



## Paper & Paperboard Testing Program

### Summary Report #287G-April 2017

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[Explanation of Tables and Definitions of Terms](#)

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## **The CTS Paper, Paperboard & Corrugated Fiberboard Program**

In 1969, the National Bureau of Standards (now designated the National Institute for Standards and Technology) and the Technical Association of the Pulp and Paper Industry (TAPPI) developed an interlaboratory program for paper and paperboard testing. Since 1971, Collaborative Testing Services has operated the Collaborative Reference Program for Paper and Paperboard. With hundreds of organizations from around the world participating in these tests, this program has become one of the largest of its kind. The program allows laboratories to compare the performance of their testing with that of other participating laboratories, and provides a realistic picture of the state of paper testing.

### **About CTS**

Founded in 1971, Collaborative Testing Services, Inc. (CTS) is a privately - owned company that specializes in interlaboratory tests for a variety of industrial sectors: rubber, plastics, fasteners and metals, CKPG, paper, wine, and color, as well as proficiency tests for forensic laboratories. All of the tests are designed to assist organizations in achieving and maintaining quality assurance objectives. Labs from the U.S., as well as more than 80 countries, currently participate in CTS programs.

If there are any questions on the report or testing program, please contact:

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## Key for Web Summary Reports (Page 1 of 2)

<b>WebCode</b>	Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Paper Report published on the CTS Web site. The WebCode for each analysis can be found on the datasheets and in the Performance Analysis Report mailed to each participant.
<b>Lab Mean</b>	The average of the values obtained for each sample by the participant.
<b>Grand Mean</b>	The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.
<b>ΔE</b>	The calculated total color difference between the two samples. For the Hunter L,a,b analyses it is calculated in Hunter units (ΔE). For the L*,a*,b* analyses it is calculated in CIELAB units (ΔE*).
<b>Difference from Grand Mean</b>	The difference of the LAB MEAN from the GRAND MEAN.
<b>Between-Lab Standard Deviation</b>	An indication of the precision of measurement between the laboratories. The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).
<b>Comparative Performance Value</b>	An indication of how well a laboratory's results agree with the other participants. The CPV is a ratio indicating the number of standard deviations from the GRAND MEAN. The closer a laboratory's COMPARATIVE PERFORMANCE VALUE is to zero, the more consistent its results are with the other participants' data (and vice versa). The critical value for each CPV will vary depending on the number of labs participating in a test.
<b>Inst Code</b>	A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section), if instruments are tracked.
<b>Data Flag</b>	DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

<u>DATA FLAG</u>	<u>STATISTICALLY INCLUDED/EXCLUDED</u>	<u>ACTION REQUIRED</u>
*	INCLUDED	<b>CAUTION</b> - review testing procedure and monitor future results. Results fall outside 95% ellipse but within a 99% ellipse that is calculated but not drawn.
X	EXCLUDED	<b>STOP</b> - immediate review of data and/or testing procedure is required. Results fall outside the 99% ellipse. See specific notes following each table for more information on why the data is excluded.
M	EXCLUDED	<b>PROCEED</b> - lab was unable to report data for at least one sample.

**Graph** - For each laboratory, the LAB MEAN for the first sample (x-axis) is plotted against the LAB MEAN for the second sample (y-axis) with each point representing a laboratory. The horizontal and vertical cross-hairs are the GRAND MEANS for each sample. When 20 or more laboratories are in the statistics, an ellipse is also drawn so that 95% of the time a randomly selected laboratory will be included inside the ellipse. Plotted data flags are explained on the previous page.

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### Common Problems Highlighted in Footnotes

1. **Extreme data** - The laboratory's results for one or both samples are so inconsistent with those of the other participants that the lab mean(s) fall outside the plot. The participant is advised to immediately review his data and/or testing procedure.
2. **Systematic bias** - The laboratory's results are either consistently high or low for both samples when compared to the other participants (the plotted point falls near the top or bottom of the ellipse). This indicates that the participant is performing the test with a constant bias. Causes of systematic errors include improper calibration, the particular make/model of equipment or a modification to the testing procedure.
3. **Inconsistency in testing between samples/sample sets** - The laboratory's results indicate that there are differences in the way the two samples tested (the plotted point falls to the side of the ellipse). This type of error may be attributed to the analyst deviating from the procedure when testing one of the samples or a material interaction occurrence with the instrument or room conditions. The inconsistency is reflected in the CPVs for the two samples, such as a +1.5 CPV for sample A and a -2.2 CPV for sample B. CTS also will specify if the laboratory's data for one sample are high/low compared to the other participants. If this inconsistency is slight, the lab's plotted point will be an \* that falls on the edge of the ellipse.
4. **Inconsistency in testing within a sample** - The laboratory's within-lab standard deviation for a specified sample is high when compared to the other participants, often causing the lab's plotted point to fall outside of the ellipse.

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Labs flagged with an \* are not typically included in the footnotes of a data table. These labs may locate their position in the control ellipse and use the definitions above to help identify the type of testing error. An \* should serve as a caution flag, a "yellow light", to a lab. If this error is repeated in future rounds, a lab may need to stop and review its testing procedures. The initial data flag is not cause for alarm. Interlaboratory tests conducted at regular intervals permit a lab to recognize trends in testing.



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 350**  
**Color & Color Difference - Near White Papers - C/2deg obs**  
**Hunter L,a,b - Illuminant C - 2 Degree Observer**

**Report #287G**  
**April 2017**

Web Code	F	Samples	Hunter L, a, b Color Values			Color Difference Values				Instr Code
			L	a	b	$\Delta L$	$\Delta a$	$\Delta b$	$\Delta E$	
4U9LF3		GA41	91.09	-0.02	1.58	-1.31	0.04	0.57	1.43	TS
		GA42	89.78	0.02	2.15					
4Y4FD4		GA41	91.51	-0.51	0.98	-0.92	0.03	0.78	1.20	MK
		GA42	90.59	-0.48	1.76					
9Y4AU Y		GA41	90.06	0.28	0.53	-1.23	-0.13	1.05	1.62	TS
		GA42	88.83	0.15	1.58					
AG77WU		GA41	91.19	-0.74	1.37	-1.37	-0.06	0.59	1.49	TC
		GA42	89.82	-0.80	1.96					
B4BCX7		GA41	91.77	-0.62	1.71	-1.73	-0.04	0.15	1.73	LA
		GA42	90.05	-0.66	1.86					
CLLQR6		GA41	93.17	-0.67	1.23	-0.67	0.00	0.59	0.89	EH
		GA42	92.50	-0.66	1.82					
DXVLMV		GA41	92.81	-0.75	1.02	-0.73	-0.05	1.07	1.30	LS
		GA42	92.08	-0.80	2.09					
GUN8R2		GA41	93.80	-0.99	0.78	-1.51	0.04	0.53	1.60	XS
		GA42	92.29	-0.96	1.31					
HGCJTN		GA41	92.25	-0.65	2.18	-1.29	0.09	0.79	1.51	HH
		GA42	90.96	-0.56	2.97					
LLB4AF		GA41	91.44	-0.56	1.26	-1.19	-0.02	0.70	1.38	TC
		GA42	90.25	-0.58	1.96					
NNBY2H		GA41	90.78	-0.76	0.14	-0.92	-0.05	0.26	0.96	HH
		GA42	89.85	-0.81	0.40					
P4MPL3		GA41	89.96	0.09	0.63	-0.69	0.01	1.15	1.34	TS
		GA42	89.27	0.09	1.78					
PH7H73		GA41	93.21	-0.70	1.54	-0.67	0.07	0.90	1.12	TC
		GA42	92.55	-0.63	2.43					
PWKMFG		GA41	92.25	-0.69	-0.27	-1.03	0.12	0.42	1.12	HE
		GA42	91.22	-0.57	0.15					
QD7TZE		GA41	90.50	-0.52	0.29	-0.87	0.01	0.53	1.02	HH
		GA42	89.63	-0.51	0.81					
TU8CTM		GA41	90.66	-0.02	0.62	0.46	-0.21	1.47	1.55	TS
		GA42	91.11	-0.23	2.09					



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 350**  
**Color & Color Difference - Near White Papers - C/2deg obs**  
**Hunter L,a,b - Illuminant C - 2 Degree Observer**

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Web Code	F	Samples	Hunter L, a, b Color Values			Color Difference Values				Instr Code
			L	a	b	$\Delta L$	$\Delta a$	$\Delta b$	$\Delta E$	
U9H8PV		GA41	91.60	-0.75	-0.13	-1.00	0.03	-0.42	1.08	HG
		GA42	90.61	-0.73	-0.55					
VH27RK		GA41	92.98	-0.64	1.34	-1.00	-0.04	0.63	1.18	EH
		GA42	91.98	-0.67	1.97					
WJANLA		GA41	90.34	-0.42	0.74	-0.82	0.00	1.09	1.36	TS
		GA42	89.51	-0.41	1.83					
X8TBPQ		GA41	94.11	-1.12	-0.39	-0.20	-0.19	1.10	1.13	HE
		GA42	93.90	-1.32	0.71					
YC4N4J		GA41	91.20	-0.50	0.88	-1.31	-0.05	1.10	1.71	XX
		GA42	89.89	-0.55	1.97					
YLQMWA		GA41	91.08	-0.59	1.30	-0.97	-0.05	0.80	1.26	NE
		GA42	90.11	-0.64	2.10					

Grand Means			Summary Statistics						
GA41	91.716	-0.539	0.879						
GA42	90.764	-0.560	1.598	-0.952	-0.021	0.720	1.318		
Std Dev Btwn Labs									
GA41	1.205	0.341	0.668						
GA42	1.300	0.338	0.817	0.460	0.081	0.408	0.243		

Statistics based on 22 of 22 reporting participants

**Analysis Notes:**

9Y4AUY - One determination removed from the Lab Mean of Sample GA42 per Grubb's Test at 1% risk (TAPPI 1205).

**Key to Instrument Codes Reported by Participants**

EH	Datacolor Elrepho SF450	HE	Hunter LabScan
HG	Hunter ColorQUEST	HH	Hunter D25DP - 9000
LA	L & W Elrepho AL300	LS	L & W Elrepho SE 070
MK	Macbeth Color-Eye 7000 Spectrophotometer	NE	Minolta CM-3500d Spectrophotometer
TC	Technidyne Color Touch Series	TS	Technidyne Brightimeter Micro S-5
XS	X-Rite 938 Spectrodensitometer	XX	Instrument make/model not specified by lab



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 350**  
**Color & Color Difference - Near White Papers - C/2deg obs**  
**Hunter L,a,b - Illuminant C - 2 Degree Observer**

**Report #287G**  
**April 2017**

Web  
Code

F Samples

Hunter L, a, b Color Values

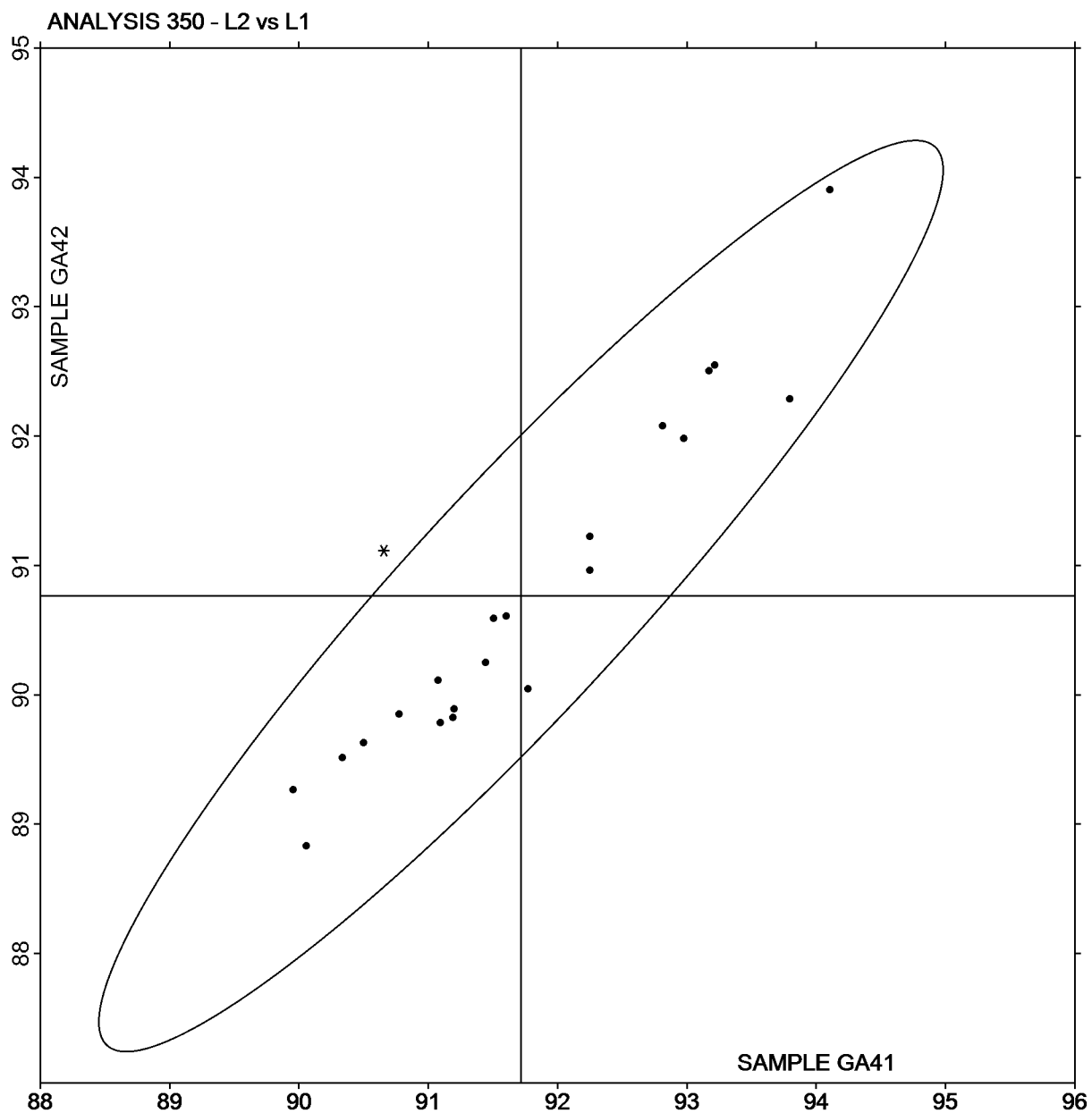
L a b

Color Difference Values

$\Delta L$   $\Delta a$   $\Delta b$   $\Delta E$

Instr Code

Plot of L values GA42 v L values GA41





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 350**  
**Color & Color Difference - Near White Papers - C/2deg obs**  
**Hunter L,a,b - Illuminant C - 2 Degree Observer**

**Report #287G**  
**April 2017**

Web  
Code

F Samples

Hunter L, a, b Color Values

L

a

b

Color Difference Values

$\Delta L$

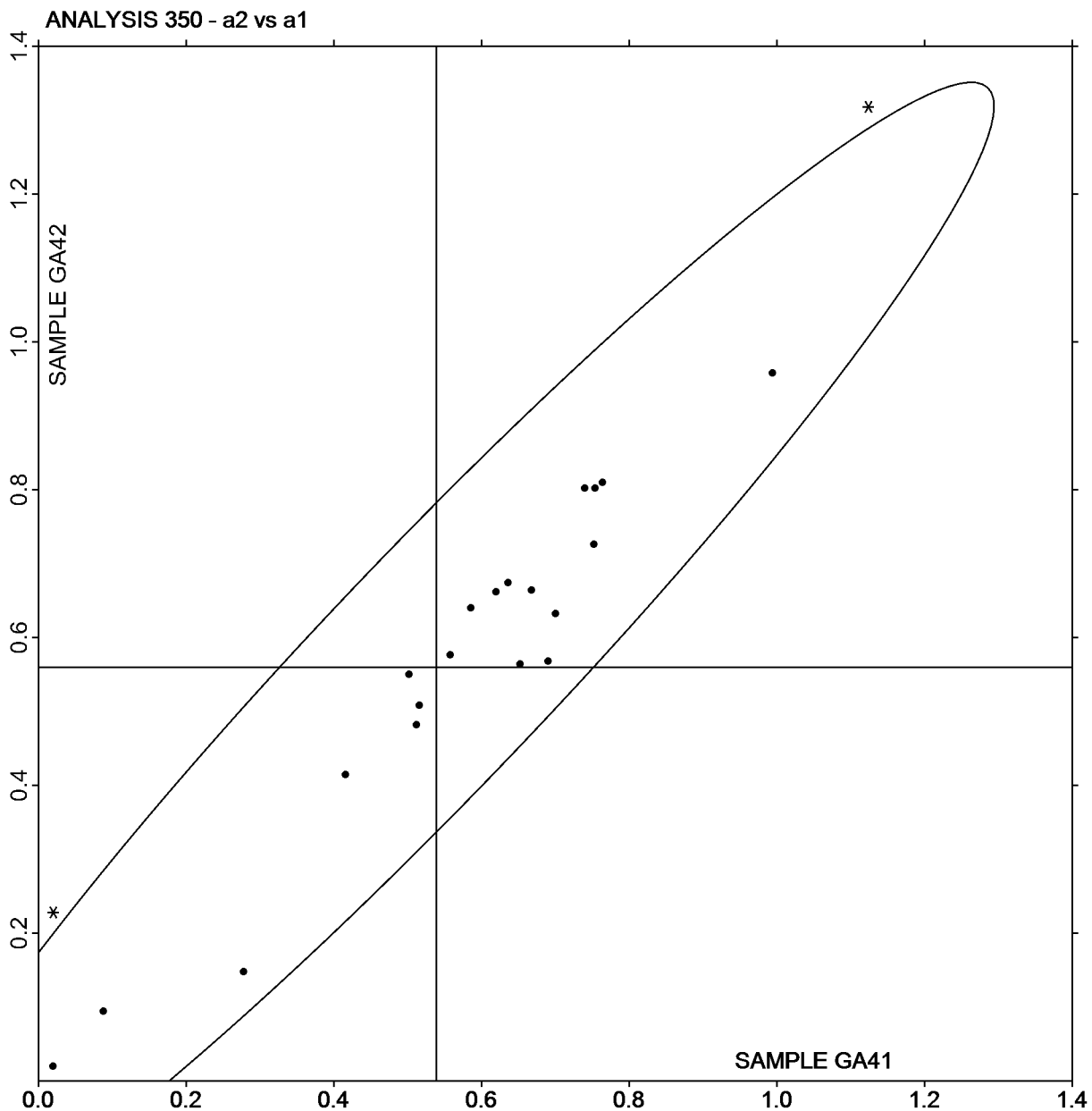
$\Delta a$

$\Delta b$

$\Delta E$

Instr Code

Plot of a values GA42 v a values GA41



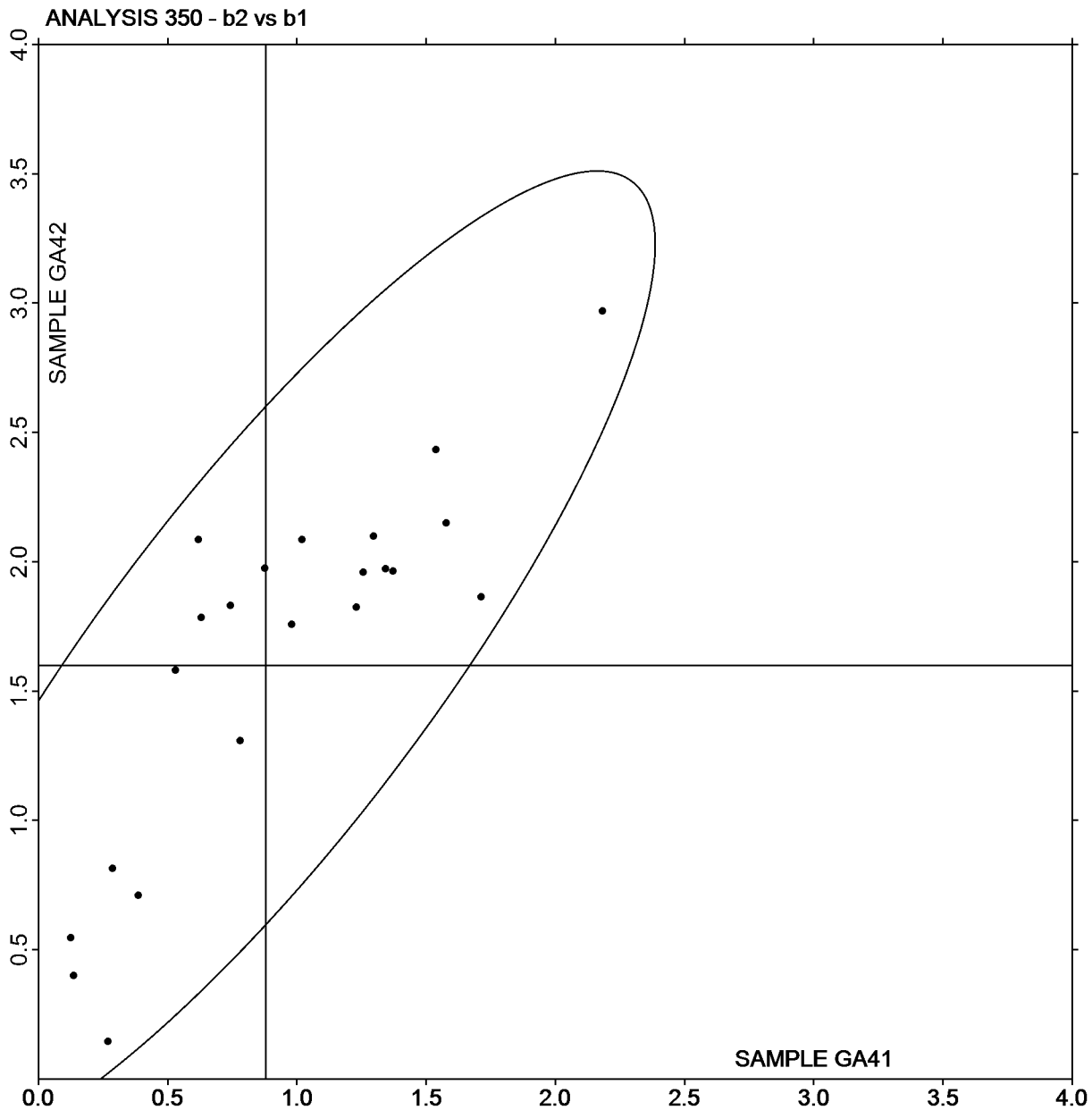




**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 350**  
**Color & Color Difference - Near White Papers - C/2deg obs**  
**Hunter L,a,b - Illuminant C - 2 Degree Observer**

**Report #287G**  
**April 2017**

Plot of b values GA42 v b values GA41





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 351**  
**Color & Color Difference - Near White Papers - D65/10deg obs**  
**Hunter L,a,b - Illuminant D65 - 10 Degree Observer**

**Report #287G**  
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2E4HX7	GA41	92.91	-1.36	2.35	-0.67	0.03	1.38	1.53	NG
	GA42	92.24	-1.33	3.73					
46P9MH	GA41	94.65	-0.30	0.36	-0.89	0.03	0.87	1.24	XP
	GA42	93.76	-0.27	1.23					
APYG64	GA41	91.56	-1.01	0.21	-0.61	0.37	0.87	1.13	HE
	GA42	90.94	-0.64	1.08					
CUGQ7X	GA41	93.43	-0.94	0.59	-0.74	0.15	0.66	1.00	HT
	GA42	92.69	-0.79	1.26					
H3EA93	GA41	93.07	-1.37	2.37	-0.74	0.01	1.35	1.54	NG
	GA42	92.33	-1.36	3.73					
HGD9Z7	GA41	93.71	-0.56	-0.16	-0.79	0.16	0.40	0.90	XX
	GA42	92.92	-0.40	0.24					
KRP6CM	GA41	93.04	-1.17	1.74	-0.78	0.11	0.90	1.19	EH
	GA42	92.26	-1.06	2.64					
MMM44P	GA41	93.18	-1.29	1.92	-0.81	0.04	1.02	1.30	LS
	GA42	92.36	-1.25	2.94					
MWBUNW	GA41	93.24	-1.01	0.45	-0.69	0.13	0.94	1.18	HT
	GA42	92.55	-0.89	1.39					
P9EYUE	GA41	93.26	-0.82	0.56	-0.94	0.08	0.44	1.04	EF
	GA42	92.32	-0.74	1.00					
PCEBNU	GA41	92.86	-0.25	-0.41	-1.52	0.03	-0.54	1.61	HV
	GA42	91.34	-0.21	-0.95					
PWKMFG	GA41	92.19	-0.71	-0.33	-0.95	0.16	0.51	1.09	HE
	GA42	91.24	-0.55	0.18					
Q4KKHD	GA41	91.79	-0.85	1.39	-1.21	0.11	0.61	1.36	XM
	GA42	90.59	-0.74	2.00					
XA6VRA	GA41	93.55	-0.82	1.03	-1.01	0.03	0.38	1.08	NF
	GA42	92.55	-0.79	1.42					
YER3UE	GA41	93.16	-0.97	0.48	-0.56	0.19	0.95	1.12	HT
	GA42	92.60	-0.78	1.43					
ZREQ3J	GA41	91.26	-1.08	1.47	-1.13	0.05	0.70	1.33	TC
	GA42	90.12	-1.02	2.16					
ZUZZF6	GA41	93.27	-1.02	0.19	-0.52	0.20	0.93	1.08	XP
	GA42	92.75	-0.82	1.12					



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 351**  
**Color & Color Difference - Near White Papers - D65/10deg obs**  
**Hunter L,a,b - Illuminant D65 - 10 Degree Observer**

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Grand Means			Summary Statistics				
GA41	92.949	-0.915	0.836				
GA42	92.092	-0.804	1.564	-0.856	0.111	0.728	1.220
Stnd Dev Btwn Labs							
GA41	0.836	0.324	0.892				
GA42	0.932	0.335	1.224	0.254	0.092	0.440	0.201

Statistics based on 17 of 17 reporting participants

**Key to Instrument Codes Reported by Participants**

EF	Datacolor Elrepho 3000	EH	Datacolor Elrepho SF450
HE	Hunter LabScan	HT	Hunter UltraScan Vis
HV	Hunter Ultrascan XE	LS	L & W Elrepho SE 070
NF	Minolta CM-3600d Spectrophotometer	NG	Minolta CM-3700d Spectrophotometer
TC	Technidyne Color Touch Series	XM	X-Rite CA-22
XP	X-Rite Spectrophotometer DTP	XX	Instrument make/model not specified by lab



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 351**  
**Color & Color Difference - Near White Papers - D65/10deg obs**  
**Hunter L,a,b - Illuminant D65 - 10 Degree Observer**

**Report #287G**  
**April 2017**

Web  
Code

F Samples

Hunter L, a, b Color Values

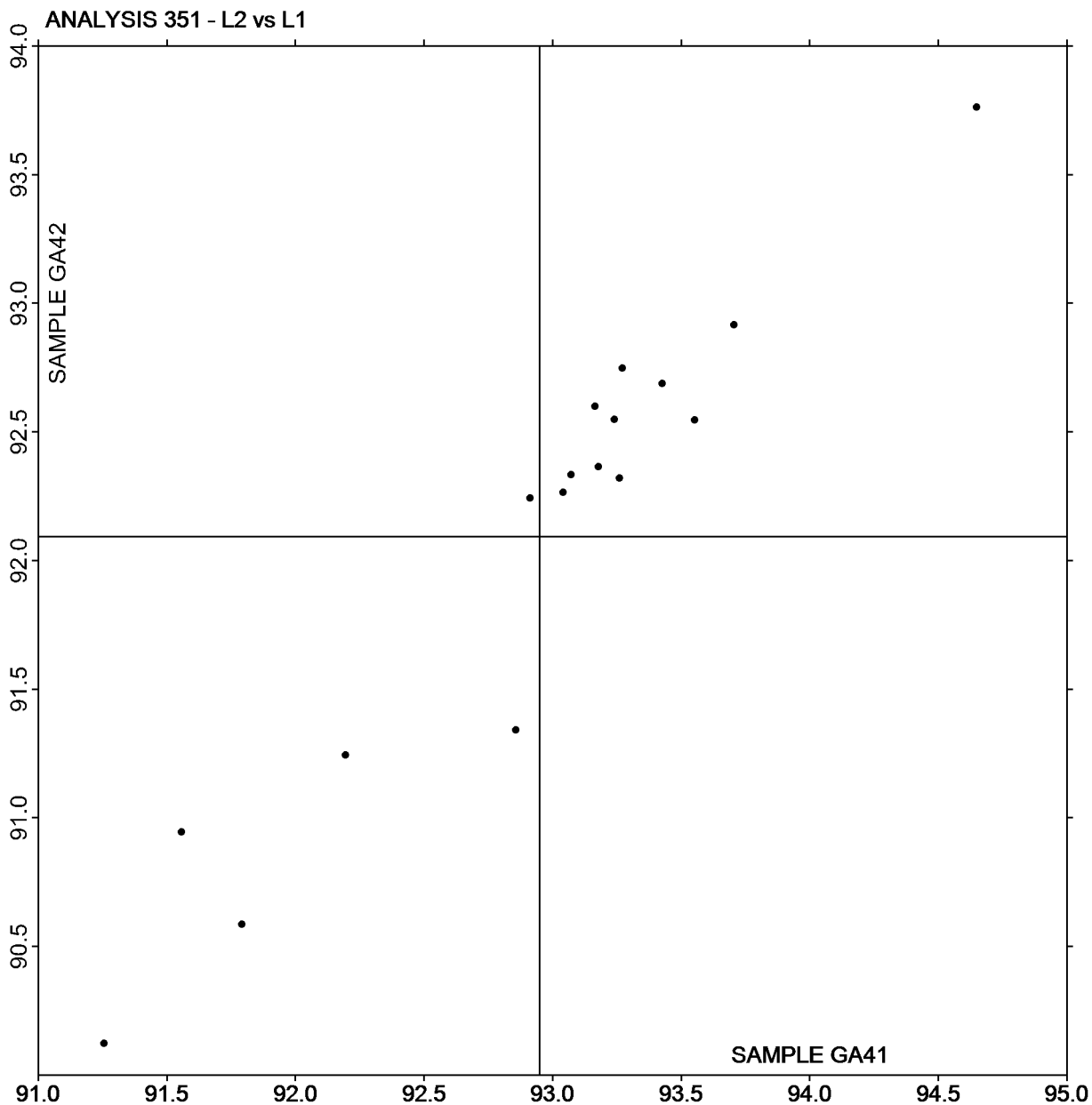
L a b

Color Difference Values

$\Delta L$   $\Delta a$   $\Delta b$   $\Delta E$

Instr Code

Plot of L values GA42 v L values GA41



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

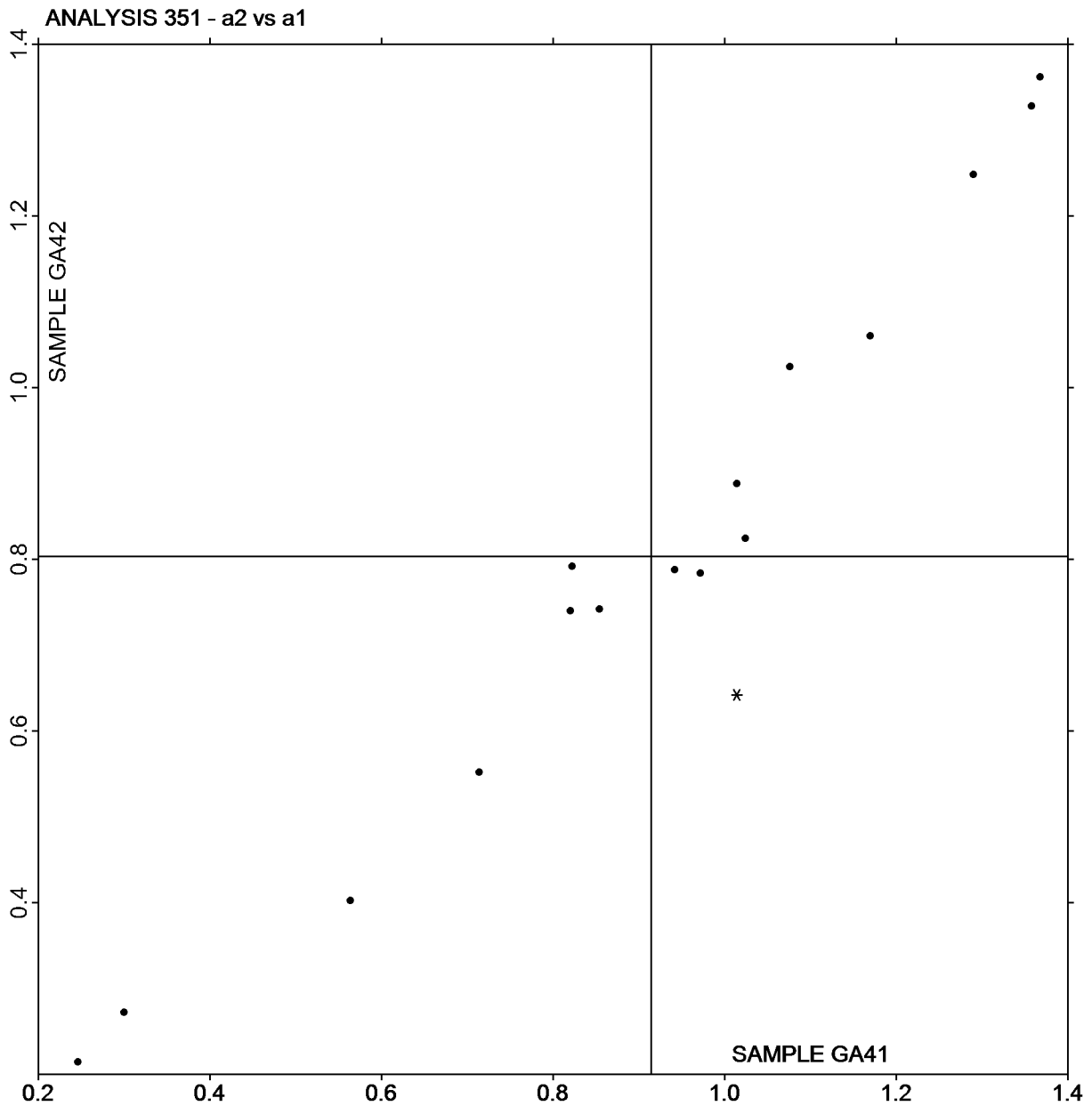


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 351**  
**Color & Color Difference - Near White Papers - D65/10deg obs**  
**Hunter L,a,b - Illuminant D65 - 10 Degree Observer**

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Web Code	F	Samples	Hunter L, a, b Color Values			Color Difference Values				Instr Code
			L	a	b	$\Delta L$	$\Delta a$	$\Delta b$	$\Delta E$	

Plot of a values GA42 v a values GA41



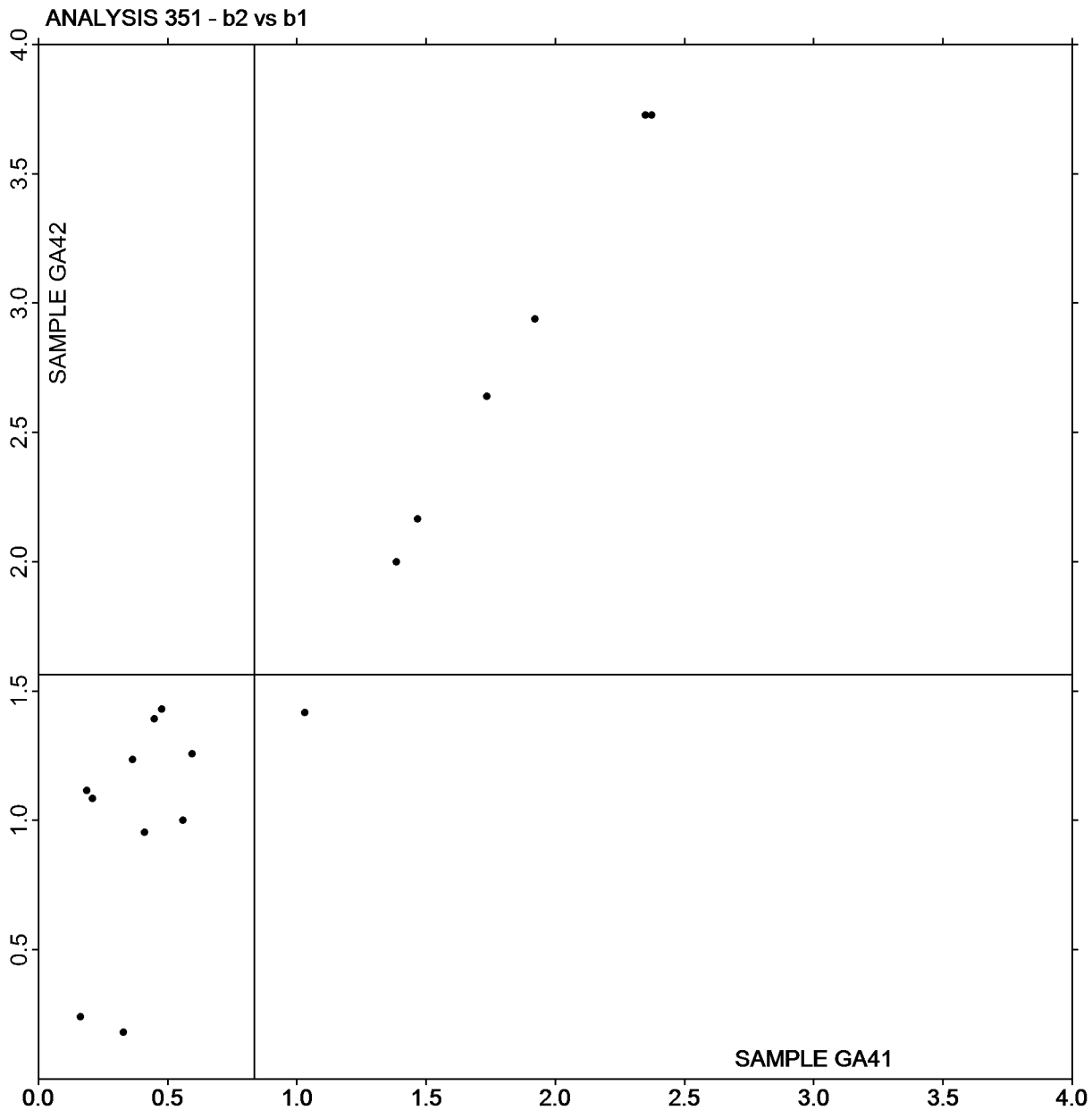
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 351**  
**Color & Color Difference - Near White Papers - D65/10deg obs**  
**Hunter L,a,b - Illuminant D65 - 10 Degree Observer**

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Plot of b values GA42 v b values GA41



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 360  
Thickness (Caliper), Printing papers**

**Report #287G  
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WebCode	Data Flag	Sample GV41			Sample GV42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2E4HX7		5.096	0.115	1.29	4.707	0.049	0.81	LW
382Q7N		5.076	0.095	1.07	4.744	0.086	1.42	LW
39EFBL		4.788	-0.193	-2.18	4.533	-0.125	-2.06	PP
3K4HP8		4.996	0.015	0.17	4.696	0.039	0.63	LW
46P9MH		4.950	-0.031	-0.35	4.670	0.012	0.20	TM
4C768J		4.999	0.017	0.20	4.654	-0.004	-0.07	LW
4U9LF3		5.036	0.055	0.61	4.683	0.025	0.41	EM
4Y4FD4		4.973	-0.008	-0.09	4.661	0.003	0.05	PP
6YLP2Y		5.141	0.160	1.80	4.749	0.091	1.50	LW
6YZBAE		5.016	0.035	0.39	4.668	0.010	0.17	LA
73GZB4		4.978	-0.003	-0.04	4.665	0.007	0.12	LW
76H2BZ		4.974	-0.008	-0.09	4.643	-0.015	-0.25	EM
82DWWJ		4.934	-0.048	-0.54	4.645	-0.013	-0.22	FR
8NTF6Z		5.060	0.079	0.89	4.740	0.082	1.35	TM
8UHUU8		5.078	0.097	1.09	4.704	0.046	0.75	LW
9BEPWW		5.070	0.089	1.00	4.648	-0.010	-0.16	EM
9FFJ3E		5.041	0.060	0.67	4.694	0.036	0.59	EM
9JBCYV		5.050	0.068	0.77	4.743	0.085	1.40	LW
9Y4AUY		4.775	-0.206	-2.32	4.529	-0.129	-2.12	TM
AFAT8G	*	4.790	-0.191	-2.16	4.470	-0.188	-3.10	TM
APYG64		5.025	0.044	0.50	4.738	0.080	1.33	TM
B4BCX7		5.029	0.047	0.53	4.670	0.012	0.20	LA
CLLQR6		4.974	-0.007	-0.08	4.645	-0.013	-0.21	EM
D7PT6Z	X	5.108	0.127	1.43	4.582	-0.076	-1.25	LW
DXVLMV		5.023	0.041	0.47	4.678	0.020	0.34	LW
EFXKAP		5.016	0.035	0.39	4.699	0.041	0.68	PP
EL2PZM		4.940	-0.041	-0.47	4.640	-0.018	-0.30	LW
EY9EXP		4.958	-0.023	-0.26	4.612	-0.046	-0.76	LA
FGY8ZY		5.020	0.038	0.43	4.676	0.018	0.30	TM
FMT337		4.891	-0.090	-1.02	4.554	-0.104	-1.71	EM
GUN8R2		4.930	-0.051	-0.58	4.600	-0.058	-0.95	TM
GV2VTR	X	4.850	-0.131	-1.48	4.420	-0.238	-3.92	TM
GWRZLY		4.946	-0.035	-0.40	4.703	0.045	0.74	LW
H3EA93		5.084	0.103	1.16	4.677	0.019	0.31	EM
HGD9Z7		4.949	-0.032	-0.36	4.649	-0.009	-0.15	LW
HXJHXK		4.835	-0.146	-1.65	4.558	-0.100	-1.65	TA
KHJFCX	X	4.900	-0.081	-0.92	4.470	-0.188	-3.10	XX
KMXV7V		4.957	-0.025	-0.28	4.624	-0.034	-0.55	LW
KR6NVK	X	4.748	-0.233	-2.63	4.412	-0.246	-4.05	EM
KZYPCX		4.873	-0.109	-1.22	4.605	-0.053	-0.87	XX
L9PP7G	*	5.166	0.185	2.08	4.708	0.050	0.82	TM



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 360  
Thickness (Caliper), Printing papers**

**Report #287G  
April 2017**

WebCode	Data Flag	Sample GV41			Sample GV42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
LLB4AF		4.995	0.014	0.15	4.714	0.056	0.92	TA
LYJPVU	*	4.852	-0.129	-1.46	4.679	0.021	0.35	PP
MWBUNW		4.998	0.017	0.19	4.698	0.040	0.66	EM
MXLWCF		5.006	0.025	0.28	4.636	-0.022	-0.36	LW
NC3972		4.773	-0.208	-2.35	4.531	-0.127	-2.09	TM
PCEBNU		5.013	0.032	0.36	4.688	0.030	0.49	EM
PH7H73		4.988	0.007	0.07	4.648	-0.010	-0.16	LA
Q4KKHD		4.980	-0.001	-0.01	4.575	-0.083	-1.37	LW
QXFNWR	X	4.695	-0.286	-3.23	4.308	-0.350	-5.76	TA
RMAXUG		5.031	0.050	0.56	4.673	0.015	0.25	MS
TU8CTM	X	5.179	0.198	2.23	4.413	-0.245	-4.04	TM
VFY7T9		4.981	0.000	0.00	4.682	0.024	0.40	LW
VZ237A		5.014	0.033	0.37	4.743	0.085	1.40	EM
WJANLA		4.864	-0.117	-1.32	4.612	-0.046	-0.76	LA
WXU3PA		4.996	0.015	0.16	4.630	-0.028	-0.46	EM
XA6VRA		5.058	0.076	0.86	4.717	0.059	0.97	TM
XG2M6A		4.968	-0.013	-0.15	4.638	-0.020	-0.33	TM
XPVXCJ		4.879	-0.102	-1.15	4.653	-0.005	-0.08	TM
YC4N4J		5.130	0.149	1.67	4.720	0.062	1.02	XX
YER3UE		5.013	0.032	0.36	4.666	0.008	0.13	EM

	Sample GV41	Summary Statistics	Sample GV42
Grand Means	4.9814 mils		4.6579 mils
SD Btwn Labs	0.0888 mils		0.0607 mils
Statistics based on 55 of 61 reporting participants			

**Comments on Assigned Data Flags for Test #360**

- KR6NVK (X) - Data for sample GV42 are low.
- D7PT6Z (X) - Inconsistent in testing between samples.
- TU8CTM (X) - Data for sample GV42 are low.
- GV2VTR (X) - Data for sample GV42 are low. Inconsistent within the determinations of sample GV42.
- KHJFCX (X) - Data for sample GV42 are low.
- QXFNWR (X) - Data for both samples are low.





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 360**  
**Thickness (Caliper), Printing papers**

**Report #287G**  
**April 2017**

**Key to Instrument Codes Reported by Participants**

EM	Emveco	FR	Frank Instruments
LA	L & W Autoline	LW	L & W
MS	Messmer	PP	Technidyne Profile/Plus
TA	Thwing-Albert	TM	TMI
XX	Instrument make/model not specified by lab		



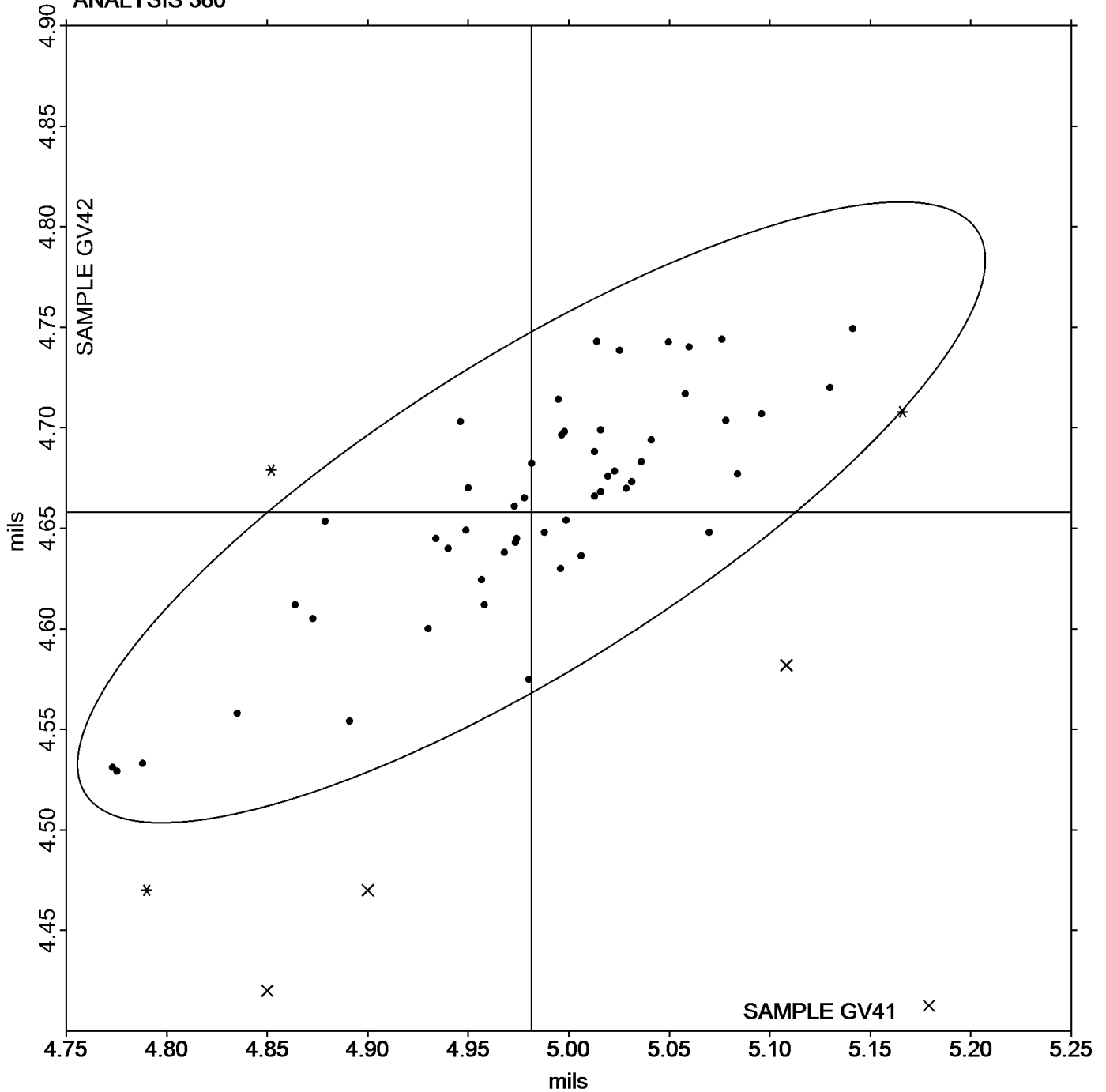
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 360**  
**Thickness (Caliper), Printing papers**

Report #287G  
April 2017

Grand Mean Sample **GV41** = 4.9814 mils

Grand Mean Sample **GV42** = 4.6579 mils

**ANALYSIS 360**





**Paper & Paperboard Interlaboratory Testing Program  
Analysis 361  
Thickness (Caliper), Packaging papers**

Report #287G  
April 2017

WebCode	Data Flag	Sample GY41			Sample GY42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
36XVMK		9.040	-0.286	-1.84	13.74	-0.31	-1.59	TM
3LHLLK		9.216	-0.110	-0.71	14.12	0.07	0.37	PP
4C768J		9.256	-0.071	-0.45	13.94	-0.11	-0.58	LW
4QB739		9.370	0.044	0.28	14.14	0.09	0.47	LA
6YLP2Y		9.557	0.230	1.48	14.40	0.35	1.78	XX
76H2BZ		9.473	0.147	0.94	14.16	0.12	0.59	EM
7GBP4E		9.227	-0.100	-0.64	13.81	-0.24	-1.22	LA
B4BCX7		9.472	0.146	0.94	14.13	0.08	0.39	LA
BXNP3Z		9.146	-0.181	-1.16	13.78	-0.27	-1.40	TM
GKJGPQ		9.445	0.119	0.76	14.27	0.22	1.11	TM
GPBLHU		9.180	-0.146	-0.94	14.04	-0.01	-0.05	TA
GV2VTR		9.040	-0.286	-1.84	13.61	-0.44	-2.26	TM
GWRZLY		9.532	0.205	1.32	14.18	0.13	0.66	LW
HGCJTN		9.141	-0.185	-1.19	13.76	-0.29	-1.49	EM
HRUZLU		9.400	0.074	0.47	14.01	-0.04	-0.20	TA
HVUBDN		9.470	0.144	0.92	14.29	0.24	1.26	LA
JJWPQP		9.417	0.091	0.58	14.24	0.19	0.98	LW
KRP6CM		9.593	0.267	1.71	14.39	0.34	1.73	EM
MMM44P		9.280	-0.046	-0.30	14.01	-0.04	-0.20	XX
NNBY2H		9.338	0.011	0.07	14.10	0.05	0.26	EM
PWKMFG		9.200	-0.126	-0.81	13.98	-0.07	-0.37	EM
Q9BWFU		9.298	-0.029	-0.18	14.03	-0.01	-0.08	LW
QD7TZE		9.363	0.037	0.24	14.07	0.02	0.10	EM
QXFNWR		9.081	-0.245	-1.58	13.81	-0.24	-1.25	TA
TTRQJL		9.528	0.202	1.30	14.41	0.36	1.85	TM
TWWJDK		9.310	-0.016	-0.11	13.90	-0.15	-0.80	TA
VRAH9N		9.100	-0.226	-1.45	14.00	-0.05	-0.26	LW
WEJ7AJ		9.533	0.207	1.33	14.14	0.09	0.47	TM
X8TBPQ		9.413	0.087	0.56	14.07	0.02	0.11	LA
XG2M6A		9.434	0.108	0.69	14.11	0.06	0.32	TM
YMM6U6		9.290	-0.036	-0.23	13.99	-0.06	-0.31	LA
ZR2XQP		9.310	-0.016	-0.11	14.12	0.07	0.34	XX
ZREQ3J		9.319	-0.007	-0.05	13.91	-0.14	-0.73	EM

	Sample GY41	Summary Statistics	Sample GY42
Grand Means	9.3264 mils		14.050 mils
SD Btwn Labs	0.1557 mils		0.194 mils
Statistics based on 33 of 33 reporting participants			



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 361**  
**Thickness (Caliper), Packaging papers**

**Report #287G**  
**April 2017**

**Analysis Notes:**

NNBY2H - One determination removed from the Lab Mean of Sample GY41 per Grubb's Test at 1% risk (TAPPI 1205).

VRAH9N - Data appear to be reported as mils, not micrometers as indicated on datasheet. Units corrected by CTS.

**Key to Instrument Codes Reported by Participants**

EM	Emveco	LA	L & W Autoline
LW	L & W	PP	Technidyne Profile/Plus
TA	Thwing-Albert	TM	TMI
XX	Instrument make/model not specified by lab		

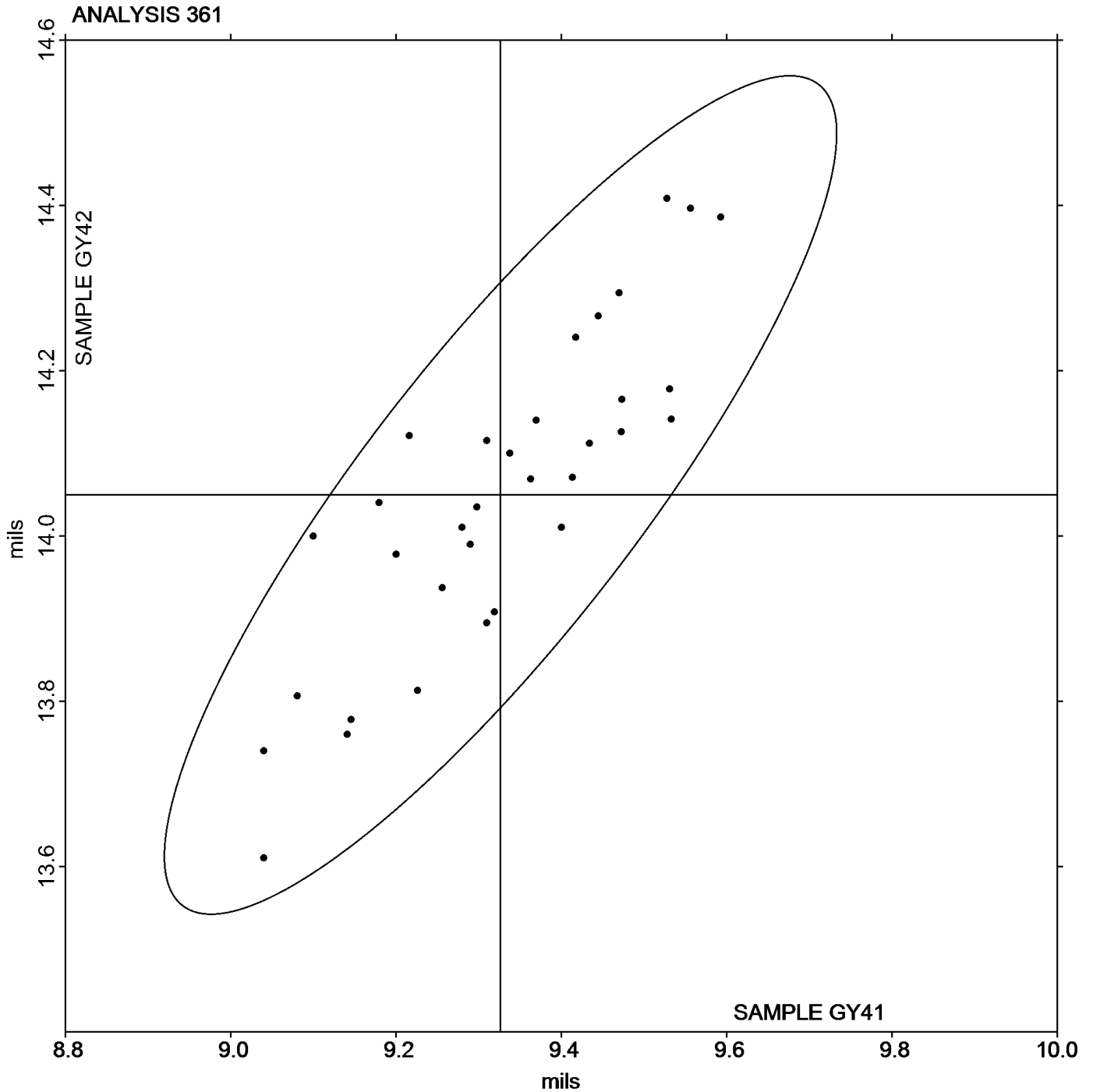


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 361**  
**Thickness (Caliper), Packaging papers**

Report #287G  
April 2017

Grand Mean Sample **GY41** = 9.3264 mils

Grand Mean Sample **GY42** = 14.050 mils





**Paper & Paperboard Interlaboratory Testing Program  
Analysis 364**

**Report #287G  
April 2017**

**Coefficient of Static Friction - Horizontal Plane Method - Printing Papers**

WebCode	Data Flag	Sample GD41			Sample GD42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2E4HX7		0.5974	0.0253	0.49	0.5070	-0.0321	-1.01	TM
4U9LF3		0.6038	0.0317	0.62	0.5368	-0.0023	-0.07	XX
7GBP4E		0.5284	-0.0437	-0.85	0.5112	-0.0279	-0.88	TA
7WMZW9		0.6242	0.0521	1.01	0.5580	0.0189	0.59	TA
FMBQN8		0.5066	-0.0655	-1.27	0.5824	0.0433	1.36	IT
GUN8R2	<b>X</b>	0.3720	-0.2001	-3.89	0.2792	-0.2599	-8.17	XX

		<b>Summary Statistics</b>	
	<b>Sample GD41</b>		<b>Sample GD42</b>
Grand Means	0.57208 COF		0.53908 COF
SD Btwn Labs	0.05138 COF		0.03180 COF
Statistics based on 5 of 6 reporting participants			

**Comments on Assigned Data Flags for Test #364**

GUN8R2 (X) - Extreme Data.

**Key to Instrument Codes Reported by Participants**

<b>IT</b>	IMASS SP-2100	<b>TA</b>	Thwing-Albert Friction Tester
<b>TM</b>	TMI 32-06 Monitor/Slip and Friction	<b>XX</b>	Instrument make/model not specified by lab



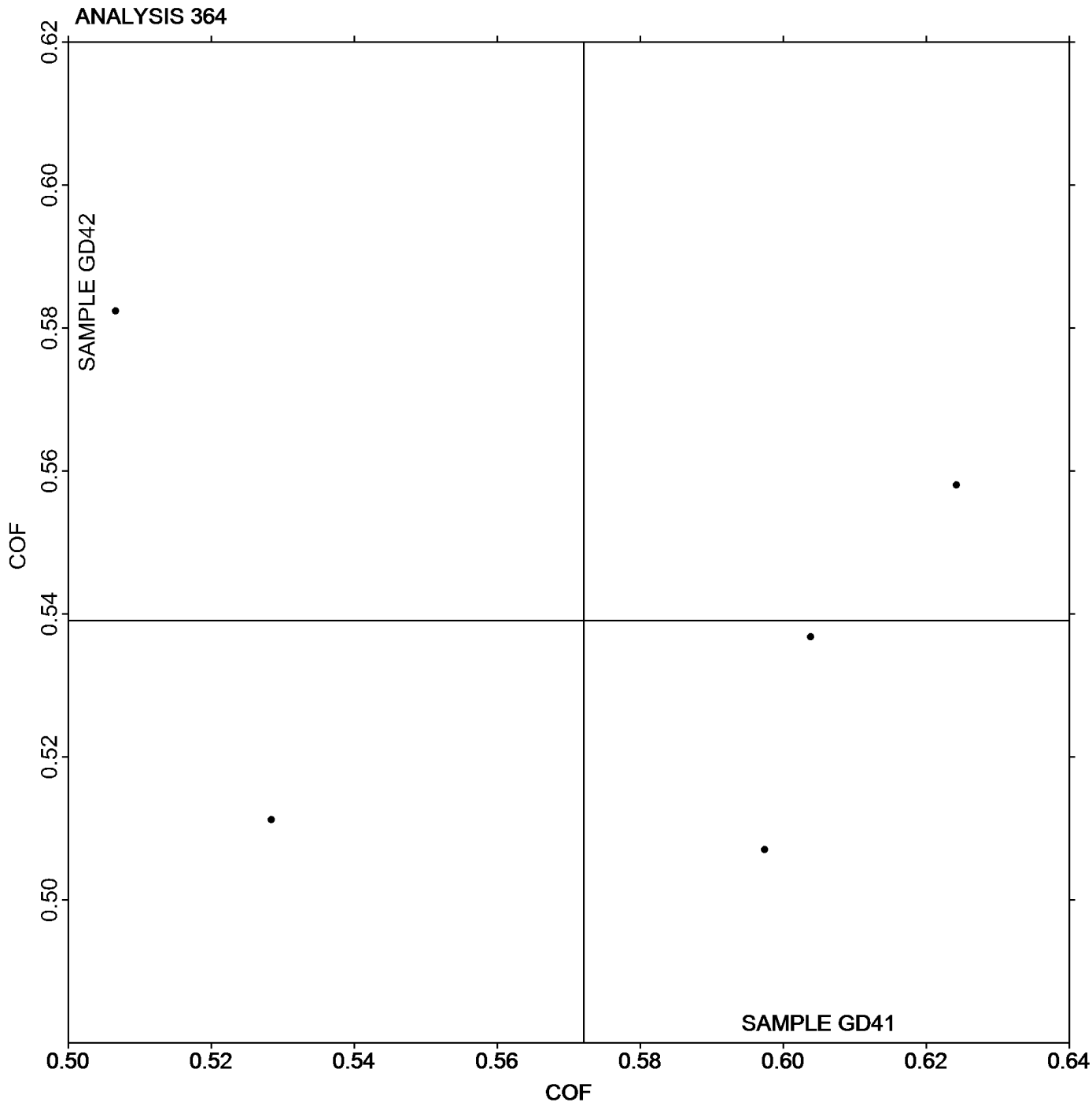
**Paper & Paperboard Interlaboratory Testing Program  
Analysis 364**

**Report #287G  
April 2017**

**Coefficient of Static Friction - Horizontal Plane Method - Printing Papers**

Grand Mean Sample **GD41** = 0.57208 COF

Grand Mean Sample **GD42** = 0.53908 COF



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 365**

Report #287G  
April 2017

**Coefficient of Kinetic Friction - Horizontal Plane Method - Printing Papers**

WebCode	Data Flag	Sample GD41			Sample GD42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2E4HX7		0.5974	0.1274	1.54	0.5006	0.0252	0.37	TM
39EFBL		0.3692	-0.1008	-1.22	0.3480	-0.1274	-1.89	TM
7GBP4E		0.4686	-0.0014	-0.02	0.5052	0.0298	0.44	TA
7WMZW9		0.4626	-0.0074	-0.09	0.4524	-0.0230	-0.34	TA
B4BCX7		0.4780	0.0080	0.10	0.5004	0.0250	0.37	TM
FMBQN8		0.3568	-0.1132	-1.37	0.4640	-0.0114	-0.17	IR
FMT337		0.5244	0.0544	0.66	0.5064	0.0310	0.46	TA
GUN8R2		0.4106	-0.0594	-0.72	0.4138	-0.0616	-0.91	XX
HXJHXK	X	0.2054	-0.2646	-3.21	0.1752	-0.3002	-4.45	TA
P4MPL3		0.5628	0.0928	1.12	0.5874	0.1120	1.66	TA

		Summary Statistics			
		Sample GD41		Sample GD42	
Grand Means		0.47004	COF	0.47536	COF
SD Btwn Labs		0.08248	COF	0.06740	COF
Statistics based on 9 of 10 reporting participants					

**Comments on Assigned Data Flags for Test #365**

HXJHXK (X) - Data for both samples are low. Inconsistent within the determinations of sample GD42.

**Key to Instrument Codes Reported by Participants**

IR	IMASS SP-2000	TA	Thwing-Albert Friction Tester
TM	TMI 32-06 Monitor/Slip and Friction	XX	Instrument make/model not specified by lab





# Paper & Paperboard Interlaboratory Testing Program Analysis 365

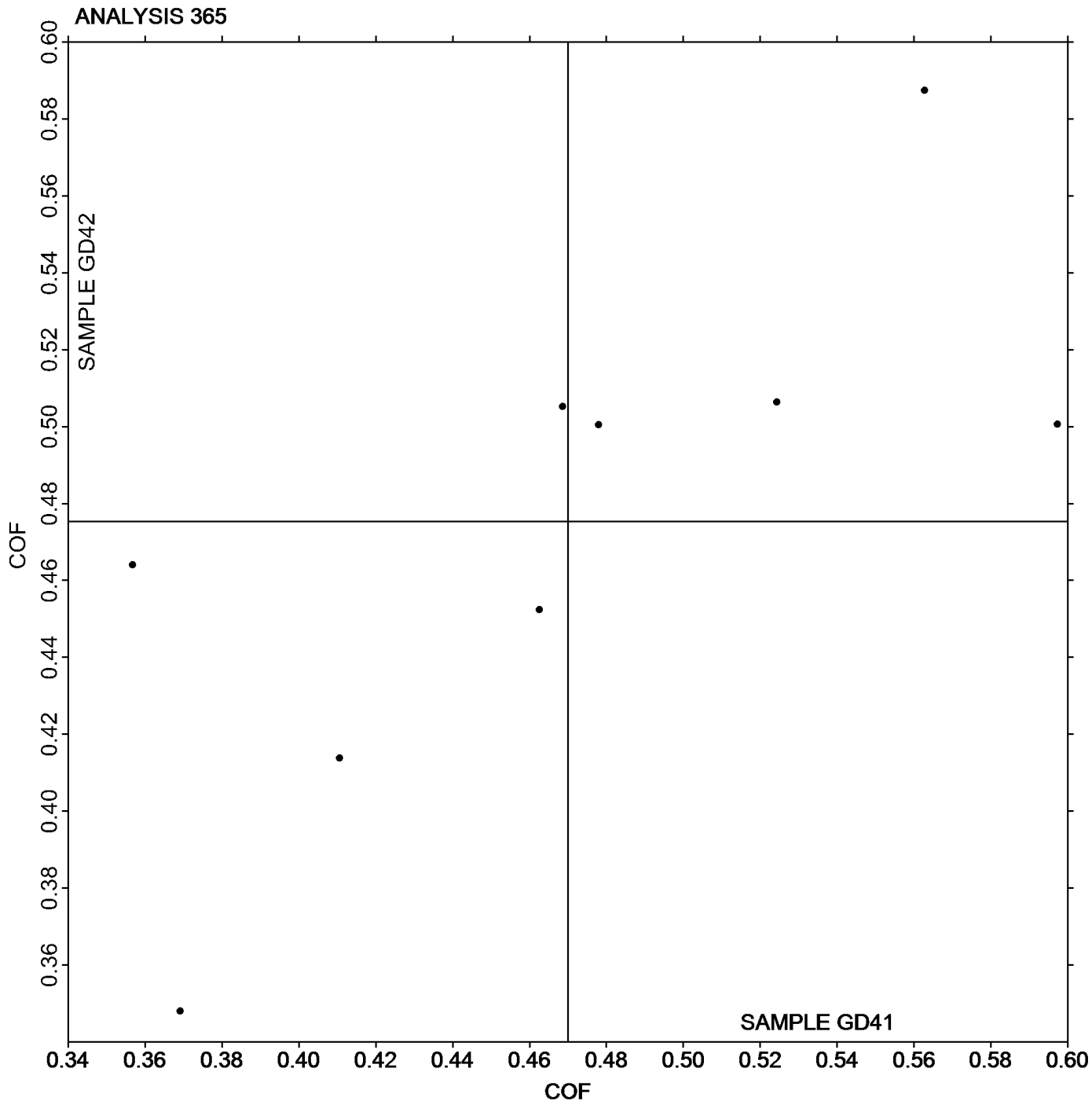
Report #287G

April 2017

## Coefficient of Kinetic Friction - Horizontal Plane Method - Printing Papers

Grand Mean Sample **GD41** = 0.47004 COF

Grand Mean Sample **GD42** = 0.47536 COF



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 370  
Air Resistance - Gurley Oil Type**

Report #287G  
April 2017

WebCode	Data Flag	Sample GE41			Sample GE42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
36XVMK		18.62	0.07	0.07	15.71	-0.02	-0.03	TL
382Q7N		18.16	-0.39	-0.37	15.37	-0.36	-0.48	LP
3K4HP8		17.35	-1.20	-1.13	15.51	-0.22	-0.30	LP
3LHLLK		17.74	-0.81	-0.76	15.47	-0.27	-0.35	PP
3N89WM		19.00	0.45	0.42	15.08	-0.65	-0.86	GA
4C768J		18.21	-0.34	-0.32	15.83	0.10	0.13	PP
6YLP2Y		18.35	-0.20	-0.19	15.69	-0.04	-0.06	LP
73GZB4		19.07	0.52	0.49	15.77	0.04	0.05	LP
7GBP4E		18.42	-0.13	-0.12	16.05	0.32	0.42	LA
7WMZW9		19.21	0.66	0.62	15.94	0.21	0.27	WG
8NTF6Z		18.51	-0.04	-0.04	14.79	-0.94	-1.24	HG
9FFJ3E		18.68	0.13	0.13	15.63	-0.11	-0.14	PP
9Y4AUY		17.71	-0.84	-0.79	15.48	-0.25	-0.33	LP
AU69BG		16.81	-1.74	-1.63	14.98	-0.75	-0.99	XX
CLLQR6		19.66	1.11	1.04	16.34	0.61	0.80	HG
DXVLMV		18.99	0.44	0.41	15.81	0.08	0.10	LP
EFXKAP		18.77	0.22	0.20	15.72	-0.02	-0.02	PP
EY9EXP		19.76	1.21	1.14	16.78	1.05	1.38	LA
GT93WA		18.43	-0.12	-0.11	15.47	-0.26	-0.35	LP
GUN8R2		18.90	0.35	0.33	15.80	0.07	0.09	GS
HGCJTN	*	15.90	-2.65	-2.49	13.80	-1.93	-2.55	PP
KHJFCX		20.47	1.92	1.80	17.05	1.32	1.73	WG
L2Q8TP		19.25	0.70	0.66	16.69	0.96	1.26	XX
LLB4AF		18.39	-0.16	-0.15	15.02	-0.72	-0.95	PP
LYJPVU		18.71	0.16	0.15	14.75	-0.98	-1.30	PP
MCKPZH	X	17.19	-1.36	-1.28	13.25	-2.48	-3.27	TN
MWBUNW		20.46	1.91	1.79	17.38	1.65	2.17	HG
P9EYUE		20.02	1.47	1.38	16.58	0.85	1.11	LP
PCEBNU		18.02	-0.53	-0.50	15.53	-0.20	-0.27	PP
Q4KKHD		17.40	-1.15	-1.08	15.00	-0.73	-0.97	LW
Q9BWFU		16.19	-2.36	-2.22	14.67	-1.06	-1.40	TL
TU8CTM	X	15.44	-3.11	-2.92	12.73	-3.00	-3.96	LW
VH27RK		16.56	-1.99	-1.87	14.38	-1.36	-1.79	RE
VZ237A		19.53	0.98	0.92	16.54	0.80	1.06	XX
WJANLA		18.10	-0.45	-0.42	16.06	0.33	0.43	LA
XG2M6A		18.50	-0.05	-0.05	15.85	0.12	0.15	PP
YC4N4J		18.63	0.08	0.08	16.13	0.40	0.52	XX
YER3UE		18.33	-0.22	-0.21	16.37	0.63	0.84	PP
YMM6U6		19.70	1.15	1.08	16.60	0.87	1.14	LA
ZREQ3J		20.00	1.45	1.36	16.68	0.95	1.25	PP
ZT8HEP		18.90	0.35	0.33	15.35	-0.39	-0.51	LA



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 370  
Air Resistance - Gurley Oil Type**

**Report #287G  
April 2017**

		<b>Summary Statistics</b>	
		<b>Sample GE41</b>	<b>Sample GE42</b>
Grand Means		18.549 sec/100 cc	15.734 sec/100 cc
SD Btwn Labs		1.065 sec/100 cc	0.759 sec/100 cc
Statistics based on 39 of 41 reporting participants			

**Comments on Assigned Data Flags for Test #370**

TU8CTM (X) - Data for both samples are low.

MCKPZH (X) - Data for sample GE42 are low.

**Analysis Notes:**

KHJFCX - One determination removed from the Lab Mean of Sample GE41 per Grubb's Test at 1% risk (TAPPI 1205).

**Key to Instrument Codes Reported by Participants**

<b>GA</b> Gurley Precision #4340 Automatic Densometer	<b>GS</b> Gurley-Hill S-P-S Tester #4190
<b>HG</b> Technidyne - Hagerty Model #1	<b>LA</b> L & W Autoline
<b>LP</b> L & W Densometer, Air Permeance	<b>LW</b> L & W Type Gurley Densometer, Oil Flotation
<b>PP</b> Technidyne Profile/Plus	<b>RE</b> Regmed Gurley Densometer PGH-T
<b>TL</b> Gurley Densometer #41110, Oil Flotation	<b>TN</b> Gurley S-P-S Tester #4190
<b>WG</b> W & LE Gurley Tester	<b>XX</b> Instrument make/model not specified by lab



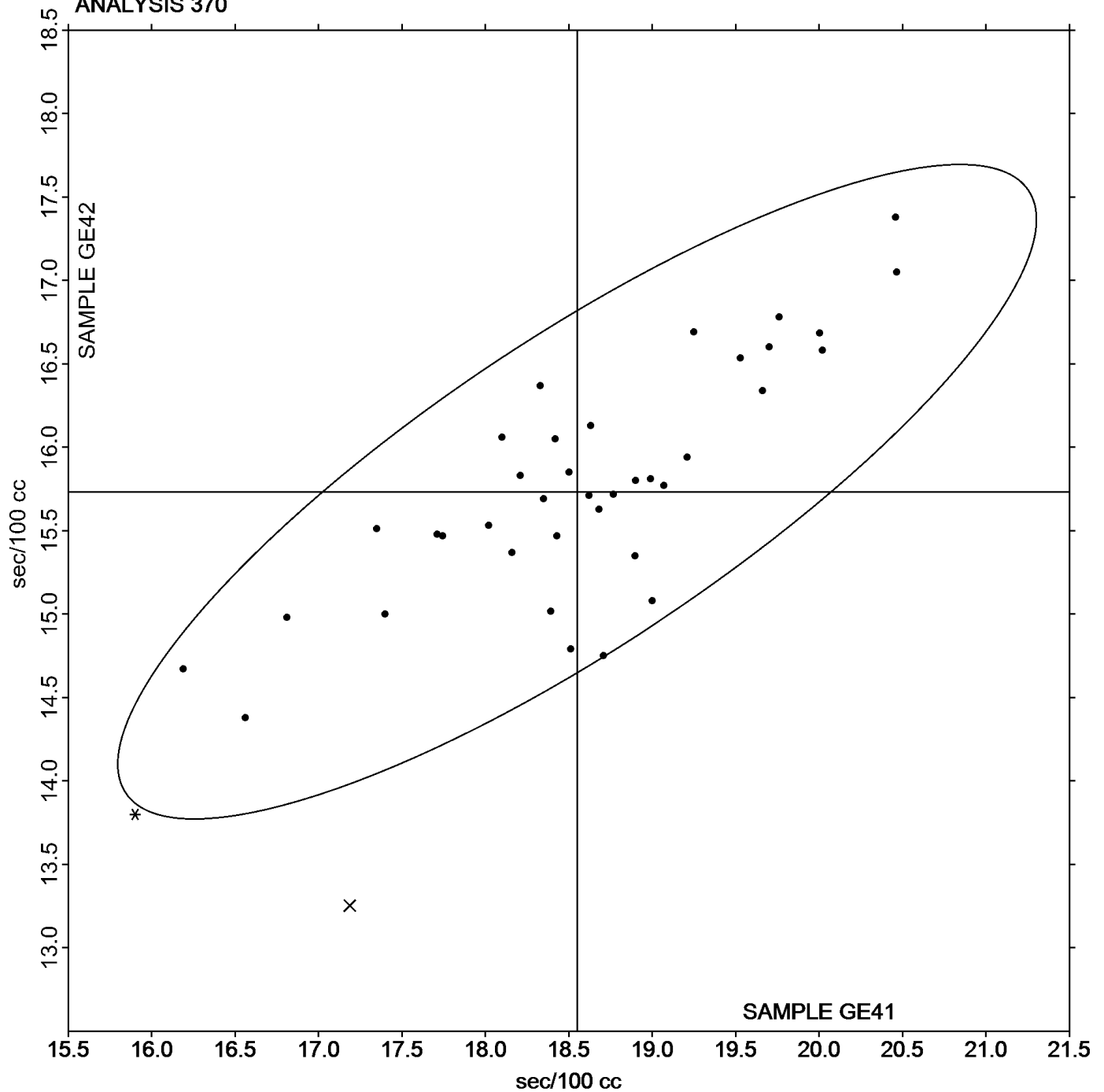
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 370**  
**Air Resistance - Gurley Oil Type**

**Report #287G**  
**April 2017**

Grand Mean Sample **GE41** = 18.549 sec/100 cc

Grand Mean Sample **GE42** = 15.734 sec/100 cc

**ANALYSIS 370**





**Paper & Paperboard Interlaboratory Testing Program  
Analysis 372**

Report #287G

April 2017

**Porosity - Sheffield Type - Sheffield Units for 3/4 inch Diameter Orifice**

WebCode	Data Flag	Sample GE41			Sample GE42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2WLJN2		148.9	6.0	0.96	168.9	4.9	0.90	XX
46P9MH		131.8	-11.1	-1.79	160.1	-3.9	-0.73	TT
B977V8	X	178.2	35.3	5.68	204.2	40.2	7.43	VM
CYDDXZ		139.2	-3.7	-0.60	161.7	-2.3	-0.43	LP
DZLPF3		145.4	2.5	0.40	162.1	-1.9	-0.36	HM
GUN8R2		141.2	-1.7	-0.28	154.8	-9.2	-1.71	SH
H3DACA	X	19.0	-123.9	-19.95	17.3	-146.7	-27.16	TT
HGCJTN		155.7	12.8	2.06	175.1	11.1	2.05	SH
KQED37		138.2	-4.7	-0.76	163.7	-0.4	-0.07	GA
LLB4AF		146.1	3.2	0.51	162.3	-1.7	-0.32	HM
XG2M6A		143.6	0.7	0.11	169.2	5.2	0.96	PP
XPVXCJ		141.5	-1.4	-0.23	164.8	0.8	0.14	TT
YC4N4J		140.6	-2.3	-0.37	161.7	-2.3	-0.43	XX

Sample GE41		Summary Statistics		Sample GE42	
Grand Means	142.93 Sheffield Units			164.03 Sheffield Units	
SD Btwn Labs	6.21 Sheffield Units			5.40 Sheffield Units	
Statistics based on 11 of 13 reporting participants					

**Comments on Assigned Data Flags for Test #372**

H3DACA (X) - Extreme Data.

B977V8 (X) - Extreme Data.

**Key to Instrument Codes Reported by Participants**

<b>GA</b> Gurley Precision #4340 Automatic Densometer	<b>HM</b> Technidyne - Hagerty Model #538
<b>LP</b> L & W Densometer, Air Permeance	<b>PP</b> Technidyne Profile/Plus
<b>SH</b> Sheffield	<b>TT</b> TMI Monitor/Smoothness II, Model 58-24
<b>VM</b> Valmet PaperLab (was Kajaani/Robotest)	<b>XX</b> Instrument make/model not specified by lab



# Paper & Paperboard Interlaboratory Testing Program Analysis 372

Report #287G

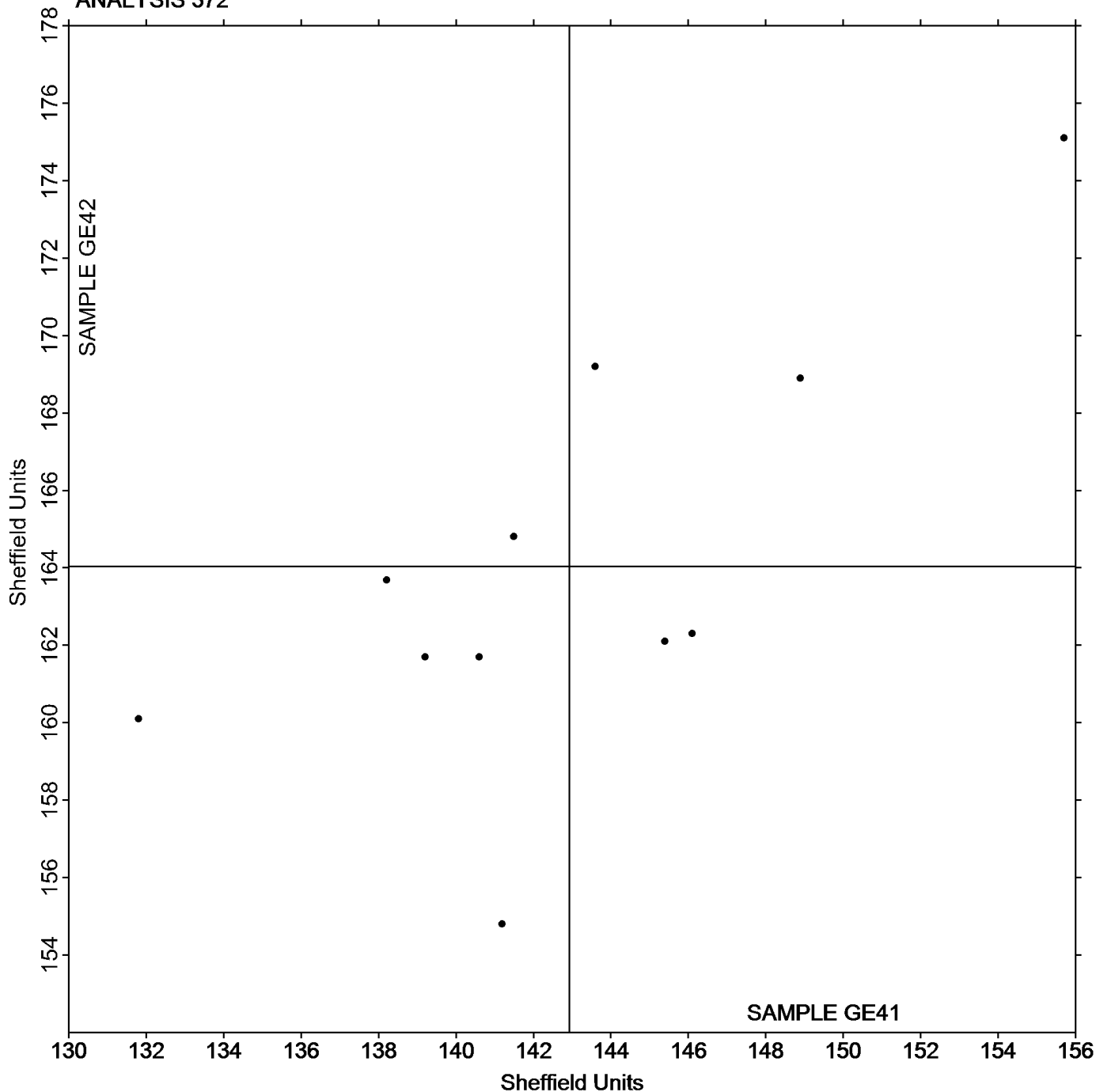
April 2017

## Porosity - Sheffield Type - Sheffield Units for 3/4 inch Diameter Orifice

Grand Mean Sample **GE41** = 142.93 Sheffield Units

Grand Mean Sample **GE42** = 164.03 Sheffield Units

### ANALYSIS 372



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 376  
Roughness - Print Surf Method - 0.5 to 4.0 Microns**

Report #287G  
April 2017

WebCode	Data Flag	Sample GJ41			Sample GJ42		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3LHLLK		0.7880	0.0040	0.05	0.8270	-0.0154	-0.26
46P9MH	*	0.9430	0.1590	2.11	0.9170	0.0746	1.25
4QB739		0.6700	-0.1141	-1.52	0.7210	-0.1214	-2.04
4Y4FD4		0.8970	0.1130	1.50	0.9190	0.0766	1.29
76H2BZ		0.8215	0.0375	0.50	0.8820	0.0396	0.66
7WMZW9		0.6650	-0.1191	-1.58	0.7560	-0.0864	-1.45
9BEPWW		0.7340	-0.0501	-0.67	0.7790	-0.0634	-1.07
9JBCYV		0.7360	-0.0481	-0.64	0.7820	-0.0604	-1.02
9Y4AUY		0.7930	0.0090	0.12	0.8840	0.0416	0.70
AFAT8G		0.7390	-0.0451	-0.60	0.8220	-0.0204	-0.34
AG77WU		0.7470	-0.0371	-0.49	0.8110	-0.0314	-0.53
CJYUHU		0.9440	0.1600	2.13	0.9530	0.1106	1.86
CLLQR6		0.7430	-0.0411	-0.55	0.8120	-0.0304	-0.51
DZLPF3		0.6690	-0.1151	-1.53	0.7410	-0.1014	-1.70
FBFKQ3	X	1.0460	0.2620	3.48	1.0660	0.2236	3.76
FJ8ZF7		0.8060	0.0220	0.29	0.8580	0.0156	0.26
GWRZLY		0.8090	0.0250	0.33	0.8630	0.0206	0.35
HGCJTN		0.7890	0.0050	0.07	0.8720	0.0296	0.50
HVUBDN		0.6750	-0.1091	-1.45	0.7930	-0.0494	-0.83
HXJHXX	X	0.9150	0.1310	1.74	1.0730	0.2306	3.87
KMXV7V		0.8570	0.0730	0.97	0.8880	0.0456	0.77
KRP6CM		0.7460	-0.0381	-0.51	0.8540	0.0116	0.19
MMM44P		0.8160	0.0320	0.42	0.8860	0.0436	0.73
NNBY2H		0.7880	0.0040	0.05	0.8530	0.0106	0.18
P4MPL3		0.7690	-0.0151	-0.20	0.8100	-0.0324	-0.54
PCEBNU		0.8940	0.1100	1.46	0.9320	0.0896	1.51
PWKMFG		0.7950	0.0110	0.15	0.8410	-0.0014	-0.02
QD7TZE		0.7410	-0.0431	-0.57	0.8150	-0.0274	-0.46
VZ237A		0.7880	0.0040	0.05	0.8660	0.0236	0.40
W4GNYG		0.6940	-0.0901	-1.20	0.7490	-0.0934	-1.57
WXU3PA		0.8130	0.0290	0.38	0.9090	0.0666	1.12
X8TBPQ		0.8520	0.0680	0.90	0.8780	0.0356	0.60

Sample GJ41		Summary Statistics	Sample GJ42	
Grand Means	0.78405 Microns		0.84243 Microns	
SD Btwn Labs	0.07523 Microns		0.05951 Microns	
Statistics based on 30 of 32 reporting participants				



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 376**  
**Roughness - Print Surf Method - 0.5 to 4.0 Microns**

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**Report #287G**  
**April 2017**

**Comments on Assigned Data Flags for Test #376**

HXJHXK (X) - Data for sample GJ42 are high. Inconsistent within the determinations of sample GJ42.

FBFKQ3 (X) - Data for both samples are high.





Paper & Paperboard Interlaboratory Testing Program

Analysis 376

Report #287G

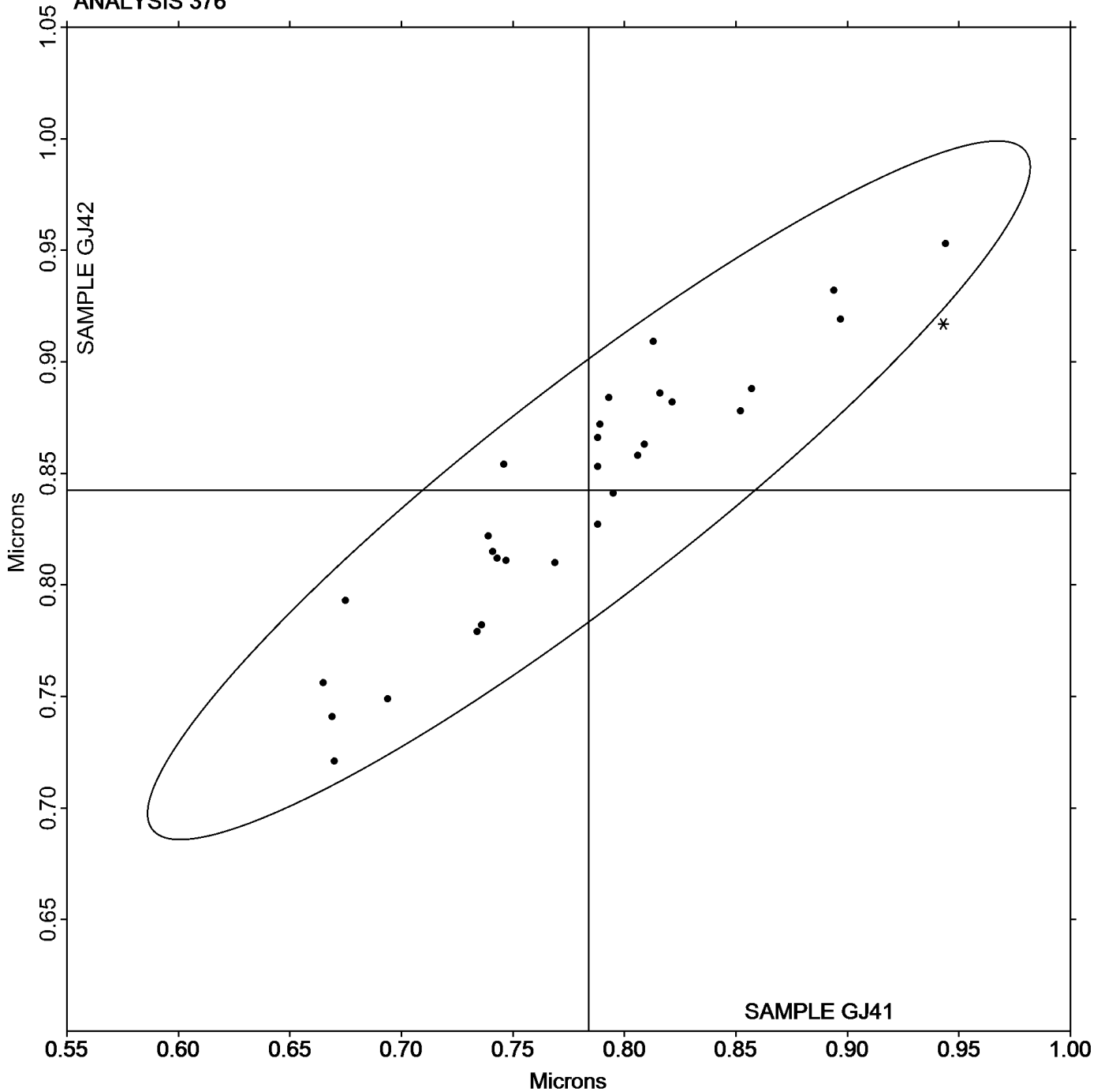
April 2017

Roughness - Print Surf Method - 0.5 to 4.0 Microns

Grand Mean Sample **GJ41** = 0.78405 Microns

Grand Mean Sample **GJ42** = 0.84243 Microns

ANALYSIS 376





**Paper & Paperboard Interlaboratory Testing Program  
Analysis 377  
Roughness - Print Surf Method - 2.5 to 6.0 Microns**

**Report #287G  
April 2017**

WebCode	Data Flag	Sample GK41			Sample GK42		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
4C768J		3.745	-0.210	-1.35	4.226	0.081	0.57
4U9LF3		4.142	0.187	1.20	4.266	0.121	0.85
6YLP2Y		4.000	0.045	0.29	4.016	-0.129	-0.90
7WMZW9		3.937	-0.018	-0.11	4.102	-0.043	-0.30
9FFJ3E		4.132	0.177	1.14	4.352	0.207	1.45
B977V8		4.115	0.160	1.03	4.269	0.124	0.87
CLLQR6		3.835	-0.120	-0.77	3.930	-0.215	-1.50
WJANLA		3.753	-0.202	-1.29	4.009	-0.136	-0.95
ZREQ3J		3.932	-0.023	-0.14	4.131	-0.014	-0.10

		<b>Summary Statistics</b>	
	<b>Sample GK41</b>		<b>Sample GK42</b>
Grand Means	3.9546 Microns		4.1446 Microns
SD Btwn Labs	0.1558 Microns		0.1427 Microns
Statistics based on 9 of 9 reporting participants			

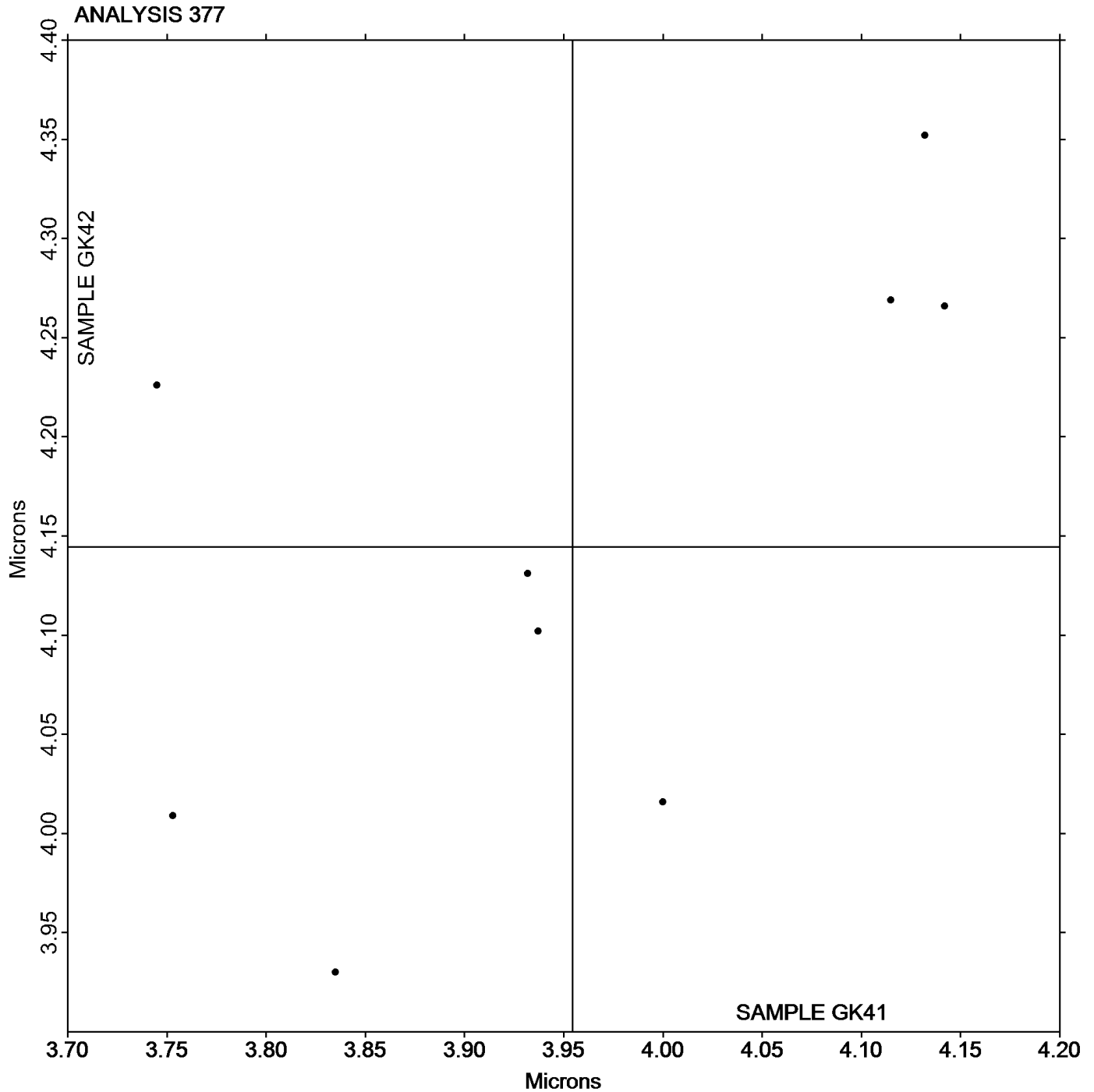


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 377**  
**Roughness - Print Surf Method - 2.5 to 6.0 Microns**

Report #287G  
April 2017

Grand Mean Sample **GK41** = 3.9546 Microns

Grand Mean Sample **GK42** = 4.1446 Microns



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 378  
Roughness - Sheffield Type**

Report #287G  
April 2017

WebCode	Data Flag	Sample GL41			Sample GL42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2E4HX7		252.6	6.3	0.48	92.54	-5.39	-0.61	PP
2WLJN2	X	146.3	-100.0	-7.58	174.40	76.47	8.73	XX
3LHLLK		255.1	8.7	0.66	94.47	-3.46	-0.39	PP
46P9MH		232.3	-14.0	-1.06	89.80	-8.13	-0.93	TT
4C768J		255.9	9.6	0.73	89.35	-8.58	-0.98	PP
4QB739		232.4	-13.9	-1.06	98.90	0.97	0.11	LA
4U9LF3		257.9	11.6	0.88	96.20	-1.73	-0.20	HM
6YLP2Y		246.2	-0.1	-0.01	94.20	-3.73	-0.43	LW
6YZBAE		234.7	-11.6	-0.88	95.90	-2.03	-0.23	LA
76H2BZ		254.8	8.5	0.64	93.45	-4.48	-0.51	HM
7WMZW9		267.0	20.7	1.57	106.50	8.57	0.98	XX
8NTF6Z		268.0	21.7	1.64	103.20	5.27	0.60	TS
9FFJ3E		256.5	10.2	0.77	97.85	-0.08	-0.01	PP
9Y4AUY		219.8	-26.5	-2.01	105.60	7.67	0.88	TS
CYDDXZ		249.2	2.9	0.22	96.70	-1.23	-0.14	PP
EFXKAP		263.5	17.2	1.30	91.16	-6.77	-0.77	PP
EY9EXP		224.6	-21.7	-1.64	85.37	-12.56	-1.43	LA
FBFKQ3	X	185.7	-60.6	-4.60	98.10	0.17	0.02	TS
GUN8R2	*	257.5	11.2	0.85	124.80	26.87	3.07	XX
GV2VTR		262.0	15.7	1.19	108.00	10.07	1.15	GL
H3EA93	X	290.8	44.5	3.37	132.50	34.57	3.94	XX
HGCJTN		247.8	1.5	0.11	95.00	-2.93	-0.33	PP
HGD9Z7		246.9	0.5	0.04	89.05	-8.88	-1.01	SH
HRUZLU		234.3	-12.0	-0.91	91.84	-6.09	-0.69	PP
HVUBDN		248.2	1.9	0.14	96.20	-1.73	-0.20	LA
HXJHXK		245.1	-1.2	-0.09	92.80	-5.13	-0.59	PP
J3Q7D8		222.6	-23.7	-1.80	96.20	-1.73	-0.20	TT
KHJFCX		256.9	10.6	0.80	108.90	10.97	1.25	PG
KQED37		257.8	11.5	0.87	102.46	4.53	0.52	GA
KRP6CM		250.9	4.6	0.35	98.10	0.17	0.02	LW
KUA8YM	X	285.1	38.7	2.94	82.22	-15.71	-1.79	MP
LLB4AF		241.3	-5.0	-0.38	96.72	-1.21	-0.14	PP
LYJPVU		238.1	-8.3	-0.63	93.97	-3.96	-0.45	PP
MMM44P		271.8	25.5	1.93	110.40	12.47	1.42	TT
MWBUNW		247.0	0.7	0.05	90.80	-7.13	-0.81	HM
NNBY2H		257.7	11.4	0.86	91.60	-6.32	-0.72	PP
P4KZPJ		262.4	16.1	1.22	92.40	-5.53	-0.63	GA
P4MPL3		239.9	-6.4	-0.49	99.50	1.57	0.18	HM
P9EYUE		229.8	-16.5	-1.25	84.50	-13.43	-1.53	LW
PCEBNU		241.1	-5.2	-0.40	93.70	-4.23	-0.48	HM
PWKMFG		239.3	-7.0	-0.53	86.98	-10.95	-1.25	PP



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 378  
Roughness - Sheffield Type**

**Report #287G  
April 2017**

WebCode	Data Flag	Sample GL41			Sample GL42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
Q4KKHD		242.0	-4.3	-0.33	100.90	2.97	0.34	TS
QD7TZE		255.0	8.7	0.66	105.85	7.92	0.90	PP
TF7HHE		232.5	-13.8	-1.05	90.04	-7.89	-0.90	XX
TTRQJL		261.7	15.4	1.17	111.81	13.88	1.58	GA
TU8CTM	*	211.3	-35.0	-2.66	98.10	0.17	0.02	SH
TWWJDK		248.3	1.9	0.15	85.82	-12.11	-1.38	PP
U9GHGR		225.7	-20.6	-1.56	94.10	-3.83	-0.44	TS
VZ237A		242.2	-4.2	-0.32	92.44	-5.49	-0.63	HM
WJANLA		246.6	0.3	0.02	117.30	19.37	2.21	LA
X8TBPQ		243.3	-3.0	-0.23	97.70	-0.23	-0.03	LW
XG2M6A		248.7	2.4	0.18	90.10	-7.83	-0.89	PP
XPVXCJ		259.0	12.7	0.96	112.20	14.27	1.63	TT
XYM9ME	*	233.8	-12.5	-0.95	119.10	21.17	2.42	TS
YC4N4J		237.2	-9.1	-0.69	105.40	7.47	0.85	XX
YER3UE		241.5	-4.8	-0.37	99.00	1.07	0.12	SH
ZREQ3J		257.4	11.1	0.84	95.25	-2.68	-0.31	PP

Sample GL41		Summary Statistics	Sample GL42	
Grand Means	246.32 Sheffield		97.929 Sheffield	
SD Btwn Labs	13.19 Sheffield		8.764 Sheffield	
Statistics based on 53 of 57 reporting participants				

**Comments on Assigned Data Flags for Test #378**

- KUA8YM (X) - Data for sample GL41 are high.
- FBFKQ3 (X) - Data for sample GL41 are low.
- H3EA93 (X) - Data for both samples are high.
- 2WLJN2 (X) - Extreme Data.

**Key to Instrument Codes Reported by Participants**

<b>GA</b> Gurley Precision #4340 Automatic Densometer	<b>GL</b> Giddings and Lewis Sheffield
<b>HM</b> Technidyne - Hagerty Model #538	<b>LA</b> L & W Roughness Sheffield - Autoline
<b>LW</b> L & W Roughness Tester	<b>MP</b> Metso Paperlab
<b>PG</b> Precision Gage Smoothcheck	<b>PP</b> Technidyne Profile/Plus
<b>SH</b> Sheffield (Bendix Precisionaire)	<b>TS</b> TMI Monitor/Smoothness, Model 58-02
<b>TT</b> TMI Monitor/Smoothness II, Model 58-24	<b>XX</b> Instrument make/model not specified by lab



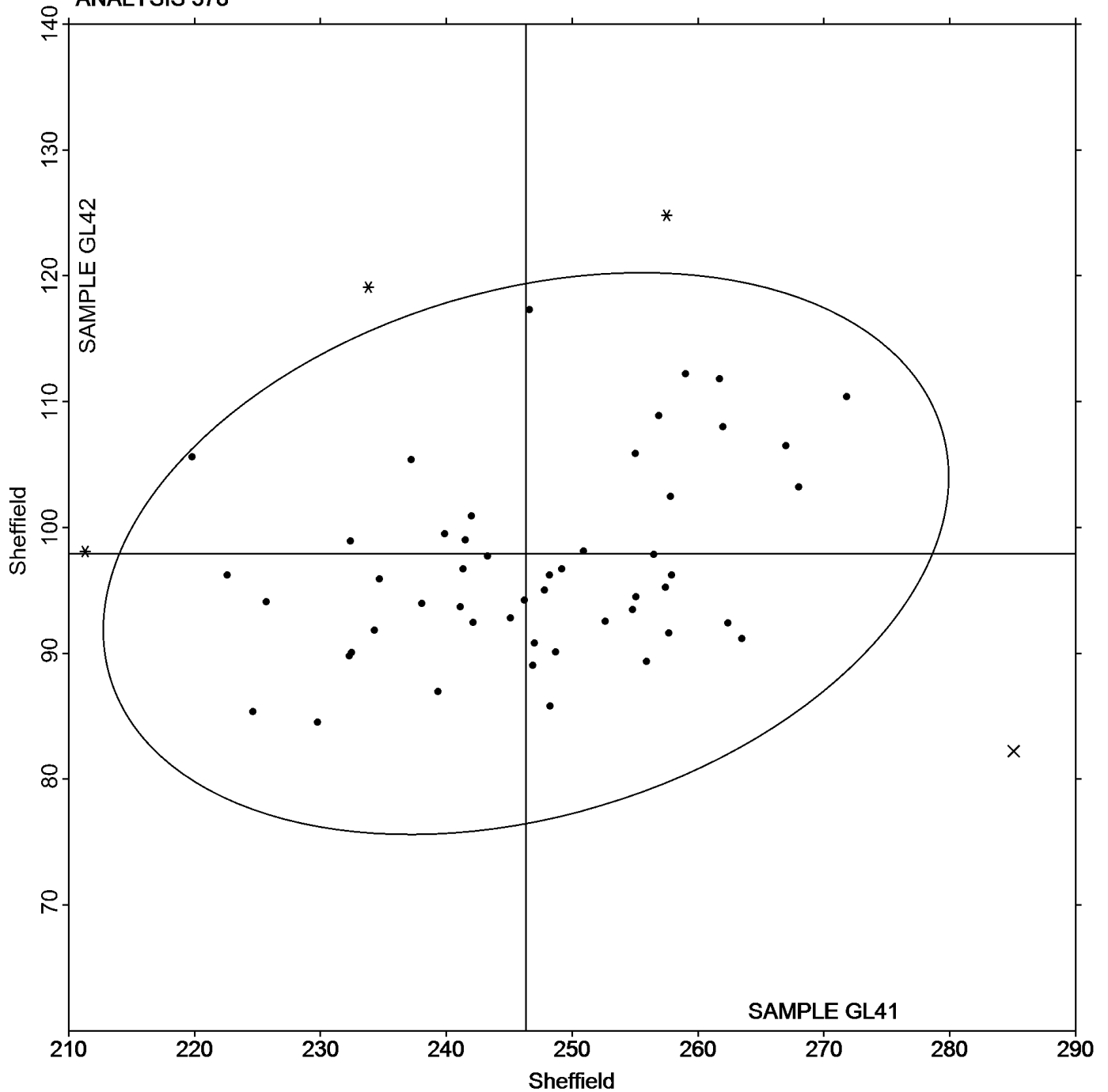
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 378**  
**Roughness - Sheffield Type**

Report #287G  
April 2017

Grand Mean Sample **GL41** = 246.32 Sheffield

Grand Mean Sample **GL42** = 97.929 Sheffield

**ANALYSIS 378**





**Paper & Paperboard Interlaboratory Testing Program  
Analysis 382  
Moisture in Paper**

**Report #287G  
April 2017**

WebCode	Data Flag	Sample GM41			Sample GM42		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
4U9LF3		4.570	0.194	0.93	4.250	0.052	0.27
4Y77JL		4.290	-0.086	-0.41	4.110	-0.088	-0.45
9FFJ3E		4.645	0.269	1.29	4.480	0.282	1.45
DXVLMV		3.925	-0.451	-2.16	3.800	-0.398	-2.06
GKJGPQ		4.392	0.016	0.08	4.216	0.018	0.09
KMXV7V		4.380	0.003	0.02	4.194	-0.004	-0.02
LFPV2J		4.275	-0.101	-0.49	4.298	0.100	0.52
RMAXUG		4.410	0.034	0.16	4.075	-0.123	-0.64
YMQMWA		4.500	0.124	0.59	4.360	0.162	0.84

		<b>Summary Statistics</b>	
	<b>Sample GM41</b>		<b>Sample GM42</b>
Grand Means	4.3763 Percent		4.1981 Percent
SD Btwn Labs	0.2085 Percent		0.1936 Percent
Statistics based on 9 of 9 reporting participants			



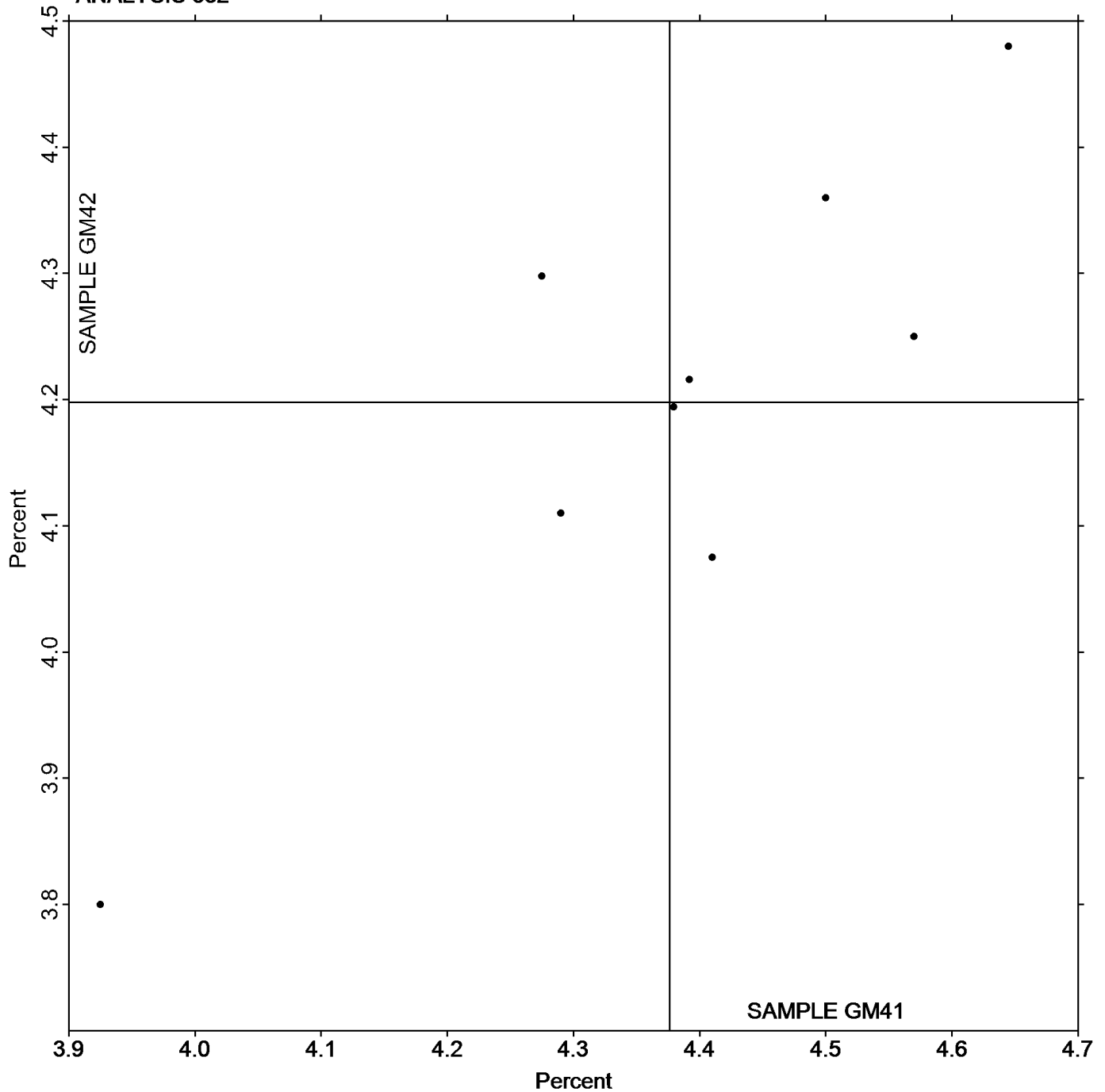
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 382**  
**Moisture in Paper**

**Report #287G**  
**April 2017**

Grand Mean Sample **GM41** = 4.3763 Percent

Grand Mean Sample **GM42** = 4.1981 Percent

**ANALYSIS 382**



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.





**Paper & Paperboard Interlaboratory Testing Program  
Analysis 384  
Opacity (89% Reflectance Backing) - Fine Papers**

Report #287G  
April 2017

WebCode	Data Flag	Sample GN41			Sample GN42		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2E4HX7		93.24	-0.25	-0.57	93.24	-0.07	-0.14
36XVMK		93.84	0.35	0.79	93.39	0.08	0.15
46P9MH		94.17	0.68	1.53	94.20	0.89	1.68
4C768J		93.53	0.04	0.10	93.25	-0.07	-0.12
4U9LF3		93.89	0.40	0.90	93.27	-0.04	-0.08
4Y4FD4		93.75	0.26	0.59	93.27	-0.04	-0.08
76H2BZ		92.68	-0.81	-1.82	92.53	-0.78	-1.48
8NTF6Z		93.80	0.31	0.70	93.93	0.62	1.17
9BEPWW		93.45	-0.04	-0.09	93.49	0.18	0.34
9FFJ3E		93.76	0.27	0.62	93.41	0.09	0.18
AG77WU		93.88	0.39	0.88	93.41	0.10	0.19
APYG64		93.44	-0.05	-0.11	92.75	-0.56	-1.06
CJYUHU	*	92.27	-1.22	-2.75	91.73	-1.58	-2.99
CLLQR6		93.38	-0.11	-0.24	93.28	-0.03	-0.06
EFXKAP		93.43	-0.06	-0.13	93.16	-0.15	-0.29
EY9EXP		93.40	-0.09	-0.20	93.23	-0.08	-0.15
GUN8R2	X	94.50	1.01	2.28	97.90	4.59	8.68
GV2VTR	X	95.82	2.33	5.24	95.21	1.90	3.59
H3EA93		93.36	-0.13	-0.29	93.77	0.46	0.87
HGD9Z7		94.26	0.77	1.74	94.15	0.84	1.58
HXJHXK		93.68	0.19	0.43	94.37	1.05	1.99
KHJFCX		93.42	-0.07	-0.15	93.04	-0.28	-0.52
LLB4AF	*	94.42	0.93	2.09	93.43	0.11	0.22
MWBUNW		93.08	-0.41	-0.92	92.96	-0.35	-0.67
P4MPL3		93.31	-0.18	-0.40	93.24	-0.07	-0.14
PCEBNU		93.28	-0.21	-0.47	93.60	0.29	0.54
PH7H73		93.45	-0.04	-0.09	93.39	0.07	0.14
Q4KKHD		93.10	-0.39	-0.87	93.27	-0.04	-0.08
WJANLA		93.54	0.05	0.12	93.41	0.10	0.19
XA6VRA		93.46	-0.03	-0.06	93.44	0.13	0.24
XG2M6A		93.64	0.15	0.34	93.09	-0.22	-0.42
XPVXCJ		93.73	0.24	0.54	93.54	0.23	0.43
YC4N4J		92.63	-0.86	-1.93	92.13	-1.18	-2.23
YER3UE		93.36	-0.13	-0.29	93.64	0.33	0.62

		Summary Statistics			
		Sample GN41		Sample GN42	
Grand Means	93.488	Percent		93.312	Percent
SD Btwn Labs	0.445	Percent		0.529	Percent
Statistics based on 32 of 34 reporting participants					



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 384**  
**Opacity (89% Reflectance Backing) - Fine Papers**

**Report #287G**  
**April 2017**

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**Comments on Assigned Data Flags for Test #384**

GUN8R2 (X) - Extreme Data for Sample GN42.

GV2VTR (X) - Data for both samples are high. Inconsistent within the determinations of both samples.



# Paper & Paperboard Interlaboratory Testing Program

Report #287G

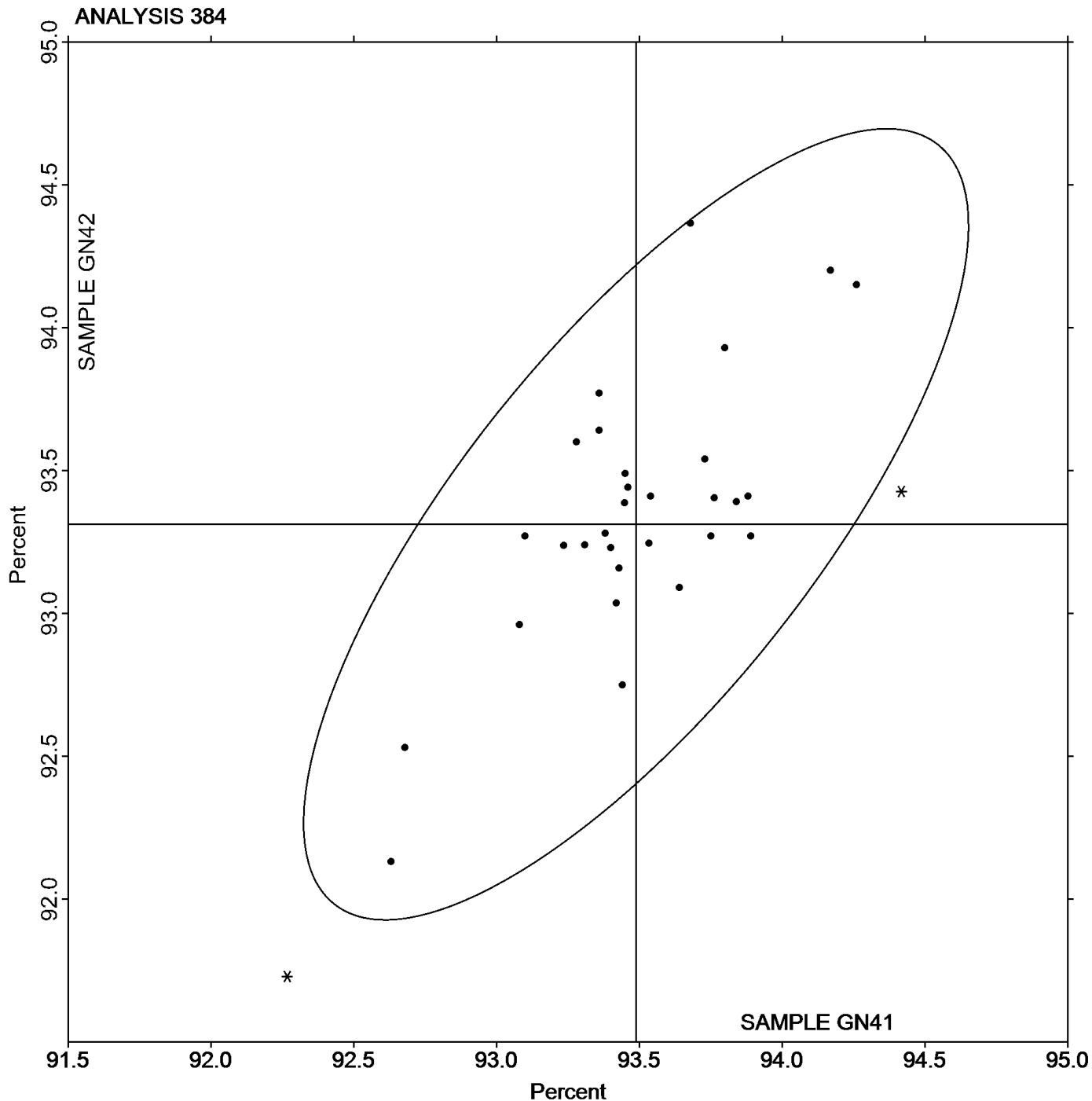
## Analysis 384

April 2017

### Opacity (89% Reflectance Backing) - Fine Papers

Grand Mean Sample **GN41** = 93.488 Percent

Grand Mean Sample **GN42** = 93.312 Percent





**Paper & Paperboard Interlaboratory Testing Program  
Analysis 386  
Opacity (Paper Backing) - Fine Papers and Newsprint**

**Report #287G  
April 2017**

WebCode	Data Flag	Sample GP41			Sample GP42		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
382Q7N		94.49	0.09	0.61	93.43	0.04	0.55
3K4HP8		94.21	-0.18	-1.22	93.28	-0.11	-1.55
76H2BZ	X	93.28	-1.12	-7.51	93.33	-0.06	-0.86
AFAT8G	X	94.01	-0.38	-2.58	93.84	0.45	6.72
B4BCX7		94.37	-0.03	-0.20	93.51	0.12	1.74
D7PT6Z		94.32	-0.07	-0.48	93.32	-0.07	-1.02
DXVLMV		94.68	0.28	1.90	93.40	0.01	0.18
EAP28P		94.16	-0.24	-1.58	93.32	-0.07	-0.98
EL2PZM		94.45	0.05	0.37	93.37	-0.01	-0.21
GWRZLY		94.35	-0.04	-0.29	93.33	-0.06	-0.92
LLB4AF		94.42	0.02	0.15	93.45	0.06	0.87
MXLWCF		94.62	0.22	1.50	93.46	0.07	1.08
VFY7T9		94.34	-0.06	-0.39	93.43	0.04	0.57
VH27RK		94.34	-0.05	-0.35	93.37	-0.02	-0.31

		<b>Summary Statistics</b>	
	<b>Sample GP41</b>		<b>Sample GP42</b>
Grand Means	94.395 Percent		93.388 Percent
SD Btwn Labs	0.149 Percent		0.068 Percent
Statistics based on 12 of 14 reporting participants			

**Comments on Assigned Data Flags for Test #386**

- AFAT8G (X) - Extreme Data.
- 76H2BZ (X) - Extreme Data for Sample GP41.

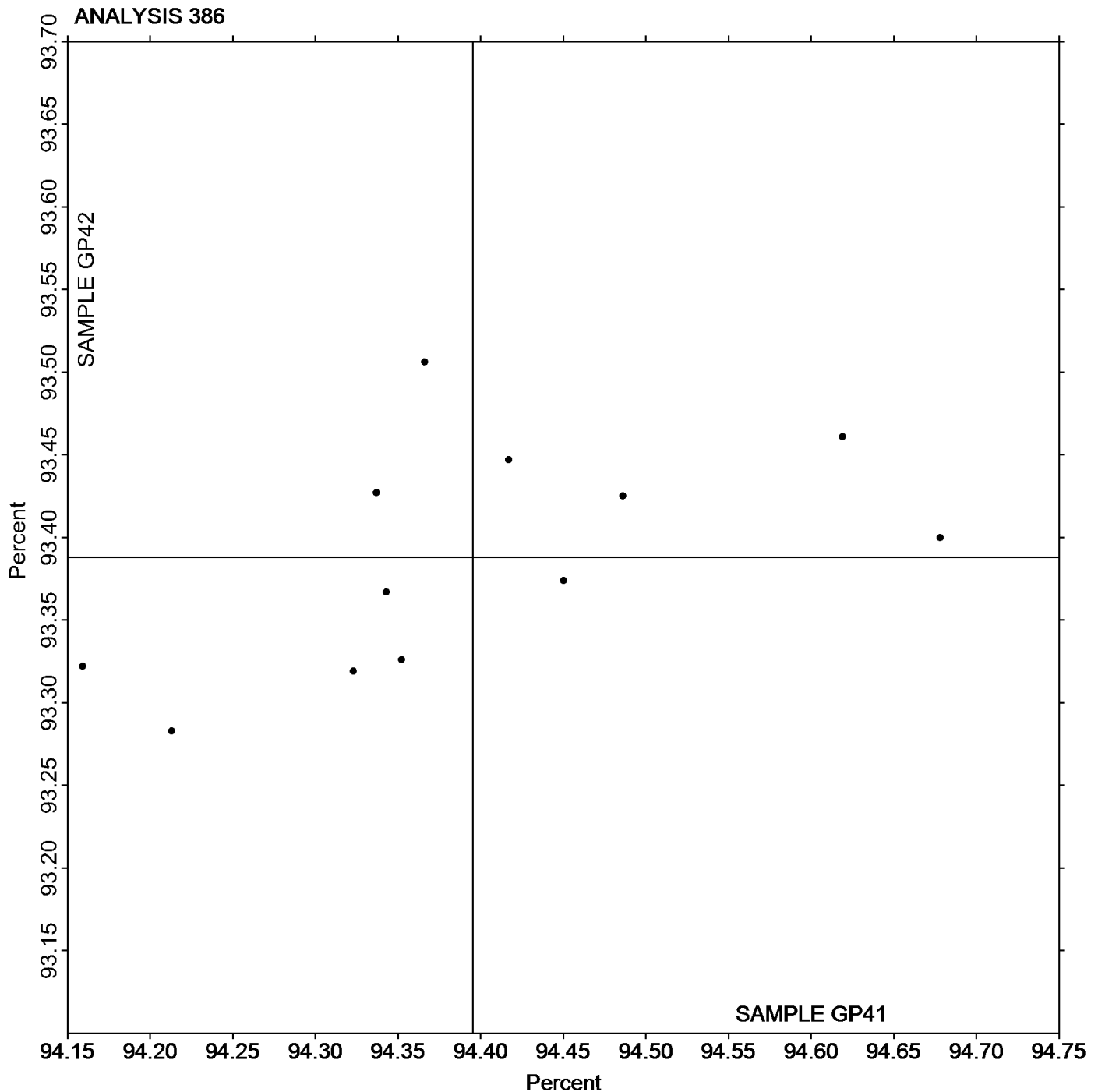


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 386**  
**Opacity (Paper Backing) - Fine Papers and Newsprint**

Report #287G  
April 2017

Grand Mean Sample **GP41** = 94.395 Percent

Grand Mean Sample **GP42** = 93.388 Percent



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 390  
Directional Brightness**

Report #287G  
April 2017

WebCode	Data Flag	Sample GR41			Sample GR42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
36XVMK		82.93	0.73	0.81	79.71	0.43	0.36	TS
4Y4FD4		82.67	0.47	0.53	79.83	0.55	0.45	MK
76H2BZ		81.49	-0.70	-0.78	78.38	-0.90	-0.75	TS
8NTF6Z		81.39	-0.80	-0.89	78.51	-0.77	-0.63	TS
CJYUHU		82.18	-0.01	-0.01	79.53	0.25	0.21	VM
CLLQR6		81.96	-0.23	-0.25	78.70	-0.58	-0.48	TT
EFXKAP	*	81.31	-0.88	-0.97	79.69	0.41	0.34	TS
GUN8R2	X	87.83	5.64	6.24	84.33	5.05	4.17	PE
H3EA93		81.75	-0.44	-0.49	78.20	-1.08	-0.89	XX
HGD9Z7		80.99	-1.20	-1.33	77.84	-1.44	-1.19	TA
HRUZLU		81.51	-0.68	-0.75	78.27	-1.01	-0.83	TS
HXJHXX		81.58	-0.61	-0.68	77.86	-1.41	-1.17	TS
KHJFCX		82.92	0.73	0.81	80.35	1.08	0.89	TS
KRP6CM		81.69	-0.50	-0.56	78.68	-0.60	-0.50	TT
MMM44P		83.00	0.81	0.90	79.99	0.71	0.59	TT
NC3972		82.52	0.33	0.37	78.80	-0.48	-0.39	HG
NNBY2H		82.71	0.52	0.57	81.10	1.82	1.50	HD
P4MPL3		81.63	-0.57	-0.63	78.50	-0.78	-0.64	TT
PCEBNU		81.13	-1.07	-1.18	77.96	-1.32	-1.09	TT
PWKMF6		82.75	0.56	0.62	79.53	0.25	0.20	TT
QD7TZE		83.53	1.34	1.48	81.98	2.70	2.23	HD
RMAXUG		81.60	-0.59	-0.65	78.77	-0.51	-0.42	XX
TWWJDK		81.88	-0.31	-0.34	78.69	-0.59	-0.49	TS
WJANLA		81.43	-0.76	-0.84	78.32	-0.96	-0.79	TS
XG2M6A		83.55	1.36	1.51	81.49	2.21	1.83	XS
XPVXCJ		83.15	0.96	1.06	79.96	0.68	0.57	TS
YC4N4J	*	84.64	2.45	2.71	81.73	2.45	2.02	XX
ZREQ3J		81.26	-0.93	-1.03	78.15	-1.13	-0.93	TS

Sample GR41		Summary Statistics	Sample GR42	
Grand Means	82.190 Percent		79.278 Percent	
SD Btwn Labs	0.903 Percent		1.211 Percent	
Statistics based on 27 of 28 reporting participants				

**Comments on Assigned Data Flags for Test #390**

GUN8R2 (X) - Extreme Data.



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 390**  
**Directional Brightness**

**Report #287G**  
**April 2017**

**Key to Instrument Codes Reported by Participants**

<b>HD</b>	Hunter D25DP - 9000	<b>HG</b>	Hunter Labscan / XE
<b>MK</b>	Macbeth Color-Eye 7000 Spectrophotometer	<b>PE</b>	Photovolt 577
<b>TA</b>	Technidyne, Diano, M.S. S-4	<b>TS</b>	Technidyne Brightimeter Micro S-5
<b>TT</b>	Technidyne Brightimeter Micro S4-M	<b>VM</b>	Valmet PaperLab (was Kajaani/Robotest)
<b>XS</b>	X-Rite 938 Spectrodensitometer	<b>XX</b>	Instrument make/model not specified by lab



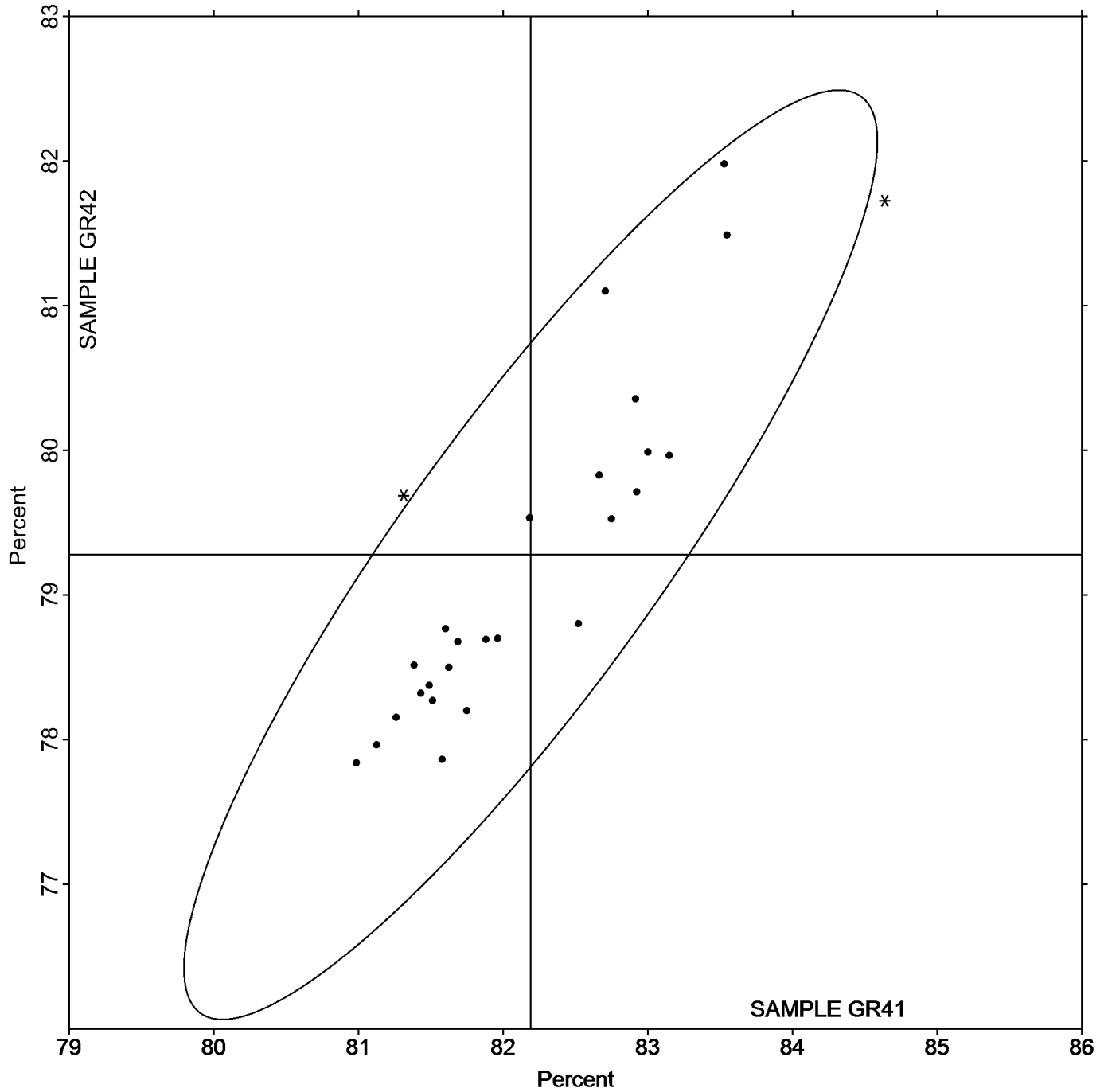
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 390**  
**Directional Brightness**

Report #287G  
April 2017

Grand Mean Sample **GR41** = 82.190 Percent

Grand Mean Sample **GR42** = 79.278 Percent

**ANALYSIS 390**







**Paper & Paperboard Interlaboratory Testing Program  
Analysis 391  
Directional Brightness of Fluorescent Samples**

Report #287G  
April 2017

WebCode	Data Flag	Sample GZ41			Sample GZ42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2E4HX7		92.21	1.36	1.88	97.87	0.54	0.91	TS
46P9MH		91.10	0.25	0.34	97.84	0.51	0.86	TT
4C768J		90.62	-0.23	-0.32	97.19	-0.14	-0.23	TS
8NTF6Z		90.80	-0.05	-0.07	97.36	0.03	0.05	TS
9BEPWW		92.28	1.43	1.97	98.36	1.03	1.73	TT
9FFJ3E		90.34	-0.51	-0.70	96.72	-0.61	-1.03	TS
AG77WU		90.70	-0.15	-0.21	97.77	0.44	0.73	PP
EY9EXP		90.82	-0.03	-0.04	97.36	0.03	0.05	TT
LQBZ9H		90.88	0.03	0.04	97.52	0.19	0.32	TS
MWBUNW		89.58	-1.27	-1.75	96.30	-1.03	-1.74	HT
PH7H73		90.27	-0.58	-0.80	96.39	-0.94	-1.57	TS
Q4KKHD		90.86	0.01	0.01	97.12	-0.21	-0.35	TS
XA6VRA		90.60	-0.25	-0.35	97.48	0.15	0.25	TS

Sample GZ41		Summary Statistics		Sample GZ42	
Grand Means	90.851 Percent			97.329 Percent	
SD Btwn Labs	0.725 Percent			0.595 Percent	
Statistics based on 13 of 13 reporting participants					

**Analysis Notes:**

2E4HX7 - One determination removed from the Lab Mean of Sample GZ42 per Grubb's Test at 1% risk (TAPPI 1205).

**Key to Instrument Codes Reported by Participants**

HT	Hunter UltraScan Vis	PP	Technidyne Profile/Plus
TS	Technidyne Brightimeter Micro S-5	TT	Technidyne Brightimeter Micro S4-M

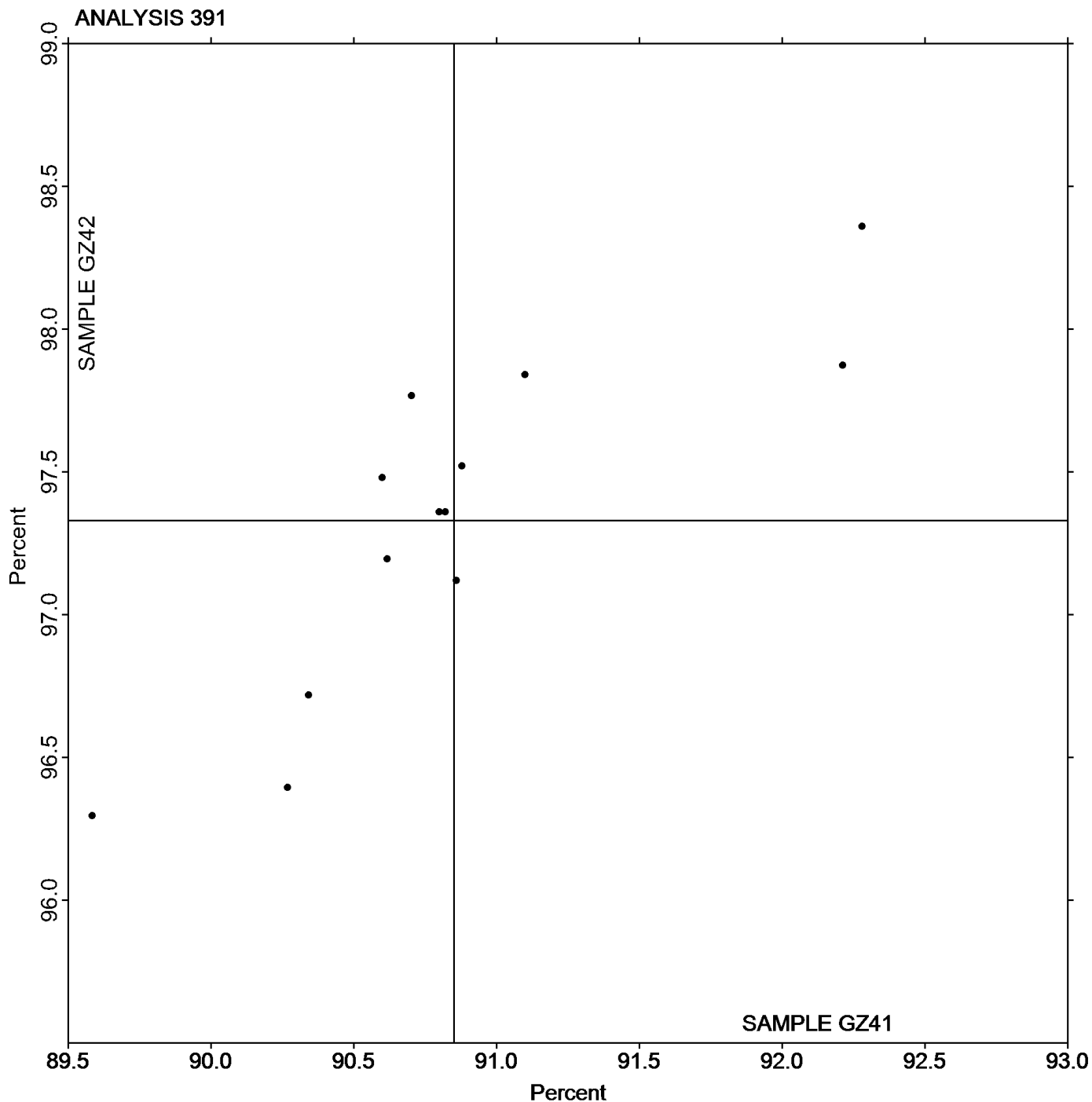


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 391**  
**Directional Brightness of Fluorescent Samples**

Report #287G  
April 2017

Grand Mean Sample **GZ41** = 90.851 Percent

Grand Mean Sample **GZ42** = 97.329 Percent



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 392  
Diffuse Brightness**

**Report #287G  
April 2017**

WebCode	Data Flag	Sample GR41			Sample GR42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3LHLLK		81.78	-0.12	-0.40	78.80	-0.07	-0.21	TC
4QL8ML		81.75	-0.15	-0.50	78.66	-0.21	-0.59	TC
76H2BZ	X	83.31	1.41	4.58	80.77	1.90	5.35	TC
9JBCYV		82.02	0.12	0.38	79.09	0.21	0.60	TC
B4BCX7		82.01	0.11	0.35	78.91	0.03	0.09	LA
B8CHEW		81.91	0.00	0.01	78.85	-0.02	-0.06	TC
D7PT6Z		81.64	-0.26	-0.86	78.62	-0.25	-0.71	TM
DXVLMV		81.54	-0.37	-1.19	78.56	-0.31	-0.87	LS
EAP28P		82.31	0.41	1.32	79.33	0.46	1.29	TC
EL2PZM		81.68	-0.23	-0.74	78.59	-0.28	-0.80	TC
FMT337		81.74	-0.16	-0.54	78.67	-0.21	-0.59	TC
GT93WA		82.07	0.17	0.54	78.83	-0.05	-0.14	TC
GWRZLY		82.01	0.11	0.34	78.94	0.07	0.18	LS
KR6NVK		81.64	-0.27	-0.87	78.53	-0.34	-0.96	TC
KRP6CM		82.22	0.31	1.02	79.50	0.62	1.75	EG
L9PP7G		82.06	0.16	0.51	78.93	0.06	0.16	TC
LLB4AF		82.28	0.38	1.23	79.39	0.52	1.46	TC
LQBZ9H		81.84	-0.06	-0.21	78.85	-0.02	-0.07	TC
MMM44P		81.59	-0.32	-1.03	78.61	-0.26	-0.74	EG
P4MPL3	*	82.87	0.96	3.13	79.90	1.02	2.88	LT
P9EYUE		82.00	0.10	0.31	79.14	0.26	0.74	EF
PWKMGF		81.45	-0.45	-1.48	78.26	-0.61	-1.72	TL
RMAXUG		81.92	0.02	0.06	78.70	-0.18	-0.50	EE
VH27RK		81.48	-0.43	-1.39	78.59	-0.29	-0.81	EG
WJANLA		81.73	-0.17	-0.55	78.57	-0.30	-0.86	TC
WXU3PA		82.01	0.10	0.34	78.96	0.09	0.25	TC
ZREQ3J		81.97	0.07	0.22	78.95	0.07	0.20	TC

	Sample GR41	Summary Statistics	Sample GR42
Grand Means	81.903 Percent		78.874 Percent
SD Btwn Labs	0.307 Percent		0.355 Percent
Statistics based on 26 of 27 reporting participants			

**Comments on Assigned Data Flags for Test #392**

76H2BZ (X) - Data for both samples are high. Possible Systematic Error.



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 392**  
**Diffuse Brightness**

**Report #287G**  
**April 2017**

**Key to Instrument Codes Reported by Participants**

EE	Datacolor Elrepho 2000	EF	Datacolor Elrepho 3000
EG	Datacolor Elrepho 450X	LA	L & W Elrepho - Autoline
LS	L & W Elrepho SE 070	LT	L & W Elrepho SE 071
TC	Technidyne Color Touch Series	TL	Technidyne Technibrite TB-1
TM	Technidyne Technibrite Micro TB-1C		

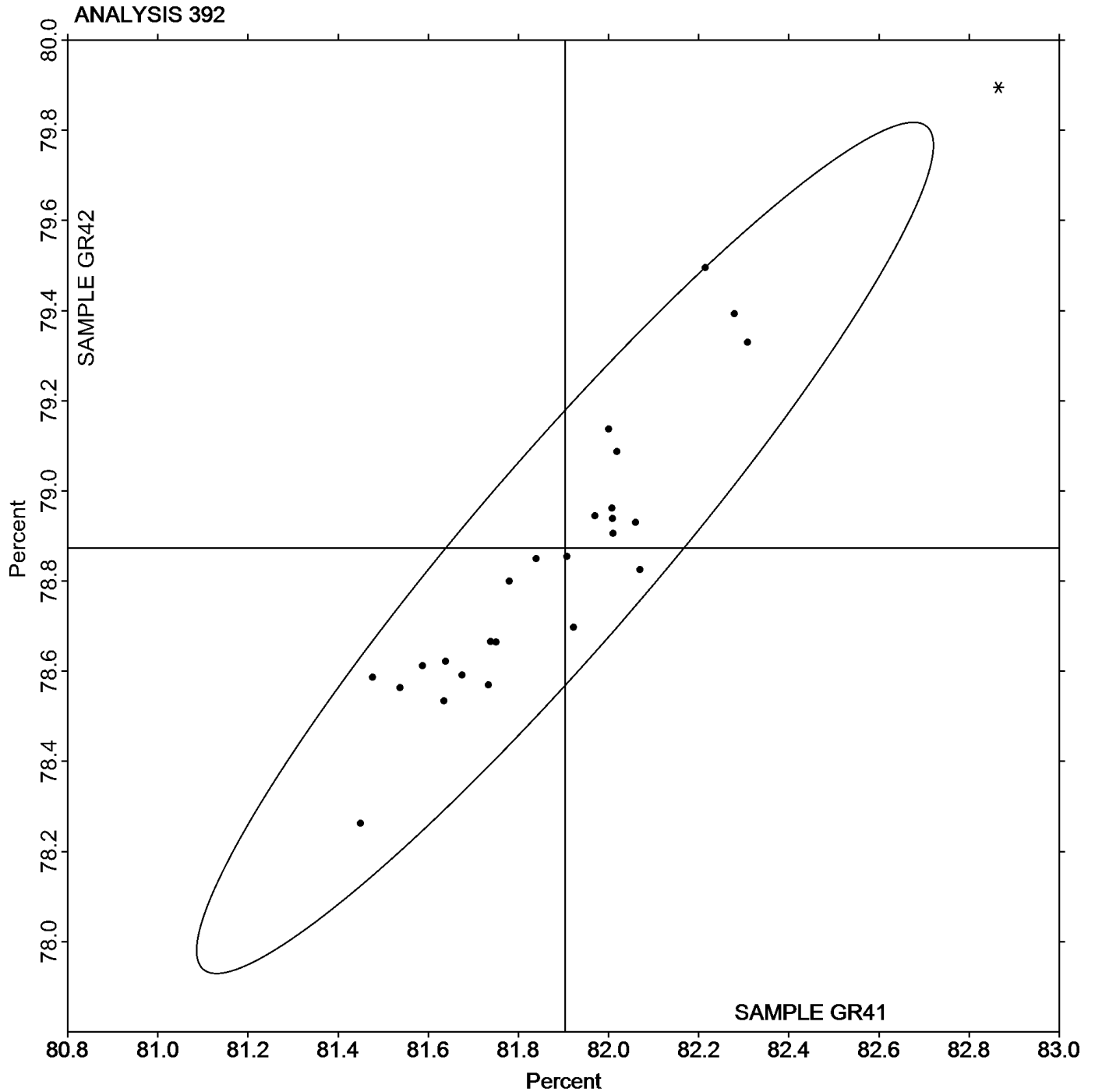


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 392**  
**Diffuse Brightness**

**Report #287G**  
**April 2017**

Grand Mean Sample **GR41** = 81.903 Percent

Grand Mean Sample **GR42** = 78.874 Percent





**Paper & Paperboard Interlaboratory Testing Program  
Analysis 394  
Fluorescent Component of Directional Brightness**

**Report #287G  
April 2017**

WebCode	Data Flag	Sample GZ41			Sample GZ42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2E4HX7		3.554	0.009	0.06	8.062	-0.092	-0.53	TS
4C768J		3.570	0.025	0.17	8.270	0.116	0.66	TS
8NTF6Z		3.292	-0.253	-1.74	7.834	-0.320	-1.84	TS
9FFJ3E		3.764	0.219	1.51	8.150	-0.004	-0.03	TS
AG77WU		3.392	-0.153	-1.05	8.112	-0.042	-0.24	PP
EY9EXP		3.540	-0.005	-0.03	8.260	0.106	0.60	TT
LQBZ9H		3.708	0.163	1.12	8.416	0.262	1.50	TS
PH7H73		3.484	-0.061	-0.42	8.006	-0.148	-0.85	TS
XA6VRA		3.600	0.055	0.38	8.280	0.126	0.72	TS

		<b>Summary Statistics</b>	
		<b>Sample GZ41</b>	<b>Sample GZ42</b>
Grand Means		3.5449 Percent	8.1544 Percent
SD Btwn Labs		0.1455 Percent	0.1746 Percent
Statistics based on 9 of 9 reporting participants			

**Key to Instrument Codes Reported by Participants**

- |    |                                    |    |                                   |
|----|------------------------------------|----|-----------------------------------|
| PP | Technidyne Profile/Plus            | TS | Technidyne Brightimeter Micro S-5 |
| TT | Technidyne Brightimeter Micro S4-M |    |                                   |

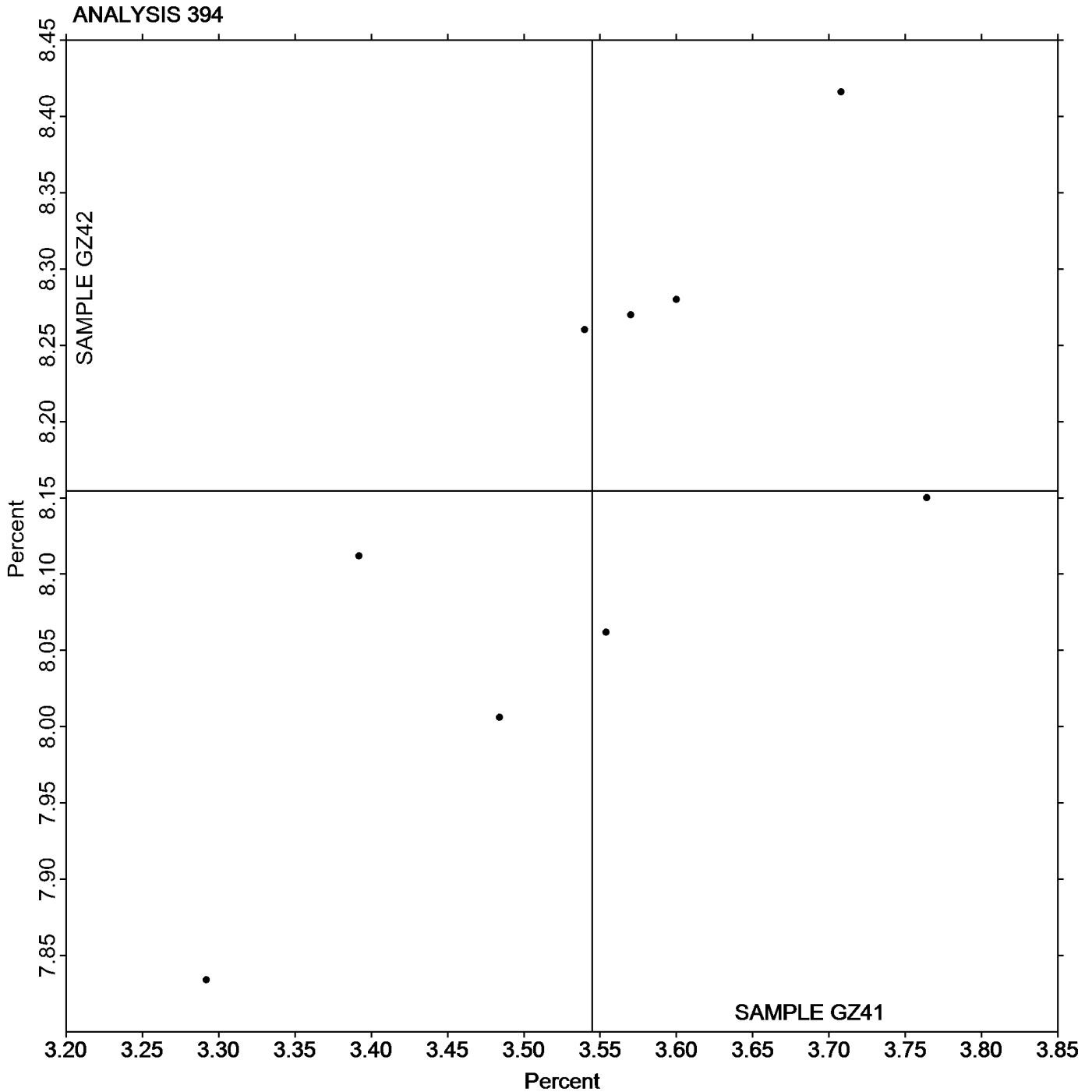


# Paper & Paperboard Interlaboratory Testing Program Analysis 394 Fluorescent Component of Directional Brightness

Report #287G  
April 2017

Grand Mean Sample **GZ41** = 3.5449 Percent

Grand Mean Sample **GZ42** = 8.1544 Percent



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 395  
Specular Gloss at 75 Degrees - High Range**

**Report #287G  
April 2017**

WebCode	Data Flag	Sample GT41			Sample GT42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
4QB739	*	72.49	-4.07	-2.71	79.36	-3.89	-2.65	XX
4Y4FD4		77.07	0.51	0.34	83.62	0.37	0.25	PP
76H2BZ		78.73	2.17	1.45	84.84	1.58	1.08	TG
9BEPWW		78.10	1.54	1.03	84.42	1.16	0.79	TG
9Y4AUY		77.13	0.57	0.38	84.85	1.60	1.09	XX
AG77WU		77.41	0.85	0.57	84.70	1.45	0.98	PP
CJYUHU		77.60	1.04	0.70	82.57	-0.68	-0.47	VM
CLLQR6		76.60	0.04	0.03	84.03	0.78	0.53	TH
GWRZLY		76.73	0.17	0.12	85.15	1.90	1.29	LB
HGCJTN		75.60	-0.96	-0.64	83.60	0.35	0.24	GM
HVUBDN		74.91	-1.65	-1.10	81.97	-1.28	-0.87	LA
HXJHXX		76.18	-0.38	-0.25	83.41	0.16	0.11	TH
KRP6CM		77.13	0.57	0.38	84.02	0.77	0.52	TH
MMM44P		74.95	-1.61	-1.07	83.58	0.33	0.22	GM
NNBY2H		78.61	2.05	1.37	82.73	-0.52	-0.36	TH
PH7H73		76.57	0.01	0.01	82.03	-1.22	-0.83	LA
PWKMF6		75.46	-1.10	-0.73	81.94	-1.31	-0.89	GS
QD7TZE		76.76	0.20	0.14	81.75	-1.50	-1.02	TH

Sample GT41		Summary Statistics		Sample GT42	
Grand Means	76.557 Gloss Units			83.254 Gloss Units	
SD Btwn Labs	1.500 Gloss Units			1.469 Gloss Units	
Statistics based on 18 of 18 reporting participants					

**Key to Instrument Codes Reported by Participants**

<b>GM</b>	BYK-Gardner micro-gloss	<b>GS</b>	BYK-Gardner Glossgard II
<b>LA</b>	L & W Gloss - Autoline 300	<b>LB</b>	L & W Gloss Tester Code 224
<b>PP</b>	Technidyne Profile/Plus	<b>TG</b>	Technidyne T480
<b>TH</b>	Technidyne T480A	<b>VM</b>	Valmet PaperLab (was Kajaani/Robotest)
<b>XX</b>	Instrument make/model not specified by lab		





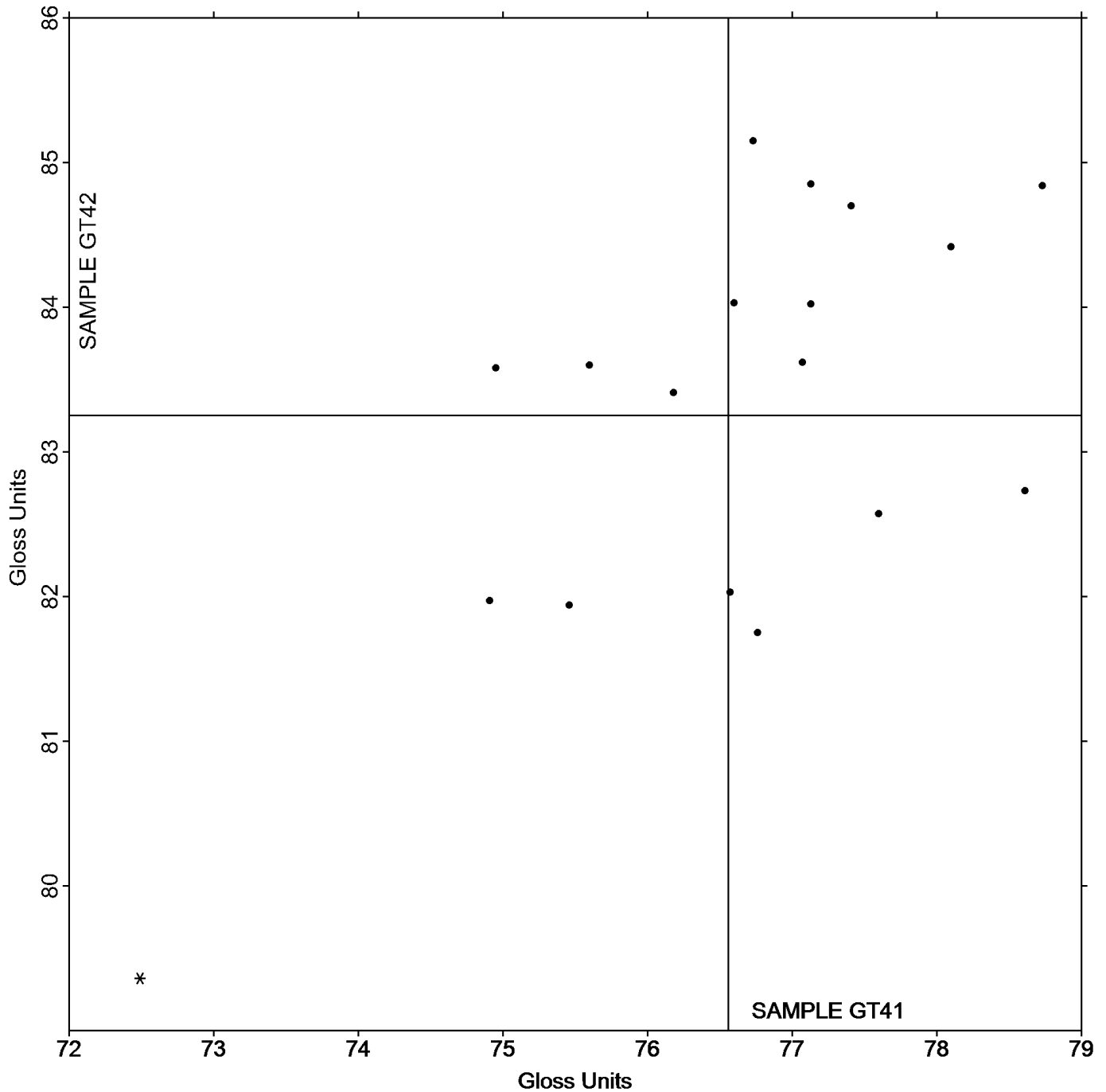
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 395**  
**Specular Gloss at 75 Degrees - High Range**

Report #287G  
April 2017

Grand Mean Sample **GT41** = 76.557 Gloss Units

Grand Mean Sample **GT42** = 83.254 Gloss Units

**ANALYSIS 395**



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 396  
Specular Gloss at 75 Degrees - Low Range**

**Report #287G  
April 2017**

WebCode	Data Flag	Sample GU41			Sample GU42			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
4U9LF3		25.97	-0.04	-0.08	41.46	-0.14	-0.18	PP
76H2BZ		26.87	0.86	1.61	42.17	0.57	0.70	TG
GWRZLY		25.84	-0.17	-0.32	42.39	0.79	0.96	LA
HGD9Z7		26.33	0.31	0.58	42.11	0.51	0.62	TH
KMXV7V		25.77	-0.24	-0.45	41.99	0.39	0.47	XX
XG2M6A		26.17	0.16	0.29	41.01	-0.59	-0.73	TH
ZREQ3J		25.14	-0.87	-1.63	40.10	-1.50	-1.85	TH

Sample GU41		Summary Statistics		Sample GU42	
Grand Means	26.013 Gloss Units			41.605 Gloss Units	
SD Btwn Labs	0.535 Gloss Units			0.815 Gloss Units	
Statistics based on 7 of 7 reporting participants					

**Key to Instrument Codes Reported by Participants**

<b>LA</b>	L & W Gloss - Autoline 300	<b>PP</b>	Technidyne Profile/Plus
<b>TG</b>	Technidyne T480	<b>TH</b>	Technidyne T480A
<b>XX</b>	Instrument make/model not specified by lab		

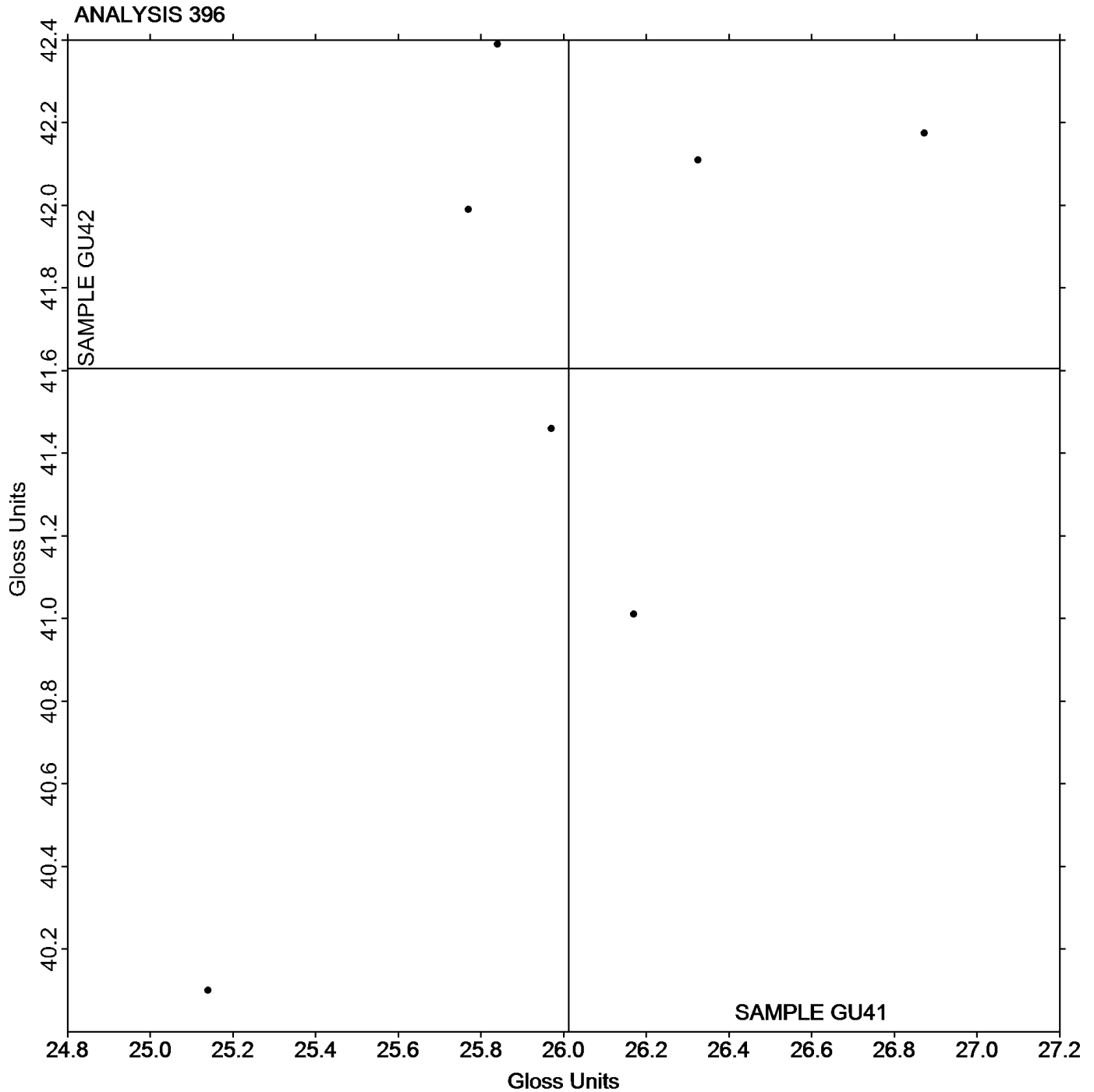


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 396**  
**Specular Gloss at 75 Degrees - Low Range**

Report #287G  
April 2017

Grand Mean Sample **GU41** = 26.013 Gloss Units

Grand Mean Sample **GU42** = 41.605 Gloss Units



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 398  
Grammage (Mass per Unit Area)**

Report #287G  
April 2017

WebCode	Data Flag	Sample GW41			Sample GW42		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
6LWRXF		100.5	0.2	0.34	103.8	0.0	0.07
6YZBAE		101.0	0.7	1.04	104.0	0.2	0.37
7GBP4E		101.1	0.8	1.30	103.8	0.0	0.05
82DWWJ		99.3	-1.0	-1.55	102.9	-0.9	-1.51
APYG64		101.1	0.8	1.28	104.5	0.8	1.32
B8CHEW		101.3	1.0	1.52	105.2	1.5	2.57
BXNP3Z		100.7	0.3	0.54	103.6	-0.1	-0.17
DXVLMV		100.2	-0.1	-0.21	103.5	-0.2	-0.38
GKJGPQ		100.1	-0.2	-0.26	103.2	-0.5	-0.87
GWRZLY		100.4	0.0	0.08	103.5	-0.3	-0.46
H3EA93		99.6	-0.8	-1.22	103.2	-0.5	-0.92
HGD9Z7		99.1	-1.2	-1.88	102.7	-1.0	-1.80
JJWPQP		100.7	0.4	0.62	104.2	0.5	0.89
KMXV7V		100.3	0.0	-0.02	104.2	0.5	0.81
MWBUNW		100.8	0.5	0.82	103.6	-0.2	-0.27
MXLWCF	X	133.7	33.4	53.45	138.6	34.9	60.22
NC3972		100.2	-0.2	-0.25	103.7	0.0	0.00
Q4KKHD		100.2	-0.1	-0.24	103.2	-0.6	-0.99
RMAXUG		100.3	0.0	-0.05	104.2	0.5	0.82
XA6VRA		100.7	0.4	0.58	104.3	0.5	0.91
XG2M6A		100.1	-0.3	-0.41	103.2	-0.5	-0.93
YER3UE		100.4	0.1	0.14	103.9	0.1	0.21
ZR2XQP	*	99.0	-1.3	-2.16	103.9	0.2	0.29

	Sample GW41	Summary Statistics	Sample GW42
Grand Means	100.31 g/sq m		103.73 g/sq m
SD Btwn Labs	0.63 g/sq m		0.58 g/sq m
Statistics based on 22 of 23 reporting participants			

**Comments on Assigned Data Flags for Test #398**

MXLWCF (X) - Extreme Data.

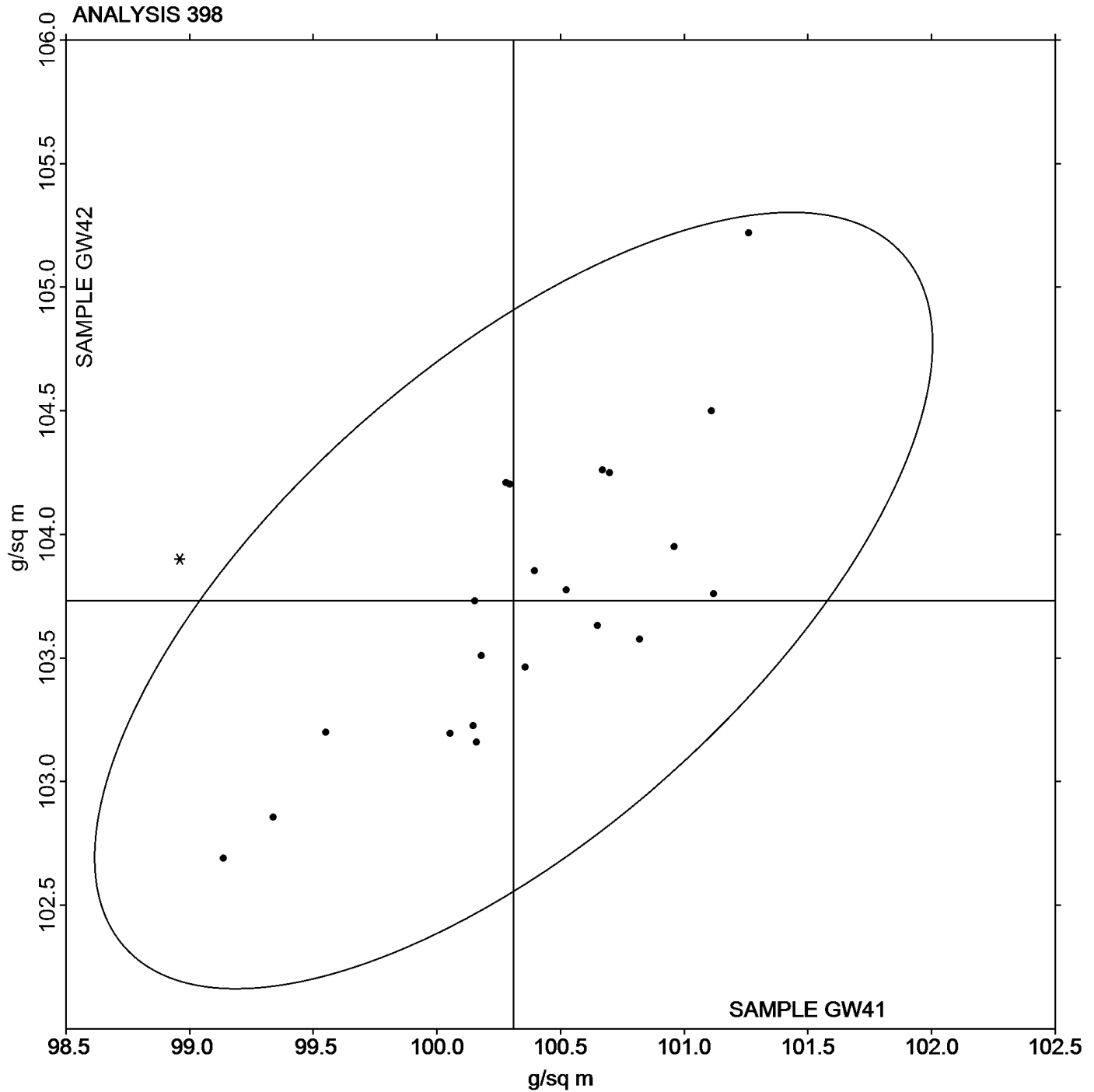


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 398**  
**Grammage (Mass per Unit Area)**

Report #287G  
April 2017

Grand Mean Sample **GW41** = 100.31 g/sq m

Grand Mean Sample **GW42** = 103.73 g/sq m





**Paper & Paperboard Interlaboratory Testing Program  
Analysis 399  
Sizing Test (Hercules Type)**

Report #287G  
April 2017

WebCode	Data Flag	Sample GX41			Sample GX42		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2E4HX7		21.95	1.52	0.20	610.1	2.5	0.03
2WLJN2		39.50	19.07	2.56	744.2	136.6	1.38
39EFBL		19.73	-0.70	-0.09	519.2	-88.4	-0.90
3N89WM	X	21.89	1.46	0.20	1,144.3	536.7	5.44
46P9MH		12.90	-7.53	-1.01	593.8	-13.8	-0.14
4C768J		12.15	-8.28	-1.11	535.7	-71.9	-0.73
4U9LF3		13.85	-6.58	-0.88	504.4	-103.2	-1.05
4Y4FD4		29.61	9.18	1.23	544.0	-63.6	-0.64
6YLP2Y		22.71	2.28	0.31	609.0	1.4	0.01
8NTF6Z		12.42	-8.01	-1.08	591.8	-15.8	-0.16
9FFJ3E	M	24.77	4.34	0.58	No data reported for this sample		
B7ZT6T		13.18	-7.25	-0.97	538.7	-68.9	-0.70
CLLQR6		29.86	9.43	1.27	587.5	-20.1	-0.20
EFXKAP		21.77	1.34	0.18	677.2	69.6	0.71
GUN8R2		18.26	-2.17	-0.29	476.5	-131.1	-1.33
GV2VTR		23.92	3.49	0.47	627.7	20.1	0.20
H3EA93		19.80	-0.63	-0.08	561.0	-46.6	-0.47
HGCJTN		19.90	-0.53	-0.07	537.1	-70.5	-0.71
HRUZLU		30.85	10.42	1.40	850.2	242.6	2.46
P4MPL3		22.27	1.84	0.25	509.2	-98.4	-1.00
PCEBNU		18.29	-2.14	-0.29	525.3	-82.3	-0.83
PH7H73		16.77	-3.66	-0.49	545.0	-62.6	-0.63
Q4KKHD		8.20	-12.23	-1.64	674.8	67.2	0.68
QXFNWR		28.00	7.57	1.02	521.6	-86.0	-0.87
TWWJDK		30.11	9.68	1.30	792.0	184.4	1.87
WJANLA		16.35	-4.08	-0.55	722.6	115.0	1.17
XPVXCJ		17.00	-3.43	-0.46	642.9	35.3	0.36
YC4N4J		11.83	-8.60	-1.16	756.3	148.7	1.51
ZT8HEP	M	22.31	1.88	0.25	No data reported for this sample		

	Sample GX41	Summary Statistics	Sample GX42
Grand Means	20.430 Seconds		607.60 Seconds
SD Btwn Labs	7.436 Seconds		98.64 Seconds
Statistics based on 26 of 29 reporting participants			

9FFJ3E (M) - Participant did not submit data for sample GX42.

ZT8HEP (M) - Participant did not submit data for sample GX42.

3N89WM (X) - Data for sample GX42 are high.

\*Some variations were reported by participants for the sample GX42 material. As a result, data for this test was further reviewed by CTS and conspicuously low results were removed before final analysis.



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 399**  
**Sizing Test (Hercules Type)**

Report #287G  
April 2017

Grand Mean Sample **GX41** = 20.430 Seconds

Grand Mean Sample **GX42** = 607.60 Seconds

**ANALYSIS 399**

