

Table III
Standard Sample unit Size = 25
Number of Sample units

	6		13		21		29	
AQL	Pa=50%	Pa=10%	Pa=50%	Pa=10%	Pa=50%	Pa=10%	Pa=50%	Pa=10%
Expressed as Defects per Hundred Units or Percent Defective								
0.40	1.8	3.5	1.1	2.1	1.1	1.8	0.9	1.5
0.65	2.4	4.5	1.7	2.9	1.5	2.2	1.2	1.8
1.0	3.1	5.3	2.1	3.2	1.8	2.7	1.7	2.5
1.5	3.8	6.2	3.0	4.4	2.6	3.6	2.3	3.1
2.5	5.1	7.8	4.2	5.8	3.7	4.9	3.5	4.5
4.0	7.1	10.3	6.1	8.0	5.7	7.1	5.3	6.5
5.0	8.4	11.9	7.3	9.4	6.8	8.4	6.4	7.7
6.5	10.4	14.2	9.1	11.4	8.5	10.2	8.1	9.5
8.5	13.1	17.3	11.3	13.8	10.8	12.7	10.3	11.9
10.0	14.4	18.8	13.1	15.9	12.3	14.4	12.0	13.7
Expressed as Defects per Hundred Units Only								
12.5	17.8	22.6	15.9	18.9	15.2	17.5	14.7	16.5
15.0	20.4	25.5	18.7	21.9	17.8	20.3	17.4	19.4
20.0	26.4	32.2	24.2	27.9	23.3	26.0	22.8	25.1
25.0	32.4	38.8	29.7	33.8	28.7	31.7	28.1	30.6
33.0	41.1	48.2	38.3	42.7	37.2	40.7	36.6	39.5
40.0	49.1	56.8	46.0	50.8	44.7	48.4	43.9	47.1
50.0	59.8	68.2	56.5	61.8	55.1	59.3	54.4	57.9
65.0	76.3	85.5	72.5	78.5	71.0	75.7	70.0	74.0
Expressed as Percent Defective Only								
12.5	17.1	21.2	15.6	18.3	15.0	17.0	14.6	16.2
15.0	20.4	24.8	18.3	21.2	17.6	19.8	17.3	19.1
20.0	25.7	30.4	23.9	27.0	23.0	25.3	22.6	24.5
25.0	31.0	36.0	29.1	32.4	28.3	30.8	27.7	29.8
33.0	39.7	44.9	37.4	40.8	36.5	39.2	35.9	38.2
40.0	47.0	52.2	44.8	48.3	43.5	46.3	43.1	45.5
50.0	57.0	62.1	54.6	58.2	53.6	56.4	53.2	55.5

Table IV
Standard Sample Unit Size = 50
Number of Sample Units

	6		13		21		29	
AQL	Pa=50%	Pa=10%	Pa=50%	Pa=10%	Pa=50%	Pa=10%	Pa=50%	Pa=10%
Expressed as Defects per Hundred Units or Percent Defective								
0.15	0.6	1.3	0.6	1.0	0.4	0.8	0.4	0.6
0.25	0.9	1.8	0.7	1.2	0.5	0.9	0.5	0.8
0.40	1.2	2.2	0.9	1.4	0.8	1.2	0.7	1.1
0.65	1.6	2.7	1.3	2.0	1.1	1.6	1.1	1.5
1.0	2.2	3.5	1.8	2.6	1.6	2.1	1.5	1.9
1.5	2.9	4.3	2.4	3.3	2.2	2.8	2.0	2.6
2.5	4.2	5.9	3.6	4.7	3.4	4.2	3.2	3.9
4.0	6.2	8.3	5.3	6.6	5.1	6.1	4.9	5.7
5.0	7.2	9.4	6.6	7.9	6.2	7.2	6.0	6.8
6.5	9.2	11.7	8.3	9.8	7.9	9.0	7.6	8.6
8.5	11.6	14.3	10.4	12.1	10.0	11.3	9.8	10.9
10.0	13.2	16.1	12.1	13.9	11.7	13.0	11.4	12.6
Expressed as Defects per Hundred Units Only								
12.5	16.2	19.4	14.9	16.9	14.3	15.8	14.0	15.3
15.0	18.9	22.3	17.6	19.7	17.0	18.6	16.7	18.1
20.0	24.6	28.4	23.0	25.4	22.3	24.2	22.0	23.5
25.0	29.9	34.1	28.2	30.9	27.6	29.6	27.2	29.0
33.0	38.5	43.1	36.8	39.9	36.0	38.3	35.5	37.5
40.0	46.2	51.2	44.2	47.6	43.3	45.9	42.8	45.0
50.0	56.8	62.4	54.7	58.4	53.7	56.6	53.1	55.5
Expressed as Percent Defective Only								
12.5	15.9	18.7	14.7	16.7	14.2	15.6	14.0	15.1
15.0	18.5	21.5	17.3	19.2	16.9	18.4	16.6	17.8
20.0	23.9	27.1	22.7	24.8	22.0	23.7	21.8	23.1
25.0	29.2	32.6	27.9	30.2	27.3	29.0	26.9	28.4
33.0	37.5	41.1	36.1	38.5	35.5	37.4	35.1	36.7
40.0	44.8	48.5	43.3	45.8	42.5	44.5	42.2	43.8
50.0	54.8	58.5	53.3	55.8	52.6	54.6	52.2	53.9

Table V
Standard Sample Unit Size = 100
Number of Sample Units

	6		13		21	
AQL	Pa=50%	Pa=10%	Pa=50%	Pa=10%	Pa=50%	Pa=10%
Expressed as Defects per Hundred Units or Percent Defective						
0.10	0.4	0.9	0.3	0.5	0.3	0.4
0.15	0.6	1.1	0.4	0.6	0.3	0.5
0.25	0.8	1.3	0.5	0.8	0.5	0.7
0.40	0.9	1.5	0.7	1.1	0.7	0.9
0.65	1.3	2.0	1.1	1.5	1.0	1.3
1.0	1.8	2.6	1.5	2.0	1.4	1.8
1.5	2.4	3.4	2.1	2.7	2.0	2.4
2.5	3.6	4.7	3.3	4.0	3.1	3.6
4.0	5.4	6.8	5.0	5.8	4.7	5.4
5.0	6.6	8.0	6.1	7.0	5.8	6.5
6.5	8.3	9.9	7.7	8.7	7.5	8.2
8.5	10.6	12.4	9.9	11.0	9.5	10.4
10.0	12.3	14.2	11.5	12.7	11.2	12.1
Expressed as Defects per Hundred Units Only						
12.5	14.9	17.1	14.1	15.5	13.8	14.8
15.0	17.6	19.8	16.8	18.3	16.4	17.5
20.0	23.1	25.6	22.1	23.8	21.6	22.9
25.0	28.4	31.2	27.3	29.2	26.8	28.3
33.0	36.9	40.1	35.7	37.8	35.1	36.7
40.0	44.4	47.9	43.0	45.3	42.3	44.1
50.0	54.9	58.8	53.3	55.9	52.5	54.6
Expressed as Percent Defective Only						
12.5	14.8	16.7	14.0	15.3	13.7	14.7
15.0	17.4	19.4	16.7	18.0	16.3	17.3
20.0	22.8	24.9	21.9	23.4	21.5	22.6
25.0	27.9	30.3	27.0	28.6	26.6	27.8
33.0	36.3	38.8	35.2	36.9	34.7	36.0
40.0	43.4	46.0	42.3	44.0	41.8	43.2
50.0	53.4	56.0	52.3	54.1	51.8	53.2

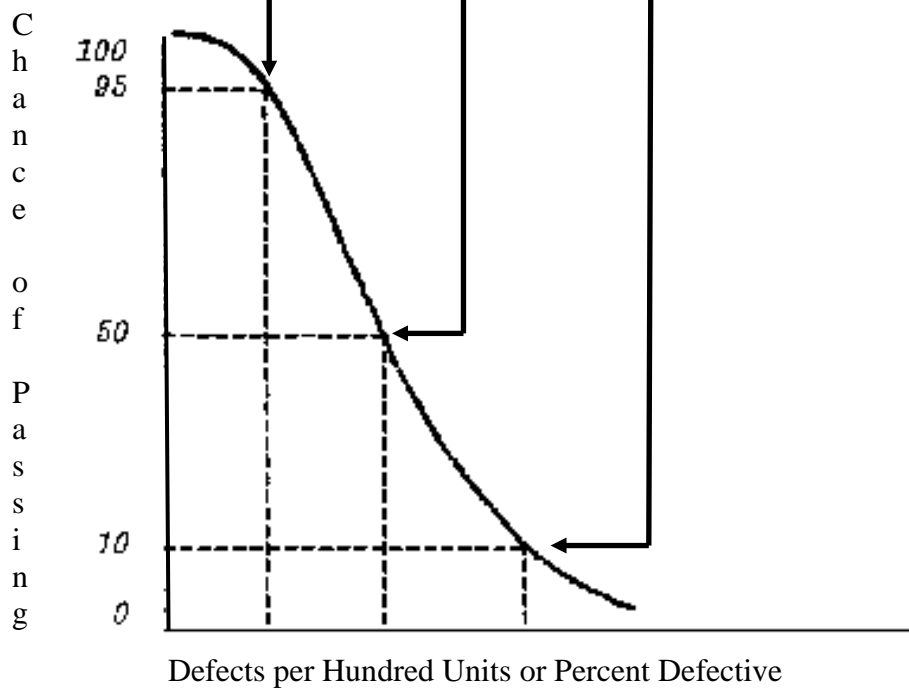
Example 44: Relationship of Pa to the OC Curve

Table I
Standard Sample Unit Size = 6

AQL	6		13	
	Pa = 50%	Pa = 10%	Pa = 50%	Pa = 10%
1.0	4.7	10.8	3.4	6.8
2.5	10.2	18.6	6.0	10.2
8.5	18.5	29.3	15.0	21.3

Table V
Standard Sample Size = 100

AQL	6		13	
	Pa = 50%	Pa = 10%	Pa = 50%	Pa = 10%
1.0	1.8	2.6	1.5	2.0
2.5	3.6	4.7	3.3	4.0
8.5	10.6	12.4	9.9	11.0



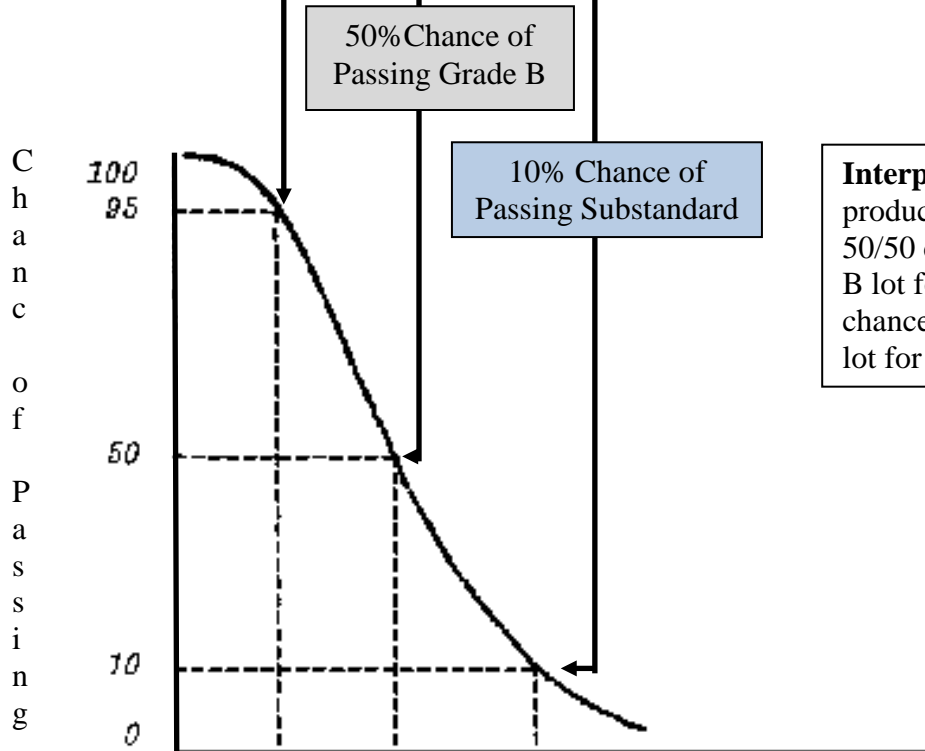
The probability of acceptance (Pa) values take on a new meaning if they are compared to the AQL's in the U.S. standards. However, all defects found in the sample must be equally offending against each grade level. Do not use the reasoning of example 45 shown below if any of the defects are adjusted See Adjusting The Defect Tally on pages 24 and 25.

Example 45: Relationship of Pa to specific AQL's

AQL	GRADE A			GRADE B				GRADE C				
	Total ^{1/2}	Maj	Sev	Crit	Total ^{1/2}	Maj	Sev	Crit	Total ^{1/2}	Maj	Sev	Crit
	12.5	4.0	1.5	1.0	20.0	6.5	4.0	1.5	25.0	10.0	6.5	2.5

Table II
Standard Sample Size = 13

AQL	6		13		21		
	Pa = 50%	Pa = 10%	Pa = 50%	Pa = 10%	Pa = 50%	Pa = 10%	
	12.5	20.1	27.3	17.6	22.0	16.4	19.7



Interpretation: Using 78 units of product, 13 X 6 = 78, there is a 50/50 chance of passing a grade B lot for Grade A and a 10 % chance of passing a Substandard lot for grade A.

K. How to verify a sample (lot inspection)

It is possible to evaluate a small sample to indicate the reliability of the original evaluation of a large sample; or, to indicate if there has been a change in quality since the original evaluation; or, to audit another grader. The advantage of this procedure is to reduce the time required for re-grading, as a small sample could be graded faster than a large sample. Then, if the small sample indicates the original evaluation is unreliable, other methods could be used to re-evaluate the quality of the lot (such as re-grading at the full sample size).

To verify a lot that has been previously graded under the lot single sampling plan (attributes) the procedure is as follows:

1. Obtain the smallest sample possible that would be suitable for the kind of product (e.g., draw a larger sample for green beans than for peach halves) and the anticipated grade level (e.g., draw a larger sample for a borderline lot than one that is well within grade).
2. Use the "Pa" values to assist in determining the sample size and reliability (e.g., an AQL of 5.0 has a Pa = 10% value of 22.2 for 36 units of product [$6 \times 6 = 36$]; but the Pa = 10% value for 169 units of product [$13 \times 13 = 169$] is 11.2 at the 5.0 AQL).
3. Grade the sample that you've selected.
4. Compare the results of the re-grade to the results of the original grade.
5. Accept the original grade if it is verified by the re-grade.
6. Resample at a larger sample size if you're not satisfied with the first re-grade.

Optional Lot Inspection Procedures Using U.S. Standards for Grades (Attributes only)**Outline**

- A. Determine sampling rate.
- B. Draw sample.
- C. Evaluate individual containers for:
 - 1. Non Quality factors
 - 2. Subjective Prerequisite factors
- D. Determine the amount of product to be evaluated for:
 - 1. Objective Prerequisite factors
 - 2. Classified factors
- E. Evaluate the sample for:
 - 1. Objective Prerequisite factors
 - 2. Classified factors
- F. Obtain applicable AQL's from the U.S. Standard.
- G. Determine Acceptance Numbers from the Regulations or attached Table I.
- H. Determine the grade for each classification.
- I. Determine the final grade for the lot.

Procedures - Lot Inspection by Attributes

Step 1. Determine the sampling rate from CFR 52, §52.38c of Regulations Governing Inspection and Certification of Processed Fruits and Vegetables and Related Products.

Step 2. Draw the number of containers required to meet the prescribed sampling rate.

Note: Be sure you have drawn enough containers to produce at least 36 units of product. Units may be by count or by weight. See applicable style in the U.S. Standard for the product that is being inspected.

Step 3. Begin the inspection by performing the examination of non-quality (net weight vacuum, etc.) factors and subjective prerequisites (usually similar varietal characteristics, flavor and odor, and brightness or appearance) on a number of containers at least equal to the sampling rate.

Step 4. Determine the amount of product to be used. Add all of the units of product together (units of count or weight). Simply count all of the units (halves, slices, etc.) where count is the criteria but units of weight must be calculated as follows:

$$\frac{(W_d) (28.3495)}{U_g} = \text{units}_t$$

Where:

W_d = Total of all the drained weights of the sample in ounces.

U_g = Weight of an individual unit expressed in grams.

28.3495 = Number of grams in one ounce.

Units_t = Total number of Units in sample

The following example is for six No. 10 cans of Diced Peaches which have the following drained weights:

73.5 oz.

71.9

74.7

72.8

73.9

74.2

441.0 oz.

$$\frac{441.0 \times 28.3495}{8}$$

8

$$= 1562.77 \text{ units}$$

From the below table - adjusted to 8 g increments, the largest number of units *less than 1562.77 units is 1450*. This is the amount of product to be used for inspection. It would be 1450 units = 11,600 g = 409.2 oz. You may derive this 409.2 oz. of product two different acceptable ways.

<i>Number of Samples</i>					
	6	13	21	29	
	<i>Total Weight of Diced^{1/}</i>				
Standard Sample Unit Sizes	6	36 x 8 g = 288 g or 10.2 oz.	78 x 8 g = 624 g or 22 oz	126 x 8 g = 1008 g or 35.6 oz	174 x 8 g = 1392 g or 49.1 oz
	13	78 x 8 g = 624 g or 22 oz	169 x 8 g = 1352 g or 47.7 oz	273 x 8 g = 2184 g or 77 oz	377 x 8 g = 3016 g or 98.7 oz
	25	150 x 8 g = 1200 g or 42.3 oz	325 x 8 g = 2600 g or 91.7 oz	525 x 8 g = 4200 g or 148.2 oz	725 x 8 g = 5800 g or 204.6 oz
	50	300 x 8 g = 2400 g or 84.7 oz	650 x 8 g = 5200 g or 183.4 oz	1050 x 8 g = 8400 g or 296.3 oz	1450 x 8 g = 11600 g or 409.2 oz
	100	600 x 8 g = 4800 g or 169.3 oz	1300 x 8 g = 10400 g or 366.8 oz	2100 x 8 g = 16800 g or 592.6 oz	2900 x 8 g = 23200 g or 818.4 oz

^{1/} Sample size = 8 g increments = weight of diced peaches equivalent to the number of sample units = the standard sample unit size.

The two acceptable ways to arrive at the required amount of product :

1. Use all of the drained product in the first five cans (total the individual drained weights from each can) plus select the balance of the total amount required from the sixth can.
2. Select equal amounts from each can.
(This method requires evaluating the balance of each can for foreign material.)

Step 5. Evaluate the product as to the objective prerequisites (pit frags, loose seeds, decay, character, etc.) and the classified defects and record in the applicable section of the tally sheet.

There are several correct ways to handle the summation of the defects. The following options may be used:

1. Mass of the product together, remove the defects and record on the tally sheet;
or

2. Inspect the product from each individual container, mass the defects of each classification together and record on the tally sheet; or
3. Inspect the product from each individual container, record the defects on the tally sheet and then total the defects of each classification.

Step 6. Next, refer to the Acceptable Quality Level (AQL) Tables in the U.S. Standards applicable style of the product being evaluated. The AQL's will appear similar to the following example:

	GRADE A				GRADE B				GRADE C			
	Total ^{1/}	Maj	Sev	Crit	Total ^{1/}	Maj	Sev	Crit	Total ^{1/}	Maj	Sev	Crit
AQL ^{2/}	12.5	4.0	1.5	1.0	20.0	6.5	4.0	1.5	25.0	10.0	6.5	2.5

^{1/} Total = Minor + Major + Severe + Critical

^{2/} AQL expressed as defects per 100 units

Step 7. Acceptance numbers are found in applicable tables in the Regulations, 7 CFR 52, § 52.38C. The applicable lot inspection tables are XV; XVI; XVIII or XIX or use the Acceptance Numbers table at the end of the section.

To determine the correct table, select the one that has a "Standard Sample Unit Size" that corresponds to the "Standard Sample Unit Size Row" selected in STEP 4.

To determine the "Column" of Acceptance Numbers to use, pick the one that has the number of sample units that corresponds to the number of sample units "Column" selected in STEP 4.

Example:

The example used in STEP 4 selected **1450** units of product to be evaluated; thus, the 1450 unit box was found in the "50" standard sample unit size "Row" and in the "29" number of sample units "Column"; therefore, select Table XVIII (which is the one for "Standard sample unit size = 50") and select from the 29 number of sample units "Column", the acceptance numbers that correspond to the applicable AQL's found in the far left column.

<i>Number of Samples</i>				
	6	13	21	29
<i>Total Weight of Diced^{1/}</i>				
6	36 x 8 g = 288 g or 10.2 oz.	78 x 8 g = 624 g or 22 oz	126 x 8 g = 1008 g or 35.6 oz	174 x 8 g = 1392 g or 49.1 oz
13	78 x 8 g = 624 g or 22 oz	169 x 8 g = 1352 g or 47.7 oz	273 x 8 g = 2184 g or 77 oz	377 x 8 g = 3016 g or 98.7 oz
25	150 x 8 g = 1200 g or 42.3 oz	325 x 8 g = 2600 g or 91.7 oz	525 x 8 g = 4200 g or 148.2 oz	725 x 8 g = 5800 g or 204.6 oz
50	300 x 8 g = 2400 g or 84.7 oz	650 x 8 g = 5200 g or 183.4 oz	1050 x 8 g = 8400 g or 296.3 oz	1450 x 8 g = 11600 g or 409.2 oz
100	600 x 8 g = 4800 g or 169.3 oz	1300 x 8 g = 10400 g or 366.8 oz	2100 x 8 g = 16800 g or 592.6 oz	2900 x 8 g = 23200 g or 818.4 oz

Standard Sample Unit Sizes

^{1/} Sample size = 8 g increments = weight of diced peaches equivalent to the number of sample units = the standard sample unit size.

TABLE XVIII
LOT SINGLE SAMPLING PLANS

STANDARD SAMPLE UNIT SIZE = 50				
NUMBER OF SAMPLE UNITS				
	6	13	21	29
ACCEPTANCE NUMBERS				
QUALITY LEVELS EXPRESSED AS DEFECTS PER 100 UNITS OR PERCENT DEFECTIVE				
AQL				
0.15	1	3	4	5
0.25	2	4	5	7
0.40	3	5	8	10

Step 8. Compare the number of defects found in each classification with the acceptance number applicable for that classification. Determine the grade of each classification.

Step 9. Determine the grade of the lot from the lowest grade given to any prerequisite or classification of defects.

Special Situations

A. If the sample rate and the number of units per container are such that the minimum number of units of product required to evaluate a lot is not met, then extra containers must be drawn to meet this requirement.

Example:

A lot of 200 cases of 24/8 oz. peach halves are to be sampled. Using Table XI in the Regulations, 7 CFR 52, § 52.38c, the lot sample size would be 6, but 6 cans would not yield 36 halves (probably 18-24 halves). Therefore, draw 2 containers from each location sampled in the lot. Mark each container with the same identifications.

Evaluate the non-quality factors and subjective prerequisites on one container from each sampling and then use enough of the extra containers to make up the needed 36 units to complete the evaluation.

- B. If the lot consists of large institutional size containers (i.e. No. 10 metal cans, 2-3 pound cartons, gallons, etc.), then, 3 sample units may be drawn if Inspection Aid No. 42 specifies the 3 sample unit rate. The number of product units from the 3 containers must still be equal to or greater than 36.
- C. If the lot consists of containers of obvious non-uniformity, the judgment of quality must be exercised before proceeding with evaluation. If it is obvious that the applicant is attempting to "dilute" defects by mixing poor quality with good quality, follow the instructions on pages 31 and 32. If all of the containers in the sample have the same code, then the final lot grade should be that of the obviously low quality.



ACCEPTANCE NUMBERS
 (Continued from previous page)

Number of units 36 78 126 150 169 174 273 300 325 377 525 600 650 725 1030 1300 1450 2100 2900

AQL

QUALITY LEVELS EXPRESSED AS PERCENT DEFECTIVE ONLY

12.5	8	15	22	25	28	29	43	47	50	58	78	88	95	105	149	182	202	287	392
15.0	9	17	25	30	33	34	51	55	59	68	92	104	112	125	177	216	240	342	467
20.0	11	21	33	38	42	43	65	71	77	88	120	136	147	163	231	284	315	450	615
25.0	13	26	39	46	51	53	80	87	94	108	148	167	181	200	286	351	390	558	763
33.0	16	32	50	59	66	67	103	112	121	139	191	217	234	260	372	457	508	728	999
40.0	19	38	59	70	78	80	123	134	145	166	228	260	281	312	446	549	611	877	1203
50.0	23	46	72	85	95	98	150	164	177	204	281	320	346	385	552	680	756	1088	1494
65.0	28	57	70	107	120	123	190	209	225	260	359	409	443	492	708	873	972	1401	1927
70.0	29	61	96	114	128	132	204	223	241	279	385	438	474	528	759	937	1044	1505	2071
75.0	31	64	102	121	136	140	217	237	257	297	410	467	506	563	811	1001	1115	1608	2213
85.0	34	71	114	135	151	156	242	265	287	332	400	524	567	632	1912	1126	1255	1812	2497