CONTAMINATION CONTROL FOR HARD DISK DRIVE PARTS
Parts Cleaning Application for Spectrex Particle Counter

CONTAMINATION CONTROL PROCEDURE

A. PURPOSE

This procedure is a consistent analytical method for measuring and counting releasable particulate contamination on surfaces of drive parts to determine cleanliness.

B. SCOPE

This procedure covers the size distribution and quantitative analysis of particulate contamination. 1.0*µm* and greater in size easily extractable from the surface of parts in a vetted state under minimal stress conditions. All the procedures involved in sample preparation should be performed in a clean room or clean bench. This test is applicable to precision cleaned parts, include spacer and clamp which are cleaned in-house, and clean room packaged parts only.

C. LIQUID PARTICLE COUNTING

1. Equipment and Materials

1.1. Spectrex PC-2000. The threshold should be set to 11 (knob)
1.2. Beakers: 150ml, 1000ml Pyrex beakers which has been cleaned several times
1.3. Forceps: with unserrated and Teflon coated tip
1.4. Sonicator: Branson 5210
1.5. Particle free fishing line. Stop Watch, Teflon coated magnetic bar
1.6. Water, deionizer (< 18.2 Meg). 0.22*µm* membrane filtered and no bubbles.

2. Test Procedure

2.1 Background Determination and Particle Counting for spacer or clamp.

2.1.1 Using detergent, brush and rinse the beakers with 0.22*µm* membrane filtered DI water. Rinse several times.

2.1.2. Prepare 150ml air bubble - free DI water, and gently pour into Pyrex beaker.

In the case of a large part, you must use a 1000ml Pyrex beaker. To determine the particles in the water, put the water-filled beaker into the sonicator and perform a one minute sonication. Then wait for one minute and check the beaker

with the particle counter

2.1.3. If the total particle count (counts/cc) of the blank is under 2, start the particle counting. Discard the blank water and refill the beaker with 150ml DI water. Using the fishing line, hang the sample and soak it into the 150ml beaker. Then perform a one minute sonication (Be careful not to touch the beaker wall.). When the sonication is finished, remove the sample and put an ultra clean Teflon-coated magnetic bar into the beaker. Insert into the LPC. After one minute check the particle count several times and average the acquired data.

2.2. Background Determination and Particle Counting for VDM, HAS, BASE, COVER.

2.2.1. Clean 1000ml and 150ml Pyrex beakers with DI water containing particle free detergent, using brush and rinse the beakers with 0.22*μm* membrane filtered DI water several times.

2.2.2. Prepare 1000ml air bubble free DI water, and gently pour into 1000ml water-filled beaker. To determine the blank particle count, put the 1000ml water-filled beaker into the sonicator and perform one minute sonication. Transfer 100ml of water from the 1000ml water filled beaker to the 150ml beaker and clean the 1000ml beaker. After one minute, check the blank particle count of 100ml DI water which is in the 150ml beaker. If the total particle count (counts/cc) of blank is under two, then start the particle counting.
Discard the 100ml DI water of blank and wash the 150ml beaker with Clean DI water.

2.2.3. Use the fishing line to hang the sample. Place it into the 1000ml beaker which is filled with DI water. (In case of CVM the test volume is 500ml, in case of HAS, test volume is 600ml and bearing should be removed. As for the base and cover, the test volume is 700ml.)

2.2.4. Perform one minute sonication for HAS, VCM, BASE, COVER. When sonication is finished, remove the sample from the beaker and transfer 100ml of the particle extracted water into a clean 150ml beaker and put the Teflon coated magnetic bar into the beaker. Insert it into LPC. After one minute check the particle count several times and average the acquired data.

2.2.5. In the case of the SPINDLE MOTOR , the procedures are almost the same as the VCM or HAS except for the sonication time and test volume of DI Water for particle extraction. As for SPM, apply three seconds of sonication in 500ml DI water and remove the sample from the beaker. Ten seconds more of sonication should be applied because of particle diffusion. After that, the procedures are the same as above. When you perform the sonication, be careful not to touch the sample and beaker wall.

2.3. Background Determination and Particle Counting for Screws

2.3.1. Clean 400ml Pyrex beakers with DI water containing particle-free detergent using brush and rinse the beakers with 0.22*μm* membrane filtered DI water several times.

2.3.2. Prepare 200ml of bubble free DI water, and gently pour it into the clean 400ml Pyrex beaker with magnetic bar. Put the beaker on the magnetic stirrer

and set the magnetic stirrer to 160 rpm. Magnetic bar stirring is performed for five minutes and then 100ml of water is transferred from the 200ml water-filled beaker to the 150ml beaker and the 400ml beaker cleaned several times.

2.3.3. Check the particle number of the 100ml DI water which is in the 150ml Beaker. If the total particle count (counts/cc) of blank is zero, then start the Particle counting. Discard the 100ml DI water of blank and wash the 150ml Beaker with clean DI water.

2.3.4. Prepare 200ml of bubble free DI water and gently pour into the 400ml Pyrex beaker with sample and magnetic bar. Lay the beaker on the magnetic stirrer and set magnetic stirrer to 160rpm. Magnetic bar stirring is performed for five minutes and then 100ml of water from 200ml water-filled beaker is transferred to the 150ml beaker. Remember to put the clean Teflon coated magnetic bar into the beaker. Insert the beaker into LPC and leave for one minute.

2.3.5. Check the particle several times and average the acquired data.

3. The Calculation method

< 1*μm/cm* SIZED number of Particles

$$= \frac{(S - B) \times TV}{A \times N}$$

Ss Average of total particle number (count/cc) for Sample
Bx Average of total particle number (count/cc) for Blank
TV Total volume of DI water used for extraction of parts (ml)
A Surface Area of Parts in cm^2
N Total number of particles extracted