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**RGA Scanning Test of
Sensor/Actuator Head and Kapton Cable**

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1 ABSTRACT

We believe that the recent outrageous failure of the sensor/actuator heads - Kapton cables assembly in the RGA scanning test is attributed to a wrong kind of glue used to attach the stiffeners to the Kapton cables. We also conclude that a wrong cleaning procedure used was responsible for the unexpected failure of the second batch of the heads in the RGA scanning.

2 INTRODUCTION

Recently the assembly of the sensor/actuator heads (2nd batch) and the Kapton cables failed in the RGA scanning test by a factor of 40. We then tested the Kapton cables and the heads separately, suspecting that a wrong kind of glue used to attach the stiffeners to the Kapton cables would be responsible for the failure. Surprisingly the Kapton cables passed the test after being baked at 145°C, whereas the heads failed by a factor of 5 unexpectedly. It was very confusing because the 1st and 3rd (tested later) batches of the heads showed much better outgassing results. Table 1 summarizes the RGA scanning test results for the sensor/actuator heads and the kapton cables.

Table 1: Summary of the RGA scanning test results for the sensor/actuator heads and the cables.

#	Components	Status	Quantity	Baking Condition	Results ^a (×threshold)
1	Heads - Teflon cables assembly	1st batch of heads	6 heads	80°C, 48 hrs	× 1.4
2	Heads - Kapton cables assembly	2nd batch of heads	5 heads	80°C, 48 hrs	× 40 Vacseal turned Yel- low in color
3	Kapton cables	Same cables as #2		140°C, 48 hrs	× 1.9
4	Kapton cables	Same cables as #2		145°C, 48 hrs	× 0.17
5	Heads	2nd batch	5	80°C, 48 hrs	× 5
6	Heads	3rd batch	7	80°C, 48 hrs	<< × 4 ^b

a. The threshold of the test is 10^{-11} Torr for the sum of the vacuum pressure for the masses (41, 43, 53, 55, and 57) at 25 l/sec pumping speed.

b. Since no empty baking was done between #5 and #6, the result reflects the background level.

3 TEST OF THE HEAD COMPONENTS

We tested the various head components to investigate why the 2nd batch of the heads showed much more outgassing than the 1st and 3rd batches, and also whether any of the head components could be responsible for the outrageous failure (a factor of 40) of the heads - cables assembly. We chose the following components to be tested, considering the following possible causes.

- LEDs and photodiodes: Those from the same batch used for the 2nd batch of the heads might be poor in vacuum quality.
- Unmixed Vacseal: Vacseal mixed improperly might be a contaminant.
- Solder
- Vacseal cleaned with Acetone: Acetone might have been used for cleaning the 2nd batch of the heads mistakenly, while only Iso-Propyl Alcohol should be used for the normal cleaning procedure. It was observed that Vacseal in the 2nd batch of the heads turned yellow in color after being baked.

4 RESULTS

The LEDs and photodiodes, unmixed Vacseal, and solder were found not to be a contaminant. Vacseal cleaned with Acetone, Methanol, and Iso-Propyl Alcohol turned yellow in color after being baked and failed the test by a factor of 4. We then scraped the yellow Vacseal off the 2nd batch of the heads and tested them again. The outgassing result was improved from $\times 5$ to $\times 2.2$. Table 2 shows the results of the test as well as the condition of the experiment.

Table 2: Summary of the RGA scanning test results for the sensor/actuator heads and the cables.

#	Components	Status	Quantity	Baking Condition	Results ^a (\times threshold)
7	LED and photodiode	from the same batch as those used for the 2nd batch of the heads	10 each	80°C, 48 hrs	$\times 0.6$
8	Vacseal	Unmixed; separated on a glass plate; not cleaned	100 mg each	80°C, 48 hrs	$\times 1.1$
9	Solder	Pre-melted	~ 50 mg	80°C, 48 hrs	$\times 0.7$
10	Vacseal	Mixed; Cleaned with Acetone, Methanol, and Iso-Propyl Alcohol	200 mg	80°C, 48 hrs	$\times 4$, Turned Yellow in color
11	heads	2nd batch; yellow Vacseal scraped off	5	80°C, 48 hrs	$\times 2.2$

a. The threshold of the test is 10^{-11} Torr for the sum of the vacuum pressure for the masses (41, 43, 53, 55, and 57) at 25 l/sec pumping speed.

5 CONCLUSIONS

Since we could not find any components which can produce a factor of 40 failure, we believe that a wrong kind of glue used to attach the stiffeners to the Kapton cables was responsible for the outrageous failure. We guess that the wrong glue was cleaned up by baking at 145°C; that's why it passed the test eventually. We also conclude from the results that a wrong cleaning procedure used was responsible for the failure of the second batch of the heads in the RGA scanning. We should be careful not use Acetone to clean Vacseal.