Introduction to AQL
(Acceptable Quality Level)

What Is AQL ?

- AQL Stands for "**Acceptable Quality Level**". It is a sampling method designed to answer the simple question :

> **What is the number of items one needs to inspect to get confidence that the goods' quality is up to the specifications?**

- AQL tables also allow you to determine the **maximum number of unsatisfactory pieces** for three different types of defects

    - **Critical -** The product is unsafe or hazardous for the end user or/and contravenes mandatory regulations.
    - **Major** - The product's usage is affected, and/or the defects are perceivable enough to affect the product's marketability or sellability.
    - **Minor** - Here, the sellability is not directly compromised but that kind of defects should be mentioned, counted and limited.

The Two Main Tables of AQL

- AQL employs two primary tables to determine the sampling plan and acceptance criteria for a given lot size:

  - AQL **General Inspection Level** Table

    This table helps determine the sample size code letter, which is used to find the specific sampling plan. It is divided into three general levels (I, II, III) and four special levels (S-1, S-2, S-3, S-4). General Inspection Level II is the most commonly used.

  - AQL **Sampling Size Code Letters** Table

    Once the sample size code letter is determined, this table is used to find the specific sampling plan, including the number of samples to be inspected and the acceptance/rejection criteria based on the AQL.

General Inspection Level Table

Lot or Batch Size	I	II	III
Inspection Level - Table A			
2 to 8	A	A	B
9 to 15	A	B	C
16 to 25	B	C	D
26 to 50	C	D	E
51 to 90	C	E	F
91 to 150	D	F	G
151 to 280	E	G	H
281 to 500	F	H	J
501 to 1200	G	J	K
1201 to 3200	H	K	L
3201 to 10000	J	L	M
10001 to 35000	K	M	N
35001 to 150000	L	N	P
150001 to 500000	M	P	Q
over 500000	N	Q	R

Given 2 inputs :
- **Inspection level** : Level I, Reduced Inspection, Level II, Normal Inspection, Level III, Tightened Inspection
- **Batch size**

The user obtains a letter to be used in the second table (next slide)

Let's take an example :
M. Zhang needs to perform a normal inspection for 5000 pieces. Reading the table, **he gets the letter L.**

Sampling Size Code Letters

Inspection Level - Table B

Table B	AQL	0.065		0.100		0.150		0.250		0.400		0.650		1.000		1.500		2.500		4.000		6.500	
		Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re
A	2																				0	1
B	3																	0	1	0	1
C	5															0	1	0	1	1	2
D	8													0	1	0	1	1	2	1	2
E	13											0	1	0	1	1	2	1	2	2	3
F	20									0	1	0	1	1	2	1	2	2	3	3	4
G	32							0	1	0	1	1	2	1	2	2	3	3	4	5	6
H	50					0	1	0	1	1	2	1	2	2	3	3	4	5	6	7	8
J	80			0	1	0	1	1	2	1	2	2	3	3	4	5	6	7	8	10	11
K	125	0	1	0	1	1	2	1	2	2	3	3	4	5	6	7	8	10	11	14	15
L	200	0	1	1	2	1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22
M	315	0	1	1	2	1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22
N	500	1	2	1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22		
P	800	1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22				
Q	1250	2	3	3	4	5	6	7	8	10	11	14	15	21	22						
R	2000	3	4	5	6	7	8	10	11	14	15	21	22								

This table is used to find the specific sampling plan, including the number of samples to be inspected and the acceptance/rejection criteria based on the AQL.

Input : Letter from previous table, AQL

Output : Sampling size, Acceptance/Rejection threshold

Example continued: M. Zhang wishes to have 0% critical defects, 1.5% major defects and 4% minor defects. Given the L row, he needs to control 200 items. The inspection will pass if there are less or equal to 7 items having major defects and 14 or less having minor defects and none having critical defects.

Supplier's Risk vs Buyer's Risk

- For suppliers, there is a potential risk of having their production rejected despite meeting the level of quality requested. Statistically, however, the probability of finding 8 or more defective pieces out of 200 inspected, is rather low, if the total percentage of defective pieces is below 1.5%.

- On the other hand, there is also a risk that an AQL based inspection will report the sample as "passed". But actually, the proportion of defects in the inspected batch really is proportionally smaller than what it is in the entire production. This is what we call "the buyer's risk". It should not be underestimated.

- The **AQL standard favors suppliers** as it takes into account their risk more extensively than the buyer's risk. Therefore, **when an AQL result is failed, clients have all the legitimacy to ask their suppliers to rework the production and pay for reinspection.**

Inspection Level and Severity

- Buyers should make full use of the **tools** they have at their disposal, **to enhance the inspections' accuracy**. First of all, the levels (I, II and III) should vary according to the trust of the buyer in his manufacturer.

- The larger the sample size is, the lower the margin of error. The inspection result should reflect more accurately the overall quality of the production, the upper we climb on the level ladder. (Level III being the more accurate)

- Therefore, if, after various orders, you find that your supplier's quality has consistently been good, you may consider lowering the sampling size to Level I. On the contrary, if the last report showed that the production failed to meet the requirements, it makes sense to increase the check to Level III.

- As for the severity, for regular consumer products, the standard tolerates 0 Critical Defects, 2.5% of Major Defects, and 4% of Minor Defects. The buyer may choose a different level depending on the industry, product's value, and the type of end users. It is essential to communicate about these AQL levels with the factory **prior** to placing an order, as well as to refer to them in the Purchase Order or contract.

Questions ?

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