



## Paper & Paperboard Testing Program

### Summary Report #2902 G - October 2017

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[Introduction to the Paper & Paperboard Interlaboratory Program](#)

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## **The CTS Paper & Paperboard Interlaboratory 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, color and wine, 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 #2902 G,  
October 2017**

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

Web Code	Data Flag	Samples	Hunter L, a, b Color Values			Color Difference Values				Instr Code
			L	a	b	$\Delta L$	$\Delta a$	$\Delta b$	$\Delta E$	
39HHAY		GA47	95.18	-0.98	3.52	-0.11	0.03	-0.40	0.42	HE
		GA48	95.07	-0.95	3.12					
3FVD7T		GA47	94.88	-0.43	3.99	0.30	-0.05	0.08	0.32	NE
		GA48	95.19	-0.48	4.07					
7PAM7H		GA47	93.80	-0.80	3.68	0.39	0.01	-0.02	0.39	TC
		GA48	94.18	-0.79	3.66					
98369H	X	GA47	92.96	0.16	3.28	0.38	-0.08	0.02	0.39	TS
		GA48	93.34	0.08	3.30					
9UYNEA		GA47	95.02	-0.74	3.70	0.28	0.00	-0.01	0.28	TC
		GA48	95.30	-0.74	3.69					
ACDLXC		GA47	95.89	-0.71	2.96	0.36	-0.03	-0.03	0.37	XS
		GA48	96.26	-0.75	2.93					
B4WBJC	X	GA47	94.22	0.16	3.34	0.34	-0.04	0.00	0.34	TS
		GA48	94.56	0.13	3.34					
BA7G4N		GA47	94.00	-1.01	3.73	0.12	-0.09	-0.12	0.20	HG
		GA48	94.13	-1.10	3.61					
FB4HW9		GA47	94.33	-0.94	2.86	0.12	-0.10	-0.17	0.23	HE
		GA48	94.45	-1.03	2.69					
FE24HK		GA47	95.14	-0.82	3.60	0.26	-0.01	0.05	0.26	EH
		GA48	95.40	-0.84	3.65					
FE4R36		GA47	95.10	-0.74	3.78	0.26	0.04	0.02	0.27	TS
		GA48	95.36	-0.70	3.80					
GBXNQ9		GA47	93.04	-0.48	3.58	0.34	-0.04	0.04	0.35	TS
		GA48	93.38	-0.52	3.62					
H634EC		GA47	94.15	-0.68	3.58	0.34	-0.01	0.00	0.34	MK
		GA48	94.49	-0.69	3.58					
J4BH87		GA47	94.60	-0.69	3.53	0.37	0.04	0.01	0.37	HE
		GA48	94.97	-0.64	3.54					
J6KMHA		GA47	93.69	-0.83	3.71	0.39	0.01	0.02	0.39	TM
		GA48	94.07	-0.83	3.73					
KQD3C3		GA47	93.85	-0.82	3.76	0.26	-0.01	0.03	0.26	LA
		GA48	94.10	-0.82	3.79					



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

Web Code	Data Flag	Samples	Hunter L, a, b Color Values			Color Difference Values				Instr Code
			L	a	b	$\Delta L$	$\Delta a$	$\Delta b$	$\Delta E$	
N324PE		GA47	92.79	-0.22	3.47	0.33	-0.08	0.04	0.34	TS
		GA48	93.12	-0.30	3.51					
N3YJTY		GA47	94.94	-0.75	3.81	0.30	-0.01	-0.01	0.30	EH
		GA48	95.25	-0.76	3.80					
NA3FMW		GA47	93.93	-0.60	3.98	0.55	-0.05	0.16	0.57 X	VM
		GA48	94.48	-0.65	4.14					
TRZC3F		GA47	93.86	-0.84	3.65	0.35	-0.01	0.01	0.35	XX
		GA48	94.21	-0.85	3.65					
U2NFTV		GA47	94.43	-0.95	3.03	0.15	-0.09	-0.16	0.23	HE
		GA48	94.58	-1.04	2.87					
XFBWAN		GA47	94.10	-0.69	3.54	-0.21	-0.01	0.03	0.22	TC
		GA48	93.88	-0.70	3.57					
YALYWL		GA47	93.08	-0.46	3.49	0.33	0.01	0.00	0.33	TS
		GA48	93.41	-0.46	3.49					

Grand Means			Summary Statistics					
GA47	94.217	-0.723	3.548	0.261	-0.021	-0.021	0.323	
GA48	94.486	-0.744	3.547					
Std Dev Btwn Labs				0.171	0.042	0.115	0.084	
GA47	0.808	0.198	0.299					
GA48	0.786	0.201	0.351					

Statistics based on 21 of 23 reporting participants

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

B4WBJC (X) - High a values for both samples and inconsistent within the determinations for Sample GA47.

98369H (X) - High a values for both samples.

**Analysis Notes:**

NA3FMW - One determination removed from the Lab Mean of Sample GA48, b values, per Grubb's Test at 1% risk (TAPPI 1205).



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

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

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**Key to Instrument Codes Reported by Participants**

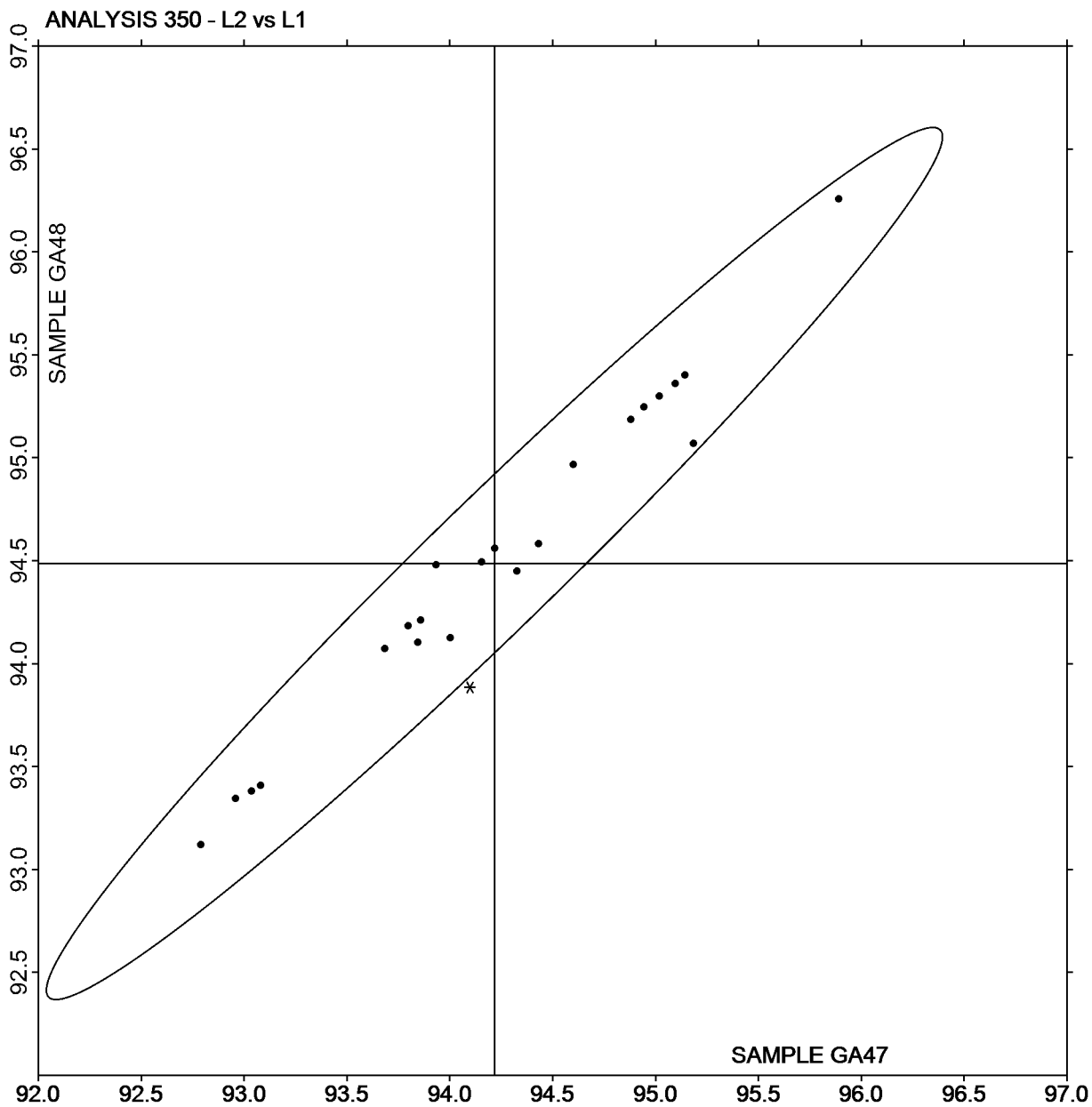
<b>EH</b>	Datacolor Elrepho SF450	<b>HE</b>	Hunter LabScan
<b>HG</b>	Hunter ColorQUEST	<b>LA</b>	L & W Elrepho AL300
<b>MK</b>	Macbeth Color-Eye 7000 Spectrophotometer	<b>NE</b>	Minolta CM-3500d Spectrophotometer
<b>TC</b>	Technidyne Color Touch Series	<b>TM</b>	Technidyne Technibrite Micro TB-1C
<b>TS</b>	Technidyne Brightimeter Micro S-5	<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 350**  
**Color & Color Difference - Near White Papers - C/2deg obs**  
**Hunter L,a,b - Illuminant C - 2 Degree Observer**

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October 2017

Plot of L values GA48 v L values GA47



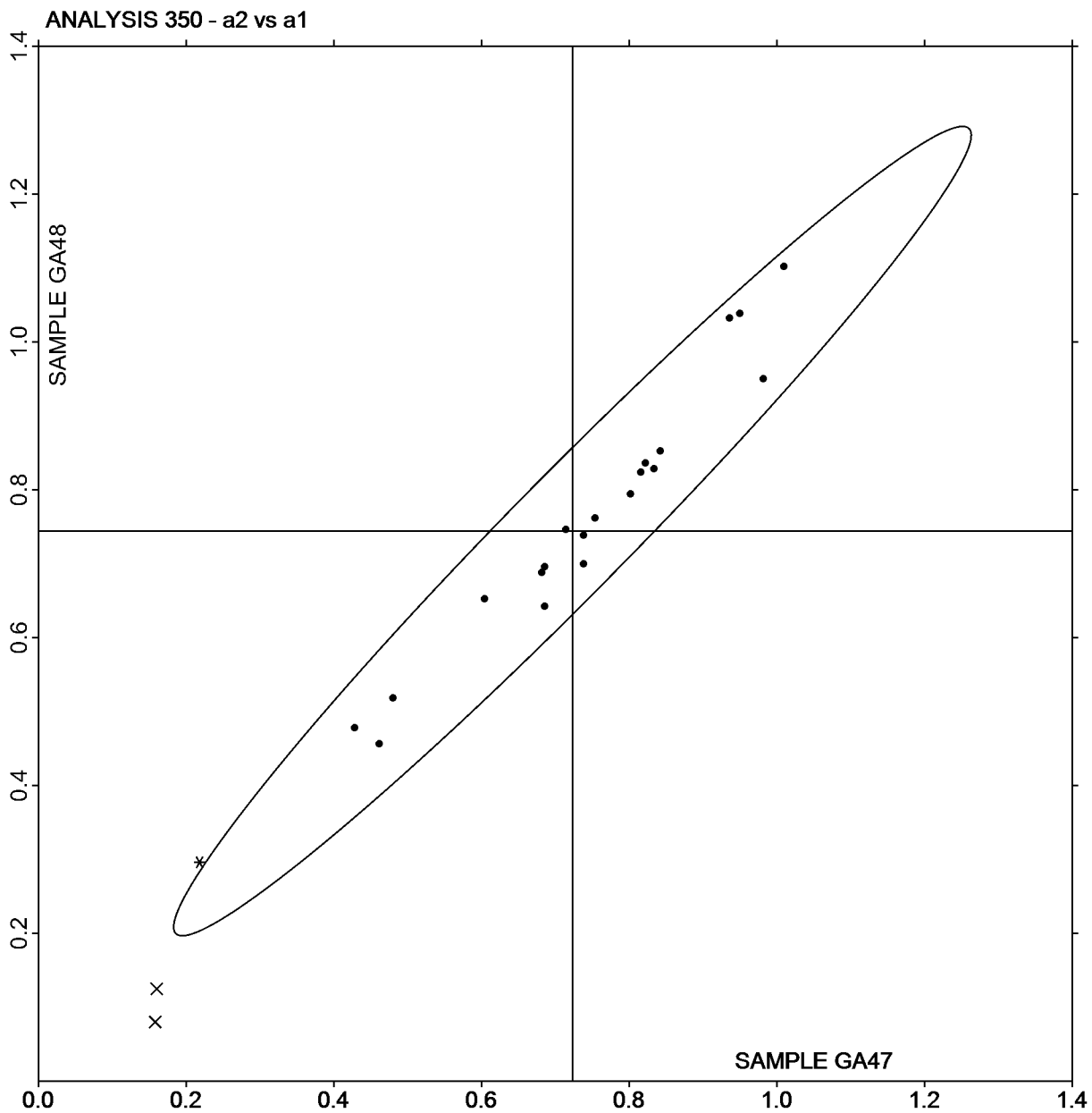




**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 350**  
**Color & Color Difference - Near White Papers - C/2deg obs**  
**Hunter L,a,b - Illuminant C - 2 Degree Observer**

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Plot of a values GA48 v a values GA47

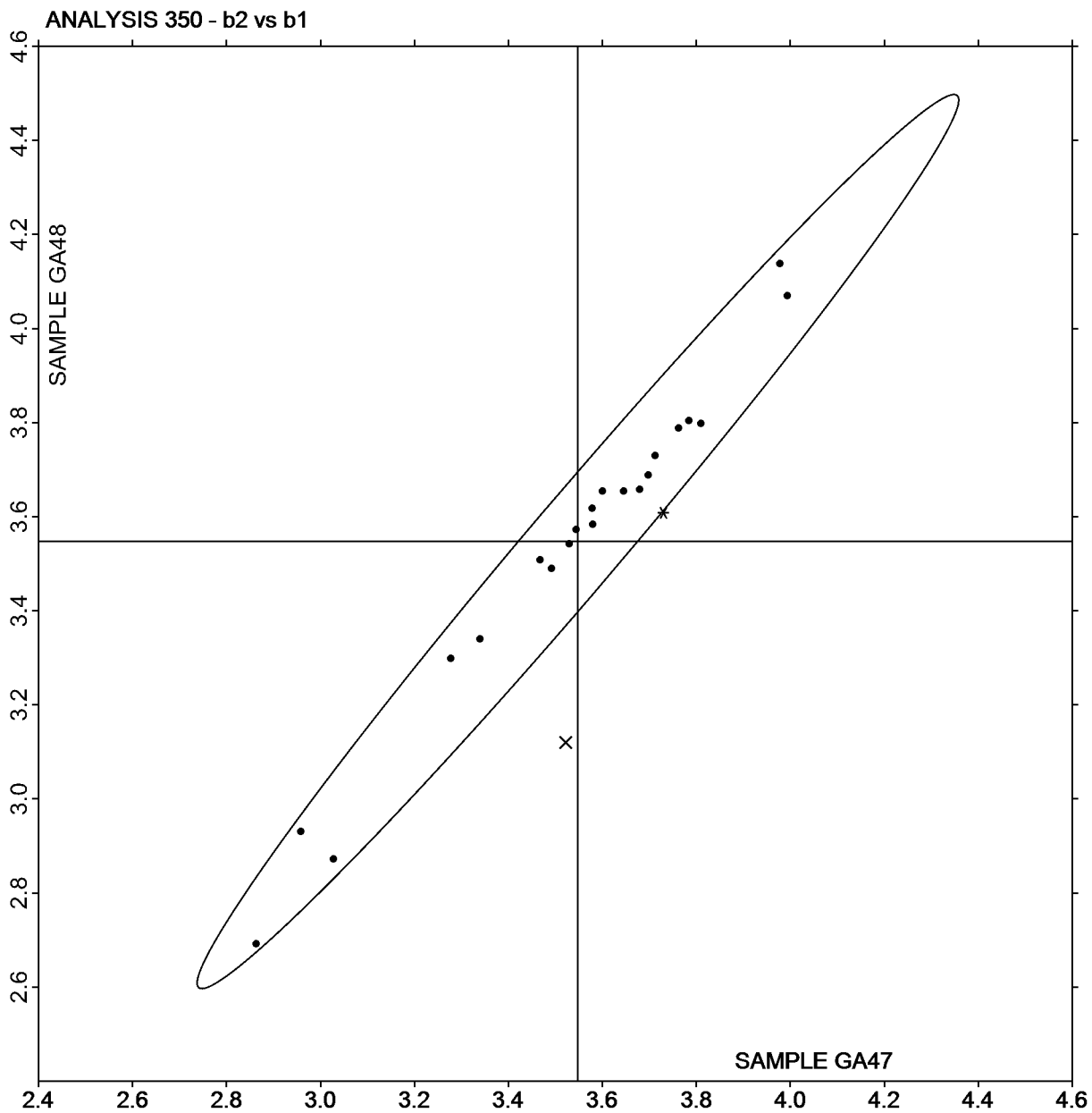




**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 350**  
**Color & Color Difference - Near White Papers - C/2deg obs**  
**Hunter L,a,b - Illuminant C - 2 Degree Observer**

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Plot of b values GA48 v b values GA47





**Paper & Paperboard Interlaboratory Testing Program  
Analysis 351**

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**Color & Color Difference - Near White Papers - D65/10deg obs  
Hunter L,a,b - Illuminant D65 - 10 Degree Observer**

Web Code	Data Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	
2XZEPU		GA47	93.70	-0.61	3.56	0.36	0.02	-0.01	0.36	TC
		GA48	94.05	-0.59	3.56					
864ABN		GA47	95.36	-0.69	3.50	0.26	0.03	0.00	0.26	XX
		GA48	95.62	-0.66	3.51					
BFPPLU		GA47	95.36	-0.70	3.78	0.28	0.04	0.02	0.29	HT
		GA48	95.64	-0.66	3.80					
CJ8BT8		GA47	95.44	-0.72	3.69	0.30	0.03	0.07	0.31	HT
		GA48	95.73	-0.70	3.76					
CPTGAE		GA47	94.67	-0.74	3.58	-0.18	0.02	-0.40	0.44 X	NG
		GA48	94.49	-0.72	3.18					
FMTJ7N		GA47	93.76	-0.63	3.17	0.35	0.03	0.02	0.35	TC
		GA48	94.11	-0.60	3.19					
J4BH87		GA47	94.61	-0.68	3.52	0.26	0.03	0.05	0.27	HE
		GA48	94.87	-0.65	3.58					
MF76K4		GA47	95.47	-0.64	3.85	0.25	-0.02	-0.01	0.25	XV
		GA48	95.72	-0.66	3.84					
MHXYNZ		GA47	95.28	-0.62	3.91	0.30	-0.02	0.03	0.30	XM
		GA48	95.57	-0.63	3.94					
TQP8RD		GA47	95.07	-0.60	4.01	0.30	0.05	-0.01	0.30	NG
		GA48	95.37	-0.55	4.00					
VCXMXU		GA47	94.20	-0.66	3.50	0.33	0.04	-0.04	0.33	HE
		GA48	94.53	-0.61	3.46					
VRQCVC		GA47	96.97	-0.57	2.82	-0.03	-0.07	-0.16	0.18	XP
		GA48	96.93	-0.64	2.66					
XFWHVM		GA47	95.10	-0.63	3.79	0.27	0.03	-0.03	0.27	LS
		GA48	95.37	-0.60	3.76					
XUR2BP		GA47	95.24	-0.68	3.84	0.27	0.04	0.00	0.28	HT
		GA48	95.51	-0.64	3.85					
YJUE3T		GA47	94.83	-0.76	3.18	-0.08	0.01	-0.36	0.36	EH
		GA48	94.75	-0.75	2.82					
YRHCM8		GA47	95.20	-0.60	3.96	0.27	0.04	-0.02	0.27	NG
		GA48	95.46	-0.56	3.94					



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

Z3Z4R	<b>GA47</b>	95.29	-0.57	3.78	0.27	0.01	0.05	0.27	NF
	<b>GA48</b>	95.55	-0.55	3.83					
ZYDTD4	<b>GA47</b>	94.60	-0.55	3.44	0.29	0.04	0.01	0.29	HV
	<b>GA48</b>	94.89	-0.51	3.44					

<u>Grand Means</u>			<b>Summary Statistics</b>					
<b>GA47</b>	95.008	-0.648	3.605	0.225	0.019	-0.043	0.299	
<b>GA48</b>	95.234	-0.628	3.562					
<u>Std Dev Btw Labs</u>								
<b>GA47</b>	0.732	0.061	0.311	0.154	0.029	0.133	0.056	
<b>GA48</b>	0.697	0.062	0.385					
Statistics based on 18 of 18 reporting participants								

**Key to Instrument Codes Reported by Participants**

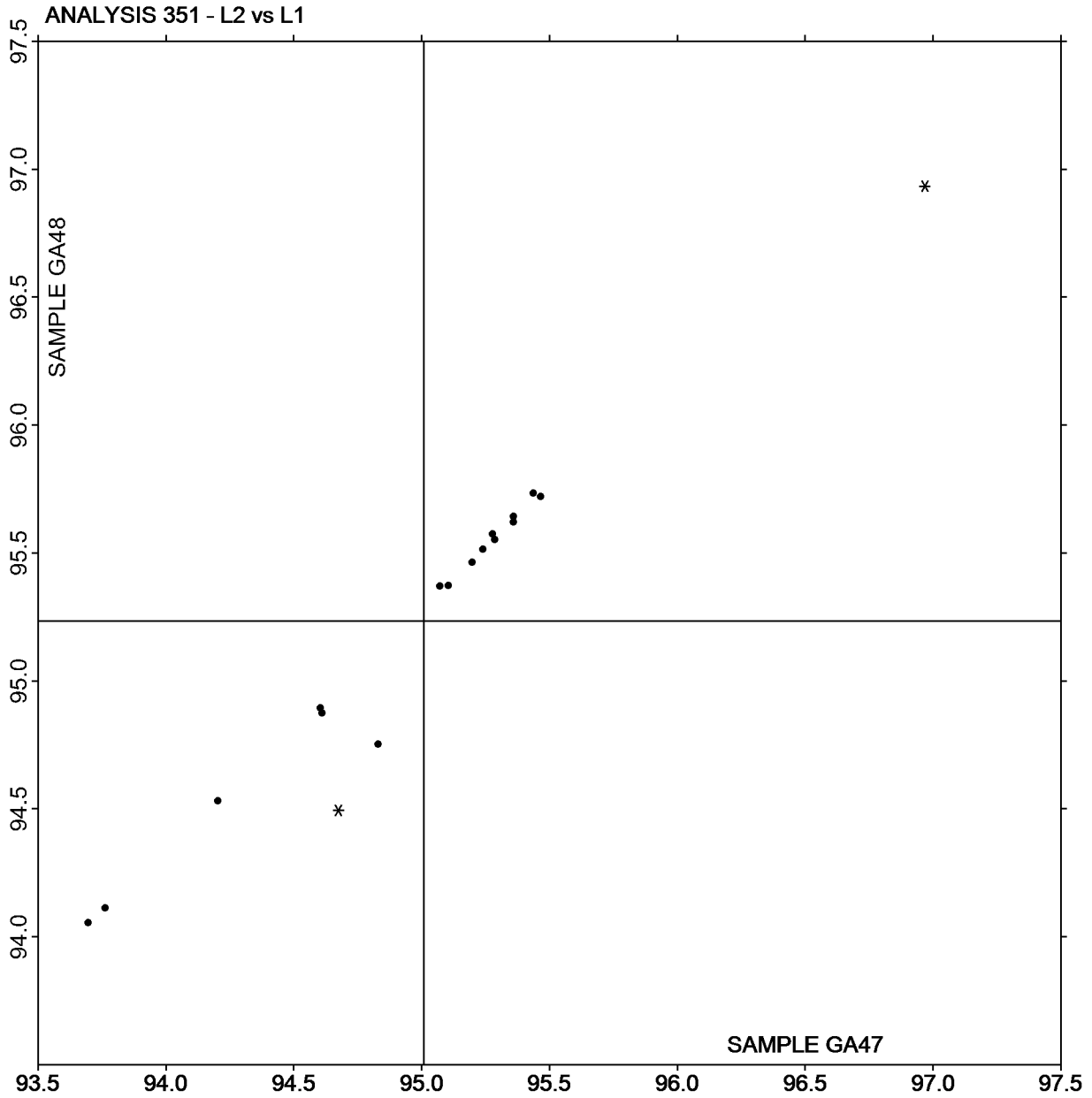
<b>EH</b>	Datacolor Elrepho SF450	<b>HE</b>	Hunter LabScan
<b>HT</b>	Hunter UltraScan Vis	<b>HV</b>	Hunter Ultrascan XE
<b>LS</b>	L & W Elrepho SE 070	<b>NF</b>	Minolta CM-3600d Spectrophotometer
<b>NG</b>	Minolta CM-3700d Spectrophotometer	<b>TC</b>	Technidyne Color Touch Series
<b>XM</b>	X-Rite CA-22	<b>XP</b>	X-Rite Spectrophotometer DTP
<b>XV</b>	X-Rite SP60 Series	<b>XX</b>	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 #2902 G,**  
**October 2017**

Plot of L values GA48 v L values GA47



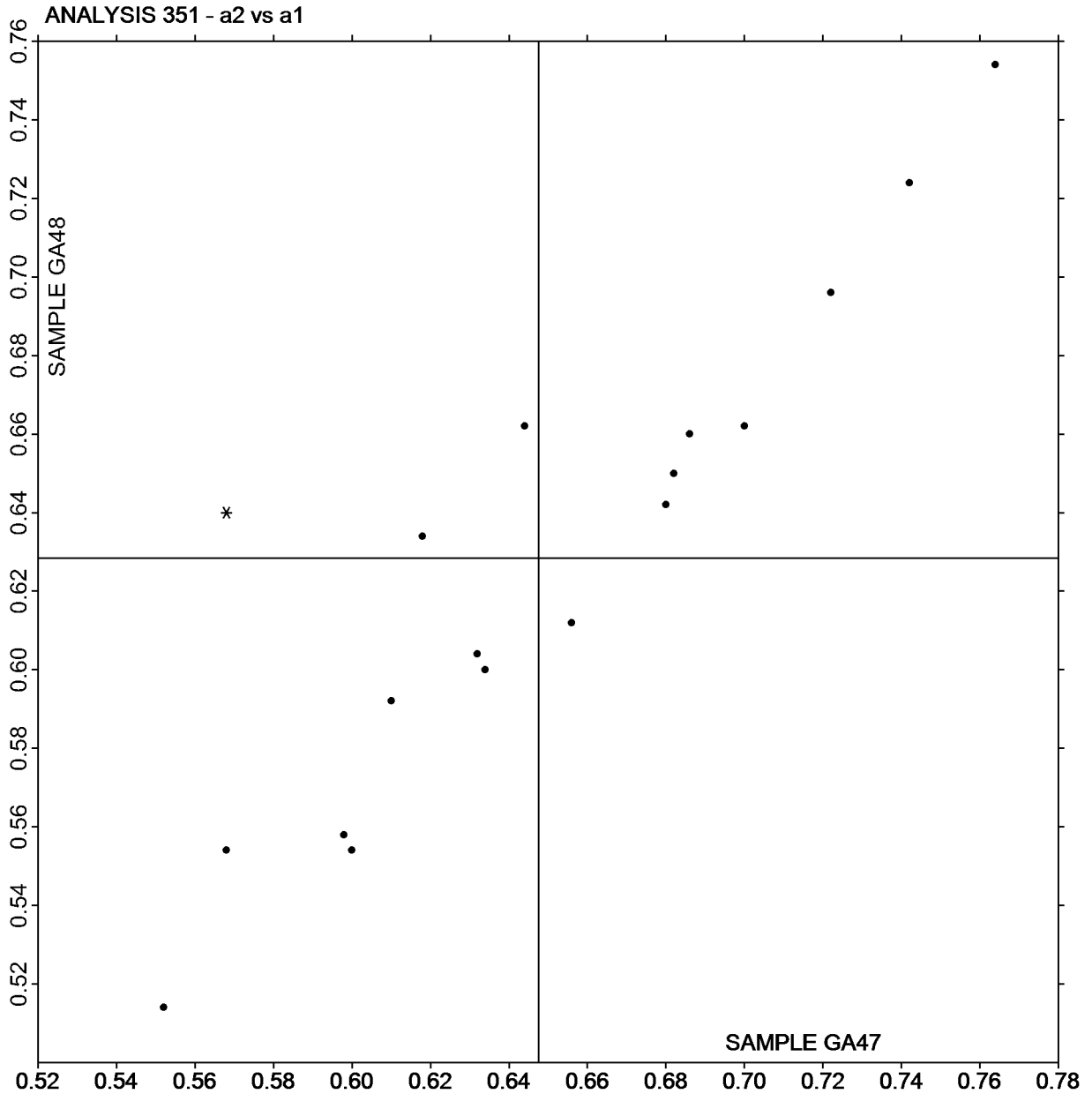
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**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 a values GA48 v a values GA47



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



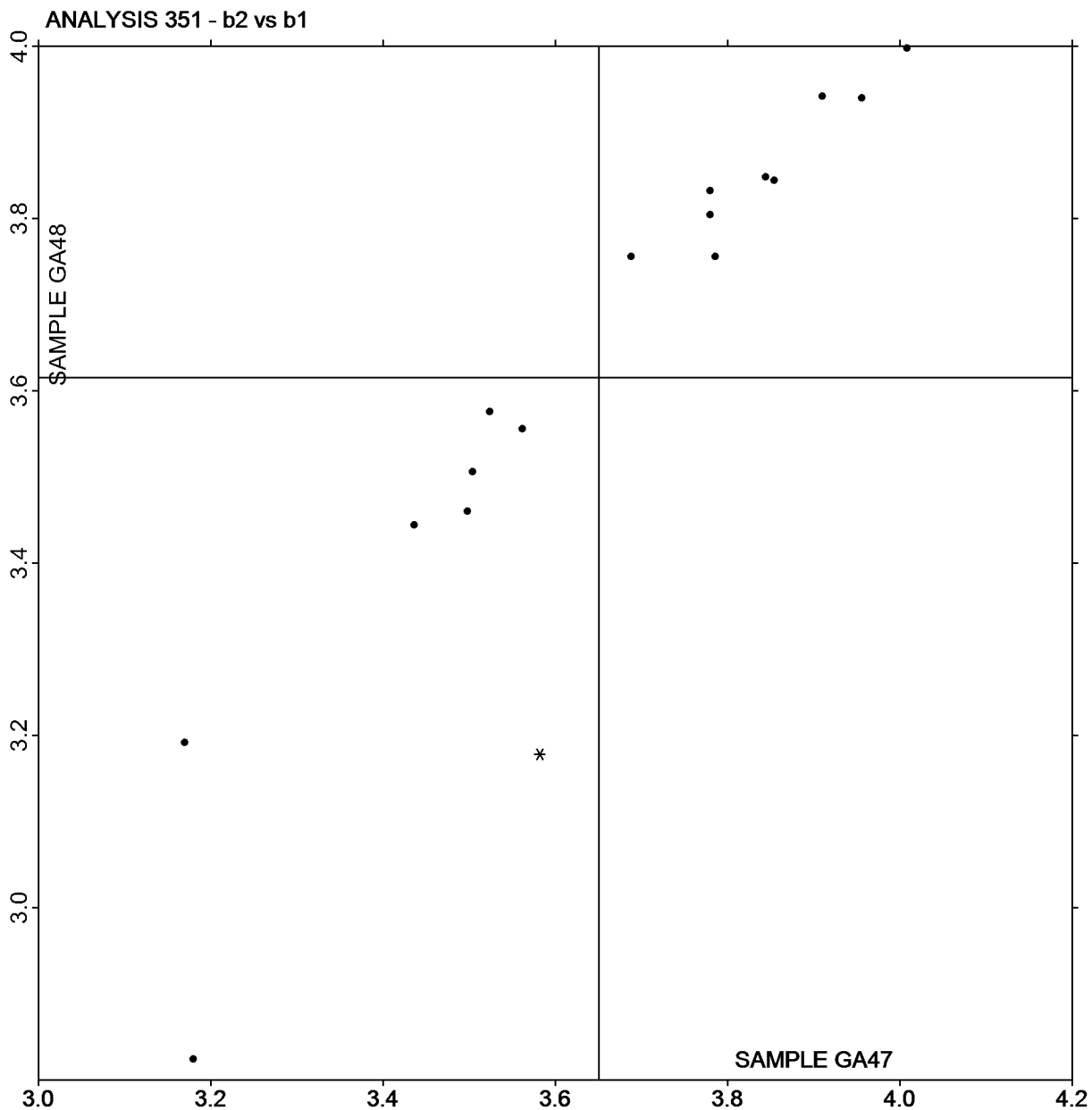
# Paper & Paperboard Interlaboratory Testing Program Analysis 351

Report #2902 G,  
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Color & Color Difference - Near White Papers - D65/10deg obs  
Hunter L,a,b - Illuminant D65 - 10 Degree Observer

Web Code	Data Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	

Plot of b values GA48 v b values GA47



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**  
**TAPPI Official Test Method T411**

Report #2902G,  
October 2017

WebCode	Data Flag	Sample GV47			Sample GV48			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2WUU2U	*	3.782	-0.101	-1.45	3.739	-0.142	-2.20	EM
2XZEPU		3.794	-0.089	-1.27	3.797	-0.084	-1.30	PP
3F2JUH		3.905	0.022	0.32	3.871	-0.010	-0.15	TM
4THXAL	X	3.626	-0.257	-3.69	3.637	-0.244	-3.78	EM
6M934R		3.827	-0.056	-0.80	3.835	-0.046	-0.71	PP
864ABN		3.876	-0.007	-0.10	3.848	-0.033	-0.51	LW
8MHT3L		3.873	-0.010	-0.14	3.821	-0.060	-0.92	XX
946L8J		3.867	-0.016	-0.23	3.844	-0.037	-0.57	LA
98369H		3.804	-0.079	-1.14	3.831	-0.049	-0.76	TM
9CHFLL		3.913	0.030	0.44	3.915	0.034	0.53	TM
9UYNEA		3.883	0.000	0.01	3.869	-0.012	-0.18	LA
ACDLXC		3.750	-0.133	-1.91	3.760	-0.121	-1.87	TM
BFPPLU		3.897	0.014	0.21	3.866	-0.015	-0.23	EM
BZWYNC		3.897	0.014	0.20	3.917	0.036	0.56	TM
CMPLQB		3.956	0.073	1.05	3.930	0.049	0.76	LW
CPTGAE		3.975	0.092	1.33	3.965	0.084	1.31	LW
DAWJMA		3.886	0.003	0.05	3.860	-0.021	-0.32	LW
EMEEUT		3.867	-0.016	-0.23	3.857	-0.024	-0.37	TA
EVP377		3.859	-0.024	-0.34	3.866	-0.015	-0.23	LW
FE24HK		3.953	0.070	1.01	3.914	0.033	0.52	EM
GBXNQ9	*	3.814	-0.069	-0.99	3.892	0.011	0.18	LA
GFN39N		3.865	-0.018	-0.25	3.875	-0.006	-0.09	LA
GWTCB9	X	3.746	-0.137	-1.97	3.941	0.060	0.93	LW
GXRHR3		3.860	-0.022	-0.32	3.857	-0.024	-0.37	LW
H634EC		3.913	0.030	0.44	3.920	0.039	0.61	PP
HA3AYA		3.927	0.044	0.64	3.886	0.005	0.08	EM
J6KMHA		3.885	0.002	0.03	3.921	0.040	0.62	TA
JAFDQ7		3.897	0.014	0.21	3.896	0.015	0.24	EM
JCKQQT		3.879	-0.004	-0.05	3.910	0.029	0.45	TM
JH9NZ2		3.970	0.087	1.26	3.990	0.109	1.69	LW
KQD3C3		3.961	0.079	1.13	3.944	0.063	0.98	LA
KQJDCE		3.769	-0.114	-1.63	3.791	-0.090	-1.39	TM
L9CFMN		3.929	0.046	0.67	3.915	0.035	0.54	XX
LR79FY		3.893	0.010	0.15	3.856	-0.025	-0.39	LW
LRLET4		3.921	0.038	0.55	3.917	0.036	0.56	LW
MHXYNZ		3.819	-0.064	-0.92	3.854	-0.026	-0.41	LW
N9NXH7		3.780	-0.103	-1.48	3.810	-0.071	-1.10	TM
NQ7XPN		3.890	0.007	0.10	3.882	0.001	0.02	MS
NULHHV		3.887	0.005	0.07	3.906	0.025	0.39	EM
PT3ZRV		3.913	0.030	0.43	3.905	0.024	0.38	LW





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 360**  
**Thickness (Caliper), Printing papers**  
**TAPPI Official Test Method T411**

Report #2902G,  
October 2017

WebCode	Data Flag	Sample GV47			Sample GV48			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
PVFDU7		3.917	0.034	0.49	3.922	0.041	0.64	PP
QDU4C3		3.982	0.099	1.43	3.989	0.108	1.68	EM
QFZUDQ		3.875	-0.008	-0.11	3.894	0.013	0.20	FR
RY6QAR		3.985	0.102	1.47	3.943	0.062	0.96	LW
TPWJ8W		3.909	0.026	0.38	3.910	0.029	0.45	TM
TQP8RD		3.709	-0.174	-2.50	3.741	-0.140	-2.16	PP
TRZC3F	X	3.900	0.017	0.25	3.680	-0.201	-3.11	XX
TFENPR		3.994	0.111	1.60	3.981	0.100	1.55	TM
UGFFGA		3.920	0.037	0.54	3.930	0.049	0.76	EM
VCXMXU		3.968	0.085	1.22	3.941	0.060	0.93	TM
VJJFBE		3.768	-0.115	-1.65	3.795	-0.086	-1.33	TA
VRQCVC	X	3.780	-0.103	-1.48	3.870	-0.011	-0.17	TM
VYWQ2M		3.949	0.067	0.96	3.931	0.050	0.78	LW
WCXWDX		3.920	0.038	0.54	3.939	0.058	0.90	LW
XFBWAN		3.965	0.082	1.18	3.981	0.100	1.55	TA
XUR2BP		3.823	-0.060	-0.86	3.870	-0.011	-0.17	EM
XUX48P		4.010	0.127	1.83	3.975	0.095	1.46	LW
XYMQTH	*	3.720	-0.163	-2.34	3.690	-0.191	-2.95	TM
YALYWL		3.860	-0.023	-0.33	3.861	-0.020	-0.31	EM
YRHCM8		3.863	-0.020	-0.28	3.865	-0.016	-0.24	EM
YUDMQM		3.839	-0.044	-0.63	3.837	-0.044	-0.68	PP
Z3Z4R		3.956	0.073	1.05	3.939	0.058	0.90	TM
ZYDTD4		3.809	-0.074	-1.06	3.796	-0.085	-1.31	EM

Summary Statistics	Sample GV47	Sample GV48
<b>Grand Means</b>	3.88 mils	3.88 mils
<b>Std Dev Btwn Labs</b>	0.07 mils	0.06 mils

Statistics based on 59 of 63 reporting participants.

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

- 4THXAL (X) - Data for both samples are low. Possible Systematic Error.
- GWTCB9 (X) - Inconsistent in testing between samples.
- TRZC3F (X) - Data for sample GV48 are low. Inconsistent within the determinations of sample GV48.
- VRQCVC (X) - Inconsistent in testing between samples.



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

## Analysis 360 Thickness (Caliper), Printing papers TAPPI Official Test Method T411

### 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		



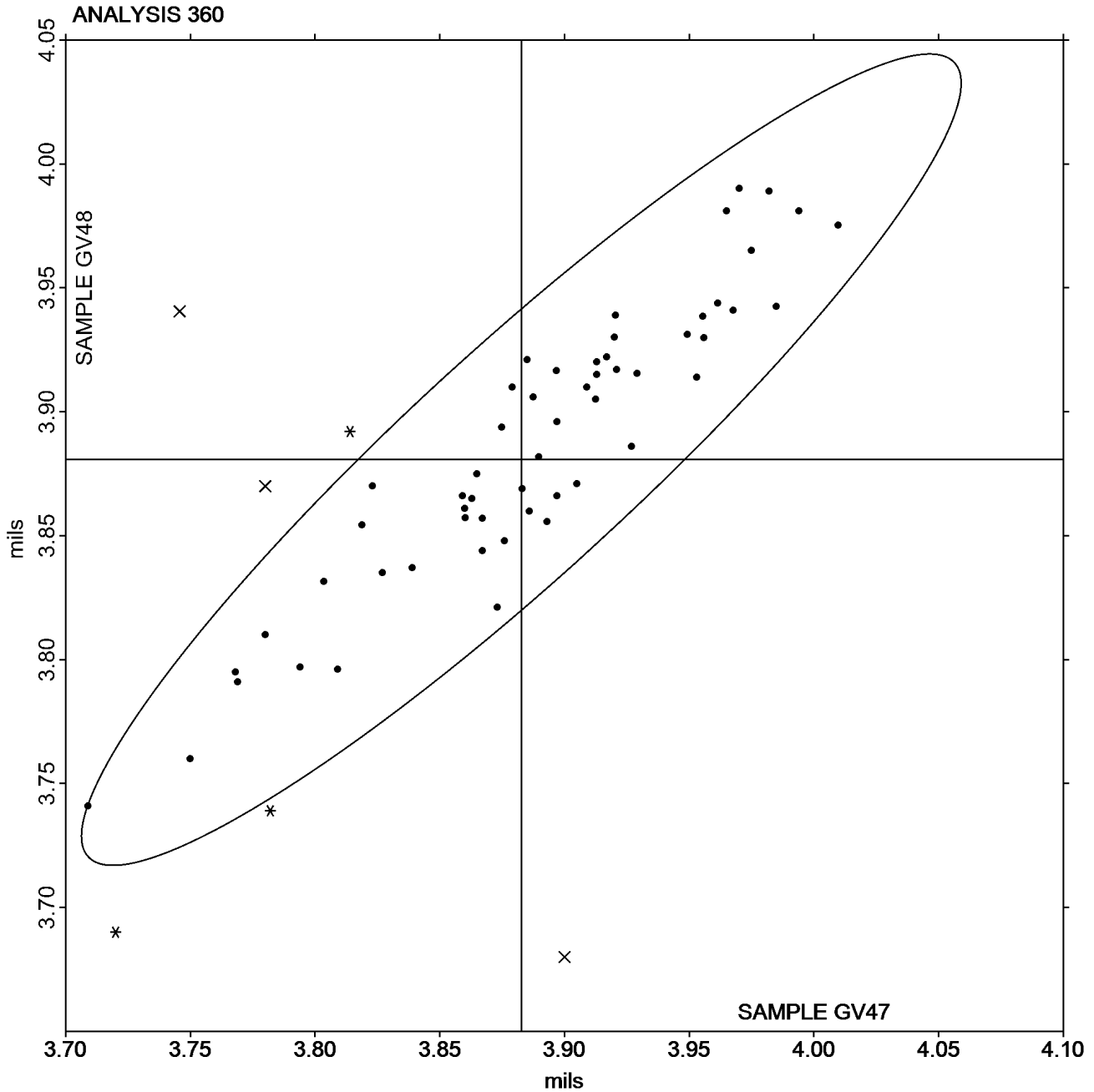
# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

## Analysis 360 Thickness (Caliper), Printing papers TAPPI Official Test Method T411

Grand Mean Sample GV47 = 3.8826  
mils

Grand Mean Sample GV48 = 3.8807  
mils





**Paper & Paperboard Interlaboratory Testing Program**

**Report #2902G,  
October 2017**

**Analysis 361  
Thickness (Caliper), Packaging papers  
TAPPI Official Test Method T411**

WebCode	Data Flag	<u>Sample GY47</u>			<u>Sample GY48</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2877BH		14.03	-0.05	-0.35	14.03	-0.05	-0.42	TM
39HHAY		13.94	-0.13	-0.91	13.97	-0.11	-0.93	LA
3F2JUH		14.30	0.22	1.49	14.19	0.11	0.90	TM
69BXT9		14.18	0.10	0.68	14.11	0.03	0.25	TM
772846		13.98	-0.10	-0.67	14.03	-0.05	-0.45	TA
8LMCLH		14.26	0.18	1.25	14.32	0.24	1.97	TM
B4WBJC		13.90	-0.18	-1.25	13.96	-0.12	-1.01	EM
B8EPRH		13.89	-0.18	-1.26	13.96	-0.13	-1.06	LA
BCACMR		14.22	0.15	1.00	14.13	0.04	0.35	LA
FB4HW9		14.18	0.10	0.69	14.14	0.05	0.44	EM
FMTJ7N		14.01	-0.07	-0.50	14.10	0.01	0.11	EM
J4BH87		14.02	-0.06	-0.39	13.98	-0.10	-0.85	EM
JPQZE3		14.11	0.04	0.25	14.13	0.05	0.38	LW
JXK8W9		14.20	0.13	0.86	14.21	0.12	1.03	LA
KEHUTY		14.02	-0.06	-0.40	14.11	0.03	0.22	LA
LD7GN3		14.07	-0.01	-0.05	14.10	0.01	0.09	TA
LR79FY		14.29	0.21	1.45	14.23	0.14	1.20	XX
LTGXWQ		13.97	-0.11	-0.75	13.93	-0.16	-1.30	TM
MBU2U3		13.97	-0.11	-0.77	13.96	-0.13	-1.07	TA
N9NXH7		13.92	-0.16	-1.08	13.91	-0.17	-1.44	TM
NA3FMW		13.89	-0.18	-1.26	14.03	-0.06	-0.48	XX
NFQZQC		14.35	0.27	1.83	14.23	0.15	1.24	XX
NULHHV		14.20	0.13	0.86	14.15	0.06	0.52	EM
P3GM66		14.10	0.02	0.14	14.03	-0.05	-0.45	LW
PT3ZRV		14.04	-0.03	-0.23	14.04	-0.04	-0.37	LW
R9UE7F		13.89	-0.19	-1.28	13.90	-0.18	-1.53	TM
U2NFTV		14.27	0.19	1.28	14.30	0.21	1.76	EM
URZLGY		14.03	-0.05	-0.33	14.16	0.08	0.63	LA
VJJFBE	X	13.82	-0.26	-1.79	13.37	-0.71	-5.89	TA
WCXWDX		14.22	0.14	0.95	14.19	0.11	0.90	LW
XFWHVM		14.10	0.02	0.15	14.10	0.02	0.13	XX
Y4DFXT		13.77	-0.31	-2.10	13.85	-0.23	-1.94	TM
YJUE3T		14.18	0.10	0.70	14.23	0.14	1.18	EM

<b>Summary Statistics</b>	<u>Sample GY47</u>	<u>Sample GY48</u>
<b>Grand Means</b>	14.08 mils	14.08 mils
<b>Std Dev Btwn Labs</b>	0.15 mils	0.12 mils
Statistics based on 32 of 33 reporting participants.		



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 361**  
**Thickness (Caliper), Packaging papers**  
**TAPPI Official Test Method T411**

**Report #2902G,**  
**October 2017**

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**Comments on Assigned Data Flags for Test #361**

VJJFBE (X) - Data for sample GY48 are low.

**Analysis Notes:**

39HHAY - Data appear to be reported as micrometers, not mils as indicated on datasheet. Unit changed by CTS.

LR79FY - One determination removed from the Lab Mean of Sample GY47 per Grubb's Test at 1% risk (TAPPI 1205).

**Key to Instrument Codes Reported by Participants**

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



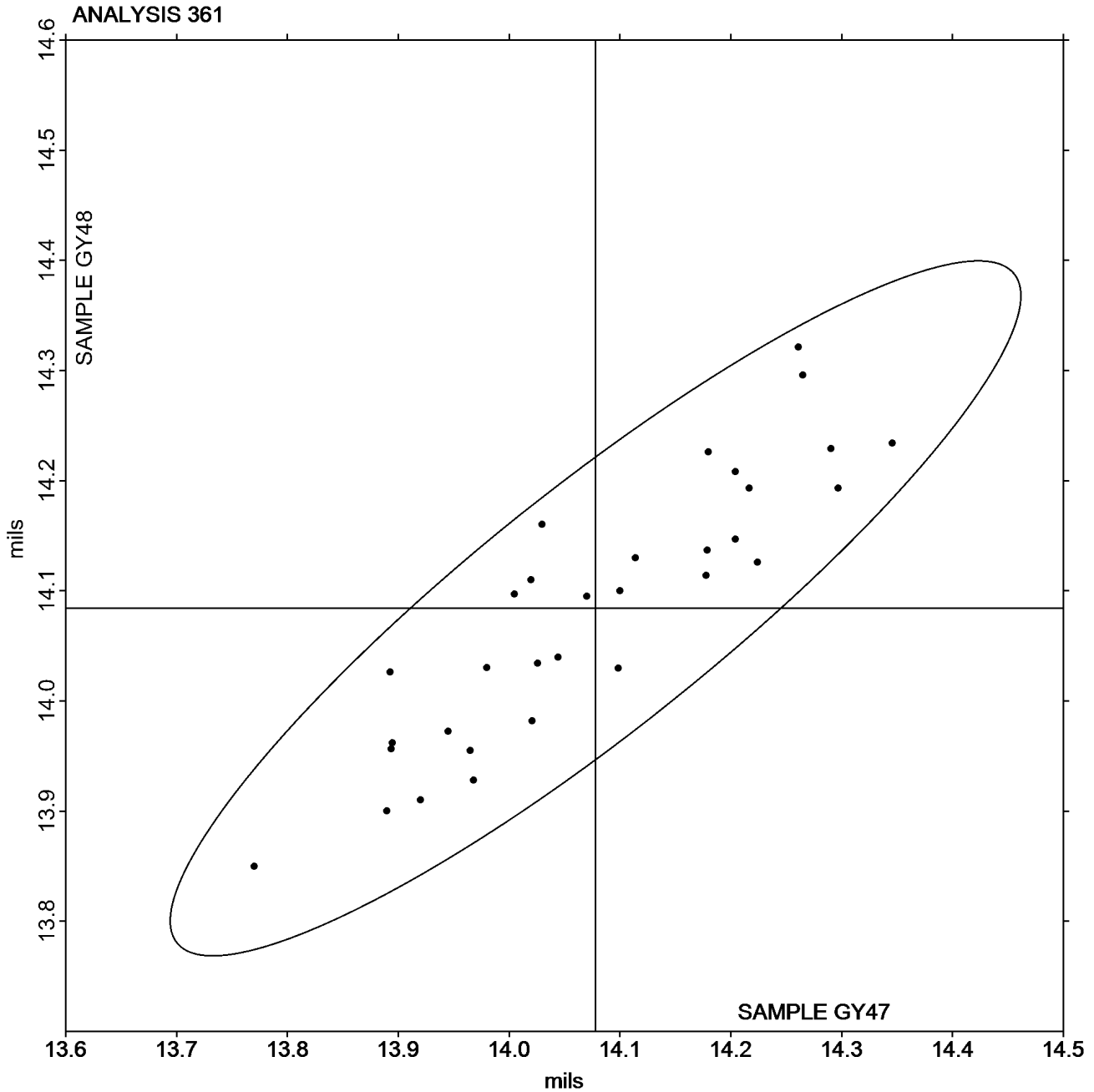
# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

## Analysis 361 Thickness (Caliper), Packaging papers TAPPI Official Test Method T411

Grand Mean Sample GY47 = 14.078  
mils

Grand Mean Sample GY48 = 14.084  
mils





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 364**  
**Coefficient of Static Friction - Horizontal Plane Method - Printing Papers**  
**TAPPI Official Test Method T549**

**Report #2902G,**  
**October 2017**

WebCode	Data Flag	<u>Sample GD47</u>			<u>Sample GD48</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
78C9MH		0.6104	0.0949	1.24	0.6400	0.0988	0.97	TA
ACCKFK		0.5330	0.0175	0.23	0.5610	0.0198	0.19	IT
ACDLXC		0.4132	-0.1023	-1.34	0.3640	-0.1773	-1.74	XX
B8EPRH		0.5004	-0.0151	-0.20	0.5452	0.0040	0.04	TA
CPTGAE		0.5302	0.0147	0.19	0.6144	0.0732	0.72	TM
LR79FY		0.5174	0.0019	0.02	0.6378	0.0966	0.95	TL
UGFFGA		0.4080	-0.1075	-1.41	0.4140	-0.1273	-1.25	TA
YALYWL		0.6114	0.0959	1.25	0.5536	0.0124	0.12	XX

<b>Summary Statistics</b>	<u><b>Sample GD47</b></u>	<u><b>Sample GD48</b></u>
<b>Grand Means</b>	0.52 COF	0.54 COF
<b>Std Dev Btwn Labs</b>	0.08 COF	0.10 COF

Statistics based on 8 of 8 reporting participants.

**Key to Instrument Codes Reported by Participants**

IT	IMASS SP-2100	TA	Thwing-Albert Friction Tester
TL	TMI 32-90 Lab Master/Slip and Friction	TM	TMI 32-06 Monitor/Slip and Friction
XX	Instrument make/model not specified by lab		

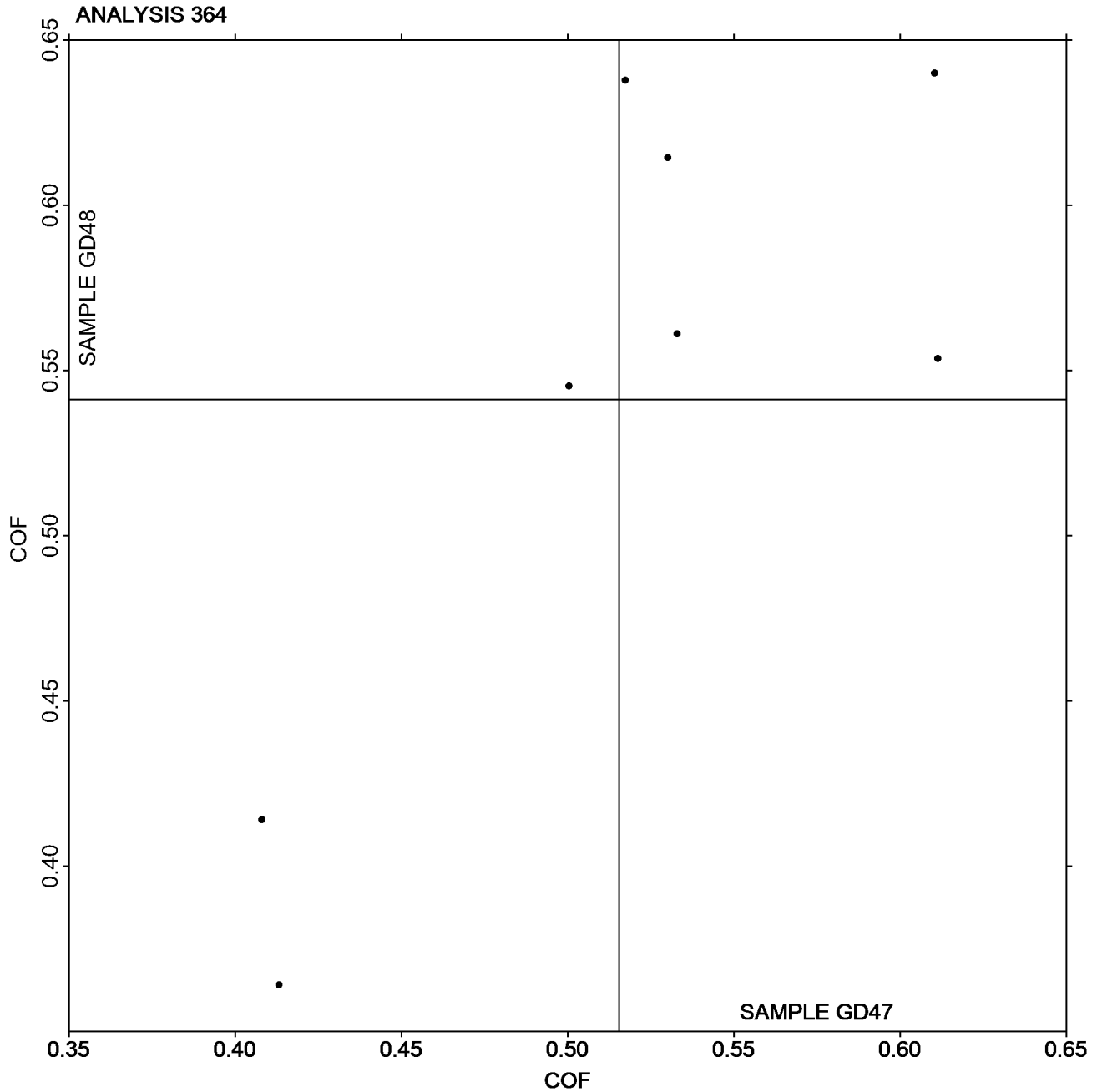


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 364**  
**Coefficient of Static Friction - Horizontal Plane Method - Printing Papers**  
**TAPPI Official Test Method T549**

Report #2902G,  
October 2017

Grand Mean Sample GD47 = 0.51550  
COF

Grand Mean Sample GD48 =  
0.54125 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**  
**Coefficient of Kinetic Friction - Horizontal Plane Method - Printing Papers**  
**TAPPI Official Test Method T549**

Report #2902G,  
October 2017

WebCode	Data Flag	<u>Sample GD47</u>			<u>Sample GD48</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2WUU2U		0.5470	0.0649	0.96	0.5494	0.0472	0.66	TA
6M934R		0.4350	-0.0471	-0.70	0.4950	-0.0072	-0.10	TA
78C9MH		0.4866	0.0045	0.07	0.5098	0.0076	0.11	TA
ACCKFK		0.4188	-0.0633	-0.93	0.4282	-0.0740	-1.04	IR
ACDLXC	X	0.4548	-0.0273	-0.40	0.3606	-0.1416	-1.98	XX
B8EPRH		0.4758	-0.0063	-0.09	0.5140	0.0118	0.16	TA
CPTGAE		0.5078	0.0257	0.38	0.5496	0.0474	0.66	TM
J6KMHA		0.3864	-0.0957	-1.41	0.3894	-0.1128	-1.58	TA
KQD3C3		0.5708	0.0887	1.31	0.5828	0.0806	1.13	TM
LR79FY		0.5760	0.0939	1.39	0.5930	0.0908	1.27	TL
N324PE		0.4168	-0.0653	-0.96	0.4110	-0.0912	-1.28	TA

<b>Summary Statistics</b>	<u>Sample GD47</u>	<u>Sample GD48</u>
<b>Grand Means</b>	0.48 COF	0.50 COF
<b>Std Dev Btwn Labs</b>	0.07 COF	0.07 COF

Statistics based on 10 of 11 reporting participants.

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

ACDLXC (X) - Inconsistent in testing between samples. Inconsistent within the determinations of sample GD47.

**Key to Instrument Codes Reported by Participants**

IR	IMASS SP-2000	TA	Thwing-Albert Friction Tester
TL	TMI 32-90 Lab Master/Slip and Friction	TM	TMI 32-06 Monitor/Slip and Friction
XX	Instrument make/model not specified by lab		

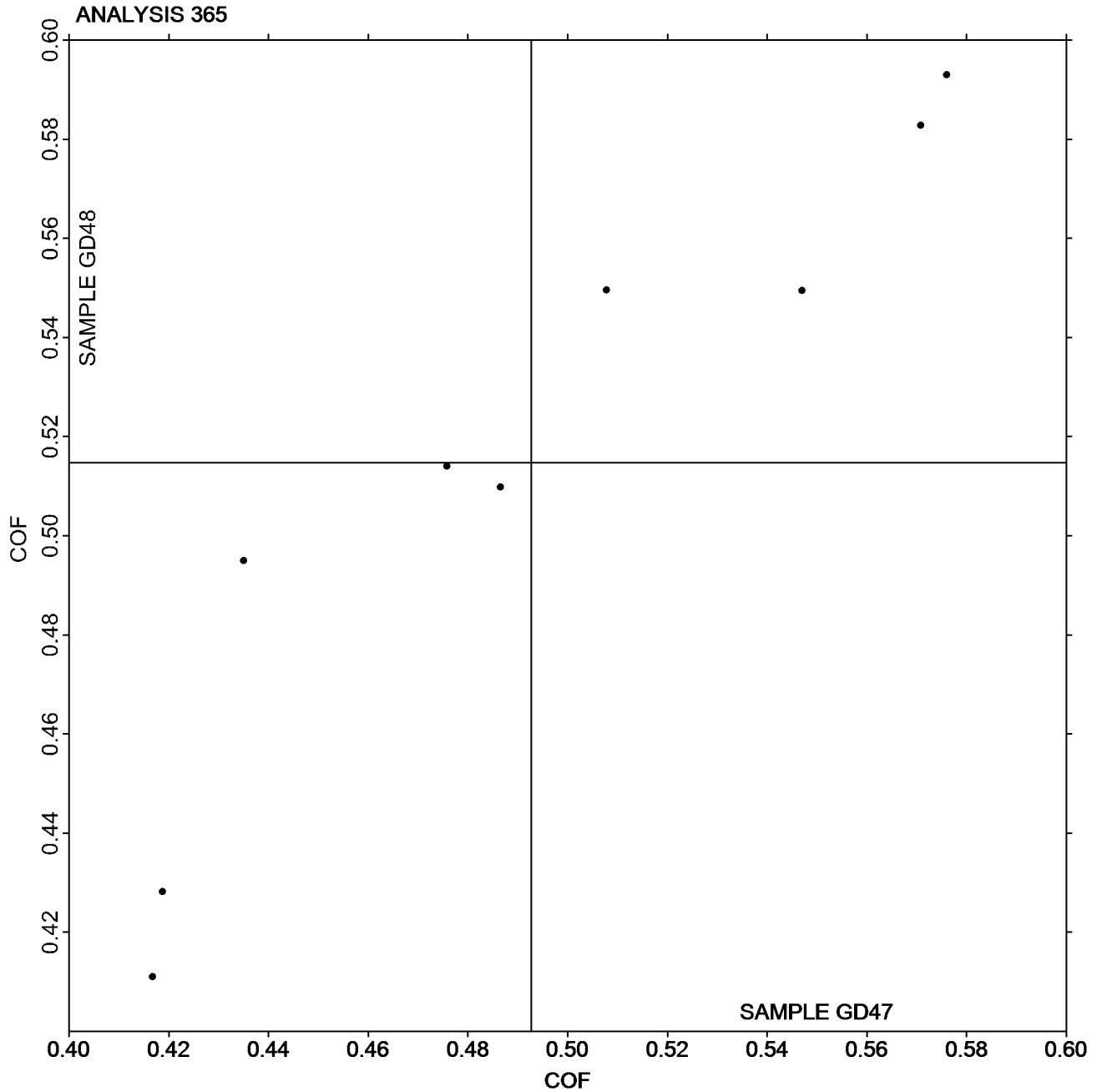


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 365**  
**Coefficient of Kinetic Friction - Horizontal Plane Method - Printing Papers**  
**TAPPI Official Test Method T549**

Report #2902G,  
October 2017

Grand Mean Sample GD47 = 0.48210  
COF

Grand Mean Sample GD48 =  
0.50222 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

Report #2902G,  
October 2017

## Analysis 370

### Air Resistance - Gurley Oil Type

### TAPPI Official Test Method T460

WebCode	Data Flag	Sample GE47			Sample GE48			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2XZEPU		25.11	-0.18	-0.14	24.66	-0.97	-0.81	HG
3F2JUH		25.26	-0.03	-0.02	25.91	0.29	0.24	PP
438L6P		23.84	-1.45	-1.16	24.11	-1.52	-1.26	LP
78C9MH		26.70	1.41	1.14	27.34	1.71	1.43	WG
946L8J		27.23	1.94	1.56	27.53	1.91	1.59	LA
98369H		25.68	0.39	0.32	26.33	0.70	0.59	LP
ACDLXC		23.90	-1.39	-1.12	24.40	-1.23	-1.02	GS
B8EPRH		24.93	-0.36	-0.29	26.14	0.51	0.43	LA
BFPPLU		25.70	0.41	0.33	25.37	-0.26	-0.21	HG
D6M74P		23.94	-1.35	-1.08	24.82	-0.81	-0.67	XX
E2HZ2P		25.35	0.06	0.05	26.62	0.99	0.83	LP
E86PJD	X	21.44	-3.85	-3.09	19.70	-5.92	-4.94	TN
FE24HK		25.94	0.65	0.53	27.51	1.88	1.57	HG
FMD3CV		26.57	1.28	1.03	25.77	0.14	0.12	XX
FMTJ7N		25.75	0.46	0.37	25.23	-0.40	-0.33	PP
GBXNQ9		25.90	0.61	0.49	25.51	-0.12	-0.10	LA
GNLTWJ		25.38	0.09	0.07	26.54	0.92	0.76	LA
JCKQQT		25.10	-0.19	-0.15	25.97	0.34	0.29	HG
JPQZE3		24.80	-0.49	-0.39	25.18	-0.45	-0.37	LW
LR79FY		25.03	-0.26	-0.21	26.37	0.74	0.62	LP
MHXYNZ		24.90	-0.39	-0.31	25.20	-0.43	-0.36	LW
N3YJTY		24.97	-0.32	-0.25	24.88	-0.75	-0.63	RE
NA3FMW	*	21.97	-3.32	-2.67	22.39	-3.24	-2.70	VM
P3GM66		23.21	-2.08	-1.67	23.48	-2.15	-1.79	TL
PVFDU7		26.88	1.59	1.28	25.93	0.30	0.25	PP
QDU4C3		24.11	-1.17	-0.94	25.03	-0.59	-0.49	PP
R9UE7F		27.32	2.03	1.64	27.32	1.69	1.41	TL
RY6QAR		23.09	-2.20	-1.77	23.74	-1.89	-1.57	LP
T6ULUV	X	32.09	6.80	5.47	31.36	5.73	4.78	GA
TRZC3F		25.07	-0.22	-0.17	26.08	0.45	0.38	XX
UGFFGA		25.80	0.52	0.41	24.87	-0.75	-0.63	PP
URZLGY		26.50	1.21	0.98	25.40	-0.23	-0.19	LA
VYWQ2M		26.30	1.01	0.82	26.29	0.66	0.55	LP
WCXWDX		25.97	0.68	0.55	26.28	0.65	0.55	PP
XFBWAN		23.56	-1.73	-1.39	25.20	-0.43	-0.36	PP
XUR2BP		26.99	1.70	1.37	27.43	1.80	1.51	PP
Y4DFXT		25.50	0.21	0.17	26.07	0.44	0.37	TL
YUDMQM		27.10	1.81	1.45	27.28	1.65	1.38	PP
Z3Z4R		24.21	-1.08	-0.87	23.87	-1.76	-1.47	XX
ZYDTD4		25.34	0.05	0.04	25.73	0.10	0.09	PP



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

## Analysis 370

Air Resistance - Gurley Oil Type

TAPPI Official Test Method T460

Summary Statistics	Sample GE47	Sample GE48
<b>Grand Means</b>	25.29 sec/100 cc	25.63 sec/100 cc
<b>Stnd Dev Btwn Labs</b>	1.24 sec/100 cc	1.20 sec/100 cc

Statistics based on 38 of 40 reporting participants.

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

T6ULUV (X) - Data for both samples are high. Possible Systematic Error.

E86PJD (X) - Data for both samples are low. Possible Systematic Error.

### Analysis Notes:

BFPPLU - One determination removed from the Lab Mean of Sample GE47 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 #4110, Oil Flotation	<b>TN</b> Gurley S-P-S Tester #4190
<b>VM</b> Valmet PaperLab (was Kajaani/Robotest)	<b>WG</b> W & LE Gurley Tester
<b>XX</b> Instrument make/model not specified by lab	



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

## Analysis 370

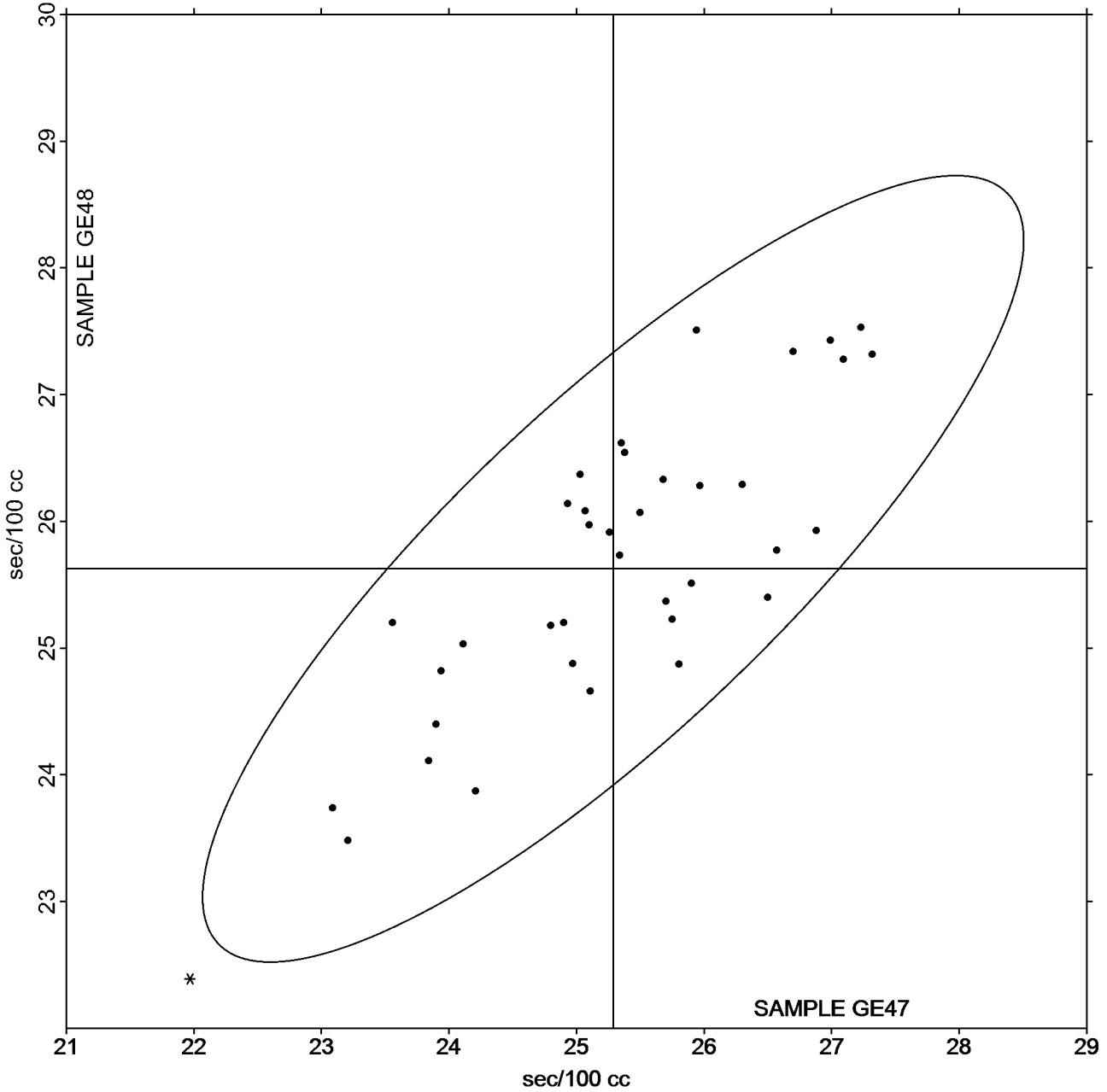
Air Resistance - Gurley Oil Type

TAPPI Official Test Method T460

Grand Mean Sample GE47 = 25.287  
sec/100 cc

Grand Mean Sample GE48 = 25.626  
sec/100 cc

ANALYSIS 370





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 372**  
**Porosity - Sheffield Type - Sheffield Units for 3/4 inch Diameter Orifice**  
**TAPPI Official Test Method T547**

Report #2902G,  
October 2017

WebCode	Data Flag	Sample GE47			Sample GE48			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2XZEPU		108.3	-5.0	-0.94	106.5	-5.7	-1.30	TT
3F2JUH		111.4	-1.8	-0.35	112.2	0.0	-0.01	PP
8JK8BJ	X	23.1	-90.2	-17.08	15.8	-96.4	-21.90	XX
9CHFLL		117.7	4.4	0.84	117.1	4.9	1.11	SH
A4YVFR	X	26.6	-86.7	-16.42	25.9	-86.3	-19.61	TT
ACDLXC		110.6	-2.7	-0.50	109.0	-3.2	-0.73	SH
BZWYNC		114.5	1.2	0.23	110.5	-1.7	-0.39	TT
DEB4PP		119.7	6.4	1.22	120.6	8.4	1.91	VM
JQLHDJ	X	108.1	-5.2	-0.98	98.6	-13.6	-3.10	GA
MJQWRZ		106.4	-6.9	-1.30	107.2	-5.0	-1.14	LP
NA3FMW		124.6	11.3	2.15	117.3	5.1	1.16	PP
PF2AAW		113.6	0.3	0.06	112.5	0.3	0.06	HM
TRZC3F		113.0	-0.3	-0.05	107.7	-4.5	-1.03	XX
VRQCVC		107.8	-5.5	-1.03	113.4	1.2	0.27	TT
XFBWAN		111.5	-1.8	-0.33	112.6	0.4	0.09	HM

Summary Statistics	Sample GE47	Sample GE48
<b>Grand Means</b>	113.26 Sheffield Units	112.21 Sheffield Units
<b>Std Dev Btwn Labs</b>	5.28 Sheffield Units	4.40 Sheffield Units
Statistics based on 12 of 15 reporting participants.		

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

- JQLHDJ (X) - Data for sample GE48 are low.
- A4YVFR (X) - Extreme Data.
- 8JK8BJ (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

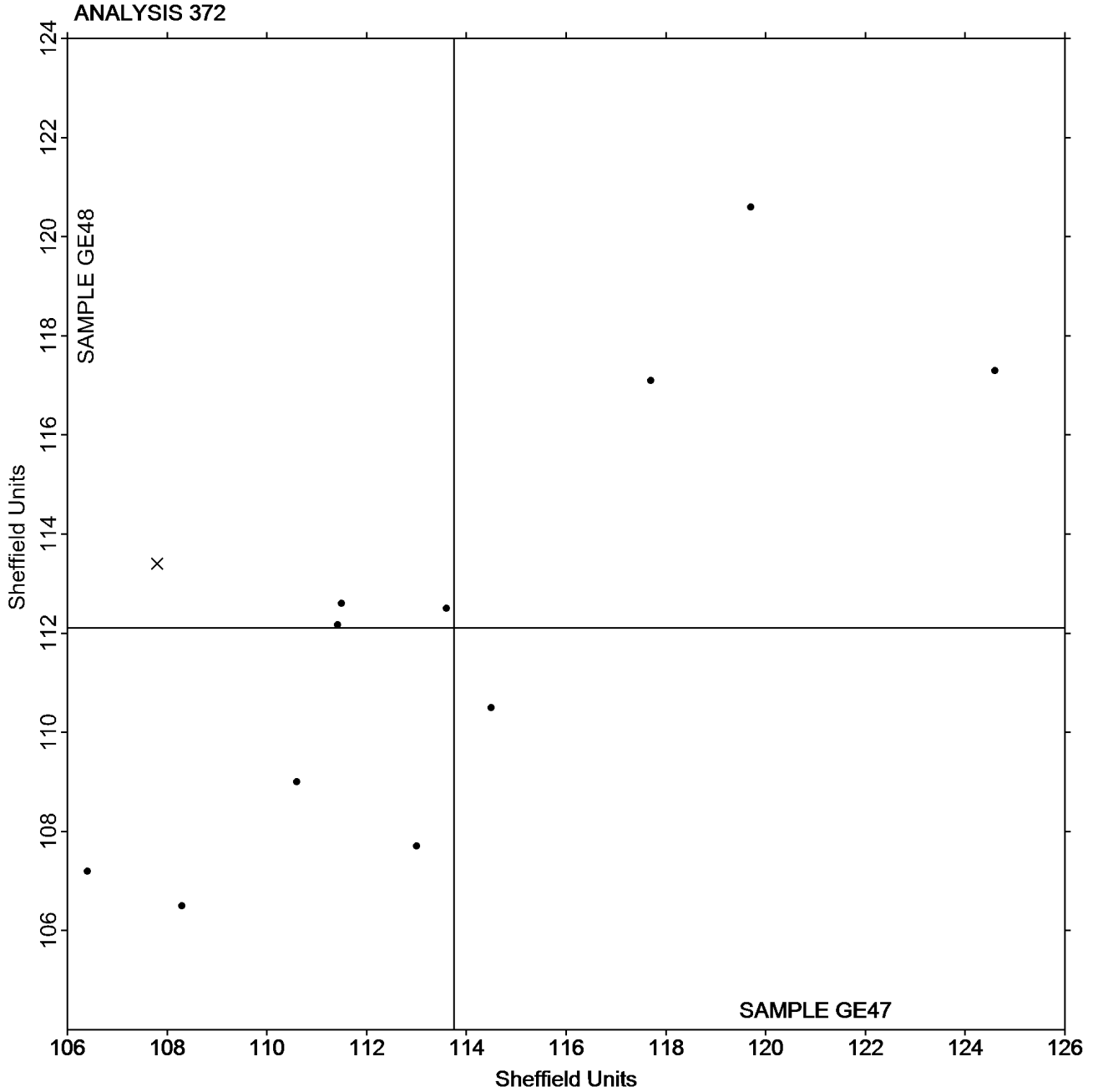


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 372**  
**Porosity - Sheffield Type - Sheffield Units for 3/4 inch Diameter Orifice**  
**TAPPI Official Test Method T547**

**Report #2902G,**  
**October 2017**

**Grand Mean Sample GE47 = 113.26**  
**Sheffield Units**

**Grand Mean Sample GE48 = 112.21**  
**Sheffield 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**

**Report #2902G,  
October 2017**

**Analysis 376**

**Roughness - Print Surf Method - 0.5 to 4.0 Microns**

**TAPPI Official Test Method T555**

WebCode	Data Flag	Sample GJ47			Sample GJ48			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2XZEPU		0.7580	-0.0567	-0.58	0.8330	-0.0374	-0.38	ZZ
39HHAY		0.8200	0.0053	0.05	0.9130	0.0426	0.43	ZZ
4MBCFX		0.9380	0.1233	1.25	1.0130	0.1426	1.45	ZZ
6V2GKH		0.8610	0.0463	0.47	0.9240	0.0536	0.55	ZZ
78C9MH		0.7300	-0.0847	-0.86	0.7690	-0.1014	-1.03	ZZ
7PAM7H		0.7650	-0.0497	-0.50	0.8520	-0.0184	-0.19	ZZ
98369H		0.6870	-0.1277	-1.30	0.7480	-0.1224	-1.25	ZZ
9UYNEA		0.6760	-0.1387	-1.41	0.7850	-0.0854	-0.87	ZZ
AJVTXP		0.8980	0.0833	0.85	0.9680	0.0976	0.99	ZZ
B4WBJC	X	1.2920	0.4773	4.85	1.2940	0.4236	4.32	ZZ
BCACMR		0.6700	-0.1447	-1.47	0.7390	-0.1314	-1.34	ZZ
CMPLQB		0.7600	-0.0547	-0.56	0.7970	-0.0734	-0.75	ZZ
EVP377		0.8550	0.0403	0.41	0.9300	0.0596	0.61	ZZ
FB4HW9		0.7760	-0.0387	-0.39	0.8400	-0.0304	-0.31	ZZ
FE24HK		0.7560	-0.0587	-0.60	0.8410	-0.0294	-0.30	ZZ
H634EC		0.8920	0.0773	0.78	0.9190	0.0486	0.50	ZZ
HA3AYA	X	0.7140	-0.1007	-1.02	0.8860	0.0156	0.16	ZZ
J4BH87		0.7740	-0.0407	-0.41	0.7930	-0.0774	-0.79	ZZ
J6KMHA		0.9280	0.1133	1.15	0.9910	0.1206	1.23	ZZ
JAFDQ7		0.9690	0.1543	1.57	0.9840	0.1136	1.16	ZZ
JXK8W9		0.9110	0.0963	0.98	0.9800	0.1096	1.12	ZZ
KEHUTY		0.6800	-0.1347	-1.37	0.7130	-0.1574	-1.61	ZZ
N324PE		0.7320	-0.0827	-0.84	0.7630	-0.1074	-1.10	ZZ
NA3FMW	*	1.0620	0.2473	2.51	1.0890	0.2186	2.23	ZZ
NULHHV		0.8385	0.0238	0.24	0.8960	0.0256	0.26	ZZ
PF2AAW		0.6730	-0.1417	-1.44	0.7230	-0.1474	-1.50	ZZ
PT3ZRV		0.8220	0.0073	0.07	0.8650	-0.0054	-0.06	ZZ
Q6X9CJ		0.8290	0.0143	0.15	0.8710	0.0006	0.01	ZZ
QDU4C3		0.7620	-0.0527	-0.53	0.8230	-0.0474	-0.48	ZZ
U2NFTV		0.7252	-0.0895	-0.91	0.7790	-0.0914	-0.93	ZZ
XEJ37T		0.9390	0.1243	1.26	1.0300	0.1596	1.63	ZZ
XFWHVM		0.8120	-0.0027	-0.03	0.8540	-0.0164	-0.17	ZZ
XYMQTH		0.8010	-0.0137	-0.14	0.8050	-0.0654	-0.67	ZZ
YJUE3T		0.8290	0.0143	0.15	0.9010	0.0306	0.31	ZZ
ZYDTD4		0.9560	0.1413	1.43	0.9930	0.1226	1.25	ZZ





# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

## Analysis 376

Roughness - Print Surf Method - 0.5 to 4.0 Microns

TAPPI Official Test Method T555

Summary Statistics	Sample GJ47	Sample GJ48
Grand Means	0.81 Microns	0.87 Microns
Stnd Dev Btwn Labs	0.10 Microns	0.10 Microns

Statistics based on 33 of 35 reporting participants.

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

B4WBJC (X) - Data for both samples are high. Possible Systematic Error.

HA3AYA (X) - Inconsistent in testing between samples.

### Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

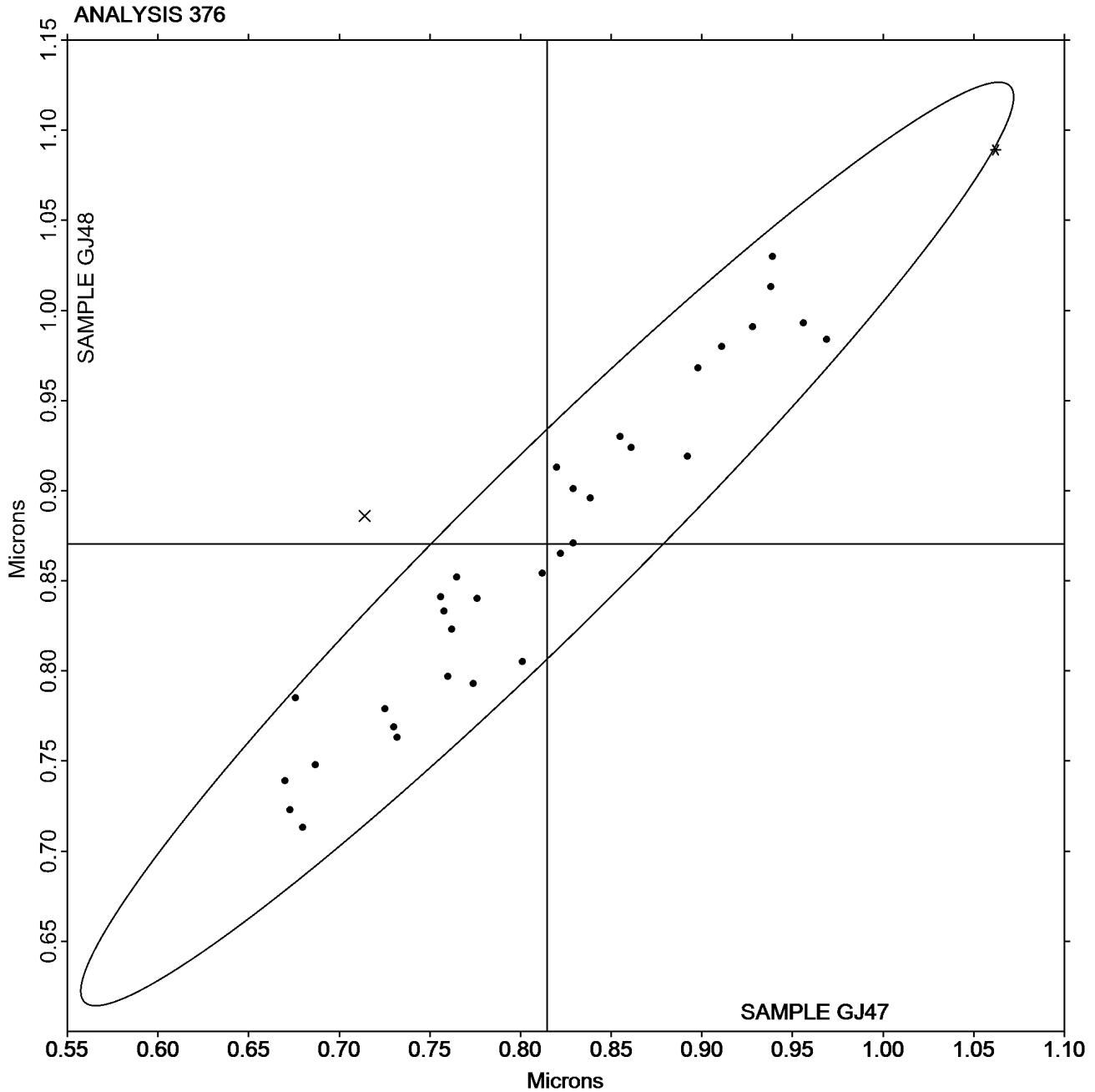
## Analysis 376

Roughness - Print Surf Method - 0.5 to 4.0 Microns

TAPPI Official Test Method T555

Grand Mean Sample GJ47 = 0.81469  
Microns

Grand Mean Sample GJ48 =  
0.87042 Microns





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 377**  
**Roughness - Print Surf Method - 2.5 to 6.0 Microns**  
**TAPPI Official Test Method T555**

Report #2902G,  
October 2017

WebCode	Data Flag	<u>Sample GK47</u>			<u>Sample GK48</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2877BH		3.760	-0.085	-0.59	3.800	-0.272	-1.79	ZZ
78C9MH		3.789	-0.056	-0.38	4.117	0.045	0.30	ZZ
DEB4PP		3.818	-0.027	-0.18	4.160	0.088	0.58	ZZ
FE24HK		3.706	-0.139	-0.96	3.941	-0.131	-0.86	ZZ
FMTJ7N		3.889	0.045	0.31	4.110	0.038	0.25	ZZ
GBXNQ9		3.586	-0.259	-1.79	3.953	-0.119	-0.78	ZZ
LR79FY		3.904	0.060	0.41	4.022	-0.050	-0.33	ZZ
UGFFGA		4.074	0.230	1.59	4.294	0.222	1.47	ZZ
WCXWDX		3.905	0.061	0.42	4.052	-0.020	-0.13	ZZ
YALYWL		4.014	0.170	1.17	4.267	0.195	1.29	ZZ

<b>Summary Statistics</b>	<u>Sample GK47</u>	<u>Sample GK48</u>
<b>Grand Means</b>	3.84 Microns	4.07 Microns
<b>Std Dev Btwn Labs</b>	0.14 Microns	0.15 Microns
Statistics based on 10 of 10 reporting participants.		

**Key to Instrument Codes Reported by Participants**

ZZ Instruments No Longer Tracked



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

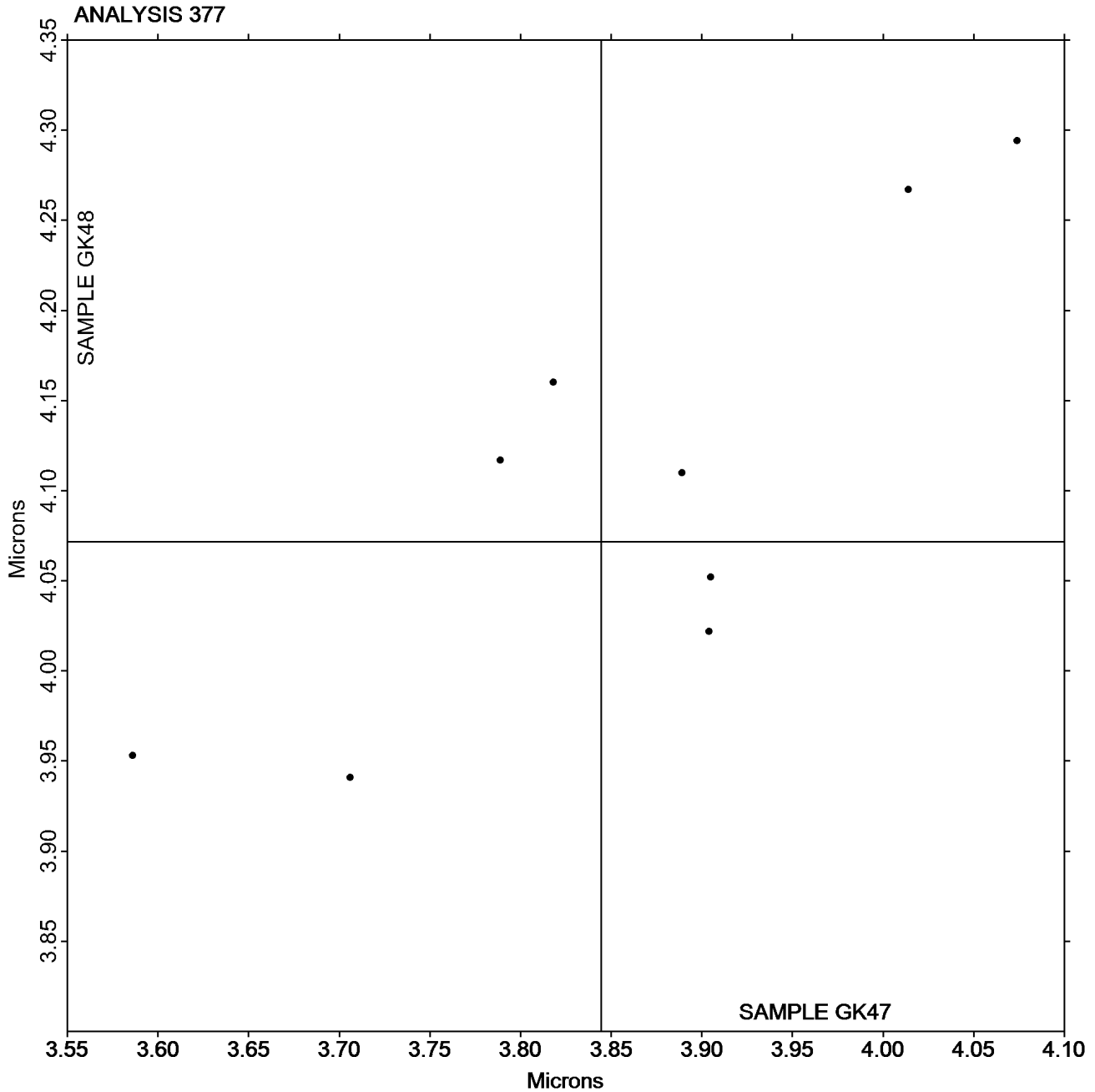
## Analysis 377

Roughness - Print Surf Method - 2.5 to 6.0 Microns

TAPPI Official Test Method T555

Grand Mean Sample GK47 = 3.8445  
Microns

Grand Mean Sample GK48 = 4.0716  
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

Report #2902G,  
October 2017

## Analysis 378

### Roughness - Sheffield Type

#### TAPPI Official Test Method T538

WebCode	Data Flag	Sample GL47			Sample GL48			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2XZEPU		157.7	11.3	0.98	160.6	12.2	1.28	TT
39HHAY		145.4	-1.0	-0.09	149.9	1.5	0.15	LW
3F2JUH		149.8	3.4	0.29	149.8	1.4	0.15	PP
4MBCFX		134.5	-11.9	-1.04	142.5	-5.9	-0.62	TS
78C9MH	*	171.4	25.0	2.17	159.8	11.4	1.19	XX
7G4HGL		142.0	-4.4	-0.39	144.1	-4.3	-0.45	XX
864ABN		140.4	-6.0	-0.52	138.8	-9.7	-1.01	SH
8JK8BJ	X	68.3	-78.2	-6.80	32.5	-115.9	-12.15	XX
8LMCLH		146.1	-0.3	-0.03	142.3	-6.1	-0.64	GA
8MHT3L		126.0	-20.4	-1.78	125.3	-23.1	-2.42	XX
946L8J		135.5	-11.0	-0.95	138.0	-10.4	-1.09	LA
98369H		140.5	-5.9	-0.52	143.5	-4.9	-0.52	TS
9CHFLL		155.2	8.8	0.76	159.4	11.0	1.15	SH
A6D6M8		175.3	28.9	2.51	170.0	21.6	2.26	TT
ACDLXC		147.6	1.2	0.10	146.8	-1.6	-0.17	XX
AJVTXP		160.8	14.4	1.25	163.3	14.9	1.56	LW
B4WBJC		139.4	-7.0	-0.61	149.5	1.1	0.11	GL
BCACMR		138.6	-7.8	-0.68	145.2	-3.2	-0.34	LA
BFPLU		130.5	-15.9	-1.39	140.0	-8.4	-0.88	HM
BZWYNC	*	118.0	-28.4	-2.47	121.5	-26.9	-2.82	TT
CPTGAE	*	122.8	-23.6	-2.06	139.5	-8.9	-0.93	PP
FB4HW9		150.6	4.2	0.36	157.2	8.8	0.92	PP
FMTJ7N	*	154.4	8.0	0.70	141.3	-7.1	-0.74	PP
GBXNQ9	X	196.8	50.4	4.39	198.5	50.1	5.25	LA
GFN39N		143.8	-2.6	-0.23	153.6	5.2	0.54	LA
J4BH87		149.2	2.8	0.25	145.9	-2.5	-0.27	PP
J6KMHA		152.4	6.0	0.52	152.7	4.3	0.45	PP
JCKQQT		149.0	2.6	0.22	153.1	4.7	0.49	TS
JQLHDJ		163.3	16.9	1.47	158.4	9.9	1.04	GA
JXK8W9		132.0	-14.4	-1.25	139.0	-9.4	-0.99	LA
KEHUTY		151.0	4.6	0.40	149.4	1.0	0.10	LA
LD7GN3		139.9	-6.5	-0.56	143.3	-5.1	-0.54	PP
LR79FY		149.4	3.0	0.26	149.1	0.7	0.07	LW
MBU2U3		137.9	-8.5	-0.74	139.9	-8.5	-0.90	PP
MHXYNZ		140.7	-5.7	-0.50	149.5	1.1	0.11	TS
MJQWRZ		156.4	10.0	0.87	152.9	4.5	0.47	PP
N324PE		151.7	5.3	0.46	163.2	14.8	1.55	HM
N9NXH7		170.0	23.6	2.05	168.0	19.6	2.05	GL
NA3FMW		142.2	-4.2	-0.37	149.6	1.2	0.12	VM
NULHHV		153.0	6.5	0.57	148.3	-0.1	-0.01	HM



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 378**  
**Roughness - Sheffield Type**  
**TAPPI Official Test Method T538**

Report #2902G,  
October 2017

WebCode	Data Flag	Sample GL47			Sample GL48			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
PJYQK7		150.1	3.7	0.32	150.0	1.6	0.16	GA
PVFDU7		138.2	-8.3	-0.72	146.3	-2.1	-0.22	PP
QDU4C3		132.6	-13.9	-1.21	132.2	-16.2	-1.70	PP
TQP8RD		147.5	1.1	0.09	145.5	-2.9	-0.31	PP
TRZC3F		129.7	-16.7	-1.46	137.4	-11.0	-1.16	XX
U2NFTV		145.0	-1.4	-0.12	148.4	-0.1	-0.01	PP
UGFFGA		155.4	9.0	0.78	155.0	6.6	0.69	PP
VRQCVC		146.4	0.0	0.00	144.9	-3.5	-0.37	TT
WCXWDX		152.5	6.0	0.53	150.4	2.0	0.21	PP
XFBWAN		140.2	-6.2	-0.54	149.5	1.1	0.11	PP
XUR2BP		154.4	8.0	0.69	149.5	1.1	0.11	SH
YALYWL		151.1	4.7	0.41	145.2	-3.2	-0.34	HM
YJUE3T		143.8	-2.6	-0.23	148.7	0.3	0.03	LW
YRHCM8	*	155.0	8.6	0.75	166.4	18.0	1.88	PP
YUDMQM		159.0	12.5	1.09	157.0	8.6	0.90	PP
ZYDTD4		141.4	-5.0	-0.44	144.7	-3.7	-0.39	HM

Summary Statistics	Sample GL47	Sample GL48
<b>Grand Means</b>	146.42 Sheffield	148.43 Sheffield
<b>Std Dev Btwn Labs</b>	11.49 Sheffield	9.54 Sheffield

Statistics based on 54 of 56 reporting participants.

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

GBXNQ9 (X) - Data for both samples are high.

8JK8BJ (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>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>VM</b> Valmet PaperLab (was Kajaani\Robotest)
<b>XX</b> Instrument make/model not specified by lab	



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

## Analysis 378

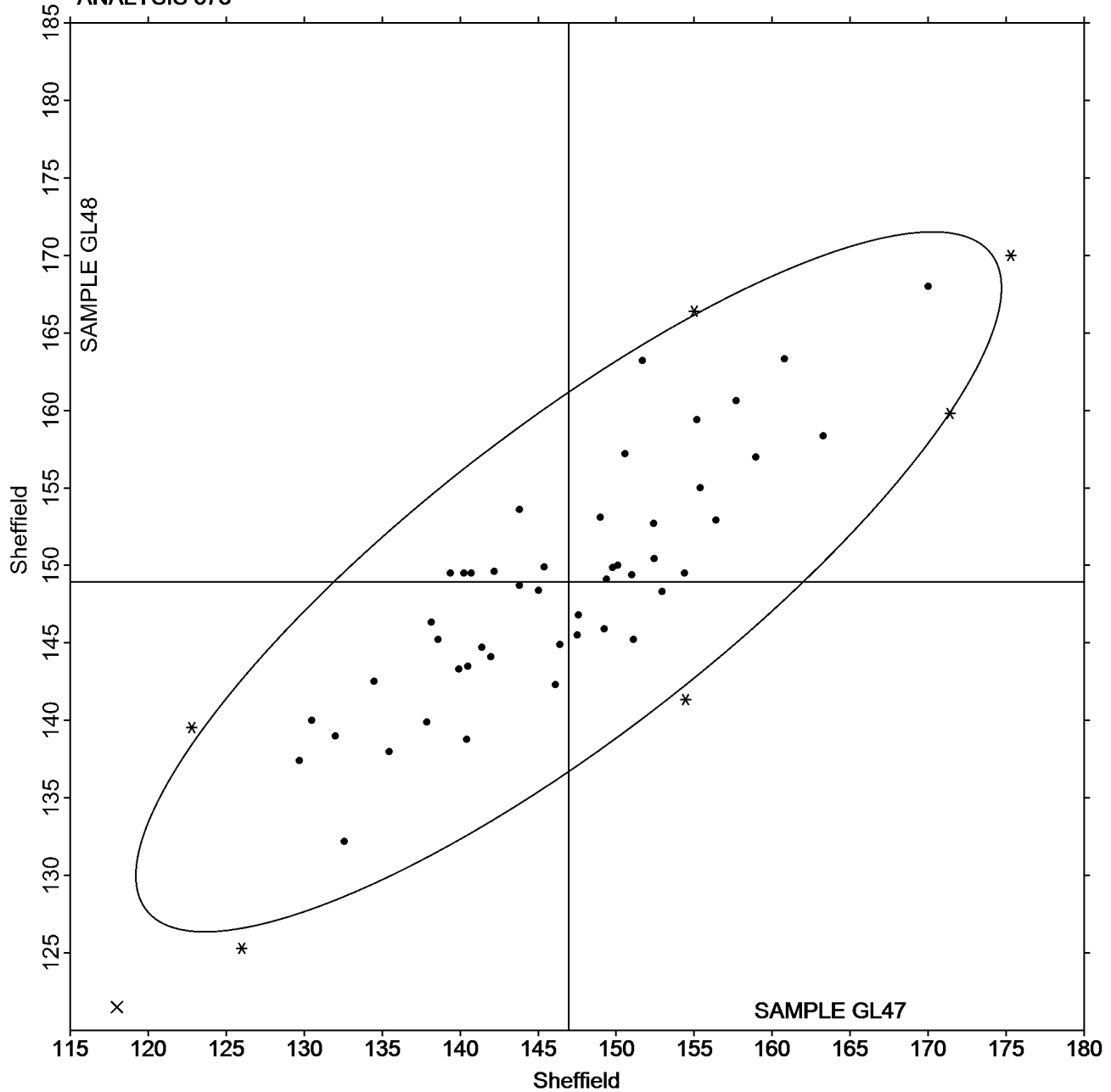
### Roughness - Sheffield Type

#### TAPPI Official Test Method T538

Grand Mean Sample GL47 = 146.42  
Sheffield

Grand Mean Sample GL48 = 148.43  
Sheffield

#### ANALYSIS 378





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 382**  
**Moisture in Paper**  
**TAPPI Official Test Method T412**

Report #2902G,  
October 2017

WebCode	Data Flag	<u>Sample GM47</u>			<u>Sample GM48</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2877BH		4.840	0.339	0.77	4.500	-0.045	-0.13	ZZ
3FVD7T		5.140	0.639	1.45	5.000	0.455	1.30	ZZ
69BXT9		4.366	-0.135	-0.31	4.537	-0.008	-0.02	ZZ
EVP377		4.398	-0.103	-0.24	4.520	-0.025	-0.07	ZZ
FT4BYB		3.709	-0.792	-1.80	3.975	-0.570	-1.63	ZZ
JU2VCK		5.041	0.540	1.23	5.125	0.580	1.66	ZZ
KYAXD8		4.614	0.113	0.26	4.668	0.123	0.35	ZZ
NQ7XPN		4.545	0.044	0.10	4.585	0.040	0.11	ZZ
QWM8XA		4.020	-0.481	-1.09	4.271	-0.274	-0.79	ZZ
UGFFGA		4.739	0.238	0.54	4.737	0.192	0.55	ZZ
YALYWL		4.100	-0.401	-0.91	4.080	-0.465	-1.33	ZZ

<b>Summary Statistics</b>	<u>Sample GM47</u>	<u>Sample GM48</u>
<b>Grand Means</b>	4.50 Percent	4.55 Percent
<b>Std Dev Btwn Labs</b>	0.44 Percent	0.35 Percent
Statistics based on 11 of 11 reporting participants.		

**Key to Instrument Codes Reported by Participants**

ZZ Instruments No Longer Tracked





# Paper & Paperboard Interlaboratory Testing Program

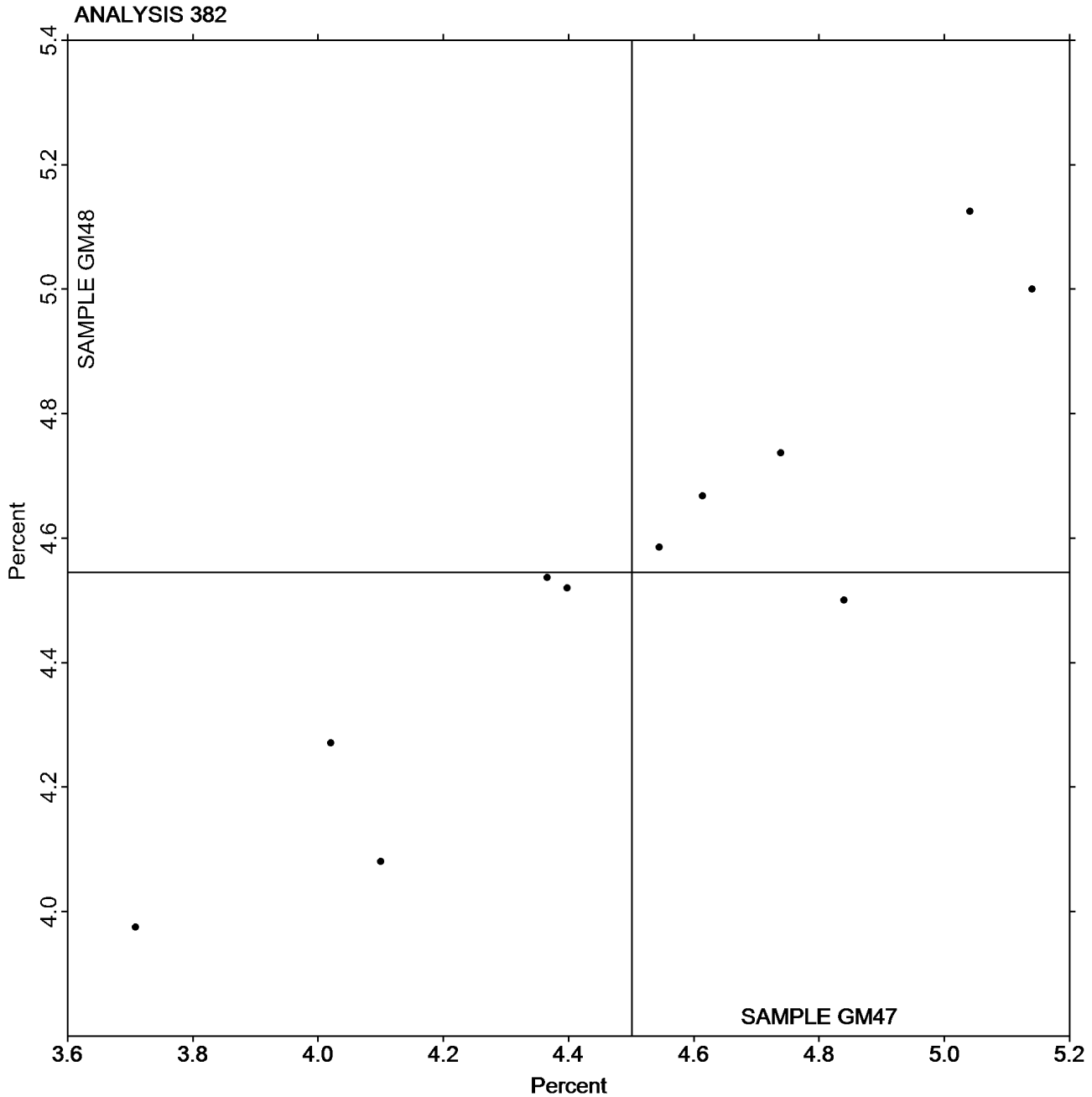
Report #2902G,  
October 2017

## Analysis 382 Moisture in Paper

### TAPPI Official Test Method T412

Grand Mean Sample GM47 = 4.5010  
Percent

Grand Mean Sample GM48 = 4.5453  
Percent





**Paper & Paperboard Interlaboratory Testing Program**

**Report #2902G,  
October 2017**

**Analysis 384**

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

**TAPPI Official Test Method T425**

WebCode	Data Flag	Sample GN47			Sample GN48			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2XZEPU		89.29	0.25	0.48	89.11	0.02	0.04	ZZ
3F2JUH		89.84	0.80	1.54	89.42	0.33	0.60	ZZ
7PAM7H		89.20	0.16	0.30	89.51	0.42	0.76	ZZ
864ABN		89.53	0.49	0.94	89.59	0.50	0.90	ZZ
8MHT3L		89.39	0.34	0.66	89.11	0.02	0.03	ZZ
946L8J		88.57	-0.47	-0.91	88.79	-0.30	-0.54	ZZ
9CHFLL		88.96	-0.08	-0.16	88.87	-0.22	-0.39	ZZ
9UYNEA	*	88.80	-0.24	-0.47	89.80	0.71	1.28	ZZ
ACDLXC	X	87.03	-2.01	-3.87	86.83	-2.26	-4.06	ZZ
BFPLU		89.02	-0.02	-0.04	88.76	-0.33	-0.59	ZZ
BZWYNC		90.18	1.14	2.19	90.04	0.95	1.71	ZZ
CPTGAE	X	92.98	3.94	7.59	92.89	3.81	6.84	ZZ
FE24HK		89.38	0.34	0.65	89.19	0.10	0.18	ZZ
GBXNQ9		88.55	-0.49	-0.95	88.53	-0.56	-1.00	ZZ
H634EC		89.19	0.15	0.28	89.40	0.31	0.56	ZZ
HA3AYA		89.66	0.62	1.19	89.63	0.54	0.98	ZZ
J6KMHA		88.62	-0.42	-0.81	88.47	-0.62	-1.11	ZZ
JCKQQT		88.77	-0.27	-0.52	89.37	0.28	0.51	ZZ
MHXYNZ		89.03	-0.01	-0.02	89.07	-0.02	-0.03	ZZ
N324PE		89.58	0.54	1.04	89.11	0.02	0.04	ZZ
N9NXH7	X	92.75	3.71	7.14	93.35	4.26	7.66	ZZ
NPWRBZ		88.72	-0.33	-0.63	88.60	-0.49	-0.88	ZZ
NULHHV		88.25	-0.79	-1.53	87.87	-1.22	-2.19	ZZ
R9UE7F		88.65	-0.39	-0.76	88.22	-0.87	-1.56	ZZ
TQP8RD		88.49	-0.55	-1.06	89.24	0.15	0.27	ZZ
TRZC3F	*	87.43	-1.61	-3.10	87.58	-1.51	-2.71	ZZ
UGFFGA		89.45	0.40	0.78	89.52	0.43	0.77	ZZ
VCXMXU		88.77	-0.27	-0.52	88.92	-0.17	-0.30	ZZ
VRQCVC		89.44	0.40	0.77	89.92	0.83	1.50	ZZ
WCXWDX		88.94	-0.11	-0.21	88.93	-0.16	-0.28	ZZ
XEJ37T		88.51	-0.53	-1.03	89.17	0.09	0.16	ZZ
XUR2BP		88.98	-0.06	-0.12	88.97	-0.12	-0.21	ZZ
YALYWL		89.23	0.19	0.36	88.98	-0.11	-0.19	ZZ
YRHCM8		89.60	0.56	1.07	89.93	0.84	1.51	ZZ
YUDMQM		88.93	-0.11	-0.22	89.17	0.09	0.15	ZZ
Z3Z4R		89.27	0.22	0.43	89.53	0.44	0.80	ZZ
ZYDTD4		89.24	0.20	0.38	88.66	-0.43	-0.77	ZZ



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

## Analysis 384

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

#### TAPPI Official Test Method T425

Summary Statistics	Sample GN47	Sample GN48
Grand Means	89.04 Percent	89.09 Percent
Stnd Dev Btwn Labs	0.52 Percent	0.56 Percent

Statistics based on 34 of 37 reporting participants.

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

CPTGAE (X) - Extreme Data.

ACDLXC (X) - Data for both samples are low. Possible Systematic Error.

N9NXH7 (X) - Extreme Data.

#### Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

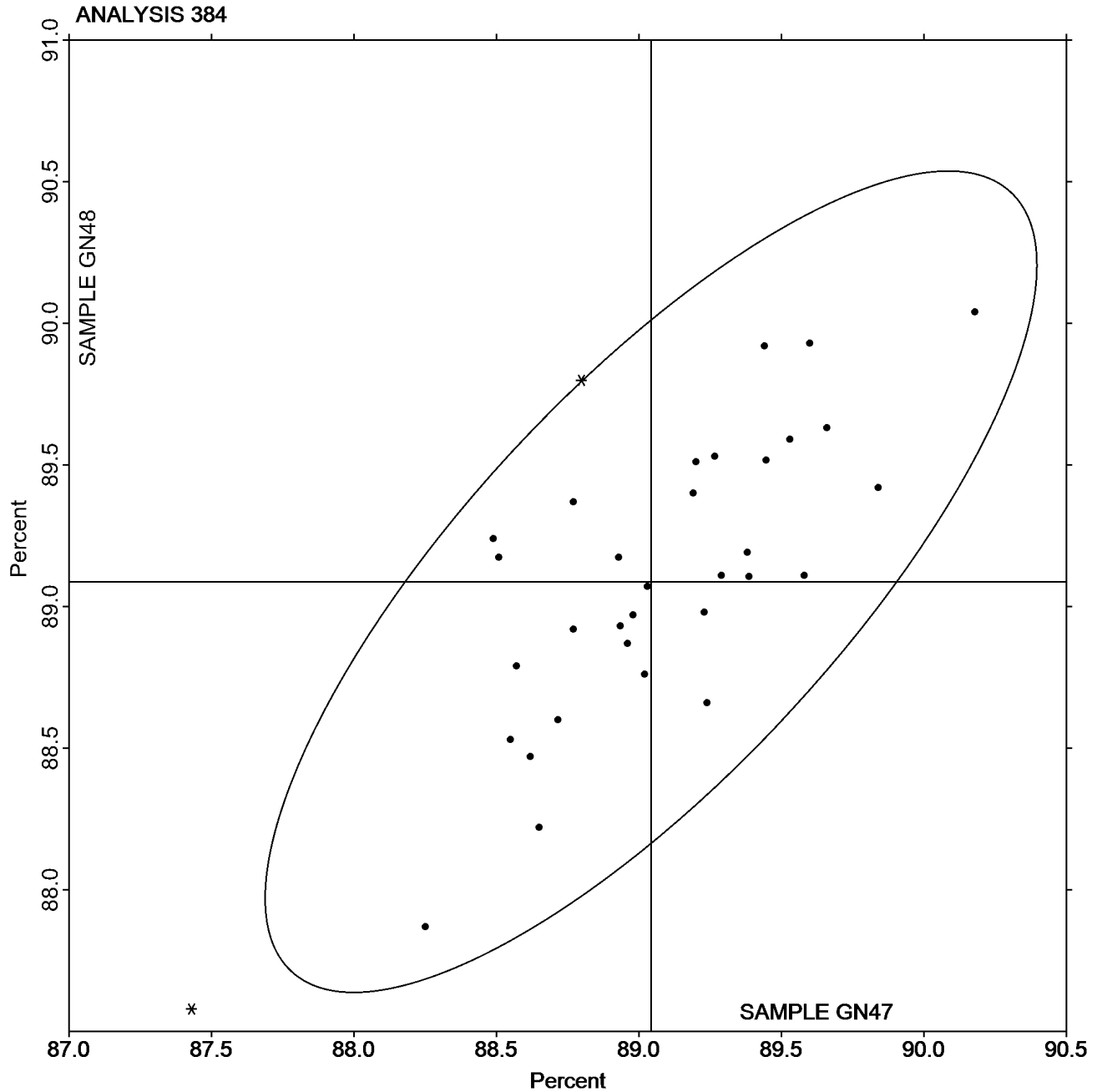
## Analysis 384

Opacity (89% Reflectance Backing) - Fine Papers

TAPPI Official Test Method T425

Grand Mean Sample GN47 = 89.042  
Percent

Grand Mean Sample GN48 = 89.088  
Percent





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 386**  
**Opacity (Paper Backing) - Fine Papers and Newsprint**  
**TAPPI Official Test Method T519**

Report #2902G,  
October 2017

WebCode	Data Flag	<u>Sample GP47</u>			<u>Sample GP48</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
DAWJMA		90.03	0.00	0.04	90.08	0.01	0.09	ZZ
DTUKYF		90.02	-0.01	-0.06	90.15	0.09	0.87	ZZ
GWTCB9		89.97	-0.05	-0.58	90.05	-0.01	-0.12	ZZ
J6KMHA	X	89.47	-0.55	-6.35	90.04	-0.03	-0.26	ZZ
JH9NZ2		90.08	0.06	0.71	89.89	-0.17	-1.72	ZZ
JPQZE3		89.88	-0.14	-1.61	90.00	-0.07	-0.66	ZZ
KQD3C3		90.07	0.05	0.54	90.25	0.19	1.84	ZZ
N3YJTY		89.94	-0.08	-0.96	89.96	-0.10	-1.03	ZZ
NULHHV		89.99	-0.04	-0.42	90.05	-0.02	-0.20	ZZ
PT3ZRV		89.88	-0.14	-1.62	90.05	-0.02	-0.20	ZZ
RY6QAR		90.06	0.04	0.42	90.15	0.08	0.83	ZZ
VYWQ2M		90.07	0.05	0.57	90.00	-0.07	-0.64	ZZ
XFBWAN		90.02	0.00	0.01	89.98	-0.09	-0.90	ZZ
XYMQTH		90.20	0.18	2.06	90.22	0.15	1.51	ZZ
Y4DFXT		90.10	0.08	0.89	90.10	0.03	0.34	ZZ

<b>Summary Statistics</b>	<u>Sample GP47</u>	<u>Sample GP48</u>
<b>Grand Means</b>	90.02 Percent	90.07 Percent
<b>Std Dev Btwn Labs</b>	0.09 Percent	0.10 Percent

Statistics based on 14 of 15 reporting participants.

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

J6KMHA (X) - Extreme Data for Sample GP47.

**Key to Instrument Codes Reported by Participants**

ZZ Instruments No Longer Tracked



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

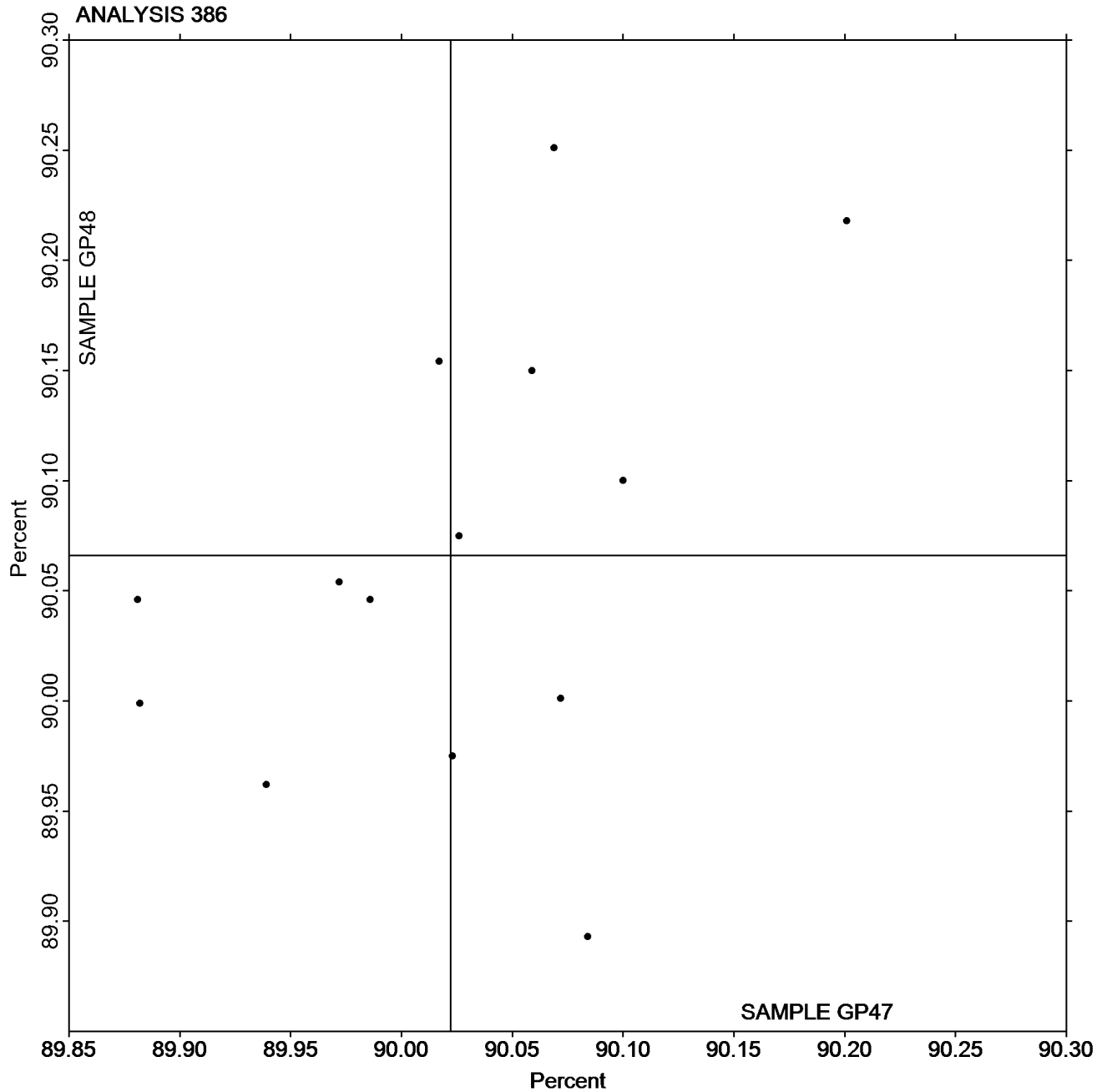
## Analysis 386

Opacity (Paper Backing) - Fine Papers and Newsprint

TAPPI Official Test Method T519

Grand Mean Sample GP47 = 90.022  
Percent

Grand Mean Sample GP48 = 90.066  
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**  
**TAPPI Official Test Method T452**

Report #2902G,  
October 2017

WebCode	Data Flag	Sample GR47			Sample GR48			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2877BH	X	87.01	2.83	2.66	86.74	2.02	2.07	TS
37A8BA		84.67	0.50	0.46	85.40	0.68	0.70	XX
3F2JUH		84.43	0.25	0.23	84.89	0.17	0.18	XS
864ABN		82.98	-1.20	-1.13	83.64	-1.08	-1.11	TA
8MHT3L	X	92.49	8.31	7.79	86.40	1.67	1.72	XX
ACDLXC	X	89.00	4.82	4.52	89.48	4.76	4.89	PE
AJVTXP	X	87.04	2.86	2.68	86.46	1.74	1.79	XX
B4WBJC		85.51	1.33	1.25	86.01	1.29	1.33	TS
BCACMR	*	86.46	2.28	2.14	86.54	1.82	1.87	EF
BZWYNC		84.69	0.51	0.48	85.30	0.58	0.59	TS
FB4HW9		84.58	0.40	0.38	85.08	0.36	0.37	HG
FE24HK	*	84.68	0.50	0.47	85.60	0.88	0.90	TT
FMTJ7N		83.21	-0.97	-0.91	83.79	-0.93	-0.96	TS
GBXNQ9		82.82	-1.36	-1.28	83.43	-1.29	-1.33	TS
H634EC		84.27	0.10	0.09	84.74	0.02	0.02	MK
J4BH87	X	87.43	3.25	3.04	88.16	3.44	3.53	TT
J6KMHA		82.61	-1.57	-1.47	83.23	-1.50	-1.54	TS
JCKQQT		83.50	-0.68	-0.64	84.00	-0.72	-0.74	TS
KQJDCE		85.26	1.08	1.02	85.79	1.07	1.09	HG
LD7GN3		83.34	-0.84	-0.79	84.23	-0.50	-0.51	TS
MBU2U3		83.08	-1.10	-1.03	83.68	-1.04	-1.07	TS
N324PE		82.78	-1.40	-1.32	83.45	-1.27	-1.31	TT
NQ7XPN		83.69	-0.49	-0.46	84.08	-0.65	-0.66	XX
NULHHV		82.61	-1.57	-1.47	83.42	-1.30	-1.33	TS
R9UE7F		85.31	1.13	1.06	85.44	0.72	0.74	TS
TQP8RD		83.70	-0.48	-0.45	84.30	-0.42	-0.43	XX
TRZC3F		85.03	0.85	0.79	85.39	0.67	0.68	XX
U2NFTV		85.03	0.85	0.80	85.52	0.80	0.82	HG
V2GVB6		84.73	0.55	0.51	85.34	0.62	0.63	TS
XEJ37T		85.58	1.40	1.31	86.05	1.33	1.36	TS
XFWHVM		84.99	0.81	0.76	85.46	0.74	0.76	TT
YJUE3T		83.15	-1.03	-0.96	83.83	-0.90	-0.92	TT
YRHCM8		84.53	0.35	0.32	84.90	0.18	0.18	TS
YUDMQM		82.86	-1.32	-1.24	83.39	-1.33	-1.37	TS
ZYDTD4		85.31	1.13	1.06	85.75	1.03	1.06	TT



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 390**  
**Directional Brightness**  
**TAPPI Official Test Method T452**

**Report #2902G,**  
**October 2017**

<b>Summary Statistics</b>	<b><u>Sample GR47</u></b>	<b><u>Sample GR48</u></b>
<b>Grand Means</b>	84.18 Percent	84.72 Percent
<b>Std Dev Btwn Labs</b>	1.07 Percent	0.97 Percent

Statistics based on 30 of 35 reporting participants.

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

- J4BH87 (X) - Data for both samples are high. Possible Systematic Error.
- ACDLXC (X) - Data for both samples are high. Possible Systematic Error. Inconsistent within the determinations of sample GR48.
- 2877BH (X) - Data for sample GR47 are high. Inconsistent within the determinations of both samples.
- 8MHT3L (X) - Extreme Data for Sample GR47.
- AJVTXP (X) - Data for sample GR47 are high.

**Key to Instrument Codes Reported by Participants**

<b>EF</b>	L & W Datacolor Elrepho	<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>XS</b>	X-Rite 938 Spectrodensitometer
<b>XX</b>	Instrument make/model not specified by lab		



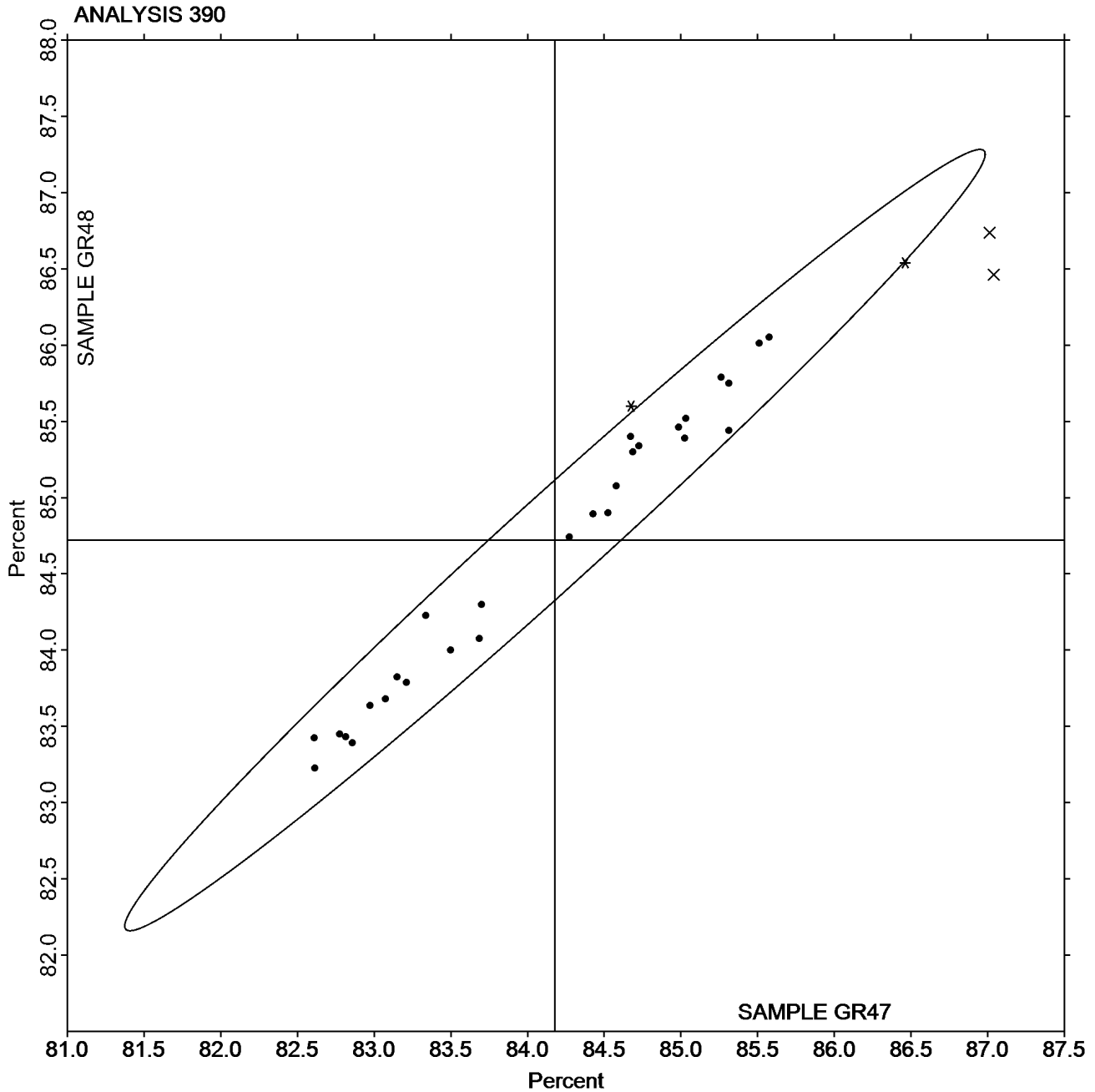


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 390**  
**Directional Brightness**  
**TAPPI Official Test Method T452**

**Report #2902G,**  
**October 2017**

**Grand Mean Sample GR47 = 84.179**  
**Percent**

**Grand Mean Sample GR48 = 84.722**  
**Percent**





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 391**  
**Directional Brightness of Fluorescent Samples**  
**TAPPI Official Test Method T452**

Report #2902G,  
October 2017

WebCode	Data Flag	Sample GZ47			Sample GZ48			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
7PAM7H		92.68	-0.04	-0.05	92.41	-0.31	-0.39	PP
8MHT3L		94.33	1.61	2.16	94.48	1.76	2.20	XX
946L8J		92.76	0.04	0.05	92.88	0.16	0.20	TT
9UYNEA		93.18	0.46	0.62	93.22	0.50	0.63	TS
BFPPLU		91.16	-1.56	-2.10	91.02	-1.70	-2.13	HT
CPTGAE	X	86.67	-6.05	-8.10	86.73	-6.00	-7.52	TS
FA966A		92.65	-0.07	-0.10	92.35	-0.37	-0.47	TS
HA3AYA		93.00	0.28	0.38	92.75	0.03	0.03	TT
JCKQQT		92.60	-0.12	-0.16	92.66	-0.06	-0.08	TS
MHXYNZ		92.68	-0.04	-0.05	93.02	0.30	0.37	TS
UGFFGA		92.36	-0.36	-0.48	92.95	0.23	0.28	TS
WCXWDX		93.23	0.51	0.68	92.82	0.10	0.13	TS
XUR2BP		91.78	-0.94	-1.26	91.78	-0.95	-1.19	HT
Z32Z4R		92.95	0.23	0.30	93.06	0.33	0.42	TS

Summary Statistics	Sample GZ47	Sample GZ48
<b>Grand Means</b>	92.72 Percent	92.72 Percent
<b>Std Dev Btwn Labs</b>	0.75 Percent	0.80 Percent
Statistics based on 13 of 14 reporting participants.		

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

CPTGAE (X) - Extreme Data.

**Analysis Notes:**

HA3AYA - One determination removed from the Lab Mean of Sample GZ48 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
XX	Instrument make/model not specified by lab		

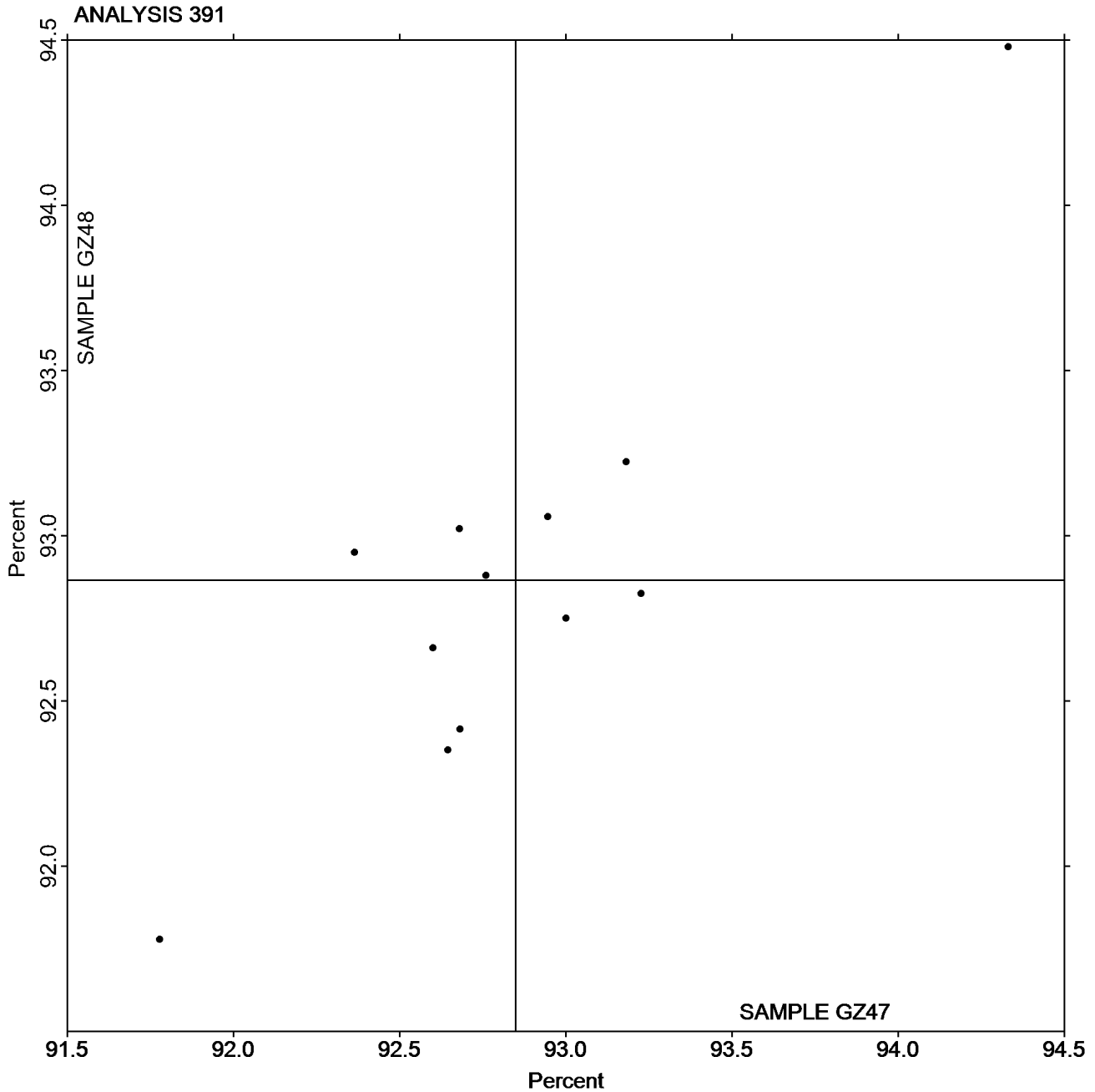


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 391**  
**Directional Brightness of Fluorescent Samples**  
**TAPPI Official Test Method T452**

**Report #2902G,**  
**October 2017**

**Grand Mean Sample GZ47 = 92.719**  
**Percent**

**Grand Mean Sample GZ48 = 92.724**  
**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**

**Report #2902G,  
October 2017**

**Analysis 392  
Diffuse Brightness**

**TAPPI Official Test Method T525**

WebCode	Data Flag	<u>Sample GR47</u>			<u>Sample GR48</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2WUU2U		83.16	-0.27	-0.90	83.66	-0.35	-1.12	TC
2XZEPU		83.48	0.06	0.20	84.08	0.08	0.27	TC
37A8BA		83.54	0.12	0.39	84.15	0.15	0.47	TC
4THXAL		83.26	-0.17	-0.56	83.80	-0.20	-0.64	TC
CMPLQB		83.59	0.16	0.55	84.12	0.12	0.38	TC
DTUKYF	X	83.26	-0.16	-0.55	83.16	-0.84	-2.73	TC
E2HZ2P		83.56	0.14	0.47	84.21	0.21	0.67	TC
FA966A		83.55	0.13	0.44	84.09	0.09	0.28	TC
FE4R36		83.48	0.06	0.20	84.12	0.12	0.39	LA
FMTJ7N		84.15	0.73	2.45	84.74	0.73	2.37	TC
GBXNQ9		83.34	-0.08	-0.28	84.01	0.01	0.02	TC
GWTCB9		83.24	-0.18	-0.62	83.82	-0.18	-0.59	TM
GXRHR3		83.24	-0.18	-0.61	83.89	-0.12	-0.37	TC
J4BH87		83.28	-0.15	-0.50	83.88	-0.13	-0.41	TL
J6KMHA		83.39	-0.03	-0.10	83.93	-0.07	-0.22	TM
JAFDQ7		83.35	-0.07	-0.23	84.09	0.09	0.30	TC
JH9NZ2		83.35	-0.07	-0.24	83.90	-0.10	-0.33	TC
KQD3C3		83.30	-0.12	-0.40	83.88	-0.12	-0.38	LA
N324PE		83.37	-0.05	-0.17	83.97	-0.03	-0.11	LT
N3YJTY		82.87	-0.55	-1.86	83.50	-0.50	-1.61	EG
NQ7XPN		83.88	0.46	1.54	84.30	0.30	0.97	EE
NULHHV		83.70	0.28	0.94	84.36	0.36	1.17	TC
PT3ZRV		83.47	0.05	0.16	83.90	-0.11	-0.34	LS
QMH6QR		83.20	-0.23	-0.76	83.81	-0.19	-0.62	TC
TTFNPR		83.57	0.15	0.51	83.99	-0.01	-0.02	TC
XFBWAN		83.60	0.18	0.61	84.18	0.18	0.57	TC
XFWHVM		82.76	-0.66	-2.22	83.24	-0.76	-2.46	EG
Y4DFXT		83.14	-0.28	-0.96	83.74	-0.26	-0.85	TM
YJUE3T		83.99	0.57	1.92	84.70	0.70	2.25	EG

<b>Summary Statistics</b>	<u>Sample GR47</u>	<u>Sample GR48</u>
<b>Grand Means</b>	83.42 Percent	84.00 Percent
<b>Std Dev Btwn Labs</b>	0.30 Percent	0.31 Percent

Statistics based on 28 of 29 reporting participants.

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

DTUKYF (X) - Data for sample GR48 are low. Inconsistent within the determinations of sample GR47.



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

## Analysis 392 Diffuse Brightness

### TAPPI Official Test Method T525

#### Key to Instrument Codes Reported by Participants

EE	Datacolor Elrepho 2000	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

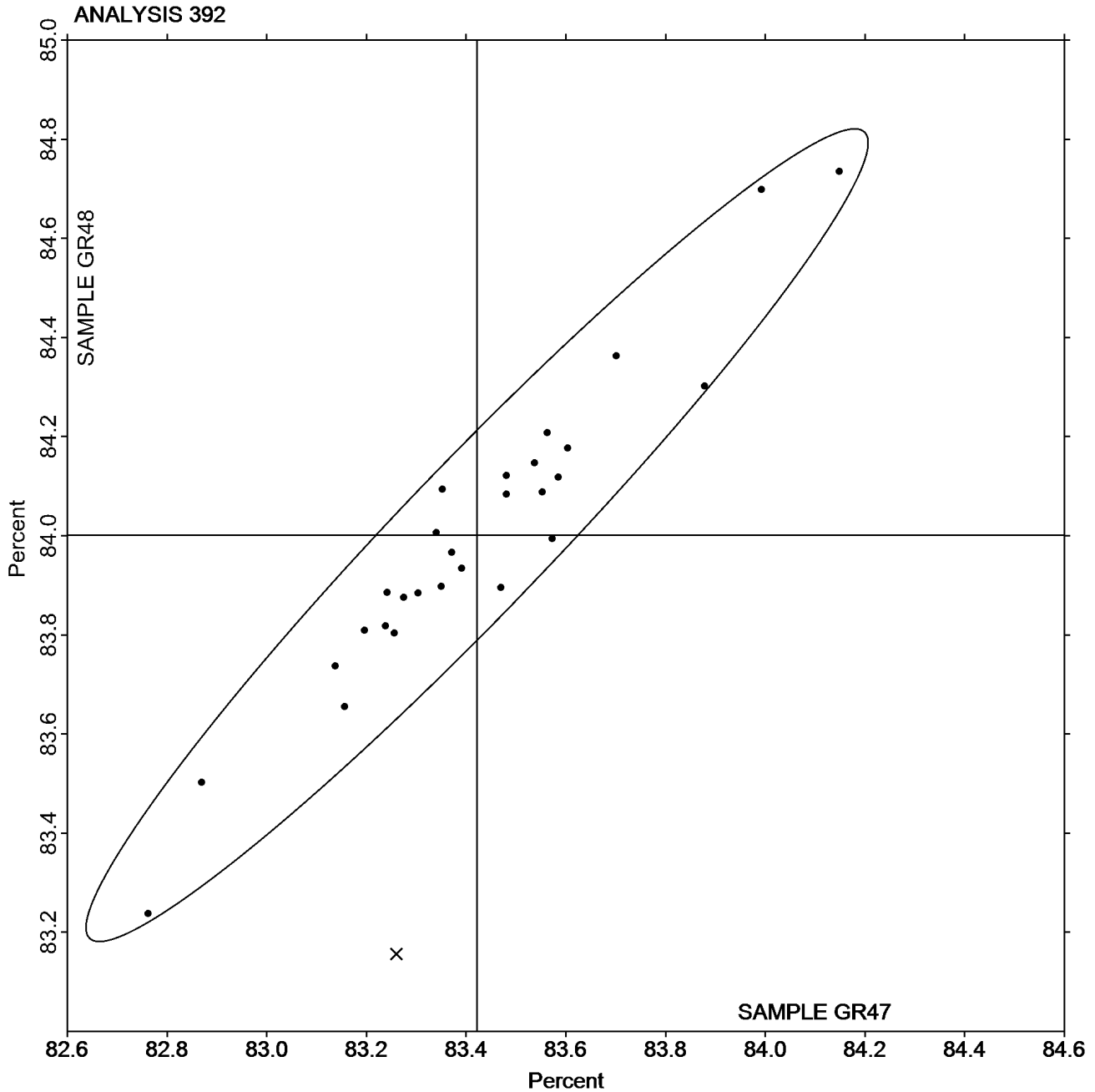
Report #2902G,  
October 2017

## Analysis 392 Diffuse Brightness

TAPPI Official Test Method T525

Grand Mean Sample GR47 = 83.422  
Percent

Grand Mean Sample GR48 = 84.001  
Percent





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 394**  
**Fluorescent Component of Directional Brightness**  
**TAPPI Official Test Method T452**

Report #2902G,  
October 2017

WebCode	Data Flag	<u>Sample GZ47</u>			<u>Sample GZ48</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
7PAM7H		6.084	0.034	0.14	6.102	0.049	0.17	PP
8MHT3L		5.924	-0.126	-0.54	5.882	-0.171	-0.61	XX
946L8J		6.200	0.150	0.64	6.260	0.207	0.74	TT
9UYNEA		5.890	-0.160	-0.69	5.880	-0.173	-0.62	TS
CPTGAE		6.184	0.134	0.57	6.248	0.195	0.69	TS
FA966A		5.688	-0.362	-1.55	5.614	-0.439	-1.56	TS
JCKQQT		5.720	-0.330	-1.41	5.640	-0.413	-1.47	TS
UGFFGA		6.238	0.188	0.80	6.296	0.243	0.86	TS
WCXWDX		6.388	0.338	1.44	6.406	0.353	1.26	TS
Z32Z4R		6.188	0.138	0.59	6.202	0.149	0.53	TS

<b>Summary Statistics</b>	<u><b>Sample GZ47</b></u>	<u><b>Sample GZ48</b></u>
<b>Grand Means</b>	6.05 Percent	6.05 Percent
<b>Std Dev Btwn Labs</b>	0.23 Percent	0.28 Percent
Statistics based on 10 of 10 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	XX	Instrument make/model not specified by lab

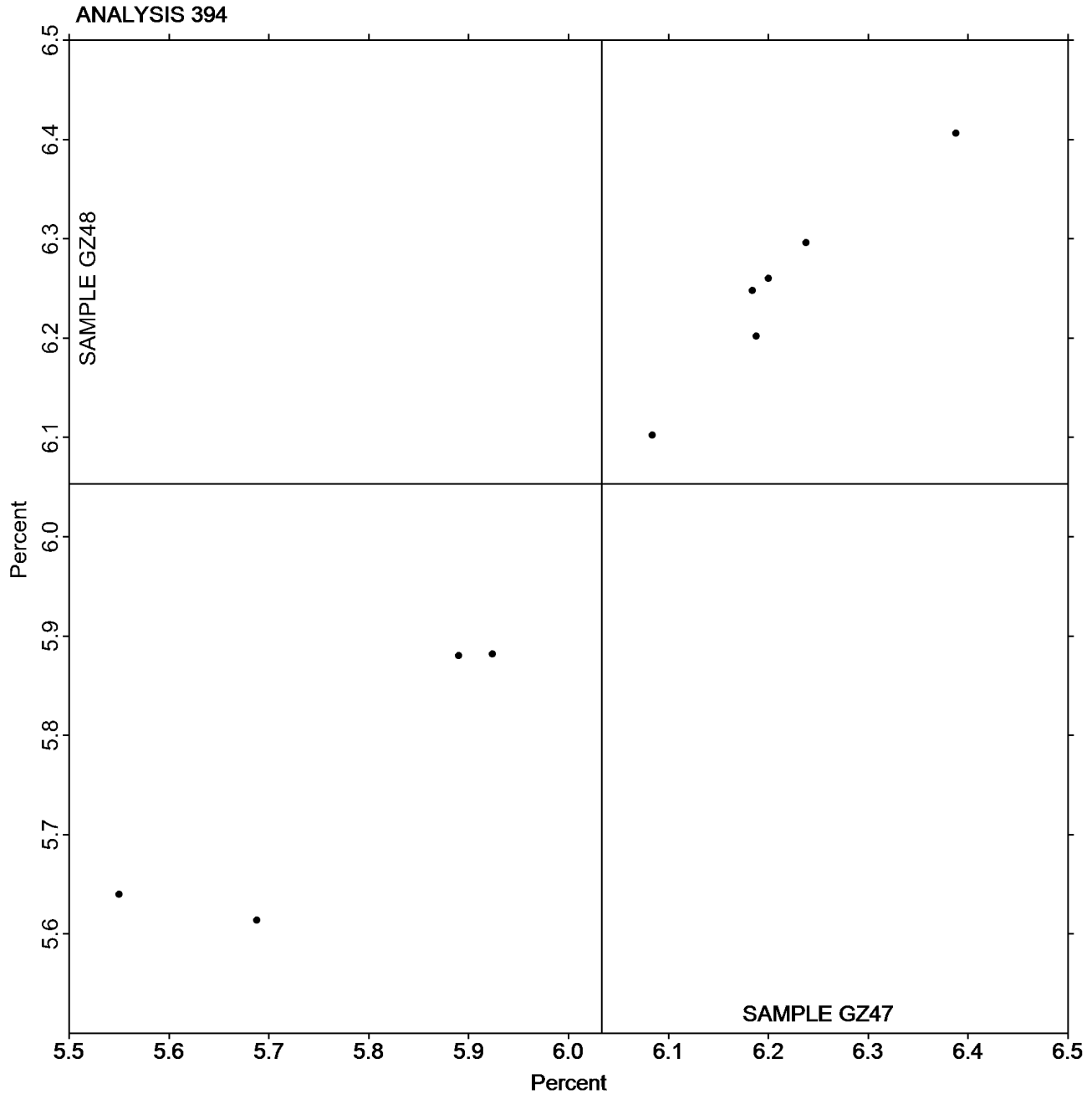


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 394**  
**Fluorescent Component of Directional Brightness**  
**TAPPI Official Test Method T452**

**Report #2902G,**  
**October 2017**

**Grand Mean Sample GZ47 = 6.0504**  
**Percent**

**Grand Mean Sample GZ48 = 6.0530**  
**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**  
**TAPPI Official Test Method T480**

Report #2902G,  
October 2017

WebCode	Data Flag	Sample GT47			Sample GT48			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
7PAM7H		77.30	0.47	0.38	76.30	0.31	0.21	PP
98369H		75.19	-1.64	-1.35	76.25	0.26	0.18	XX
9UYNEA		76.10	-0.73	-0.60	75.95	-0.04	-0.03	LA
FB4HW9		78.92	2.09	1.71	76.55	0.56	0.38	TH
FE24HK		78.13	1.30	1.06	75.02	-0.97	-0.66	TH
H634EC		76.71	-0.12	-0.10	75.84	-0.15	-0.10	PP
HA3AYA		76.71	-0.13	-0.10	76.98	0.99	0.67	TG
J4BH87		74.68	-2.15	-1.76	72.77	-3.22	-2.18	GS
J6KMHA		76.49	-0.34	-0.28	75.94	-0.05	-0.03	TH
JXK8W9		76.28	-0.55	-0.45	76.48	0.49	0.33	LA
KEHUTY		77.02	0.19	0.15	74.30	-1.69	-1.14	XX
NA3FMW		75.80	-1.03	-0.85	74.11	-1.88	-1.27	VM
NULHHV		79.41	2.58	2.11	78.72	2.73	1.85	TG
PT3ZRV		77.65	0.82	0.67	78.71	2.72	1.84	LB
QMH6QR	X	71.48	-5.35	-4.38	70.90	-5.09	-3.45	ZH
U2NFTV		77.74	0.91	0.74	77.03	1.04	0.70	TH
XEJ37T		75.67	-1.16	-0.95	74.89	-1.10	-0.74	LA
XFWHVM		76.40	-0.43	-0.35	75.49	-0.50	-0.34	GM
YJUE3T		76.80	-0.03	-0.03	76.48	0.49	0.33	TH

Summary Statistics	Sample GT47	Sample GT48
<b>Grand Means</b>	76.83 Gloss Units	75.99 Gloss Units
<b>Std Dev Btwn Labs</b>	1.22 Gloss Units	1.48 Gloss Units
Statistics based on 18 of 19 reporting participants.		

**Comments on Assigned Data Flags for Test #395**

QMH6QR (X) - Data for both samples are low.

**Key to Instrument Codes Reported by Participants**

GM	BYK-Gardner micro-gloss	GS	BYK-Gardner Glossgard II
LA	L & W Gloss - Autoline 300	LB	L & W Gloss Tester Code 224
PP	Technidyne Profile/Plus	TG	Technidyne T480
TH	Technidyne T480A	VM	Valmet PaperLab (was Kajaani/Robotest)
XX	Instrument make/model not specified by lab	ZH	Zehntner ZLR 1050





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 396**  
**Specular Gloss at 75 Degrees - Low Range**  
**TAPPI Official Test Method T480**

Report #2902G,  
October 2017

WebCode	Data Flag	<u>Sample GU47</u>			<u>Sample GU48</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2XZEPU		27.09	0.02	0.01	32.98	-1.95	-0.83	TH
3F2JUH		28.57	1.50	0.76	36.01	1.08	0.46	TH
864ABN		27.99	0.91	0.46	34.01	-0.92	-0.39	TH
AJVTXP		23.83	-3.24	-1.64	33.12	-1.81	-0.77	GA
FMTJ7N		28.15	1.08	0.55	36.18	1.25	0.53	TH
NULHHV		29.47	2.40	1.21	39.71	4.78	2.02	TG
PT3ZRV		24.46	-2.61	-1.32	34.86	-0.07	-0.03	LA
YALYWL		27.01	-0.06	-0.03	32.59	-2.34	-0.99	PP

<b>Summary Statistics</b>	<u><b>Sample GU47</b></u>	<u><b>Sample GU48</b></u>
<b>Grand Means</b>	27.07 Gloss Units	34.93 Gloss Units
<b>Stnd Dev Btwn Labs</b>	1.98 Gloss Units	2.36 Gloss Units
Statistics based on 8 of 8 reporting participants.		

**Key to Instrument Codes Reported by Participants**

GA	BYK-Gardner (model not specified)	LA	L & W Gloss - Autoline 300
PP	Technidyne Profile/Plus	TG	Technidyne T480
TH	Technidyne T480A		



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

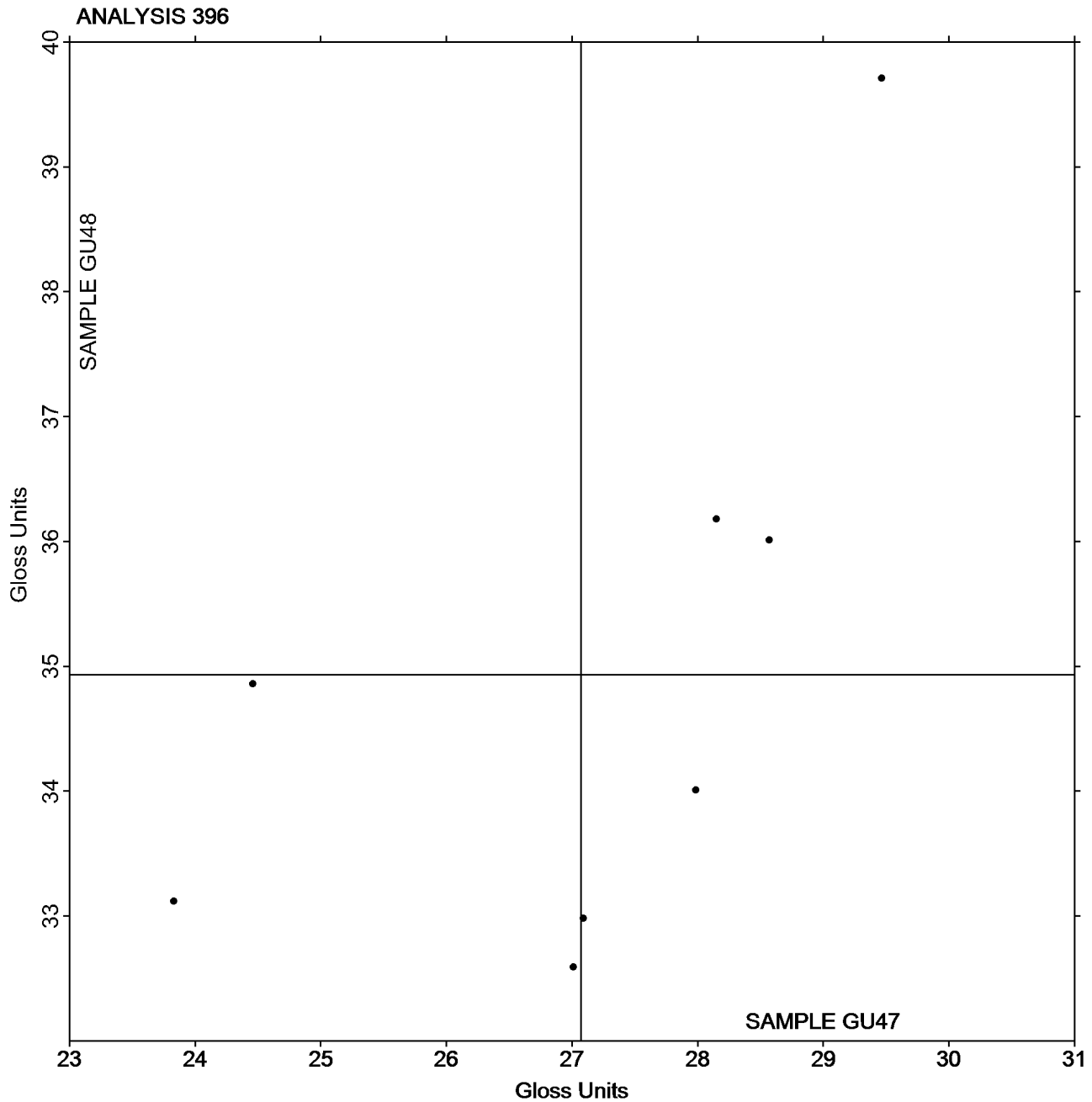
## Analysis 396

Specular Gloss at 75 Degrees - Low Range

TAPPI Official Test Method T480

Grand Mean Sample GU47 = 27.070  
Gloss Units

Grand Mean Sample GU48 = 34.932  
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)**  
**TAPPI Official Test Method T410**

Report #2902G,  
October 2017

WebCode	Data Flag	<u>Sample GW47</u>			<u>Sample GW48</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2XZEPU		90.71	1.42	2.04	103.9	0.2	0.41	ZZ
37A8BA		89.66	0.38	0.54	104.2	0.5	0.93	ZZ
3F2JUH		88.90	-0.39	-0.55	103.7	0.0	-0.03	ZZ
69BXT9		88.31	-0.97	-1.39	102.9	-0.8	-1.58	ZZ
7UM89W		89.37	0.09	0.13	104.0	0.4	0.71	ZZ
864ABN		88.78	-0.50	-0.72	102.7	-1.0	-1.95	ZZ
9CHFLL		87.94	-1.34	-1.92	103.4	-0.3	-0.54	ZZ
B8EPRH		89.24	-0.04	-0.06	103.0	-0.6	-1.27	ZZ
BFPPLU		89.91	0.63	0.90	104.0	0.3	0.66	ZZ
DAWJMA		88.92	-0.36	-0.51	103.9	0.2	0.47	ZZ
EVP377		89.37	0.08	0.12	103.5	-0.2	-0.38	ZZ
GFN39N		88.62	-0.66	-0.95	104.1	0.4	0.87	ZZ
JPQZE3		89.13	-0.15	-0.22	103.5	-0.2	-0.38	ZZ
JU2VCK		90.20	0.92	1.31	104.5	0.8	1.50	ZZ
KQJDCE		89.42	0.14	0.20	103.8	0.1	0.22	ZZ
LTGXWQ		89.34	0.05	0.08	103.7	0.0	0.02	ZZ
MHXYNZ		90.21	0.93	1.33	104.3	0.6	1.11	ZZ
NFQZQC		89.05	-0.23	-0.33	103.6	-0.1	-0.17	ZZ
NQ7XPN		89.22	-0.06	-0.09	103.9	0.2	0.36	ZZ
PT3ZRV		88.59	-0.70	-1.00	103.3	-0.3	-0.67	ZZ
QFZUDQ		90.65	1.37	1.96	104.7	1.0	1.94	ZZ
TQP8RD		88.79	-0.49	-0.71	103.2	-0.5	-0.91	ZZ
VCXMXU		90.17	0.89	1.27	104.1	0.4	0.73	ZZ
XUR2BP		89.19	-0.09	-0.13	103.6	-0.1	-0.21	ZZ
YRHCM8		88.45	-0.83	-1.19	102.6	-1.0	-2.05	ZZ
Z32Z4R		89.23	-0.05	-0.08	103.8	0.1	0.22	ZZ

<b>Summary Statistics</b>	<u>Sample GW47</u>	<u>Sample GW48</u>
<b>Grand Means</b>	89.28 g/sq m	103.69 g/sq m
<b>Std Dev Btwn Labs</b>	0.70 g/sq m	0.51 g/sq m
Statistics based on 26 of 26 reporting participants.		

**Key to Instrument Codes Reported by Participants**

ZZ Instruments No Longer Tracked



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

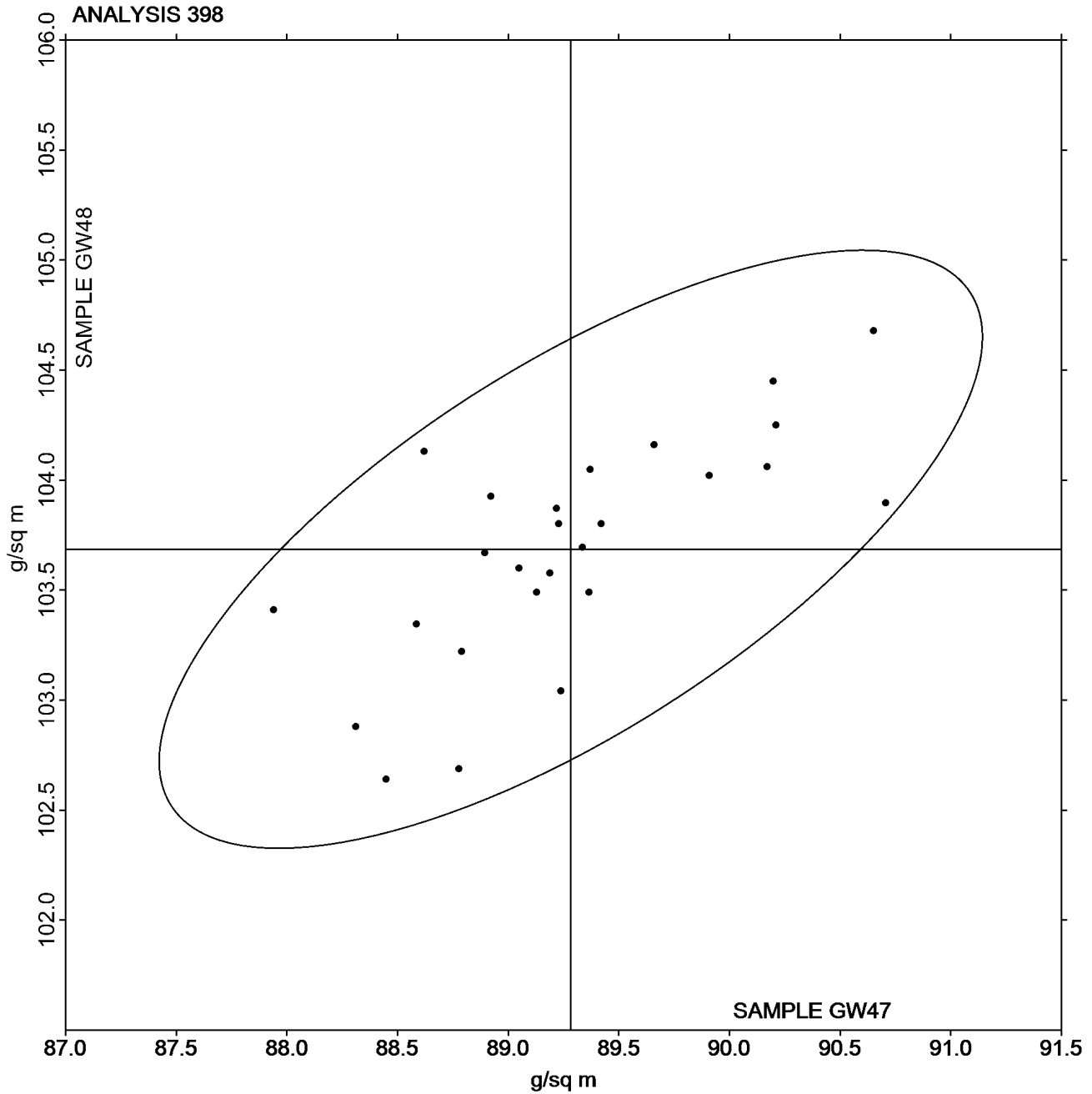
## Analysis 398

Grammage (Mass per Unit Area)

TAPPI Official Test Method T410

Grand Mean Sample GW47 = 89.283  
g/sq m

Grand Mean Sample GW48 =  
103.69 g/sq m





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 399**  
**Sizing Test (Hercules Type)**  
**TAPPI Official Test Method T530**

Report #2902G,  
October 2017

WebCode	Data Flag	Sample GX47			Sample GX48			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2XZEPU		161.7	18.8	0.80	160.6	14.2	0.60	HE
6M934R		141.1	-1.8	-0.08	127.6	-18.8	-0.80	HE
8JK8BJ		150.3	7.4	0.31	162.3	15.9	0.67	XX
9CHFLL		139.5	-3.4	-0.14	144.2	-2.2	-0.09	HE
9UYNEA		160.1	17.2	0.73	156.1	9.7	0.41	HE
ACDLXC		137.7	-5.3	-0.22	143.8	-2.6	-0.11	HE
BZWYNC		147.5	4.6	0.19	170.9	24.5	1.04	HE
CPTGAE	X	511.7	368.8	15.61	490.5	344.1	14.56	HE
FE24HK		174.1	31.1	1.32	155.2	8.8	0.37	HE
GBXNQ9	*	198.1	55.2	2.34	201.6	55.2	2.34	XX
GNLTWJ		124.7	-18.2	-0.77	145.2	-1.2	-0.05	HE
H634EC		122.5	-20.4	-0.87	155.6	9.2	0.39	HE
JCKQQT	X	240.3	97.4	4.12	170.8	24.4	1.03	HE
LD7GN3		174.3	31.4	1.33	142.5	-3.9	-0.16	HE
LR79FY		140.9	-2.0	-0.09	131.4	-15.0	-0.63	HE
MBU2U3		152.9	9.9	0.42	157.6	11.2	0.48	HE
MHXYNZ		126.9	-16.0	-0.68	162.4	16.0	0.68	HE
N324PE		111.8	-31.1	-1.32	102.1	-44.3	-1.87	HE
N9NXH7		135.4	-7.5	-0.32	132.9	-13.5	-0.57	HE
NA3FMW		135.1	-7.8	-0.33	151.5	5.1	0.22	HE
T6ULUV	*	73.3	-69.6	-2.94	112.1	-34.3	-1.45	HE
TQP8RD		104.9	-38.0	-1.61	153.0	6.6	0.28	XX
TRZC3F		140.8	-2.1	-0.09	196.9	50.5	2.14	XX
VJJFBE		163.7	20.8	0.88	118.9	-27.5	-1.16	HE
VRQCVC		165.5	22.6	0.96	159.2	12.8	0.54	HE
WCXWDX		136.6	-6.3	-0.27	95.0	-51.4	-2.18	HE
XEJ37T		138.8	-4.1	-0.17	120.2	-26.2	-1.11	HE
YALYWL		140.7	-2.2	-0.09	141.6	-4.8	-0.20	HE
YRHCM8		137.6	-5.3	-0.22	145.4	-1.0	-0.04	HE
YUDMQM		147.2	4.3	0.18	144.5	-1.9	-0.08	HE
ZYDTD4		160.9	17.9	0.76	155.2	8.8	0.37	HE

Summary Statistics	Sample GX47	Sample GX48
<b>Grand Means</b>	142.91 Seconds	146.40 Seconds
<b>Std Dev Btwn Labs</b>	23.63 Seconds	23.64 Seconds
Statistics based on 29 of 31 reporting participants.		



# Paper & Paperboard Interlaboratory Testing Program

Report #2902G,  
October 2017

## Analysis 399 Sizing Test (Hercules Type) TAPPI Official Test Method T530

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### **Comments on Assigned Data Flags for Test #399**

CPTGAE (X) - Extreme Data.

JCKQQT (X) - Data for sample GX47 are high. Inconsistent within the determinations of sample GX48.

### **Analysis Notes:**

LR79FY - One determination removed from the Lab Mean of Sample GX48 per Grubb's Test at 1% risk (TAPPI 1205).

### **Key to Instrument Codes Reported by Participants**

HE Hercules Sizing Tester

XX Instrument make/model not specified by lab





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 399**  
**Sizing Test (Hercules Type)**  
**TAPPI Official Test Method T530**

**Report #2902G,**  
**October 2017**

**Grand Mean Sample GX47 = 142.91**  
**Seconds**

**Grand Mean Sample GX48 = 146.40**  
**Seconds**

