Understanding your ISO 16232 report: Cleanliness Code or CCC

So what does that strange code CCC = A(C-E15/F-G10/H-I4/J-K00) mean? You do some research and discover the cleanliness limits listed on the print or in a table are an ISO 16232 cleanliness code which is totally based on particle count rather than mass.

So what does that ISO 16232 cleanliness code mean?

"A" = Area = Standard Area = 1,000cm^2 (defining cleanliness per a Standard Area allows you to directly compare cleanliness of parts of differing sizes) It could have either a "V" for volume or a "N" for numbers of particles per part instead of an "A" for Standard Area. The most common ISO 16232 cleanliness codes display Standard Area based spec Limits designated by the "A" in front of the parentheses.

"C-E" means that size classes C (15µm-25µm), D (25µm-50µm), and E (50µm-100µm) are combined so that particles from 15µm-100µm essentially make up a size class named "C-E."

"15" = Contamination Level = number of particles allowed for the size class preceding the Contamination Level number. A Contamination Level of "15" on an Area based report means there are 16,000 – 32,000 particles in that size class in the Standard Area of 1,000cm^2. If a Contamination Level of "15" is displayed as your Standard Area based Limit then it means up to 32,000 particles are allowed per 1,000cm^2.

"F-G" means that size classes F (100µm-150µm), and G (150µm-200µm) are combined so that particles from 150µm-200µm essentially make up a size class named "F-G."

"10" as the Contamination Level for F-G means 500-1,000 particles in the 100µm-200µm size range were found (if on a report) or are allowed per 1,000cm^2 if it is a Standard Area based Limit being displayed (on the print or in a table.)

"H-I" means that size classes H (200µm-400µm), and I (400µm-600µm) are combined so that particles from 200µm-600µm essentially make up a size class named "H-I."

"4" as the Contamination Level for H-I means 8-16 particles in the 200µm-600µm size range were found (if on a report) or are allowed per 1,000cm^2 if it is a Standard Area based Limit being displayed (on the print or in a table.)

"J-K00" means that the combination of size classes J (600µm-1,000µm), and K (1,000+µm) either had zero particles (on a report) or are allowed zero particles if being displayed as a Limit on the print or in a table.

The ISO 16232 size classes can either be grouped (per example above) and thus have a group Contamination Level or the size classes can each be assigned their own Contamination Level which would look like this: CCC = A(B16/C15/D14/E13/F10/G8/H5/I3/J2/K00)

I hope that helps demystify the ISO 16232 cleanliness code for you.

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Please feel free to give me a call – we do a lot of ISO 16232 based testing for a wide array of customers here at the Paul Hutchison Clean Technology Laboratory in Jackson, Michigan USA. Give me a call when you have a question about cleanliness testing or need cleanliness testing done. We offer Standard Turnaround for scheduled cyclical testing and Expedited Turnaround when you need results ASAP. We also sell Lab kits and can train your personnel to do cleanliness testing if your customer insists you do the testing in-house.

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Tables 1 & 2 from ISO 16232-10

Table 1 — Size classes for particle counting

Size class	Size X (µm)
B	$5 \leq x < 15$
C	$15 \leq x < 25$
D	$25 \leq x < 50$
E	$50 \leq x < 100$
F	$100 \leq x < 150$
G	$150 \leq x < 200$
H	$200 \leq x < 400$
I	$400 \leq x < 600$
J	$600 \leq x < 1000$
K	$1000 \leq x$

NOTE 1 The size of largest particle size (found or allowable) can be expressed individually, independent of the nominal size classes specified above.

NOTE 2 According to individual requirements, size ranges may be combined and left out.

Table 2 — Definition of the contamination level of a component

Number of particles per 1000 cm^2 or per 100 cm^3		Contamination level
More than	Up to and including	
0	0	00
0	1	0
1	2	1
2	4	2
4	8	3
8	16	4
16	32	5
32	64	6
64	130	7
130	250	8
250	500	9
500	1×10^3	10
1×10^3	2×10^3	11
2×10^3	4×10^3	12
4×10^3	8×10^3	13
8×10^3	16×10^3	14
16×10^3	32×10^3	15
32×10^3	64×10^3	16
64×10^3	130×10^3	17
130×10^3	250×10^3	18
250×10^3	500×10^3	19
500×10^3	1×10^6	20
1×10^6	2×10^6	21
2×10^6	4×10^6	22
4×10^6	8×10^6	23
8×10^6	16×10^6	24

NOTE n the test report, the raw number of particles should be noted.