



# **ICDM LABORATORY METHOD FOR MEASURING THE INTERNAL CLEANLINESS OF STEEL DRUMS.**

*Approved by the ICDM Board on 14 May 2004.*

The object of this recommendation is to define monitoring techniques together with the minimum values guaranteed by our profession.

### **1. Drums concerned**

Metallic drums with a capacity equal or above 200 liters having seamed top and bottom.

Open top drums as well as small and medium drums are not included in this recommendation and may be added later on.

### **2. Reference international specification**

<sup>3</sup>/<sub>4</sub> NAS 1638 (National Aerospace Standards)

### **3. Monitoring techniques**

- 3.1) Use of a drum taken during the production (batch/run) after plug screwing or when delivered at customer's facilities with only one plug handling. (The plug will be removed for the test and screwed in, in a clean environment).
- 3.2) Use of 5 litres of solvent Isopropanol or Toluene (Toluene is still in use but should be phased out in the future).
- 3.3) Pre-filtering of the solvent through a filter of 0.8 -1µm before putting it in the drum and use of a container perfectly clean so as to contain the filtered solvent. Cleanliness of the solvent is then measured and can be deducted from final result On voluntary basis one may state this blanc result in the measurement record.
- 3.4) Solvent is poured into this drum without adding pollution.
- 3.5) Washing of all parts (top, bottom, body) by rotation and sloping.
  - (1) Bottom washing: swilling out the bottom by rotating the drum placed lengthwise manually with its bottom downward.
  - (2) Body washing: swilling out the body by rolling the drum placed sideways or by rotating using a rotating machine.
  - (3) Top washing: swilling out the bottom by rotating the drum placed lengthwise manually with its bottom downward.
  - (4) Body washing: swilling out the body by rolling the drum placed sideways or by rotating using a rotating machine.
- 3.6) Recovery of the solvent by use of a pumping process perfectly clean and suitable to extract properly more than 95% of the solvent and the particles.
- 3.7) Numbering of particles found in 100 ml solvent after a single washing. Depending of the equipment it may be necessary to repeat the measurement so as to make sure the result is representative.

To get the contamination in the drum, the counting result should be multiplied by 50.
- 3.8) Filtration of the 5 litres of solvent via a membrane filter with 1 µm absolute pore size.
- 3.9) Weighing of the dry residues.
  - o Fix film filter with up to 0.1mg weighing capacity and to filtrate test solution.
  - o After filtrating test solution, swill out the inner wall of the funnel using a washing bottle with a small quantity of cleaning solution.

- Suction by using a vacuum pump until the liquid on the filter is completely suctioned. (In this case, if suction power is too strong, liquid enters into vacuum pump. So vacuum is to be adjusted properly.)
- Stop the vacuum pump, to take out the filter with tweezers and place it in a clean plate or in aluminium foiled tray.
- Dry the filter which gathers inclusion together with the plate or aluminium foiled tray in a suitable means.
- Weigh up to 0.1mg accuracy the filter using a precision balance.

**4. Typical values**

**4.1) Drums concerned**

98 % of the drums delivered among the family defined in paragraph 1.

**4.2) Uncoated drums**

- Particles – NAS class 5

i.e. :	Particles sizes in $\mu\text{m}$	Contamination of 200 l of liquid in a drum Particles per 100 ml
	5 à 15 $\mu$	8 000
	15 à 25 $\mu$	1 425
	25 à 50 $\mu$	253
	50 à 100 $\mu$	45
	> 100 $\mu$	8

- Weight – NAS class 100  
i.e. 0,02 mg for 100 ml of containing, which means a maximum of 40 mg for a 200 litres drum.

**4.3) Internal Coated drums**

- Particles – NAS class 3

i.e. :	Particles sizes en $\mu\text{m}$	Contamination of 200 l of liquid in a drum Particles per 100 ml
	5 à 15 $\mu$	2 000
	15 à 25 $\mu$	356
	25 à 50 $\mu$	63
	50 à 100 $\mu$	11
	> 100 $\mu$	2

- Weight – NAS class 100  
i.e. 0,02 mg for 100 ml of containing, which means a maximum of 40 mg for a 200 liters drum.

Remark : A drum is not free of particles after one washing in practice the situation might be less favorable.

**5. Application date**

<b>SUPPLIER</b>		<b>DRUM INTERNAL CLEANLINESS</b>	
<b>CUSTOMER :</b>		Controlled by :	
Date :			
Product code :		Production date :	
Traceability :		Factory :	
		Production line :	
<b>RESULTS OF MEASUREMENT</b>			
<u>PARTICLES</u>			
Size	Number of particles in the drum (A) (Calculated result III 7)	Contamination of 200 l of liquid in a drum Particles per 100 ml (A/2000)	NAS Class
5 – 15 μ			
15 – 25 μ			
25 – 50 μ			
50 – 100 μ			
> 100 μ			
		<b>Global NAS class :</b>	
		<b>Weight of particles :      mg</b> <b>(result III 9)</b>	
		<b>Weight per 100 ml (: 2000) :      mg</b>	
		<b>Class NAS : 100</b>	
<b>Test result according to ICDM Recommendation .....</b>			