

Paper & Paperboard Testing Program

Summary Report #2982 G - February 2019

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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)

WebCode	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.
Lab Mean	The average of the values obtained for each sample by the participant.
Grand Mean	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.
ΔE	The calculated total color difference between the two samples. For the Hunter L,a,b analyses it is calculated in Hunter units (ΔE). For the L*,a*,b* analyses it is calculated in CIELAB units (ΔE^*).
Difference from Grand Mean	The difference of the LAB MEAN from the GRAND MEAN.
Between-Lab Standard Deviation	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).
Comparative Performance Value	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.
Inst Code	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.
Data Flag	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	CAUTION - 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	STOP - 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	PROCEED - 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.

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.

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 #2982 G,
February 2019**

**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	ΔL	Δa	Δb	ΔE	
3VBTEB		GA63	92.75	-0.24	3.44	0.40	-0.13	0.11	0.44	TS
		GA64	93.15	-0.38	3.55					
6N7Z6R		GA63	93.74	-0.84	3.93	0.44	0.00	-0.03	0.45	TC
		GA64	94.18	-0.84	3.90					
8LNRUU		GA63	93.08	-0.41	3.65	0.42	-0.07	-0.03	0.43	TS
		GA64	93.50	-0.48	3.62					
8VYUFV		GA63	93.81	-0.72	4.16	0.59	0.00	0.11	0.60	HH
		GA64	94.40	-0.72	4.27					
A7LUU3		GA63	93.71	-0.83	3.82	0.41	-0.01	-0.01	0.41	XX
		GA64	94.12	-0.84	3.80					
AHEBJ4		GA63	95.06	-0.77	3.79	0.32	-0.01	-0.02	0.32	EH
		GA64	95.38	-0.78	3.77					
AQ9FC6		GA63	94.85	-0.81	4.04	0.45	0.02	0.04	0.45	LS
		GA64	95.30	-0.80	4.09					
FDZQXP		GA63	93.98	-0.12	3.46	0.39	0.03	-0.06	0.39	TS
		GA64	94.37	-0.09	3.40					
G3XTMV	X	GA63	98.23	-0.07	1.18	0.24	-0.58	-0.06	0.63	NE
		GA64	98.47	-0.65	1.11					
H3VH7H		GA63	92.85	-0.43	3.77	0.52	-0.01	-0.11	0.53	TS
		GA64	93.37	-0.44	3.67					
HNWFRW		GA63	95.02	-0.83	3.94	0.34	0.01	-0.04	0.34	TC
		GA64	95.36	-0.82	3.90					
L2DHRC		GA63	92.83	-0.14	3.48	0.32	-0.09	-0.02	0.33	TS
		GA64	93.15	-0.23	3.46					
MF4UPD		GA63	94.45	-0.68	3.67	0.48	0.03	-0.02	0.48	HE
		GA64	94.93	-0.65	3.64					
QGEJX9		GA63	94.09	-1.05	4.06	0.06	0.16	-0.27	0.32	HG
		GA64	94.16	-0.89	3.79					
TK3Y7E		GA63	93.64	-0.53	3.80	0.41	0.00	-0.03	0.41	LA
		GA64	94.06	-0.52	3.77					
UXK7H7		GA63	94.47	-0.77	3.31	0.41	0.02	-0.03	0.41	HE
		GA64	94.87	-0.75	3.28					



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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	ΔL	Δa	Δb	ΔE	
VJYD84		GA63	94.42	-0.77	3.47	0.37	0.01	-0.05	0.38	HE
		GA64	94.79	-0.76	3.42					
WAP9UD		GA63	95.06	-0.86	3.96	0.31	0.01	-0.05	0.31	LS
		GA64	95.37	-0.85	3.91					
XXCJDN		GA63	92.64	-0.16	3.44	0.55	-0.09	-0.11	0.56	TS
		GA64	93.18	-0.24	3.32					
Y3KBY7		GA63	94.73	-0.72	3.57	0.15	0.01	-0.03	0.15	XS
		GA64	94.88	-0.71	3.54					

Grand Means			Summary Statistics						
GA63	94.171	-0.614	3.724	0.387	-0.007	-0.035	0.407		
GA64	94.550	-0.621	3.689						
Std Dev Btwn Labs									
GA63	1.251	0.283	0.250	0.125	0.061	0.081	0.102		
GA64	1.201	0.244	0.261						

Statistics based on 19 of 20 reporting participants

Comments on Assigned Data Flags for Test #350

G3XTMV (X) - Inconsistent in testing between samples for "a" values. Extreme data for both "b" values. High delta "a".

Key to Instrument Codes Reported by Participants

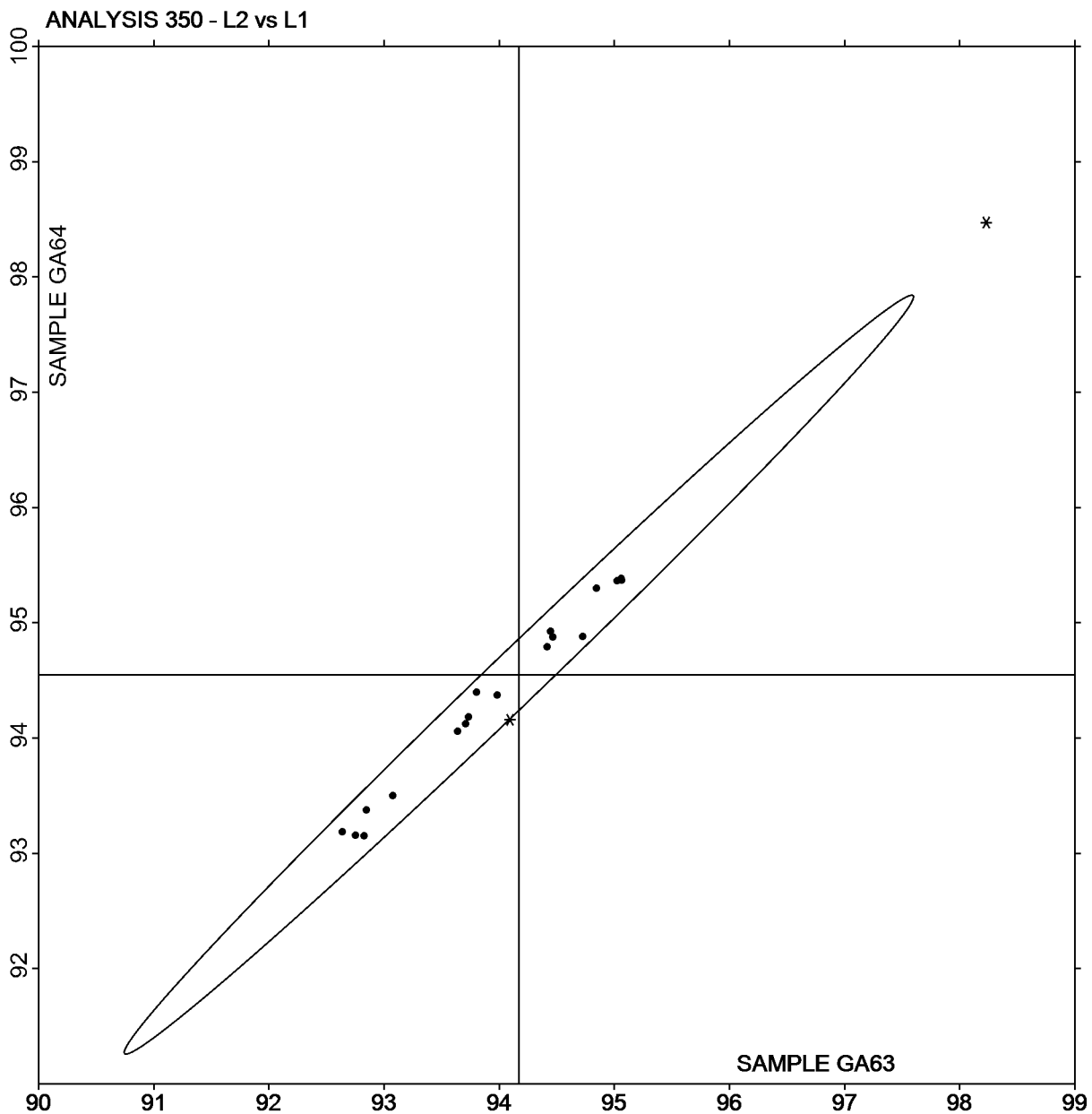
EH	Datacolor Elrepho SF450	HE	Hunter LabScan
HG	Hunter ColorQUEST	HH	Hunter D25DP - 9000
LA	L & W Elrepho AL300	LS	L & W Elrepho SE 070
NE	Minolta CM-3500d Spectrophotometer	TC	Technidyne Color Touch Series
TS	Technidyne Brightimeter Micro S-5	XS	X-Rite 938 Spectrodensitometer
XX	Instrument make/model 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 #2982 G,
February 2019

Plot of L values GA64 v L values GA63



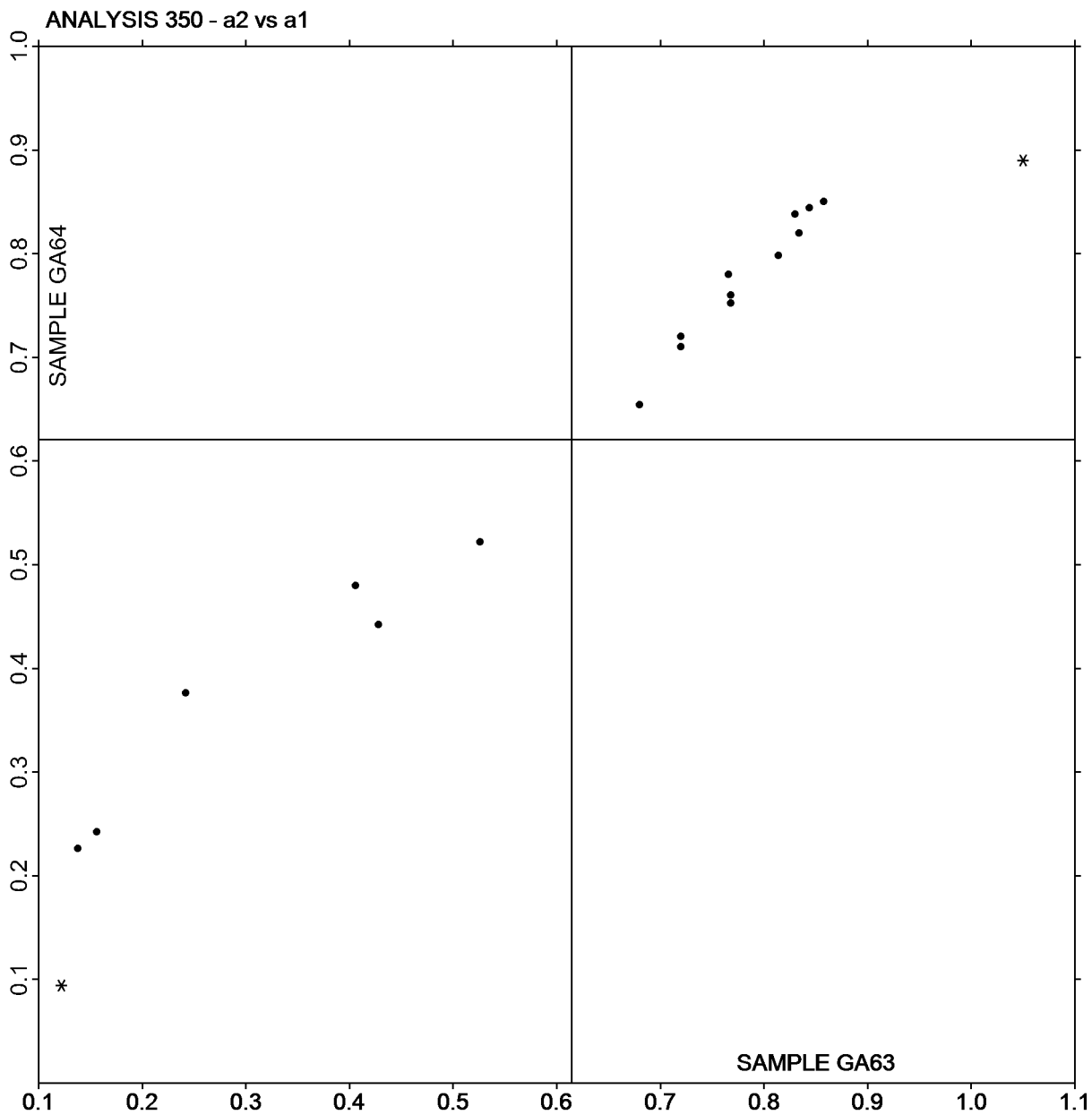
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



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

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February 2019

Plot of a values GA64 v a values GA63



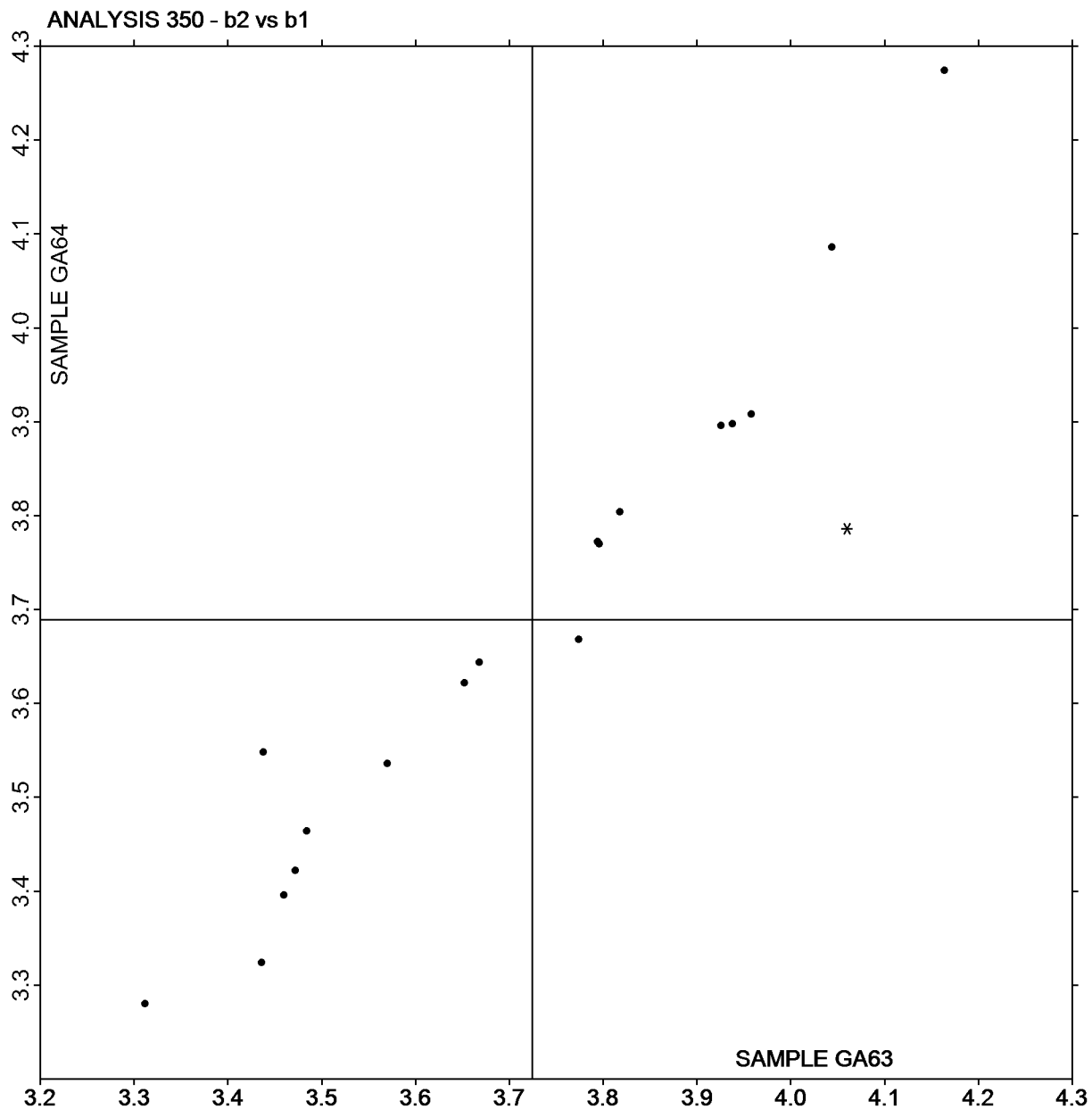
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



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

Report #2982 G,
February 2019

Plot of b values GA64 v b values GA63



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 #2982 G,
February 2019**

**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*	ΔL^*	Δa^*	Δb^*	ΔE^*	
339LM6		GA63	95.04	-0.60	4.07	0.36	0.03	-0.05	0.36	HT
		GA64	95.39	-0.57	4.02					
68FYAL		GA63	93.84	-0.67	3.44	0.38	0.04	-0.04	0.38	XA
		GA64	94.22	-0.64	3.40					
ACERLE		GA63	95.25	-0.56	3.93	0.31	0.02	0.02	0.31	NF
		GA64	95.56	-0.54	3.95					
AQ9FC6		GA63	94.85	-0.62	4.09	0.35	0.03	0.04	0.35	LS
		GA64	95.20	-0.60	4.13					
B7NP6L		GA63	95.12	-0.72	3.94	0.28	0.04	-0.06	0.29	EF
		GA64	95.40	-0.68	3.88					
BEAAR6		GA63	94.98	-0.65	4.01	0.32	0.01	-0.06	0.32	LS
		GA64	95.29	-0.64	3.95					
CQMNE6		GA63	95.48	-0.68	3.39	0.08	-0.04	-0.24	0.25	HV
		GA64	95.56	-0.72	3.15					
DR9U8Z		GA63	94.18	-0.63	3.68	0.26	-0.08	-0.16	0.32	HE
		GA64	94.44	-0.71	3.52					
DRXQZ3		GA63	95.16	-0.65	4.04	0.32	-0.03	-0.04	0.33	HT
		GA64	95.48	-0.68	4.00					
EQX7Q9		GA63	94.49	-0.66	4.20	0.36	0.02	-0.11	0.37	EH
		GA64	94.84	-0.64	4.09					
FMT2A7	X	GA63	97.63	-0.61	2.80	0.24	0.02	-0.32	0.40	XP
		GA64	97.87	-0.59	2.48					
G6NR3E		GA63	94.96	-0.68	3.88	0.32	0.04	-0.04	0.33	TC
		GA64	95.29	-0.64	3.83					
MF4UPD		GA63	94.37	-0.68	3.69	0.57	0.02	-0.05	0.57	HE
		GA64	94.95	-0.66	3.64					
QXWVU8		GA63	95.82	-0.60	3.79	-0.68	-0.03	0.09	0.69	HE
		GA64	95.14	-0.63	3.87					
WM3F2Z		GA63	94.58	-0.78	3.70	0.52	-0.01	-0.07	0.52	XC
		GA64	95.10	-0.79	3.63					
X6UWCM		GA63	95.18	-0.60	4.24	0.34	0.01	0.74	0.82 X	NG
		GA64	95.52	-0.59	4.98					



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

**Report #2982 G,
February 2019**

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

Grand Means			Summary Statistics				
GA63	94.887	-0.650	3.806	0.272	0.004	-0.002	0.414
GA64	95.158	-0.645	3.784				
Std Dev Btwn Labs							
GA63	0.514	0.055	0.363	0.286	0.036	0.219	0.162
GA64	0.401	0.064	0.527				

Statistics based on 15 of 16 reporting participants

Comments on Assigned Data Flags for Test #351

FMT2A7 (X) - Very high "L" values for both samples.

Key to Instrument Codes Reported by Participants

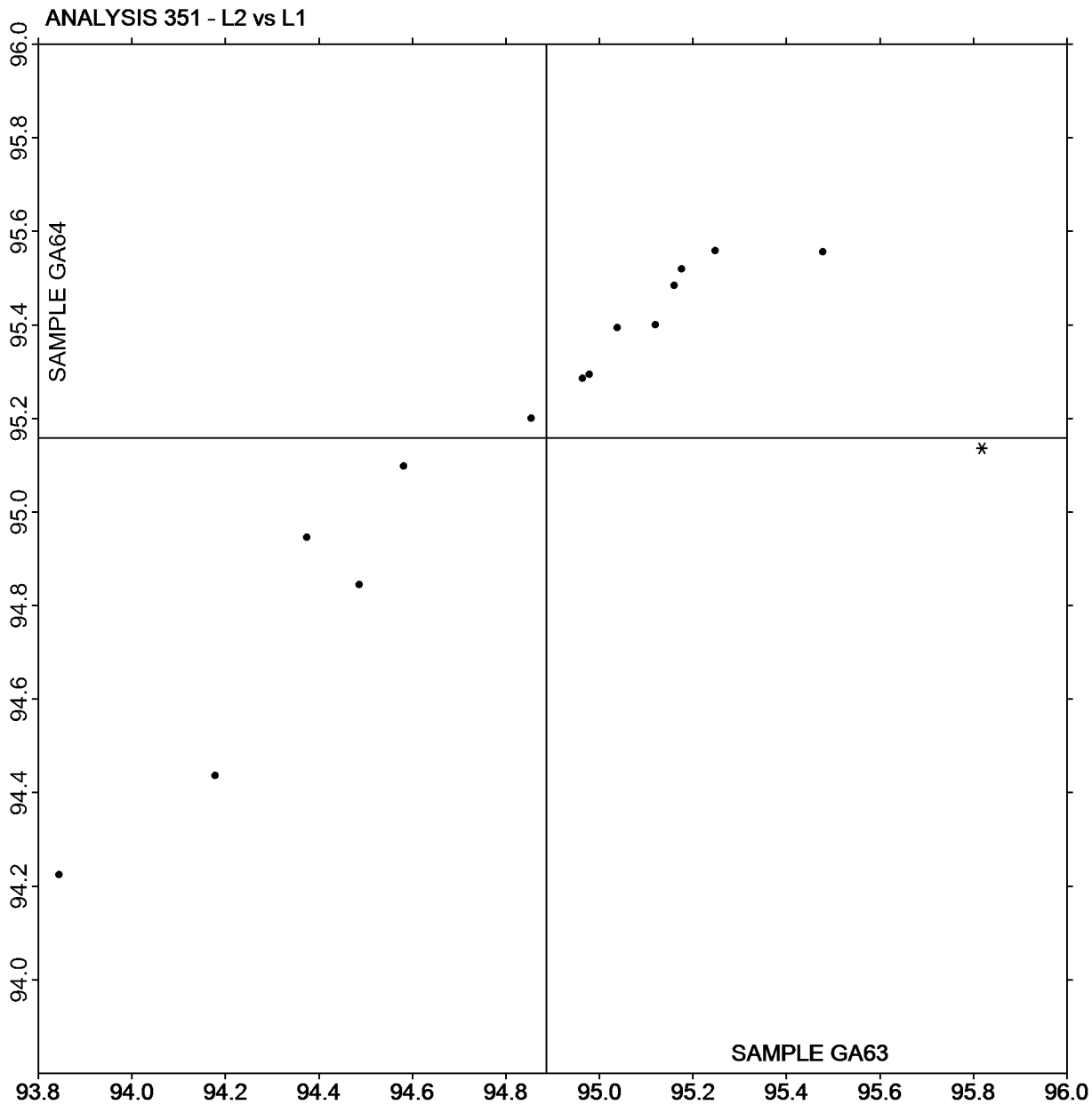
EF	Datacolor Elrepho 3000	EH	Datacolor Elrepho SF450
HE	Hunter LabScan	HT	Hunter UltraScan Vis
HV	Hunter Ultrascan XE	LS	L & W Elrepho SE 070
NF	Minolta CM-3600d Spectrophotometer	NG	Minolta CM-3700d Spectrophotometer
TC	Technidyne Color Touch Series	XA	X-Rite (model not specified)
XC	X-Rite eXact Series	XP	X-Rite Spectrophotometer DTP



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 #2982 G,
February 2019

Plot of L values GA64 v L values GA63



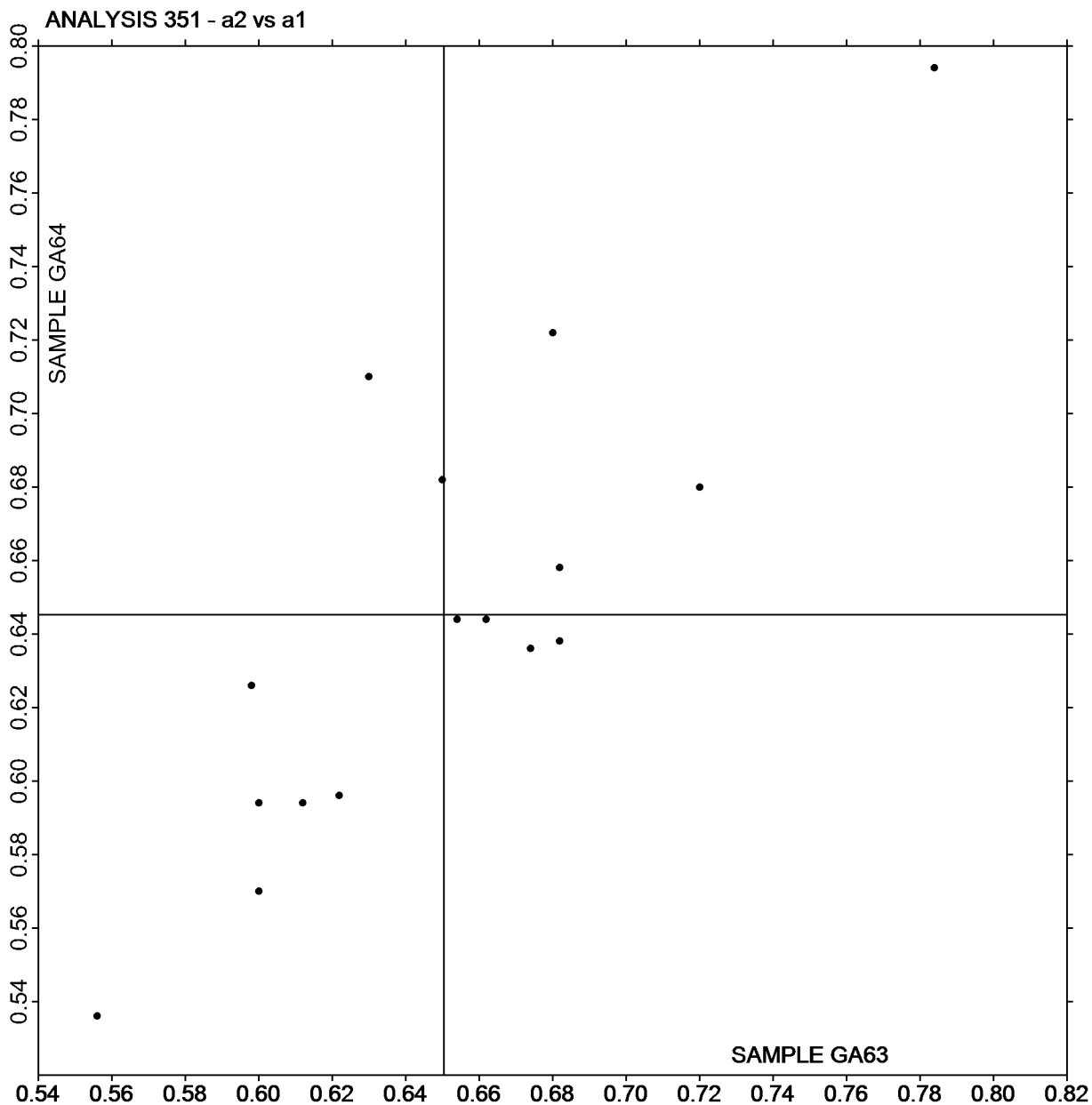
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



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 #2982 G,
February 2019

Plot of a values GA64 v a values GA63



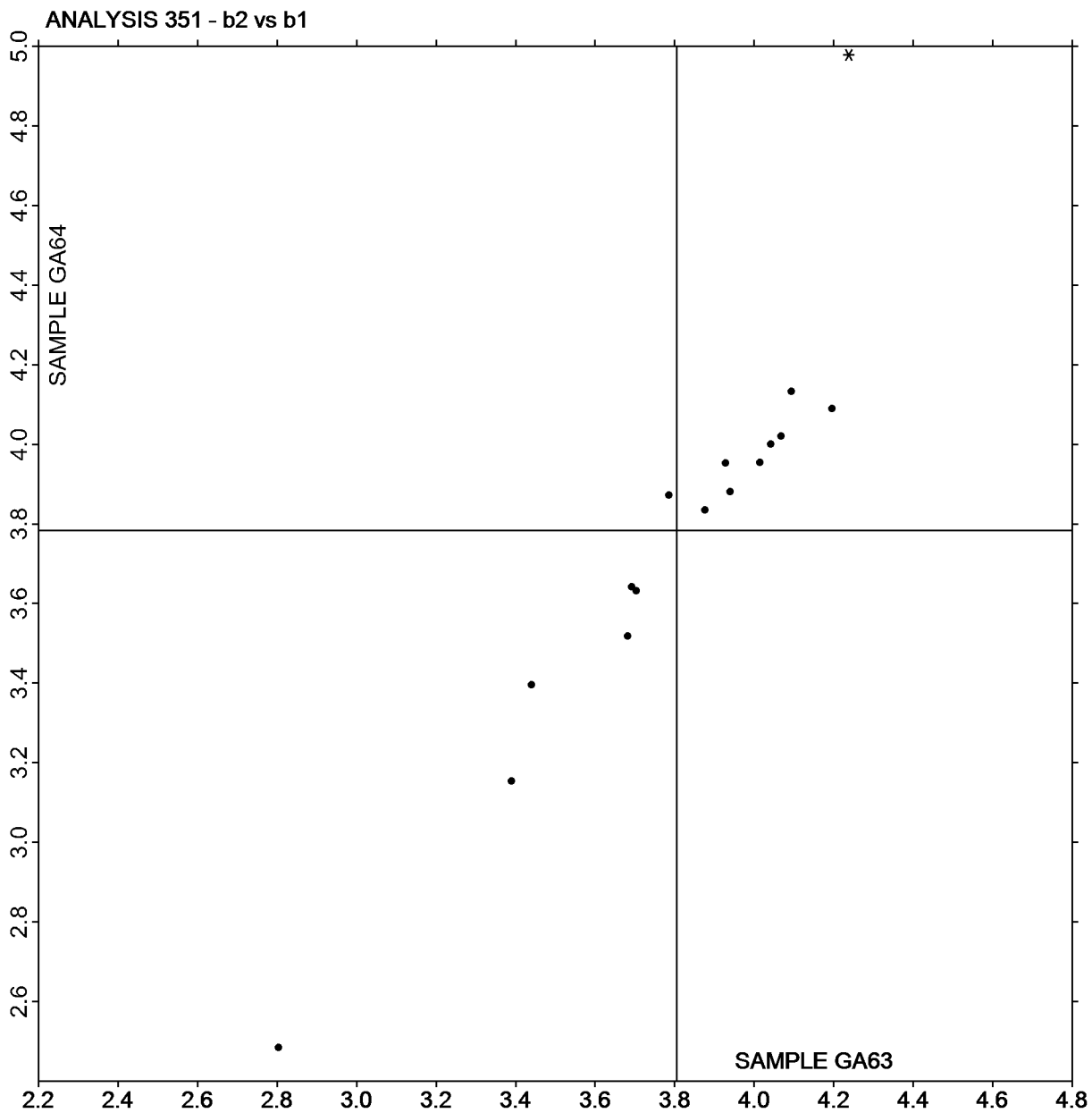
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Paper & Paperboard Interlaboratory Testing Program
Analysis 351
Color & Color Difference - Near White Papers - D65/10deg obs
Hunter L,a,b - Illuminant D65 - 10 Degree Observer

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Plot of b values GA64 v b values GA63



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 #2982G,
February 2019

Analysis 360

Thickness (Caliper), Printing papers

TAPPI Official Test Method T411

WebCode	Data Flag	Sample GV63			Sample GV64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2AWQBZ		3.874	-0.012	-0.16	3.825	-0.024	-0.35	TM
2WPVPP		3.864	-0.022	-0.30	3.849	0.000	0.00	EM
339LM6		3.917	0.031	0.41	3.858	0.009	0.14	EM
4G3P4Z		3.909	0.023	0.31	3.890	0.041	0.61	XX
4GKGGR		3.825	-0.061	-0.82	3.787	-0.062	-0.91	TA
68FYAL		3.836	-0.050	-0.67	3.800	-0.049	-0.72	LW
6G4QXY		3.759	-0.127	-1.70	3.738	-0.111	-1.63	PP
7HAR36		3.956	0.070	0.93	3.928	0.080	1.17	LW
8LNRUU	X	3.846	-0.040	-0.54	3.898	0.049	0.73	EM
A7LUU3	X	3.620	-0.266	-3.56	3.690	-0.159	-2.34	XX
ACERLE		3.970	0.084	1.12	3.900	0.051	0.75	TM
AHEBJ4		3.894	0.008	0.10	3.836	-0.013	-0.19	EM
B9KPQB		3.931	0.045	0.60	3.901	0.052	0.77	TA
C3BV8Y		3.940	0.054	0.72	3.894	0.045	0.67	LW
CC44RP		3.913	0.027	0.36	3.876	0.028	0.41	LW
CQ86U8		3.887	0.001	0.01	3.839	-0.010	-0.14	LA
CQMNE6		3.823	-0.063	-0.85	3.793	-0.056	-0.82	TA
DRXQZ3		3.773	-0.113	-1.51	3.775	-0.074	-1.09	EM
DUZTLX		3.831	-0.055	-0.74	3.846	-0.003	-0.04	PP
DXHYAL		3.942	0.056	0.75	3.905	0.056	0.83	EM
EH38YZ		3.730	-0.156	-2.09	3.727	-0.122	-1.79	TA
EYRBJA		3.763	-0.123	-1.65	3.768	-0.081	-1.19	LA
FDZQXP		3.833	-0.053	-0.72	3.830	-0.019	-0.28	TM
FHHWLD		3.802	-0.084	-1.13	3.747	-0.102	-1.50	PP
FMT2A7		3.798	-0.088	-1.18	3.814	-0.035	-0.51	TM
G6NR3E		4.035	0.149	2.00	4.004	0.155	2.29	PP
GHERNF		3.904	0.018	0.24	3.899	0.050	0.73	LW
H3VH7H		3.864	-0.022	-0.30	3.814	-0.035	-0.51	LA
HNWFRW		3.939	0.053	0.71	3.875	0.026	0.39	LA
JJYE68		3.804	-0.082	-1.10	3.779	-0.070	-1.03	EM
K4YWQU		4.005	0.119	1.59	3.949	0.101	1.48	LW
KFRJWN		3.929	0.043	0.57	3.854	0.006	0.08	MS
KTZY6E		3.983	0.097	1.30	3.932	0.084	1.23	LW
KUCXZN		3.780	-0.106	-1.42	3.730	-0.119	-1.75	TM
L2TTFH		3.897	0.011	0.14	3.867	0.018	0.27	TM
M6AD3X		3.928	0.042	0.56	3.849	0.000	0.00	EM
PFNYRD		3.880	-0.006	-0.08	3.810	-0.039	-0.57	TA
QXWVU8		3.943	0.057	0.76	3.931	0.083	1.22	TM
TAXA7P		3.888	0.002	0.02	3.847	-0.002	-0.02	XX
TK3Y7E		3.897	0.011	0.15	3.846	-0.003	-0.04	EM
U9TPA3		3.954	0.068	0.91	3.933	0.084	1.24	LW



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

Report #2982G,
February 2019

WebCode	Data Flag	<u>Sample GV63</u>			<u>Sample GV64</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
VPMXAK		3.898	0.012	0.16	3.870	0.021	0.31	LW
W6TGN3		3.997	0.111	1.49	3.937	0.089	1.31	LW
WAP9UD		3.948	0.062	0.83	3.898	0.050	0.73	LW
WM3F2Z		3.839	-0.048	-0.64	3.803	-0.046	-0.67	LW
WVWKU2		3.833	-0.053	-0.71	3.762	-0.086	-1.27	LW
X6UWCM		3.889	0.003	0.04	3.824	-0.025	-0.36	PP
XXCJDN		3.782	-0.104	-1.39	3.756	-0.092	-1.36	TM
Y3KBY7		3.820	-0.066	-0.89	3.780	-0.069	-1.01	TM
YLEV6R		3.924	0.038	0.51	3.834	-0.014	-0.21	PP
ZMHY48		4.066	0.180	2.41	4.018	0.169	2.50	TM
ZPA24U		3.958	0.072	0.96	3.925	0.076	1.13	TA
ZTWK4R		3.839	-0.047	-0.63	3.828	-0.021	-0.30	EM

Summary Statistics	<u>Sample GV63</u>	<u>Sample GV64</u>
Grand Means	3.89 mils	3.85 mils
Std Dev Btwn Labs	0.07 mils	0.07 mils

Statistics based on 51 of 53 reporting participants.

Comments on Assigned Data Flags for Test #360

- 8LNRUU (X) - Inconsistent in testing between samples.
- A7LUU3 (X) - Data for sample GV63 are low.

Analysis Notes:

FMT2A7 - Data appear to be reported as mils, not inches as indicated on datasheet. CTS will not correct the Units going forward.

Key to Instrument Codes Reported by Participants

EM	Emveco	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



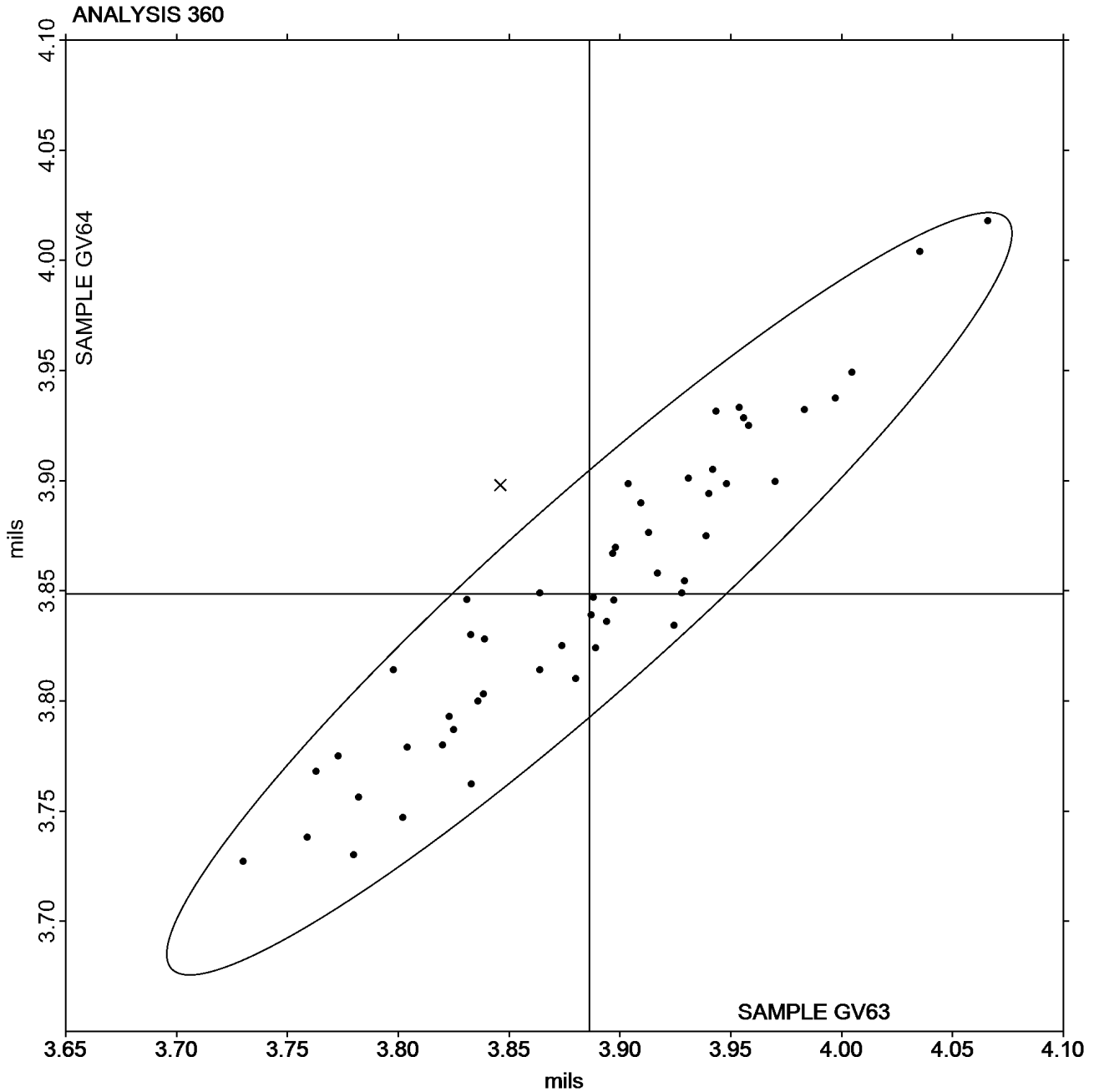
Paper & Paperboard Interlaboratory Testing Program

Report #2982G,
February 2019

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

Grand Mean Sample GV63 = 3.8862
mils

Grand Mean Sample GV64 = 3.8487
mils





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

Report #2982G,
February 2019

WebCode	Data Flag	Sample GY63			Sample GY64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
4GKGGR		14.00	-0.09	-0.48	9.455	-0.113	-0.82	TA
6AY3RQ	*	13.85	-0.23	-1.28	9.587	0.018	0.13	MM
6ZXDGG		14.03	-0.05	-0.28	9.520	-0.048	-0.35	TM
73E3BE		14.10	0.02	0.11	9.640	0.072	0.52	TM
8VYUFV		13.89	-0.19	-1.06	9.546	-0.022	-0.16	VP
AQ9FC6		14.11	0.03	0.19	9.630	0.062	0.45	TM
BEAAR6		13.77	-0.31	-1.75	9.370	-0.198	-1.44	LW
C3BV8Y		14.17	0.09	0.52	9.706	0.138	1.00	LW
CPUKCH		14.19	0.11	0.63	9.663	0.094	0.68	LW
DR9U8Z		13.88	-0.20	-1.13	9.420	-0.148	-1.07	EM
DVXUUB		14.47	0.38	2.18	9.814	0.246	1.78	LA
EH38YZ		13.84	-0.24	-1.37	9.325	-0.243	-1.76	TA
EKRMBG		14.26	0.18	1.02	9.682	0.114	0.82	LA
EQX7Q9		14.34	0.25	1.44	9.847	0.279	2.02	EM
FG4LGT		14.15	0.07	0.41	9.578	0.010	0.07	TM
FQY94K		14.07	-0.01	-0.06	9.510	-0.058	-0.42	LA
H72RRL		14.26	0.18	1.02	9.675	0.107	0.78	XX
HVFJYY		13.89	-0.19	-1.10	9.428	-0.140	-1.02	TM
JG8HFD		14.01	-0.08	-0.42	9.510	-0.058	-0.42	TA
KUCXZN		13.83	-0.25	-1.41	9.290	-0.278	-2.02	TM
KXBAVN		14.26	0.18	0.99	9.642	0.074	0.53	LW
MECVBF		14.19	0.11	0.60	9.660	0.092	0.66	TM
MF4UPD		14.15	0.07	0.41	9.577	0.009	0.06	EM
PFNYRD		14.18	0.10	0.56	9.660	0.092	0.66	TA
RLFB9P		14.01	-0.07	-0.40	9.538	-0.030	-0.22	LA
RU9JTG		13.92	-0.16	-0.90	9.570	0.002	0.01	TA
THREYQ		13.76	-0.32	-1.79	9.228	-0.340	-2.46	LA
TK3Y7E		14.16	0.08	0.46	9.587	0.019	0.14	EM
UXK7H7		14.36	0.28	1.59	9.665	0.097	0.70	EM
VJYD84		14.12	0.04	0.22	9.535	-0.033	-0.24	EM
X6Y374		14.26	0.18	1.02	9.780	0.211	1.53	TM
XBEWRY		13.89	-0.20	-1.10	9.505	-0.063	-0.46	TA
YLEV6R		14.16	0.08	0.46	9.579	0.011	0.08	LW
YQNZTK		14.12	0.04	0.24	9.514	-0.054	-0.39	LW
ZMLLHZ		14.16	0.08	0.46	9.652	0.084	0.61	TM



Paper & Paperboard Interlaboratory Testing Program

Report #2982G,
February 2019

Analysis 361

Thickness (Caliper), Packaging papers

TAPPI Official Test Method T411

Summary Statistics	Sample GY63	Sample GY64
Grand Means	14.08 mils	9.57 mils
Stnd Dev Btwn Labs	0.18 mils	0.14 mils
Statistics based on 35 of 35 reporting participants.		

Analysis Notes:

UXK7H7 - Data appear to be reported as mils, not micrometers as indicated on datasheet. CTS will not correct the Units going forward.

VJD84 - Data appear to be reported as mils, not micrometers as indicated on datasheet. CTS will not correct the Units going forward.

Key to Instrument Codes Reported by Participants

EM	Emveco	LA	L & W Autoline
LW	L & W	MM	Mitutoyo Digital Micrometer
TA	Thwing-Albert	TM	TMI
VP	Valmet Paper Lab	XX	Instrument make/model not specified by lab



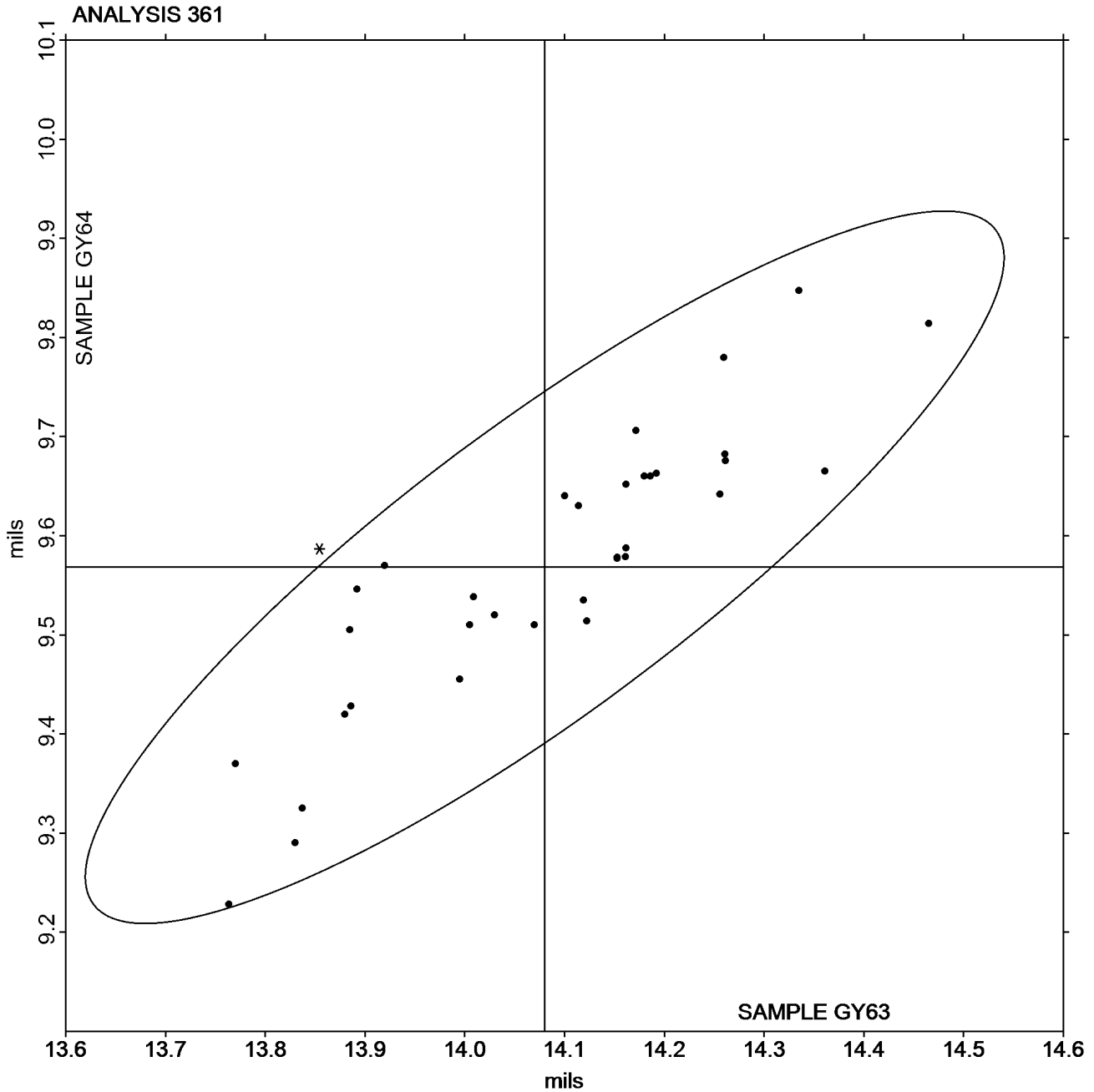
Paper & Paperboard Interlaboratory Testing Program

Report #2982G,
February 2019

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

Grand Mean Sample GY63 = 14.080
mils

Grand Mean Sample GY64 = 9.5682
mils





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

Report #2982G,
February 2019

WebCode	Data Flag	<u>Sample GD63</u>			<u>Sample GD64</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
8LNRUU		0.6100	0.0680	0.81	0.6278	0.0730	0.67	TA
CQMNE6		0.5320	-0.0100	-0.12	0.5780	0.0232	0.21	TA
DXHYAL		0.6100	0.0680	0.81	0.6040	0.0492	0.45	TA
H72RRL		0.6066	0.0646	0.77	0.6510	0.0962	0.89	TL
RFRNF7		0.6076	0.0656	0.78	0.6588	0.1040	0.96	TA
THREYQ		0.5360	-0.0060	-0.07	0.5376	-0.0173	-0.16	TA
VGF8YU		0.4196	-0.1224	-1.46	0.3922	-0.1627	-1.50	IT
Y3KBY7		0.4142	-0.1278	-1.52	0.3894	-0.1655	-1.52	XX

Summary Statistics	<u>Sample GD63</u>	<u>Sample GD64</u>
Grand Means	0.54 COF	0.55 COF
Stnd Dev Btwn Labs	0.08 COF	0.11 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	XX	Instrument make/model not specified by lab

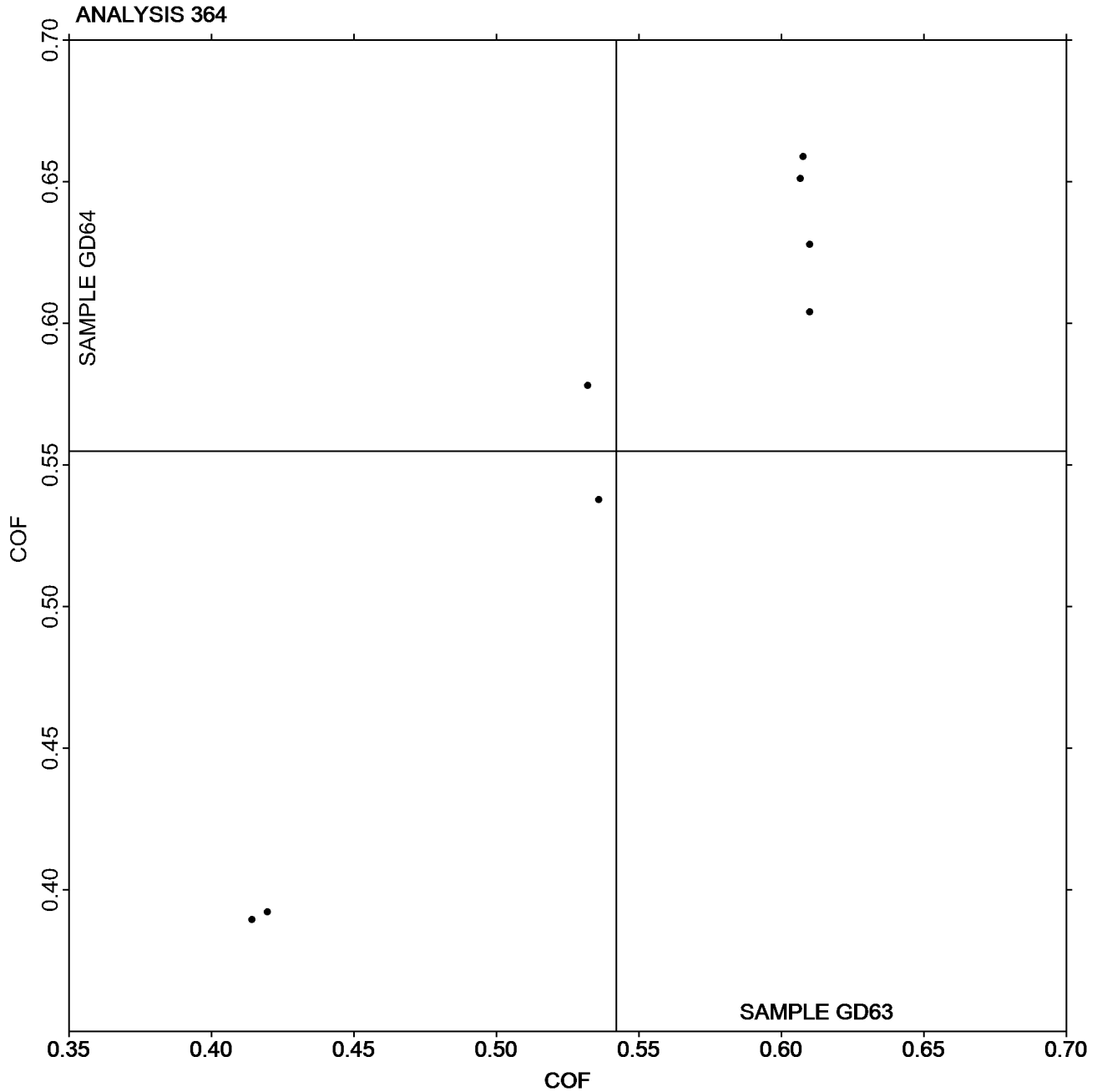


Paper & Paperboard Interlaboratory Testing Program
Analysis 364
Coefficient of Static Friction - Horizontal Plane Method - Printing Papers
TAPPI Official Test Method T549

Report #2982G,
February 2019

Grand Mean Sample GD63 = 0.54200
COF

Grand Mean Sample GD64 =
0.55485 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 #2982G,
February 2019

WebCode	Data Flag	<u>Sample GD63</u>			<u>Sample GD64</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
FHHWLD		0.4672	-0.0418	-0.68	0.4532	-0.0592	-0.92	TA
L2DHRC		0.6048	0.0958	1.56	0.6014	0.0890	1.38	TA
RFRNF7		0.4760	-0.0330	-0.54	0.5248	0.0124	0.19	TA
THREYQ		0.5100	0.0010	0.02	0.5318	0.0194	0.30	TA
VGf8YU		0.5118	0.0028	0.05	0.5012	-0.0112	-0.17	IR
Y3KBY7		0.4248	-0.0842	-1.37	0.4108	-0.1016	-1.57	XX
ZTWK4R		0.5684	0.0594	0.97	0.5636	0.0512	0.79	TA

Summary Statistics	<u>Sample GD63</u>	<u>Sample GD64</u>
Grand Means	0.51 COF	0.51 COF
Std Dev Btwn Labs	0.06 COF	0.06 COF

Statistics based on 7 of 7 reporting participants.

Key to Instrument Codes Reported by Participants

- IR IMASS SP-2000
- TA Thwing-Albert Friction Tester
- XX Instrument make/model not specified by lab

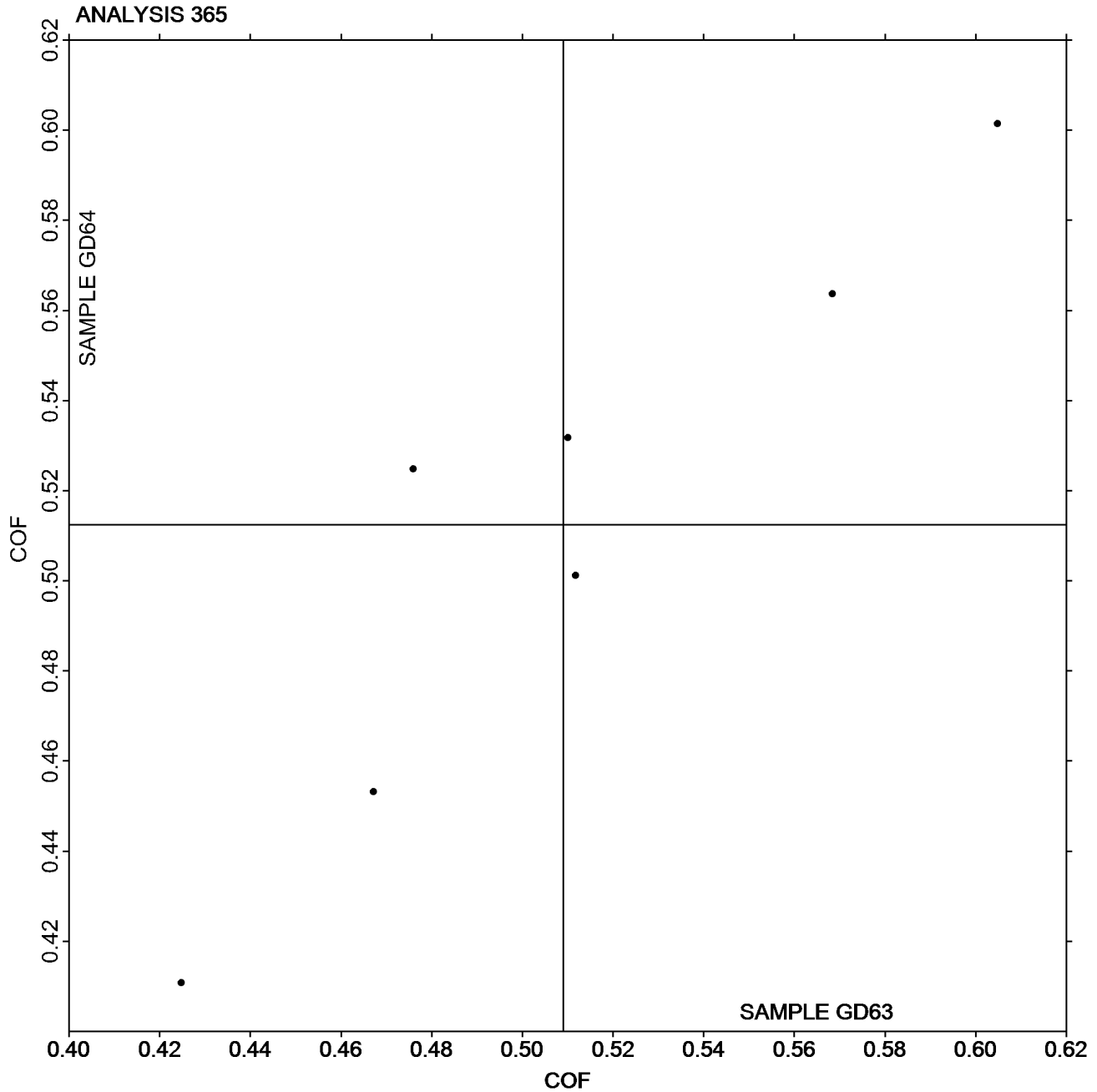


Paper & Paperboard Interlaboratory Testing Program
Analysis 365
Coefficient of Kinetic Friction - Horizontal Plane Method - Printing Papers
TAPPI Official Test Method T549

Report #2982G,
February 2019

Grand Mean Sample GD63 = 0.50900
COF

Grand Mean Sample GD64 =
0.51240 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 #2982G,
February 2019**

Analysis 370

Air Resistance - Gurley Oil Type

TAPPI Official Test Method T460

WebCode	Data Flag	Sample GE63			Sample GE64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2WPVPP		27.68	-1.79	-1.17	26.74	-1.86	-1.29	PP
339LM6	*	30.52	1.05	0.69	27.39	-1.21	-0.84	PP
4GKGGR		29.25	-0.22	-0.14	29.44	0.85	0.59	PP
4XD7EA		28.04	-1.42	-0.94	26.83	-1.77	-1.22	PP
68FYAL		30.29	0.82	0.54	29.27	0.67	0.47	XX
6G4QXY		30.86	1.39	0.91	29.78	1.19	0.82	PP
6ZXDGG		31.49	2.02	1.33	30.11	1.51	1.05	TL
73E3BE		31.12	1.65	1.09	29.38	0.78	0.54	TL
7HAR36		29.71	0.24	0.16	29.16	0.56	0.39	LP
8VYUFV		26.93	-2.54	-1.67	26.50	-2.10	-1.45	VM
9KAMRP		29.87	0.40	0.27	29.24	0.64	0.45	LP
9MFZM7		28.27	-1.20	-0.79	28.56	-0.04	-0.02	XX
9W223F		27.98	-1.49	-0.98	28.40	-0.20	-0.14	PP
A7LUU3		27.77	-1.70	-1.11	27.71	-0.89	-0.61	XX
ACERLE		26.74	-2.73	-1.79	25.71	-2.89	-2.00	PR
AHEBJ4		29.35	-0.11	-0.07	28.72	0.12	0.08	HG
B7NP6L		32.63	3.16	2.08	30.57	1.97	1.37	LP
CPUKCH		30.14	0.67	0.44	29.51	0.91	0.63	LW
CQMNE6		29.31	-0.15	-0.10	28.16	-0.44	-0.30	PP
DR9U8Z		29.56	0.09	0.06	28.64	0.04	0.03	PP
DRXQZ3		30.14	0.67	0.44	29.21	0.61	0.43	HG
DUZTLX	*	30.11	0.64	0.42	26.70	-1.89	-1.31	PP
DXHYAL		30.97	1.51	0.99	28.44	-0.16	-0.11	PP
DZBNWM		27.55	-1.92	-1.26	25.99	-2.61	-1.80	LP
EAVEWK		29.19	-0.28	-0.18	28.33	-0.27	-0.18	GA
EYRBJA	*	33.19	3.73	2.45	32.39	3.79	2.63	LA
FDZQXP		27.37	-2.10	-1.38	27.71	-0.89	-0.61	LW
FQY94K		31.30	1.83	1.20	30.80	2.20	1.53	LA
H3VH7H		29.18	-0.29	-0.19	28.37	-0.23	-0.16	LA
HDGLF3		31.05	1.58	1.04	31.13	2.54	1.76	PP
K4YWQU		29.14	-0.33	-0.21	27.41	-1.19	-0.82	LP
KG8NKE		29.54	0.07	0.05	27.68	-0.92	-0.63	XX
PDUCWZ		30.07	0.60	0.40	29.72	1.12	0.78	GL
PFNYRD		31.13	1.66	1.09	30.99	2.39	1.66	GA
RFRNF7		29.10	-0.37	-0.24	28.73	0.13	0.09	WG
THREYQ		30.75	1.28	0.84	29.49	0.89	0.62	LA
VPMXAK		26.50	-2.97	-1.95	26.71	-1.89	-1.30	LP
W376MB		29.29	-0.18	-0.12	29.92	1.32	0.92	XX
WAP9UD		28.72	-0.75	-0.49	28.16	-0.44	-0.30	LP
WM3F2Z		29.30	-0.17	-0.11	29.40	0.80	0.56	LW
XXCJDN		30.18	0.71	0.47	29.02	0.42	0.29	LP



Paper & Paperboard Interlaboratory Testing Program
Analysis 370
Air Resistance - Gurley Oil Type
TAPPI Official Test Method T460

Report #2982G,
February 2019

WebCode	Data Flag	Sample GE63			Sample GE64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
Y3KBY7		29.30	-0.17	-0.11	27.30	-1.30	-0.90	GS
YDLKVV		30.48	1.02	0.67	29.20	0.61	0.42	LA
YLEV6R		29.52	0.05	0.04	28.71	0.11	0.08	PP
YQNZTK		28.44	-1.03	-0.68	27.54	-1.06	-0.73	TL
ZMHY48		26.43	-3.04	-1.99	26.53	-2.07	-1.43	HG

Summary Statistics	Sample GE63	Sample GE64
Grand Means	29.47 sec/100 cc	28.60 sec/100 cc
Std Dev Btwn Labs	1.52 sec/100 cc	1.44 sec/100 cc
Statistics based on 46 of 46 reporting participants.		

Key to Instrument Codes Reported by Participants

GA Gurley Precision #4340 Automatic Densometer	GL Gurley #4110
GS Gurley-Hill S-P-S Tester #4190	HG Technidyne - Hagerty Model #1
LA L & W Autoline	LP L & W Densometer, Air Permeance
LW L & W Type Gurley Densometer, Oil Flotation	PP Technidyne Profile/Plus
PR Parker Print-Surf (PPS) Model M590	TL Gurley Densometer #4110, Oil Flotation
VM Valmet PaperLab (was Kajaani/Robotest)	WG W & LE Gurley Tester
XX Instrument make/model not specified by lab	



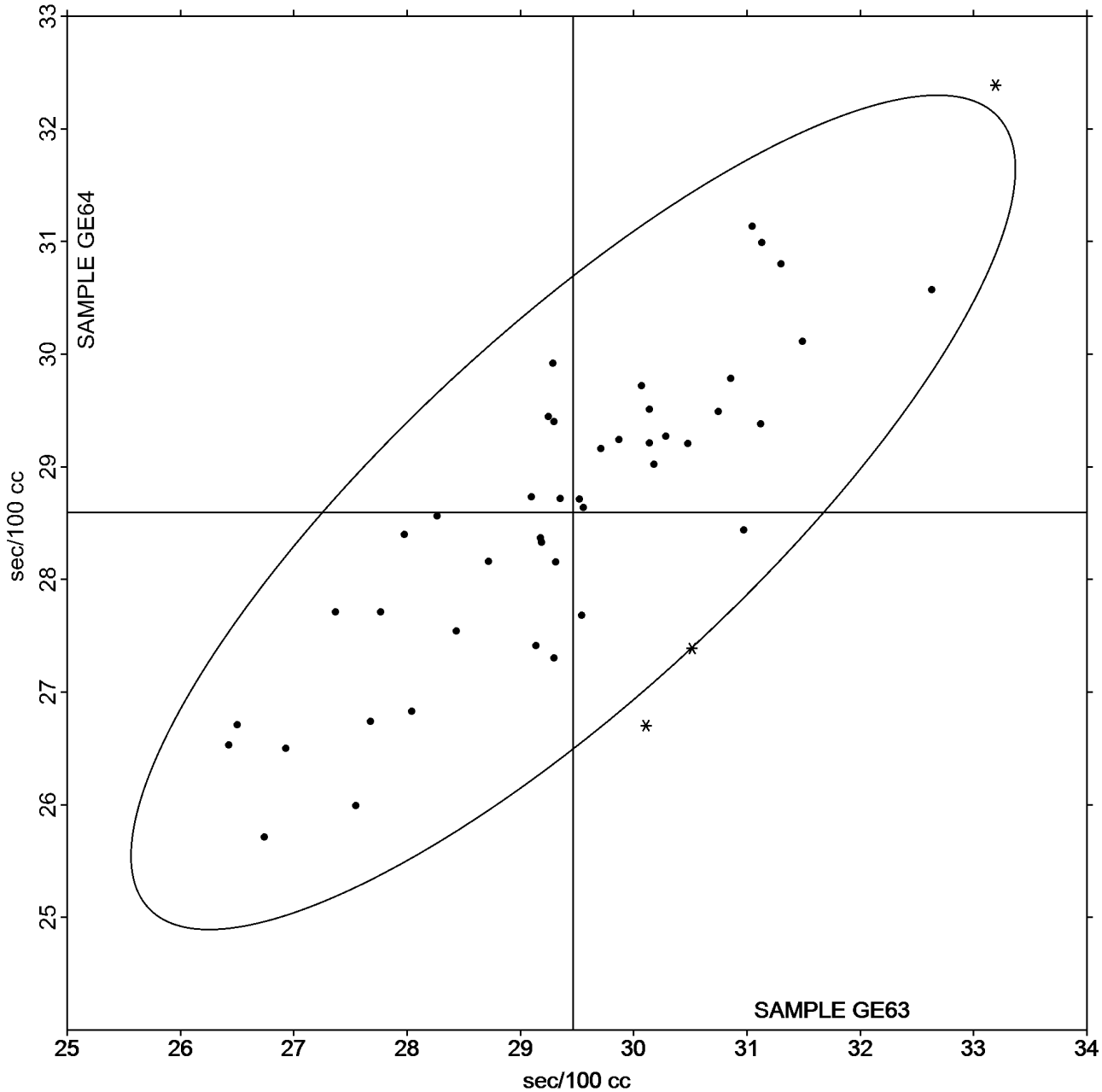
Paper & Paperboard Interlaboratory Testing Program
 Analysis 370
 Air Resistance - Gurley Oil Type
 TAPPI Official Test Method T460

Report #2982G,
 February 2019

Grand Mean Sample GE63 = 29.466
 sec/100 cc

Grand Mean Sample GE64 = 28.596
 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 #2982G,
February 2019

WebCode	Data Flag	<u>Sample GE63</u>			<u>Sample GE64</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2AWQBZ		99.2	-3.5	-0.34	102.2	-3.0	-0.33	SH
3VBTEB		91.7	-11.0	-1.08	96.7	-8.5	-0.93	TT
4JUNKK		100.2	-2.5	-0.24	102.2	-3.0	-0.32	PP
8VYUFV		103.6	0.9	0.09	103.1	-2.1	-0.23	PP
FMT2A7		115.8	13.1	1.29	115.9	10.7	1.17	TT
G6NR3E	X	28.2	-74.5	-7.32	26.8	-78.4	-8.56	PP
L2TTFH		123.0	20.3	1.99	125.0	19.8	2.16	TT
MM8M9A		101.8	-0.9	-0.09	102.6	-2.6	-0.28	TT
PFNYRD		90.2	-12.5	-1.23	96.5	-8.7	-0.95	GA
Q6ZQ48		91.9	-10.8	-1.06	94.2	-11.0	-1.20	GA
Y3KBY7		108.8	6.1	0.60	109.9	4.7	0.51	SH
ZPA24U		103.5	0.8	0.08	108.8	3.6	0.39	HM

Summary Statistics	<u>Sample GE63</u>	<u>Sample GE64</u>
Grand Means	102.70 Sheffield Units	105.19 Sheffield Units
Std Dev Btwn Labs	10.18 Sheffield Units	9.16 Sheffield Units
Statistics based on 11 of 12 reporting participants.		

Comments on Assigned Data Flags for Test #372

G6NR3E (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

GA	Gurley Precision #4340 Automatic Densometer	HM	Technidyne - Hagerty Model #538
PP	Technidyne Profile/Plus	SH	Sheffield
TT	TMI Monitor/Smoothness II, Model 58-24		

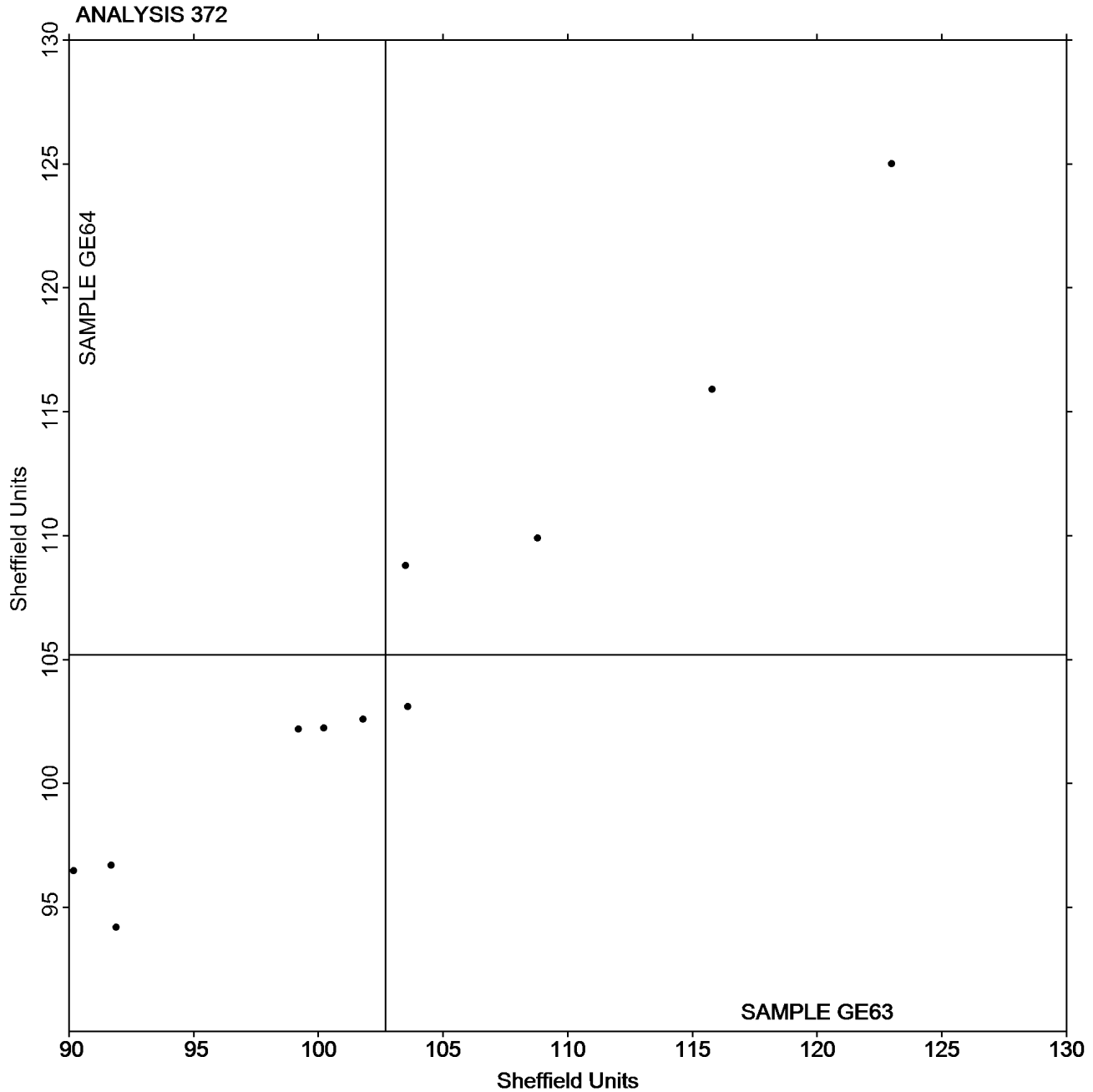


Paper & Paperboard Interlaboratory Testing Program
Analysis 372
Porosity - Sheffield Type - Sheffield Units for 3/4 inch Diameter Orifice
TAPPI Official Test Method T547

Report #2982G,
February 2019

Grand Mean Sample GE63 = 102.70
Sheffield Units

Grand Mean Sample GE64 = 105.19
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
Analysis 376
Roughness - Print Surf Method - 0.5 to 4.0 Microns
TAPPI Official Test Method T555

Report #2982G,
February 2019

WebCode	Data Flag	Sample GJ63			Sample GJ64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2CJLKL		0.5550	-0.1358	-1.84	0.4270	-0.1075	-1.52	ZZ
2WPVPP		0.6470	-0.0438	-0.59	0.5070	-0.0275	-0.39	ZZ
4GKGGR	X	0.6050	-0.0858	-1.16	0.7620	0.2275	3.21	ZZ
4ZECRU		0.6490	-0.0418	-0.57	0.4940	-0.0405	-0.57	ZZ
6N7Z6R		0.6350	-0.0558	-0.76	0.5480	0.0135	0.19	ZZ
8VYUFV		0.6550	-0.0358	-0.48	0.5210	-0.0135	-0.19	ZZ
AHEBJ4		0.7640	0.0732	0.99	0.5280	-0.0065	-0.09	ZZ
AQ9FC6		0.6830	-0.0078	-0.11	0.5780	0.0435	0.61	ZZ
BEAAR6		0.8140	0.1232	1.67	0.6920	0.1575	2.22	ZZ
BX9ZCE	X	2.5510	1.8602	25.19	1.1680	0.6335	8.93	ZZ
C3BV8Y		0.7130	0.0222	0.30	0.5030	-0.0315	-0.44	ZZ
CC44RP		0.8760	0.1852	2.51	0.6480	0.1135	1.60	ZZ
CQMNE6		0.6540	-0.0368	-0.50	0.4870	-0.0475	-0.67	ZZ
DVXUUB		0.7040	0.0132	0.18	0.5780	0.0435	0.61	ZZ
EQX7Q9		0.6520	-0.0388	-0.53	0.4530	-0.0815	-1.15	ZZ
FMT2A7	*	0.7790	0.0882	1.19	0.7190	0.1845	2.60	ZZ
GHERNF		0.6790	-0.0118	-0.16	0.5050	-0.0295	-0.42	ZZ
HNWFRW		0.6940	0.0032	0.04	0.5280	-0.0065	-0.09	ZZ
JJYE68		0.6870	-0.0038	-0.05	0.5070	-0.0275	-0.39	ZZ
L2DHRC		0.6560	-0.0348	-0.47	0.4680	-0.0665	-0.94	ZZ
MF4UPD		0.6140	-0.0768	-1.04	0.4740	-0.0605	-0.85	ZZ
MRHRW3	X	1.4040	0.7132	9.66	1.4340	0.8995	12.68	ZZ
RFRNF7		0.6500	-0.0408	-0.55	0.4810	-0.0535	-0.75	ZZ
RLFB9P		0.8320	0.1412	1.91	0.5970	0.0625	0.88	ZZ
UPUN7H		0.6440	-0.0468	-0.63	0.5590	0.0245	0.34	ZZ
UXK7H7		0.6390	-0.0518	-0.70	0.4900	-0.0445	-0.63	ZZ
VJYD84		0.6510	-0.0398	-0.54	0.5040	-0.0305	-0.43	ZZ
XXCJDN		0.7440	0.0532	0.72	0.5670	0.0325	0.46	ZZ

Summary Statistics	Sample GJ63	Sample GJ64
Grand Means	0.69 Microns	0.53 Microns
Std Dev Btwn Labs	0.07 Microns	0.07 Microns

Statistics based on 25 of 28 reporting participants.

Comments on Assigned Data Flags for Test #376

BX9ZCE (X) - Extreme Data.

MRHRW3 (X) - Extreme Data.

4GKGGR (X) - Data for sample GJ64 are high.



Paper & Paperboard Interlaboratory Testing Program

**Report #2982G,
February 2019**

Analysis 376

Roughness - Print Surf Method - 0.5 to 4.0 Microns

TAPPI Official Test Method T555

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



Paper & Paperboard Interlaboratory Testing Program

Report #2982G,
February 2019

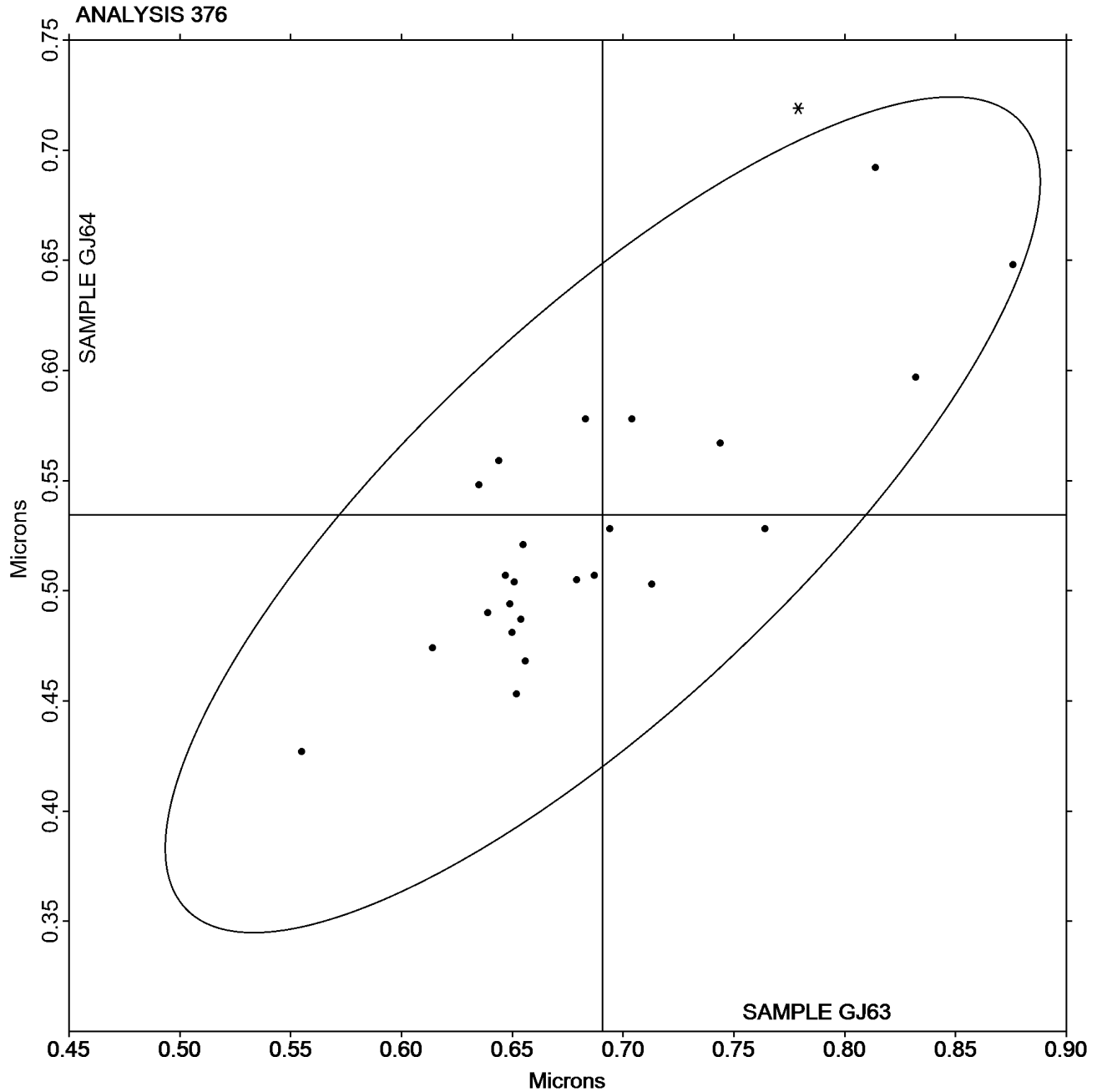
Analysis 376

Roughness - Print Surf Method - 0.5 to 4.0 Microns

TAPPI Official Test Method T555

Grand Mean Sample GJ63 = 0.69080
Microns

Grand Mean Sample GJ64 =
0.53452 Microns





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

Report #2982G,
February 2019

WebCode	Data Flag	<u>Sample GK63</u>			<u>Sample GK64</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
8LNRUU		3.612	0.021	0.10	3.696	-0.001	-0.01	ZZ
DR9U8Z		3.998	0.407	2.03	4.108	0.411	1.71	ZZ
DXHYAL		3.577	-0.014	-0.07	3.903	0.206	0.85	ZZ
H3VH7H		3.421	-0.170	-0.85	3.406	-0.291	-1.21	ZZ
H72RRL		3.633	0.042	0.21	3.690	-0.007	-0.03	ZZ
RFRNF7		3.403	-0.188	-0.94	3.568	-0.129	-0.54	ZZ
YLEV6R		3.496	-0.095	-0.48	3.511	-0.186	-0.77	ZZ

Summary Statistics	<u>Sample GK63</u>	<u>Sample GK64</u>
Grand Means	3.59 Microns	3.70 Microns
Std Dev Btwn Labs	0.20 Microns	0.24 Microns

Statistics based on 7 of 7 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



Paper & Paperboard Interlaboratory Testing Program

Report #2982G,
February 2019

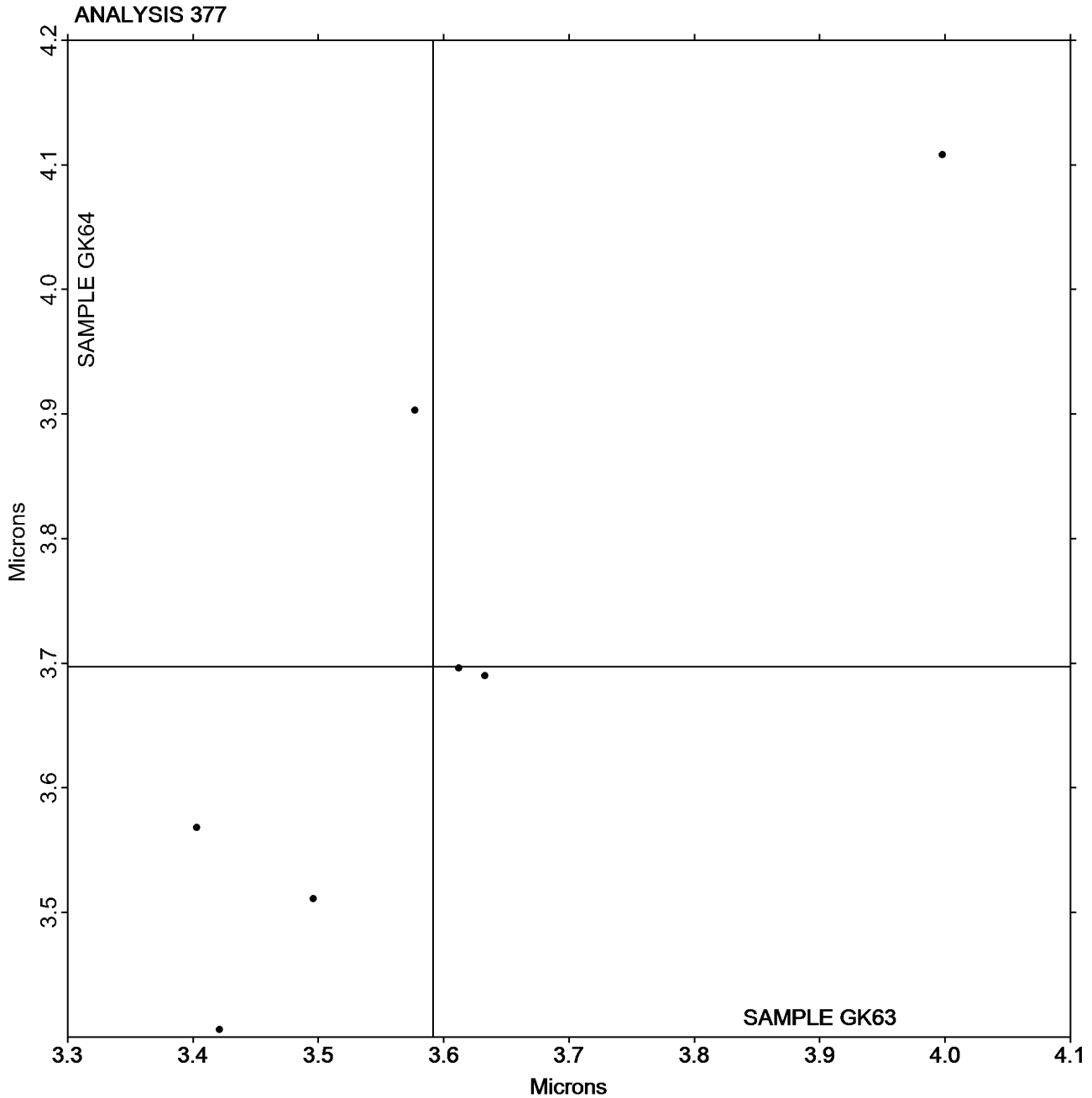
Analysis 377

Roughness - Print Surf Method - 2.5 to 6.0 Microns

TAPPI Official Test Method T555

Grand Mean Sample GK63 = 3.5914
Microns

Grand Mean Sample GK64 = 3.6974
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
TAPPI Official Test Method T538

Report #2982G,
February 2019

WebCode	Data Flag	Sample GL63			Sample GL64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2AWQBZ		115.4	-2.4	-0.31	117.2	0.9	0.12	SH
2CJLKL		122.0	4.2	0.54	127.5	11.2	1.46	LW
2R8XU8		113.3	-4.5	-0.58	103.7	-12.6	-1.64	MP
2WPVPP		106.4	-11.4	-1.46	107.3	-9.0	-1.18	PP
339LM6		111.5	-6.3	-0.81	111.5	-4.8	-0.62	SH
4JUNKK		112.8	-5.0	-0.64	108.3	-8.0	-1.04	PP
4XD7EA		121.9	4.1	0.53	126.8	10.5	1.37	PP
68FYAL		112.5	-5.3	-0.68	112.8	-3.5	-0.46	PP
6G4QXY		120.9	3.1	0.40	127.0	10.7	1.40	PP
79J7W7		105.6	-12.2	-1.56	104.7	-11.6	-1.51	TT
8LNRUU		111.0	-6.8	-0.87	114.0	-2.3	-0.30	PP
8VYUFV		120.1	2.3	0.29	108.3	-8.0	-1.04	VM
A7LUU3		112.6	-5.2	-0.66	111.6	-4.7	-0.61	XX
AQ9FC6	X	145.5	27.7	3.54	151.5	35.2	4.59	TT
B7NP6L		107.2	-10.6	-1.36	107.6	-8.7	-1.13	LW
BEAAR6		115.0	-2.8	-0.36	117.7	1.4	0.19	PP
CQMNE6		110.1	-7.7	-0.99	113.2	-3.0	-0.40	PP
DR9U8Z		118.4	0.6	0.08	118.3	2.0	0.26	LW
DRXQZ3		110.8	-7.0	-0.90	114.1	-2.2	-0.29	HM
DUZTLX		113.4	-4.4	-0.57	109.3	-7.0	-0.92	PP
DVXUUB		126.7	8.9	1.14	121.5	5.2	0.68	LA
DXHYAL		119.4	1.6	0.21	114.2	-2.1	-0.28	PP
EQX7Q9		126.3	8.5	1.09	120.3	4.0	0.52	LW
EYRBJA		100.8	-17.0	-2.18	102.6	-13.7	-1.79	LA
FDZQXP		108.9	-8.9	-1.14	105.7	-10.6	-1.38	SH
FMT2A7		127.8	10.0	1.28	132.4	16.1	2.10	TT
G6NR3E		123.2	5.4	0.69	121.4	5.1	0.67	PP
H3VH7H		120.9	3.1	0.40	118.2	1.9	0.25	LA
HDGLF3		114.2	-3.6	-0.46	112.4	-3.9	-0.51	PP
JG8HFD		114.4	-3.4	-0.43	117.7	1.4	0.19	PP
KUCXZN	X	146.5	28.7	3.67	144.0	27.7	3.62	GL
L2DHRC		125.5	7.7	0.99	121.3	5.0	0.65	HM
L2TTFH	X	151.5	33.7	4.31	141.5	25.2	3.29	TT
M6AD3X		116.9	-0.9	-0.12	109.0	-7.3	-0.95	PP
MF4UPD		118.0	0.2	0.02	114.2	-2.1	-0.27	PP
P2Z33Z		114.1	-3.7	-0.47	115.5	-0.8	-0.11	LA
PFNYRD		117.4	-0.4	-0.05	115.4	-0.9	-0.12	PP
Q6ZQ48		126.9	9.1	1.16	124.2	7.9	1.03	GA
RFRNF7		127.6	9.8	1.25	129.8	13.5	1.76	XX
RLFB9P		115.3	-2.5	-0.32	114.1	-2.2	-0.29	LA
TAXA7P		126.2	8.4	1.08	121.0	4.7	0.61	XX



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

Report #2982G,
February 2019

WebCode	Data Flag	Sample GL63			Sample GL64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
UXK7H7		115.5	-2.3	-0.29	113.7	-2.5	-0.33	PP
VJYD84		121.5	3.7	0.48	121.1	4.8	0.63	PP
WG9C2F		116.1	-1.7	-0.22	116.4	0.1	0.01	GA
WM3F2Z		120.6	2.8	0.36	118.7	2.4	0.31	TS
X6UWCM		109.0	-8.8	-1.13	114.1	-2.2	-0.29	PP
XBEWRY		120.5	2.7	0.34	114.6	-1.7	-0.22	PP
XXCJDN		112.2	-5.6	-0.72	106.8	-9.5	-1.24	TS
Y3KBY7	*	139.4	21.6	2.76	135.9	19.6	2.56	XX
YLEV6R		126.2	8.4	1.08	117.6	1.3	0.17	PP
ZMHY48		120.3	2.5	0.32	115.8	-0.5	-0.06	TS
ZMLLHZ	*	139.2	21.4	2.74	131.4	15.2	1.98	GA

Summary Statistics	Sample GL63	Sample GL64
Grand Means	117.80 Sheffield	116.29 Sheffield
Std Dev Btwn Labs	7.82 Sheffield	7.67 Sheffield

Statistics based on 49 of 52 reporting participants.

Comments on Assigned Data Flags for Test #378

- L2TTFH (X) - Data for both samples are high. Possible Systematic Error.
- KUCXZN (X) - Data for both samples are high. Possible Systematic Error.
- AQ9FC6 (X) - Data for both samples are high. Possible Systematic Error.

Key to Instrument Codes Reported by Participants

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



Paper & Paperboard Interlaboratory Testing Program

Report #2982G,
February 2019

Analysis 378

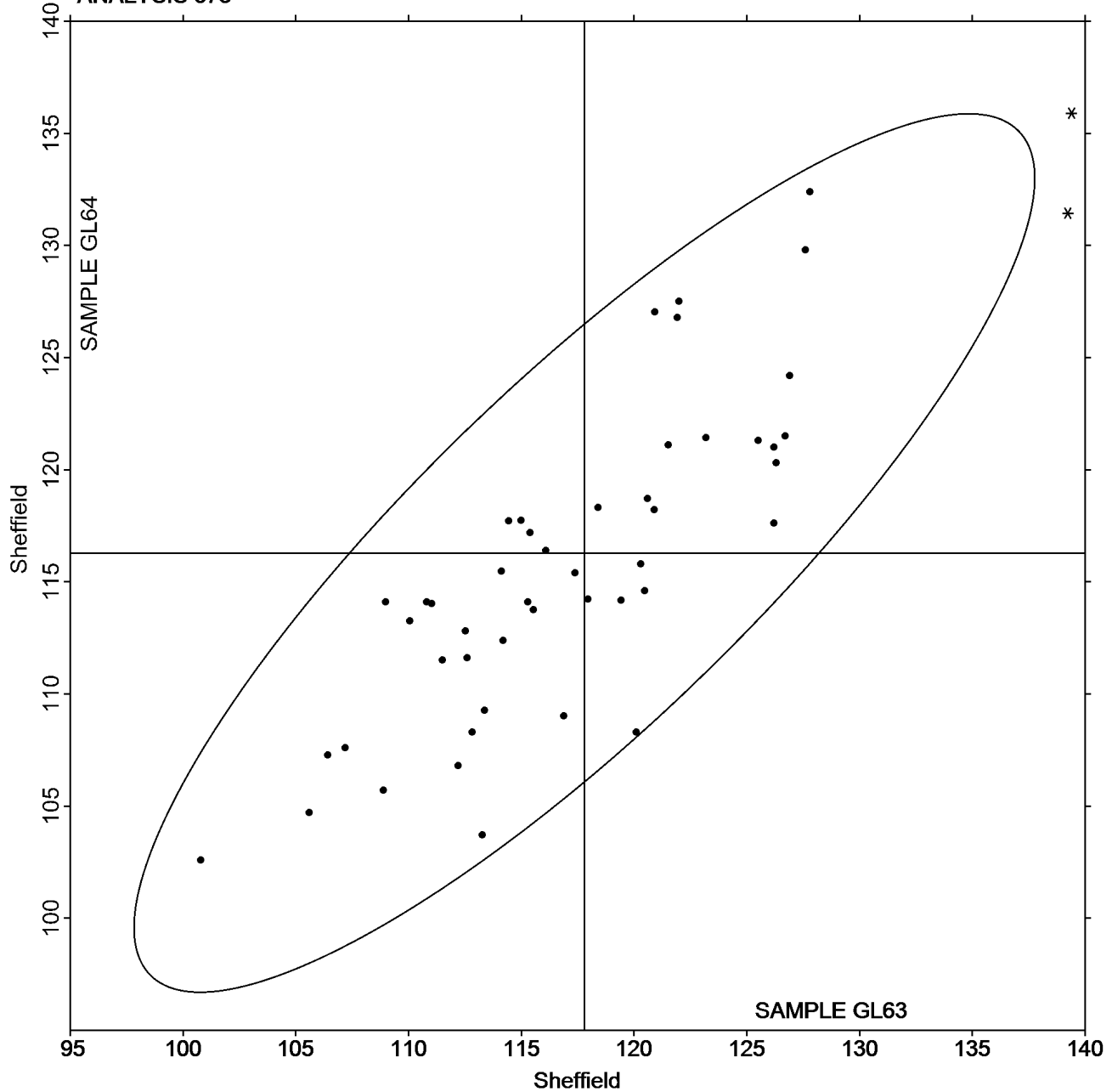
Roughness - Sheffield Type

TAPPI Official Test Method T538

Grand Mean Sample GL63 = 117.80
Sheffield

Grand Mean Sample GL64 = 116.29
Sheffield

ANALYSIS 378





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

Report #2982G,
February 2019

WebCode	Data Flag	Sample GM63			Sample GM64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
4G3P4Z		4.198	-0.079	-0.17	4.118	-0.077	-0.15	ZZ
6AY3RQ		3.446	-0.831	-1.82	3.016	-1.179	-2.29	ZZ
AQ9FC6		5.050	0.773	1.69	5.190	0.995	1.93	ZZ
CC44RP		4.371	0.094	0.20	4.338	0.143	0.28	ZZ
DXHYAL		4.560	0.283	0.62	4.846	0.651	1.26	ZZ
EEJDV8		4.940	0.663	1.45	4.370	0.175	0.34	ZZ
FG4LGT		4.213	-0.064	-0.14	4.229	0.034	0.07	ZZ
G3XTMV		4.470	0.193	0.42	4.210	0.015	0.03	ZZ
GZWKK7		3.922	-0.355	-0.78	4.076	-0.119	-0.23	ZZ
HVFJYY	X	2.290	-1.987	-4.34	4.280	0.085	0.17	ZZ
JFX7ZX		4.749	0.471	1.03	4.561	0.366	0.71	ZZ
KFRJWN		4.240	-0.037	-0.08	4.210	0.015	0.03	ZZ
L8GKWC		3.781	-0.496	-1.08	3.765	-0.430	-0.83	ZZ
WAP9UD		3.772	-0.505	-1.10	3.691	-0.504	-0.98	ZZ
XD7TGT		4.172	-0.105	-0.23	4.109	-0.086	-0.17	ZZ

Summary Statistics	Sample GM63	Sample GM64
Grand Means	4.28 Percent	4.19 Percent
Stnd Dev Btwn Labs	0.46 Percent	0.52 Percent
Statistics based on 14 of 15 reporting participants.		

Comments on Assigned Data Flags for Test #382

HVFJYY (X) - Data for sample GM63 are low.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



Paper & Paperboard Interlaboratory Testing Program

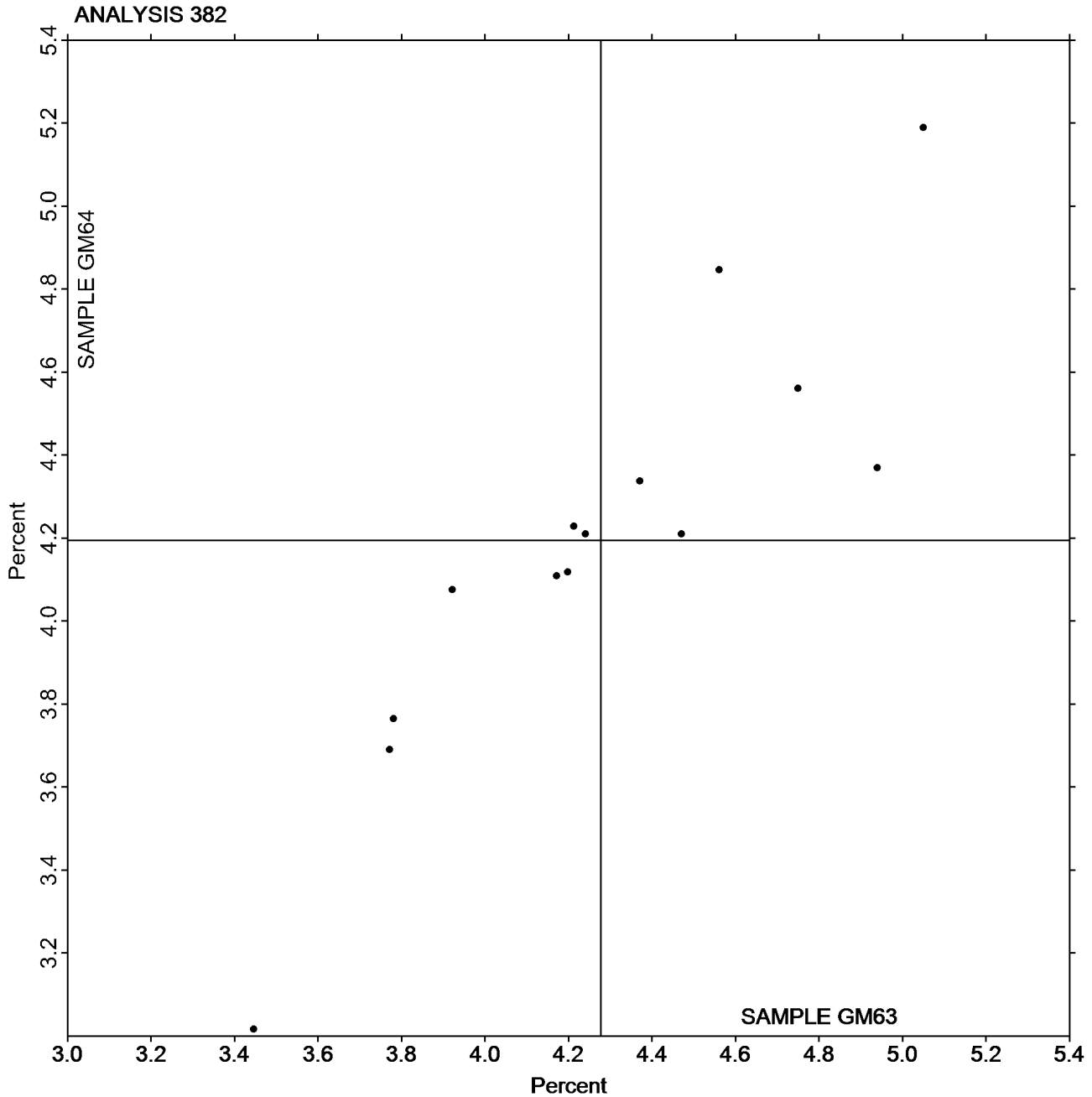
Report #2982G,
February 2019

Analysis 382 Moisture in Paper

TAPPI Official Test Method T412

Grand Mean Sample GM63 = 4.2775
Percent

Grand Mean Sample GM64 = 4.1949
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 #2982G,
February 2019

Analysis 384

Opacity (89% Reflectance Backing) - Fine Papers

TAPPI Official Test Method T425

WebCode	Data Flag	Sample GN63			Sample GN64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2AWQBZ		89.87	0.68	1.01	89.92	0.84	1.42	ZZ
339LM6		89.27	0.08	0.12	88.96	-0.12	-0.20	ZZ
4GKGGR		90.09	0.90	1.33	89.29	0.21	0.35	ZZ
68FYAL		89.37	0.18	0.27	89.47	0.39	0.66	ZZ
6G4QXY		89.04	-0.15	-0.23	88.64	-0.44	-0.74	ZZ
6N7Z6R		88.73	-0.46	-0.68	89.13	0.05	0.08	ZZ
73E3BE		88.67	-0.52	-0.77	88.52	-0.56	-0.95	ZZ
8LNRUU		88.89	-0.30	-0.45	88.45	-0.63	-1.06	ZZ
9W223F		89.15	-0.04	-0.06	89.72	0.64	1.08	ZZ
A7LUU3	X	91.90	2.71	4.02	91.77	2.69	4.54	ZZ
ACERLE		90.38	1.19	1.76	89.95	0.87	1.46	ZZ
AHEBJ4		89.02	-0.17	-0.25	88.72	-0.36	-0.61	ZZ
CQMNE6		89.72	0.53	0.78	89.60	0.52	0.88	ZZ
DRXQZ3		88.45	-0.74	-1.10	88.47	-0.61	-1.03	ZZ
DXHYAL	X	82.76	-6.43	-9.53	88.98	-0.10	-0.16	ZZ
EYRBJA	X	85.83	-3.36	-4.98	85.57	-3.51	-5.93	ZZ
FMT2A7		89.73	0.54	0.80	89.65	0.57	0.96	ZZ
G6NR3E		89.07	-0.13	-0.19	88.93	-0.15	-0.25	ZZ
H3VH7H		89.29	0.10	0.15	89.47	0.39	0.66	ZZ
HNWFRW		89.11	-0.08	-0.11	89.61	0.53	0.89	ZZ
JJYE68		89.23	0.04	0.06	89.11	0.03	0.05	ZZ
KUCXZN	*	90.90	1.71	2.53	89.94	0.86	1.45	ZZ
L2DHRC		89.39	0.20	0.30	88.99	-0.09	-0.15	ZZ
L2TTFH		89.27	0.08	0.12	89.06	-0.02	-0.03	ZZ
M6AD3X		89.42	0.23	0.34	89.74	0.66	1.12	ZZ
MPQTFJ		88.73	-0.46	-0.68	88.62	-0.46	-0.77	ZZ
MRHRW3	*	87.68	-1.51	-2.24	87.47	-1.61	-2.72	ZZ
PFNYRD		88.14	-1.05	-1.56	88.08	-1.00	-1.69	ZZ
QXWVU8		88.32	-0.87	-1.29	88.86	-0.22	-0.37	ZZ
TAXA7P		89.37	0.18	0.27	89.14	0.06	0.10	ZZ
WM3F2Z		88.93	-0.26	-0.39	88.93	-0.15	-0.26	ZZ
X6UWCM		89.82	0.63	0.93	89.57	0.49	0.83	ZZ
X6Y374		88.01	-1.18	-1.76	88.10	-0.98	-1.66	ZZ
Y3KBY7	X	87.85	-1.34	-1.99	85.58	-3.50	-5.91	ZZ
YLEV6R		89.29	0.10	0.15	89.34	0.26	0.45	ZZ
ZMHY48		89.77	0.58	0.86	89.12	0.04	0.07	ZZ



Paper & Paperboard Interlaboratory Testing Program

Report #2982G,
February 2019

Analysis 384

Opacity (89% Reflectance Backing) - Fine Papers

TAPPI Official Test Method T425

Summary Statistics	Sample GN63	Sample GN64
Grand Means	89.19 Percent	89.08 Percent
Stnd Dev Btwn Labs	0.67 Percent	0.59 Percent

Statistics based on 32 of 36 reporting participants.

Comments on Assigned Data Flags for Test #384

DXHYAL (X) - Extreme Data for Sample GN63.

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

Y3KBY7 (X) - Data for sample GN64 are low. Inconsistent within the determinations of sample GN64.

A7LUU3 (X) - Data for both samples are high. Possible Systematic Error.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



Paper & Paperboard Interlaboratory Testing Program

Report #2982G,
February 2019

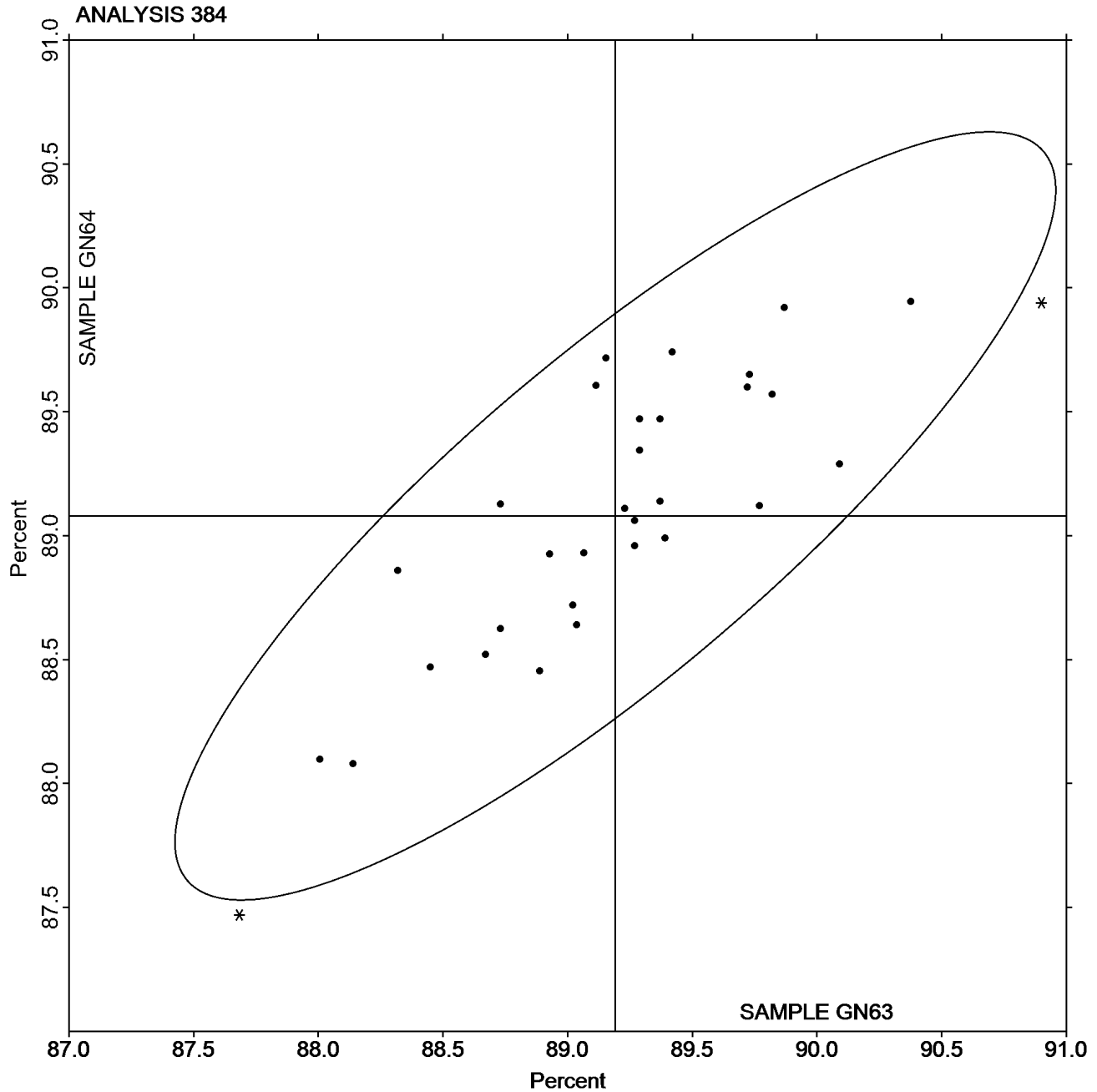
Analysis 384

Opacity (89% Reflectance Backing) - Fine Papers

TAPPI Official Test Method T425

Grand Mean Sample GN63 = 89.191
Percent

Grand Mean Sample GN64 = 89.080
Percent





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

Report #2982G,
February 2019

WebCode	Data Flag	Sample GP63			Sample GP64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
26YK3N		90.36	0.18	0.63	90.15	0.03	0.17	ZZ
4G3P4Z		89.83	-0.35	-1.22	90.03	-0.09	-0.52	ZZ
6ZXDGG		90.09	-0.09	-0.30	90.15	0.03	0.18	ZZ
9KAMRP		90.39	0.22	0.76	90.01	-0.11	-0.66	ZZ
9MFZM7		90.17	0.00	-0.02	90.28	0.16	0.97	ZZ
C3BV8Y		90.24	0.06	0.22	90.09	-0.03	-0.19	ZZ
CPUKCH		90.06	-0.11	-0.40	90.15	0.03	0.16	ZZ
K4YWQU		90.12	-0.06	-0.21	90.08	-0.04	-0.24	ZZ
TK3Y7E		90.14	-0.04	-0.13	90.08	-0.04	-0.24	ZZ
U9TPA3		90.01	-0.17	-0.58	89.93	-0.19	-1.17	ZZ
VPMXAK		90.10	-0.08	-0.28	90.14	0.02	0.12	ZZ
W6TGN3		89.96	-0.22	-0.77	90.03	-0.09	-0.52	ZZ
WAP9UD		89.99	-0.19	-0.65	89.96	-0.16	-0.99	ZZ
WVWKU2	*	91.03	0.85	2.96	90.60	0.48	2.91	ZZ

Summary Statistics	Sample GP63	Sample GP64
Grand Means	90.18 Percent	90.12 Percent
Std Dev Btwn Labs	0.29 Percent	0.17 Percent
Statistics based on 14 of 14 reporting participants.		

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



Paper & Paperboard Interlaboratory Testing Program

Report #2982G,
February 2019

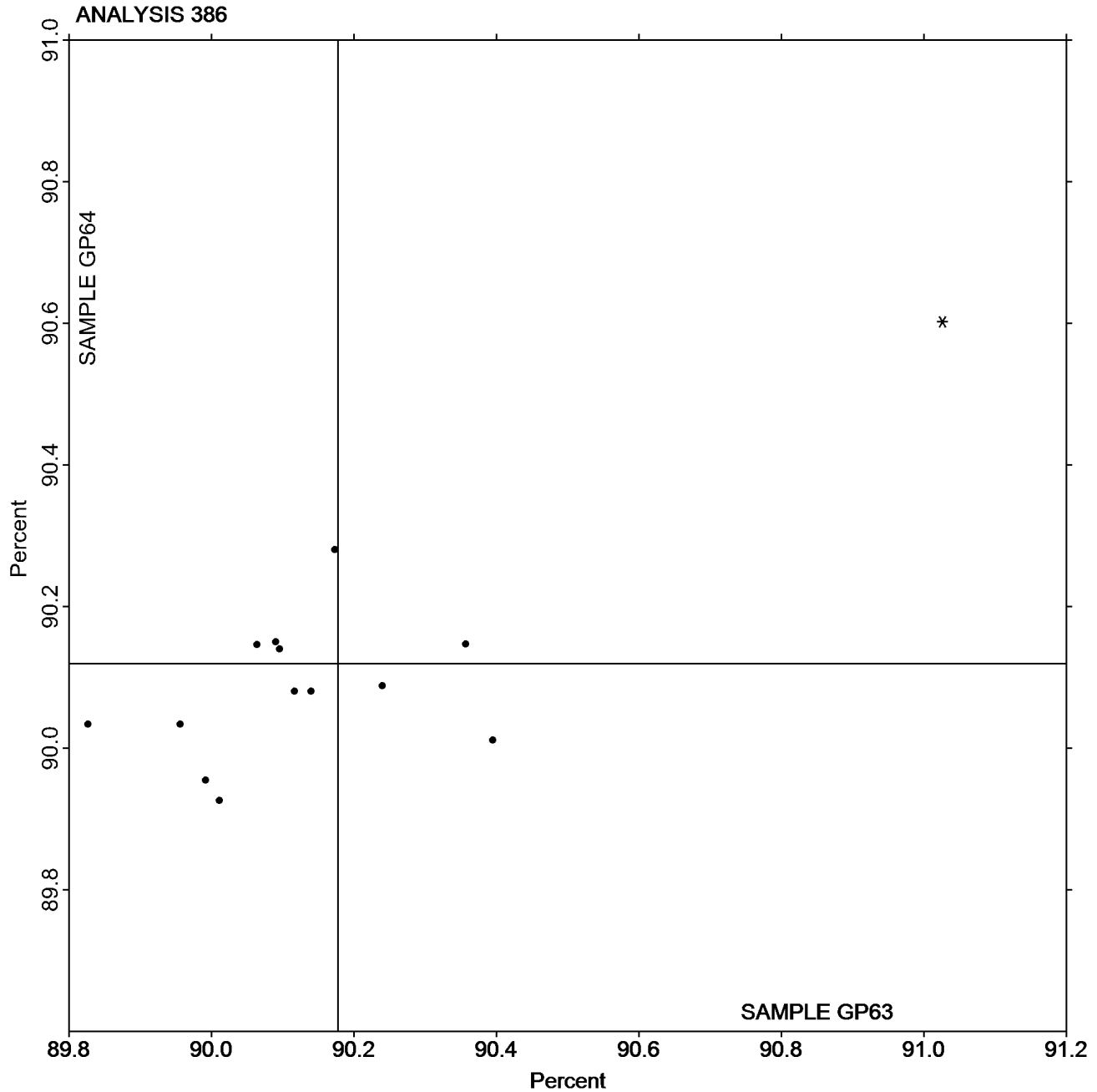
Analysis 386

Opacity (Paper Backing) - Fine Papers and Newsprint

TAPPI Official Test Method T519

Grand Mean Sample GP63 = 90.177
Percent

Grand Mean Sample GP64 = 90.120
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 #2982G,
February 2019

WebCode	Data Flag	Sample GR63			Sample GR64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2CJLKL	X	87.88	4.25	3.33	88.71	4.36	3.62	HZ
68FYAL		82.28	-1.35	-1.06	83.11	-1.23	-1.03	TT
6G4QXY		82.33	-1.30	-1.02	83.15	-1.20	-0.99	TP
73E3BE		84.18	0.55	0.43	85.01	0.67	0.55	TS
A7LUU3		84.98	1.35	1.06	85.53	1.18	0.98	XX
AHEBJ4		82.39	-1.24	-0.97	83.16	-1.18	-0.98	TT
BEAAR6		84.45	0.83	0.65	85.24	0.89	0.74	PP
BX9ZCE		84.45	0.82	0.65	85.14	0.79	0.66	TS
CQMNE6		82.13	-1.50	-1.17	82.81	-1.53	-1.27	TT
D3R8P4		84.55	0.93	0.73	85.38	1.04	0.86	TS
DR9U8Z		84.20	0.57	0.45	84.92	0.57	0.47	HG
EQX7Q9		82.81	-0.81	-0.63	83.65	-0.70	-0.58	TT
H3VH7H		82.17	-1.45	-1.14	83.00	-1.35	-1.12	TS
HVFJYY	*	86.55	2.93	2.29	86.84	2.49	2.07	TS
JG8HFD		82.32	-1.31	-1.02	83.03	-1.32	-1.09	TS
KFRJWN		83.56	-0.06	-0.05	84.18	-0.17	-0.14	XX
L2DHRC		82.34	-1.29	-1.01	83.25	-1.10	-0.91	TS
L2TTFH		84.33	0.70	0.55	84.66	0.32	0.26	TS
M6AD3X		82.53	-1.10	-0.86	83.24	-1.11	-0.92	TS
MF4UPD		84.51	0.89	0.70	85.23	0.88	0.73	TT
MRHRW3		85.09	1.46	1.14	85.94	1.60	1.33	VM
PFNYRD		83.38	-0.24	-0.19	83.92	-0.43	-0.35	XC
TAXA7P		85.40	1.78	1.39	85.88	1.54	1.28	XX
TX8GGE		82.33	-1.29	-1.01	83.15	-1.20	-1.00	TS
UXK7H7		84.81	1.18	0.92	85.54	1.20	0.99	HG
VJYD84		84.46	0.84	0.66	85.16	0.81	0.68	HG
X6UWCM		82.70	-0.92	-0.72	83.74	-0.61	-0.51	XX
X6Y374		83.46	-0.17	-0.13	84.24	-0.11	-0.09	TS
XBEWRY		81.76	-1.86	-1.46	82.58	-1.76	-1.47	TS
Y3KBY7		85.60	1.97	1.54	86.35	2.00	1.66	PE
ZMHY48		82.70	-0.92	-0.72	83.38	-0.97	-0.81	TS

Summary Statistics	Sample GR63	Sample GR64
Grand Means	83.62 Percent	84.35 Percent
Std Dev Btwn Labs	1.28 Percent	1.20 Percent
Statistics based on 30 of 31 reporting participants.		

Comments on Assigned Data Flags for Test #390

2CJLKL (X) - Data for both samples are high. Possible Systematic Error.



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

Report #2982G,
February 2019

Analysis Notes:

TAXA7P - One determination removed from the Lab Mean of Sample GR64 per Grubb's Test at 1% risk (TAPPI 1205).

Key to Instrument Codes Reported by Participants

HG	Hunter Labscan / XE	HZ	Hunter Lab ColorFlex EZ Series
PE	Photovolt 577	PP	Technidyne Profile/Plus
TP	Technidyne Test/Plus	TS	Technidyne Brightimeter Micro S-5
TT	Technidyne Brightimeter Micro S4-M	VM	Valmet PaperLab (was Kajaani/Robotest)
XC	X-Rite Color i5	XX	Instrument make/model not specified by lab



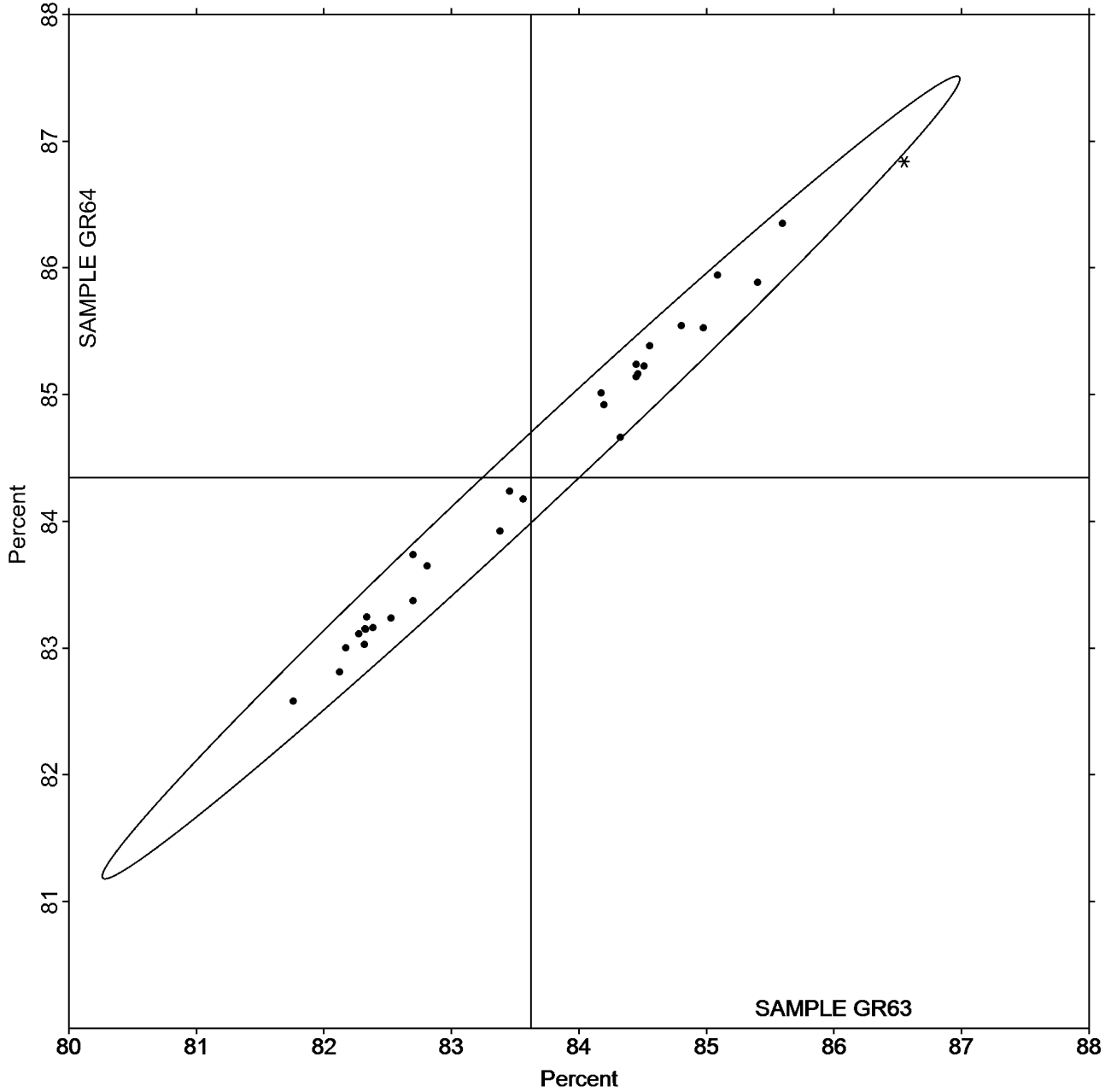
Paper & Paperboard Interlaboratory Testing Program
Analysis 390
Directional Brightness
TAPPI Official Test Method T452

Report #2982G,
February 2019

Grand Mean Sample GR63 = 83.624
Percent

Grand Mean Sample GR64 = 84.347
Percent

ANALYSIS 390





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

Report #2982G,
February 2019

WebCode	Data Flag	Sample GZ63			Sample GZ64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
26YK3N		97.08	0.72	0.59	98.91	0.39	0.61	TS
339LM6		93.36	-3.00	-2.45	97.18	-1.34	-2.10	HT
4GKGGR		96.47	0.11	0.09	98.22	-0.29	-0.46	PP
6N7Z6R		96.86	0.50	0.41	98.54	0.03	0.04	PP
AQ9FC6	X	97.34	0.98	0.80	101.54	3.03	4.74	LE
DRXQZ3		93.81	-2.55	-2.07	97.63	-0.89	-1.39	HT
DXHYAL		96.40	0.04	0.03	98.13	-0.38	-0.60	TS
EYRBJA		96.16	-0.20	-0.16	98.16	-0.35	-0.56	TT
FMT2A7	*	97.62	1.26	1.03	99.94	1.43	2.23	TT
G6NR3E		96.78	0.42	0.34	98.82	0.31	0.48	PP
HNWFRW		97.25	0.89	0.72	99.00	0.49	0.76	TS
JJYE68		96.98	0.62	0.51	98.88	0.37	0.57	TT
TAXA7P		95.74	-0.62	-0.50	98.44	-0.07	-0.12	XX
WM3F2Z		97.44	1.08	0.88	98.72	0.21	0.32	TS
YLEV6R		96.63	0.27	0.22	98.41	-0.10	-0.16	TS
ZMHY48		96.80	0.44	0.36	98.75	0.24	0.37	TS

Summary Statistics	Sample GZ63	Sample GZ64
Grand Means	96.36 Percent	98.51 Percent
Std Dev Btwn Labs	1.23 Percent	0.64 Percent
Statistics based on 15 of 16 reporting participants.		

Comments on Assigned Data Flags for Test #391

AQ9FC6 (X) - Data for sample GZ64 are high. Inconsistent within the determinations of both samples.

Key to Instrument Codes Reported by Participants

HT	Hunter UltraScan Vis	LE	L & W Elrepho
PP	Technidyne Profile/Plus	TS	Technidyne Brightimeter Micro S-5
TT	Technidyne Brightimeter Micro S4-M	XX	Instrument make/model not specified by lab

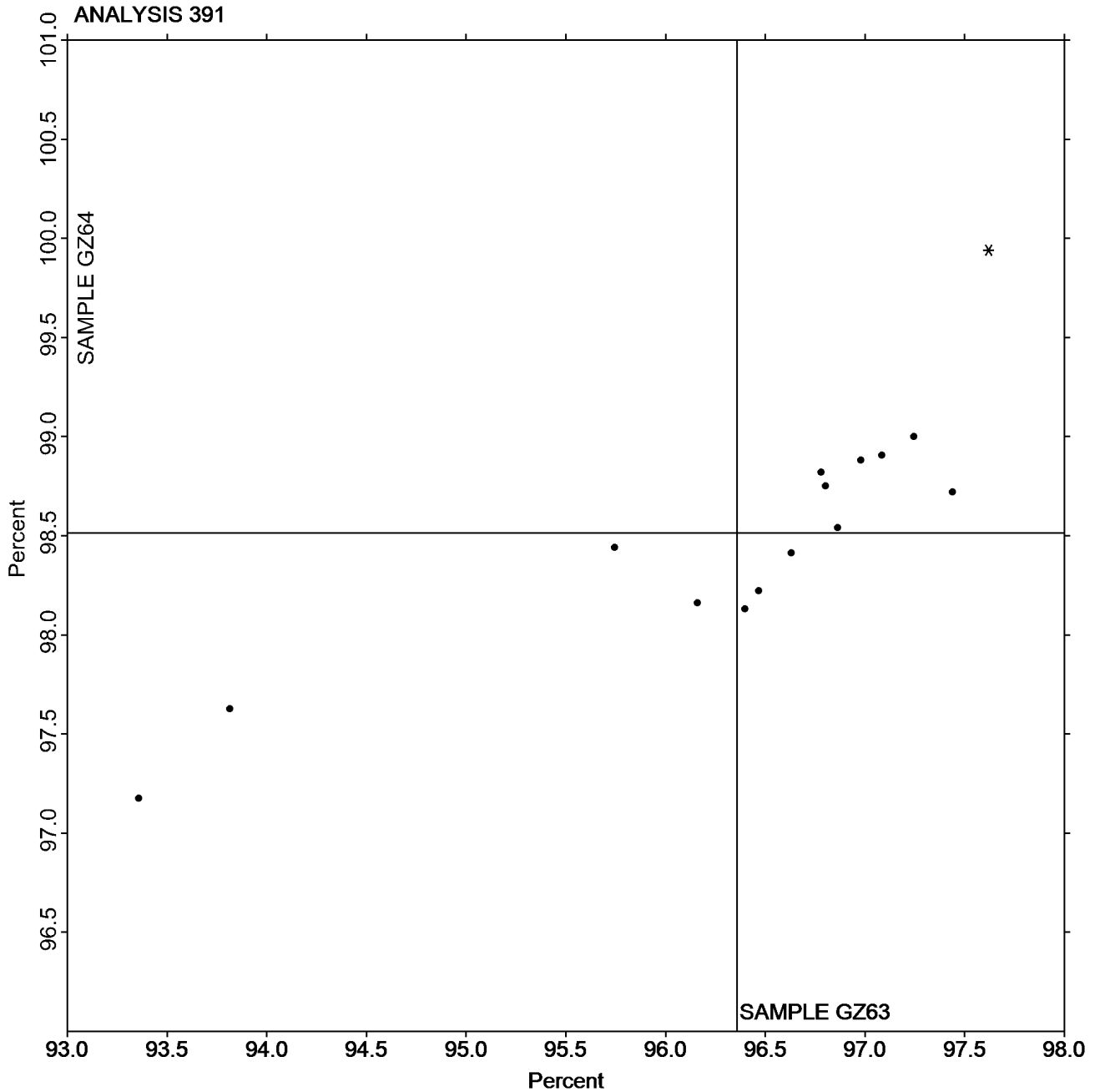


Paper & Paperboard Interlaboratory Testing Program
Analysis 391
Directional Brightness of Fluorescent Samples
TAPPI Official Test Method T452

Report #2982G,
February 2019

Grand Mean Sample GZ63 = 96.359
Percent

Grand Mean Sample GZ64 = 98.515
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
TAPPI Official Test Method T525

Report #2982G,
February 2019

WebCode	Data Flag	Sample GR63			Sample GR64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
26YK3N		83.15	0.22	0.57	84.00	0.30	0.69	TC
4G3P4Z		83.01	0.08	0.19	83.76	0.06	0.15	EG
4XD7EA		83.07	0.14	0.36	83.94	0.25	0.57	TC
6ZXDGG	*	84.11	1.18	3.06	84.94	1.24	2.84	TM
87EL2J	*	83.19	0.26	0.66	83.39	-0.31	-0.70	TZ
9KAMRP		83.04	0.11	0.29	83.96	0.26	0.60	TC
AQ9FC6		82.40	-0.54	-1.39	83.03	-0.67	-1.53	LE
B7NP6L		83.14	0.21	0.54	83.98	0.28	0.64	EF
BEAAR6		82.79	-0.14	-0.37	83.63	-0.07	-0.15	EG
C3BV8Y		83.03	0.10	0.25	83.62	-0.08	-0.18	AC
D3R8P4		82.77	-0.16	-0.41	83.67	-0.03	-0.07	TC
DR9U8Z		82.82	-0.11	-0.29	83.74	0.04	0.10	TC
EQX7Q9		81.91	-1.02	-2.66	82.72	-0.98	-2.24	EG
GHERNF	*	82.60	-0.33	-0.85	82.87	-0.83	-1.89	TC
H3VH7H		82.87	-0.06	-0.16	83.61	-0.09	-0.21	TC
KFRJWN		83.22	0.28	0.74	83.90	0.21	0.48	EE
L2DHRC		83.11	0.18	0.47	83.96	0.27	0.61	LT
MF4UPD		82.90	-0.03	-0.08	83.78	0.08	0.18	TL
TK3Y7E		82.80	-0.13	-0.34	83.58	-0.11	-0.26	LA
TX8GGE		82.80	-0.13	-0.34	83.69	0.00	-0.01	TC
W6TGN3		82.95	0.02	0.04	83.77	0.07	0.17	TM
WAP9UD		82.80	-0.13	-0.34	83.69	-0.01	-0.01	LE
ZTWK4R		82.96	0.03	0.07	83.79	0.10	0.22	TC

Summary Statistics	Sample GR63	Sample GR64
Grand Means	82.93 Percent	83.70 Percent
Std Dev Btwn Labs	0.39 Percent	0.44 Percent

Statistics based on 23 of 23 reporting participants.

Analysis Notes:

ZTWK4R - One determination removed from the Lab Mean of Sample GR64 per Grubb's Test at 1% risk (TAPPI 1205).

Key to Instrument Codes Reported by Participants

AC	ACS Spectro-Sensor II	EE	Datacolor Elrepho 2000
EF	Datacolor Elrepho 3000	EG	Datacolor Elrepho 450X
LA	L & W Elrepho - Autoline	LE	L & W Elrepho
LT	L & W Elrepho SE 071	TC	Technidyne Color Touch Series
TL	Technidyne Technibrite TB-1	TM	Technidyne Technibrite Micro TB-1C
TZ	Technibrite Model TB-1		



Paper & Paperboard Interlaboratory Testing Program

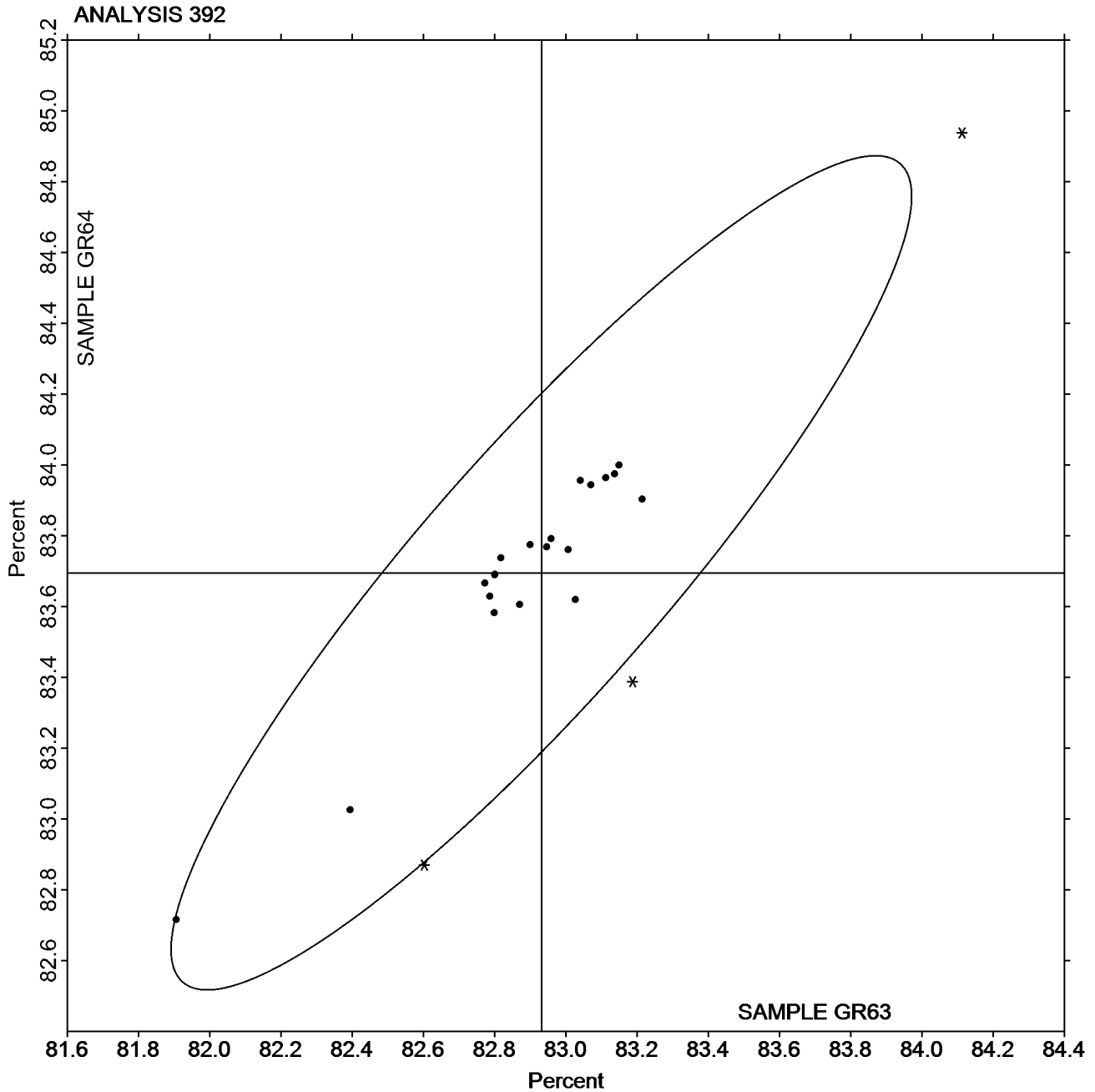
Report #2982G,
February 2019

Analysis 392 Diffuse Brightness

TAPPI Official Test Method T525

Grand Mean Sample GR63 = 82.931
Percent

Grand Mean Sample GR64 = 83.695
Percent





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

Report #2982G,
February 2019

WebCode	Data Flag	Sample GZ63			Sample GZ64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
26YK3N		6.994	0.541	1.18	9.360	0.497	0.95	TS
4GKGGR		6.098	-0.355	-0.77	8.518	-0.345	-0.66	PP
6N7Z6R		6.428	-0.025	-0.05	8.990	0.127	0.24	PP
AQ9FC6	X	9.110	2.657	5.78	12.660	3.797	7.28	LE
DXHYAL		6.094	-0.359	-0.78	8.312	-0.551	-1.05	TS
EYRBJA		6.640	0.187	0.41	8.620	-0.243	-0.46	TT
G6NR3E		6.060	-0.393	-0.85	8.720	-0.143	-0.27	XX
HNWFRW		7.072	0.619	1.35	9.390	0.527	1.01	TS
TAXA7P		5.872	-0.581	-1.26	8.228	-0.635	-1.22	XX
YLEV6R		6.202	-0.251	-0.55	8.646	-0.217	-0.41	TS
ZMHY48		7.072	0.619	1.35	9.842	0.979	1.88	TS

Summary Statistics	Sample GZ63	Sample GZ64
Grand Means	6.45 Percent	8.86 Percent
Std Dev Btwn Labs	0.46 Percent	0.52 Percent

Statistics based on 10 of 11 reporting participants.

Comments on Assigned Data Flags for Test #394

AQ9FC6 (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

LE	L & W Elrepho	PP	Technidyne Profile/Plus
TS	Technidyne Brightimeter Micro S-5	TT	Technidyne Brightimeter Micro S4-M
XX	Instrument make/model not specified by lab		

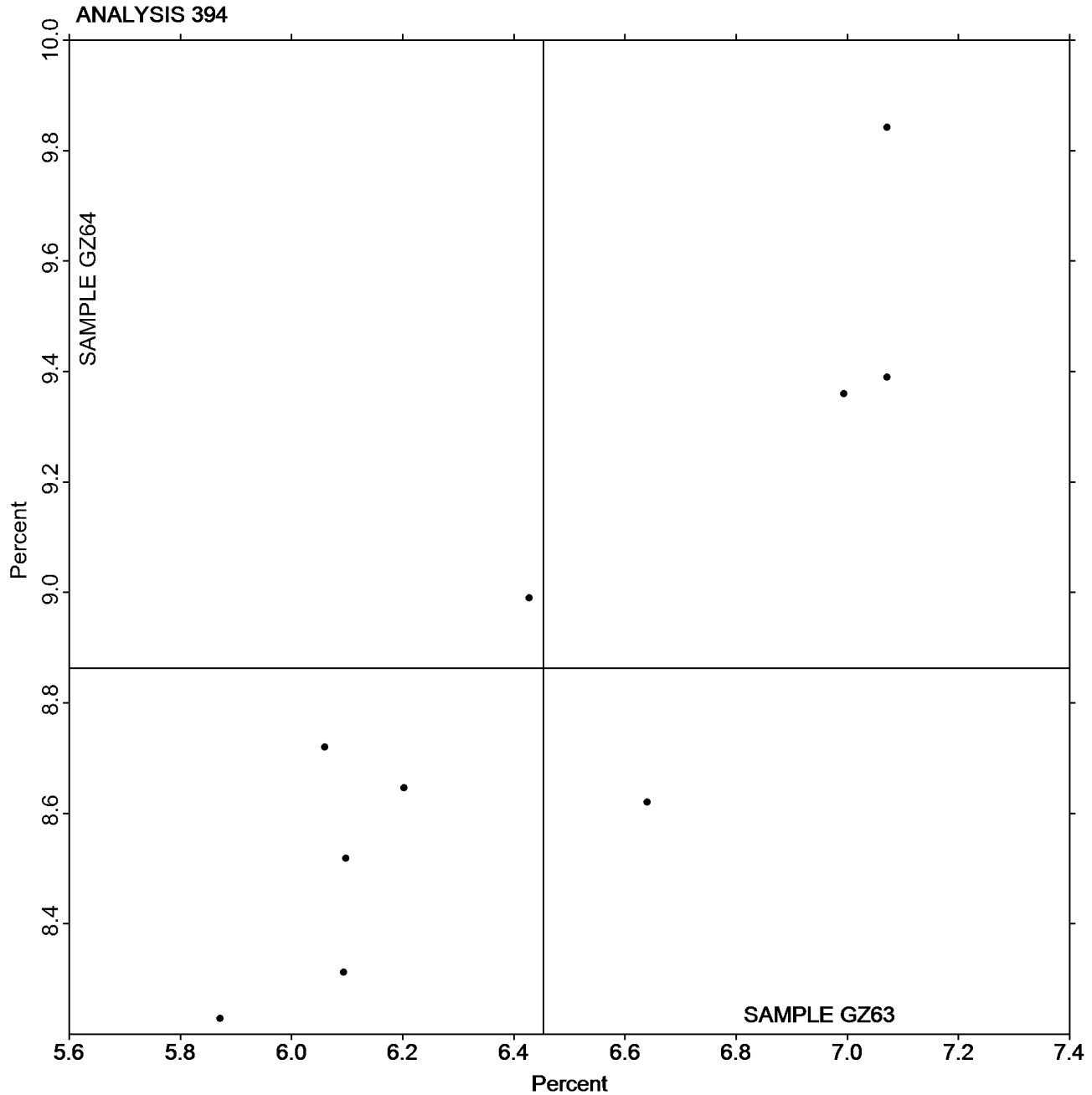


Paper & Paperboard Interlaboratory Testing Program
Analysis 394
Fluorescent Component of Directional Brightness
TAPPI Official Test Method T452

Report #2982G,
February 2019

Grand Mean Sample GZ63 = 6.4532
Percent

Grand Mean Sample GZ64 = 8.8626
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 #2982G,
February 2019

WebCode	Data Flag	Sample GT63			Sample GT64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
26YK3N		70.12	0.85	0.59	68.50	-0.61	-0.53	LA
4GKGGR		68.46	-0.81	-0.57	68.36	-0.75	-0.65	PP
6N7Z6R		68.23	-1.04	-0.73	69.37	0.26	0.23	PP
8VYUFV		70.50	1.23	0.86	68.30	-0.81	-0.71	GM
AHEBJ4		68.18	-1.10	-0.77	68.56	-0.55	-0.48	TH
BEAAR6		67.59	-1.68	-1.18	67.32	-1.79	-1.56	GA
BX9ZCE	X	52.84	-16.43	-11.55	52.88	-16.23	-14.22	LA
C3BV8Y		69.84	0.57	0.40	68.27	-0.84	-0.73	LB
DVXUUB		72.97	3.70	2.60	71.58	2.47	2.17	LA
EQX7Q9		71.13	1.86	1.30	69.91	0.80	0.70	TH
HNWFRW		67.33	-1.94	-1.37	68.42	-0.69	-0.60	LA
JJYE68		69.24	-0.03	-0.02	69.76	0.65	0.57	TG
MF4UPD		69.01	-0.26	-0.19	68.09	-1.02	-0.89	GS
MRHRW3		68.60	-0.67	-0.47	69.71	0.60	0.53	VM
RLFB9P		70.46	1.19	0.83	71.37	2.26	1.98	LF
UXK7H7		68.96	-0.31	-0.22	69.52	0.41	0.36	TH
VJYD84		68.56	-0.71	-0.50	69.40	0.29	0.26	TH
XXCJDN		68.49	-0.78	-0.55	68.36	-0.75	-0.65	XX

Summary Statistics	Sample GT63	Sample GT64
Grand Means	69.27 Gloss Units	69.11 Gloss Units
Std Dev Btwn Labs	1.42 Gloss Units	1.14 Gloss Units

Statistics based on 17 of 18 reporting participants.

Comments on Assigned Data Flags for Test #395

BX9ZCE (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

GA	BYK-Gardner (model not specified)	GM	BYK-Gardner micro-gloss
GS	BYK-Gardner Glossgard II	LA	L & W Gloss - Autoline 300
LB	L & W Gloss Tester Code 224	LF	L & W Autoline 400
PP	Technidyne Profile/Plus	TG	Technidyne T480
TH	Technidyne T480A	VM	Valmet PaperLab (was Kajaani/Robotest)
XX	Instrument make/model not specified by lab		

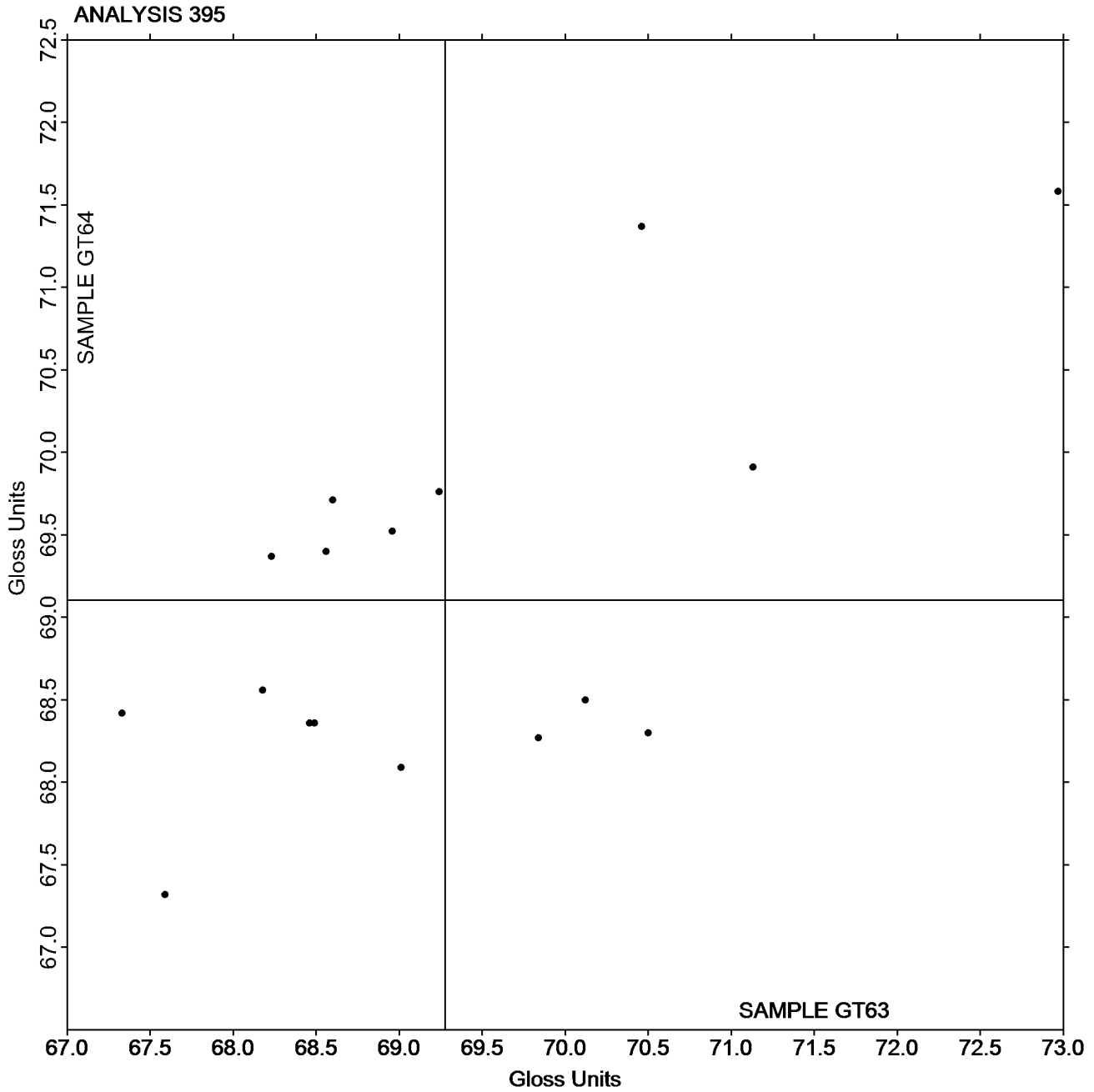


Paper & Paperboard Interlaboratory Testing Program
Analysis 395
Specular Gloss at 75 Degrees - High Range
TAPPI Official Test Method T480

Report #2982G,
February 2019

Grand Mean Sample GT63 = 69.275
Gloss Units

Grand Mean Sample GT64 = 69.106
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
TAPPI Official Test Method T480

Report #2982G,
February 2019

WebCode	Data Flag	Sample GU63			Sample GU64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
26YK3N		34.09	0.29	0.21	25.67	-1.62	-0.64	LA
2CJLKL		33.09	-0.71	-0.50	26.66	-0.63	-0.25	GS
4GKGGR		34.20	0.40	0.28	26.53	-0.76	-0.30	TP
68FYAL		31.89	-1.91	-1.35	25.28	-2.01	-0.79	TH
8LNRUU		33.00	-0.80	-0.57	26.56	-0.73	-0.29	PP
AQ9FC6		35.64	1.84	1.30	33.83	6.54	2.57	LE
C3BV8Y		33.28	-0.52	-0.37	25.37	-1.92	-0.75	LA
CC44RP		31.97	-1.83	-1.30	26.23	-1.06	-0.42	XX
DR9U8Z		34.84	1.04	0.74	28.69	1.40	0.55	TH
PFNYRD		36.00	2.20	1.56	28.10	0.81	0.32	TH

Summary Statistics	Sample GU63	Sample GU64
Grand Means	33.80 Gloss Units	27.29 Gloss Units
Std Dev Btwn Labs	1.41 Gloss Units	2.55 Gloss Units
Statistics based on 10 of 10 reporting participants.		

Key to Instrument Codes Reported by Participants

GS	BYK-Gardner Glossgard II	LA	L & W Gloss - Autoline 300
LE	L & W Elrepho	PP	Technidyne Profile/Plus
TH	Technidyne T480A	TP	Technidyne Profile Plus
XX	Instrument make/model not specified by lab		



Paper & Paperboard Interlaboratory Testing Program

Report #2982G,
February 2019

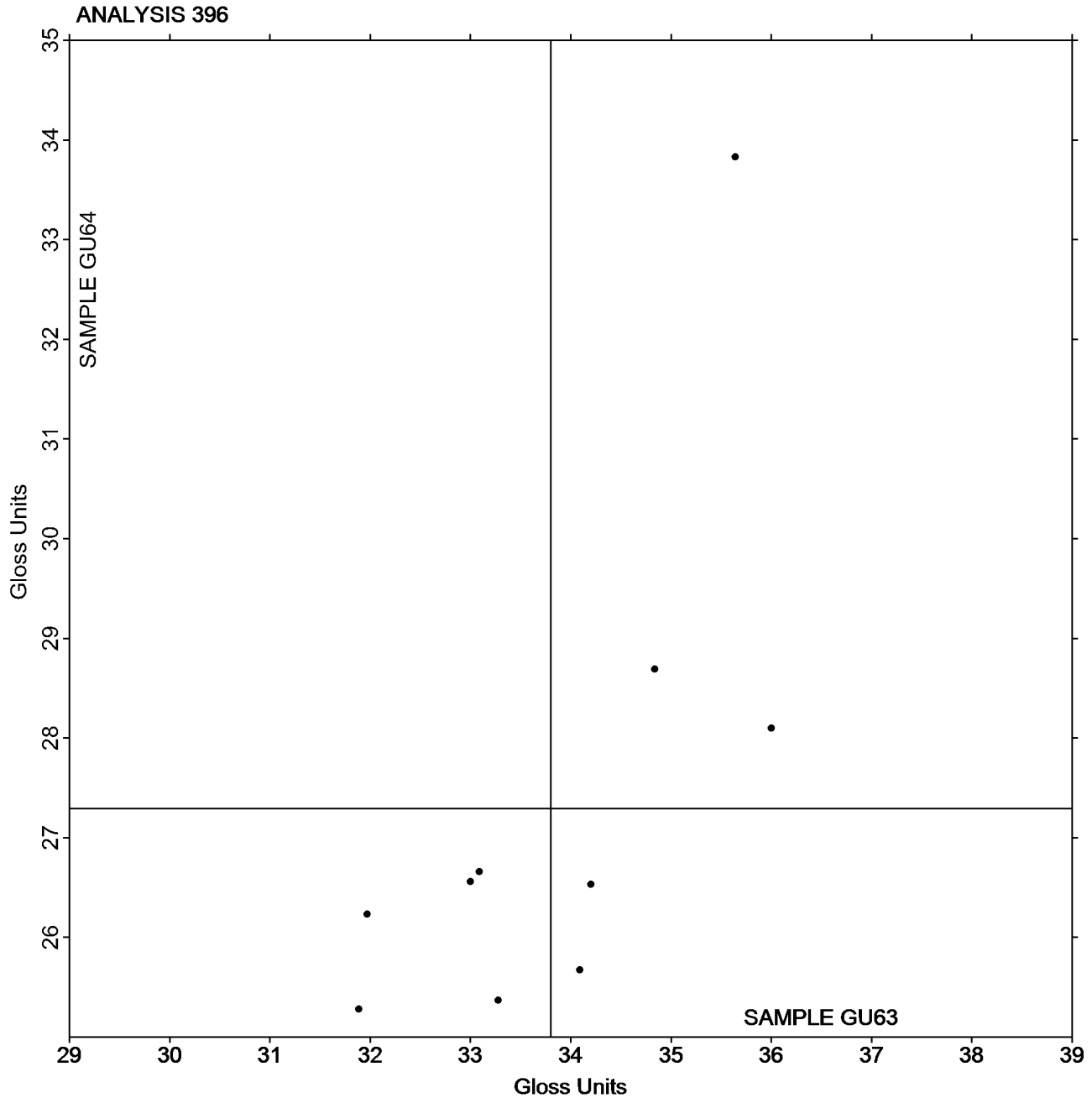
Analysis 396

Specular Gloss at 75 Degrees - Low Range

TAPPI Official Test Method T480

Grand Mean Sample GU63 = 33.800
Gloss Units

Grand Mean Sample GU64 = 27.292
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 #2982G,
February 2019

WebCode	Data Flag	Sample GW63			Sample GW64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2AWQBZ		88.92	-0.20	-0.34	102.8	-0.6	-0.75	ZZ
339LM6		89.85	0.73	1.27	104.1	0.7	0.97	ZZ
4G3P4Z		89.02	-0.09	-0.16	103.0	-0.3	-0.45	ZZ
4GKGGR		88.59	-0.53	-0.91	103.3	-0.1	-0.16	ZZ
68FYAL		89.38	0.26	0.45	102.5	-0.8	-1.14	ZZ
6AY3RQ		89.55	0.43	0.75	103.1	-0.3	-0.37	ZZ
ACERLE		89.26	0.14	0.25	103.3	-0.1	-0.09	ZZ
AQ9FC6	*	87.36	-1.76	-3.03	101.2	-2.2	-2.93	ZZ
C3BV8Y		88.87	-0.24	-0.42	103.5	0.1	0.17	ZZ
CC44RP		88.88	-0.24	-0.41	103.4	0.0	0.03	ZZ
CDVZGJ		89.64	0.52	0.90	104.8	1.4	1.94	ZZ
CPUKCH		89.54	0.42	0.73	103.5	0.1	0.13	ZZ
DRXQZ3		89.22	0.10	0.18	103.8	0.4	0.53	ZZ
EKRMBG		88.58	-0.54	-0.93	103.9	0.5	0.68	ZZ
FG4LGT		88.93	-0.18	-0.32	102.9	-0.5	-0.63	ZZ
FY727Y		88.87	-0.25	-0.43	102.8	-0.6	-0.80	ZZ
JFX7ZX		89.73	0.62	1.07	103.4	0.0	0.02	ZZ
KFRJWN		89.25	0.13	0.23	103.3	0.0	-0.03	ZZ
KXBAVN		88.91	-0.20	-0.35	103.2	-0.2	-0.28	ZZ
PFNYRD		89.31	0.19	0.33	103.5	0.1	0.13	ZZ
QXWVU8		88.39	-0.73	-1.26	103.2	-0.2	-0.25	ZZ
THREYQ	*	89.23	0.11	0.20	105.1	1.7	2.35	ZZ
TX8GGE		89.52	0.40	0.70	103.4	0.0	0.02	ZZ
WAP9UD		89.44	0.32	0.56	103.3	-0.1	-0.16	ZZ
WM3F2Z		89.26	0.14	0.24	103.1	-0.3	-0.40	ZZ
WVWKU2		90.17	1.05	1.81	103.9	0.6	0.78	ZZ
X6UWCM		88.01	-1.11	-1.91	102.7	-0.6	-0.85	ZZ
ZGGPWE		89.60	0.48	0.83	104.5	1.1	1.55	ZZ

Summary Statistics	Sample GW63	Sample GW64
Grand Means	89.12 g/sq m	103.37 g/sq m
Std Dev Btwn Labs	0.58 g/sq m	0.74 g/sq m

Statistics based on 28 of 28 reporting participants.

Analysis Notes:

FY727Y - One determination removed from the Lab Mean of Sample GW64 per Grubb's Test at 1% risk (TAPPI 1205).



Paper & Paperboard Interlaboratory Testing Program

**Report #2982G,
February 2019**

Analysis 398

Grammage (Mass per Unit Area)

TAPPI Official Test Method T410

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



Paper & Paperboard Interlaboratory Testing Program

Report #2982G,
February 2019

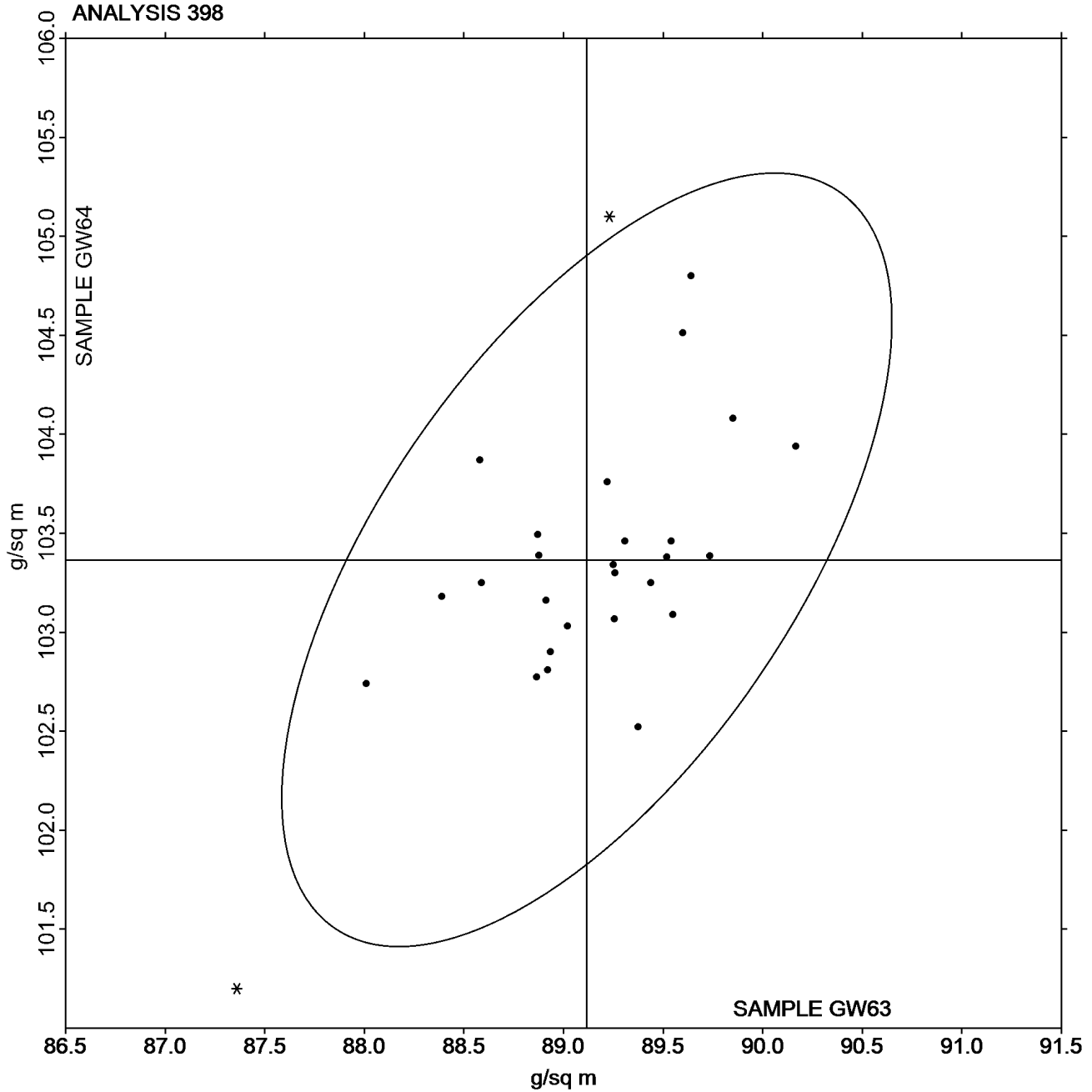
Analysis 398

Grammage (Mass per Unit Area)

TAPPI Official Test Method T410

Grand Mean Sample GW63 = 89.117
g/sq m

Grand Mean Sample GW64 =
103.37 g/sq m





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

Report #2982G,
February 2019

WebCode	Data Flag	Sample GX63			Sample GX64			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2AWQBZ		21.40	3.83	0.78	15.81	3.35	0.86	HE
3VBTEB		16.80	-0.77	-0.16	11.70	-0.76	-0.20	HE
4GKGGR		11.33	-6.24	-1.28	7.30	-5.16	-1.32	HE
4JUNKK		15.25	-2.32	-0.47	10.98	-1.48	-0.38	HE
6G4QXY		27.51	9.94	2.03	21.30	8.84	2.26	HE
8LNRUU		24.37	6.80	1.39	17.65	5.19	1.33	HE
8VYUFV		17.74	0.17	0.03	12.79	0.33	0.08	HE
A7LUU3		19.29	1.72	0.35	12.96	0.50	0.13	XX
BX9ZCE		14.40	-3.17	-0.65	9.48	-2.98	-0.76	HE
CQMNE6		21.76	4.19	0.85	16.63	4.17	1.07	HE
DXHYAL		13.70	-3.87	-0.79	9.82	-2.64	-0.68	HE
EAVEWK		13.68	-3.89	-0.80	10.14	-2.32	-0.59	HE
EH38YZ		18.60	1.03	0.21	12.00	-0.46	-0.12	HE
FMT2A7		15.55	-2.02	-0.41	11.23	-1.23	-0.32	HE
G6NR3E		11.98	-5.59	-1.14	7.79	-4.67	-1.20	HE
H3VH7H	*	26.28	8.71	1.78	17.05	4.59	1.17	XX
H72RRL		16.31	-1.26	-0.26	10.34	-2.12	-0.54	HE
HNWFRW		15.45	-2.12	-0.43	11.01	-1.45	-0.37	HE
JG8HFD		14.83	-2.74	-0.56	9.76	-2.70	-0.69	HE
KUCXZN		24.02	6.45	1.32	19.13	6.67	1.71	HE
L2DHRC		13.68	-3.89	-0.80	9.68	-2.78	-0.71	HE
L2TTFH		21.25	3.67	0.75	15.43	2.97	0.76	HE
M6AD3X		29.23	11.66	2.38	21.56	9.10	2.33	HE
PUX2XY		13.35	-4.22	-0.86	10.43	-2.03	-0.52	HE
WM3F2Z		13.20	-4.37	-0.89	9.00	-3.46	-0.89	HE
X6UWCM	X	37.84	20.27	4.14	28.61	16.15	4.13	XX
XBEWRY		14.71	-2.86	-0.58	9.63	-2.83	-0.73	HE
Y3KBY7	X	17.35	-0.22	-0.05	16.07	3.61	0.92	HE
YDLKVW		13.13	-4.44	-0.91	9.19	-3.27	-0.84	HE
YLEV6R		15.07	-2.50	-0.51	10.86	-1.60	-0.41	HE
ZMHY48		15.79	-1.78	-0.36	10.78	-1.68	-0.43	HE

Summary Statistics	Sample GX63	Sample GX64
Grand Means	17.57 Seconds	12.46 Seconds
Std Dev Btwn Labs	4.90 Seconds	3.91 Seconds
Statistics based on 29 of 31 reporting participants.		

Comments on Assigned Data Flags for Test #399

Y3KBY7 (X) - Inconsistent in testing between samples.

X6UWCM (X) - Data for both samples are high. Inconsistent within the determinations of sample GX64.



Paper & Paperboard Interlaboratory Testing Program

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Sizing Test (Hercules Type)

TAPPI Official Test Method T530

Key to Instrument Codes Reported by Participants

HE Hercules Sizing Tester

XX Instrument make/model not specified by lab



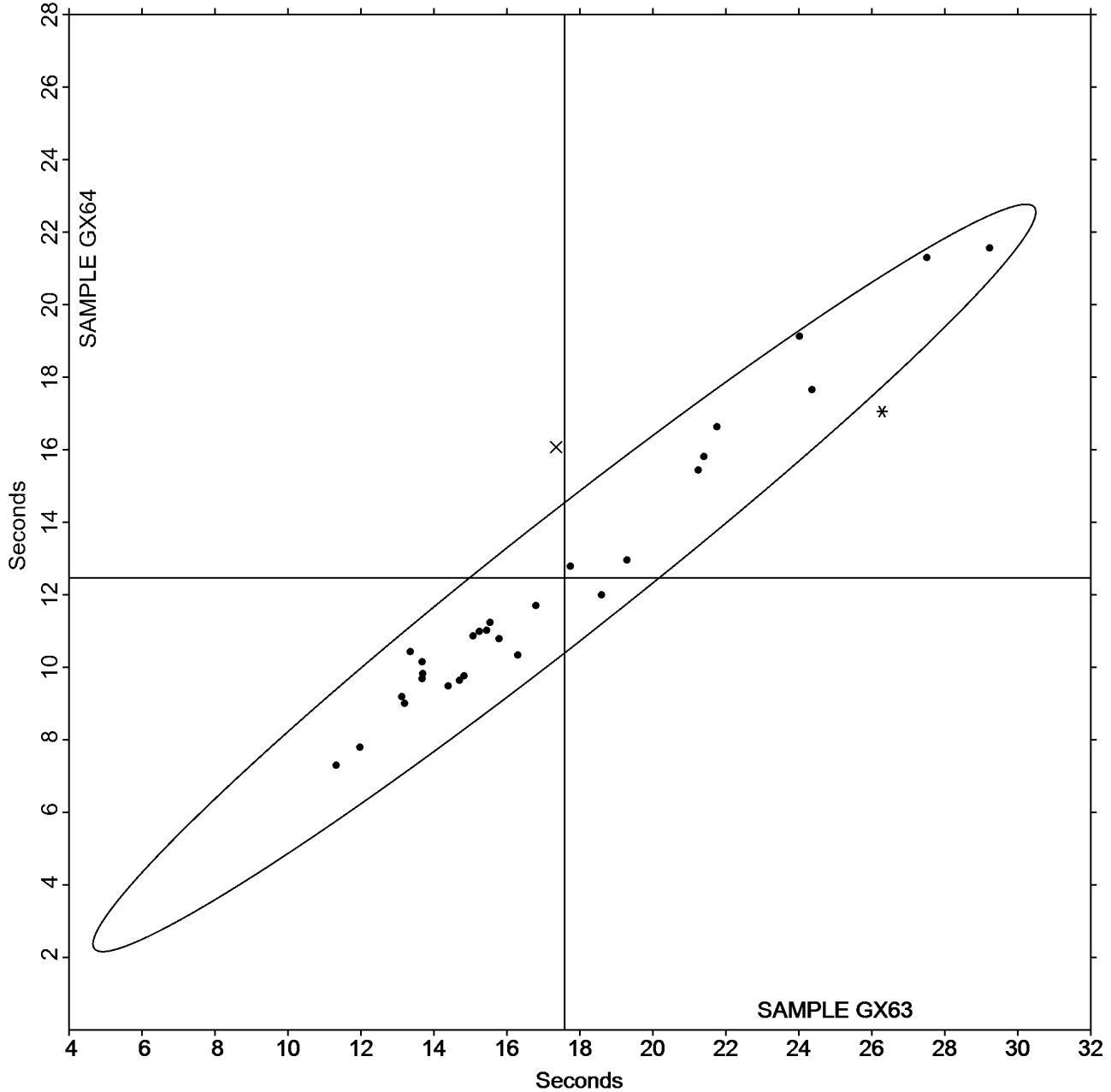
Paper & Paperboard Interlaboratory Testing Program
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Grand Mean Sample GX63 = 17.574
Seconds

Grand Mean Sample GX64 = 12.463
Seconds

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Sizing Test (Hercules Type)

TAPPI Official Test Method T530

-End of Report-