

LIGO E-Document Number: **E1900080**

**Sample Test:**

<b>Material under test:</b>		<b>SR3 ROC Actuator, Ceramic Heater Assy (NOT THE ENTIRE ACTUATOR ASSY.)</b>		
units			1	unit
absorption	2.313096	±	0.22919384	ppm/yr
scatter	9.65682	±	4.33717454	ppm/yr
max. normalized absorption			2.77E+00	ppm/yr/unit
max. normalized scatter			1.83E+01	ppm/yr/unit
test turbopump speed (liter/s)			24.391574	torr/liter/sec

1 sigma  
 1 sigma from 2nd set of 87C data after transient/instability  
 2 sigma  
 2 sigma

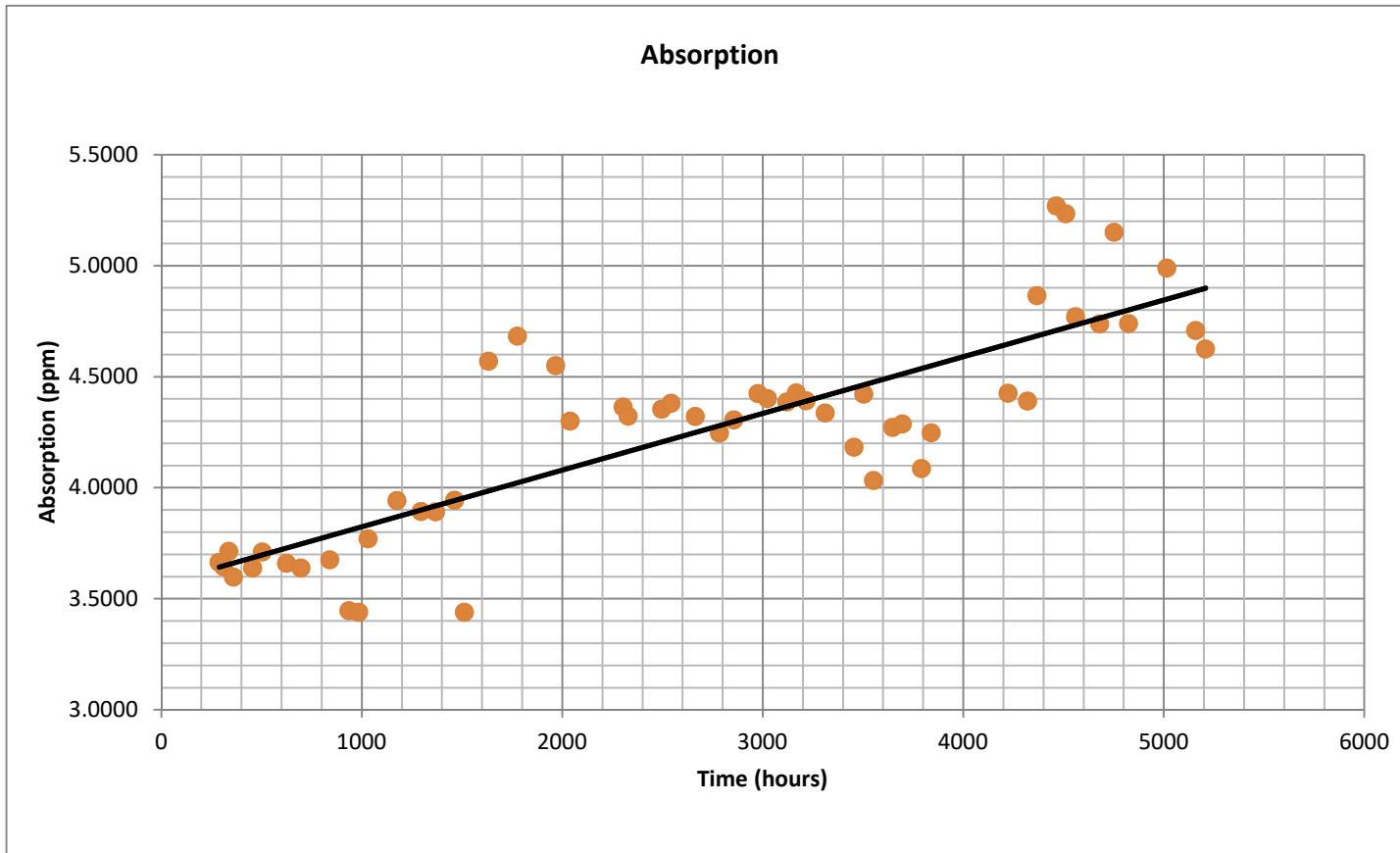
**Scaled to LIGO:**

<b>LIGO Vacuum Volume</b>	<b>Vertex</b>	<b>LHO Diagonal</b>	<b>End</b>	<b>Comments</b>
Quantity (units)	1	0	0	
LIGO ion pumping speed (liter/s)	6800	6800	1700	<a href="#">see E0900398 or PSI V049-1-078 for pump rates</a>
pumping speed ratio (test/LIGO)	0.0036	0.0036	0.0143	does not include cryo-pump and effective pumping from the Beam Tube
max. absorption (ppm/yr)	0.010	0.000	0.000	* Limit is < 0.02 ppm/yr for a single source
max. scatter (ppm/yr)	0.066	0.000	0.000	* Limit is < 0.2 ppm/yr for a single source

\* The overall limit on contamination loss on optics for AdL is < 0.5 ppm/yr absorption and < 4 ppm/yr scatter from all sources, per Table 4 of the COC Design Requirements Document (T000127-v1). It is assumed that ~20 sources could contribute.

Test Material/Assy./Device: **SR3 ROC Actuator, Ceramic Heater Assy (NOT THE ENTIRE ACTUATOR ASSY.)**

Absorption fitting			
Slope	0.000264052	3.553460204	Y-intercept
Standard Error	2.61637E-05	0.075065934	Standard error
$r_2$	0.679689851	0.262993358	sey
F	101.8547586	48	$d_f$
$ss_{reg}$	7.04483594	3.3199443	$ss_{resid}$
Absorption change rate (ppm/yr)		$\pm$ sigma (ppm/yr)	
2.3		0.2	



First 4 data points are at room temperature

Fit of data points 5 through 30 (until apparently unstable results)

Total loss fitting			
Slope	-0.000100543	156.1119203	Y-intercept
Standard Error	7.15146E-05	0.125958336	Standard error
r <sub>2</sub>	0.065937743	0.348779143	sey
F	1.976588596	28	d <sub>f</sub>
SS <sub>reg</sub>	0.240445856	3.406112928	SS <sub>resid</sub>
Total loss change rate (ppm/yr)		± sigma (ppm/yr)	
-0.9		0.6	

time	loss	
456.4166667	156.0660307	trend/fit line
3024.583333	155.807819	

Fit of data pts 5 - 15, heater @87C (except first two pts at 67C and 80C)

Total loss fitting			
Slope	0.000558387	155.2629426	Y-intercept
Standard Error	0.000154922	0.146924158	Standard error
r <sub>2</sub>	0.590743422	0.15122133	sey
F	12.99109431	9	d <sub>f</sub>
SS <sub>reg</sub>	0.297078923	0.205811015	SS <sub>resid</sub>
Total loss change rate (ppm/yr)		± sigma (ppm/yr)	
4.9		1.4	

time	loss	
456.4166667	155.5178	trend/fit line
1368.364583	156.0270203	

Fit of data points 16-23, heater at 120C

Total loss fitting			
Slope	-0.000307827	156.4210155	Y-intercept
Standard Error	0.000196851	0.374936308	Standard error
r <sub>2</sub>	0.289547692	0.17547529	sey
F	2.445324099	6	d <sub>f</sub>
SS <sub>reg</sub>	0.075295386	0.184749465	SS <sub>resid</sub>
Total loss change rate (ppm/yr)		± sigma (ppm/yr)	
-2.7		1.7	

time	loss	
1464.388889	155.9702372	trend/fit line
2496.541667	155.6525128	

Fit of data points 37-53, heater at 87C (2nd time)

Total loss fitting			
Slope	0.001102377	130.6323174	Y-intercept
Standard Error	0.000495111	2.188400029	Standard error
r <sub>2</sub>	0.248399299	1.05426088	sey
F	4.95740555	15	d <sub>f</sub>
SS <sub>reg</sub>	5.509987731	16.67199005	SS <sub>resid</sub>
Total loss change rate (ppm/yr)		± sigma (ppm/yr)	
9.7		4.3	

time	loss	
3552.541667	134.5485565	trend/fit line
5208.583333	136.3741382	

