



## Paper & Paperboard Testing Program

### Summary Report #285G-December 2016

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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><math>\Delta E</math></b>	The calculated total color difference between the two samples. For the Hunter L,a,b analyses it is calculated in Hunter units ( $\Delta E$ ). For the L*,a*,b* analyses it is calculated in CIELAB units ( $\Delta E^*$ ).
<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**

**Report #285G  
December 2016**

**Color & Color Difference - Near White Papers - C/2deg obs  
Hunter L,a,b - Illuminant C - 2 Degree Observer**

Web Code	F	Samples	Hunter L, a, b Color Values			Color Difference Values				Instr Code
			L	a	b	$\Delta L$	$\Delta a$	$\Delta b$	$\Delta E$	
26M9W9		GA37	92.54	-0.66	2.10	-0.03	0.01	-0.02	0.04	NE
		GA38	92.50	-0.65	2.08					
3KF2HA		GA37	94.09	-0.72	2.23	0.04	0.00	-0.05	0.06	TC
		GA38	94.14	-0.72	2.19					
6UJXEC	X	GA37	80.48	0.66	2.06	-0.70	0.14	-0.06	0.72	TS
		GA38	79.78	0.80	2.00					
93Y63H		GA37	92.31	-0.54	2.13	-0.04	-0.01	-0.06	0.07	XX
		GA38	92.27	-0.56	2.07					
A9GXP2		GA37	92.49	-0.58	2.00	0.15	0.08	0.09	0.20	TC
		GA38	92.64	-0.50	2.09					
ADAW6H		GA37	94.15	-0.68	2.31	0.10	0.00	-0.17	0.20	EH
		GA38	94.25	-0.68	2.13					
BA7JY4		GA37	93.26	-0.69	2.29	0.06	-0.05	0.00	0.08	HE
		GA38	93.32	-0.74	2.29					
CTE7Z3		GA37	91.44	-1.06	0.81	0.00	-0.03	0.03	0.04	HH
		GA38	91.44	-1.08	0.84					
DJ7V94		GA37	90.89	0.16	1.65	0.05	-0.10	-0.11	0.15	TS
		GA38	90.94	0.06	1.55					
DJR8AW		GA37	92.73	-0.54	2.05	0.08	0.04	-0.05	0.10	MK
		GA38	92.82	-0.50	2.00					
DVKQN3		GA37	91.83	-0.53	1.89	-0.20	0.04	-0.01	0.20	TS
		GA38	91.63	-0.49	1.88					
FCKLVQ		GA37	91.39	0.21	1.75	0.25	-0.01	0.03	0.26	TS
		GA38	91.64	0.20	1.78					
G2XZ32		GA37	94.04	-0.64	2.34	-0.03	-0.02	0.02	0.04	EH
		GA38	94.01	-0.66	2.36					
K6LQYM		GA37	91.15	0.18	1.54	-0.22	-0.04	0.00	0.23	TS
		GA38	90.93	0.14	1.53					
M78CHN		GA37	90.27	0.06	1.44	0.62	-0.17	0.25	0.69	TS
		GA38	90.89	-0.11	1.68					
RHAVCR		GA37	92.58	-0.60	2.61	0.10	0.02	-0.10	0.14	LA
		GA38	92.68	-0.58	2.51					



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 350**

Report #285G  
December 2016

**Color & Color Difference - Near White Papers - C/2deg obs  
Hunter L,a,b - Illuminant C - 2 Degree Observer**

Web Code	F	Samples	Hunter L, a, b Color Values			Color Difference Values				Instr Code
			L	a	b	$\Delta L$	$\Delta a$	$\Delta b$	$\Delta E$	
T2EYPM		GA37	90.84	-0.80	0.66	0.05	-0.02	0.03	0.07	HH
		GA38	90.89	-0.82	0.70					
ULYE2E		GA37	94.96	-0.39	1.74	-1.50	0.05	-0.10	1.50 X	HE
		GA38	93.46	-0.33	1.64					
UQRJUJ		GA37	93.12	-0.03	1.35	0.05	-0.03	-0.03	0.07	TS
		GA38	93.17	-0.06	1.31					
VJA8GH		GA37	92.54	-0.72	2.27	0.03	-0.03	0.05	0.06	TC
		GA38	92.57	-0.75	2.32					
WUNKED		GA37	94.06	-0.74	2.14	0.07	0.02	0.08	0.10	LS
		GA38	94.13	-0.72	2.21					
XFZ2U8		GA37	92.36	-0.78	2.40	0.11	-0.02	0.00	0.11	HH
		GA38	92.47	-0.81	2.41					
YW3YUH		GA37	94.60	-0.51	1.09	0.07	-0.05	0.11	0.14	XS
		GA38	94.67	-0.57	1.19					

Grand Means		Summary Statistics							
GA37	92.620	-0.433	1.864						
GA38	92.655	-0.441	1.861	-0.008	-0.015	-0.001	0.207		
Stnd Dev Btwn Labs									
GA37	1.154	0.424	0.516						
GA38	1.178	0.429	0.490	0.370	0.053	0.088	0.321		

Statistics based on 22 of 23 reporting participants

**Comments on Assigned Data Flags for Test #350**

6UJXEC (X) - Extreme data for L values, both samples. High a value for Sample GA38, large delta a.

A9GXP2 - One determination removed from the Lab Mean of Sample GA37, L values, per Grubb's Test at 1% risk (TAPPI 1205).

**Key to Instrument Codes Reported by Participants**

EH	Datacolor Elrepho SF450	HE	Hunter LabScan
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 #285G**  
**December 2016**

Web  
Code

F Samples

Hunter L, a, b Color Values

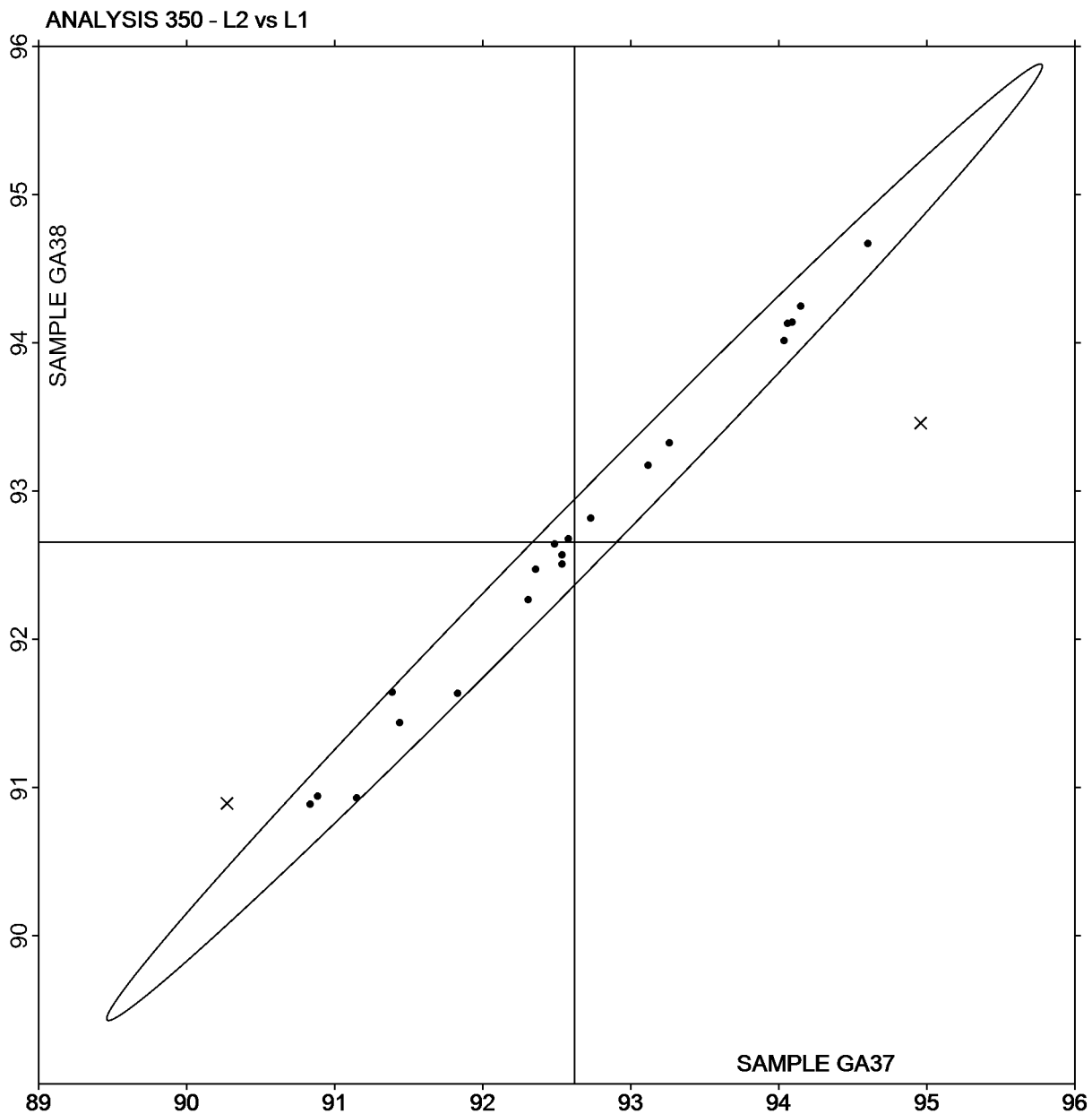
L a b

Color Difference Values

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

Instr Code

Plot of L values GA38 v L values GA37





**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 #285G  
December 2016

Web  
Code

F Samples

Hunter L, a, b Color Values

L

a

b

Color Difference Values

$\Delta L$

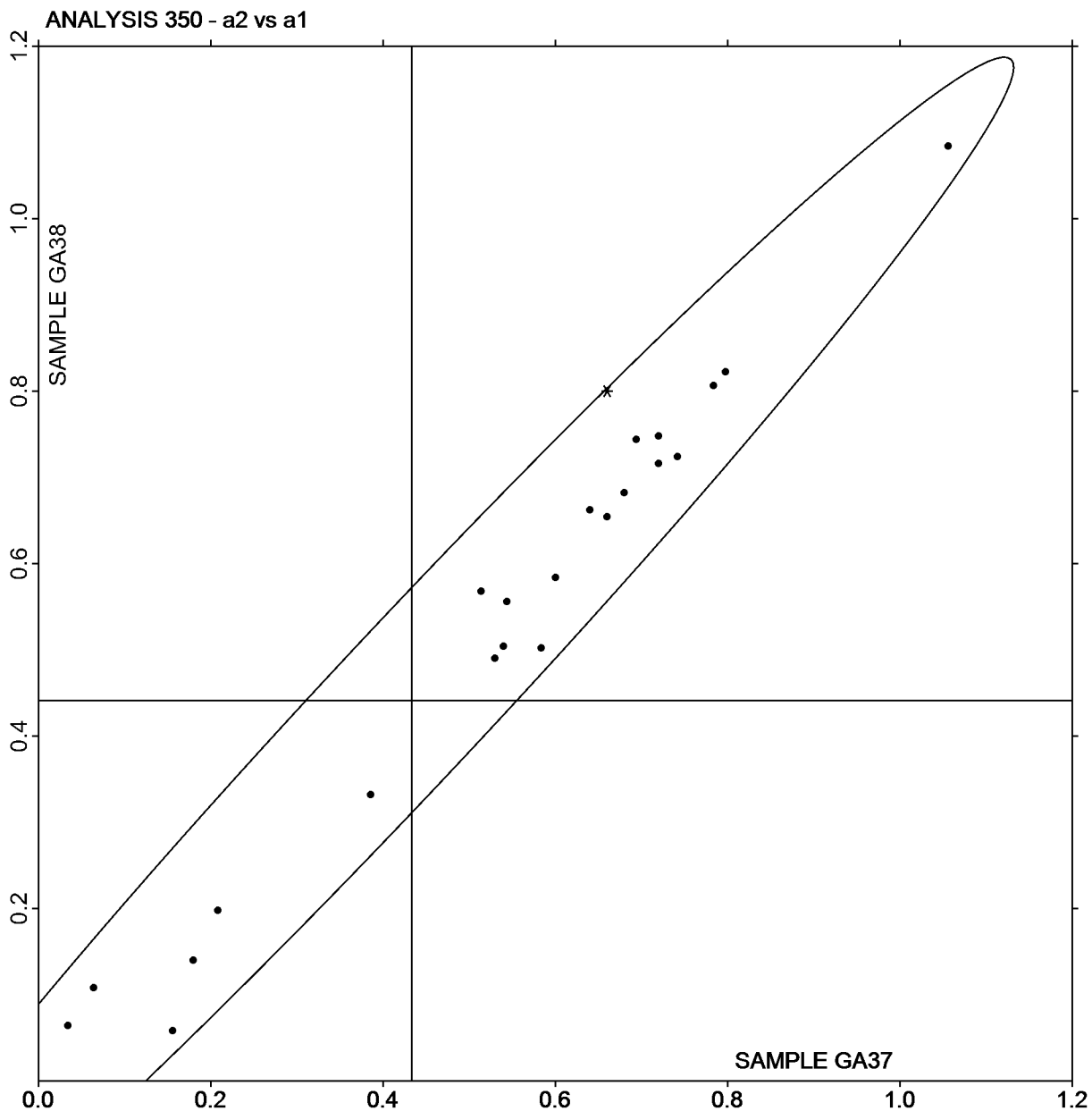
$\Delta a$

$\Delta b$

$\Delta E$

Instr Code

Plot of a values GA38 v a values GA37



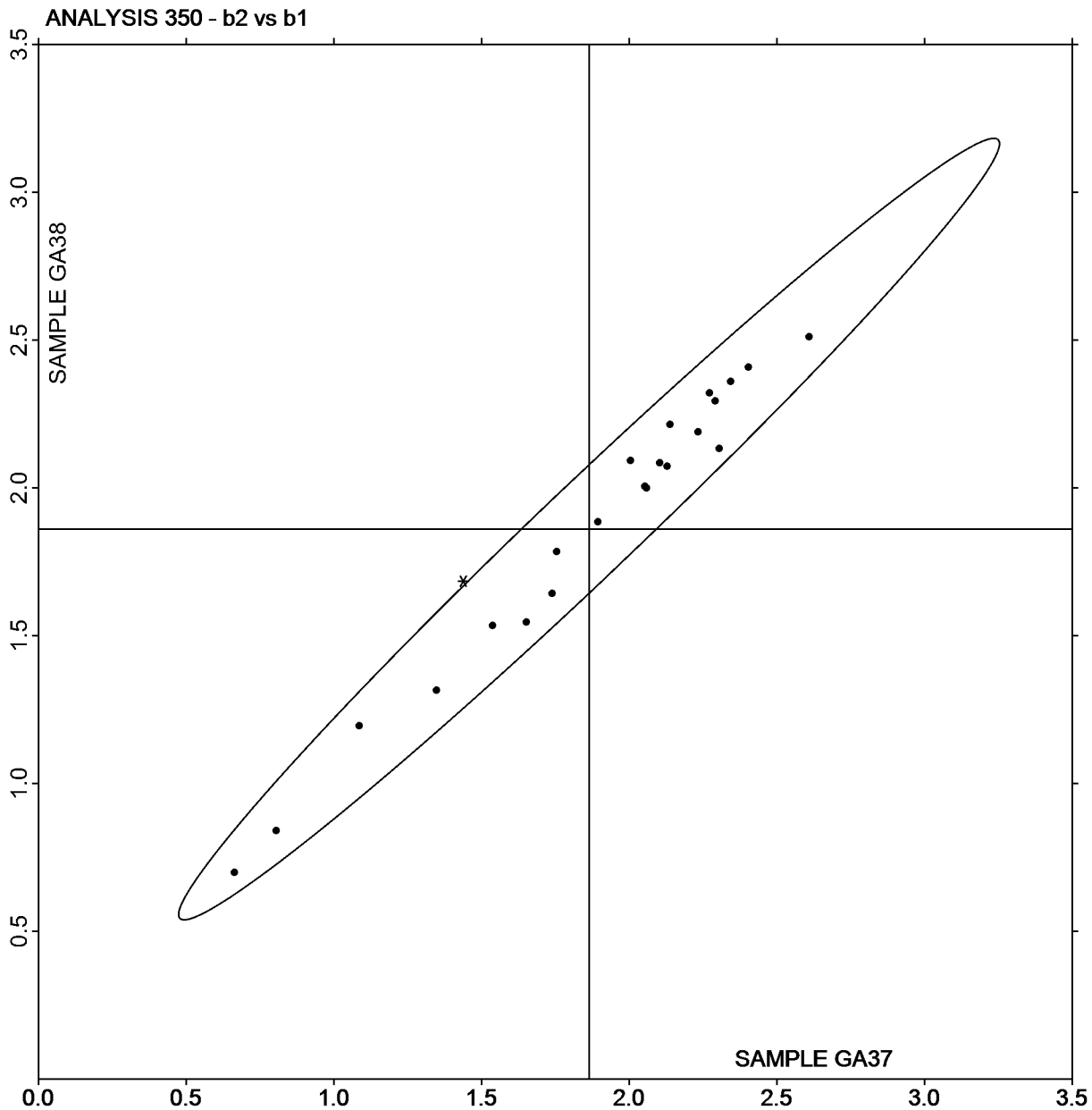




**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 350**  
**Color & Color Difference - Near White Papers - C/2deg obs**  
**Hunter L,a,b - Illuminant C - 2 Degree Observer**

**Report #285G**  
**December 2016**

Plot of b values GA38 v b values GA37





**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 #285G**  
**December 2016**

2VLL3Q	X	GA37 GA38	95.91 95.35	-0.24 -0.38	1.82 1.95	-0.57	-0.14	0.13	0.60 X	XP
2YJ66P	X	GA37 GA38	88.92 88.59	0.33 0.36	3.12 3.08	-0.33	0.04	-0.04	0.33 X	TC
3FZTP4		GA37 GA38	94.36 94.32	-0.76 -0.75	2.44 2.42	-0.04	0.01	-0.02	0.05	NF
83LYN2		GA37 GA38	94.14 94.21	-0.80 -0.72	2.37 2.27	0.07	0.08	-0.10	0.15	EH
8R6ARH		GA37 GA38	93.28 93.21	-0.66 -0.69	2.25 2.18	-0.06	-0.03	-0.07	0.10	HV
BA7JY4		GA37 GA38	93.26 93.41	-0.73 -0.69	2.28 2.24	0.14	0.04	-0.04	0.15	HE
BBMHC2		GA37 GA38	94.20 94.20	-0.90 -0.90	2.40 2.44	0.00	0.00	0.04	0.04	EF
EPCRQH		GA37 GA38	92.63 92.56	-0.86 -0.94	2.33 2.30	-0.07	-0.08	-0.04	0.11	TC
F3R9VQ		GA37 GA38	94.15 94.07	-0.67 -0.75	2.81 2.72	-0.08	-0.08	-0.09	0.14	NG
FPKF7Z		GA37 GA38	92.27 92.44	-0.76 -0.86	2.11 2.19	0.17	-0.09	0.08	0.21	HE
KXPQN2		GA37 GA38	94.16 94.20	-0.73 -0.69	2.52 2.53	0.04	0.04	0.02	0.06	NG
LMJ7XT		GA37 GA38	92.40 92.43	-0.76 -0.76	2.44 2.48	0.03	-0.01	0.04	0.05	XM
M9WFF2		GA37 GA38	94.28 94.28	-0.85 -0.86	2.45 2.49	0.00	-0.01	0.04	0.04	HT
PA3FRM		GA37 GA38	94.22 94.25	-0.83 -0.85	2.47 2.47	0.03	-0.02	0.00	0.03	LS
RNDZ2Q		GA37 GA38	94.37 94.36	-0.78 -0.80	2.47 2.52	-0.01	-0.02	0.05	0.05	HT
U83Z7R		GA37 GA38	94.15 94.20	-0.62 -0.65	2.91 2.90	0.05	-0.02	-0.01	0.06	NG
XACGN7		GA37 GA38	94.20 94.25	-0.78 -0.71	2.37 2.61	0.05	0.07	0.24	0.25	TC
YCH2C7		GA37 GA38	94.18 94.20	-0.93 -0.94	2.41 2.36	0.02	-0.02	-0.04	0.05	TC



**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 #285G**  
**December 2016**

Z8V2AW	GA37	94.48	-0.77	2.25	0.02	-0.03	-0.01	0.03	XX
	GA38	94.51	-0.79	2.24					

Grand Means		Summary Statistics							
GA37	93.808	-0.689	2.433	0.021	-0.010	0.005	0.094		
GA38	93.830	-0.703	2.442						
Std Dev Btwn Labs									
GA37	0.738	0.286	0.284	0.068	0.049	0.078	0.066		
GA38	0.722	0.288	0.264						

Statistics based on 17 of 19 reporting participants

**Comments on Assigned Data Flags for Test #351**

2YJ66P (X) - Extreme data for L values, for both samples. High a values, both samples. Large delta L and delta E.  
 2VLL3Q (X) - High L value for Sample GA37. Large delta L, delta a and delta E.

**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 #285G**  
**December 2016**

Web  
Code

F Samples

Hunter L, a, b Color Values

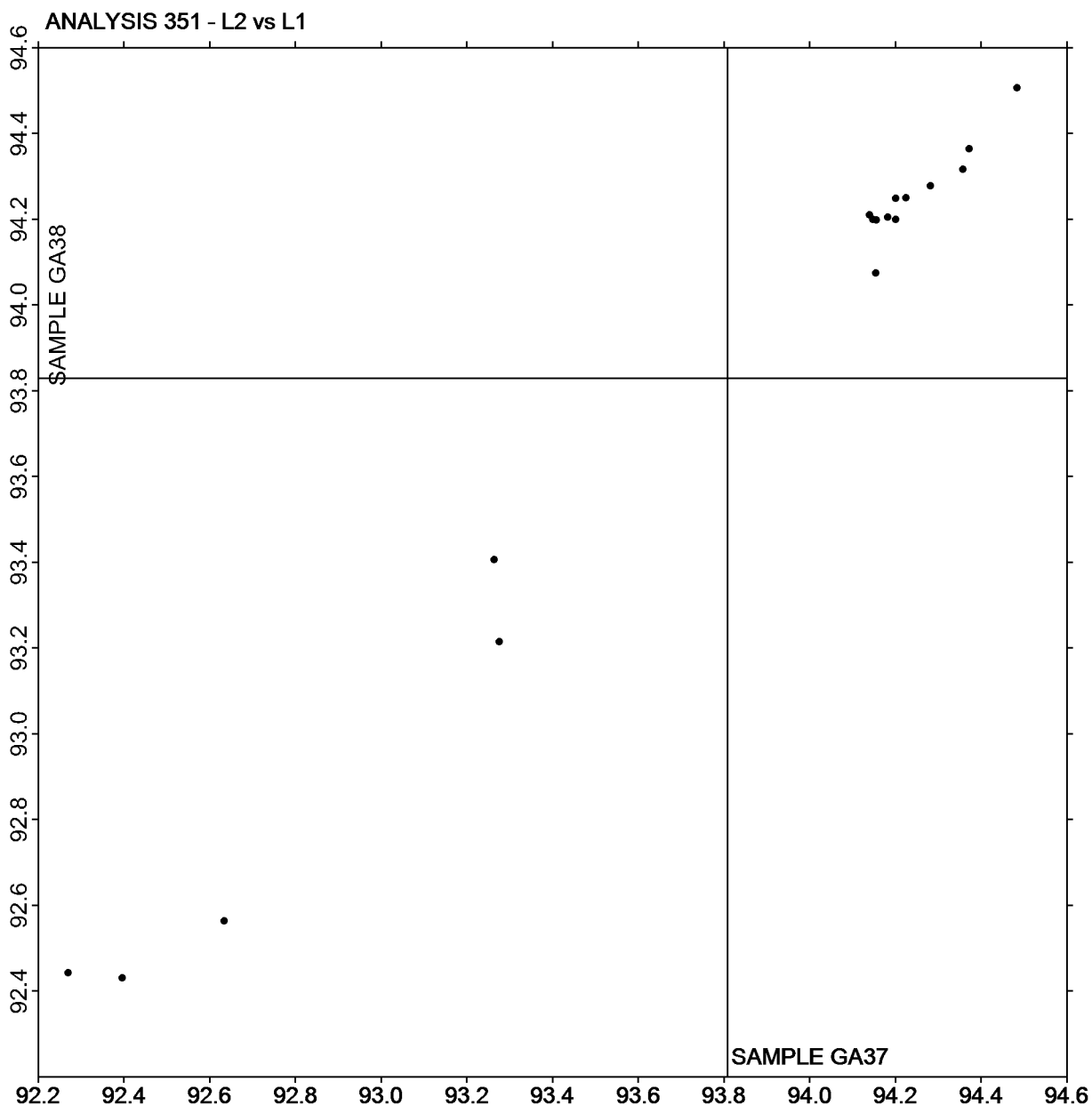
L a b

Color Difference Values

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

Instr Code

Plot of L values GA38 v L values GA37



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**

**Report #285G**  
**December 2016**

Web  
Code

F Samples

Hunter L, a, b Color Values

L

a

b

Color Difference Values

$\Delta L$

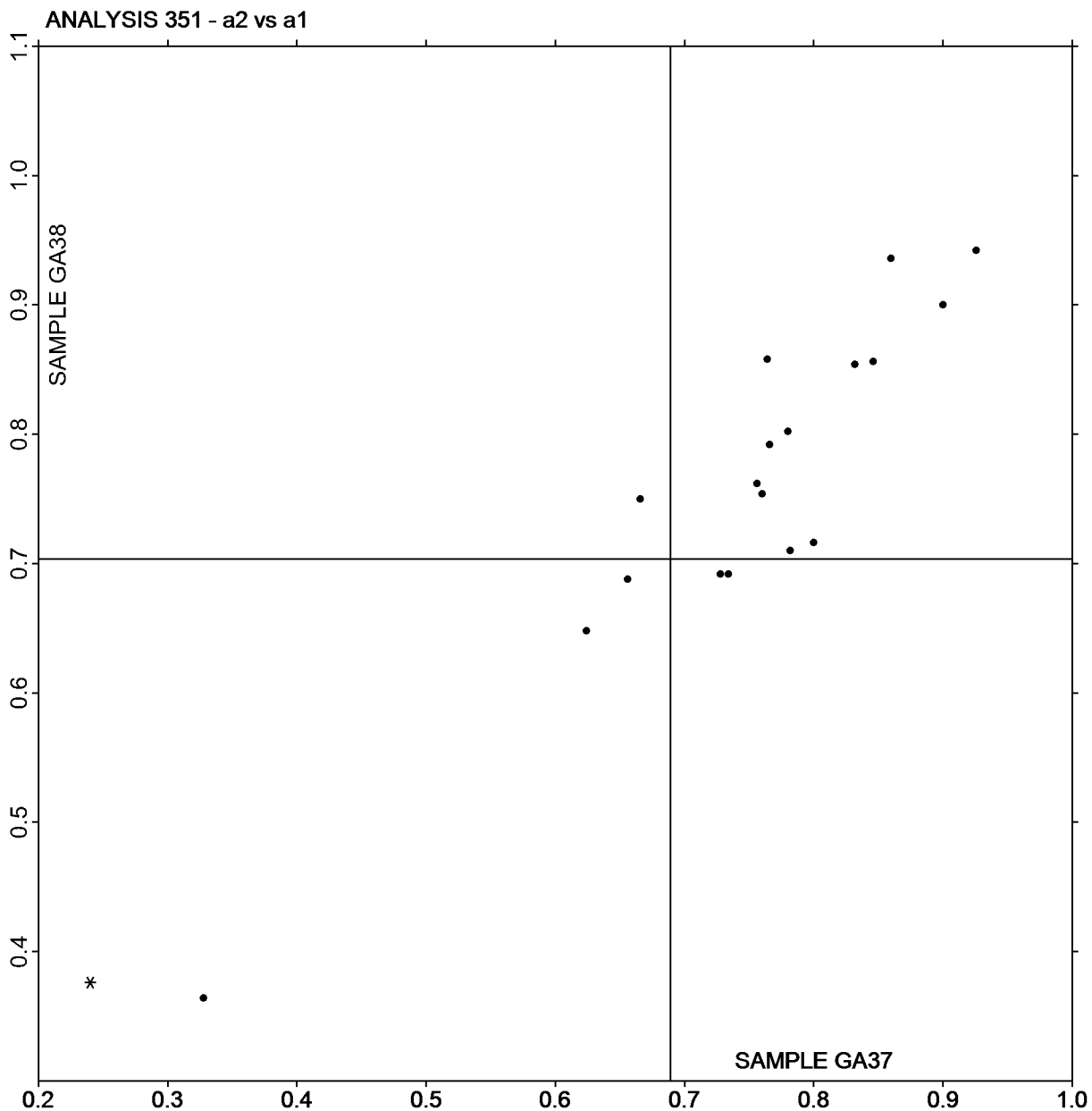
$\Delta a$

$\Delta b$

$\Delta E$

Instr Code

Plot of a values GA38 v a values GA37



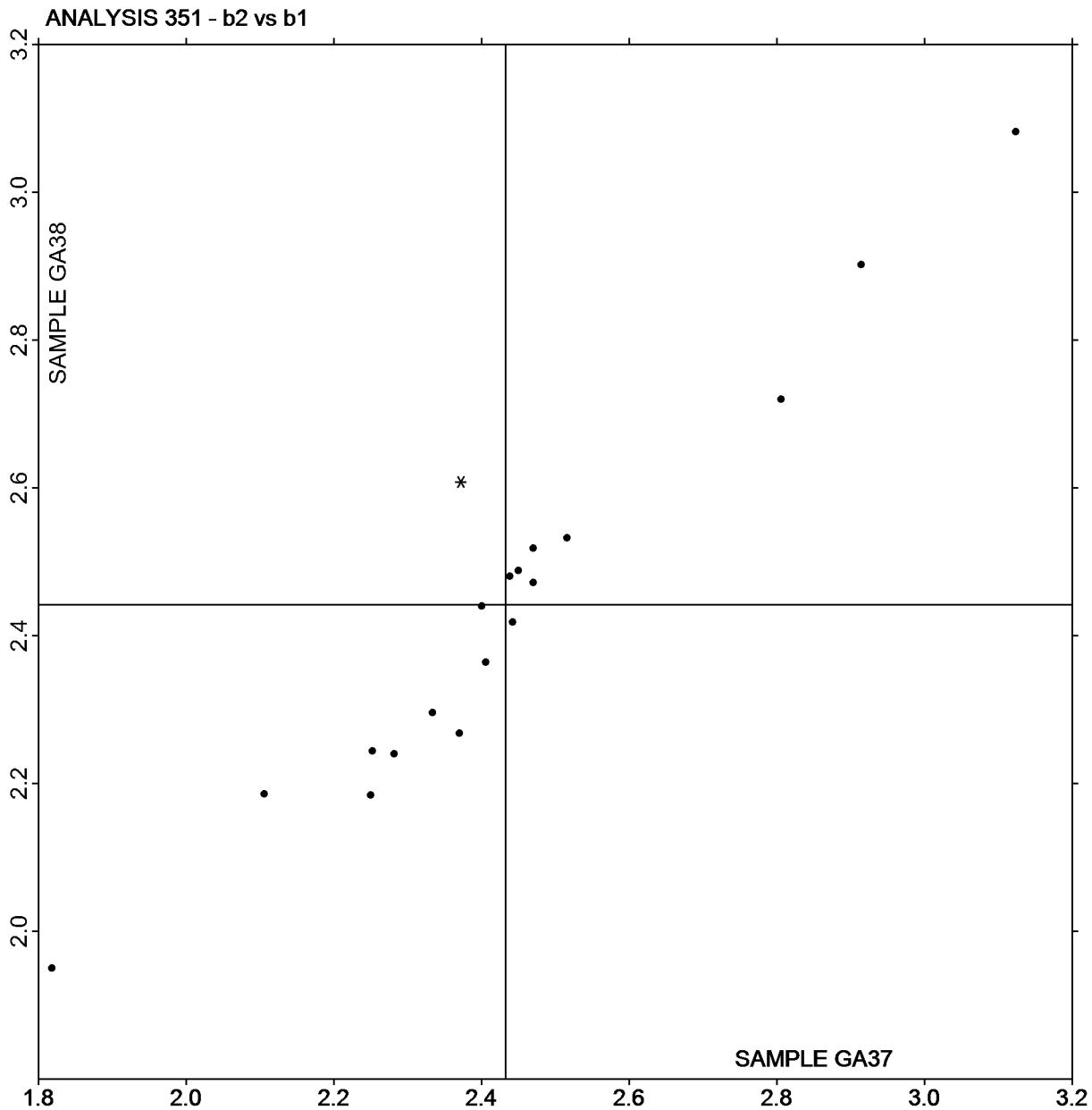
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**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**

**Report #285G**  
**December 2016**

Plot of b values GA38 v b values GA37



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 #285G  
December 2016

WebCode	Data Flag	Sample GV37			Sample GV38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2VLL3Q		4.975	-0.021	-0.29	4.900	-0.067	-0.89	TM
3FZTP4		5.109	0.113	1.56	5.072	0.105	1.40	TM
3KF2HA		5.005	0.009	0.12	4.915	-0.052	-0.69	LA
3ZBMJV		4.928	-0.068	-0.94	4.901	-0.066	-0.87	TA
4L6PDB		5.013	0.017	0.24	4.998	0.031	0.42	LW
4RWYJ3	X	5.075	0.079	1.09	4.862	-0.105	-1.39	PP
6ABVF8		5.031	0.035	0.49	4.967	0.001	0.01	LW
7BZHAM		4.920	-0.076	-1.05	4.880	-0.087	-1.15	XX
7HVKCX		4.928	-0.068	-0.94	4.950	-0.017	-0.22	TM
7HY8QQ		5.009	0.013	0.18	5.014	0.047	0.63	EM
8BWFY9		5.058	0.062	0.86	4.998	0.031	0.42	LW
8R6ARH		4.950	-0.046	-0.64	4.861	-0.106	-1.41	TA
93Y63H		5.130	0.134	1.85	5.080	0.113	1.51	XX
A9GV44		5.064	0.068	0.94	5.044	0.077	1.03	TM
A9GXP2		5.018	0.022	0.30	5.015	0.048	0.64	TA
ADAW6H		4.986	-0.010	-0.14	4.940	-0.027	-0.36	EM
AYAZ66		4.932	-0.064	-0.88	4.937	-0.029	-0.39	LW
CD7WF3		5.049	0.053	0.73	4.976	0.010	0.13	LW
D98XL4	X	5.319	0.323	4.46	5.280	0.313	4.16	TM
DJ7V94	X	4.734	-0.262	-3.62	4.848	-0.118	-1.57	TM
DJR8AW		4.988	-0.008	-0.11	5.010	0.043	0.58	PP
DVKQN3		4.957	-0.039	-0.54	4.916	-0.051	-0.67	LA
EPCRQH		5.086	0.090	1.24	5.110	0.143	1.91	TA
EX7UWZ	X	47.912	42.916	592.34	47.393	42.427	564.26	TM
F3R9VQ		4.952	-0.044	-0.61	4.947	-0.020	-0.26	LW
FCKLVQ		5.072	0.076	1.05	4.979	0.012	0.16	EM
FPKF7Z		5.102	0.106	1.46	5.002	0.035	0.47	TM
FRDEFR		4.875	-0.121	-1.67	4.918	-0.049	-0.65	EM
JK6RGM		4.999	0.003	0.04	5.017	0.050	0.67	EM
K6LQYM		4.881	-0.115	-1.58	4.822	-0.144	-1.92	TM
KP9CHP		4.962	-0.034	-0.47	4.990	0.023	0.31	TM
KXPQN2		5.039	0.043	0.59	5.030	0.063	0.84	XX
LMJ7XT		4.957	-0.039	-0.54	4.992	0.025	0.34	LW
M7PZ7B		4.875	-0.121	-1.67	4.827	-0.140	-1.86	EM
M9WFF2		5.127	0.131	1.81	5.054	0.087	1.16	EM
MHHMAK	X	4.727	-0.269	-3.71	4.798	-0.169	-2.24	EM
MPHYBN		5.012	0.016	0.22	5.011	0.044	0.59	PP
N2WFHK		4.884	-0.112	-1.55	4.894	-0.072	-0.96	LW
NK88H2		5.049	0.053	0.73	5.007	0.040	0.54	FR
NZJNP4		4.922	-0.074	-1.02	4.885	-0.082	-1.09	MT
NZY6KW		5.007	0.011	0.15	5.036	0.069	0.92	XX



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

Report #285G  
December 2016

WebCode	Data Flag	Sample GV37			Sample GV38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
P3KATU		5.028	0.032	0.44	5.005	0.038	0.51	EM
PEB7R8		4.950	-0.046	-0.63	5.013	0.046	0.61	LW
QU8KPF		5.111	0.115	1.58	5.075	0.108	1.44	LW
R7U4MH		4.840	-0.156	-2.15	4.830	-0.137	-1.82	TM
RHAVCR		5.110	0.114	1.57	4.969	0.002	0.03	LA
RNDZ2Q		4.994	-0.002	-0.03	4.972	0.005	0.07	EM
T6GWXU		5.031	0.035	0.48	4.999	0.032	0.43	EM
TJVZJP		5.106	0.110	1.52	4.984	0.018	0.23	TM
TNRQNF		4.926	-0.070	-0.97	4.896	-0.071	-0.94	LA
V8VD2J		5.089	0.093	1.28	5.129	0.162	2.16	LW
VMRPFE		4.931	-0.065	-0.90	4.921	-0.045	-0.60	LW
W2M74R		4.921	-0.075	-1.03	4.858	-0.108	-1.44	TM
W4CDNN		4.970	-0.026	-0.36	4.980	0.013	0.17	XX
WM7EFK		5.087	0.091	1.26	5.025	0.058	0.78	PP
WRYDUF		5.012	0.016	0.22	5.024	0.057	0.76	MS
WUNKED		5.002	0.006	0.08	4.991	0.024	0.32	LW
XAU7CT		5.029	0.033	0.45	5.051	0.084	1.12	LW
YCH2C7		4.992	-0.004	-0.05	4.876	-0.091	-1.21	LW
YHL636		4.956	-0.040	-0.55	5.012	0.045	0.60	EM
YUCU2B		4.930	-0.067	-0.92	4.903	-0.064	-0.85	LW
YW3YUH		5.000	0.004	0.05	4.950	-0.017	-0.22	TM
YW7NWU	*	4.868	-0.128	-1.77	4.761	-0.206	-2.74	TA
Z8V2AW		5.032	0.036	0.50	4.917	-0.050	-0.66	LW

	Sample GV37	Summary Statistics	Sample GV38
Grand Means	4.9961 mils		4.9667 mils
SD Btwn Labs	0.0725 mils		0.0752 mils
Statistics based on 59 of 64 reporting participants			

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

- 4RWYJ3 (X) - Inconsistent in testing between samples. Inconsistent within the determinations of sample GV38.
- MHHMAK (X) - Data for sample GV37 are low.
- EX7UWZ (X) - Extreme Data.
- DJ7V94 (X) - Data for sample GV37 are low.
- D98XL4 (X) - Data for both samples are high. Possible Systematic Error.
  
- K6LQYM - One determination removed from the Lab Mean of Sample GV37 per Grubb's Test at 1% risk (TAPPI 1205).
- NZJNP4 - Data appear to be reported as mm, not mils as indicated on datasheet. Units corrected by CTS.





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

**Report #285G**  
**December 2016**

**Key to Instrument Codes Reported by Participants**

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

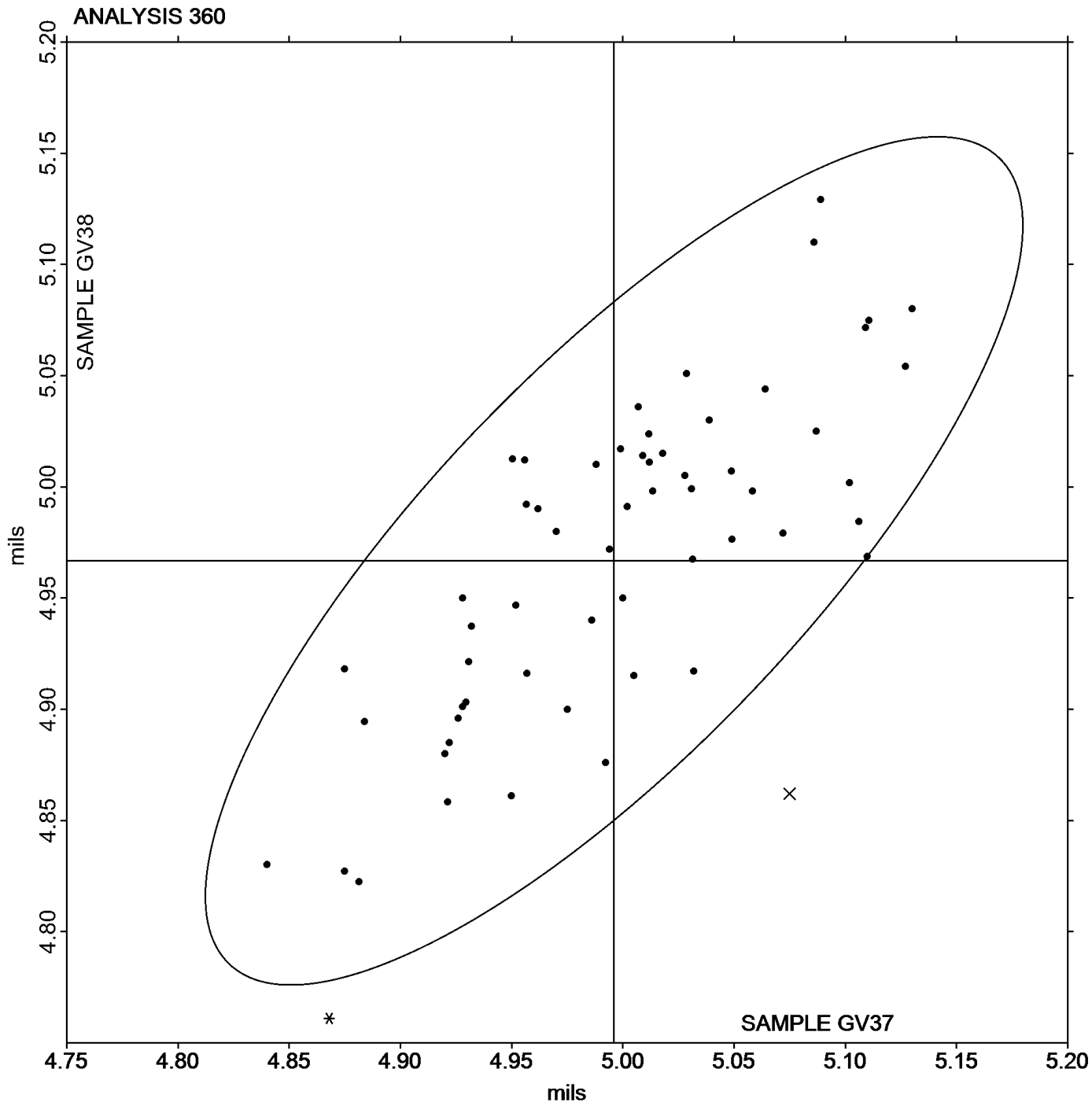


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 360**  
**Thickness (Caliper), Printing papers**

Report #285G  
December 2016

Grand Mean Sample **GV37** = 4.9961 mils

Grand Mean Sample **GV38** = 4.9667 mils





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

**Report #285G  
December 2016**

WebCode	Data Flag	Sample GY37			Sample GY38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
22PPTP		14.02	-0.06	-0.39	9.376	-0.052	-0.40	PP
2DFGFE		14.08	0.00	-0.01	9.326	-0.102	-0.79	TM
2YJ66P		14.14	0.06	0.44	9.532	0.104	0.80	EM
3TPPV9		14.03	-0.05	-0.33	9.390	-0.038	-0.29	LA
6UJXEC		13.95	-0.13	-0.92	9.351	-0.077	-0.59	EM
7HVKCX		14.14	0.06	0.44	9.486	0.058	0.44	TM
7W39N2		13.98	-0.10	-0.68	9.380	-0.048	-0.37	TM
83LYN2		14.33	0.25	1.78	9.589	0.161	1.24	EM
922U9Z		14.11	0.03	0.21	9.533	0.105	0.80	TM
9F7V7B		13.94	-0.13	-0.94	9.249	-0.180	-1.38	LA
BA7JY4		14.11	0.03	0.21	9.396	-0.032	-0.25	EM
CTE7Z3		14.15	0.08	0.54	9.580	0.152	1.17	EM
EB9KDX		13.80	-0.28	-1.97	9.123	-0.305	-2.34	TM
EKJKAU		14.22	0.14	1.00	9.563	0.135	1.04	LW
G2FU4B		13.97	-0.11	-0.75	9.440	0.012	0.09	TM
HLVVAU		14.28	0.21	1.44	9.587	0.158	1.22	XX
L7EWWT		14.04	-0.04	-0.30	9.395	-0.033	-0.26	TA
LGWH3M		14.35	0.27	1.91	9.690	0.262	2.01	LA
NQT3HK		14.23	0.15	1.07	9.440	0.012	0.09	LA
PA3FRM		14.05	-0.03	-0.19	9.330	-0.098	-0.75	XX
PEB7R8		14.13	0.05	0.34	9.429	0.001	0.01	LW
QAC46J		14.02	-0.06	-0.43	9.450	0.022	0.17	TM
QHTH9N		13.94	-0.14	-1.00	9.370	-0.058	-0.45	TA
QU8KPF		14.22	0.15	1.02	9.607	0.179	1.37	XX
R7U4MH		13.77	-0.31	-2.16	9.230	-0.198	-1.52	TM
RHAVCR		14.21	0.13	0.90	9.634	0.206	1.58	LA
T2EYPM		14.37	0.29	2.06	9.566	0.138	1.06	EM
T873HQ		13.93	-0.15	-1.06	9.293	-0.135	-1.04	LW
ULYE2E		14.02	-0.05	-0.38	9.299	-0.129	-0.99	LA
XFZ2U8		14.12	0.04	0.28	9.448	0.020	0.15	EM
XH7MKT		13.90	-0.18	-1.27	9.313	-0.115	-0.89	PP
XLNPPD		14.07	-0.01	-0.07	9.374	-0.054	-0.42	PP
YUCU2B		14.08	0.00	-0.01	9.520	0.092	0.71	LW
YW7NWU		14.08	0.01	0.04	9.342	-0.086	-0.66	TA
ZFTUKB		13.93	-0.15	-1.03	9.250	-0.178	-1.37	TA
ZVM2XC		14.11	0.03	0.20	9.535	0.107	0.82	LW



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

**Report #285G  
December 2016**

	<b>Sample GY37</b>	<b>Summary Statistics</b>	<b>Sample GY38</b>
Grand Means	14.078 mils		9.4282 mils
SD Btwn Labs	0.143 mils		0.1302 mils
			Statistics based on 36 of 36 reporting participants

**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		



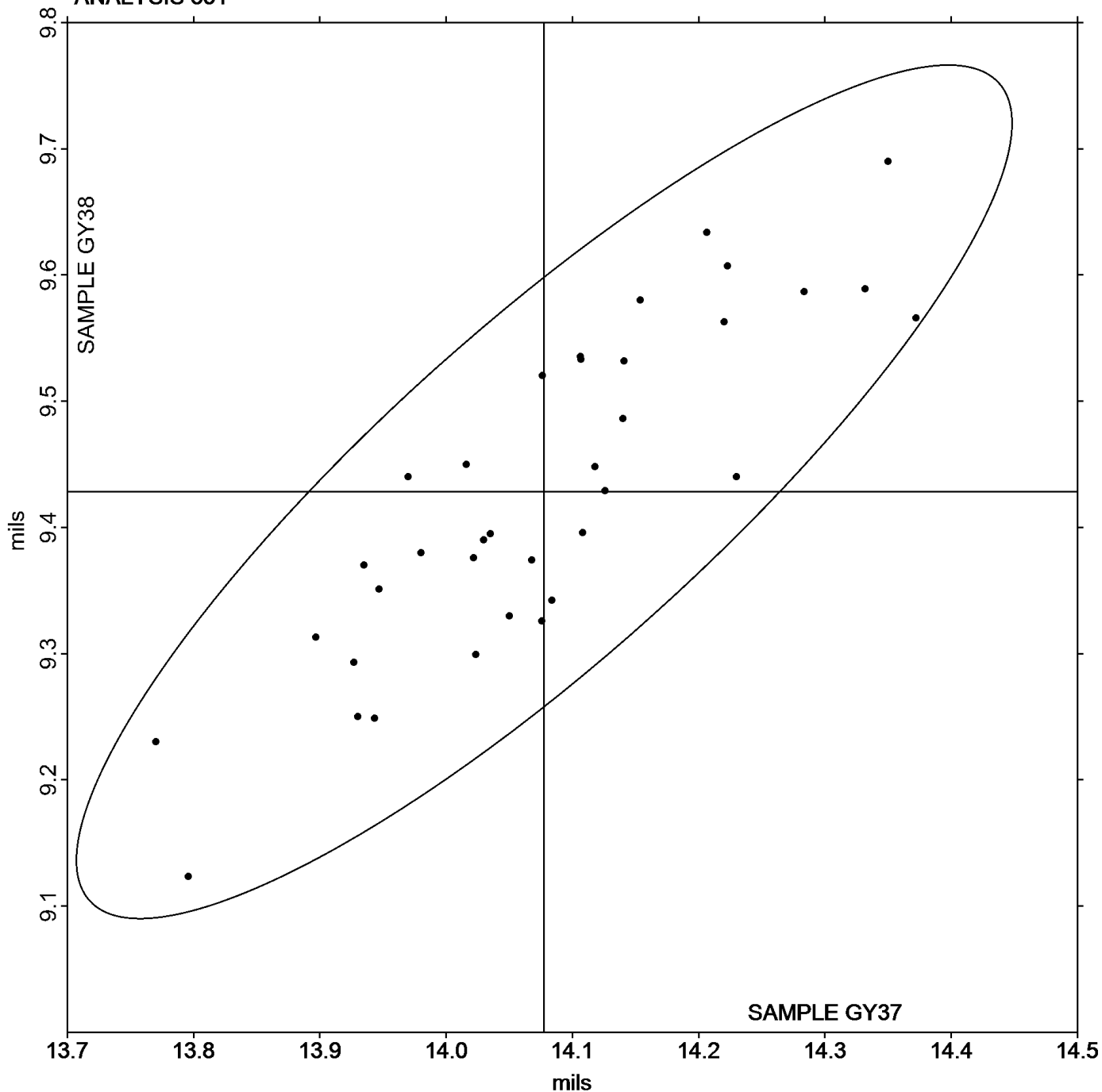
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 361**  
**Thickness (Caliper), Packaging papers**

Report #285G  
December 2016

Grand Mean Sample **GY37** = 14.078 mils

Grand Mean Sample **GY38** = 9.4282 mils

**ANALYSIS 361**





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

**Report #285G  
December 2016**

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

WebCode	Data Flag	Sample GD37			Sample GD38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
9F7V7B		0.4614	-0.0774	-0.71	0.4924	-0.0212	-0.23	TA
9LAX86		0.6338	0.0950	0.88	0.5858	0.0722	0.77	TA
ADAW6H		0.6276	0.0888	0.82	0.5980	0.0844	0.90	TA
F3R9VQ		0.6184	0.0796	0.73	0.6106	0.0970	1.03	TM
F9L7KH		0.4386	-0.1002	-0.92	0.4792	-0.0344	-0.37	IT
FCKLVQ		0.6132	0.0744	0.69	0.4844	-0.0292	-0.31	XX
YW3YUH		0.3784	-0.1604	-1.48	0.3446	-0.1690	-1.80	XX

		<b>Summary Statistics</b>	
	<b>Sample GD37</b>		<b>Sample GD38</b>
Grand Means	0.53877 COF		0.51357 COF
SD Btwn Labs	0.10843 COF		0.09380 COF
Statistics based on 7 of 7 reporting participants			

**Key to Instrument Codes Reported by Participants**

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



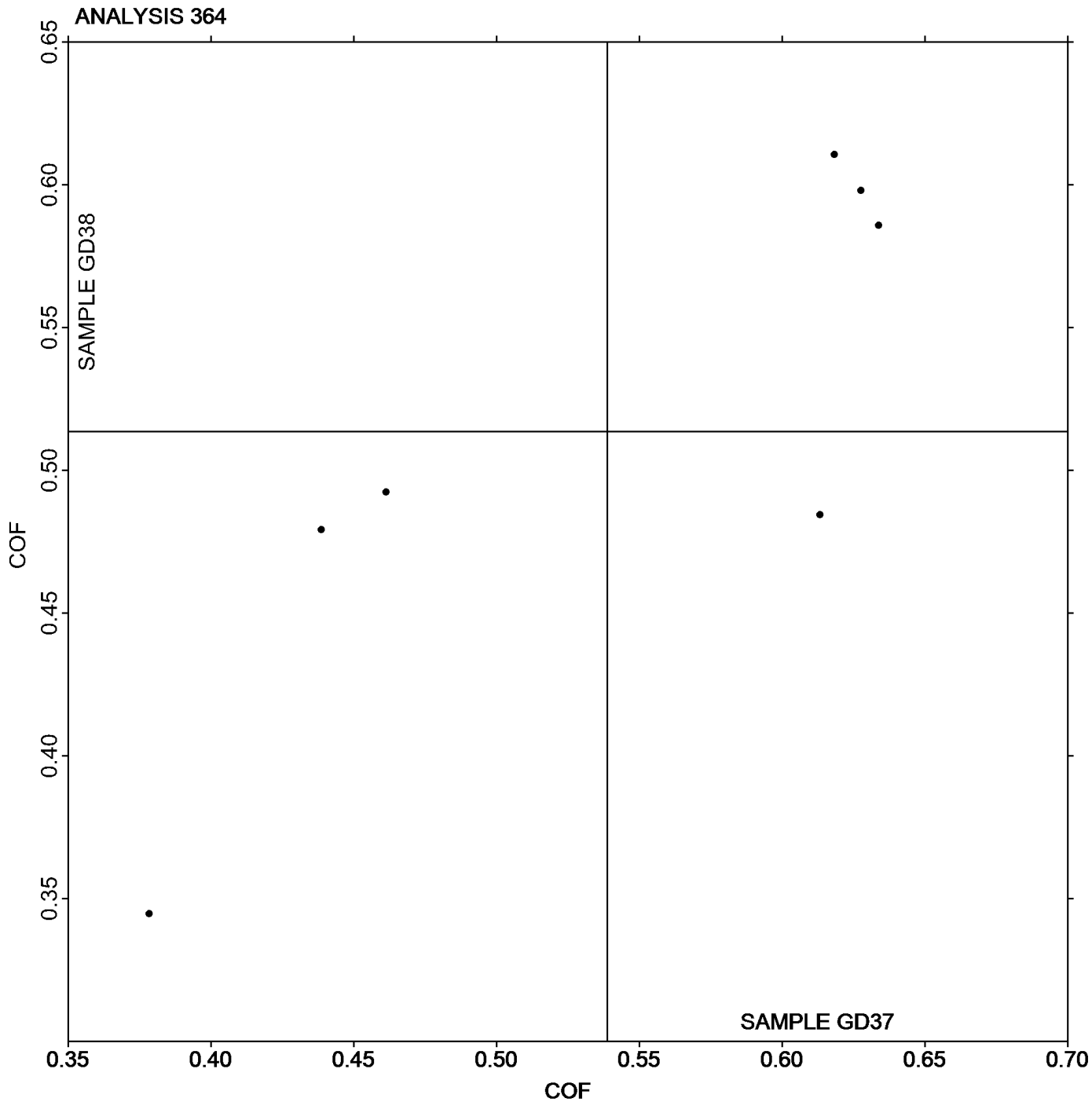
# Paper & Paperboard Interlaboratory Testing Program Analysis 364

Report #285G  
December 2016

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

Grand Mean Sample **GD37** = 0.53877 COF

Grand Mean Sample **GD38** = 0.51357 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 #285G  
December 2016

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

WebCode	Data Flag	Sample GD37			Sample GD38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3ZBMJV		0.3398	-0.0713	-0.71	0.3452	-0.0419	-0.46	TM
9F7V7B		0.3884	-0.0227	-0.23	0.4198	0.0327	0.36	TA
9LAX86		0.4788	0.0677	0.67	0.4328	0.0457	0.50	TA
ADAW6H		0.4480	0.0369	0.37	0.3910	0.0039	0.04	TA
EW9JYC		0.4470	0.0359	0.36	0.3766	-0.0105	-0.11	TA
F3R9VQ		0.5204	0.1093	1.08	0.5032	0.1161	1.27	TM
F9L7KH		0.3228	-0.0883	-0.87	0.3186	-0.0685	-0.75	IR
M78CHN		0.2266	-0.1845	-1.83	0.2416	-0.1455	-1.59	TA
M7PZ7B		0.4944	0.0833	0.82	0.4742	0.0871	0.96	TA
RHAVCR		0.5462	0.1351	1.34	0.5020	0.1149	1.26	TM
YW3YUH		0.3100	-0.1011	-1.00	0.2526	-0.1345	-1.47	XX

		<b>Summary Statistics</b>	
		<b>Sample GD37</b>	<b>Sample GD38</b>
Grand Means		0.41113 COF	0.38705 COF
SD Btwn Labs		0.10101 COF	0.09125 COF
Statistics based on 11 of 11 reporting participants			

**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





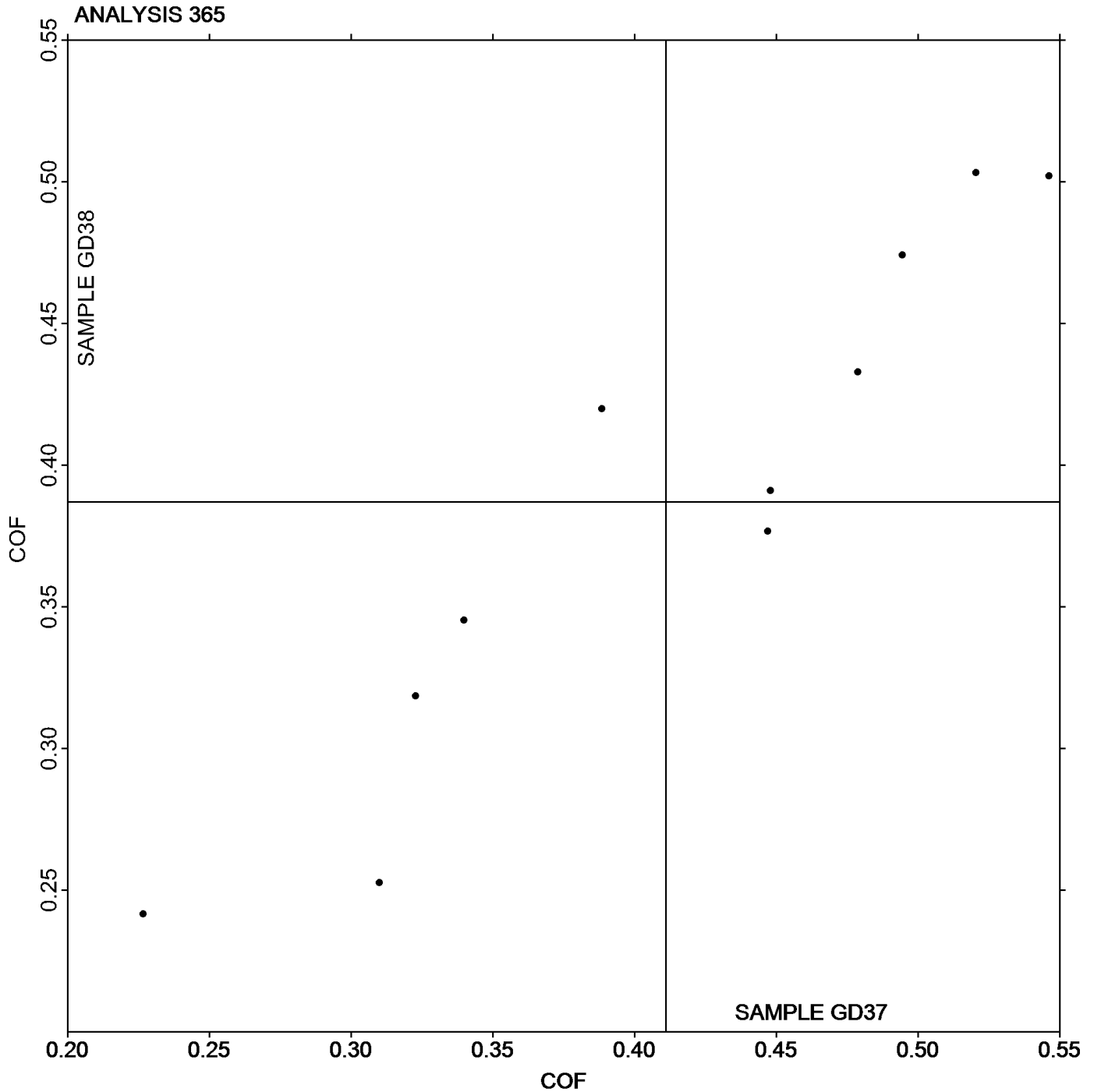
**Paper & Paperboard Interlaboratory Testing Program  
Analysis 365**

**Report #285G  
December 2016**

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

Grand Mean Sample **GD37** = 0.41113 COF

Grand Mean Sample **GD38** = 0.38705 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 #285G  
December 2016

WebCode	Data Flag	Sample GE37			Sample GE38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
22PPTP		16.86	-0.58	-0.65	20.35	-0.19	-0.18	PP
2YJ66P		17.74	0.29	0.33	21.12	0.58	0.54	PP
2ZFKGL		16.34	-1.10	-1.24	20.37	-0.17	-0.16	TN
4RWYJ3		17.69	0.24	0.27	20.15	-0.39	-0.35	PP
6ABVF8		16.62	-0.82	-0.93	18.98	-1.56	-1.43	LP
7BZHAM		18.47	1.03	1.15	21.96	1.42	1.30	WG
7HVKCX		17.30	-0.14	-0.16	20.10	-0.44	-0.40	PP
7HY8QQ		17.74	0.30	0.33	21.57	1.04	0.95	PP
7W39N2	*	15.73	-1.71	-1.93	19.97	-0.57	-0.52	TL
8R6ARH		17.00	-0.44	-0.50	20.06	-0.48	-0.44	PP
93Y63H		17.71	0.27	0.30	20.85	0.31	0.29	XX
9F7V7B		17.07	-0.37	-0.42	20.15	-0.39	-0.36	LA
9LAX86		17.92	0.48	0.54	21.48	0.94	0.86	WG
A9GV44		16.62	-0.82	-0.93	20.62	0.08	0.07	HG
A9GXP2		17.21	-0.24	-0.27	19.55	-0.99	-0.91	PP
ADAW6H		18.52	1.08	1.21	21.21	0.67	0.62	HG
BBMHC2		18.63	1.19	1.33	22.10	1.56	1.43	LP
BXXGZ2		18.74	1.30	1.46	21.43	0.89	0.82	XX
DJ7V94		16.09	-1.35	-1.53	18.96	-1.58	-1.45	LW
DVKQN3		17.87	0.43	0.48	20.74	0.20	0.18	LA
EPCRQH	*	18.68	1.24	1.39	23.22	2.68	2.46	HG
G2FU4B		18.19	0.75	0.84	20.84	0.30	0.28	TL
G2XZ32		15.53	-1.92	-2.16	18.65	-1.89	-1.73	RE
GK78EU		17.54	0.10	0.11	21.13	0.59	0.54	LP
HLVVAU		16.62	-0.82	-0.93	19.39	-1.15	-1.05	XX
K6LQYM		16.82	-0.62	-0.70	19.37	-1.17	-1.07	LP
K94QGN		16.29	-1.15	-1.30	18.96	-1.58	-1.45	LP
LMJ7XT		17.20	-0.24	-0.28	19.70	-0.84	-0.77	LW
M9WFF2		18.69	1.25	1.40	21.69	1.15	1.05	HG
MPHYBN		17.41	-0.03	-0.04	20.34	-0.19	-0.18	PP
N2WFHK		17.71	0.27	0.30	20.97	0.43	0.40	LP
NCBF9M		17.74	0.30	0.33	20.42	-0.12	-0.11	XX
NQT3HK		17.80	0.36	0.40	21.00	0.46	0.42	LA
P3KATU		18.33	0.88	0.99	21.52	0.98	0.90	HG
PEB7R8		17.26	-0.18	-0.21	20.37	-0.17	-0.15	PP
QU8KPF		17.76	0.32	0.35	19.84	-0.70	-0.64	LP
RBP3VL		18.79	1.35	1.51	22.99	2.45	2.24	GA
RNDZ2Q		17.53	0.08	0.09	20.39	-0.14	-0.13	PP
T873HQ		17.02	-0.42	-0.48	19.93	-0.61	-0.56	TL
TNRQNF		18.94	1.49	1.68	23.22	2.68	2.45	LA
WM7EFK		16.59	-0.86	-0.97	20.12	-0.42	-0.39	HG



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

Report #285G  
December 2016

WebCode	Data Flag	Sample GE37			Sample GE38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
WUNKED		17.70	0.26	0.29	20.79	0.25	0.23	LP
XAU7CT		16.00	-1.44	-1.63	18.67	-1.87	-1.71	LP
XFZ2U8		15.38	-2.06	-2.32	18.98	-1.56	-1.43	PP
XH7MKT		17.83	0.39	0.44	19.61	-0.93	-0.85	PP
XLNPPD	X	217.00	199.56	224.68	247.10	226.56	207.46	LA
XNU8RF		18.35	0.91	1.02	21.36	0.82	0.75	TN
XVQ4BC		17.93	0.49	0.55	20.21	-0.33	-0.30	LA
YHL636		17.41	-0.03	-0.04	20.05	-0.49	-0.45	GL
YW3YUH		17.90	0.46	0.51	20.92	0.38	0.35	GS
ZVM2XC	X	14.84	-2.60	-2.93	12.41	-8.13	-7.44	LW

Sample GE37		Summary Statistics		Sample GE38	
Grand Means	17.445 sec/100 cc			20.538 sec/100 cc	
SD Btwn Labs	0.888 sec/100 cc			1.092 sec/100 cc	
Statistics based on 49 of 51 reporting participants					

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

- XLNPPD (X) - Extreme Data.
- ZVM2XC (X) - Extreme Data.

**Key to Instrument Codes Reported by Participants**

<b>GA</b> Gurley Precision #4340 Automatic Densometer	<b>GL</b> Gurley #4110
<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 #4110, 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	



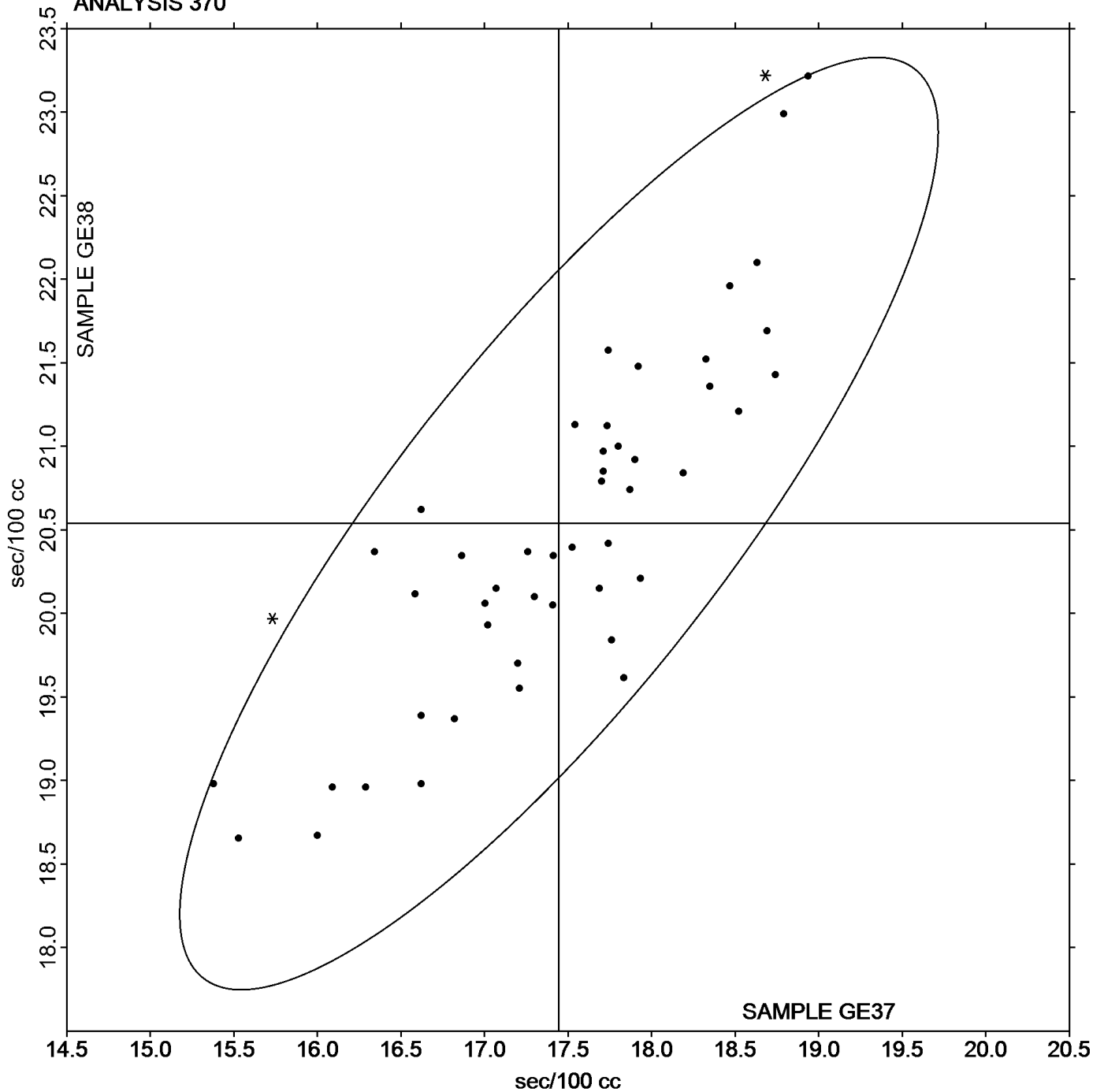
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 370**  
**Air Resistance - Gurley Oil Type**

Report #285G  
December 2016

Grand Mean Sample **GE37** = 17.445 sec/100 cc

Grand Mean Sample **GE38** = 20.538 sec/100 cc

**ANALYSIS 370**





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

Report #285G  
December 2016

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

WebCode	Data Flag	Sample GE37			Sample GE38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2VLL3Q		146.9	-11.5	-0.76	126.6	-7.1	-0.88	TT
3CZJJ9		177.2	18.8	1.24	142.9	9.2	1.13	TT
4VUHML		188.2	29.8	1.97	151.3	17.6	2.17	VM
7HVKCX		153.8	-4.6	-0.30	139.8	6.1	0.75	PP
93Y63H		148.1	-10.3	-0.68	128.3	-5.4	-0.67	XX
A9GXP2		155.1	-3.3	-0.22	136.2	2.5	0.31	HM
EPCRQH		148.4	-10.0	-0.66	131.6	-2.1	-0.26	TT
H9VU2Z		159.2	0.8	0.05	140.3	6.6	0.81	HM
M42QUN		152.3	-6.1	-0.40	126.8	-7.0	-0.86	GA
N9TFQL		145.5	-12.9	-0.85	124.7	-9.0	-1.11	LP
TJVZJP		139.3	-19.1	-1.26	124.3	-9.4	-1.16	TT
XFZ2U8		166.0	7.6	0.50	140.4	6.7	0.82	SH
YB3Z8J		148.7	-9.7	-0.64	124.2	-9.5	-1.17	LP
YCH2C7		159.4	1.0	0.07	135.1	1.4	0.17	HM
YW3YUH	*	188.1	29.7	1.96	133.3	-0.4	-0.05	SH

		Summary Statistics	
		Sample GE37	Sample GE38
Grand Means		158.41 Sheffield Units	133.72 Sheffield Units
SD Btwn Labs		15.16 Sheffield Units	8.11 Sheffield Units
Statistics based on 15 of 15 reporting participants			

**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

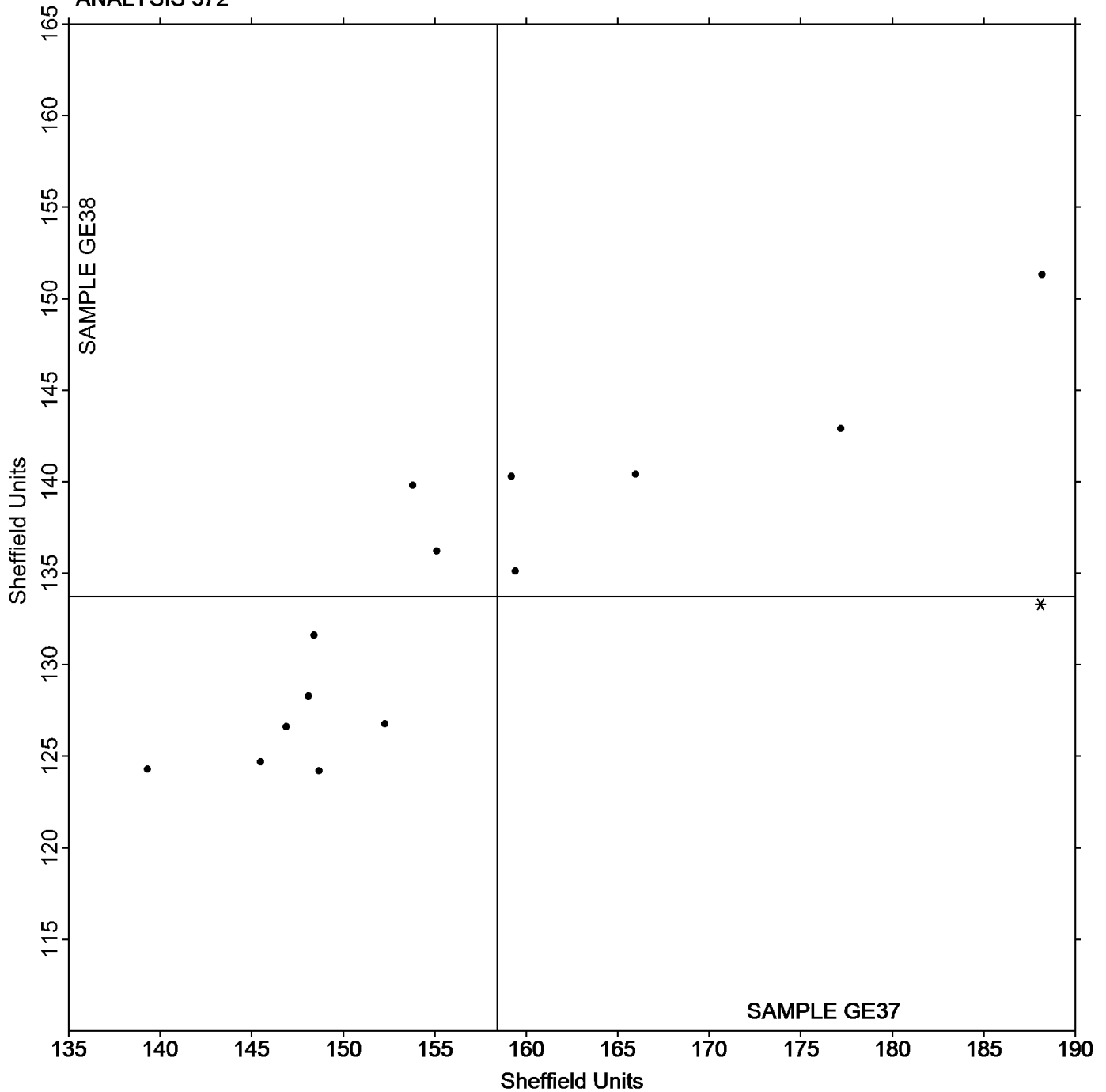
Report #285G  
December 2016

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

Grand Mean Sample **GE37** = 158.41 Sheffield Units

Grand Mean Sample **GE38** = 133.72 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 #285G  
December 2016

WebCode	Data Flag	Sample GJ37			Sample GJ38		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
22PPTP		0.8040	-0.0043	-0.05	1.109	-0.050	-0.58
3TPPV9	X	0.6730	-0.1353	-1.59	1.064	-0.095	-1.10
6UJXEC		0.9590	0.1507	1.77	1.292	0.133	1.56
83LYN2		0.8270	0.0187	0.22	1.205	0.046	0.54
8R6ARH		0.8070	-0.0013	-0.01	1.156	-0.003	-0.03
93HUNJ		0.8180	0.0097	0.11	1.119	-0.040	-0.46
9LAX86		0.6400	-0.1683	-1.97	0.974	-0.185	-2.15
ADAW6H		0.7300	-0.0783	-0.92	1.102	-0.057	-0.66
AYAZ66		0.7300	-0.0783	-0.92	1.120	-0.039	-0.45
BA7JY4		0.7660	-0.0423	-0.50	1.104	-0.055	-0.64
BT2U8D	X	1.0370	0.2287	2.68	1.261	0.102	1.19
CTE7Z3		0.7250	-0.0833	-0.98	1.090	-0.069	-0.80
DJR8AW		0.8180	0.0097	0.11	1.182	0.023	0.27
EPCRQH		0.8860	0.0777	0.91	1.207	0.048	0.56
FRDEFR		0.9270	0.1187	1.39	1.219	0.060	0.70
H9VU2Z		0.6490	-0.1593	-1.87	1.027	-0.132	-1.54
JK6RGM		0.8160	0.0077	0.09	1.169	0.010	0.12
K6LQYM		0.7890	-0.0193	-0.23	1.165	0.006	0.07
KAFA6		0.8330	0.0247	0.29	1.229	0.070	0.82
LGWH3M	X	1.0640	0.2557	3.00	1.233	0.074	0.87
M78CHN		0.9800	0.1717	2.01	1.327	0.168	1.96
P3KATU		0.7820	-0.0263	-0.31	1.138	-0.021	-0.24
PA3FRM		0.8030	-0.0053	-0.06	1.125	-0.034	-0.39
T2EYPM		0.7220	-0.0863	-1.01	1.089	-0.070	-0.81
T6GWXU		0.7880	-0.0203	-0.24	1.167	0.008	0.10
ULYE2E		0.8320	0.0237	0.28	1.171	0.012	0.14
VJA8GH		0.7630	-0.0453	-0.53	1.124	-0.035	-0.40
VKJCWR	*	0.9900	0.1817	2.13	1.402	0.243	2.84
XFZ2U8		0.9000	0.0917	1.08	1.215	0.056	0.66
XH7MKT		0.8030	-0.0053	-0.06	1.147	-0.012	-0.14
XLNPPD	X	4.2560	3.4477	40.44	10.518	9.359	109.21
YNMFBJ		0.7650	-0.0433	-0.51	1.072	-0.087	-1.01
YUCU2B		0.7880	-0.0203	-0.24	1.155	-0.004	-0.04

Sample GJ37		Summary Statistics	Sample GJ38	
Grand Means	0.80828 Microns		1.1587 Microns	
SD Btwn Labs	0.08526 Microns		0.0857 Microns	
Statistics based on 29 of 33 reporting participants				



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

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**Report #285G**  
**December 2016**

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

XLNPPD (X) - Extreme Data.

LGWH3M (X) - Data for sample GJ37 are high.

3TPPV9 (X) - Data appear to be off by a factor of .01. Corrected by CTS (x100).

BT2U8D (X) - Data for sample GJ37 are high.



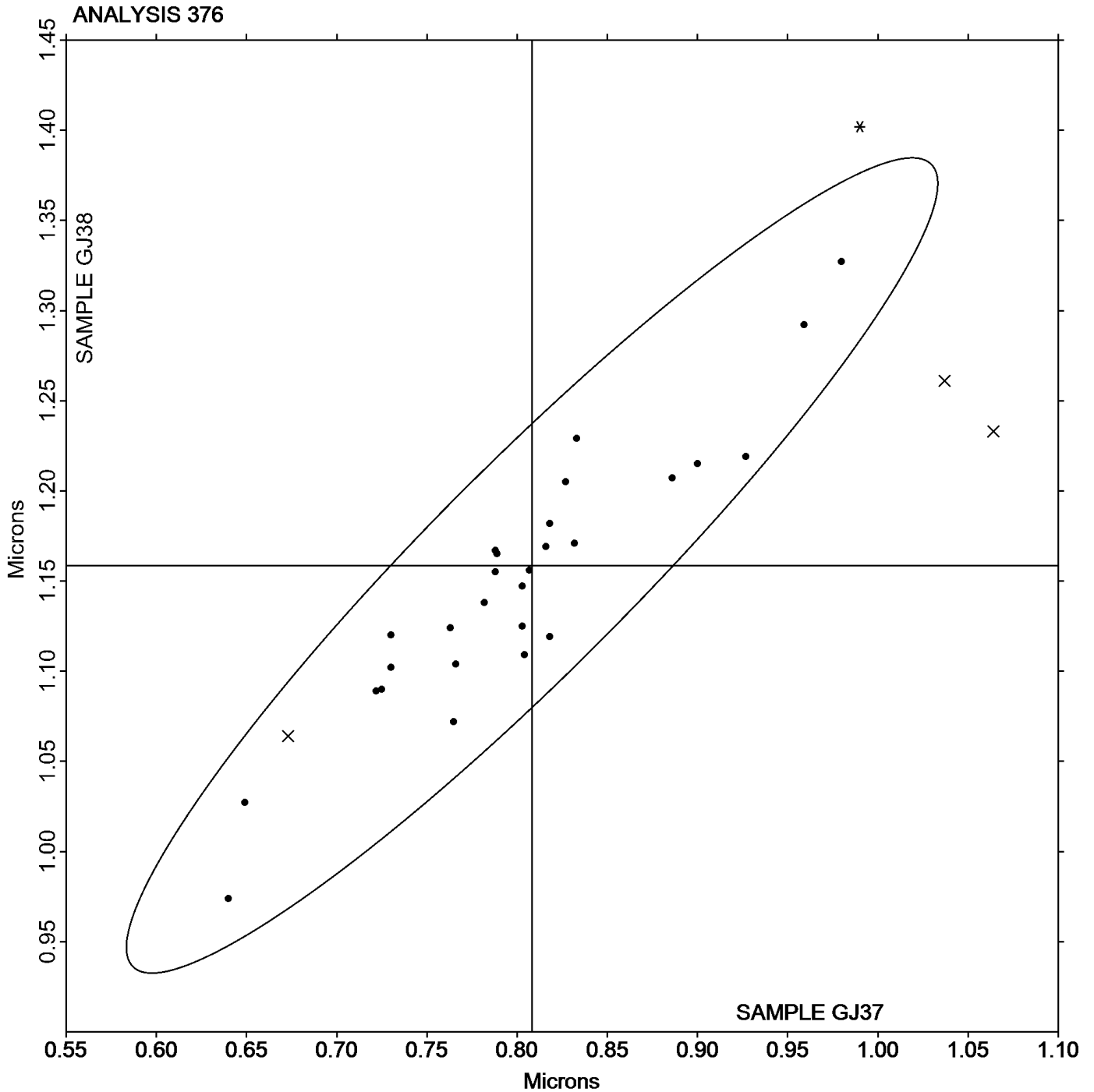


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 376**  
**Roughness - Print Surf Method - 0.5 to 4.0 Microns**

Report #285G  
December 2016

Grand Mean Sample **GJ37** = 0.80828 Microns

Grand Mean Sample **GJ38** = 1.1587 Microns





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

**Report #285G  
December 2016**

WebCode	Data Flag	Sample GK37			Sample GK38		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2YJ66P		3.811	-0.051	-0.40	2.968	-0.013	-0.13
4VUHML		3.994	0.132	1.01	2.980	-0.001	-0.01
7HY8QQ		3.996	0.134	1.03	3.133	0.152	1.47
9LAX86		3.742	-0.120	-0.93	2.830	-0.151	-1.46
ADAW6H		3.979	0.117	0.90	2.961	-0.020	-0.19
DVKQN3		3.612	-0.250	-1.93	2.845	-0.136	-1.31
FCKLVQ		3.933	0.071	0.54	3.125	0.144	1.39
KAFHA6	X	4.373	0.511	3.93	3.501	0.520	5.01
PEB7R8		3.866	0.004	0.03	2.993	0.012	0.12
QU8KPF		3.828	-0.034	-0.26	2.994	0.013	0.13

		<b>Summary Statistics</b>	
		<b>Sample GK37</b>	<b>Sample GK38</b>
Grand Means		3.8623 Microns	2.9810 Microns
SD Btwn Labs		0.1298 Microns	0.1037 Microns
Statistics based on 9 of 10 reporting participants			

**Comments on Assigned Data Flags for Test #377**

KAFHA6 (X) - Data for both samples are high.

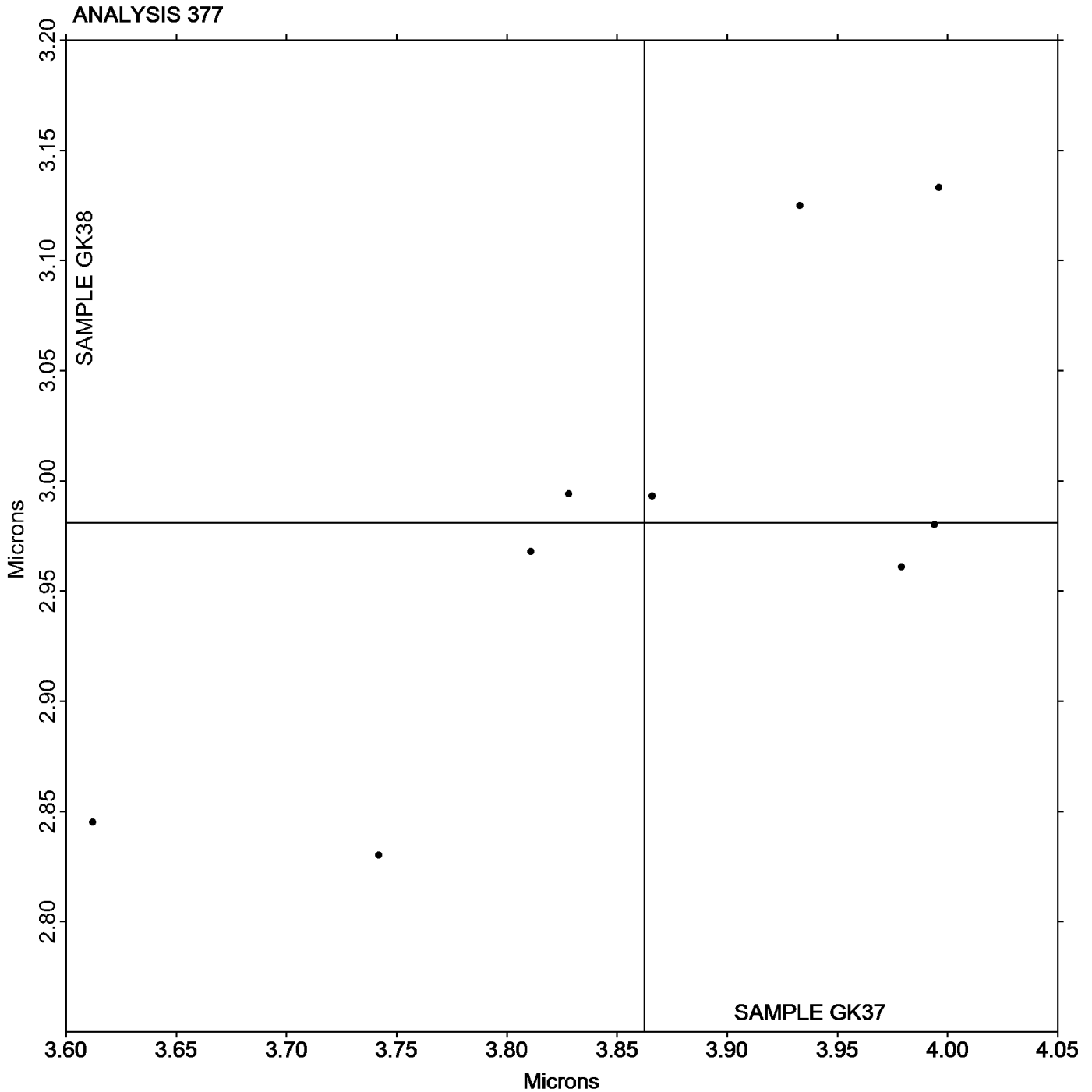


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 377**  
**Roughness - Print Surf Method - 2.5 to 6.0 Microns**

Report #285G  
December 2016

Grand Mean Sample **GK37** = 3.8623 Microns

Grand Mean Sample **GK38** = 2.9810 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 #285G  
December 2016

WebCode	Data Flag	Sample GL37			Sample GL38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
22PPTP		235.0	8.1	0.63	260.5	15.0	1.08	PP
2DFGFE	*	251.6	24.7	1.93	250.6	5.1	0.37	GA
2VLL3Q		222.2	-4.7	-0.37	227.6	-17.9	-1.29	TT
2YJ66P		215.2	-11.7	-0.91	243.7	-1.8	-0.13	PP
3TPPV9		224.3	-2.6	-0.20	248.0	2.5	0.18	LA
4RWYJ3		243.7	16.9	1.32	266.6	21.1	1.53	PP
6UJXEC		198.5	-28.4	-2.22	212.0	-33.5	-2.42	GL
7B39F6		234.6	7.7	0.60	249.6	4.1	0.30	GA
7BZHAM		234.4	7.5	0.59	254.4	8.9	0.65	PG
7CBKX7	X	257.5	30.6	2.40	300.3	54.9	3.97	MP
7HVKCX		227.7	0.8	0.06	250.9	5.4	0.39	HM
7HY8QQ		240.8	13.9	1.09	250.5	5.1	0.37	PP
83LYN2		232.9	6.0	0.47	251.7	6.2	0.45	LW
8R6ARH	*	203.7	-23.2	-1.81	210.6	-34.9	-2.52	PP
93Y63H	*	215.4	-11.5	-0.90	213.9	-31.6	-2.28	XX
9LAX86		242.5	15.6	1.22	249.5	4.0	0.29	XX
A9GV44		226.0	-0.9	-0.07	258.9	13.4	0.97	TS
A9GXP2		218.3	-8.6	-0.67	242.9	-2.5	-0.18	PP
BA7JY4		226.7	-0.2	-0.01	237.4	-8.1	-0.58	PP
BBMHC2		205.2	-21.7	-1.70	230.5	-15.0	-1.08	LW
CTE7Z3		215.2	-11.6	-0.91	234.4	-11.1	-0.80	PP
DJ7V94	X	181.2	-45.7	-3.57	206.9	-38.6	-2.79	SH
DVKQN3		206.2	-20.7	-1.62	238.4	-7.1	-0.51	LA
EPCRQH		241.0	14.1	1.11	265.4	19.9	1.44	TT
F3R9VQ		234.6	7.7	0.60	258.0	12.5	0.90	PP
FCKLVQ		231.2	4.3	0.34	261.1	15.6	1.13	HM
HDL47R		221.6	-5.2	-0.41	228.6	-16.9	-1.22	XX
JK6RGM		229.7	2.8	0.22	248.7	3.2	0.23	XX
K6LQYM	*	191.1	-35.8	-2.80	214.9	-30.6	-2.21	TS
KC9C9U		222.7	-4.2	-0.33	246.2	0.7	0.05	TS
KX2MU7	X	233.9	7.0	0.55	222.5	-23.0	-1.66	TT
KXPQN2		196.4	-30.5	-2.39	219.1	-26.4	-1.91	XX
L7EWWT		228.5	1.6	0.13	262.7	17.2	1.24	PP
LGWH3M		224.6	-2.3	-0.18	241.0	-4.5	-0.32	LA
LMJ7XT		230.3	3.4	0.27	228.6	-16.9	-1.22	TS
M42QUN		235.5	8.7	0.68	254.4	8.9	0.65	GA
M78CHN		215.9	-11.0	-0.86	237.4	-8.1	-0.58	HM
M9WFF2		225.5	-1.4	-0.11	247.6	2.1	0.15	HM
MPHYBN		225.9	-1.0	-0.08	245.3	-0.2	-0.01	HM
MT7DYX		229.1	2.2	0.17	246.6	1.1	0.08	TS
NZY6KW		223.9	-3.0	-0.23	239.6	-5.9	-0.42	LA



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

Report #285G  
December 2016

WebCode	Data Flag	Sample GL37			Sample GL38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
P3KATU		227.4	0.5	0.04	244.6	-0.9	-0.06	HM
PA3FRM		244.3	17.4	1.36	267.4	21.9	1.59	TT
PEB7R8		227.3	0.4	0.03	246.7	1.2	0.09	PP
QHTH9N		224.9	-1.9	-0.15	245.2	-0.2	-0.02	PP
QU8KPF		230.1	3.2	0.25	248.9	3.4	0.25	LW
R7U4MH		251.5	24.6	1.93	260.5	15.0	1.09	GL
RNDZ2Q		222.5	-4.4	-0.34	243.5	-2.0	-0.14	SH
T2EYPM		242.5	15.6	1.22	256.0	10.5	0.76	PP
TJVZJP		243.2	16.3	1.28	260.5	15.0	1.09	TT
TNRQNF		215.5	-11.4	-0.89	225.1	-20.3	-1.47	LA
U83Z7R		226.1	-0.8	-0.06	250.6	5.1	0.37	PP
ULYE2E		223.6	-3.3	-0.26	240.8	-4.7	-0.34	LW
W4CDNN		243.5	16.6	1.30	251.0	5.5	0.40	XX
XFZ2U8		231.7	4.8	0.38	260.0	14.5	1.05	PP
XH7MKT		220.3	-6.6	-0.51	241.4	-4.1	-0.29	PP
XLNPPD		234.0	7.1	0.56	246.9	1.4	0.10	PP
YB3Z8J		233.2	6.3	0.50	258.8	13.3	0.96	PP
YCH2C7		241.8	14.9	1.17	261.6	16.1	1.17	HM
YHL636		219.1	-7.8	-0.61	239.8	-5.6	-0.41	PP
YW3YUH		234.3	7.4	0.58	255.4	9.9	0.72	XX
Z8V2AW		221.0	-5.9	-0.46	250.1	4.6	0.33	SH

	Sample GL37	Summary Statistics	Sample GL38
Grand Means	226.87 Sheffield		245.47 Sheffield
SD Btwn Labs	12.78 Sheffield		13.83 Sheffield
Statistics based on 59 of 62 reporting participants			

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

- DJ7V94 (X) - Data for both samples are low. Possible Systematic Error.
- 7CBKX7 (X) - Data for sample GL38 are high.
- KX2MU7 (X) - Inconsistent in testing between samples.



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

**Report #285G**  
**December 2016**

**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

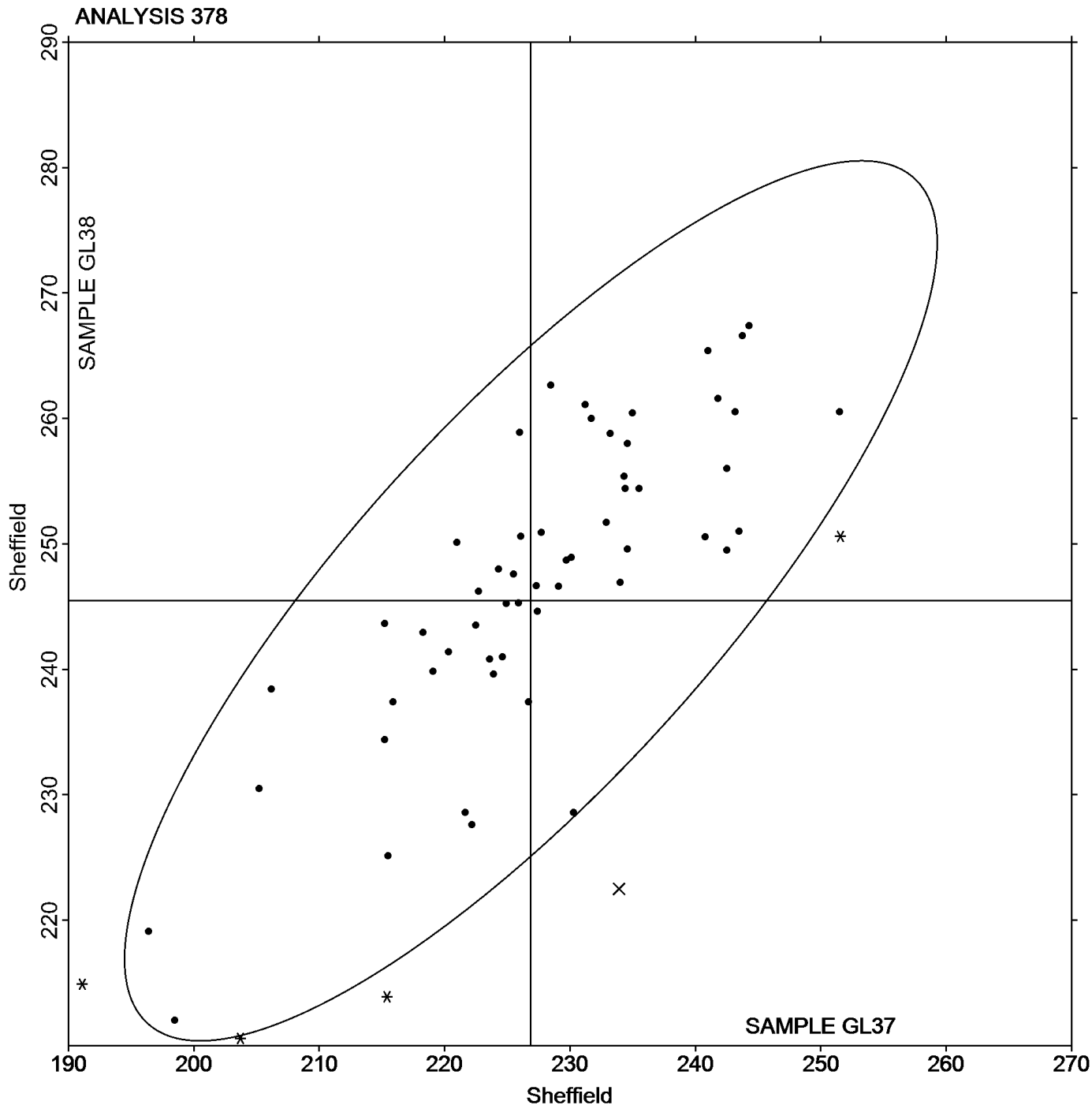
## Analysis 378

### Roughness - Sheffield Type

Report #285G  
December 2016

Grand Mean Sample **GL37** = 226.87 Sheffield

Grand Mean Sample **GL38** = 245.47 Sheffield





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

**Report #285G  
December 2016**

WebCode	Data Flag	Sample GM37			Sample GM38		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
26M9W9		4.640	0.221	0.54	4.703	0.091	0.26
3EPNFL		5.280	0.861	2.09	5.269	0.657	1.87
7HY8QQ		4.624	0.205	0.50	4.532	-0.080	-0.23
922U9Z		4.339	-0.080	-0.19	4.691	0.079	0.22
BWKBZH		4.110	-0.309	-0.75	4.230	-0.382	-1.09
FCKLVQ		4.480	0.061	0.15	4.850	0.238	0.68
FEQ6V8		3.819	-0.600	-1.46	4.246	-0.366	-1.04
VMRPFE		4.406	-0.013	-0.03	4.720	0.108	0.31
WRYDUF		4.540	0.121	0.29	4.795	0.183	0.52
WUNKED		3.953	-0.466	-1.13	4.083	-0.529	-1.50

		<b>Summary Statistics</b>		
	<b>Sample GM37</b>		<b>Sample GM38</b>	
Grand Means	4.4191	Percent	4.6119	Percent
SD Btwn Labs	0.4123	Percent	0.3519	Percent
Statistics based on 10 of 10 reporting participants				





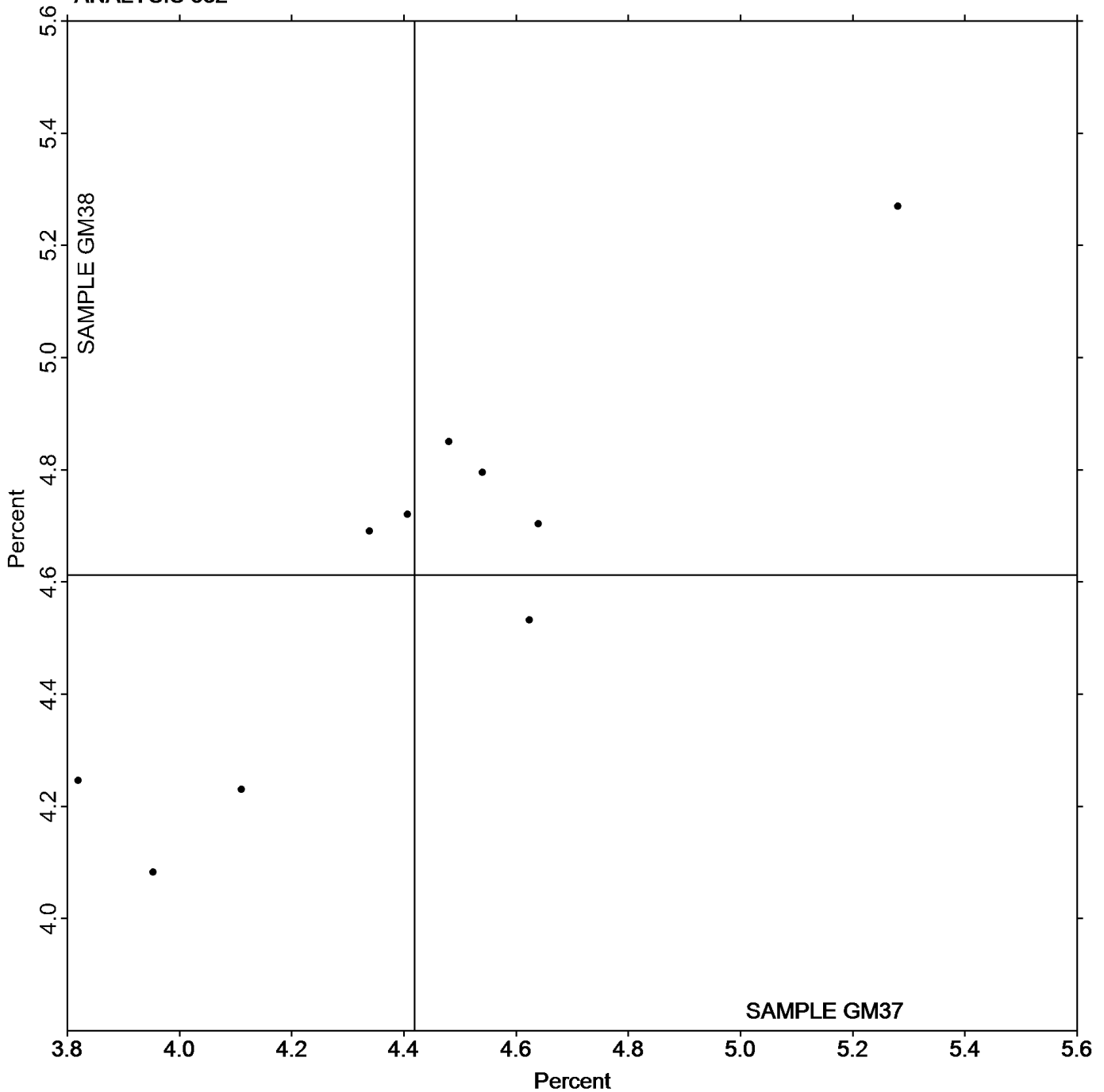
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 382**  
**Moisture in Paper**

**Report #285G**  
**December 2016**

Grand Mean Sample **GM37** = 4.4191 Percent

Grand Mean Sample **GM38** = 4.6119 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 #285G  
December 2016

WebCode	Data Flag	Sample GN37			Sample GN38		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2VLL3Q		94.16	0.57	1.27	94.17	0.69	1.41
3FZTP4		93.42	-0.17	-0.37	93.51	0.03	0.05
3KF2HA		93.85	0.26	0.58	93.36	-0.12	-0.25
4RWYJ3		93.68	0.10	0.21	93.94	0.45	0.93
7BZHAM		93.00	-0.59	-1.30	93.42	-0.06	-0.13
7HVKCX		93.61	0.02	0.05	93.08	-0.40	-0.83
7HY8QQ		93.79	0.20	0.45	93.56	0.07	0.15
8R6ARH		93.74	0.15	0.34	93.67	0.19	0.38
93Y63H	*	92.48	-1.11	-2.45	92.34	-1.14	-2.35
A9GV44		93.56	-0.03	-0.06	93.52	0.04	0.08
ADAW6H		93.90	0.31	0.69	93.78	0.30	0.61
BT2U8D	*	92.19	-1.40	-3.09	92.50	-0.99	-2.03
DJR8AW		93.88	0.29	0.65	93.91	0.43	0.87
DVKQN3		93.45	-0.14	-0.30	93.39	-0.09	-0.19
EPCRQH		94.11	0.53	1.16	93.71	0.23	0.46
F3R9VQ		93.04	-0.54	-1.20	93.66	0.17	0.35
FCKLVQ		94.06	0.47	1.04	93.50	0.02	0.04
FPKF7Z		93.69	0.10	0.23	93.07	-0.41	-0.85
G2FU4B		93.59	0.00	0.01	92.84	-0.64	-1.32
JK6RGM		93.03	-0.56	-1.23	92.94	-0.54	-1.12
KXPQN2		94.29	0.70	1.56	94.02	0.54	1.10
LMJ7XT		93.64	0.06	0.13	93.17	-0.32	-0.65
LW9R8X		93.38	-0.20	-0.45	93.05	-0.44	-0.89
M78CHN		93.53	-0.06	-0.12	93.65	0.17	0.34
M9WFF2		93.62	0.03	0.07	93.48	0.00	-0.01
PEB7R8		93.83	0.24	0.53	93.62	0.13	0.27
R7U4MH		93.89	0.30	0.67	94.56	1.08	2.21
RNDZ2Q		93.75	0.16	0.36	93.61	0.13	0.26
T6GWXU		93.90	0.31	0.69	93.83	0.35	0.71
TJVZJP		93.48	-0.11	-0.24	93.23	-0.25	-0.52
TNRQNF	*	93.47	-0.12	-0.26	92.41	-1.07	-2.20
U83Z7R		93.52	-0.07	-0.15	93.91	0.43	0.87
VJA8GH		93.92	0.33	0.74	93.88	0.40	0.81
VKJCWR		93.14	-0.44	-0.98	93.60	0.12	0.25
W4CDNN		94.25	0.66	1.46	94.26	0.78	1.60
YHL636		92.99	-0.60	-1.32	93.28	-0.20	-0.42
YW3YUH	X	90.50	-3.09	-6.83	89.14	-4.34	-8.91
Z8V2AW		93.86	0.27	0.61	93.50	0.02	0.03



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 384**

**Report #285G  
December 2016**

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

	<b>Sample GN37</b>	<b>Summary Statistics</b>	<b>Sample GN38</b>
Grand Means	93.586 Percent		93.484 Percent
SD Btwn Labs	0.452 Percent		0.488 Percent
Statistics based on 37 of 38 reporting participants			

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

YW3YUH (X) - Extreme Data.

**Analysis Notes:**

A9GV44 - One determination removed from the Lab Mean of Sample GN37 per Grubb's Test at 1% risk (TAPPI 1205).

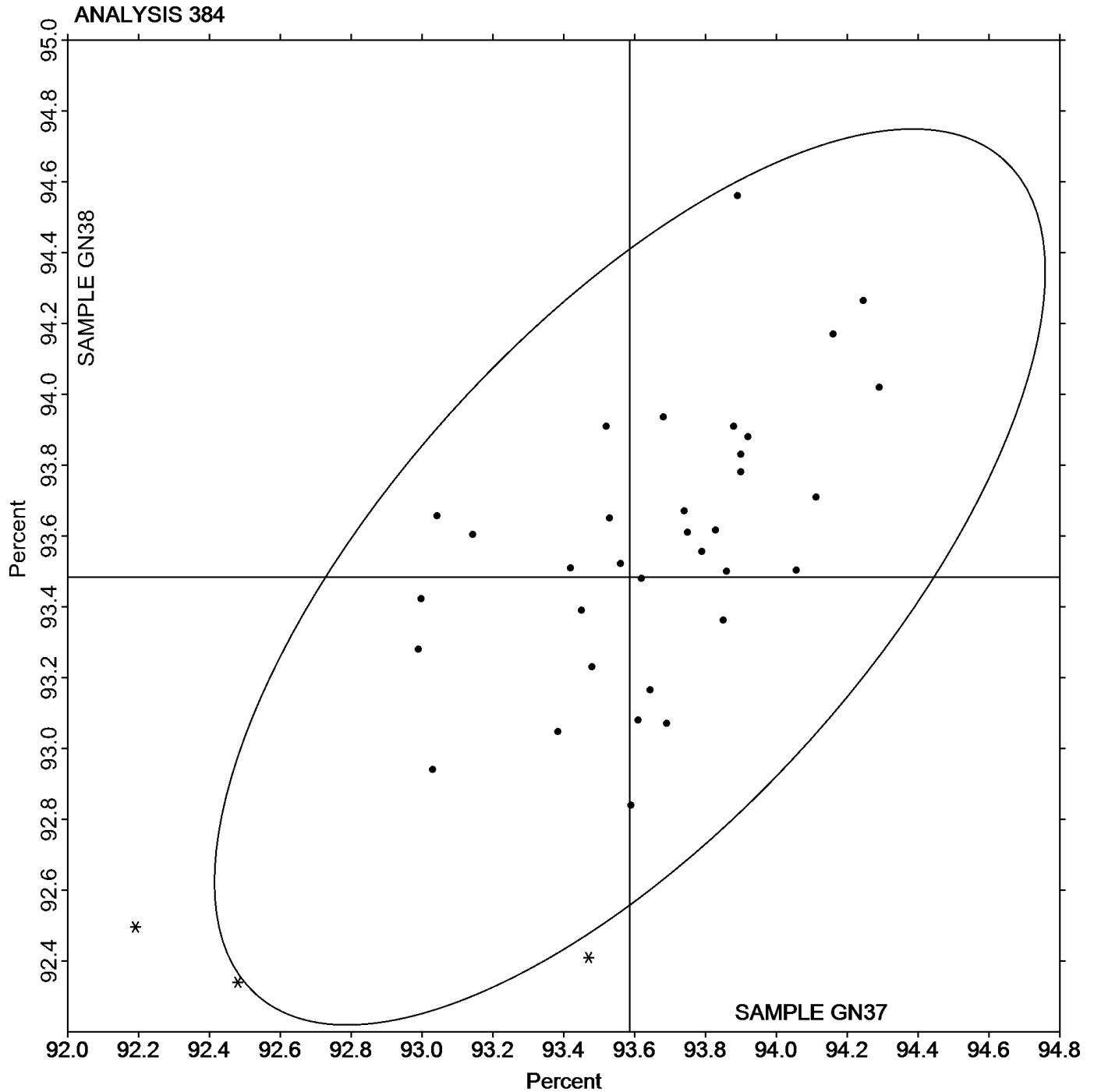


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 384**  
**Opacity (89% Reflectance Backing) - Fine Papers**

Report #285G  
December 2016

Grand Mean Sample **GN37** = 93.586 Percent

Grand Mean Sample **GN38** = 93.484 Percent





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

**Report #285G  
December 2016**

WebCode	Data Flag	Sample GP37			Sample GP38		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
6ABVF8		94.51	0.04	0.30	94.46	0.02	0.16
7W39N2		94.38	-0.08	-0.57	94.46	0.02	0.18
8BWFY9		94.36	-0.10	-0.69	94.34	-0.10	-0.70
A9GXP2		94.35	-0.12	-0.81	94.33	-0.11	-0.78
CD7WF3		94.56	0.09	0.63	94.69	0.25	1.80
D98XL4		94.47	0.01	0.04	94.31	-0.13	-0.91
G2XZ32		94.42	-0.04	-0.29	94.50	0.07	0.49
HLVVAU		94.61	0.14	0.97	94.18	-0.26	-1.88
JK6RGM	X	93.23	-1.23	-8.44	93.31	-1.12	-8.10
RHAVCR		94.30	-0.17	-1.13	94.64	0.21	1.50
V8VD2J		94.66	0.20	1.37	94.36	-0.08	-0.55
WUNKED		94.61	0.15	1.00	94.36	-0.07	-0.52
XACGN7		94.62	0.15	1.04	94.39	-0.04	-0.31
XAU7CT		94.40	-0.07	-0.46	94.33	-0.11	-0.80
YCH2C7		94.12	-0.35	-2.36	94.50	0.06	0.45
YUCU2B		94.61	0.15	1.00	94.63	0.20	1.43
ZVM2XC		94.46	0.00	-0.02	94.50	0.06	0.44

		<b>Summary Statistics</b>	
	<b>Sample GP37</b>		<b>Sample GP38</b>
Grand Means	94.463 Percent		94.436 Percent
SD Btwn Labs	0.146 Percent		0.139 Percent
Statistics based on 16 of 17 reporting participants			

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

JK6RGM (X) - Extreme Data.

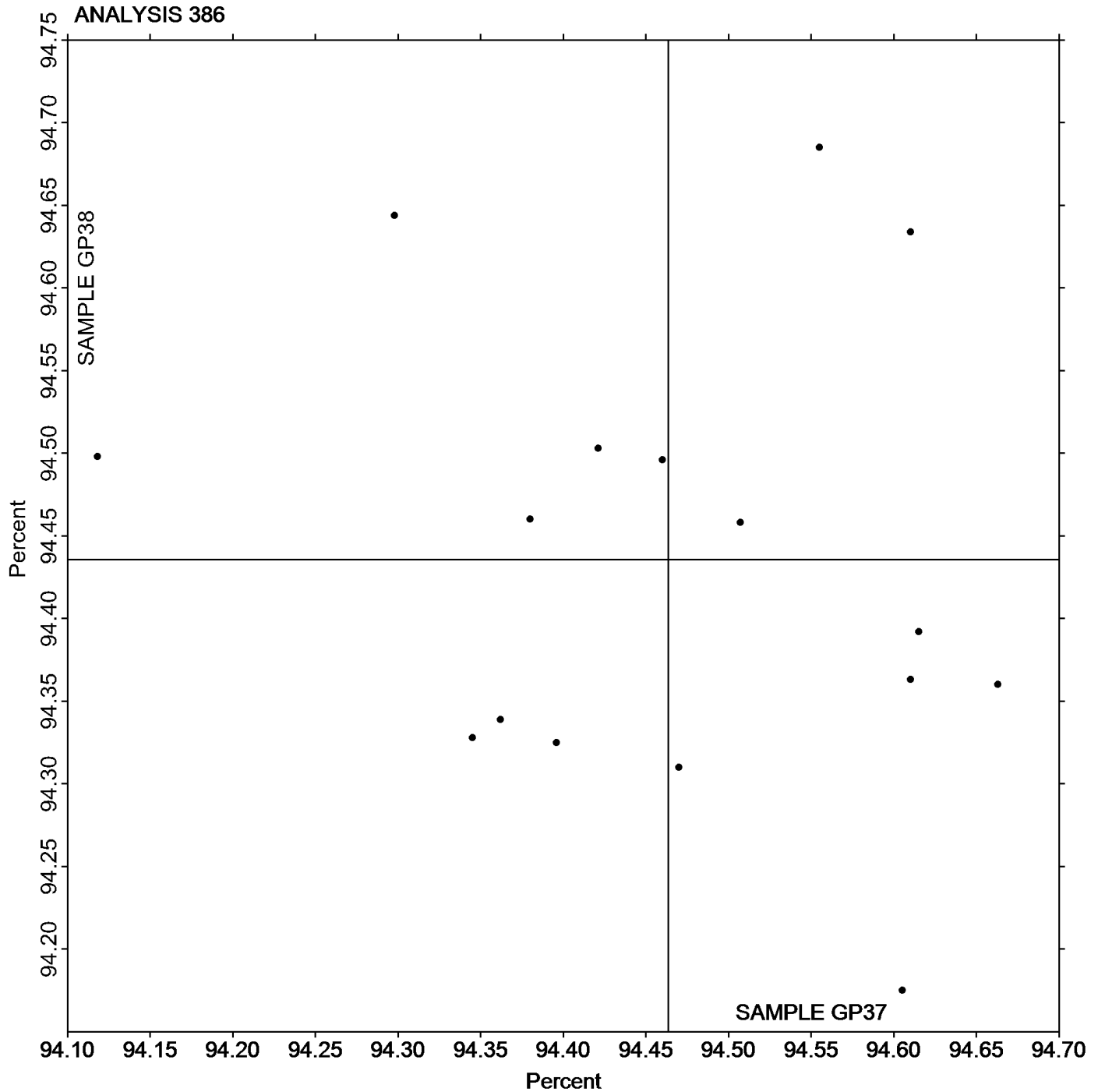


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 386**  
**Opacity (Paper Backing) - Fine Papers and Newsprint**

Report #285G  
December 2016

Grand Mean Sample **GP37** = 94.463 Percent

Grand Mean Sample **GP38** = 94.436 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 #285G  
December 2016

WebCode	Data Flag	Sample GR37			Sample GR38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2YJ66P		83.76	-1.12	-0.95	83.11	-1.03	-0.85	TS
4RWYJ3		83.78	-1.11	-0.94	82.74	-1.41	-1.16	TT
6UJXEC		84.00	-0.89	-0.75	83.80	-0.35	-0.28	TS
7BZHAM		85.77	0.89	0.75	84.99	0.85	0.70	TS
7HVKCX		84.68	-0.21	-0.18	84.11	-0.03	-0.03	XS
83LYN2		84.04	-0.85	-0.72	83.29	-0.86	-0.71	TT
8R6ARH		85.63	0.74	0.63	84.75	0.60	0.50	TT
93Y63H	*	88.76	3.88	3.29	87.99	3.84	3.16	XX
A9GV44		84.23	-0.66	-0.56	83.29	-0.86	-0.71	TS
ADAW6H	*	84.86	-0.02	-0.02	84.79	0.64	0.53	TT
BA7JY4		85.68	0.79	0.67	84.94	0.79	0.65	TT
BT2U8D		84.29	-0.59	-0.50	83.62	-0.52	-0.43	VM
CTE7Z3		85.27	0.38	0.32	84.67	0.52	0.43	HD
DJR8AW		84.90	0.02	0.01	84.13	-0.01	-0.01	MK
DVKQN3		85.73	0.84	0.71	84.78	0.64	0.53	TS
G2FU4B		85.76	0.88	0.74	84.94	0.79	0.65	TS
JK6RGM		83.59	-1.30	-1.10	82.61	-1.53	-1.26	TT
KP9CHP		86.38	1.49	1.26	85.43	1.28	1.05	HG
KXPQN2		84.43	-0.46	-0.39	83.66	-0.48	-0.40	XX
L7EWWT		84.03	-0.86	-0.73	82.98	-1.17	-0.96	TS
M78CHN		83.51	-1.37	-1.16	82.80	-1.35	-1.11	TT
PA3FRM		85.88	0.99	0.84	85.04	0.89	0.73	TT
QHTH9N		83.92	-0.97	-0.82	83.06	-1.08	-0.89	TS
T2EYPM		84.94	0.06	0.05	84.22	0.08	0.06	HD
TJVZJP		85.90	1.01	0.86	84.81	0.67	0.55	TS
U83Z7R		85.53	0.64	0.54	84.80	0.65	0.54	XX
VKJCWR		85.53	0.64	0.54	85.01	0.87	0.71	TS
W4CDNN		85.95	1.06	0.90	85.76	1.62	1.33	XX
WRYDUF		84.51	-0.37	-0.32	83.81	-0.33	-0.27	XX
XLNPPD		82.71	-2.18	-1.85	81.77	-2.37	-1.95	PP
YW3YUH	X	91.00	6.12	5.18	90.15	6.01	4.94	PE
Z8V2AW		83.55	-1.34	-1.13	82.79	-1.36	-1.12	TA

Sample GR37		Summary Statistics	Sample GR38	
Grand Means	84.886 Percent		84.145 Percent	
SD Btwn Labs	1.179 Percent		1.215 Percent	
Statistics based on 31 of 32 reporting participants				

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

YW3YUH (X) - Data for both samples are high. Possible Systematic Error.



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

**Report #285G**  
**December 2016**

**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>PP</b>	Technidyne Profile/Plus	<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		





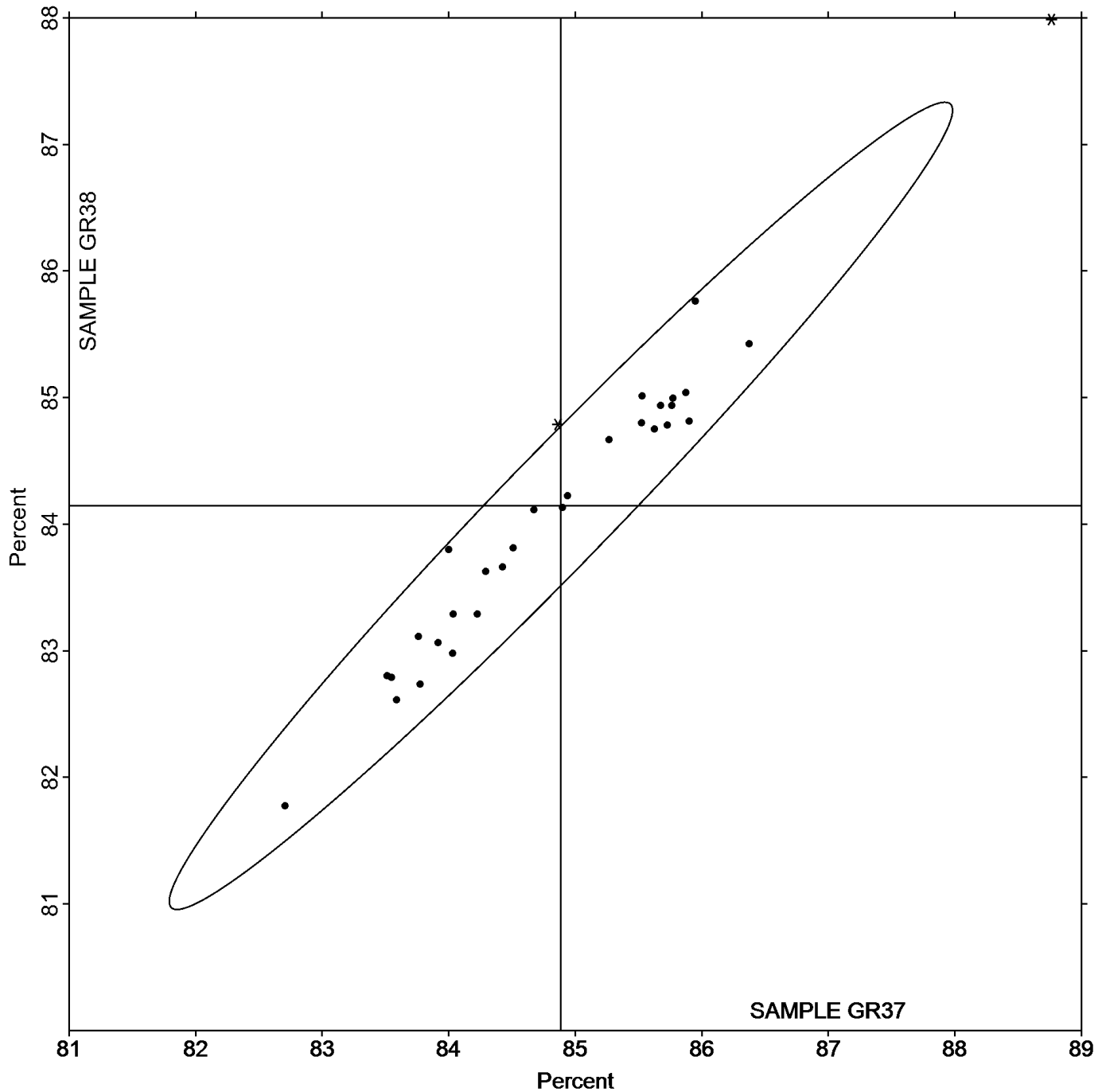
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 390**  
**Directional Brightness**

Report #285G  
December 2016

Grand Mean Sample **GR37** = 84.886 Percent

Grand Mean Sample **GR38** = 84.145 Percent

**ANALYSIS 390**





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

Report #285G  
December 2016

WebCode	Data Flag	Sample GZ37			Sample GZ38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2VLL3Q		90.98	0.09	0.11	90.82	-0.03	-0.03	TT
3FZTP4		90.82	-0.07	-0.09	90.90	0.05	0.06	TS
3KF2HA		90.63	-0.26	-0.33	90.49	-0.36	-0.44	TS
7HY8QQ		90.50	-0.39	-0.50	90.47	-0.38	-0.47	TS
826XJE		92.26	1.37	1.73	92.16	1.32	1.62	TS
A9GV44		90.95	0.06	0.08	90.82	-0.03	-0.04	TS
EW9JYC		90.84	-0.05	-0.07	90.74	-0.11	-0.13	TS
F3R9VQ		92.39	1.49	1.89	92.46	1.61	1.99	TS
LMJ7XT		90.74	-0.15	-0.19	90.72	-0.13	-0.16	TS
M78CHN		90.24	-0.65	-0.82	90.26	-0.59	-0.73	TS
M9WFF2		89.53	-1.37	-1.73	89.54	-1.31	-1.62	HT
PEB7R8		90.65	-0.24	-0.30	90.71	-0.14	-0.17	TS
RNDZ2Q		89.83	-1.06	-1.34	89.88	-0.97	-1.19	HT
T6GWXU		90.70	-0.19	-0.24	90.40	-0.45	-0.55	TT
TNRQNF		91.00	0.11	0.14	90.86	0.01	0.02	TT
UQRJUJ	X	92.14	1.24	1.57	94.58	3.73	4.60	TS
VJA8GH		90.76	-0.13	-0.16	90.71	-0.14	-0.17	PP
W4CDNN		92.34	1.45	1.84	92.47	1.63	2.01	XX

Sample GZ37		Summary Statistics		Sample GZ38	
Grand Means	90.893 Percent			90.848 Percent	
SD Btwn Labs	0.791 Percent			0.811 Percent	
Statistics based on 17 of 18 reporting participants					

**Comments on Assigned Data Flags for Test #391**

UQRJUJ (X) - Data for sample GZ38 are high.

**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
XX	Instrument make/model not specified by lab		

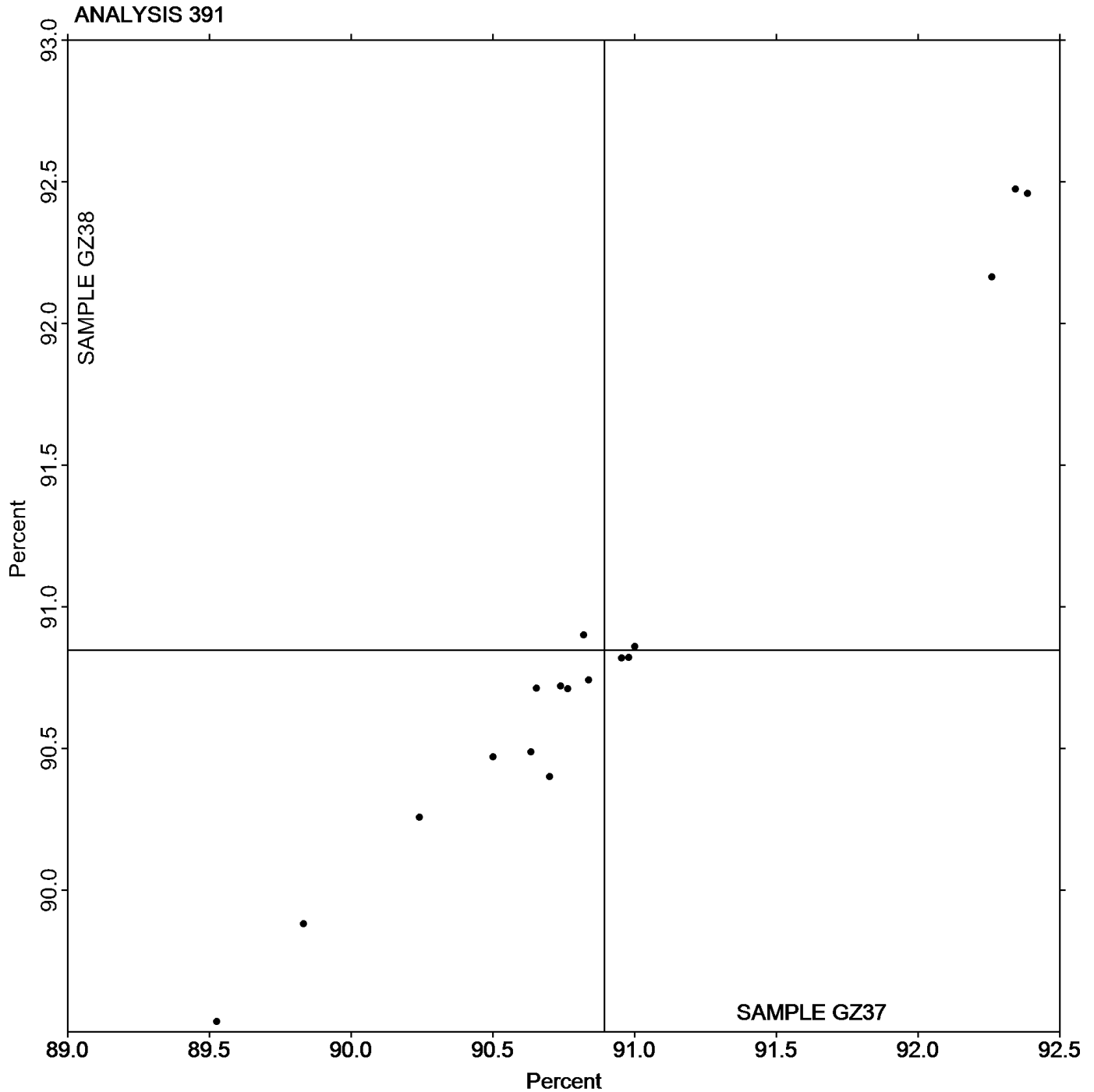


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 391**  
**Directional Brightness of Fluorescent Samples**

Report #285G  
December 2016

Grand Mean Sample **GZ37** = 90.893 Percent

Grand Mean Sample **GZ38** = 90.848 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 #285G  
December 2016

WebCode	Data Flag	Sample GR37			Sample GR38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
22PPTP		84.27	0.15	0.66	83.55	0.19	0.71	TC
2YJ66P	X	75.21	-8.90	-38.52	74.59	-8.78	-33.63	TC
7W39N2		83.75	-0.36	-1.57	83.03	-0.34	-1.30	TM
826XJE		84.35	0.23	1.02	83.59	0.23	0.87	TC
83LYN2		84.42	0.30	1.31	83.76	0.39	1.51	EG
8BWFY9		84.03	-0.08	-0.35	83.23	-0.14	-0.52	TM
A9GXP2		84.21	0.09	0.41	83.62	0.25	0.97	TC
AYAZ66		84.13	0.02	0.09	83.36	0.00	-0.01	TC
BA7JY4		84.10	-0.01	-0.06	83.29	-0.08	-0.29	TL
BBMHC2		84.30	0.19	0.81	83.53	0.16	0.62	EF
DVKQN3		84.18	0.06	0.27	83.46	0.09	0.35	TC
EPCRQH		84.38	0.27	1.17	83.57	0.20	0.78	TC
FRDEFR		84.23	0.12	0.50	83.36	-0.01	-0.03	TC
G2XZ32		83.67	-0.44	-1.92	82.91	-0.45	-1.72	EG
GK78EU		84.21	0.09	0.40	83.43	0.07	0.26	TC
JK6RGM	*	83.59	-0.53	-2.27	82.61	-0.75	-2.88	TM
KAFHA6		83.92	-0.19	-0.84	83.22	-0.15	-0.57	TC
M78CHN		84.34	0.22	0.96	83.38	0.02	0.08	LT
M7PZ7B		84.24	0.12	0.54	83.58	0.21	0.82	TC
MHHMAK	*	83.87	-0.24	-1.05	83.35	-0.01	-0.06	TC
PA3FRM		83.80	-0.31	-1.35	83.04	-0.33	-1.25	EG
RHAVCR		83.88	-0.24	-1.02	83.08	-0.28	-1.08	LA
WRYDUF		84.32	0.21	0.91	83.62	0.25	0.97	EE
WUNKED		84.02	-0.09	-0.40	83.21	-0.16	-0.61	LS
XACGN7		84.43	0.32	1.38	83.74	0.38	1.46	TC
XH7MKT		84.15	0.04	0.16	83.44	0.07	0.28	PP
Y6ECCE		84.06	-0.05	-0.22	83.29	-0.08	-0.30	TC
YCH2C7		84.30	0.19	0.82	83.58	0.22	0.84	TC
YUCU2B		84.03	-0.08	-0.36	83.39	0.02	0.09	LS

Sample GR37		Summary Statistics	Sample GR38	
Grand Means	84.113 Percent		83.363 Percent	
SD Btwn Labs	0.231 Percent		0.261 Percent	
Statistics based on 28 of 29 reporting participants				

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

2YJ66P (X) - Extreme Data.



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

**Report #285G**  
**December 2016**

**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
PP	Technidyne Profile/Plus	TC	Technidyne Color Touch Series
TL	Technidyne Technibrite TB-1	TM	Technidyne Technibrite Micro TB-1C

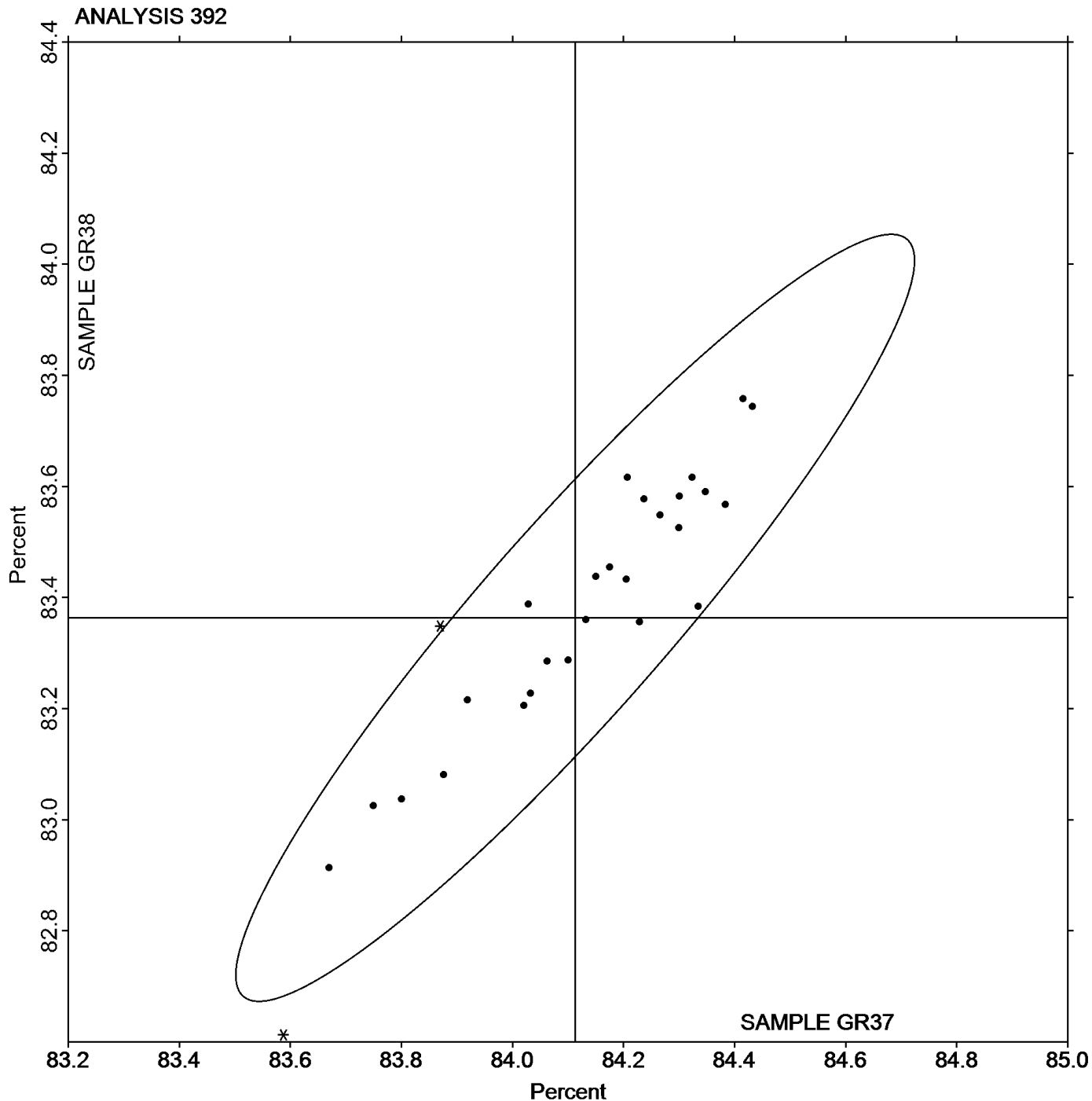


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 392**  
**Diffuse Brightness**

Report #285G  
December 2016

Grand Mean Sample **GR37** = 84.113 Percent

Grand Mean Sample **GR38** = 83.363 Percent





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

**Report #285G  
December 2016**

WebCode	Data Flag	Sample GZ37			Sample GZ38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3FZTP4		3.680	0.111	0.40	3.560	0.041	0.13	TS
3KF2HA		3.312	-0.257	-0.93	3.360	-0.159	-0.52	TS
7HY8QQ		3.584	0.015	0.05	3.538	0.019	0.06	TS
826XJE		3.720	0.151	0.55	3.752	0.233	0.75	TS
A9GV44		3.288	-0.281	-1.02	3.150	-0.369	-1.19	TS
EW9JYC		3.778	0.209	0.76	3.748	0.229	0.74	TS
F3R9VQ		3.724	0.155	0.56	3.672	0.153	0.49	TS
M78CHN		3.892	0.323	1.17	4.000	0.481	1.55	TS
PEB7R8		3.730	0.161	0.58	3.664	0.145	0.47	TS
TNRQNF		3.800	0.231	0.84	3.760	0.241	0.78	TT
UQRJUI		3.262	-0.307	-1.11	2.940	-0.579	-1.87	TS
VJA8GH		3.672	0.103	0.37	3.544	0.025	0.08	PP
W4CDNN		2.956	-0.613	-2.22	3.064	-0.455	-1.47	XX

		<b>Summary Statistics</b>	
		<b>Sample GZ37</b>	<b>Sample GZ38</b>
Grand Means		3.5691 Percent	3.5194 Percent
SD Btwn Labs		0.2757 Percent	0.3092 Percent
Statistics based on 13 of 13 reporting participants			

**Key to Instrument Codes Reported by Participants**

<b>PP</b>	Technidyne Profile/Plus	<b>TS</b>	Technidyne Brightimeter Micro S-5
<b>TT</b>	Technidyne Brightimeter Micro S4-M	<b>XX</b>	Instrument make/model not specified by lab



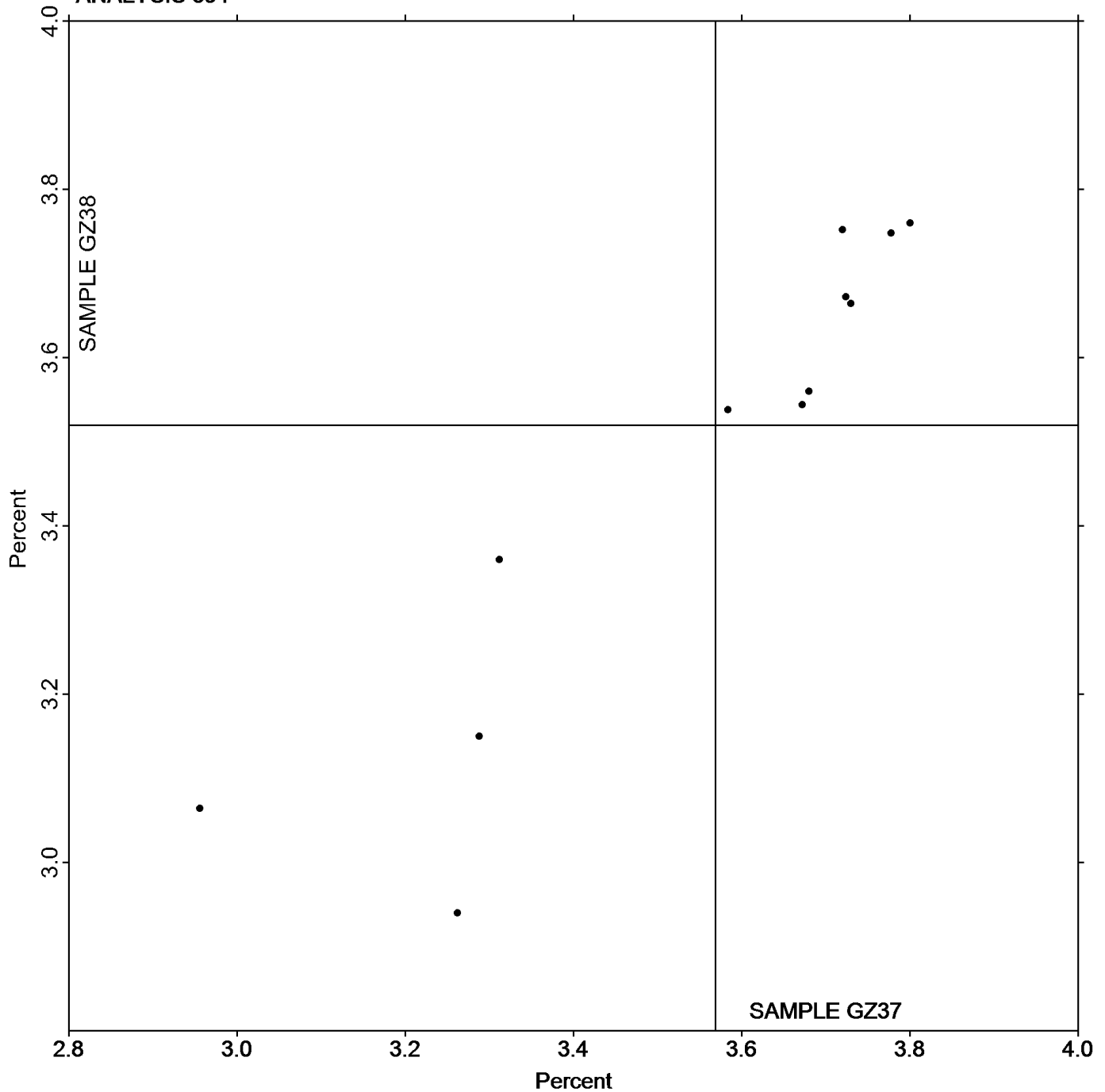
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 394**  
**Fluorescent Component of Directional Brightness**

Report #285G  
December 2016

Grand Mean Sample **GZ37** = 3.5691 Percent

Grand Mean Sample **GZ38** = 3.5194 Percent

**ANALYSIS 394**



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 #285G  
December 2016**

WebCode	Data Flag	Sample GT37			Sample GT38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3KF2HA		77.92	1.07	1.07	71.67	2.08	1.41	LA
83LYN2		77.27	0.42	0.42	70.24	0.65	0.44	TH
ADAW6H		78.03	1.18	1.18	70.79	1.20	0.81	TH
BA7JY4		76.78	-0.07	-0.07	67.60	-1.99	-1.34	GS
BT2U8D		76.68	-0.17	-0.17	68.43	-1.16	-0.78	VM
CTE7Z3		76.76	-0.09	-0.09	70.83	1.24	0.84	TH
D98XL4		75.50	-1.35	-1.35	67.70	-1.89	-1.27	GA
DJR8AW		75.82	-1.03	-1.03	70.53	0.94	0.64	PP
JK6RGM		78.31	1.46	1.46	71.32	1.73	1.17	TG
K6LQYM		75.36	-1.49	-1.49	67.97	-1.62	-1.09	XX
KAFHA6		75.27	-1.58	-1.58	67.05	-2.54	-1.71	ZH
LGWH3M		77.36	0.51	0.51	70.13	0.54	0.37	LA
PA3FRM		75.52	-1.33	-1.33	67.89	-1.70	-1.15	GM
T2EYPM		77.58	0.73	0.73	71.06	1.47	0.99	TH
T6GWXU		77.35	0.50	0.49	70.95	1.36	0.92	TG
VJA8GH		78.06	1.21	1.21	70.03	0.44	0.30	PP
XFZ2U8		77.25	0.40	0.40	69.02	-0.57	-0.38	GM
YUCU2B		76.48	-0.37	-0.37	69.36	-0.23	-0.15	LB

Sample GT37		Summary Statistics	Sample GT38	
Grand Means	76.850 Gloss Units		69.587 Gloss Units	
SD Btwn Labs	1.002 Gloss Units		1.482 Gloss Units	
Statistics based on 18 of 18 reporting participants				

**Key to Instrument Codes Reported by Participants**

<b>GA</b> BYK-Gardner (model not specified)	<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
<b>ZH</b> Zehntner ZLR 1050	

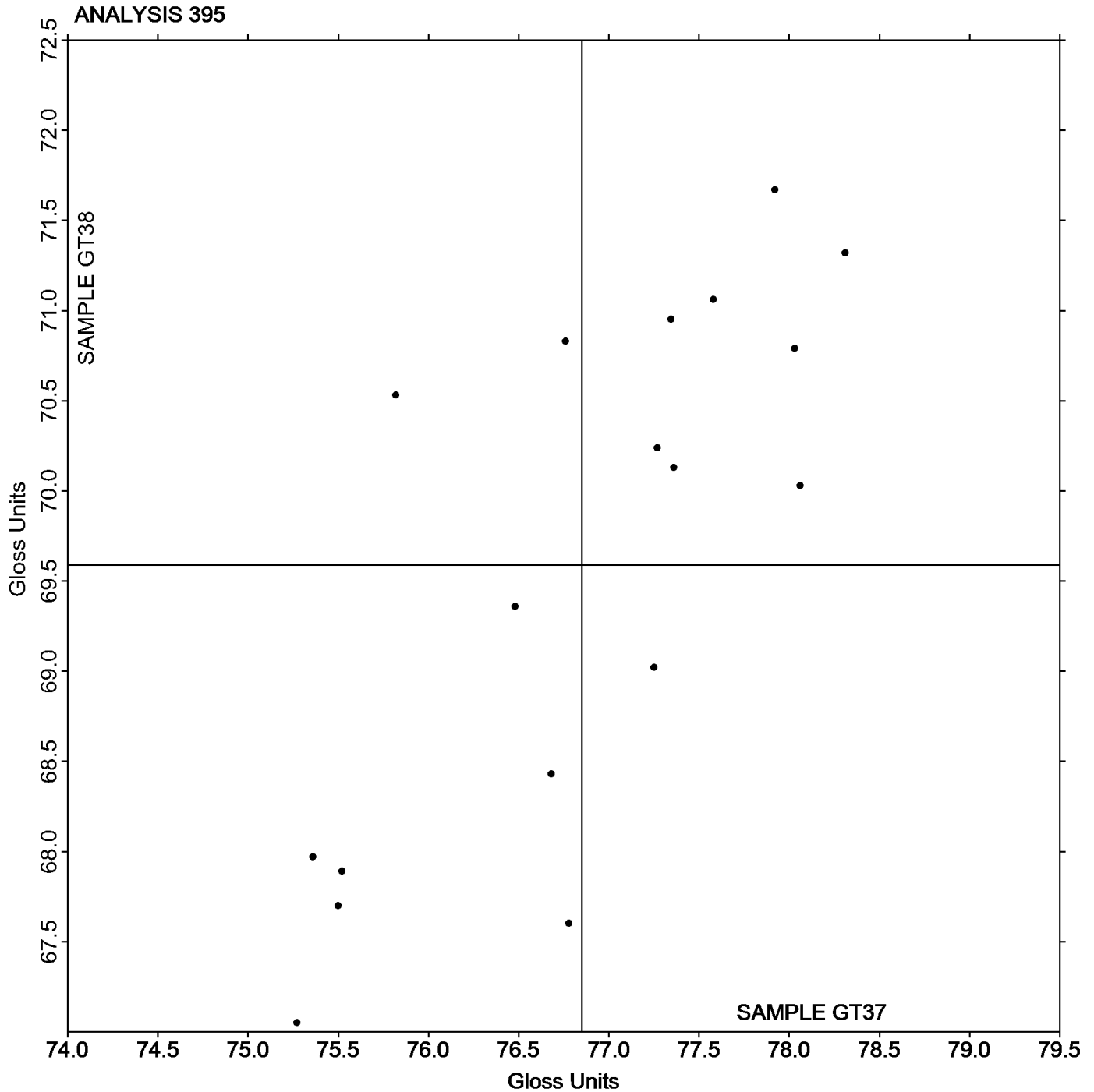


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 395**  
**Specular Gloss at 75 Degrees - High Range**

Report #285G  
December 2016

Grand Mean Sample **GT37** = 76.850 Gloss Units

Grand Mean Sample **GT38** = 69.587 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 396  
Specular Gloss at 75 Degrees - Low Range**

**Report #285G  
December 2016**

WebCode	Data Flag	Sample GU37			Sample GU38			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2YJ66P		27.04	0.51	0.60	43.40	0.63	0.29	TH
7HVKCX		25.78	-0.75	-0.88	40.86	-1.91	-0.87	TH
A9GV44		26.20	-0.33	-0.39	40.18	-2.59	-1.18	GN
EPCRQH		27.66	1.13	1.33	47.13	4.36	1.98	TH
FCKLVQ		26.26	-0.27	-0.32	41.45	-1.32	-0.60	PP
JK6RGM		27.57	1.04	1.22	44.04	1.27	0.58	TG
VMRPFE		26.12	-0.41	-0.48	42.58	-0.19	-0.09	XX
YUCU2B		25.11	-1.42	-1.67	40.97	-1.80	-0.82	LA
Z8V2AW		27.03	0.50	0.59	44.32	1.55	0.70	TH

		<b>Summary Statistics</b>	
		<b>Sample GU37</b>	<b>Sample GU38</b>
Grand Means		26.530 Gloss Units	42.770 Gloss Units
SD Btwn Labs		0.851 Gloss Units	2.202 Gloss Units
Statistics based on 9 of 9 reporting participants			

**Key to Instrument Codes Reported by Participants**

<b>GN</b>	Gardco Novo-Gloss	<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



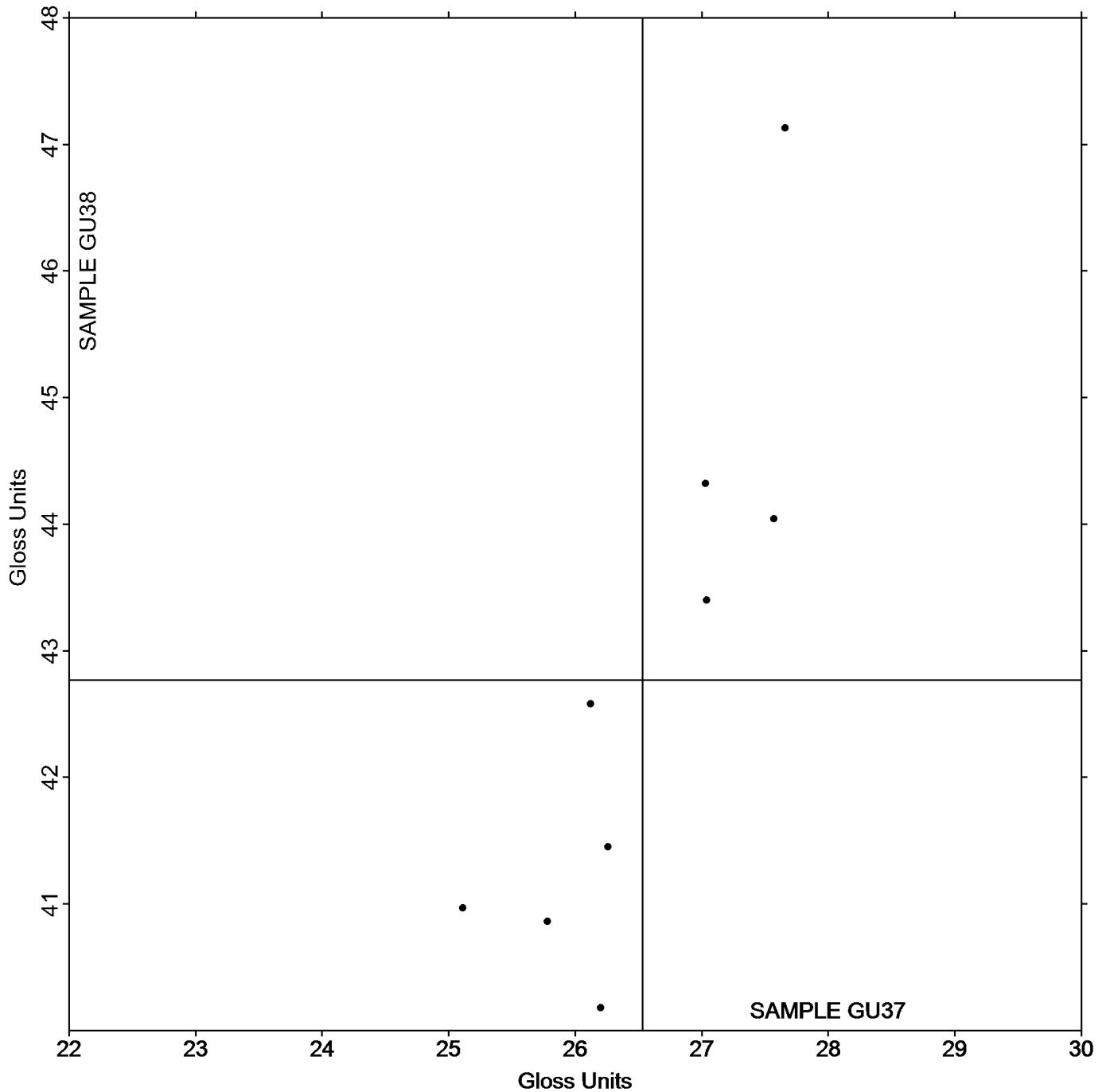
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 396**  
**Specular Gloss at 75 Degrees - Low Range**

Report #285G  
December 2016

Grand Mean Sample **GU37** = 26.530 Gloss Units

Grand Mean Sample **GU38** = 42.770 Gloss Units

**ANALYSIS 396**



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 #285G  
December 2016

WebCode	Data Flag	Sample GW37			Sample GW38		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3EPNFL	X	88.17	2.12	3.28	74.69	2.13	5.76
3FZTP4		85.64	-0.41	-0.63	72.36	-0.20	-0.54
43T3PG		85.78	-0.27	-0.41	73.23	0.67	1.83
7HVKCX		85.69	-0.35	-0.55	72.35	-0.21	-0.56
922U9Z		85.45	-0.60	-0.93	72.36	-0.20	-0.53
9F7V7B	*	84.20	-1.85	-2.86	72.90	0.34	0.93
EB9KDX		85.12	-0.93	-1.44	71.79	-0.77	-2.09
EKJKAU		86.65	0.60	0.93	72.86	0.30	0.82
EPCRQH		86.25	0.21	0.32	72.34	-0.22	-0.59
FPKF7Z		86.01	-0.04	-0.06	73.00	0.44	1.20
HLVVAU		86.50	0.45	0.70	72.09	-0.47	-1.28
HPH8D7		86.49	0.44	0.69	72.93	0.37	1.02
KP9CHP		85.67	-0.38	-0.58	72.50	-0.06	-0.16
KXPQN2		86.28	0.23	0.36	72.56	0.00	0.00
LMJ7XT		86.43	0.38	0.59	72.74	0.18	0.49
M9WFF2	X	78.06	-7.99	-12.38	66.21	-6.35	-17.20
NK88H2	*	87.77	1.73	2.67	72.95	0.39	1.05
NZY6KW	X	88.70	2.65	4.11	74.20	1.64	4.45
RNDZ2Q		86.18	0.13	0.21	72.49	-0.07	-0.18
U83Z7R	X	85.47	-0.58	-0.89	72.64	0.08	0.22
V8VD2J		85.84	-0.20	-0.31	72.61	0.05	0.13
VMRPFE		86.23	0.18	0.28	72.85	0.29	0.78
W2M74R	X	72.78	-13.27	-20.56	86.70	14.14	38.31
WRYDUF		86.12	0.07	0.11	73.00	0.44	1.20
WUNKED		85.94	-0.11	-0.16	72.21	-0.35	-0.94
Y6ECCE		86.36	0.31	0.49	72.92	0.36	0.98
YCH2C7		86.57	0.52	0.81	72.56	0.00	0.01
YUCU2B		86.09	0.04	0.06	72.01	-0.55	-1.48
YYVUGQ		86.04	0.00	0.00	72.42	-0.14	-0.38
Z8V2AW		85.33	-0.72	-1.11	71.94	-0.62	-1.67
ZVM2XC		86.58	0.53	0.83	72.55	-0.01	-0.02

	Sample GW37	Summary Statistics	Sample GW38
Grand Means	86.046 g/sq m		72.558 g/sq m
SD Btwn Labs	0.645 g/sq m		0.369 g/sq m
Statistics based on 26 of 31 reporting participants			



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

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**Report #285G**  
**December 2016**

M9WFF2 (X) - Extreme Data.

3EPNFL (X) - Data for both samples are high. Inconsistent within the determinations of both samples.

U83Z7R (X) - Data appear to be off by a factor of .01. Corrected by CTS (x100).

NZY6KW (X) - Data for both samples are high. Inconsistent within the determinations of both samples.

W2M74R (X) - Extreme Data.

WRYDUF - Two determinations removed from the Lab Mean of Sample GW38 per Grubb's Test at 1% risk (TAPPI 1205).



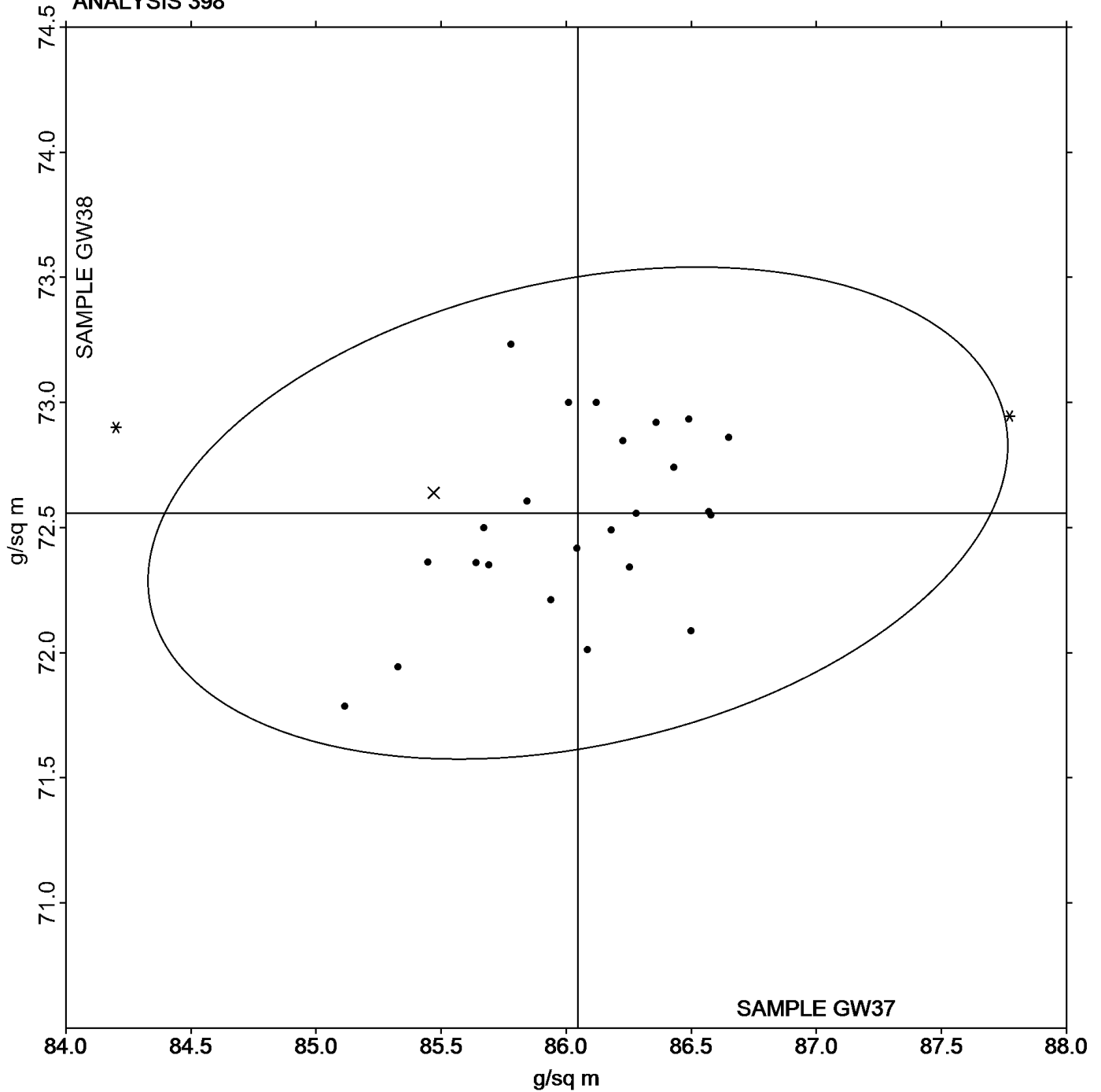
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 398**  
**Grammage (Mass per Unit Area)**

Report #285G  
December 2016

Grand Mean Sample **GW37** = 86.046 g/sq m

Grand Mean Sample **GW38** = 72.558 g/sq m

**ANALYSIS 398**





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

Report #285G  
December 2016

WebCode	Data Flag	Sample GX37			Sample GX38		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2VLL3Q		10.40	-9.87	-1.49	13.30	-6.77	-0.90
3KF2HA		14.50	-5.77	-0.87	14.42	-5.65	-0.75
3ZBMJV		21.76	1.49	0.22	20.06	-0.01	0.00
4RWYJ3		32.13	11.86	1.79	21.31	1.24	0.16
7HY8QQ		24.04	3.77	0.57	21.75	1.68	0.22
8R6ARH		21.12	0.85	0.13	20.57	0.50	0.07
93Y63H		13.40	-6.87	-1.04	13.84	-6.23	-0.83
A9GV44		22.88	2.61	0.39	17.07	-3.00	-0.40
ADAW6H		15.10	-5.17	-0.78	17.99	-2.08	-0.28
DJR8AW		15.17	-5.10	-0.77	17.25	-2.82	-0.37
DVKQN3		14.37	-5.90	-0.89	13.28	-6.79	-0.90
EPCRQH		23.94	3.67	0.55	16.15	-3.92	-0.52
F3R9VQ		27.09	6.82	1.03	23.12	3.05	0.40
FCKLVQ		10.58	-9.69	-1.46	15.17	-4.90	-0.65
KXPQN2		28.00	7.73	1.17	27.00	6.93	0.92
L7EWWT		26.78	6.51	0.98	36.99	16.92	2.24
LMJ7XT		13.81	-6.46	-0.97	12.32	-7.75	-1.03
M78CHN		18.68	-1.59	-0.24	20.68	0.61	0.08
PEB7R8		26.35	6.08	0.92	17.93	-2.14	-0.28
QHTH9N	*	27.27	7.00	1.06	37.88	17.81	2.36
QU8KPF		16.62	-3.65	-0.55	13.03	-7.04	-0.93
R7U4MH		33.80	13.53	2.04	32.60	12.53	1.66
RBP3VL		18.67	-1.60	-0.24	15.18	-4.89	-0.65
TJVZJP		7.83	-12.44	-1.88	7.79	-12.28	-1.63
U83Z7R		25.26	4.99	0.75	26.44	6.37	0.84
VKJCWR		9.65	-10.62	-1.60	10.57	-9.50	-1.26
WM7EFK		25.69	5.42	0.82	31.24	11.17	1.48
XFZ2U8		25.00	4.73	0.71	27.90	7.83	1.04
XVQ4BC		18.46	-1.81	-0.27	18.39	-1.68	-0.22
YHL636		20.99	0.72	0.11	24.86	4.79	0.63
YW3YUH		19.61	-0.66	-0.10	11.73	-8.34	-1.10
YW7NWU		19.70	-0.57	-0.09	24.40	4.33	0.57

		Summary Statistics	
	Sample GX37		Sample GX38
Grand Means	20.270 Seconds		20.069 Seconds
SD Btwn Labs	6.633 Seconds		7.548 Seconds
Statistics based on 32 of 32 reporting participants			





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

**Report #285G**  
**December 2016**

Grand Mean Sample **GX37** = 20.270 Seconds

Grand Mean Sample **GX38** = 20.069 Seconds

**ANALYSIS 399**

