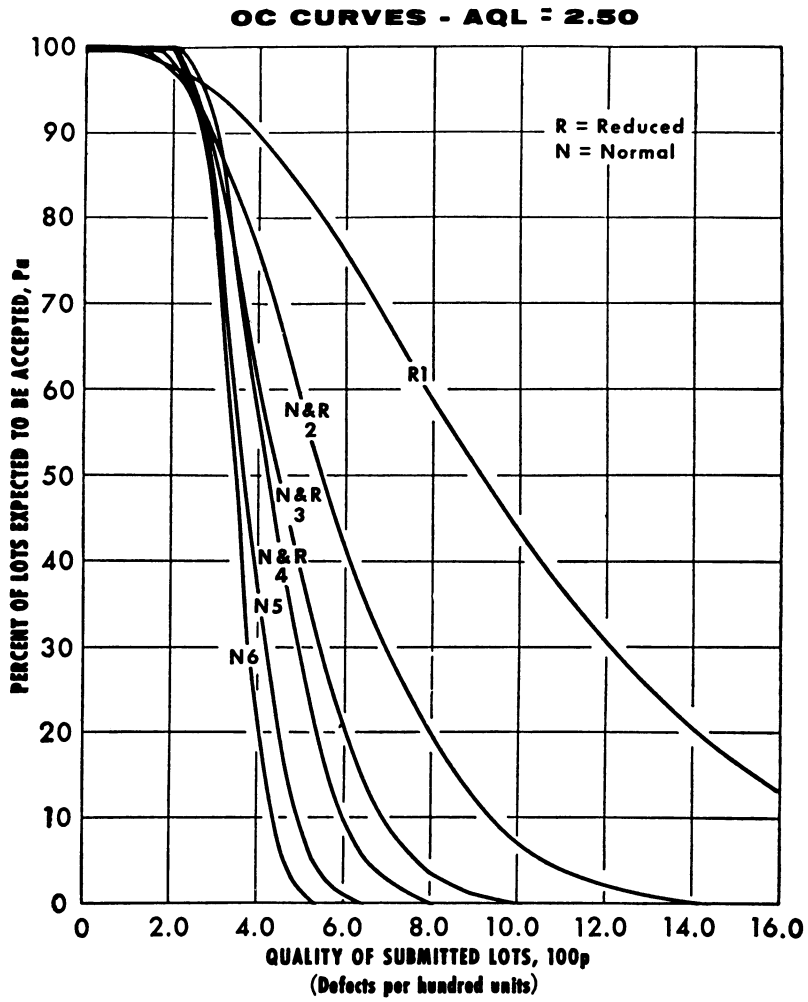
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 121-65 (12) AGRICULTURAL MARKETING SERVICE

REDUCED AND NORMAL INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=2.50 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=2.50]

Comparable sampling plans	Identification number of OC curves																	
	R1			N and R2			N and R3			N and R4			N5			N6		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	29	2	3	84	4	5	168	7	8	315	13	14	500	18	19	800	27	28
Double	18 36	0 2	3 3	36 96	0 4	4 5	120 180	3 8	7 9	168 348	5 14	10 15	228 516	5 19	11 20			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



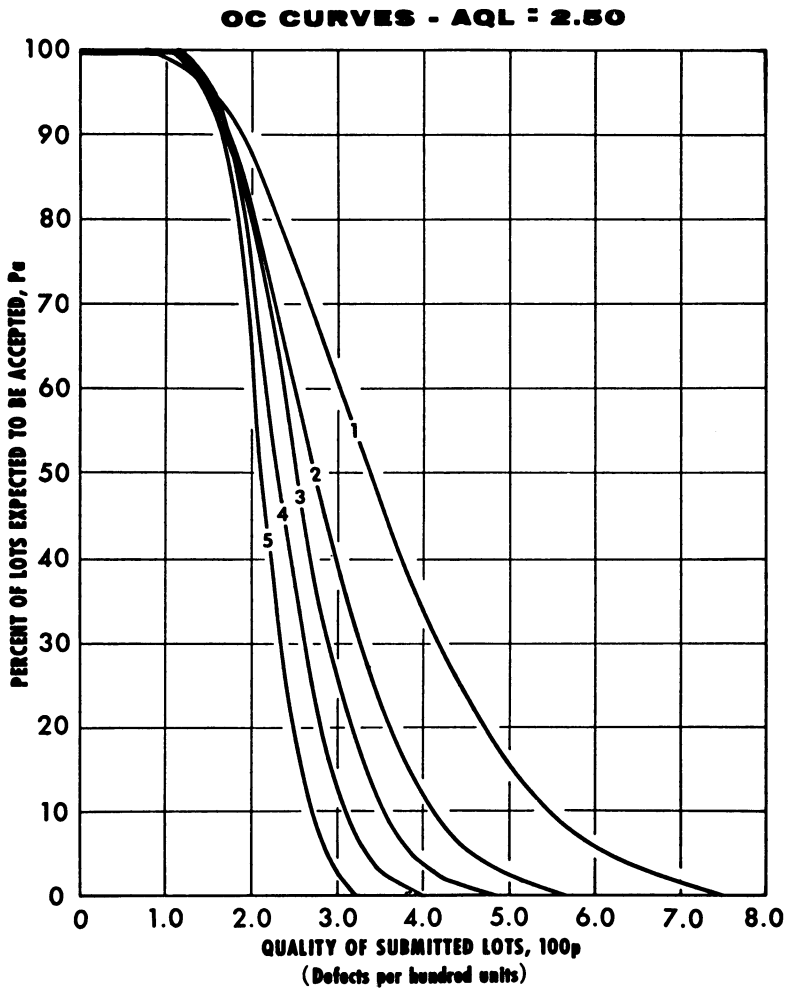
U.S. DEPARTMENT OF AGRICULTURE NEG. C&MS 125–65 (12) AGRICULTURAL MARKETING SERVICE

TIGHTENED INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=2.50 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=2.50]

Comparable sampling plans	Identification number of OC curves														
	1			2			3			4			5		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	168	5	6	315	8	9	500	12	13	800	18	19	1,250	26	27
Double	120 180	2 5	6 6	168 348	2 9	7 10	228 516	3 12	9 13	456 864	8 19	13 20			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



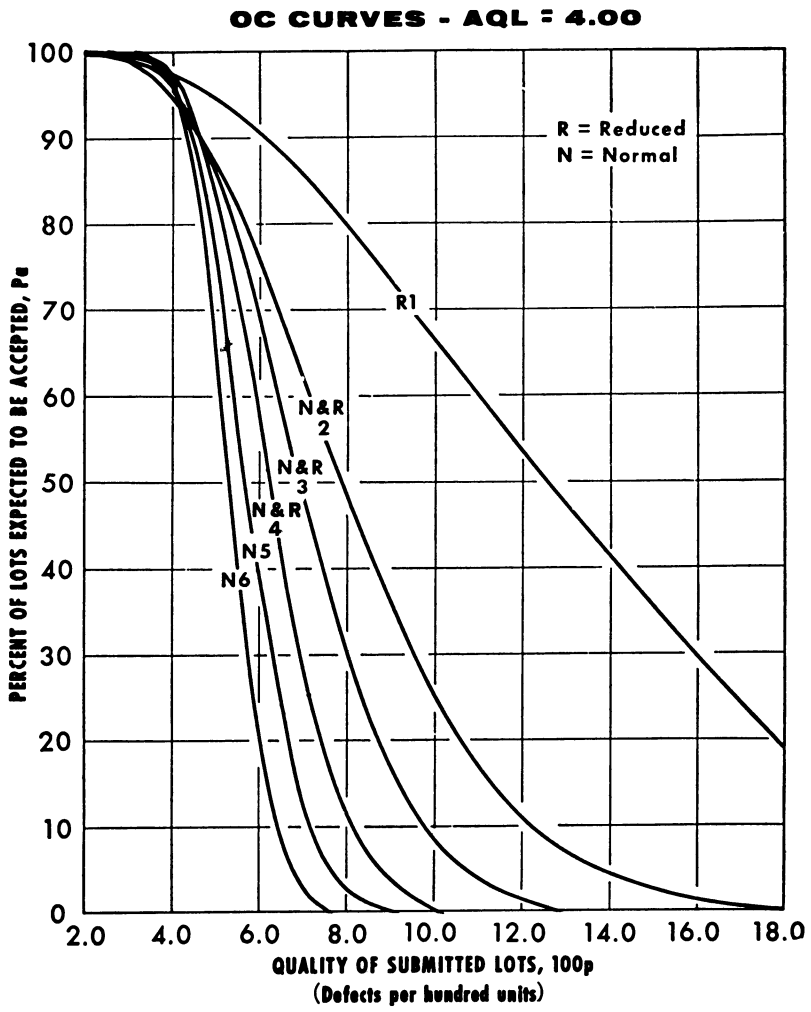
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 126-65 (12) AGRICULTURAL MARKETING SERVICE

REDUCED AND NORMAL INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=4.00 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=4.00]

Comparable sampling plans	Identification number of OC curves																	
	R1			N and R2			N and R3			N and R4			N5			N6		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	29	3	4	84	6	7	168	11	12	315	19	20	500	28	29	800	42	43
Double	18 36	1 4	3 5	36 96	0 7	5 8	120 180	6 12	10 13	168 348	7 21	13 22	228 516	8 29	17 30			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



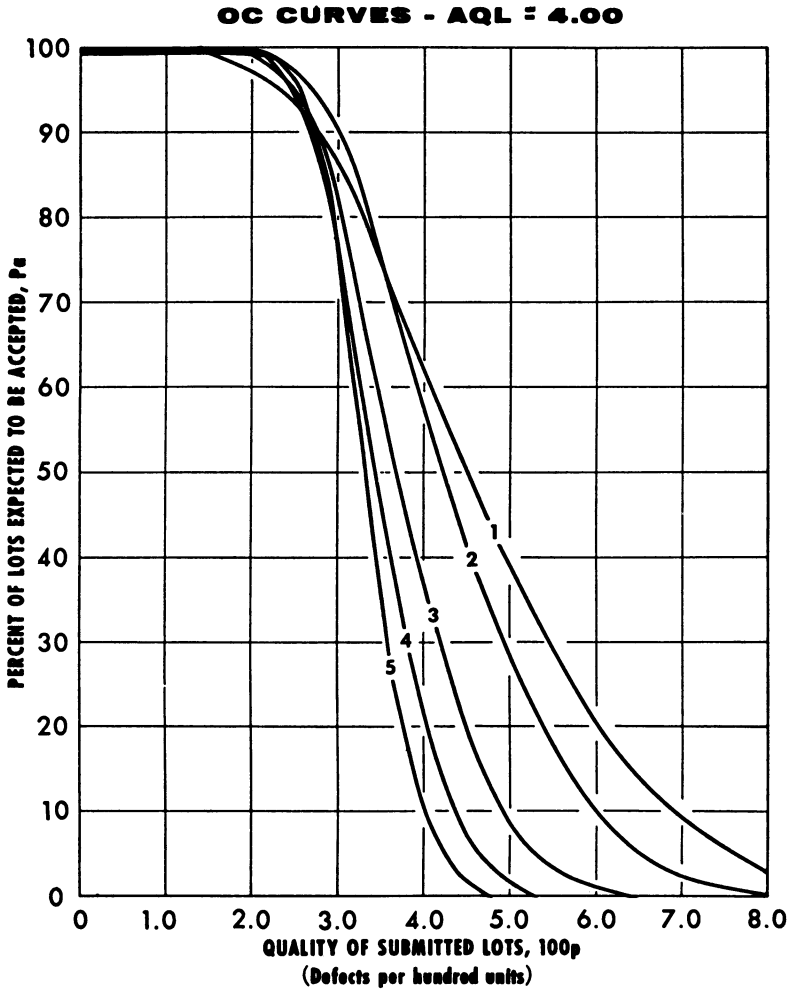
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 122–65 (12) AGRICULTURAL MARKETING SERVICE

TIGHTENED INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=4.00 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=4.00]

Comparable sampling plans	Identification number of OC curves														
	1			2			3			4			5		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	168	7	8	315	13	14	500	18	19	800	27	28	1,250	41	42
Double	120 180	3 8	7 9	168 348	5 14	10 15	228 516	5 19	11 20	456 864	12 29	19 30			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



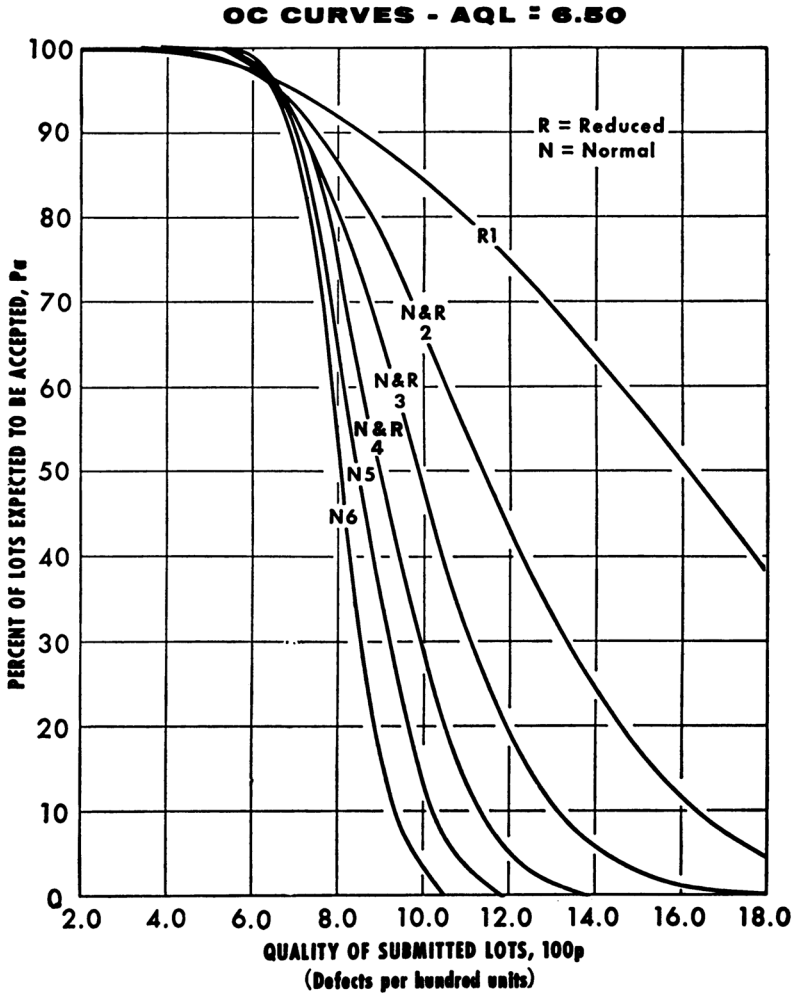
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 127–65 (12) AGRICULTURAL MARKETING SERVICE

REDUCED AND NORMAL INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=2.50 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=6.50]

Comparable sampling plans	Identification number of OC curves																	
	R1			N and R2			N and R3			N and R4			N5			N6		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	29	4	5	84	9	10	168	16	17	315	28	29	500	42	43	800	64	65
Double	18 36	1 5	4 6	36 96	2 10	7 11	120 180	10 17	14 18	168 348	12 31	18 32	228 516	15 43	24 44			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



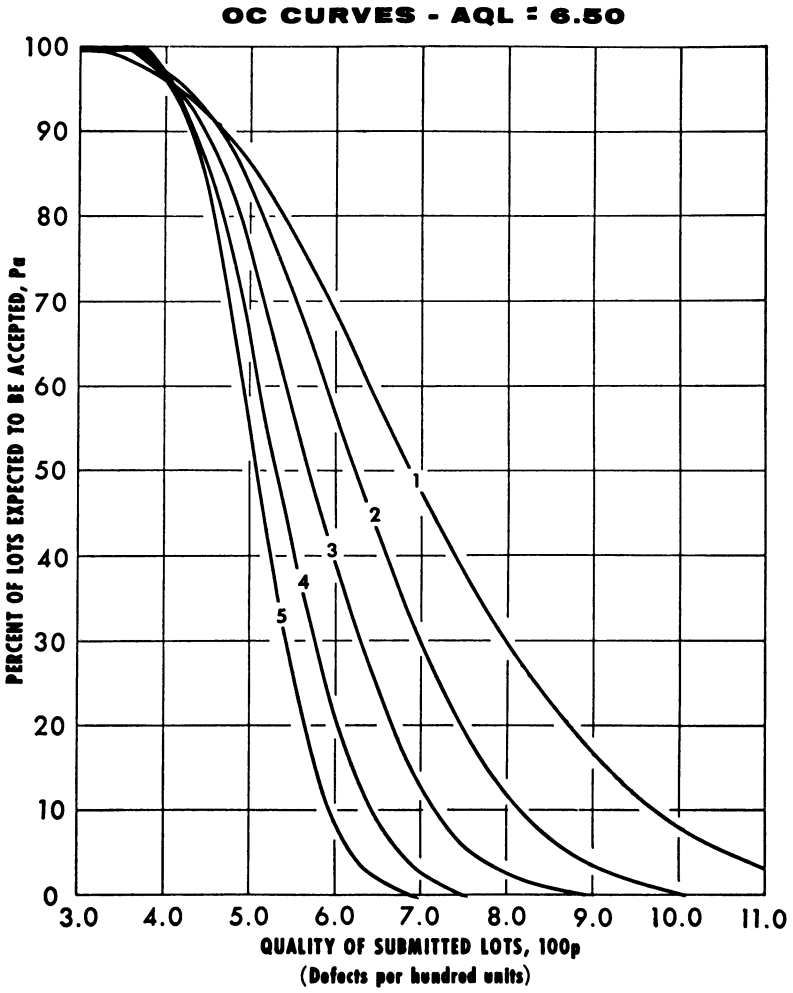
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 132–65 (12) AGRICULTURAL MARKETING SERVICE

TIGHTENED INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=6.50 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=6.50]

Comparable sampling plans	Identification number of OC curves														
	1			2			3			4			5		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	168	11	12	315	19	20	500	28	29	800	42	43	1,250	63	64
Double	120 180	6 12	10 13	168 348	7 21	13 22	228 516	8 29	17 30	456 864	21 44	28 45			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



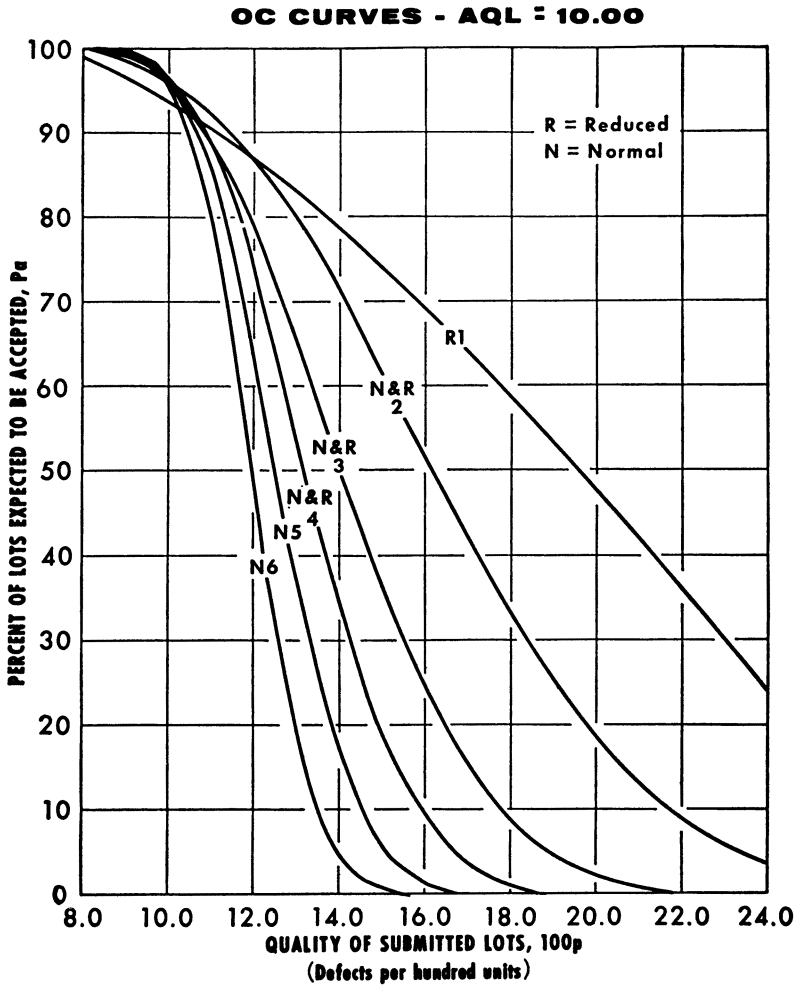
U. S. DEPARTMENT OF AGRICULTURE NEG. C&MS 133-65 (12) AGRICULTURAL MARKETING S

REDUCED AND NORMAL INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=10.00 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=10.00]

Comparable sampling plans	Identification number of OC curves																	
	R1			N and R2			N and R3			N and R4			N5			N6		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	29	5	6	84	13	14	168	23	24	315	41	42	500	62	63	800	95	96
Double	18 36	2 6	5 7	36 96	3 15	9 16	120 180	14 25	19 26	168 348	19 45	26 46	228 516	23 64	34 65			

n_c=Cumulative sample size. Ac=Acceptance number. Re=Rejection number.



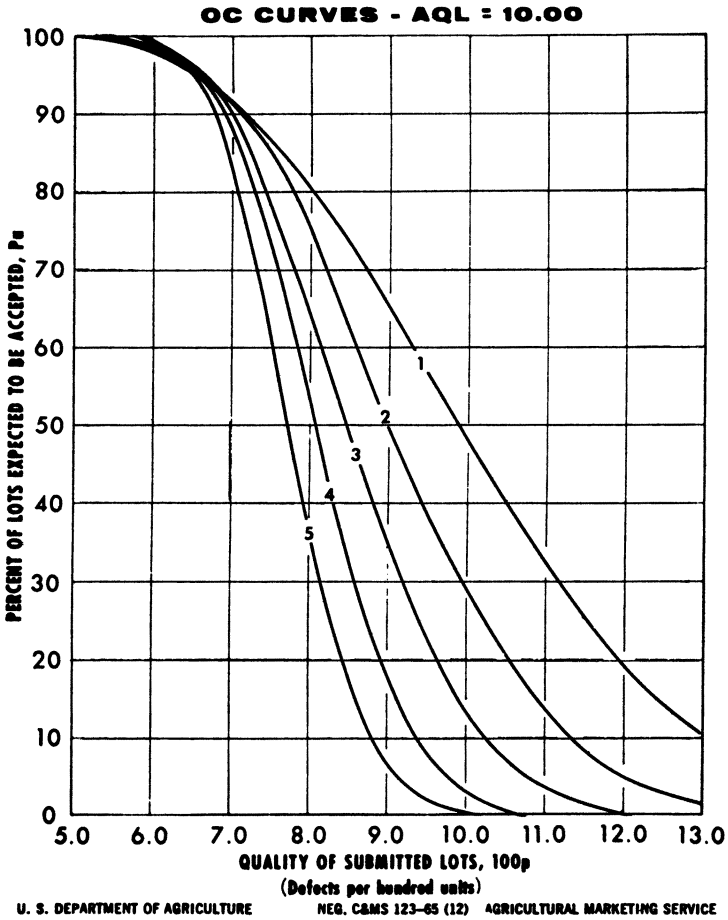
U. S. DEPARTMENT OF AGRICULTURE NFA. C&MS 120–65 (12) AGRICULTURAL MARKETING SERVICE

TIGHTENED INSPECTION PLANS—SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=10.00 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=10.00]

Comparable sampling plans	Identification number of OC curves														
	1			2			3			4			5		
	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re	n_c	Ac	Re
Single	168	16	17	315	28	29	500	42	43	800	64	65	1,250	96	97
Double	120 180	10 17	14 18	168 348	12 31	18 32	228 516	15 43	24 44	456 864	32 69	41 70			

n_c=Cumulative sampling size. Ac=Acceptance number. Re=Rejection number.



[31 FR 4687, Mar. 19, 1966; 31 FR 4949, Mar. 25, 1966, as amended at 36 FR 18457, Sept. 15, 1971. Redesignated at 41 FR 42640, Sept. 28, 1976 and 42 FR 32514, June 27, 1977, further redesignated at 45 FR 69424, Oct. 21, 1980 and 46 FR 63203, Dec. 31, 1981]

§ 42.141 Obtaining Operating Characteristic (OC) curve information for skip lot sampling and inspection.

The Operating Characteristic (OC) curve information (probability of acceptance) for skip lot sampling and inspection procedures described in § 42.121 is easily obtained from the single curve in § 42.142. The procedure for using the curve in § 42.142 is as follows:

(a) Select any sampling plan for normal condition of container inspection from Table I or Table I-A of § 42.109.

(b) For a given Quality of Submitted Lots, 100_p, find the Percent of Lots Expected to be Accepted, Pa from the respective OC curve in § 42.140.

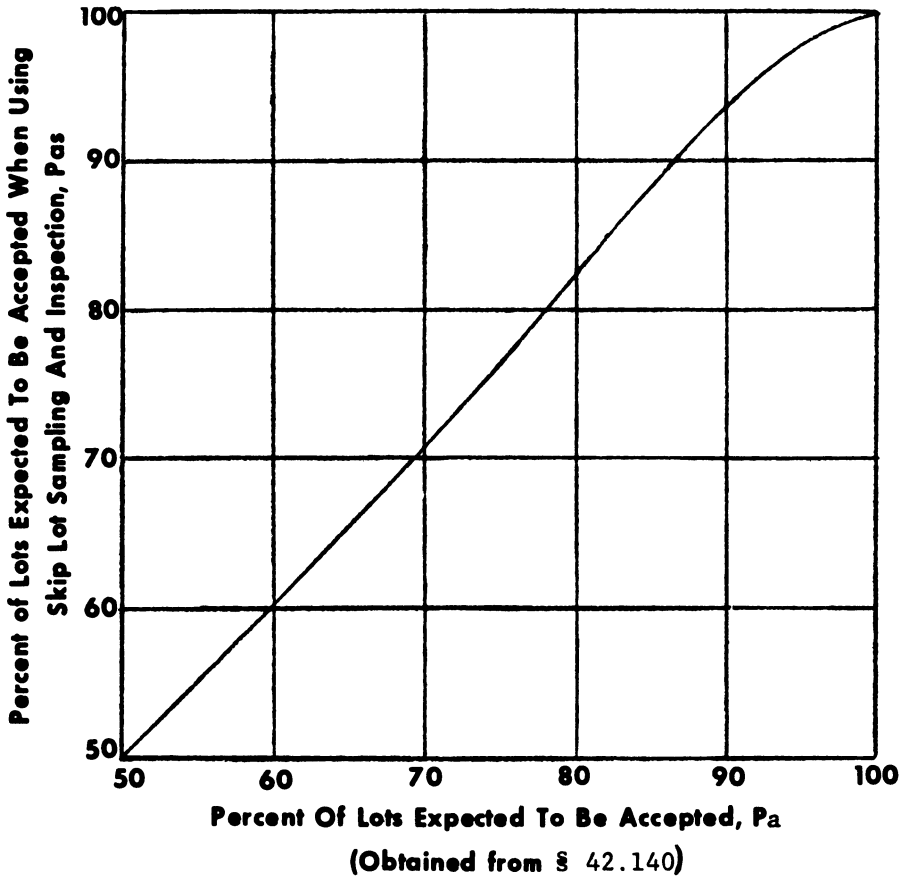
(c) Refer to § 42.142 with this Percent of Lots Expected to be Accepted, Pa, and read the new Percent of Lots Expected to be Accepted, Pas, which results when using these skip lot procedures.

For example, let's assume the lot size is 6,001 to 12,000 containers, and we use the single sampling plan of size 168 for normal inspection (Table I of § 42.109) along with an AQL for total defects of 6.5. The OC curve for this sampling plan is curve N and R3. Also, assume that the quality of the lot is 6.5 defects per hundred units. From curve N and R3, then, the Pa is determined to be 95 percent. Then refer to the graph in § 42.142 and locate Pa of 95 percent along the horizontal axis. From this point, proceed vertically to the curve and then horizontally to the left to the vertical axis. From this point on the vertical axis, Pas is determined to be approximately 98[1] percent for skip lot sampling and inspection.

[41 FR 42641, Sept. 28, 1976. Redesignated at 42 FR 32514, June 27, 1977 and 45 FR 69424, Oct. 21, 1980 and further redesignated at 46 FR 63203, Dec. 31, 1981]

[1] This slight increase of Pas over Pa results because all the lots offered for inspection are no longer being inspected. Some lots are being ''skipped'', and thereby accepted, which would have been rejected if inspected. The largest increase in Pa which will occur using skip lot sampling is approximately 4 percent. It is for this reason that skip lot sampling procedures are applied only in instances where past production quality has been consistently high—as evidenced by the requirement to have 10 consecutively acceptable lots prior to a reduction in sampling rate—and where all requirements in § 42.120 also have been met.

§42.142 Curve for obtaining Operating Characteristic (OC) curve information for skip lot sampling and inspection.



NOTES: 1. This curve applies only to the specific skip lot sampling and inspection plan described in §42.121 and §42.123.

2. Pa and Pas are essentially equal for values under 50 percent.

[41 FR 42641, Sept. 28, 1976. Redesignated at 42 FR 32514, June 27, 1977 and further redesignated at 45 FR 69424, Oct. 21, 1980 and 46 FR 63203, Dec. 31, 1981]

§ 42.143 Operating Characteristic (OC) curves for on-line sampling and inspection.

(a) This section contains the Operating Characteristic (OC) curve for each of the on-line cumulative sum sampling plans provided in subpart D. The OC curve and the corresponding cumulative sum sampling plans are listed by AQL.

(b) Different plan parameters used to make acceptance and rejection decisions are provided for each AQL.

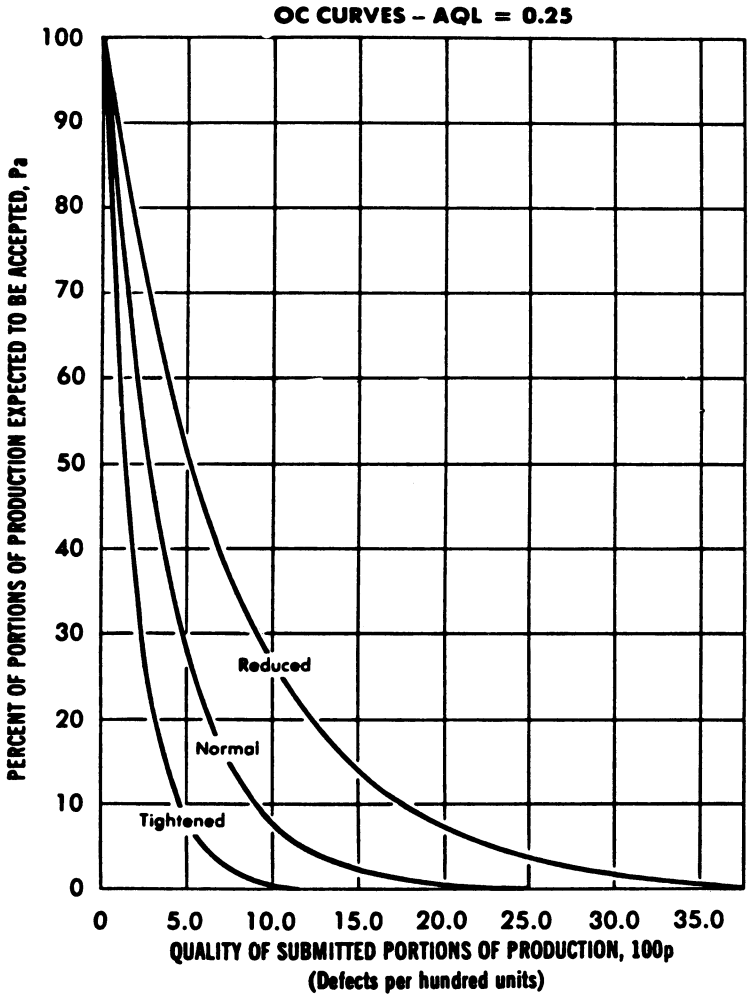
(c) The curves show the ability of the various cumulative sum sampling plans to distinguish between good and bad portions of production. The interpretation of these curves for portions of production is similar to the interpretation of the OC curves for stationary lots as illustrated in § 42.140(c).

REDUCED, NORMAL AND TIGHTENED INSPECTION PLANS—CUMULATIVE SUM SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=0.25 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=0.25]

Identification name of OC curves											
Reduced				Normal				Tightened			
n_g	T	L	S	n_g	T	L	S	n_g	T	L	S
13	0	0	0	25	0.05	0.95	0.35	50	0.1	0.9	0.3

n_g=Number of sample units in a subgroup. T=Subgroup tolerance. L=Acceptance limit. S=Starting value.

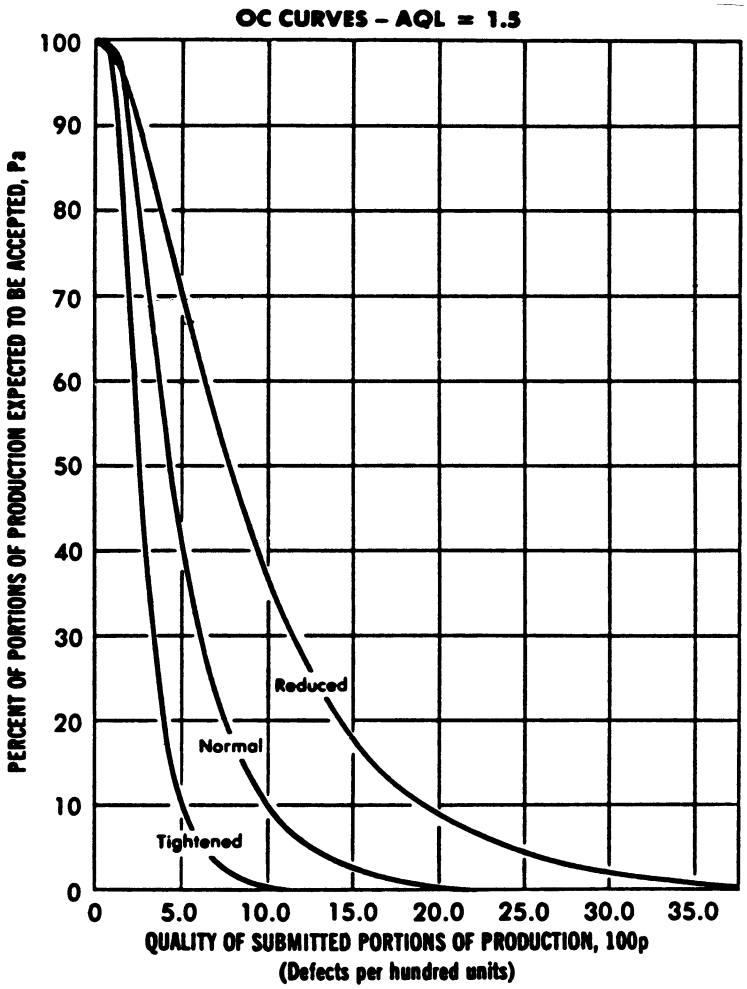


REDUCED, NORMAL, AND TIGHTENED INSPECTION PLANS—CUMULATIVE SUM SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=1.5 DEFECTS PER HUNDRED UNITS

[Sampling plans—AQL=1.5]

Identification name of OC curves											
Reduced				Normal				Tightened			
n_g	T	L	S	n_g	T	L	S	n_g	T	L	S
13	0.5	0.5	0	25	0.5	2	1	50	0.8	1.6	0.4

n_g=Number of sample units in a subgroup. T=Subgroup tolerance. L=Acceptance limit. S=Starting value.

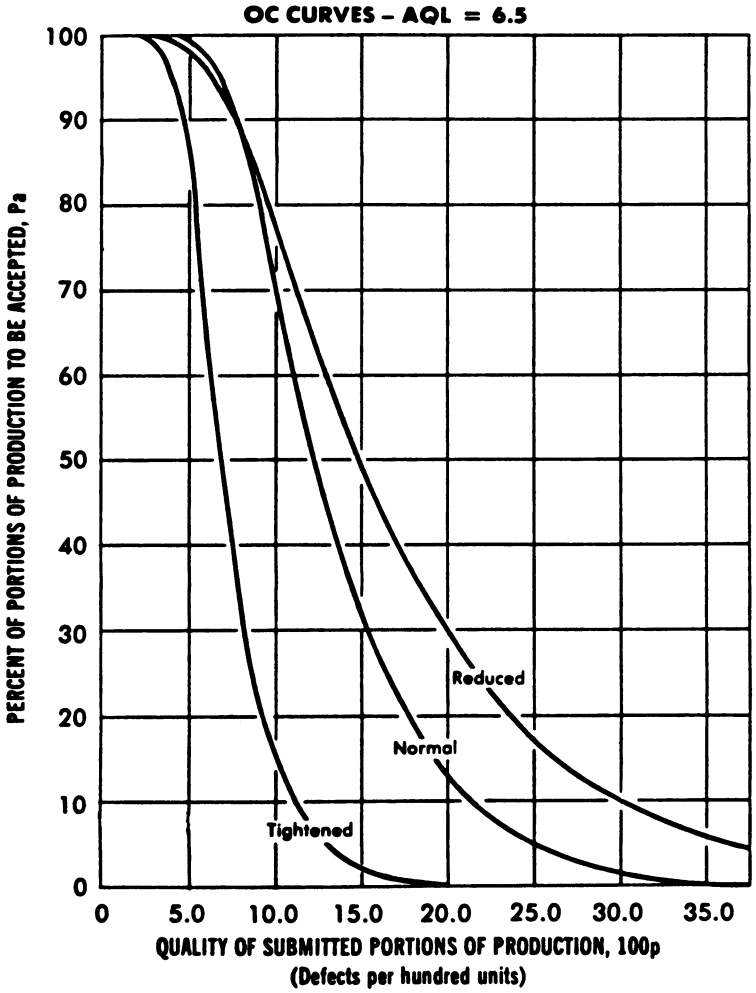


REDUCED, NORMAL, AND TIGHTENED INSPECTION PLANS—CUMULATIVE SAMPLING PLANS AND OPERATING CHARACTERISTIC (OC) CURVES FOR AQL=6.5 DEFECTS PER HUNDRED UNITS

[Sampling Plans—AQL=6.5]

Identification name of OC curves											
Reduced				Normal				Tightened			
n_g	T	L	S	n_g	T	L	S	n_g	T	L	S
13	1	2	1	25	2	3	1	50	2.5	3	1

n_g=Number of sample units in a subgroup. T=Subgroup tolerance. L=Acceptance limit. S=Starting value.



[45 FR 69424; Oct. 21, 1980. Redesignated at 46 FR 63203, Dec. 31, 1981]