Paper & Paperboard Testing Program

Summary Report #288G-June 2017

Introduction to the Paper & Paperboard Program

Explanation of Tables and Definitions of Terms

Analysis	Analysis Name
350	Color & Color Difference (Near White Papers),
351	Color & Color Difference (Near White Papers),
360	Thickness (Caliper), Printing papers,
361	Thickness (Caliper), Packaging papers,
364	Coefficient of Static Friction-Horizontal Plane,
365	Coefficient of Kinetic Friction-Horizontal Plane,
370	Air Resistance, Gurley Oil Type,
372	Porosity, Sheffield Type,
376	Roughness - Print Surf Method 0.5 to 4.0 Microns,
377	Roughness - Print Surf Method 2.5 to 6.0 Microns,
378	Roughness, Sheffield Type,
382	Moisture Content,
384	Opacity (89% Backing) 82 to 95%,
386	Opacity (Paper Backing) 82 to 95%,
390	Brightness (Directional),
391	Directional Brightness of Fluorescent Samples,
392	Brightness (Diffuse),
394	Fluorescent Component of Directional Brightness,
395	Specular Gloss 75 Degree, 50-95 Units,
396	Specular Gloss 75 Degreee, 20-65 Units,
398	Grammage (Basis Weight),
399	Sizing Test, Hercules Type,

The CTS Paper, Paperboard & Corrugated Fiberboard Program

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

About CTS

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

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

Collaborative Testing Services, Inc.
21331 Gentry Drive
Sterling, Virginia 20166 USA
+1-571-434-1925
FAX #: +1-571-434-1937
paper@cts-interlab.com

Office Hours: 8:00 a.m. - 4:30 p.m. ET

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:

DATA FLAG	STATISTICALLY INCLUDED/EXCLUDED	ACTION REQUIRED
*	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.

Key for Web Summary Reports (Page 2 of 2)

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

Color & Color Difference - Near White Papers - C/2deg obs

Hunter L,a,b - Illuminant C - 2 Degree Observer

Web Code	F	Samples	Hunter L, a, b Color Values			Color Difference Values				Instr Code
			L	a	b	ΔL	Δa	Δb	ΔE	
2DELXZ		GA43	95.40	-0.79	3.62	-2.01	0.14	-2.16	2.95	EH
		GA44	93.39	-0.65	1.46					
2ET89M		GA43	95.30	-0.71	3.79	-2.42	0.09	-2.76	3.68	EH
		GA44	92.87	-0.62	1.02					
48484U		GA43	93.94	-0.63	3.54	-2.20	0.02	-1.77	2.82	TS
		GA44	91.75	-0.60	1.78					
6V8M3T		GA43	93.46	-0.57	3.38	-3.06	0.13	-2.76	4.12	HH
		GA44	90.40	-0.45	0.62					
7J88YA		GA43	93.21	-0.18	3.33	-3.24	0.22	-2.79	4.28	TS
		GA44	89.98	0.04	0.54					
B6E4K2		GA43	93.83	-0.31	2.96	-2.88	0.07	-2.16	3.60	TM
		GA44	90.95	-0.24	0.80					
C4URDF		GA43	95.30	-0.83	3.76	-2.27	0.05	-2.39	3.29	LS
		GA44	93.03	-0.77	1.37					
DAVMAK		GA43	93.25	-0.52	2.99	-3.11	0.16	-2.81	4.19	HH
		GA44	90.14	-0.37	0.19					
ET66VA	X	GA43	92.64	-0.58	2.63	-9.94	0.88	-2.05	10.19X	TS
		GA44	82.70	0.30	0.58					
F79LMW		GA43	94.56	-0.72	4.12	-1.47	-0.32	-1.83	2.37	VM
		GA44	93.09	-1.04	2.29					
FQFXBD	X	GA43	93.33	-0.53	2.69	-11.59	0.24	-3.29	12.05X	NE
		GA44	81.74	-0.28	-0.60					
HAL3VR		GA43	94.07	-0.66	3.73	-2.82	-0.30	-3.17	4.25	TC
		GA44	91.26	-0.95	0.55					
K48ATR		GA43	95.33	-0.73	3.76	-2.15	-0.35	-2.84	3.58	TS
		GA44	93.17	-1.08	0.92					
K7WFDN		GA43	94.18	-0.69	3.58	-2.61	0.13	-2.14	3.37	TC
		GA44	91.58	-0.57	1.44					
KKTYKE		GA43	94.10	-0.63	3.69	-2.86	0.12	-2.49	3.80	XX
		GA44	91.24	-0.51	1.19					
MRPDHK		GA43	95.36	-0.79	3.67	-2.37	0.03	-2.42	3.39	TC
		GA44	92.99	-0.76	1.24					

Copyright © 2017 CTS, Inc

Paper & Paperboard Interlaboratory Testing Program

Report #288G
June 2017

Analysis 350

Color & Color Difference - Near White Papers - C/2deg obs

Hunter L,a,b - Illuminant C - 2 Degree Observer

Web Code	F	Samples	Hunter L, a, b Color Values L	a	b	Color Difference Values ΔL	Δa	Δb	ΔE	Instr Code
NFNATG		GA43	94.53	-0.68	3.57	-1.99	0.23	-1.69	2.62	MK
		GA44	92.54	-0.44	1.88					
PLN7R8		GA43	95.01	-0.63	3.56	-2.50	-0.02	-3.36	4.18	HE
		GA44	92.51	-0.65	0.20					
R9YQ4Y		GA43	95.12	-0.79	3.74	-3.59	0.12	-2.12	4.18	LA
		GA44	91.52	-0.67	1.61					
UDJTZU		GA43	96.82	-0.74	2.88	-2.89	0.18	-2.30	3.69	XS
		GA44	93.93	-0.56	0.58					
XG8BR3		GA43	95.54	-0.64	3.51	-2.64	-0.05	-2.77	3.82	LS
		GA44	92.90	-0.68	0.75					
YCCYDH		GA43	96.76	-0.93	2.80	-2.34	-0.24	-2.39	3.35	HE
		GA44	94.43	-1.17	0.40					
YWKWWD		GA43	94.18	-0.07	3.15	-3.05	0.33	-2.73	4.11	TS
		GA44	91.13	0.26	0.42					

Summary Statistics

Grand Means							
GA43	94.727	-0.624	3.411	-2.594	0.036	-2.469	3.603
GA44	92.133	-0.542	0.924				
Stnd Dev Btwn Labs							
GA43	1.006	0.201	0.406	0.499	0.189	0.444	0.561
GA44	1.255	0.380	0.657				

Statistics based on 21 of 23 reporting participants

Comments on Assigned Data Flags for Test #350

ET66VA (X) - Extreme data for L value for sample GA44. Low delta L value; high delta a and delta E values.

FQFXBD (X) - Extreme data for L value for sample GA44. Inconsistent within determinations for L values of sample GA44 . Low delta L value and high delta E values.

Key to Instrument Codes Reported by Participants

EH	Datacolor Elrepho SF450	HE	Hunter LabScan
HH	Hunter D25DP - 9000	LA	L & W Elrepho AL300
LS	L & W Elrepho SE 070	MK	Macbeth Color-Eye 7000 Spectrophotometer
NE	Minolta CM-3500d Spectrophotometer	TC	Technidyne Color Touch Series
TM	Technidyne Technibrite Micro TB-1C	TS	Technidyne Brightimeter Micro S-5
VM	Valmet PaperLab (was Kajaani/Robotest)	XS	X-Rite 938 Spectrodensitometer
XX	Instrument make/model not specified by lab		

Copyright © 2017 CTS, Inc

Paper & Paperboard Interlaboratory Testing Program

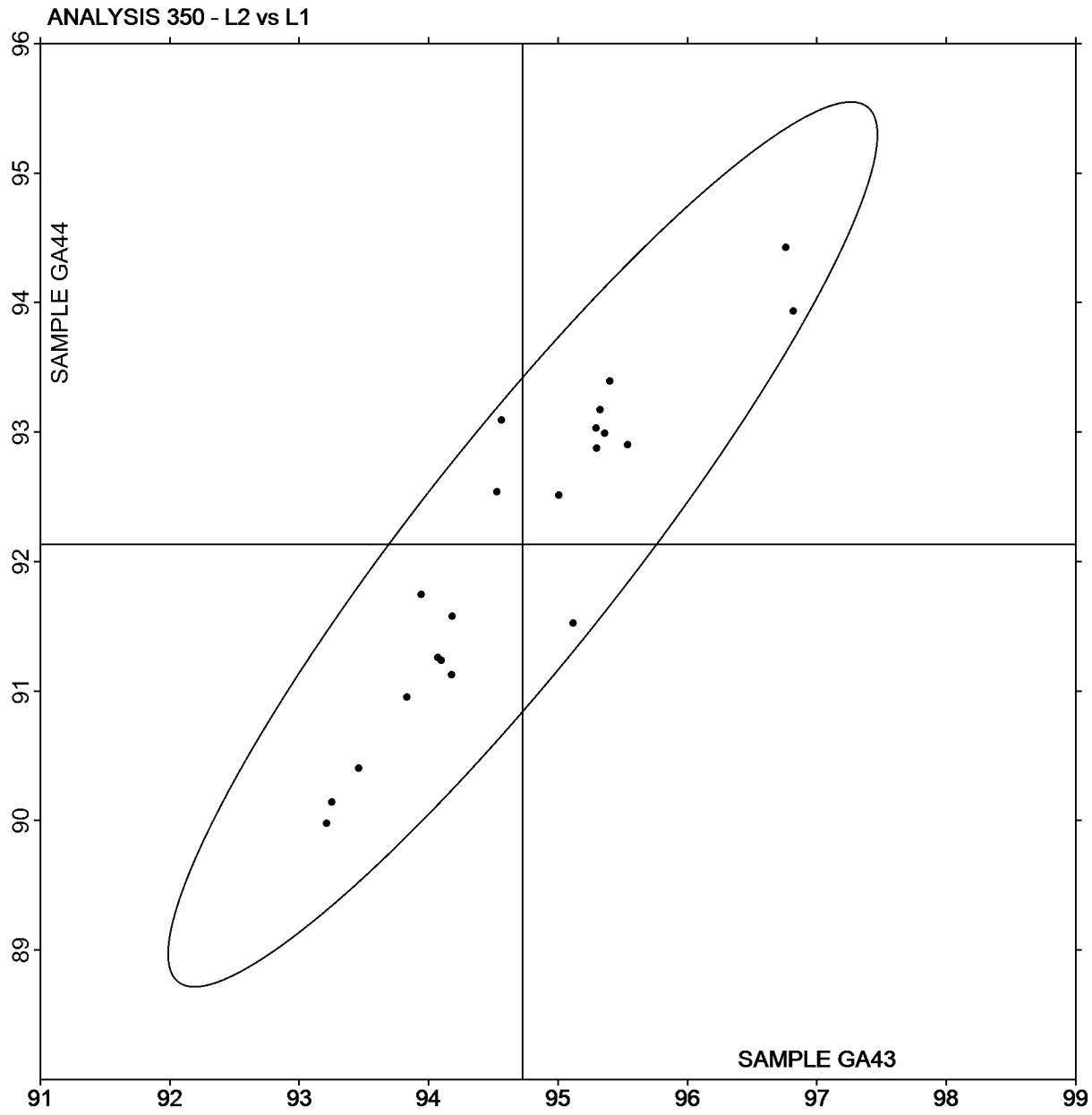
Analysis 350

Color & Color Difference - Near White Papers - C/2deg obs

Hunter L,a,b - Illuminant C - 2 Degree Observer

Web Code	F	Samples	Hunter L, a, b Color Values L	a	b	Color Difference Values ΔL	Δa	Δb	ΔE	Instr Code

Plot of L values GA44 v L values GA43



Copyright © 2017 CTS, Inc

Paper & Paperboard Interlaboratory Testing Program

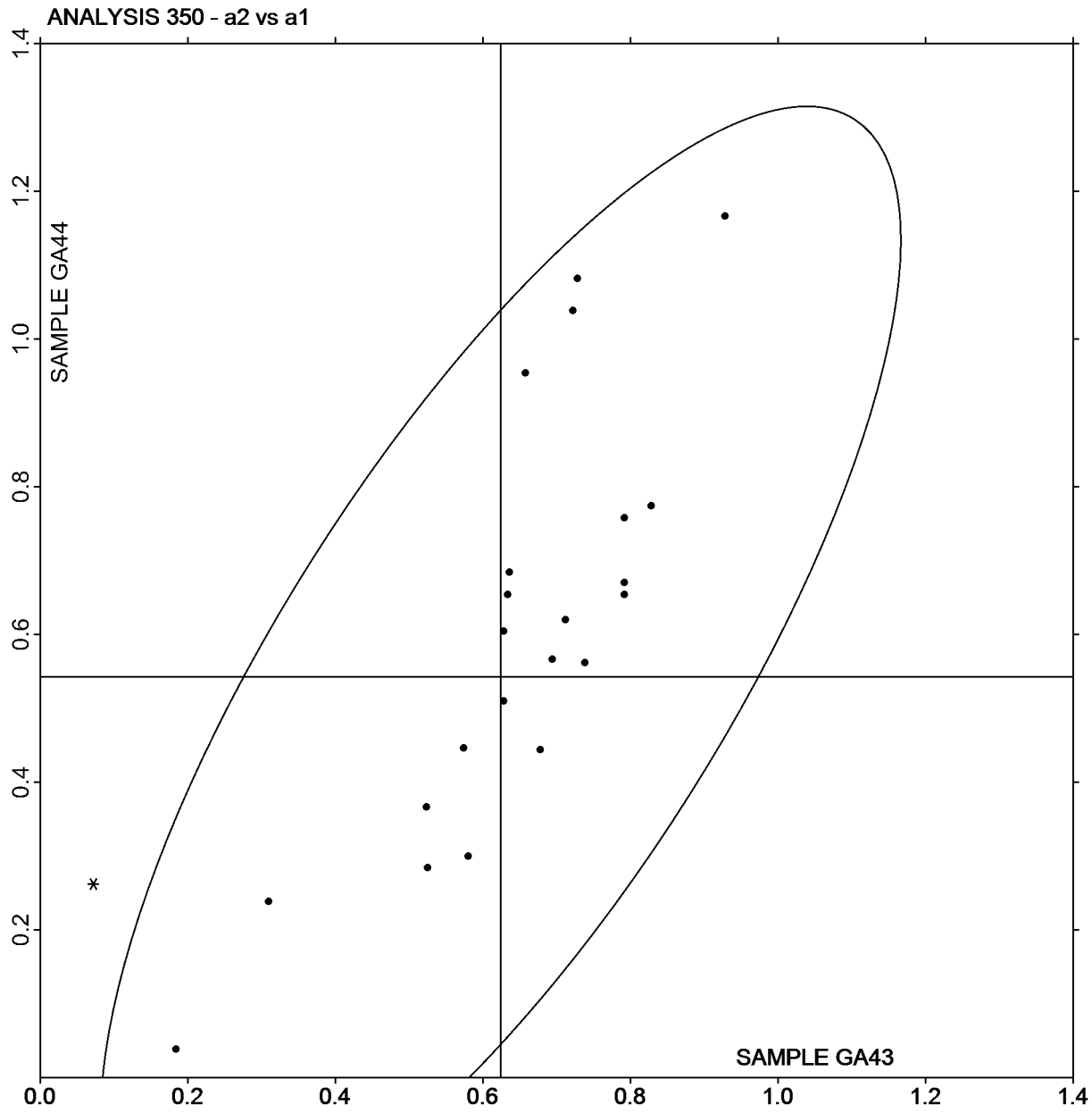
Analysis 350

Color & Color Difference - Near White Papers - C/2deg obs

Hunter L,a,b - Illuminant C - 2 Degree Observer

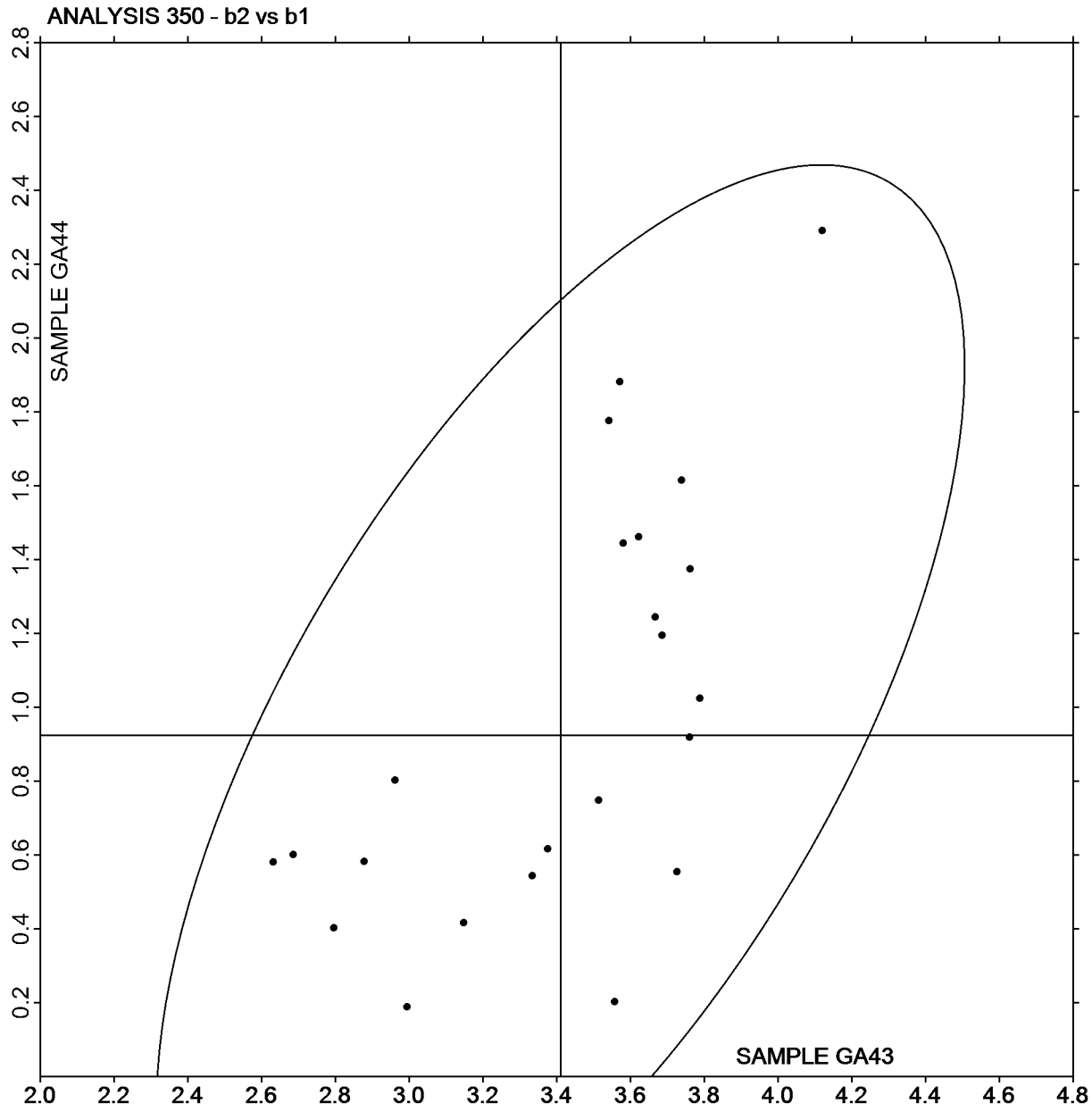
Web Code	F	Samples	Hunter L, a, b Color Values L	a	b	Color Difference Values ΔL	Δa	Δb	ΔE	Instr Code

Plot of a values GA44 v a values GA43



Copyright © 2017 CTS, Inc

Plot of b values GA44 v b values GA43



 Copyright © 2017 CTS, Inc

3UW2E2	GA43	95.32	-0.62	3.82	-1.90	-0.44	-1.30	2.34	LS
	GA44	93.42	-1.06	2.51					
77K6AQ	GA43	94.56	-0.62	3.44	-3.08	-0.41	-3.14	4.42	HE
	GA44	91.47	-1.03	0.30					
BPJR4K	GA43	95.25	-0.58	4.07	-2.10	-0.73	-1.27	2.56	NG
	GA44	93.15	-1.31	2.80					
BR8F8X	GA43	95.38	-0.70	3.76	-2.10	-0.18	-2.96	3.63	EF
	GA44	93.28	-0.88	0.80					
CJ9BQ2	GA43	94.01	-0.65	3.48	-2.92	-0.52	-2.34	3.78	TC
	GA44	91.09	-1.17	1.14					
EL8AXC	GA43	95.45	-0.60	3.75	-2.07	-0.28	-2.87	3.55	HT
	GA44	93.38	-0.88	0.87					
FY99JM	GA43	97.07	-0.49	2.96	-1.93	-0.27	-1.86	2.70	XP
	GA44	95.14	-0.76	1.10					
GLEA6P	GA43	94.92	-0.50	3.34	-2.21	0.20	-4.03	4.60	HV
	GA44	92.72	-0.30	-0.69					
HUQPCQ	GA43	95.72	-0.67	3.69	-2.28	-0.26	-3.10	3.86	HT
	GA44	93.44	-0.93	0.59					
JHBBTN	GA43	95.56	-0.58	3.92	-2.23	-0.40	-2.33	3.24	XM
	GA44	93.33	-0.98	1.59					
LANNVG	GA43	95.34	-0.55	4.05	-2.00	-0.60	-0.79	2.23	NG
	GA44	93.34	-1.15	3.26					
LFGQYG	GA43	95.51	-0.56	4.05	-2.21	-0.71	-1.17	2.60	NG
	GA44	93.31	-1.26	2.88					
LY7PX8	GA43	95.58	-0.54	3.77	-2.11	-0.28	-2.81	3.52	NF
	GA44	93.47	-0.82	0.96					
PLN7R8	GA43	94.95	-0.64	3.51	-2.16	0.06	-3.03	3.72	HE
	GA44	92.79	-0.57	0.48					
QADXPF	GA43	94.00	-0.64	3.54	-2.85	-0.21	-3.06	4.19	TC
	GA44	91.15	-0.84	0.48					
X36G27	GA43	95.83	-0.62	3.84	-1.96	-0.28	-1.87	2.72	XP
	GA44	93.87	-0.90	1.98					
X3AH3E	GA43	95.64	-0.65	3.44	-2.04	0.02	-3.81	4.32	XX
	GA44	93.60	-0.63	-0.37					
X9X7GX	GA43	95.33	-0.63	3.65	-2.39	-0.59	-1.92	3.13	EH
	GA44	92.93	-1.21	1.72					

Copyright © 2017 CTS, Inc

XG8BR3	GA43	95.48	-0.70	3.54	-2.38	-0.22	-3.46	4.21	LS
	GA44	93.10	-0.92	0.08					
ZF4PQ8	GA43	95.40	-0.61	3.84	-2.08	-0.34	-3.05	3.71	HT
	GA44	93.32	-0.95	0.78					

Summary Statistics

Grand Means								
GA43	95.314	-0.607	3.673	-2.249	-0.322	-2.510	3.452	
GA44	93.065	-0.928	1.163					
Stnd Dev Btwn Labs								
GA43	0.653	0.059	0.274	0.332	0.243	0.916	0.728	
GA44	0.928	0.245	1.085					

Statistics based on 20 of 20 reporting participants

Key to Instrument Codes Reported by Participants

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

Copyright © 2017 CTS, Inc

Paper & Paperboard Interlaboratory Testing Program

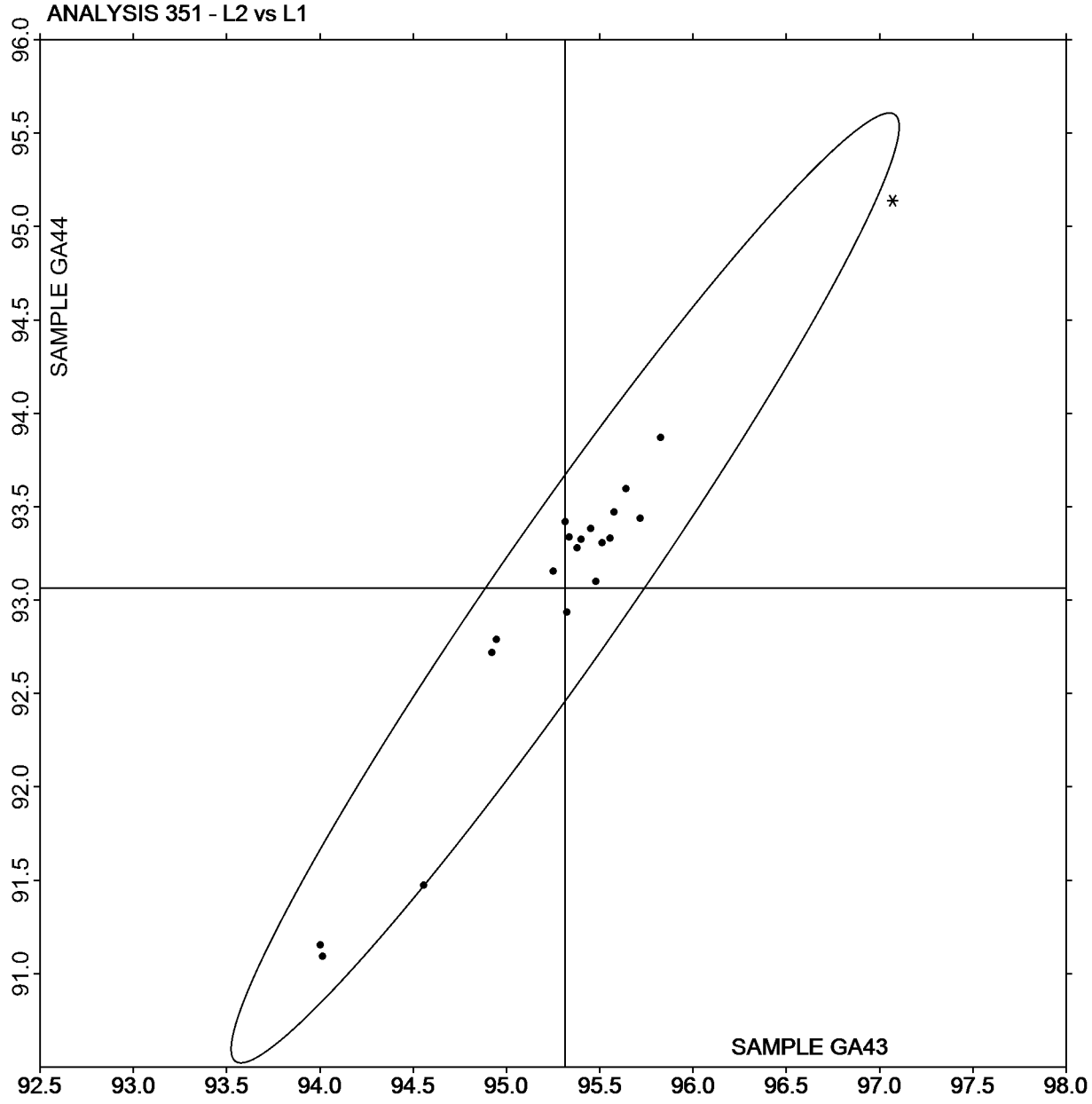
Analysis 351

Color & Color Difference - Near White Papers - D65/10deg obs

Hunter L,a,b - Illuminant D65 - 10 Degree Observer

Web Code	F	Samples	Hunter L, a, b Color Values L	a	b	Color Difference Values ΔL	Δa	Δb	ΔE	Instr Code

Plot of L values GA44 v L values GA43



Copyright © 2017 CTS, Inc

Paper & Paperboard Interlaboratory Testing Program

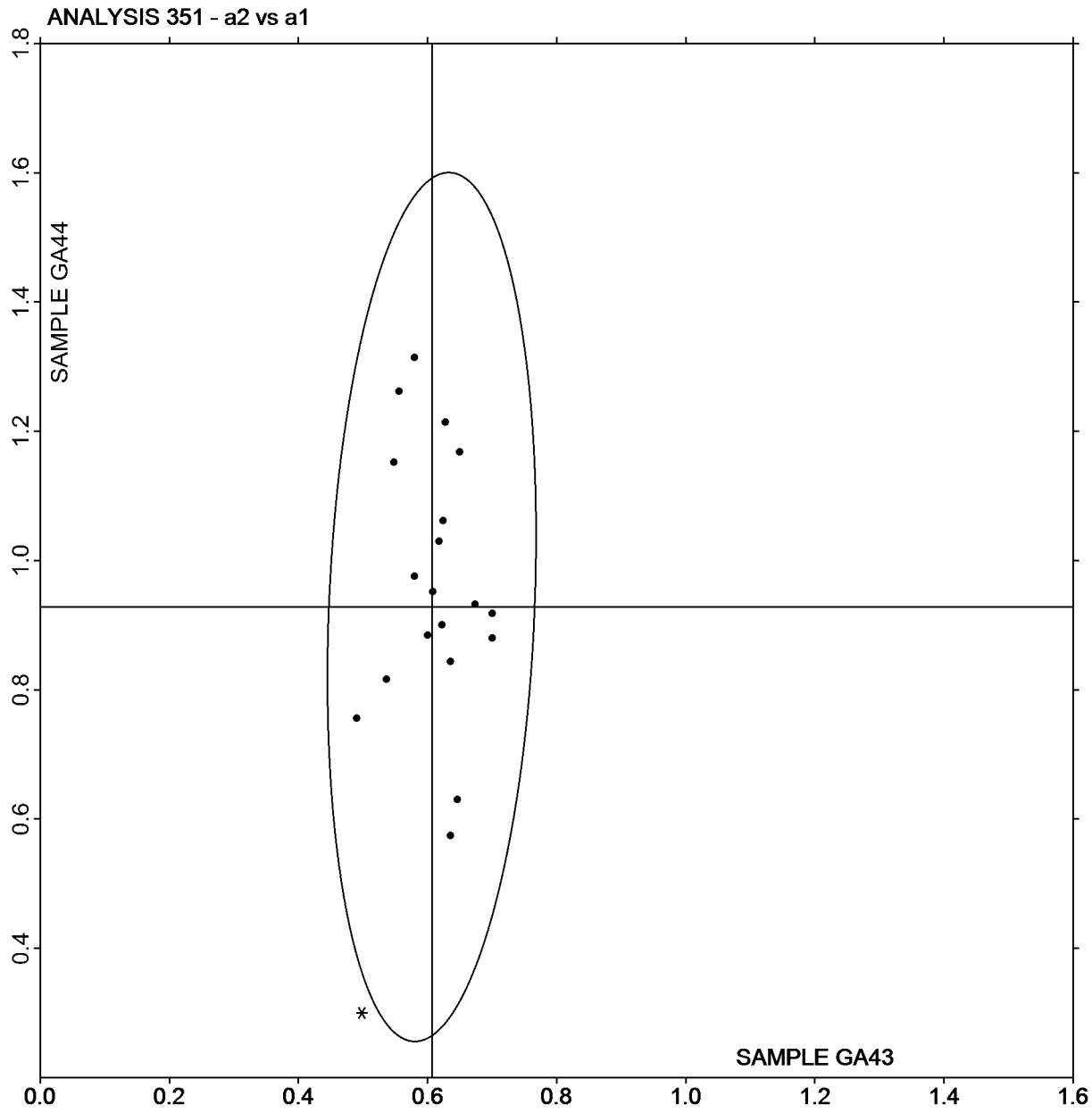
Analysis 351

Color & Color Difference - Near White Papers - D65/10deg obs

Hunter L,a,b - Illuminant D65 - 10 Degree Observer

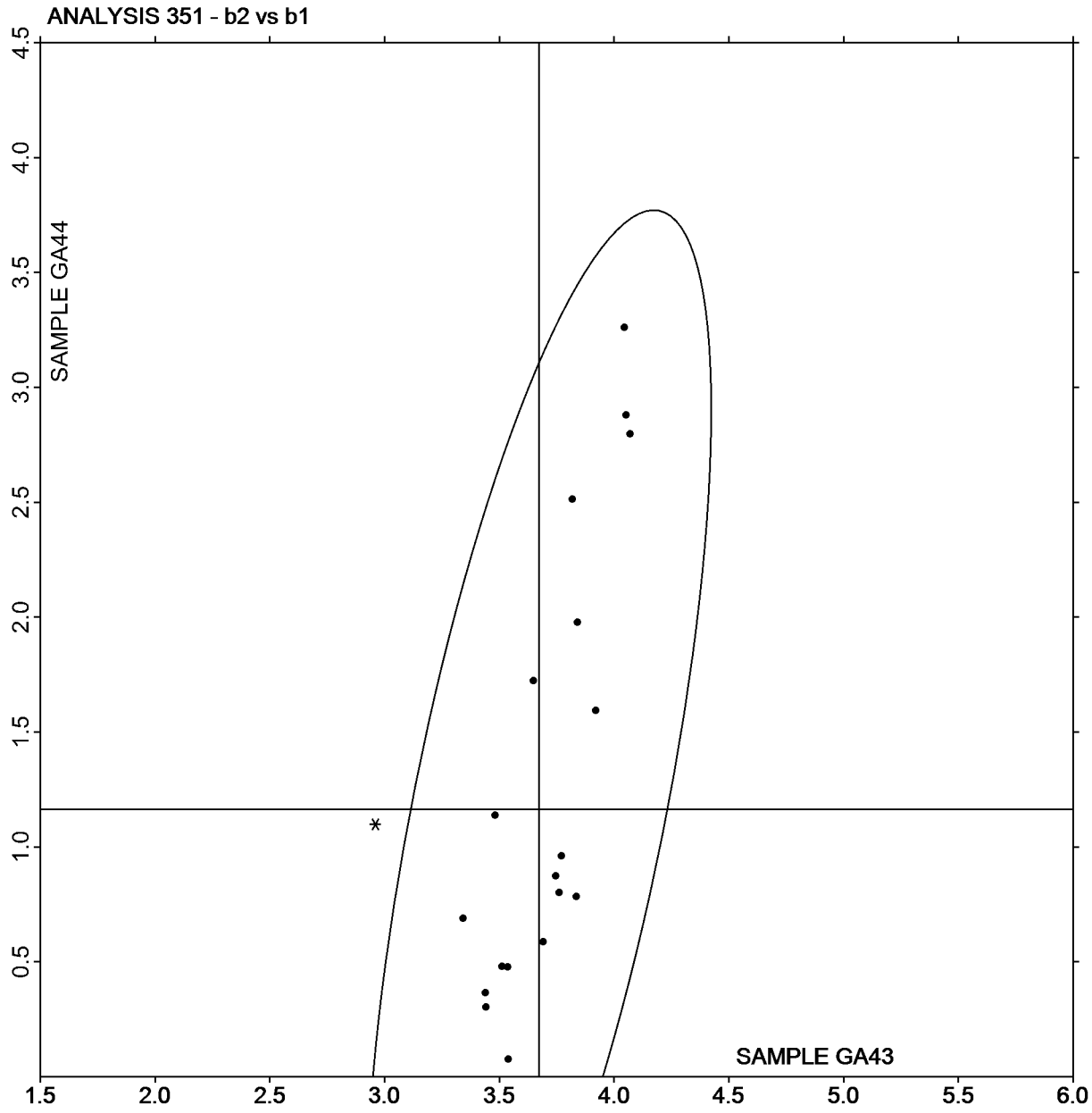
Web Code	F	Samples	Hunter L, a, b Color Values			Color Difference Values				Instr Code
			L	a	b	ΔL	Δa	Δb	ΔE	

Plot of a values GA44 v a values GA43



 Copyright © 2017 CTS, Inc

Plot of b values GA44 v b values GA43



 Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GV43 Lab Mean	Sample GV43 Diff from Grand Mean	Sample GV43 CPV	Sample GV44 Lab Mean	Sample GV44 Diff from Grand Mean	Sample GV44 CPV	Instr Code
27FWGV		5.120	0.134	1.34	4.680	0.038	0.40	LW
2DELXZ		5.027	0.041	0.41	4.708	0.066	0.70	EM
2DJWXC		4.825	-0.161	-1.62	4.464	-0.178	-1.89	EM
3N9EJV		4.797	-0.189	-1.90	4.502	-0.140	-1.48	TA
48484U	X	5.952	0.966	9.70	5.465	0.823	8.73	LA
49W3Q3		5.098	0.112	1.12	4.814	0.172	1.83	TM
4MWUGD		5.062	0.076	0.76	4.602	-0.040	-0.43	LW
676GGC		5.036	0.050	0.50	4.683	0.041	0.44	EM
6DLE9W		5.067	0.081	0.81	4.726	0.084	0.89	EM
76MUC3		4.943	-0.044	-0.44	4.656	0.014	0.15	FR
77K6AQ		5.146	0.160	1.61	4.690	0.049	0.52	TM
7NEHPV		5.011	0.025	0.25	4.635	-0.007	-0.07	LA
8VJUM2		5.046	0.060	0.61	4.661	0.020	0.21	LW
8ZQHZ3		4.964	-0.022	-0.22	4.636	-0.006	-0.06	TM
978ZRW		5.049	0.063	0.63	4.583	-0.059	-0.62	EM
9LAW9W		5.068	0.082	0.82	4.674	0.032	0.34	LW
B6E4K2	X	4.674	-0.312	-3.13	4.124	-0.518	-5.49	TA
BPJR4K		5.057	0.071	0.71	4.586	-0.056	-0.59	LW
C3H9AX		5.024	0.038	0.38	4.692	0.050	0.53	LW
C4URDF		5.054	0.067	0.68	4.710	0.068	0.72	LW
CGJQ2W		5.007	0.021	0.21	4.775	0.133	1.41	LW
CJ9BQ2		4.908	-0.078	-0.78	4.578	-0.064	-0.68	TA
EL8AXC		4.991	0.004	0.04	4.656	0.015	0.15	EM
FY99JM		4.994	0.008	0.08	4.675	0.033	0.35	TM
G8ZYMU		5.051	0.065	0.65	4.724	0.082	0.87	PP
GLEA6P		4.951	-0.035	-0.35	4.654	0.012	0.13	TA
GMPBTA		4.900	-0.086	-0.86	4.490	-0.152	-1.61	TM
HM8HYR		4.814	-0.172	-1.73	4.460	-0.181	-1.92	TM
J24YFD		4.835	-0.151	-1.52	4.628	-0.014	-0.15	LA
J4BVRL	*	4.732	-0.254	-2.55	4.575	-0.067	-0.71	TM
JHBBTN		4.988	0.002	0.02	4.571	-0.071	-0.75	LW
JM3FMR		4.974	-0.012	-0.12	4.566	-0.076	-0.81	LW
JPP4ZD		5.045	0.059	0.60	4.637	-0.005	-0.06	LW
K7WFDN		5.092	0.106	1.06	4.758	0.116	1.23	TA
KKCHR7		5.033	0.047	0.47	4.719	0.077	0.81	LW
KKTYKE		5.140	0.154	1.55	4.720	0.078	0.83	XX
LANNVG		4.886	-0.100	-1.01	4.515	-0.127	-1.34	PP
LFGQYG		4.987	0.001	0.01	4.635	-0.007	-0.07	EM
LQDGDF		4.927	-0.059	-0.59	4.738	0.096	1.02	TA
LY7PX8		5.087	0.101	1.02	4.750	0.108	1.14	TM
M2AM8E		4.780	-0.206	-2.07	4.450	-0.192	-2.03	XX

Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GV43 Lab Mean	Sample GV43 Diff from Grand Mean	Sample GV43 CPV	Sample GV44 Lab Mean	Sample GV44 Diff from Grand Mean	Sample GV44 CPV	Instr Code
MEXMZ3		5.020	0.034	0.34	4.789	0.147	1.56	TM
MRPDHK		5.063	0.077	0.77	4.621	-0.021	-0.22	LA
NAXV6B		4.898	-0.088	-0.89	4.688	0.046	0.49	XX
NFNATG		5.103	0.117	1.17	4.790	0.148	1.57	PP
PM7ZV3		4.928	-0.058	-0.58	4.627	-0.015	-0.16	LW
QHAQ7M		4.819	-0.167	-1.68	4.419	-0.223	-2.36	PP
R9YQ4Y		4.999	0.013	0.13	4.717	0.076	0.80	LA
RCA4JC		4.963	-0.024	-0.24	4.534	-0.108	-1.14	LW
TBG8W4		5.055	0.069	0.69	4.658	0.016	0.17	TM
UDJTZU		4.890	-0.096	-0.97	4.520	-0.122	-1.29	TM
V6PZ9E		5.029	0.042	0.43	4.727	0.086	0.91	EM
VYWE26		4.992	0.006	0.06	4.586	-0.056	-0.59	XX
W3VDAW		4.908	-0.078	-0.78	4.648	0.006	0.07	PP
WHPYWC		5.127	0.141	1.42	4.711	0.069	0.73	LW
X3AH3E		5.064	0.078	0.78	4.665	0.023	0.25	LW
YPWGZU		5.035	0.049	0.50	4.769	0.127	1.34	LW
YWKWWD		4.939	-0.047	-0.47	4.636	-0.006	-0.06	EM
Z8YE6B		5.038	0.052	0.52	4.632	-0.010	-0.10	TM
ZF4PQ8		5.006	0.020	0.20	4.693	0.051	0.54	EM
ZYZVJ8	*	4.740	-0.246	-2.47	4.430	-0.212	-2.25	TM
ZZBX67		5.035	0.049	0.50	4.673	0.031	0.33	MS

Summary Statistics

	Sample GV43	Sample GV44
Grand Means	4.9861 mils	4.6418 mils
SD Btwn Labs	0.0996 mils	0.0943 mils

Statistics based on 60 of 62 reporting participants

Comments on Assigned Data Flags for Test #360

B6E4K2 (X) - Data for both samples are low. Possible Systematic Error.

48484U (X) - Extreme Data.

EL8AXC - Data appear to be reported as micrometers, not mils as indicated on datasheet. Units corrected by CTS.

MEXMZ3 - One determination removed from the Lab Mean of Sample GV44 per Grubb's Test at 1% risk (TAPPI 1205).

RCA4JC - Data appear to be reported as micrometers, not mms as indicated on datasheet. Units corrected by CTS.

Copyright © 2017 CTS, Inc

Key to Instrument Codes Reported by Participants

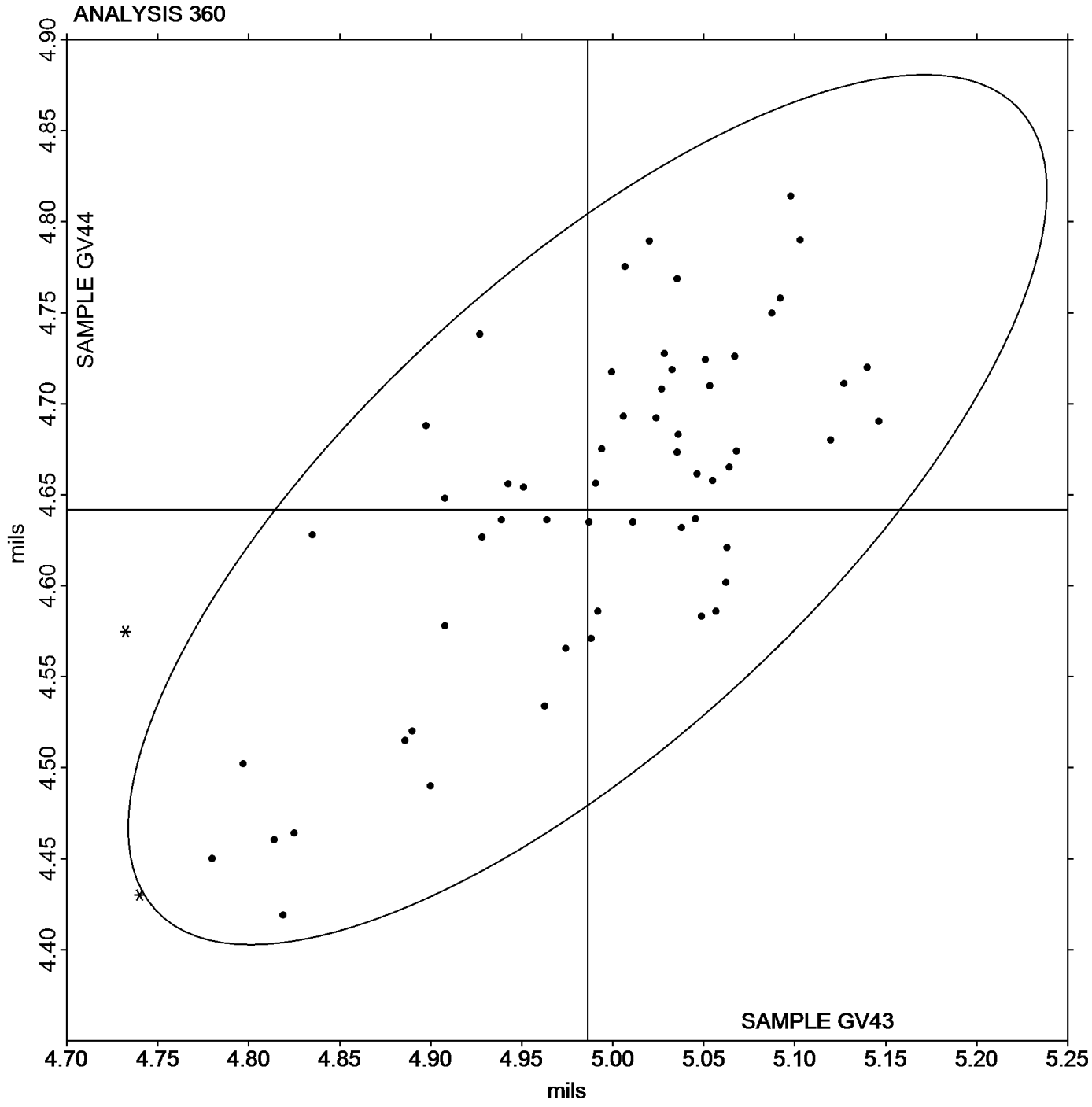
EM	Emveco	FR	Frank Instruments
LA	L & W Autoline	LW	L & W
MS	Messmer	PP	Technidyne Profile/Plus
TA	Thwing-Albert	TM	TMI
XX	Instrument make/model not specified by lab		

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GV43** = 4.9861 mils

Grand Mean Sample **GV44** = 4.6418 mils



Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GY43 Lab Mean	Sample GY43 Diff from Grand Mean	Sample GY43 CPV	Sample GY44 Lab Mean	Sample GY44 Diff from Grand Mean	Sample GY44 CPV	Instr Code
2GE63Z		14.06	-0.05	-0.33	9.384	0.006	0.05	LW
3N9EJV		13.93	-0.18	-1.15	9.324	-0.054	-0.47	TA
3TLZR3		14.00	-0.11	-0.73	9.370	-0.008	-0.07	LA
3UW2E2		14.24	0.13	0.82	9.460	0.082	0.71	XX
4ATDNQ		14.31	0.19	1.25	9.592	0.214	1.86	LA
4MWUGD		14.02	-0.09	-0.57	9.244	-0.134	-1.17	LW
64YWUC		14.22	0.11	0.70	9.478	0.100	0.87	XX
6V8M3T		14.33	0.22	1.41	9.546	0.168	1.46	EM
7LC3CL		14.33	0.21	1.37	9.567	0.189	1.64	LW
8ZQHZ3		14.18	0.06	0.42	9.462	0.084	0.73	TM
AZ377M		14.01	-0.10	-0.66	9.290	-0.088	-0.77	TA
BN2ZRE		14.10	-0.01	-0.08	9.415	0.037	0.32	TA
D64CHV		14.30	0.19	1.20	9.441	0.063	0.55	LW
DAVMAK		14.30	0.19	1.22	9.376	-0.002	-0.02	EM
EE8TKK		14.13	0.01	0.09	9.334	-0.044	-0.39	PP
ET66VA		14.00	-0.12	-0.76	9.273	-0.105	-0.92	EM
F79LMW		14.22	0.10	0.66	9.314	-0.064	-0.56	XX
GMPBTA		13.86	-0.25	-1.62	9.230	-0.148	-1.29	TM
GPEXQK		14.09	-0.03	-0.17	9.374	-0.004	-0.04	LA
HLXCEC		13.96	-0.15	-0.98	9.280	-0.098	-0.86	TM
JM3FMR		14.09	-0.03	-0.16	9.300	-0.079	-0.69	XX
KCGK3J		14.02	-0.10	-0.61	9.314	-0.064	-0.56	PP
KW68KK		14.27	0.15	0.99	9.457	0.079	0.69	TM
KYV7YJ		13.75	-0.36	-2.33	9.200	-0.178	-1.55	TM
L4HFLM		13.95	-0.17	-1.06	9.227	-0.151	-1.32	TM
PLN7R8		14.05	-0.06	-0.38	9.333	-0.045	-0.39	EM
QADXPF		14.16	0.05	0.32	9.372	-0.006	-0.05	EM
R9YQ4Y		14.15	0.04	0.26	9.433	0.054	0.47	LA
TKJRWB		13.93	-0.18	-1.18	9.360	-0.018	-0.16	TA
UQQFBC		13.94	-0.18	-1.14	9.225	-0.154	-1.34	TM
V6PZ9E		14.31	0.19	1.24	9.610	0.232	2.02	EM
X9X7GX		14.39	0.28	1.80	9.591	0.213	1.85	EM
XG8BR3		14.10	-0.01	-0.07	9.323	-0.055	-0.48	TM
XUX9TZ		14.31	0.20	1.28	9.542	0.164	1.43	TM
YCCYDH		14.00	-0.11	-0.70	9.276	-0.103	-0.89	LA
YPWGZU	X	14.20	0.09	0.55	9.782	0.403	3.51	LW
ZNMRGH		14.06	-0.05	-0.33	9.304	-0.075	-0.65	PP

Copyright © 2017 CTS, Inc

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

Summary Statistics

	Sample GY43	Sample GY44
Grand Means	14.113 mils	9.3783 mils
SD Btwn Labs	0.156 mils	0.1148 mils

Statistics based on 36 of 37 reporting participants

YPWGZU (X) - Data for sample GY44 are high.

Analysis Notes:

XUX9TZ - Data appears to be transposed between samples. Data Switched by CTS.

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

Key to Instrument Codes Reported by Participants

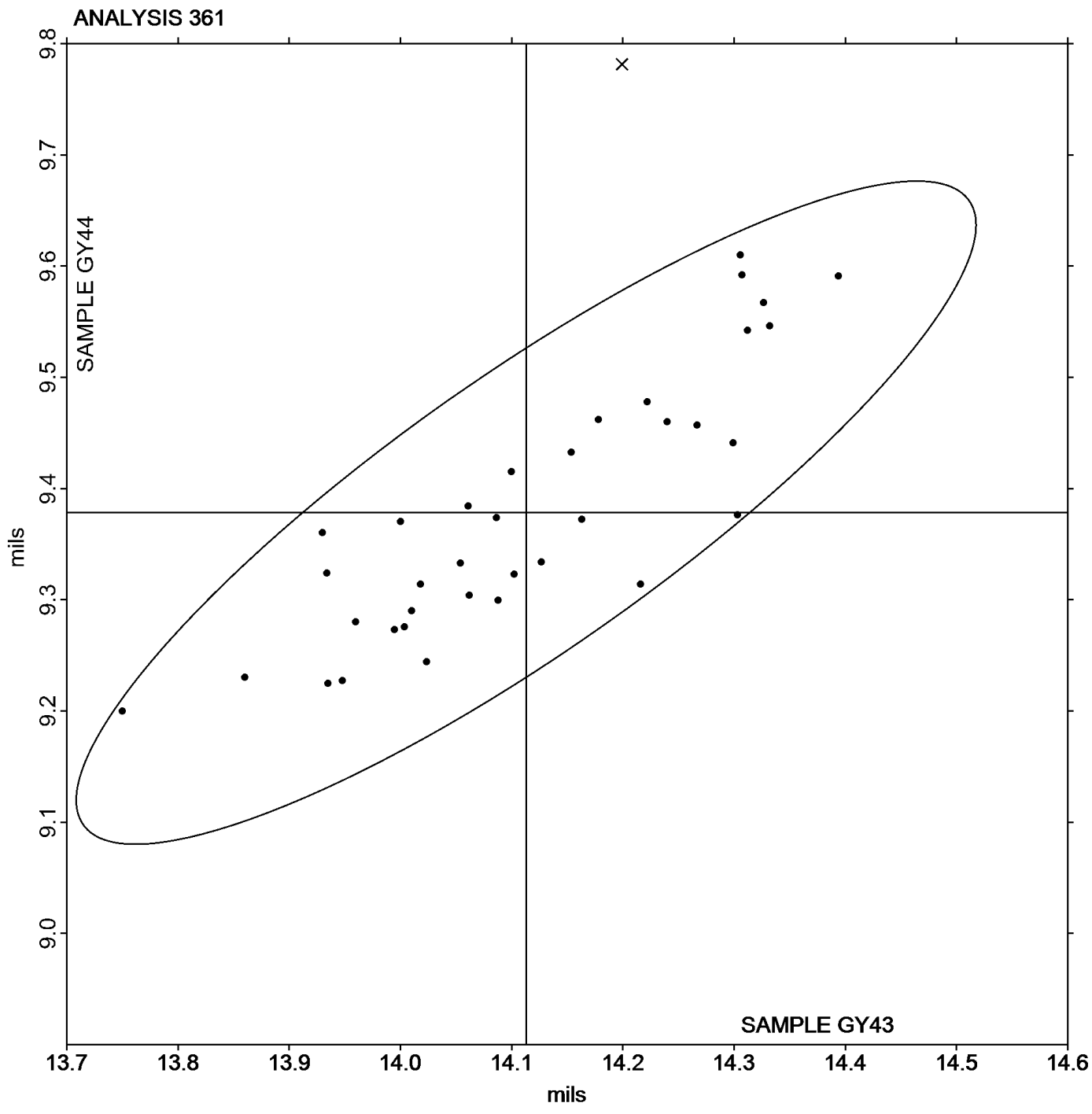
EM	Emveco	LA	L & W Autoline
LW	L & W	PP	Technidyne Profile/Plus
TA	Thwing-Albert	TM	TMI
XX	Instrument make/model not specified by lab		

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GY43** = 14.113 mils

Grand Mean Sample **GY44** = 9.3783 mils



Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GD43 Lab Mean	Sample GD43 Diff from Grand Mean	Sample GD43 CPV	Sample GD44 Lab Mean	Sample GD44 Diff from Grand Mean	Sample GD44 CPV	Instr Code
676GGC		0.3500	-0.1787	-1.86	0.3880	-0.1760	-1.60	TA
6HYVG9		0.5596	0.0309	0.32	0.6210	0.0570	0.52	IT
BPJR4K		0.6208	0.0921	0.96	0.7108	0.1468	1.34	TM
GPEXQK		0.5304	0.0017	0.02	0.5490	-0.0150	-0.14	TA
HVJJCF		0.5780	0.0493	0.51	0.6524	0.0884	0.80	TA
JM3FMR		0.5754	0.0467	0.49	0.6315	0.0675	0.61	TL
UDJTZU		0.4142	-0.1145	-1.19	0.4490	-0.1150	-1.05	XX
YWKWWD		0.6010	0.0723	0.75	0.5106	-0.0534	-0.49	XX

Summary Statistics

	Sample GD43	Sample GD44
Grand Means	0.52868 COF	0.56404 COF
SD Btwn Labs	0.09586 COF	0.10984 COF

Statistics based on 8 of 8 reporting participants

Key to Instrument Codes Reported by Participants

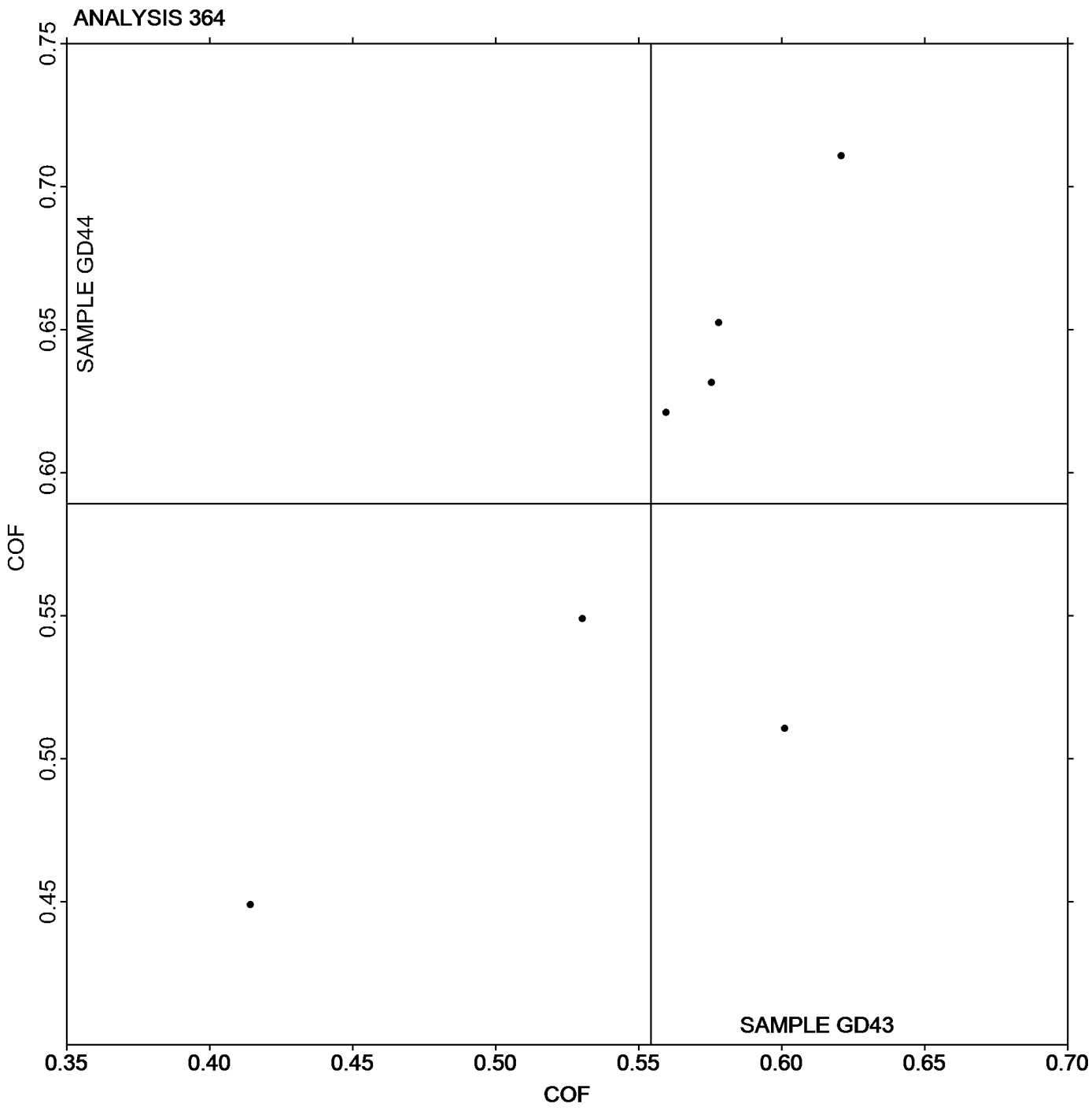
IT	IMASS SP-2100	TA	Thwing-Albert Friction Tester
TL	TMI 32-90 Lab Master/Slip and Friction	TM	TMI 32-06 Monitor/Slip and Friction
XX	Instrument make/model not specified by lab		

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GD43** = 0.52868 COF

Grand Mean Sample **GD44** = 0.56404 COF



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

Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GD43 Lab Mean	Sample GD43 Diff from Grand Mean	Sample GD43 CPV	Sample GD44 Lab Mean	Sample GD44 Diff from Grand Mean	Sample GD44 CPV	Instr Code
2DJWXC		0.5070	0.0641	0.86	0.4886	0.0285	0.47	TA
6HYVG9		0.4244	-0.0185	-0.25	0.4446	-0.0155	-0.25	IR
7J88YA		0.4258	-0.0171	-0.23	0.5250	0.0649	1.06	TA
B6E4K2		0.3398	-0.1031	-1.38	0.3676	-0.0925	-1.51	TA
BPJR4K		0.5720	0.1291	1.73	0.5204	0.0603	0.98	TM
DUHULU		0.4004	-0.0425	-0.57	0.4470	-0.0131	-0.21	TM
GPEXQK		0.4556	0.0127	0.17	0.4772	0.0171	0.28	TA
HVJJCF		0.4456	0.0027	0.04	0.5144	0.0543	0.89	TA
JM3FMR		0.5168	0.0739	0.99	0.4820	0.0219	0.36	TL
QHAQ7M		0.3408	-0.1021	-1.37	0.3508	-0.1093	-1.79	TM
R9YQ4Y		0.5178	0.0749	1.01	0.5144	0.0543	0.89	TM
UDJTZU		0.3684	-0.0745	-1.00	0.3896	-0.0705	-1.15	XX

Summary Statistics

	Sample GD43	Sample GD44
Grand Means	0.44286 COF	0.46013 COF
SD Btwn Labs	0.07450 COF	0.06121 COF

Statistics based on 12 of 12 reporting participants

Analysis Notes:

JM3FMR - One determination removed from the Lab Mean of Sample GD43 per Grubb's Test at 1% risk (TAPPI 1205).

Key to Instrument Codes Reported by Participants

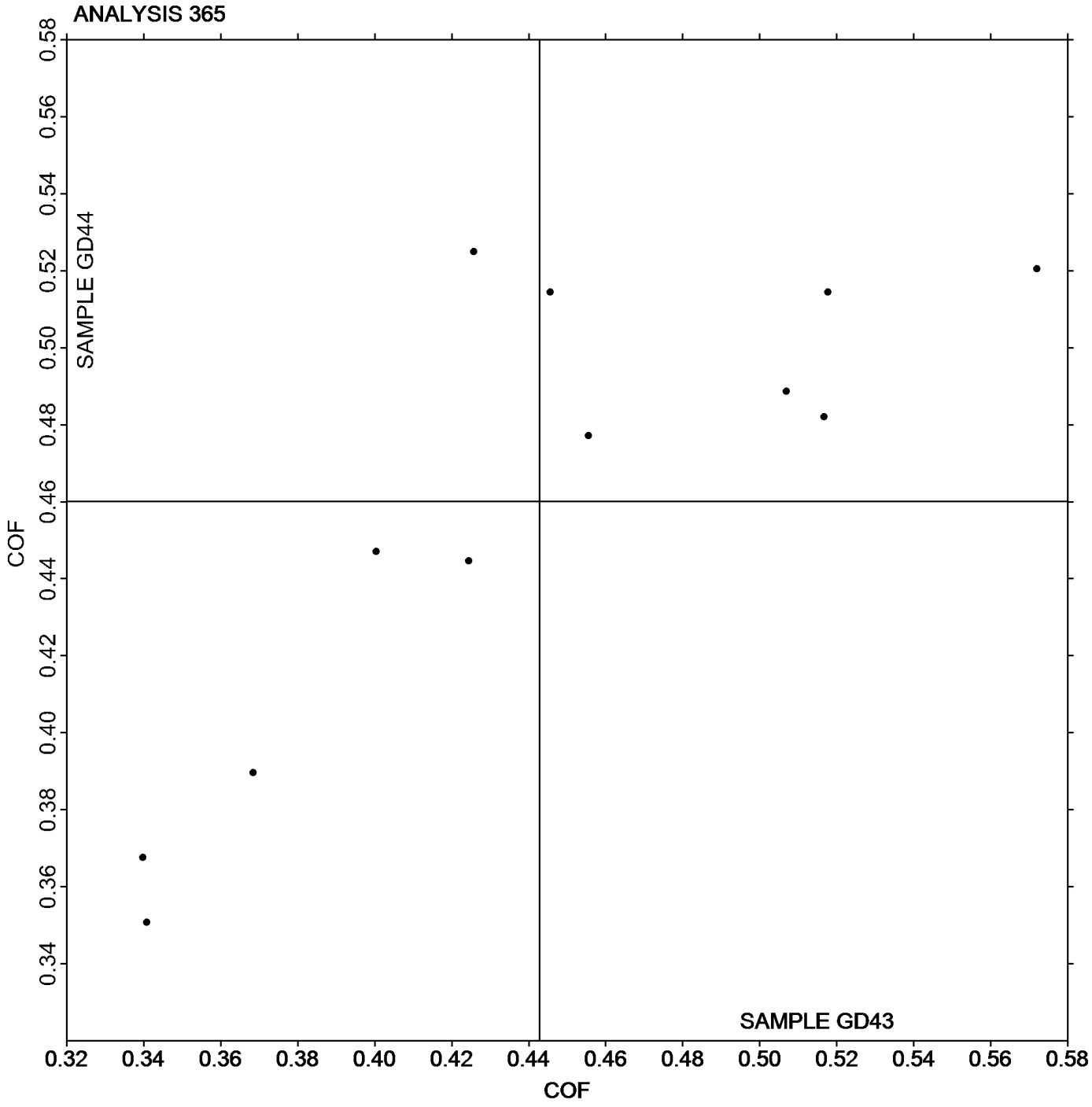
IR	IMASS SP-2000	TA	Thwing-Albert Friction Tester
TL	TMI 32-90 Lab Master/Slip and Friction	TM	TMI 32-06 Monitor/Slip and Friction
XX	Instrument make/model not specified by lab		

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GD43** = 0.44286 COF

Grand Mean Sample **GD44** = 0.46013 COF



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

Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GE43 Lab Mean	Sample GE43 Diff from Grand Mean	Sample GE43 CPV	Sample GE44 Lab Mean	Sample GE44 Diff from Grand Mean	Sample GE44 CPV	Instr Code
2DELXZ		19.02	0.71	0.63	20.89	-0.08	-0.05	HG
2ET89M		16.26	-2.05	-1.83	18.19	-2.78	-1.93	RE
2GE63Z		17.70	-0.61	-0.54	19.78	-1.19	-0.82	TL
48484U		18.96	0.65	0.58	21.53	0.56	0.39	LA
49W3Q3		17.87	-0.44	-0.39	19.67	-1.30	-0.90	HG
4MTE2R		16.99	-1.32	-1.17	19.46	-1.51	-1.05	LP
4MWUGD		18.60	0.29	0.26	20.71	-0.26	-0.18	PP
676GGC		18.88	0.58	0.51	21.23	0.26	0.18	PP
6DLE9W		17.50	-0.81	-0.72	20.20	-0.77	-0.53	PP
8ZQHZ3		19.40	1.09	0.97	21.40	0.43	0.30	GA
9DAPB9		18.84	0.53	0.47	20.98	0.01	0.01	LP
9LAW9W		17.36	-0.95	-0.84	20.08	-0.89	-0.62	LP
9Z9UE2		20.14	1.83	1.63	22.15	1.18	0.82	GA
AGDH68		18.66	0.35	0.31	21.37	0.40	0.28	LA
BR8F8X		19.11	0.80	0.71	22.29	1.32	0.91	LP
C4URDF		17.03	-1.28	-1.14	19.79	-1.18	-0.82	LP
CGJQ2W		18.19	-0.12	-0.10	21.12	0.15	0.10	LP
CJ9BQ2		20.08	1.77	1.58	23.01	2.04	1.41	HG
D64CHV		17.70	-0.61	-0.54	20.81	-0.16	-0.11	LW
EE8TKK		17.48	-0.83	-0.74	20.92	-0.05	-0.03	PP
EL8AXC		18.14	-0.17	-0.15	21.09	0.12	0.08	PP
F79LMW		15.70	-2.61	-2.32	17.90	-3.07	-2.13	VM
G8ZYMU		18.59	0.28	0.25	22.35	1.38	0.96	PP
GLEA6P		18.37	0.06	0.05	20.75	-0.22	-0.15	PP
GPEXQK		18.29	-0.02	-0.02	21.32	0.35	0.24	LA
HLXCEC	X	14.02	-4.29	-3.82	15.58	-5.39	-3.73	TL
HVJJCF		18.95	0.64	0.57	21.48	0.51	0.35	WG
J24YFD		19.20	0.89	0.79	22.26	1.29	0.89	LA
JHBBTN		17.20	-1.11	-0.99	20.40	-0.57	-0.39	LW
JM3FMR		18.07	-0.24	-0.21	20.28	-0.69	-0.48	LP
K7WFDN		18.19	-0.12	-0.11	20.41	-0.56	-0.39	PP
KCGK3J		18.59	0.28	0.25	21.79	0.82	0.57	PP
KKCHR7		18.88	0.57	0.51	20.54	-0.43	-0.30	LP
KKTYKE		18.57	0.26	0.23	20.33	-0.64	-0.44	XX
KYV7YJ		18.66	0.35	0.31	22.85	1.88	1.30	TL
M2AM8E	*	19.26	0.95	0.85	24.12	3.15	2.18	WG
MUEK3H		20.16	1.85	1.65	22.83	1.86	1.29	XX
QADXPF		18.80	0.49	0.44	21.94	0.97	0.67	PP
UDJTZU		17.70	-0.61	-0.54	19.20	-1.77	-1.23	GS
UQ7TWN		17.35	-0.96	-0.85	20.08	-0.89	-0.62	XX
W3VDAW		18.25	-0.06	-0.05	21.70	0.73	0.51	PP

Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GE43 Lab Mean	Sample GE43 Diff from Grand Mean	Sample GE43 CPV	Sample GE44 Lab Mean	Sample GE44 Diff from Grand Mean	Sample GE44 CPV	Instr Code
XCTBD3	*	15.03	-3.28	-2.92	16.72	-4.25	-2.94	TN
ZF4PQ8		18.94	0.63	0.56	22.67	1.70	1.18	HG
ZNMRGH		20.56	2.25	2.01	23.08	2.11	1.46	LA

Summary Statistics

	Sample GE43	Sample GE44
Grand Means	18.307 sec/100 cc	20.969 sec/100 cc
SD Btwn Labs	1.123 sec/100 cc	1.444 sec/100 cc

Statistics based on 43 of 44 reporting participants

Comments on Assigned Data Flags for Test #370

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

Key to Instrument Codes Reported by Participants

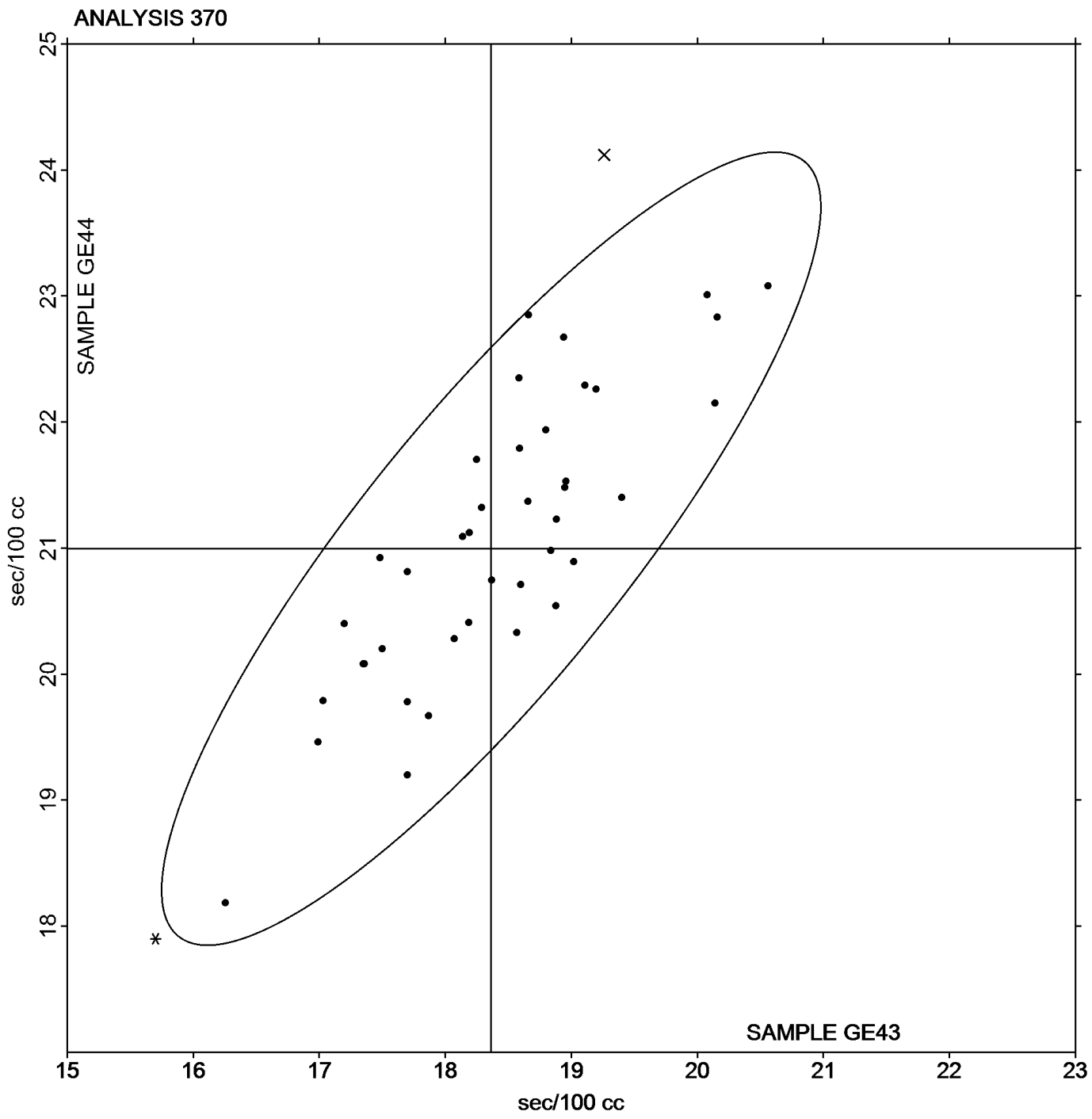
GA	Gurley Precision #4340 Automatic Densometer	GS	Gurley-Hill S-P-S Tester #4190
HG	Technidyne - Hagerty Model #1	LA	L & W Autoline
LP	L & W Densometer, Air Permeance	LW	L & W Type Gurley Densometer, Oil Flotation
PP	Technidyne Profile/Plus	RE	Regmed Gurley Densometer PGH-T
TL	Gurley Densometer #4110,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

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GE43** = 18.307 sec/100 cc

Grand Mean Sample **GE44** = 20.969 sec/100 cc



Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GE43 Lab Mean	Sample GE43 Diff from Grand Mean	Sample GE43 CPV	Sample GE44 Lab Mean	Sample GE44 Diff from Grand Mean	Sample GE44 CPV	Instr Code
7X7FCH		149.1	4.4	0.59	126.8	-2.8	-0.49	HM
8ZQHZ3		136.4	-8.4	-1.12	118.7	-10.9	-1.90	PP
CJ9BQ2		145.5	0.8	0.10	131.4	1.8	0.31	TT
DP84FM	X	174.1	29.4	3.95	153.0	23.4	4.05	VM
F79LMW		156.2	11.5	1.54	140.6	11.0	1.90	PP
FY99JM		136.7	-8.1	-1.08	125.2	-4.4	-0.77	TT
K7WFDN	X	18.2	-126.6	-17.05	20.4	-109.2	-18.94	HM
KKTYKE		145.3	0.6	0.07	130.5	0.9	0.15	XX
LKPPAT	X	19.9	-124.9	-16.82	22.1	-107.5	-18.65	TT
MEXMZ3		143.0	-1.8	-0.24	134.0	4.4	0.76	TT
UDJTZU		134.3	-10.5	-1.41	127.7	-1.9	-0.33	SH
WWQUTJ		146.5	1.8	0.24	129.5	-0.1	-0.02	GA
Z8YE6B		154.5	9.8	1.31	131.9	2.3	0.39	SH

Summary Statistics

	Sample GE43	Sample GE44
Grand Means	144.75 Sheffield Units	129.63 Sheffield Units
SD Btwn Labs	7.42 Sheffield Units	5.77 Sheffield Units

Statistics based on 10 of 13 reporting participants

Comments on Assigned Data Flags for Test #372

LKPPAT (X) - Extreme Data.

K7WFDN (X) - Extreme Data.

DP84FM (X) - Data for both samples are high. Inconsistent within the determinations of sample GE43.

K7WFDN - Data appears to be the same data submitted for Analysis 370.

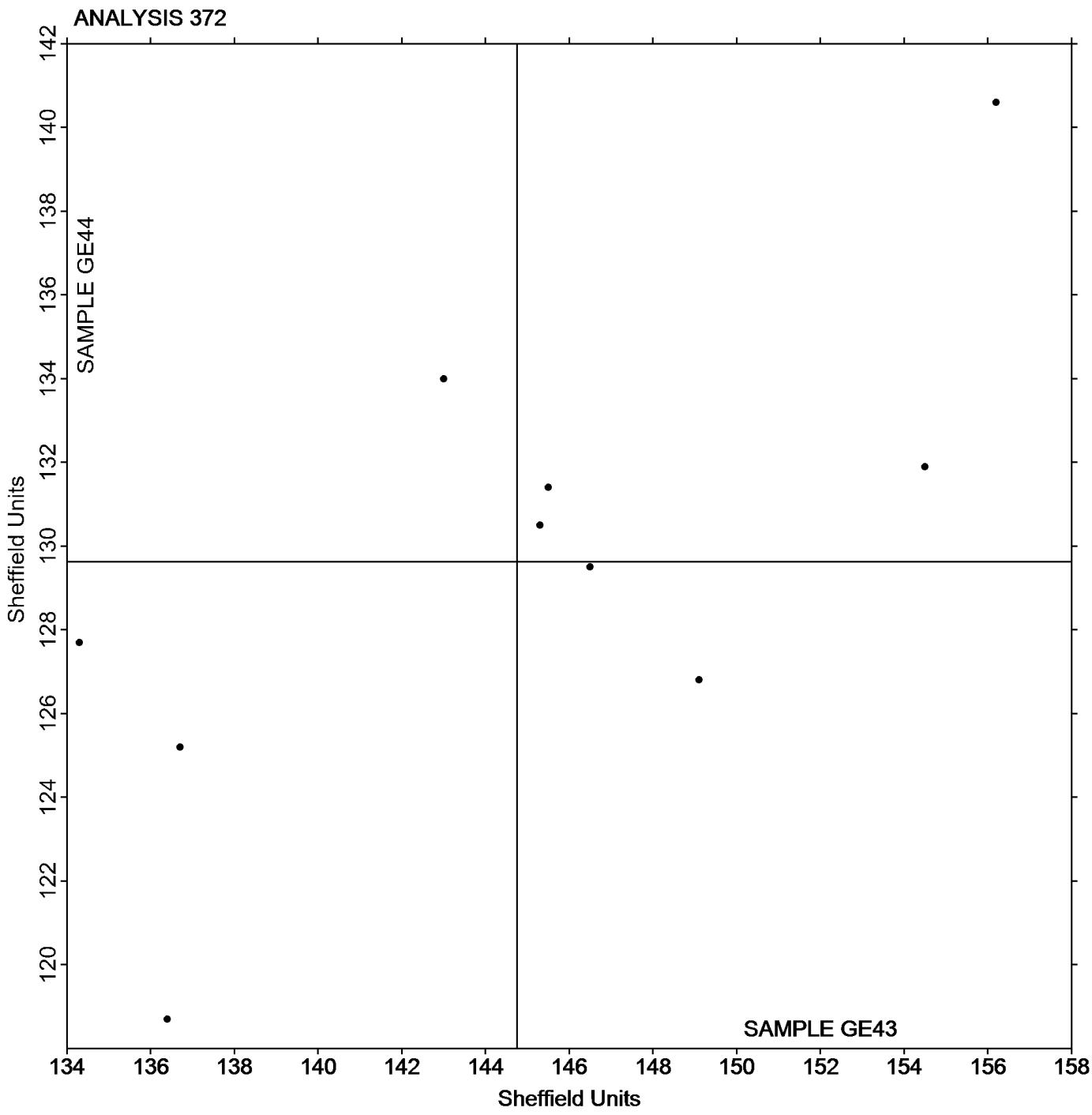
Key to Instrument Codes Reported by Participants

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	VM	Valmet PaperLab (was Kajaani/Robotest)
XX	Instrument make/model not specified by lab		

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GE43** = 144.75 Sheffield Units Grand Mean Sample **GE44** = 129.63 Sheffield Units



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

Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GJ43 Lab Mean	Sample GJ43 Diff from Grand Mean	Sample GJ43 CPV	Sample GJ44 Lab Mean	Sample GJ44 Diff from Grand Mean	Sample GJ44 CPV
24PTNN		0.7450	-0.0669	-0.65	0.7730	-0.0943	-0.98
2DELXZ		0.7330	-0.0789	-0.77	0.8070	-0.0603	-0.63
2DVWBY		1.0420	0.2301	2.24	1.0490	0.1817	1.88
3TLZR3		0.7480	-0.0639	-0.62	0.7660	-0.1013	-1.05
3UW2E2		0.8200	0.0081	0.08	0.8620	-0.0053	-0.06
4ATDNQ		0.7070	-0.1049	-1.02	0.7920	-0.0753	-0.78
4UTEGZ		0.9460	0.1341	1.31	1.0000	0.1327	1.38
6DLE9W		0.7350	-0.0769	-0.75	0.7970	-0.0703	-0.73
6V8M3T		0.7380	-0.0739	-0.72	0.8050	-0.0623	-0.65
7J88YA		0.7460	-0.0659	-0.64	0.8200	-0.0473	-0.49
7X7FCH		0.6750	-0.1369	-1.33	0.7890	-0.0783	-0.81
978ZRW		0.7270	-0.0849	-0.83	0.7730	-0.0943	-0.98
B6E4K2		0.9280	0.1161	1.13	0.9470	0.0797	0.83
C3H9AX		0.7210	-0.0909	-0.89	0.8030	-0.0643	-0.67
CJ9BQ2		0.7580	-0.0539	-0.53	0.8310	-0.0363	-0.38
DAVMAK		0.7580	-0.0539	-0.53	0.8180	-0.0493	-0.51
EE8TKK		0.7570	-0.0549	-0.54	0.8260	-0.0413	-0.43
ELP4YL		0.7920	-0.0199	-0.19	0.8350	-0.0323	-0.34
ET66VA		0.9360	0.1241	1.21	0.9950	0.1277	1.32
F79LMW		0.8010	-0.0109	-0.11	0.8280	-0.0393	-0.41
FY99JM		0.8833	0.0714	0.70	0.9130	0.0457	0.47
GLEA6P		0.8640	0.0521	0.51	0.9050	0.0377	0.39
HAL3VR		0.7600	-0.0519	-0.51	0.8200	-0.0473	-0.49
HVJJCF		0.6350	-0.1769	-1.72	0.6820	-0.1853	-1.92
KCGK3J		0.7820	-0.0299	-0.29	0.8450	-0.0223	-0.23
NFNATG		1.0300	0.2181	2.12	1.0680	0.2007	2.08
PLN7R8		0.7440	-0.0679	-0.66	0.8230	-0.0443	-0.46
PM7ZV3	X	1.4130	0.6011	5.86	1.8320	0.9647	10.01
V6PZ9E		0.8995	0.0876	0.85	1.0060	0.1387	1.44
X9X7GX		0.7950	-0.0169	-0.17	0.8720	0.0047	0.05
XG8BR3		0.9730	0.1611	1.57	0.9960	0.1287	1.33
YCCYDH		0.9700	0.1581	1.54	1.0420	0.1747	1.81
YPWGZU		0.8950	0.0831	0.81	0.9700	0.1027	1.07
ZDXKH6	X	1.4060	0.5941	5.79	1.3970	0.5297	5.49
ZNMRGH		0.7850	-0.0269	-0.26	0.8430	-0.0243	-0.25
ZYZVJ8		0.7770	-0.0349	-0.34	0.7880	-0.0793	-0.82

Copyright © 2017 CTS, Inc

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

Summary Statistics

	Sample GJ43	Sample GJ44
Grand Means	0.81194 Microns	0.86732 Microns
SD Btwn Labs	0.10263 Microns	0.09639 Microns

Statistics based on 34 of 36 reporting participants

Comments on Assigned Data Flags for Test #376

PM7ZV3 (X) - Extreme Data.

ZDXKH6 (X) - Data for both samples are high. Possible Systematic Error.

Analysis Notes:

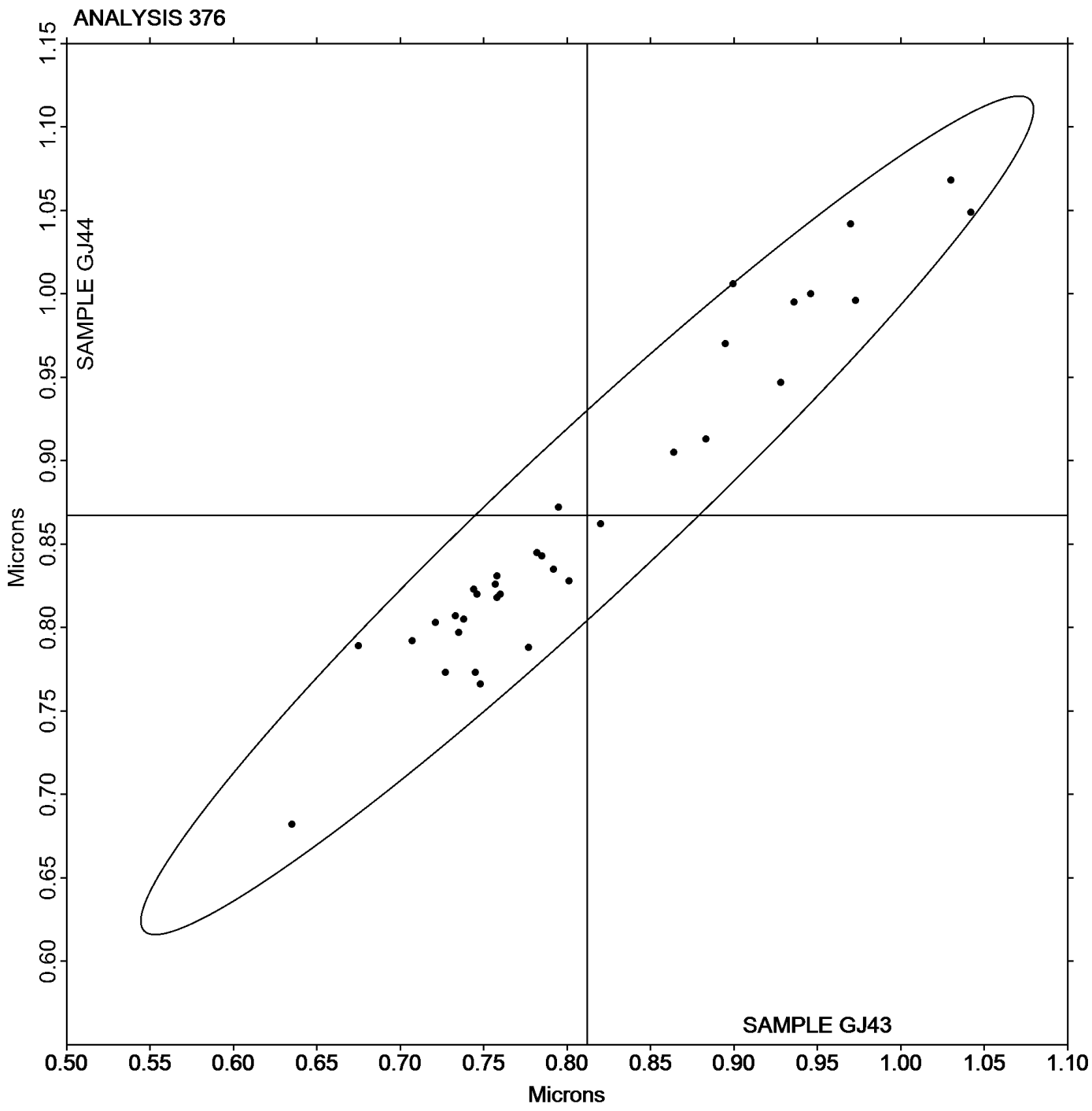
FY99JM - One determination removed from the Lab Mean of Sample GJ43 per Grubb's Test at 1% risk (TAPPI 1205).

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GJ43** = 0.81194 Microns

Grand Mean Sample **GJ44** = 0.86732 Microns



Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GK43 Lab Mean	Sample GK43 Diff from Grand Mean	Sample GK43 CPV	Sample GK44 Lab Mean	Sample GK44 Diff from Grand Mean	Sample GK44 CPV
2DELXZ		2.894	-0.074	-0.87	3.805	-0.163	-1.09
48484U		2.920	-0.048	-0.57	3.781	-0.187	-1.25
4MWUGD		2.899	-0.069	-0.81	3.937	-0.031	-0.21
676GGC		3.093	0.125	1.46	4.218	0.250	1.67
DP84FM		3.049	0.081	0.95	3.884	-0.084	-0.56
HVJJCF		2.835	-0.133	-1.57	3.878	-0.090	-0.60
JM3FMR		2.993	0.025	0.29	4.085	0.117	0.78
L4HFLM	X	3.490	0.522	6.12	3.720	-0.248	-1.66
QADXPF		3.003	0.035	0.41	4.123	0.155	1.03
YWKWWD		3.030	0.062	0.72	4.004	0.036	0.24

Summary Statistics

	Sample GK43	Sample GK44
Grand Means	2.9684 Microns	3.9683 Microns
SD Btwn Labs	0.0852 Microns	0.1496 Microns

Statistics based on 9 of 10 reporting participants

Comments on Assigned Data Flags for Test #377

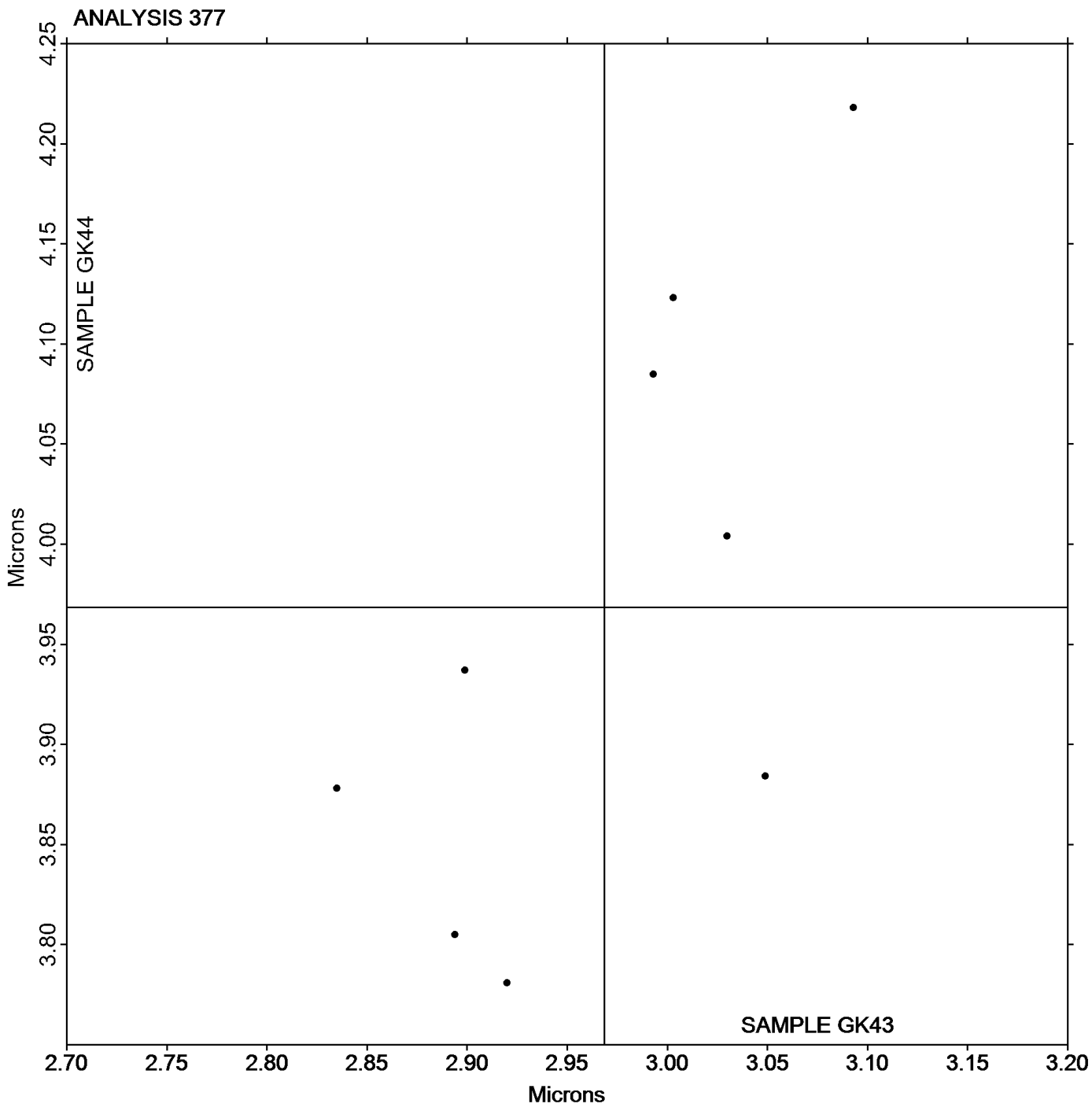
L4HFLM (X) - Extreme Data for Sample GK43.

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GK43** = 2.9684 Microns

Grand Mean Sample **GK44** = 3.9683 Microns



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

Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GL43 Lab Mean	Sample GL43 Diff from Grand Mean	Sample GL43 CPV	Sample GL44 Lab Mean	Sample GL44 Diff from Grand Mean	Sample GL44 CPV	Instr Code
2DVWBY	*	207.1	-38.9	-2.50	40.60	2.37	0.39	TS
2X4ZA4	X	293.6	47.7	3.07	23.78	-14.45	-2.40	MP
3TLZR3		241.2	-4.8	-0.31	36.70	-1.53	-0.25	LA
3UW2E2		265.7	19.7	1.27	47.30	9.07	1.51	TT
48484U	X	243.5	-2.5	-0.16	60.60	22.37	3.72	LA
49W3Q3		268.5	22.5	1.45	38.90	0.67	0.11	TS
4ATDNQ		207.9	-38.1	-2.45	33.40	-4.83	-0.80	LA
4MWUGD		246.5	0.5	0.03	30.12	-8.11	-1.35	PP
676GGC		263.6	17.6	1.13	40.20	1.98	0.33	PP
6DLE9W		231.0	-15.0	-0.97	34.79	-3.44	-0.57	PP
6V8M3T		239.6	-6.4	-0.41	37.78	-0.44	-0.07	PP
7J88YA		240.1	-5.9	-0.38	39.30	1.07	0.18	HM
7NEHPV		237.5	-8.5	-0.55	34.90	-3.33	-0.55	LA
8ZQHZ3		255.6	9.6	0.62	37.60	-0.63	-0.10	HM
AZ377M		239.1	-6.9	-0.44	32.99	-5.23	-0.87	PP
B6E4K2		219.4	-26.6	-1.71	43.82	5.59	0.93	PP
BN2ZRE		251.4	5.4	0.35	35.55	-2.67	-0.44	PP
BPJR4K		247.5	1.5	0.10	36.79	-1.43	-0.24	PP
BR8F8X		223.0	-23.0	-1.48	30.40	-7.83	-1.30	LW
CJ9BQ2		247.7	1.7	0.11	39.80	1.57	0.26	TT
DAVMAK		259.0	13.0	0.84	37.71	-0.52	-0.09	PP
DUHULU	X	351.4	105.4	6.79	21.90	-16.33	-2.71	TS
EE8TKK		251.3	5.3	0.34	32.90	-5.33	-0.89	PP
EL8AXC		222.0	-24.0	-1.55	32.50	-5.73	-0.95	SH
ET66VA		218.0	-28.0	-1.80	36.20	-2.03	-0.34	GL
ETPLBC		258.1	12.1	0.78	33.50	-4.73	-0.79	GA
F79LMW		237.7	-8.3	-0.53	27.20	-11.03	-1.83	VM
FY99JM		229.9	-16.1	-1.04	43.50	5.27	0.88	TT
G8ZYMU		261.6	15.6	1.00	37.81	-0.41	-0.07	PP
GLEA6P		268.5	22.5	1.45	40.96	2.73	0.45	PP
GMPBTA		265.0	19.0	1.22	47.40	9.17	1.53	GL
HVJJCF		255.5	9.5	0.61	43.20	4.97	0.83	XX
J24YFD		232.3	-13.7	-0.88	35.93	-2.30	-0.38	LA
JHBBTN		245.7	-0.3	-0.02	44.00	5.77	0.96	TS
JM3FMR		254.9	8.9	0.57	32.10	-6.13	-1.02	LW
K7WFDN		247.1	1.1	0.07	39.12	0.89	0.15	PP
KCGK3J		239.2	-6.8	-0.44	31.50	-6.73	-1.12	PP
KKTYKE		230.5	-15.5	-1.00	38.90	0.67	0.11	XX
LANNVG		250.1	4.1	0.26	38.30	0.07	0.01	PP
M2AM8E		254.9	8.9	0.57	38.80	0.57	0.10	PG
MEXMZ3	X	226.0	-20.0	-1.29	15.50	-22.73	-3.78	TT

Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GL43 Lab Mean	Sample GL43 Diff from Grand Mean	Sample GL43 CPV	Sample GL44 Lab Mean	Sample GL44 Diff from Grand Mean	Sample GL44 CPV	Instr Code
P9MAWZ	X	226.5	-19.5	-1.26	55.00	16.77	2.79	TS
PLN7R8		241.5	-4.5	-0.29	29.70	-8.53	-1.42	PP
QADXPF		243.5	-2.5	-0.16	33.11	-5.12	-0.85	PP
UDJTZU		250.8	4.8	0.31	44.90	6.67	1.11	XX
V6PZ9E		254.5	8.5	0.55	40.40	2.17	0.36	HM
VRVQHZ		243.7	-2.3	-0.15	33.99	-4.23	-0.70	XX
VYWE26	X	131.2	-114.8	-7.39	48.60	10.37	1.72	XX
W3VDAW		237.6	-8.4	-0.54	34.68	-3.55	-0.59	PP
WWQUTJ		280.3	34.3	2.21	50.40	12.17	2.02	GA
X3AH3E		243.1	-2.9	-0.19	36.66	-1.57	-0.26	SH
X9X7GX		246.1	0.1	0.01	38.80	0.57	0.10	LW
XG8BR3		261.0	15.0	0.97	50.20	11.97	1.99	TT
XJXFKA	*	236.6	-9.4	-0.60	51.70	13.47	2.24	TT
XUX9TZ	*	273.3	27.3	1.76	57.06	18.83	3.13	GA
YWKWWD		257.7	11.7	0.75	37.70	-0.53	-0.09	HM
Z8YE6B		254.2	8.2	0.53	31.60	-6.63	-1.10	SH
ZF4PQ8		250.0	4.0	0.26	35.00	-3.23	-0.54	HM
ZNMRGH		249.7	3.7	0.24	37.60	-0.63	-0.10	PP

Summary Statistics

	Sample GL43	Sample GL44
Grand Means	245.99 Sheffield	38.226 Sheffield
SD Btwn Labs	15.53 Sheffield	6.014 Sheffield

Statistics based on 53 of 59 reporting participants

Comments on Assigned Data Flags for Test #378

48484U (X) - Data for sample GL44 are high.

P9MAWZ (X) - Data for sample GL44 are high. Inconsistent within the determinations of sample GL44.

MEXMZ3 (X) - Data for sample GL44 are low. Inconsistent within the determinations of sample GL44.

2X4ZA4 (X) - Data for sample GL43 are high. Inconsistent within the determinations of sample GL43.

DUHULU (X) - Extreme Data for Sample GL43.

VYWE26 (X) - Extreme Data for Sample GL43.

Copyright © 2017 CTS, Inc

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

Key to Instrument Codes Reported by Participants

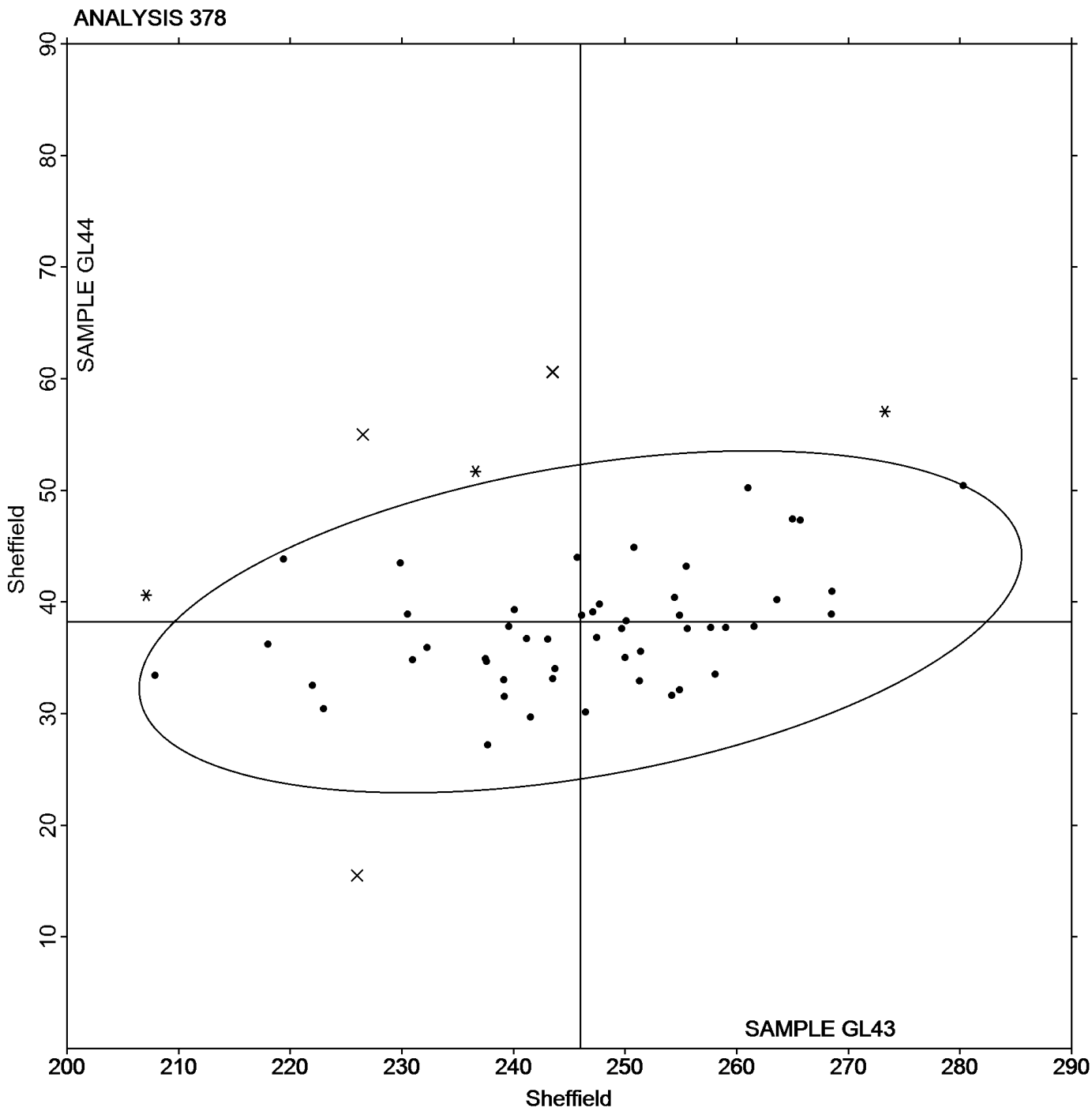
GA	Gurley Precision #4340 Automatic Densometer	GL	Giddings and Lewis Sheffield
HM	Technidyne - Hagerty Model #538	LA	L & W Roughness Sheffield - Autoline
LW	L & W Roughness Tester	MP	Metso Paperlab
PG	Precision Gage Smoothcheck	PP	Technidyne Profile/Plus
SH	Sheffield (Bendix Precisionaire)	TS	TMI Monitor/Smoothness, 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		

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GL43** = 245.99 Sheffield

Grand Mean Sample **GL44** = 38.226 Sheffield



Copyright © 2017 CTS, Inc

Paper & Paperboard Interlaboratory Testing Program
Analysis 382
Moisture in Paper

WebCode	Data Flag	Sample GM43 Lab Mean	Sample GM43 Diff from Grand Mean	Sample GM43 CPV	Sample GM44 Lab Mean	Sample GM44 Diff from Grand Mean	Sample GM44 CPV
676GGC		4.732	0.315	1.24	4.443	0.229	0.98
C4URDF		4.152	-0.265	-1.05	3.996	-0.218	-0.94
FQFXBD		4.730	0.313	1.24	4.438	0.224	0.96
KW68KK		4.212	-0.205	-0.81	4.278	0.064	0.28
L4HFLM		4.480	0.063	0.25	4.460	0.246	1.06
NHBLBE	X	4.290	-0.127	-0.50	5.560	1.346	5.79
PM7ZV3		4.207	-0.210	-0.83	3.942	-0.272	-1.17
QVTHLG		4.644	0.227	0.90	4.556	0.342	1.47
R7C6FH		4.218	-0.199	-0.79	3.916	-0.298	-1.28
UTA847		4.249	-0.168	-0.66	4.144	-0.070	-0.30
WYTCP7		4.202	-0.215	-0.85	4.019	-0.195	-0.84
XG8BR3	X	5.280	0.863	3.41	5.480	1.266	5.45
YWKWWD		4.760	0.343	1.36	4.160	-0.054	-0.23

Summary Statistics

	Sample GM43	Sample GM44
Grand Means	4.4168 Percent	4.2137 Percent
SD Btwn Labs	0.2531 Percent	0.2324 Percent

Statistics based on 11 of 13 reporting participants

Comments on Assigned Data Flags for Test #382

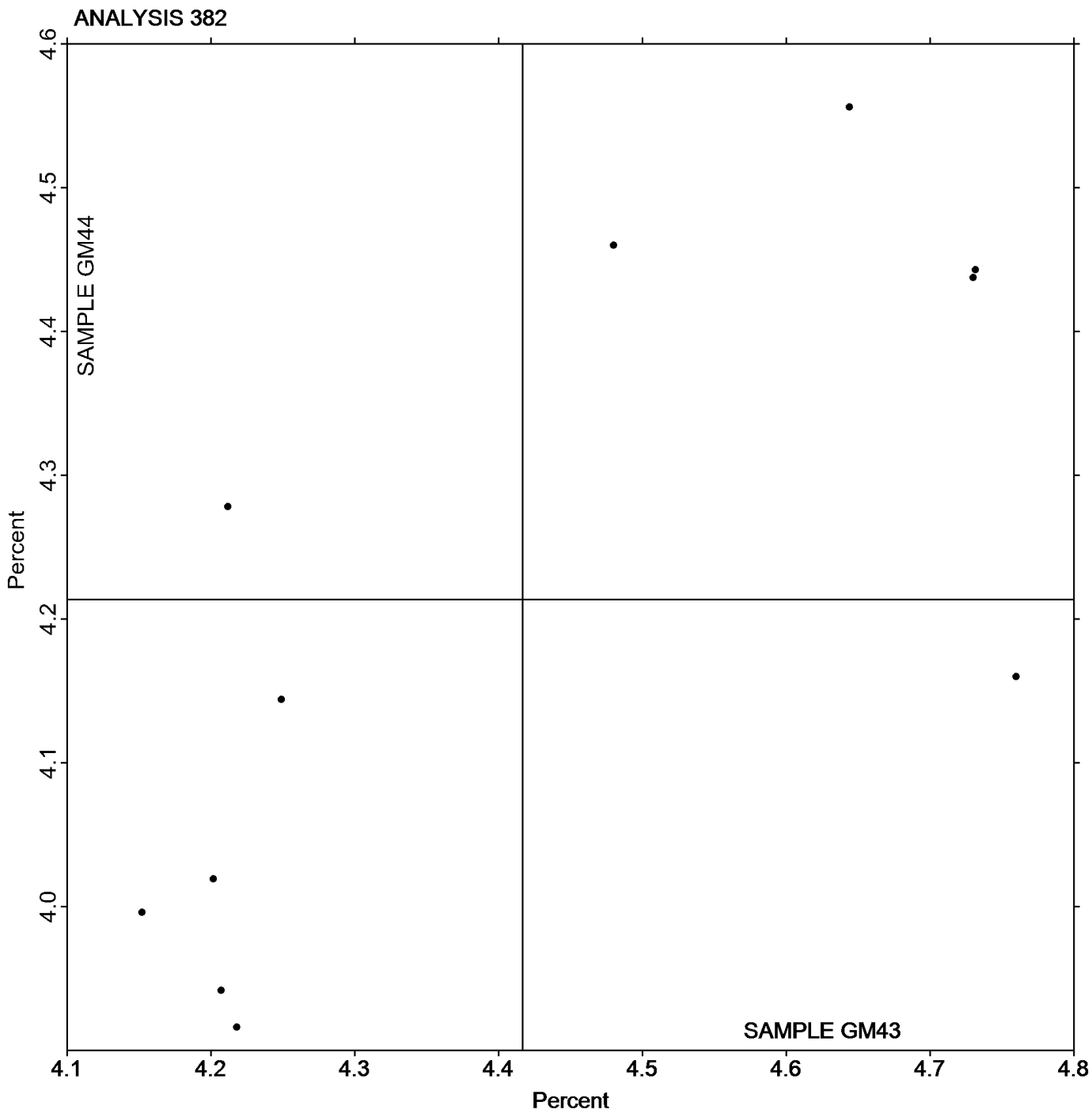
XG8BR3 (X) - Data for both samples are high. Possible Systematic Error.

NHBLBE (X) - Data for sample GM44 are high.

Copyright © 2017 CTS, Inc

Grand Mean Sample **GM43** = 4.4168 Percent

Grand Mean Sample **GM44** = 4.2137 Percent



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

Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GN43 Lab Mean	Sample GN43 Diff from Grand Mean	Sample GN43 CPV	Sample GN44 Lab Mean	Sample GN44 Diff from Grand Mean	Sample GN44 CPV
2DELXZ		93.78	0.29	0.68	94.32	0.16	0.39
48484U		93.40	-0.09	-0.22	94.23	0.07	0.18
49W3Q3		93.66	0.17	0.40	94.02	-0.14	-0.32
4MWUGD		93.11	-0.38	-0.89	93.62	-0.54	-1.27
4UTEGZ		93.39	-0.10	-0.24	93.89	-0.26	-0.62
676GGC		93.34	-0.15	-0.36	94.37	0.21	0.50
77K6AQ		93.41	-0.08	-0.19	94.21	0.05	0.13
7J88YA		93.66	0.17	0.40	94.54	0.38	0.91
8ZQHZ3		93.29	-0.20	-0.47	93.46	-0.70	-1.64
978ZRW		94.01	0.52	1.22	94.28	0.12	0.29
B6E4K2		94.10	0.60	1.42	94.97	0.81	1.91
BPJR4K		93.29	-0.20	-0.47	94.04	-0.11	-0.27
CJ9BQ2		93.47	-0.03	-0.06	94.40	0.24	0.56
EL8AXC		93.20	-0.29	-0.69	94.06	-0.10	-0.23
FY99JM		94.09	0.60	1.41	94.75	0.59	1.40
G8ZYMU		93.63	0.13	0.32	94.04	-0.12	-0.28
GLEA6P		93.36	-0.13	-0.31	94.44	0.28	0.67
GMPBTA		93.55	0.06	0.14	94.33	0.17	0.41
HAL3VR		93.99	0.50	1.17	94.23	0.07	0.18
J24YFD		92.68	-0.81	-1.91	93.52	-0.64	-1.50
JHBBTN		93.67	0.18	0.42	94.23	0.07	0.18
KKTYKE	*	92.47	-1.02	-2.40	92.90	-1.26	-2.96
KYV7YJ		93.05	-0.44	-1.04	94.10	-0.06	-0.13
LANNVG		93.53	0.04	0.09	94.31	0.15	0.36
LFGQYG		93.94	0.45	1.05	94.98	0.82	1.94
LY7PX8		93.76	0.27	0.63	94.39	0.23	0.55
M2AM8E		93.52	0.03	0.06	93.80	-0.36	-0.84
MEXMZ3		93.76	0.27	0.63	94.31	0.15	0.36
MRPDHK		93.48	-0.01	-0.02	94.31	0.16	0.37
NFNATG		93.75	0.26	0.61	94.26	0.10	0.25
TBXNRW		94.26	0.77	1.80	94.32	0.16	0.38
UDJTZU	X	88.38	-5.11	-12.01	96.51	2.35	5.55
V6PZ9E		92.52	-0.97	-2.28	93.10	-1.06	-2.49
VYWE26		93.07	-0.42	-0.99	94.24	0.09	0.20
X3AH3E		94.06	0.57	1.34	94.43	0.27	0.65
YWKWWD		93.64	0.15	0.35	94.17	0.02	0.04
Z8YE6B		93.41	-0.08	-0.19	94.09	-0.07	-0.15
ZDXKH6	X	92.16	-1.33	-3.12	92.49	-1.67	-3.93
ZF4PQ8		92.91	-0.58	-1.37	94.11	-0.05	-0.11

Copyright © 2017 CTS, Inc

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

Summary Statistics

	Sample GN43	Sample GN44
Grand Means	93.492 Percent	94.156 Percent
SD Btwn Labs	0.426 Percent	0.425 Percent

Statistics based on 37 of 39 reporting participants

Comments on Assigned Data Flags for Test #384

UDJTZU (X) - Extreme Data.

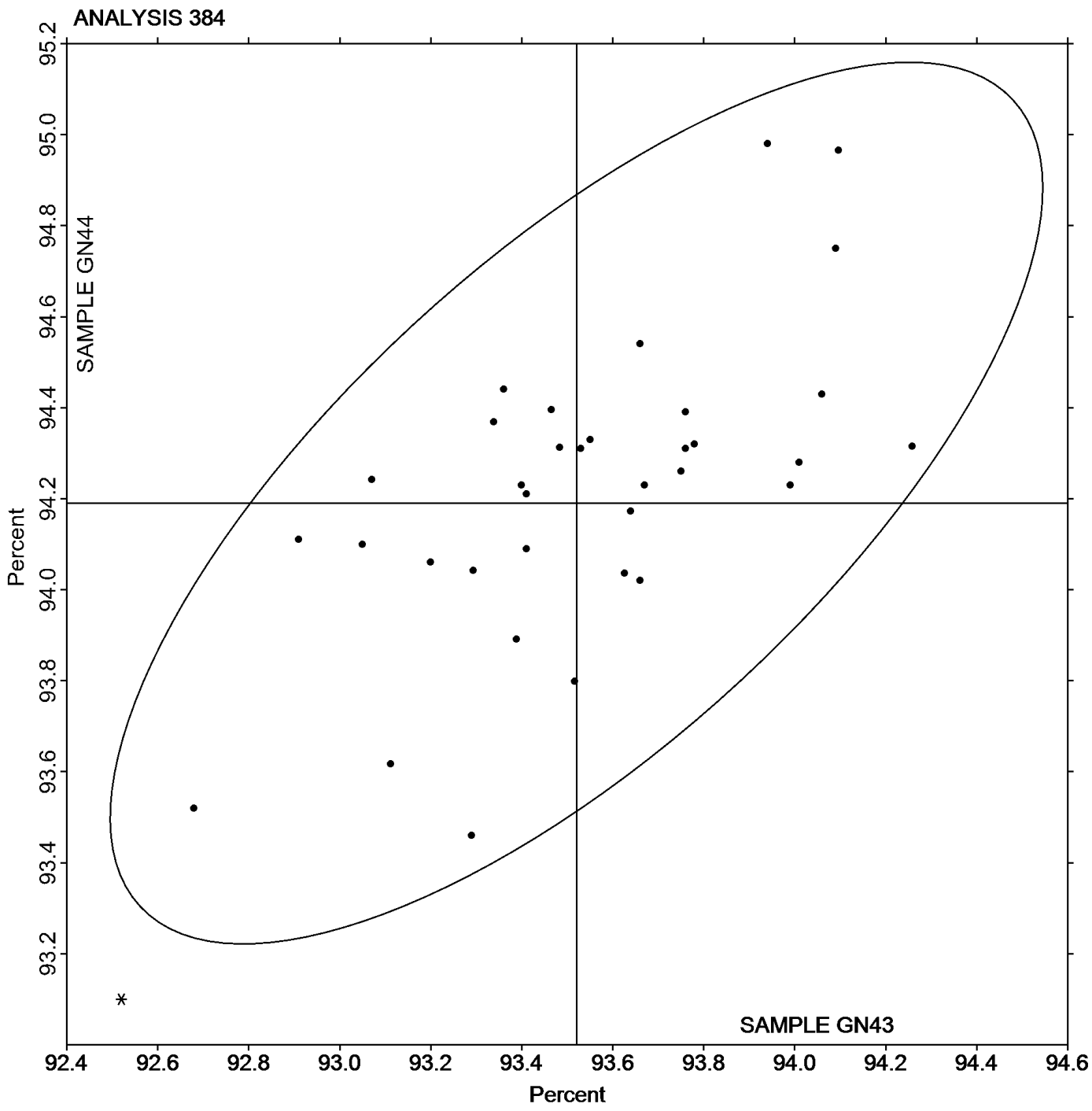
ZDXKH6 (X) - Data for both samples are low. Possible Systematic Error.

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GN43** = 93.492 Percent

Grand Mean Sample **GN44** = 94.156 Percent



Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GP43 Lab Mean	Sample GP43 Diff from Grand Mean	Sample GP43 CPV	Sample GP44 Lab Mean	Sample GP44 Diff from Grand Mean	Sample GP44 CPV
27FWGV		94.49	0.09	0.73	92.94	-0.06	-0.62
2ET89M		94.30	-0.10	-0.79	93.05	0.05	0.46
8VJUM2		94.52	0.12	0.97	93.08	0.07	0.72
9LAW9W		94.47	0.07	0.58	92.84	-0.17	-1.67
B6E4K2		94.52	0.12	0.96	93.01	0.00	0.00
C4URDF		94.39	-0.01	-0.07	92.98	-0.03	-0.28
CGJQ2W		94.42	0.02	0.13	93.01	0.00	0.03
D64CHV		94.30	-0.10	-0.78	93.03	0.02	0.21
HLXCEC		94.26	-0.14	-1.14	92.93	-0.08	-0.77
J4BVRL		94.27	-0.13	-1.04	92.88	-0.13	-1.29
K7WFDN		94.56	0.16	1.33	93.25	0.25	2.47
R9YQ4Y		94.59	0.19	1.57	92.92	-0.08	-0.83
V6PZ9E		94.25	-0.15	-1.22	93.07	0.06	0.65
WHPYWC		94.23	-0.17	-1.36	93.03	0.02	0.25
YPWGZU		94.42	0.02	0.14	93.07	0.07	0.67
ZYZVJ8	X	93.64	-0.76	-6.21	94.75	1.74	17.52

Summary Statistics

	Sample GP43	Sample GP44
Grand Means	94.400 Percent	93.006 Percent
SD Btwn Labs	0.122 Percent	0.100 Percent

Statistics based on 15 of 16 reporting participants

Comments on Assigned Data Flags for Test #386

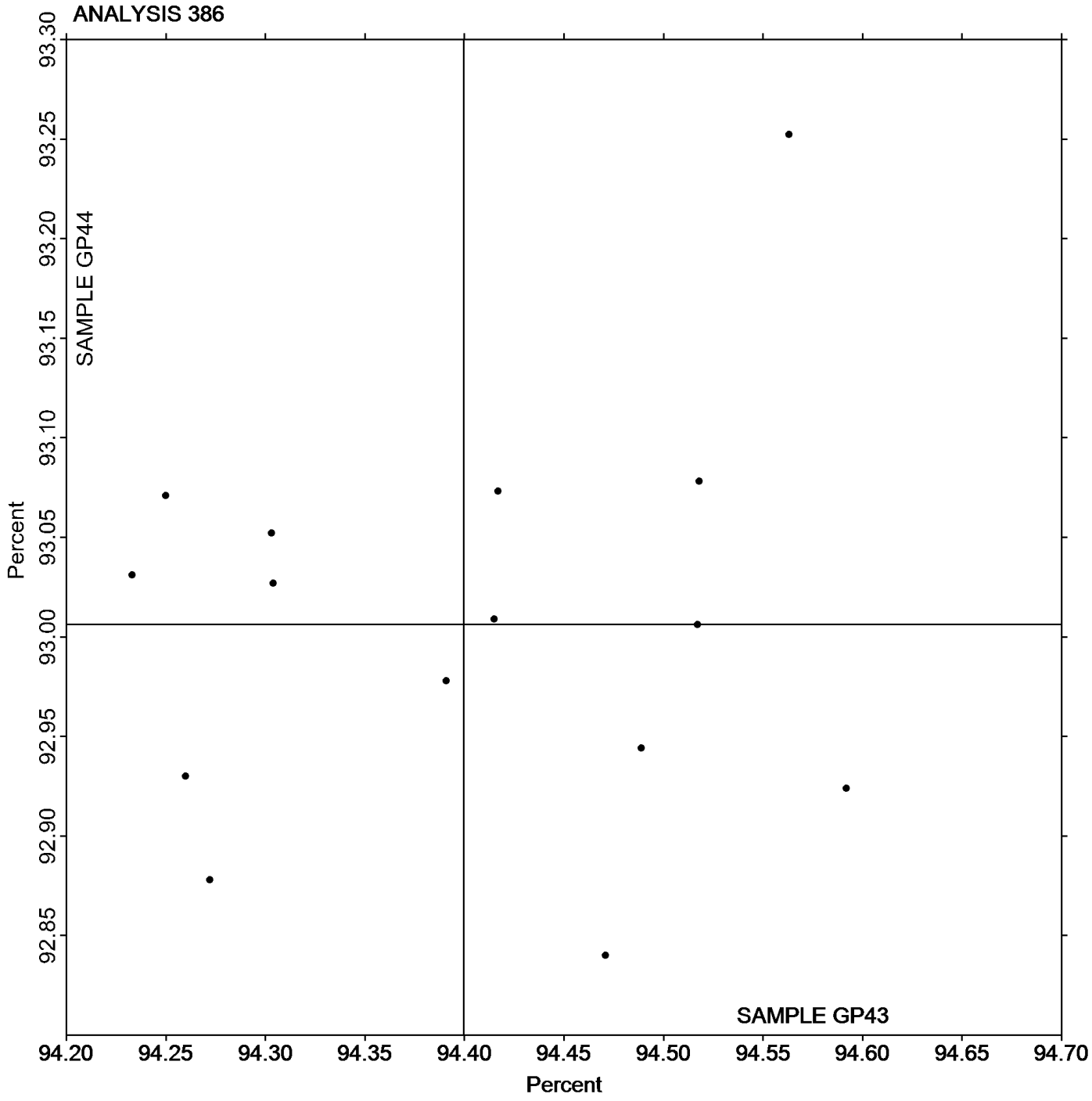
ZYZVJ8 (X) - Extreme Data.

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GP43** = 94.400 Percent

Grand Mean Sample **GP44** = 93.006 Percent



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

Copyright © 2017 CTS, Inc

Paper & Paperboard Interlaboratory Testing Program
Analysis 390
Directional Brightness

WebCode	Data Flag	Sample GR43 Lab Mean	Sample GR43 Diff from Grand Mean	Sample GR43 CPV	Sample GR44 Lab Mean	Sample GR44 Diff from Grand Mean	Sample GR44 CPV	Instr Code
2DELXZ		79.06	-0.08	-0.06	82.38	0.11	0.11	TT
3UW2E2		79.84	0.70	0.52	83.38	1.11	1.07	TT
48484U		78.62	-0.52	-0.39	81.98	-0.29	-0.28	TS
49W3Q3		78.71	-0.43	-0.32	81.64	-0.63	-0.61	TS
4UTEGZ		77.52	-1.62	-1.21	80.61	-1.65	-1.60	TS
6V8M3T	*	82.36	3.22	2.40	83.86	1.59	1.54	HD
7J88YA		78.18	-0.96	-0.72	81.30	-0.96	-0.93	TT
8ZQHZ3		81.69	2.55	1.90	84.45	2.19	2.12	XS
AZ377M		78.57	-0.57	-0.42	81.70	-0.56	-0.54	TS
B6E4K2		77.86	-1.28	-0.95	81.03	-1.24	-1.20	TS
BN2ZRE		77.80	-1.33	-0.99	80.96	-1.31	-1.27	TS
DAVMAK		81.23	2.09	1.56	82.99	0.73	0.70	HD
ET66VA	X	62.94	-16.20	-12.08	69.04	-13.23	-12.80	TS
G8ZYMU		77.66	-1.48	-1.10	81.75	-0.51	-0.50	TS
GLEA6P		78.09	-1.05	-0.78	81.20	-1.06	-1.03	TT
HM8HYR		78.48	-0.66	-0.49	82.37	0.10	0.10	HG
KKTYKE		81.81	2.67	1.99	84.58	2.31	2.24	XX
KYV7YJ		79.36	0.22	0.17	82.91	0.65	0.63	TS
L4HFLM	X	64.24	-14.90	-11.11	68.94	-13.33	-12.90	TS
LANNVG		79.40	0.26	0.20	82.54	0.27	0.26	XX
LFGQYG		78.31	-0.83	-0.62	81.69	-0.58	-0.56	TS
M2AM8E		81.17	2.03	1.51	83.32	1.05	1.02	TS
MEXMZ3		79.26	0.12	0.09	83.01	0.75	0.72	TS
NFNATG		79.80	0.66	0.50	82.68	0.42	0.40	MK
PLN7R8		79.68	0.54	0.40	82.99	0.72	0.70	TT
PQKAND		78.00	-1.14	-0.85	81.69	-0.57	-0.56	TS
QADXPF		79.74	0.60	0.45	83.06	0.80	0.77	TS
UDJTZU	X	85.00	5.87	4.37	88.49	6.23	6.03	PE
V6PZ9E		77.55	-1.59	-1.18	80.91	-1.35	-1.31	TS
VYWE26	X	84.74	5.60	4.18	86.37	4.11	3.98	XX
X3AH3E		78.26	-0.88	-0.65	81.55	-0.71	-0.69	TA
X9X7GX		78.50	-0.64	-0.48	81.69	-0.58	-0.56	TT
ZDXKH6		79.38	0.25	0.18	82.26	-0.01	-0.01	VM
ZNMRGH	X	68.44	-10.70	-7.98	71.94	-10.32	-9.99	PP
ZZBX67		78.24	-0.90	-0.67	81.49	-0.78	-0.75	XX

Copyright © 2017 CTS, Inc

Paper & Paperboard Interlaboratory Testing Program
Analysis 390
Directional Brightness

Summary Statistics

	Sample GR43	Sample GR44
Grand Means	79.138 Percent	82.264 Percent
SD Btwn Labs	1.341 Percent	1.033 Percent

Statistics based on 30 of 35 reporting participants

Comments on Assigned Data Flags for Test #390

ZNMRGH (X) - Extreme Data.

UDJTZU (X) - Extreme Data.

ET66VA (X) - Extreme Data.

L4HFLM (X) - Extreme Data.

VYWE26 (X) - Data for both samples are high.

Key to Instrument Codes Reported by Participants

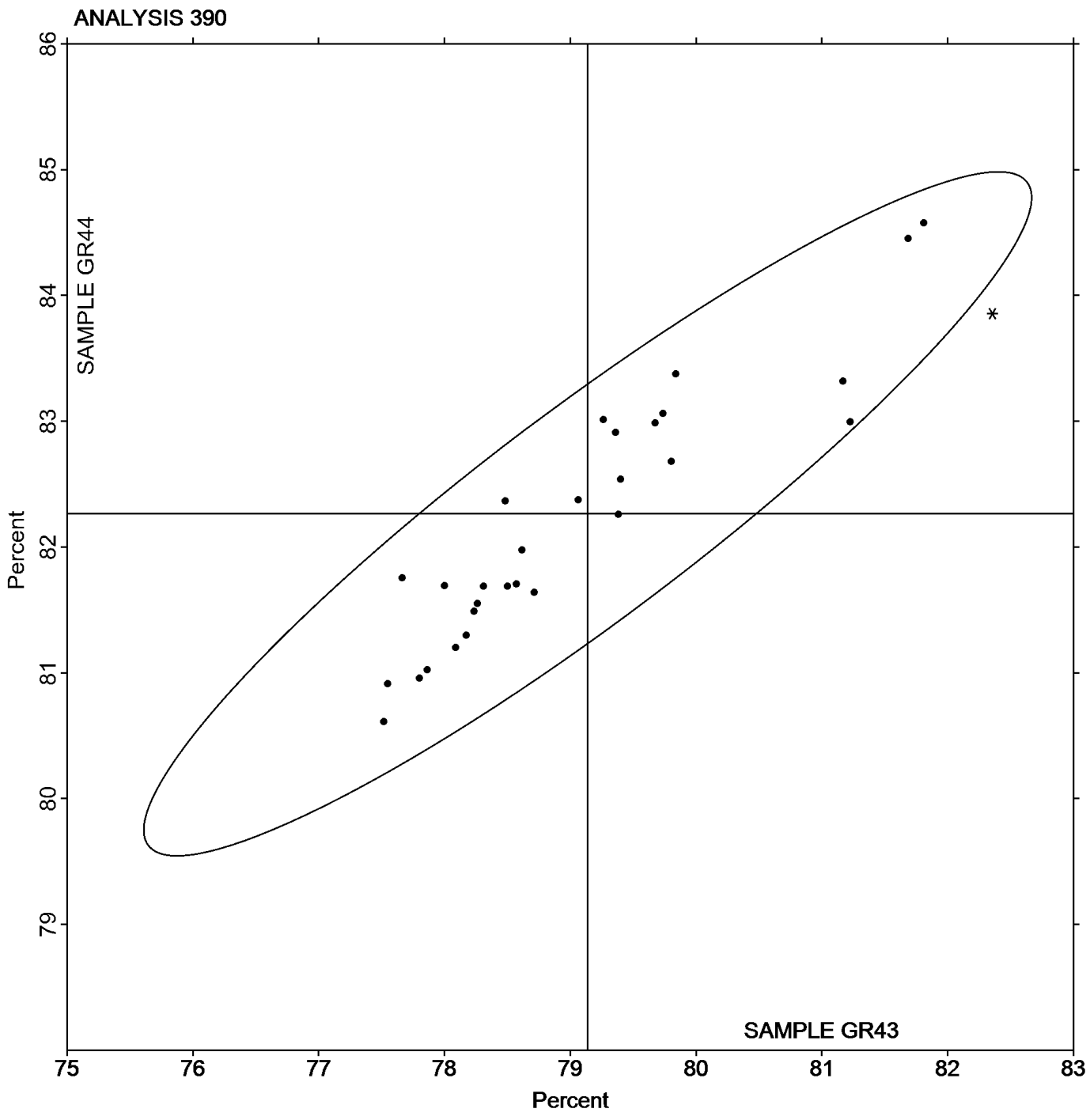
HD	Hunter D25DP - 9000	HG	Hunter Labscan / XE
MK	Macbeth Color-Eye 7000 Spectrophotometer	PE	Photovolt 577
PP	Technidyne Profile/Plus	TA	Technidyne, Diano, M.S. S-4
TS	Technidyne Brightimeter Micro S-5	TT	Technidyne Brightimeter Micro S4-M
VM	Valmet PaperLab (was Kajaani/Robotest)	XS	X-Rite 938 Spectrodensitometer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

Copyright © 2017 CTS, Inc

Paper & Paperboard Interlaboratory Testing Program
Analysis 390
Directional Brightness

Grand Mean Sample **GR43** = 79.138 Percent

Grand Mean Sample **GR44** = 82.264 Percent



Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GZ43 Lab Mean	Sample GZ43 Diff from Grand Mean	Sample GZ43 CPV	Sample GZ44 Lab Mean	Sample GZ44 Diff from Grand Mean	Sample GZ44 CPV	Instr Code
49W3Q3		90.80	-0.44	-0.60	99.38	-0.17	-0.41	TS
4MWUGD		90.87	-0.37	-0.51	99.81	0.26	0.65	TS
676GGC		91.03	-0.21	-0.29	99.55	0.00	0.01	TS
6BW9NZ		90.86	-0.38	-0.52	99.80	0.25	0.63	TS
978ZRW		92.36	1.12	1.54	99.34	-0.21	-0.51	TT
BPJR4K		91.22	-0.02	-0.03	100.23	0.69	1.70	TS
EL8AXC	X	89.52	-1.72	-2.36	97.59	-1.95	-4.84	HT
FY99JM		91.24	0.00	0.00	100.16	0.61	1.52	TT
HAL3VR		90.29	-0.95	-1.31	99.09	-0.46	-1.13	PP
J24YFD		91.08	-0.16	-0.22	99.80	0.25	0.63	TT
JHBBTN		91.36	0.12	0.16	99.76	0.21	0.53	TS
LY7PX8		90.62	-0.62	-0.85	99.38	-0.17	-0.41	TS
MRPDHK		90.58	-0.66	-0.91	99.38	-0.17	-0.41	TS
VYWE26		92.44	1.20	1.65	99.17	-0.37	-0.92	XX
XG8BR3		92.62	1.38	1.90	98.80	-0.75	-1.85	EF
ZF4PQ8	X	93.95	2.71	3.72	97.68	-1.87	-4.63	HT

Summary Statistics

	Sample GZ43	Sample GZ44
Grand Means	91.240 Percent	99.547 Percent
SD Btwn Labs	0.728 Percent	0.404 Percent

Statistics based on 14 of 16 reporting participants

Comments on Assigned Data Flags for Test #391

EL8AXC (X) - Data for sample GZ44 are low.

ZF4PQ8 (X) - Data for sample GZ43 are high and data for sample GZ44 are low.

Key to Instrument Codes Reported by Participants

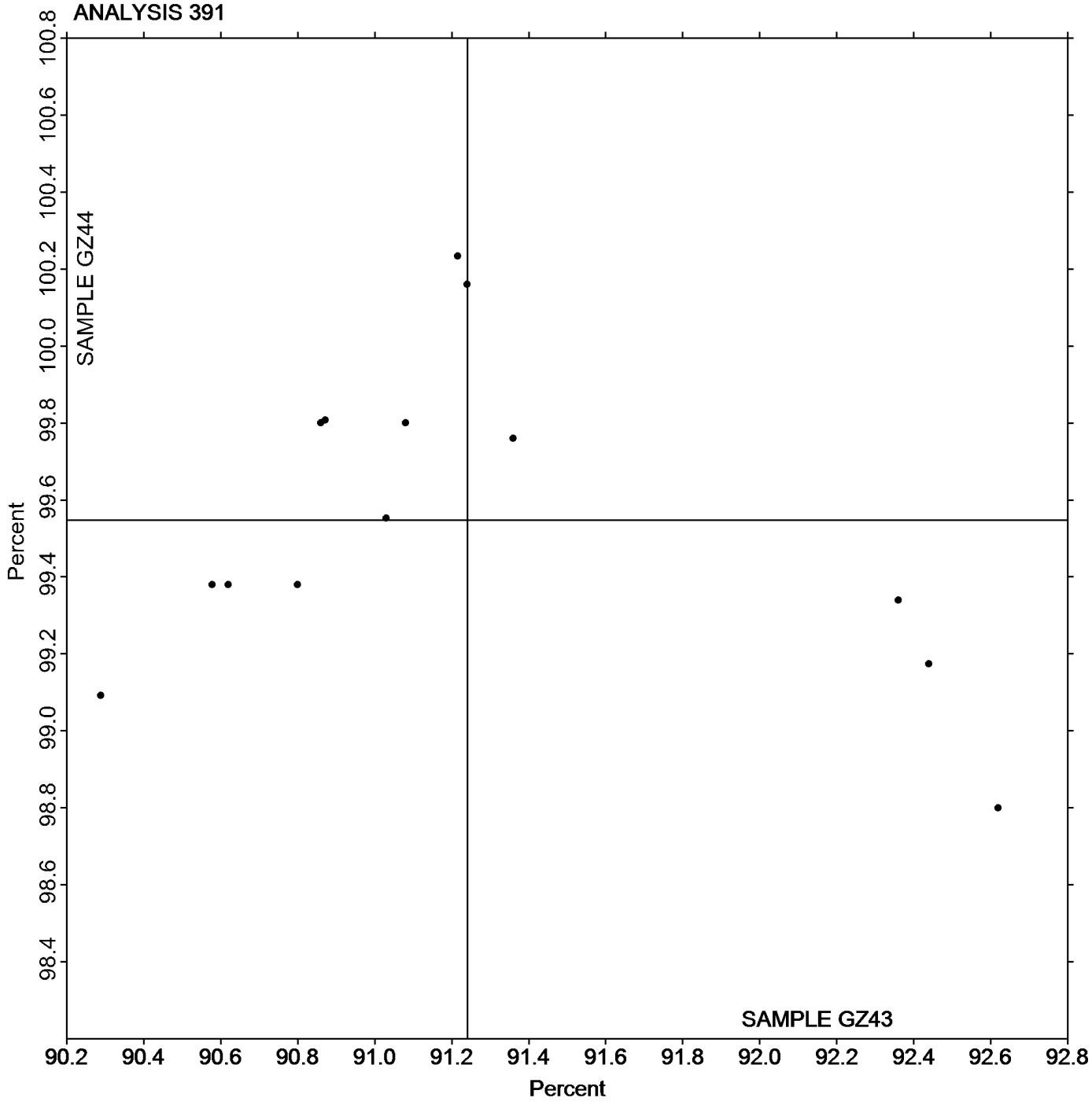
EF	L & W Datacolor Elrepho	HT	Hunter UltraScan Vis
PP	Technidyne Profile/Plus	TS	Technidyne Brightimeter Micro S-5
TT	Technidyne Brightimeter Micro S4-M	XX	Instrument make/model not specified by lab

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GZ43** = 91.240 Percent

Grand Mean Sample **GZ44** = 99.547 Percent



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

Copyright © 2017 CTS, Inc

Paper & Paperboard Interlaboratory Testing Program
Analysis 392
Diffuse Brightness

WebCode	Data Flag	Sample GR43 Lab Mean	Sample GR43 Diff from Grand Mean	Sample GR43 CPV	Sample GR44 Lab Mean	Sample GR44 Diff from Grand Mean	Sample GR44 CPV	Instr Code
27FWGV		78.47	-0.36	-1.02	81.61	-0.31	-0.82	TM
2DJWXC		78.40	-0.43	-1.22	81.44	-0.48	-1.28	TC
2ET89M		78.64	-0.18	-0.51	81.62	-0.29	-0.78	EG
3FDE64		78.98	0.16	0.46	82.16	0.24	0.65	TC
3UW2E2		78.31	-0.51	-1.46	81.54	-0.38	-1.01	EG
48484U		78.78	-0.05	-0.13	81.89	-0.02	-0.07	TC
6BW9NZ		79.27	0.45	1.28	82.18	0.27	0.72	TC
7J88YA	*	79.39	0.57	1.62	82.87	0.96	2.57	LT
9DAPB9		78.93	0.10	0.29	82.07	0.16	0.42	TC
B6E4K2		78.36	-0.46	-1.32	81.35	-0.56	-1.51	TM
BR8F8X		78.65	-0.17	-0.50	81.81	-0.10	-0.27	EF
C3H9AX		79.05	0.23	0.66	82.07	0.15	0.41	TC
C4URDF		78.44	-0.38	-1.09	81.59	-0.32	-0.86	LS
CJ9BQ2		78.90	0.07	0.21	81.91	-0.01	-0.02	TC
EE8TKK		78.94	0.12	0.33	81.97	0.06	0.16	TC
HLXCEC		78.45	-0.37	-1.07	81.26	-0.65	-1.74	TM
K48ATR		78.78	-0.05	-0.14	81.94	0.02	0.07	LA
K7WFDN		79.35	0.53	1.51	82.22	0.30	0.81	TC
PLN7R8		78.34	-0.49	-1.39	81.45	-0.46	-1.24	TL
QADXPF		79.03	0.20	0.58	81.87	-0.04	-0.11	TC
R9YQ4Y		78.90	0.08	0.22	82.10	0.19	0.50	LA
RCA4JC		78.95	0.13	0.37	82.17	0.25	0.68	TC
V6PZ9E	X	80.98	2.15	6.16	83.54	1.62	4.35	TC
X9X7GX		79.65	0.82	2.35	82.51	0.60	1.61	EG
XG8BR3		79.09	0.26	0.76	82.26	0.35	0.94	LA
YJUC9A		78.84	0.01	0.04	81.93	0.02	0.05	TC
YPWGZU		78.51	-0.31	-0.89	81.60	-0.31	-0.84	LS
ZZBX67		78.85	0.03	0.08	82.27	0.36	0.96	EE

Summary Statistics

	Sample GR43	Sample GR44
Grand Means	78.823 Percent	81.913 Percent
SD Btwn Labs	0.350 Percent	0.373 Percent

Statistics based on 27 of 28 reporting participants

Comments on Assigned Data Flags for Test #392

V6PZ9E (X) - Extreme Data.

Copyright © 2017 CTS, Inc

Key to Instrument Codes Reported by Participants

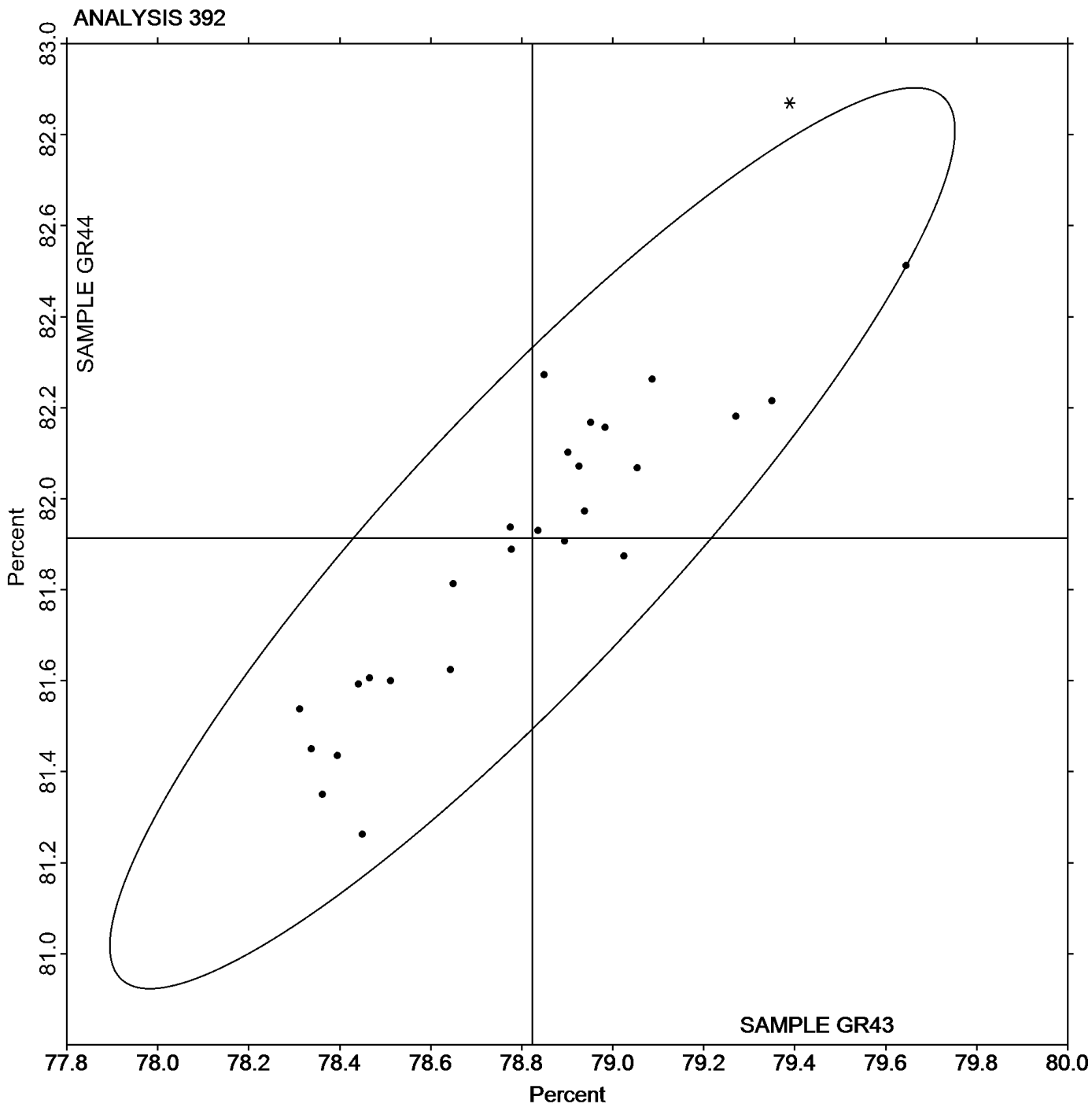
EE	Datacolor Elrepho 2000	EF	Datacolor Elrepho 3000
EG	Datacolor Elrepho 450X	LA	L & W Elrepho - Autoline
LS	L & W Elrepho SE 070	LT	L & W Elrepho SE 071
TC	Technidyne Color Touch Series	TL	Technidyne Technibrite TB-1
TM	Technidyne Technibrite Micro TB-1C		

Copyright © 2017 CTS, Inc

Paper & Paperboard Interlaboratory Testing Program
Analysis 392
Diffuse Brightness

Grand Mean Sample **GR43** = 78.823 Percent

Grand Mean Sample **GR44** = 81.913 Percent



Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GZ43 Lab Mean	Sample GZ43 Diff from Grand Mean	Sample GZ43 CPV	Sample GZ44 Lab Mean	Sample GZ44 Diff from Grand Mean	Sample GZ44 CPV	Instr Code
49W3Q3		3.220	-0.392	-1.63	6.940	-0.501	-1.36	TS
4MWUGD		3.954	0.342	1.42	7.984	0.543	1.48	TS
676GGC		3.910	0.298	1.24	7.910	0.469	1.28	TS
6BW9NZ		3.352	-0.260	-1.08	7.066	-0.375	-1.02	TS
BPJR4K		3.526	-0.086	-0.36	7.614	0.173	0.47	TS
HAL3VR		3.478	-0.134	-0.56	7.270	-0.171	-0.47	PP
J24YFD		3.800	0.188	0.78	7.680	0.239	0.65	TT
LY7PX8		3.700	0.088	0.37	7.620	0.179	0.49	TS
MRPDHK		3.480	-0.132	-0.55	7.216	-0.225	-0.61	TS
VYWE26		3.700	0.088	0.37	7.112	-0.329	-0.90	XX
XG8BR3	X	4.952	1.340	5.57	9.540	2.099	5.72	EF

Summary Statistics

	Sample GZ43	Sample GZ44
Grand Means	3.6120 Percent	7.4412 Percent
SD Btwn Labs	0.2405 Percent	0.3672 Percent

Statistics based on 10 of 11 reporting participants

Comments on Assigned Data Flags for Test #394

XG8BR3 (X) - Data for both samples are high.

Key to Instrument Codes Reported by Participants

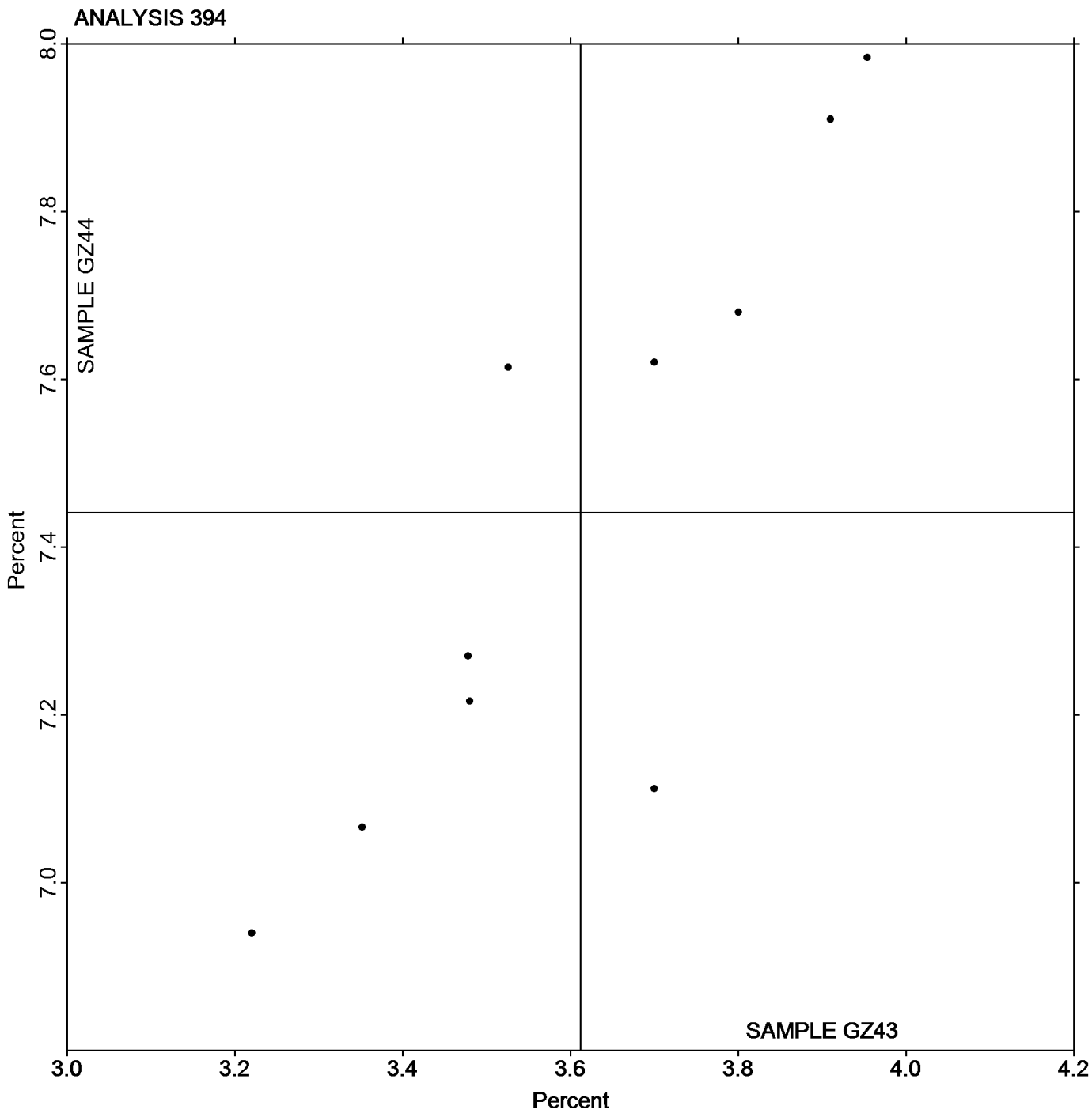
EF	Datacolor Elrepho 3000	PP	Technidyne Profile/Plus
TS	Technidyne Brightimeter Micro S-5	TT	Technidyne Brightimeter Micro S4-M
XX	Instrument make/model not specified by lab		

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GZ43** = 3.6120 Percent

Grand Mean Sample **GZ44** = 7.4412 Percent



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

Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GT43 Lab Mean	Sample GT43 Diff from Grand Mean	Sample GT43 CPV	Sample GT44 Lab Mean	Sample GT44 Diff from Grand Mean	Sample GT44 CPV	Instr Code
2DELXZ	X	91.34	14.86	6.87	91.55	15.49	8.81	TH
3TLZR3	X	68.58	-7.90	-3.65	69.46	-6.60	-3.76	XX
3UW2E2		75.66	-0.82	-0.38	75.73	-0.33	-0.19	GM
4ATDNQ		72.47	-4.01	-1.86	71.83	-4.23	-2.41	LA
4UTEGZ		74.85	-1.63	-0.76	75.48	-0.58	-0.33	LA
6V8M3T		76.79	0.31	0.14	76.35	0.29	0.16	TH
978ZRW	*	80.70	4.22	1.95	76.53	0.47	0.27	TG
B6E4K2		77.57	1.09	0.50	76.91	0.85	0.48	TH
DAVMAK		77.68	1.20	0.55	77.33	1.27	0.72	TH
F79LMW		77.31	0.83	0.38	76.23	0.17	0.09	VM
HAL3VR		77.04	0.56	0.26	78.52	2.46	1.40	PP
J4BVRL		76.78	0.30	0.14	76.00	-0.06	-0.04	GM
MRPDHK		75.53	-0.95	-0.44	75.11	-0.95	-0.54	LA
NFNATG		77.83	1.35	0.62	76.39	0.33	0.19	PP
PLN7R8		74.44	-2.04	-0.95	75.55	-0.51	-0.29	GS
V6PZ9E		78.76	2.27	1.05	78.71	2.64	1.51	TG
X9X7GX		77.31	0.83	0.38	76.19	0.13	0.07	TH
YJUC9A		71.54	-4.94	-2.29	72.18	-3.88	-2.21	ZH
YPWGZU		76.93	0.45	0.21	76.81	0.75	0.42	LB
ZDXKH6		77.53	1.05	0.48	77.29	1.23	0.70	VM

Summary Statistics

	Sample GT43	Sample GT44
Grand Means	76.484 Gloss Units	76.063 Gloss Units
SD Btwn Labs	2.163 Gloss Units	1.757 Gloss Units

Statistics based on 18 of 20 reporting participants

Comments on Assigned Data Flags for Test #395

3TLZR3 (X) - Data for both samples are low. Inconsistent within the determinations of sample GT43.

2DELXZ (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

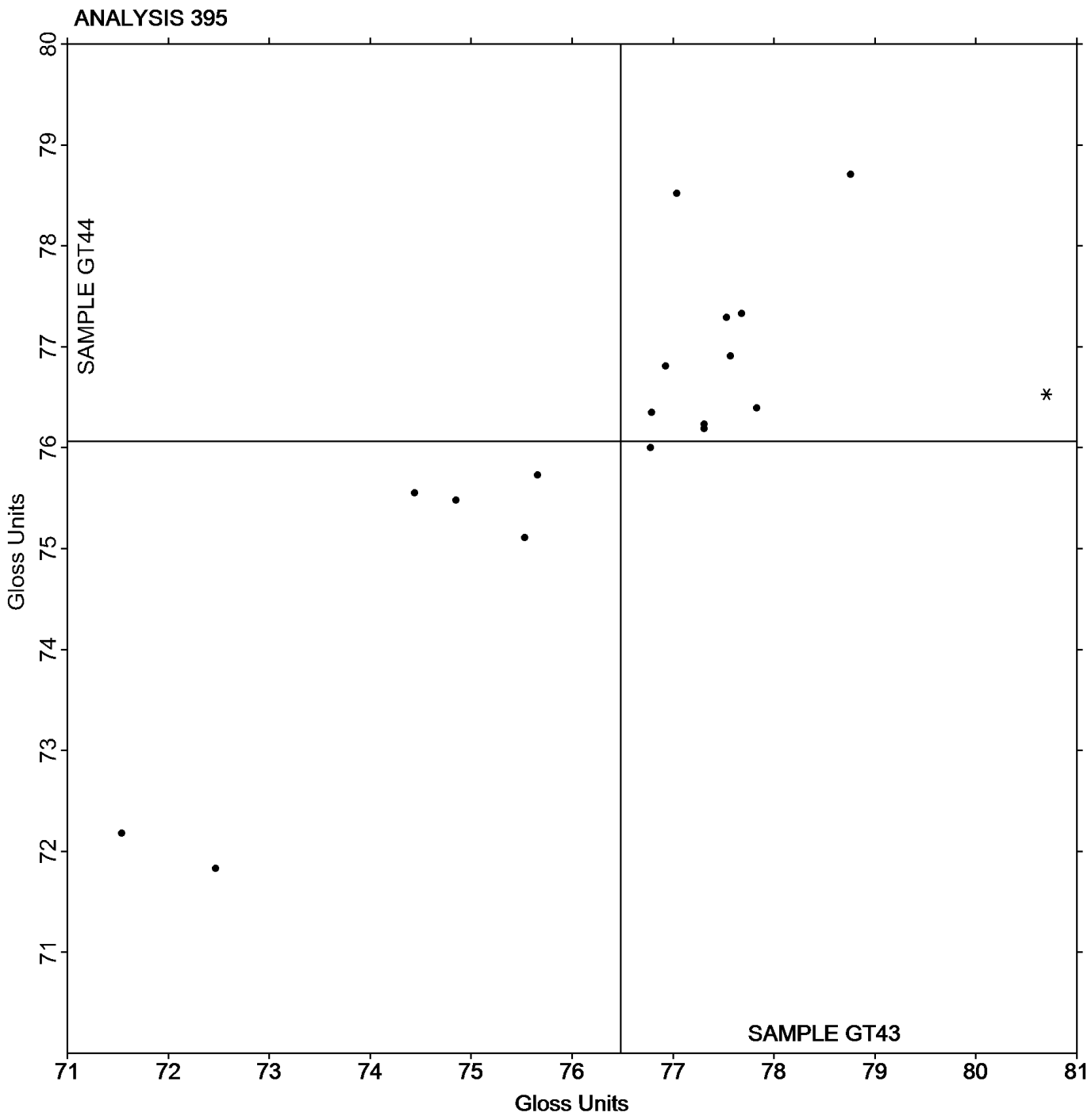
GM	BYK-Gardner micro-gloss	GS	BYK-Gardner Glossgard II
LA	L & W Gloss - Autoline 300	LB	L & W Gloss Tester Code 224
PP	Technidyne Profile/Plus	TG	Technidyne T480
TH	Technidyne T480A	VM	Valmet PaperLab (was Kajaani/Robotest)
XX	Instrument make/model not specified by lab	ZH	Zehntner ZLR 1050

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GT43** = 76.484 Gloss Units

Grand Mean Sample **GT44** = 76.063 Gloss Units



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

Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GU43 Lab Mean	Sample GU43 Diff from Grand Mean	Sample GU43 CPV	Sample GU44 Lab Mean	Sample GU44 Diff from Grand Mean	Sample GU44 CPV	Instr Code
8ZQHZ3		42.64	0.03	0.02	29.99	2.10	0.94	TH
CJ9BQ2		44.47	1.86	1.22	29.90	2.01	0.90	TH
PM7ZV3		42.65	0.04	0.02	26.58	-1.31	-0.59	XX
QADXPF		43.83	1.22	0.80	31.92	4.03	1.80	TH
V6PZ9E		39.99	-2.62	-1.73	25.73	-2.16	-0.97	TG
X3AH3E		42.61	-0.01	-0.01	26.74	-1.16	-0.52	TH
XG8BR3		44.37	1.76	1.16	28.04	0.15	0.07	TG
YPWGZU		40.77	-1.84	-1.21	25.36	-2.53	-1.13	LA
YWKWWD		42.19	-0.42	-0.28	26.79	-1.10	-0.49	PP

Summary Statistics

	Sample GU43	Sample GU44
Grand Means	42.613 Gloss Units	27.894 Gloss Units
SD Btwn Labs	1.520 Gloss Units	2.237 Gloss Units

Statistics based on 9 of 9 reporting participants

Key to Instrument Codes Reported by Participants

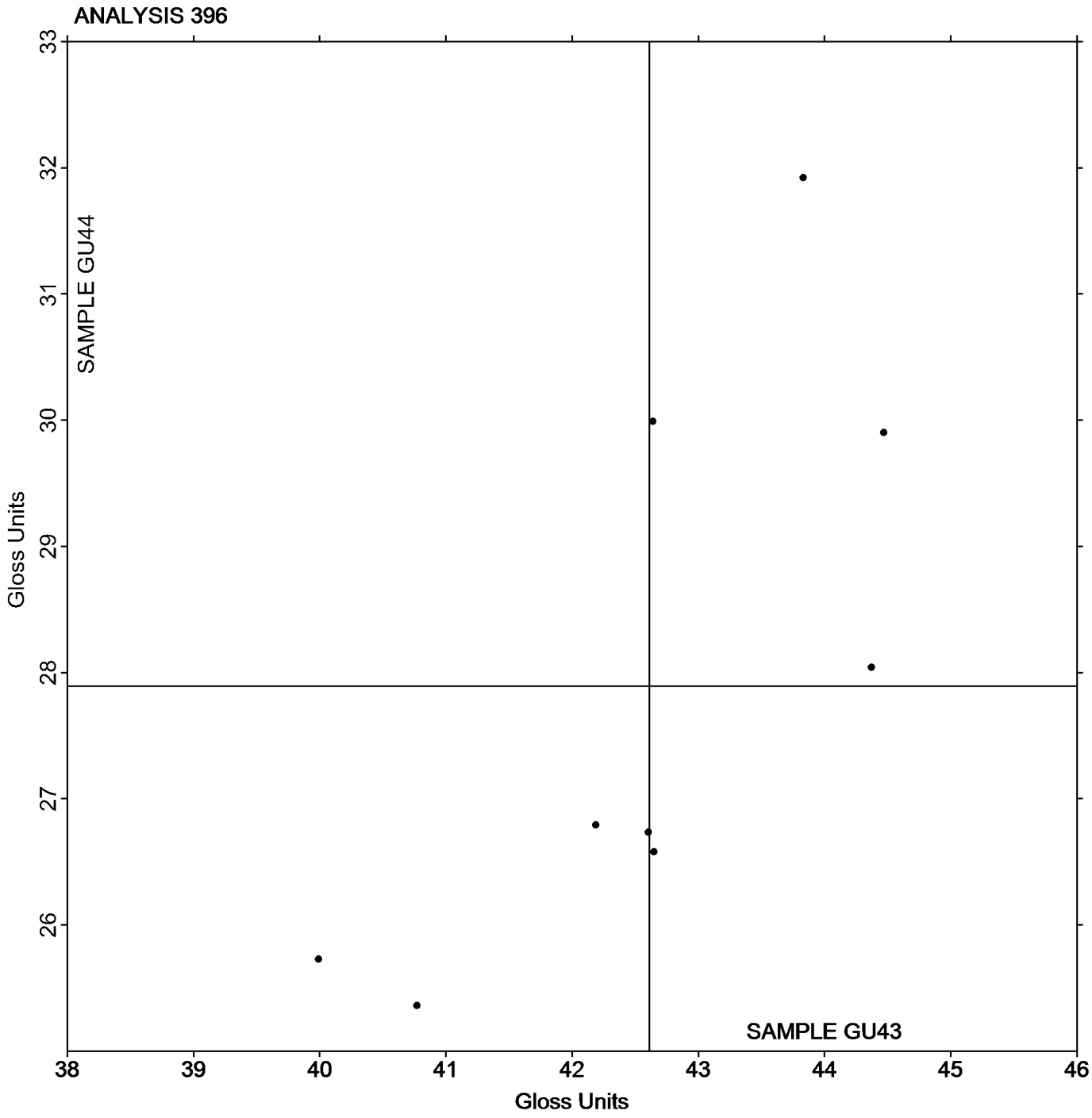
LA	L & W Gloss - Autoline 300	PP	Technidyne Profile/Plus
TG	Technidyne T480	TH	Technidyne T480A
XX	Instrument make/model not specified by lab		

Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GU43** = 42.613 Gloss Units

Grand Mean Sample **GU44** = 27.894 Gloss Units



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

Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GW43 Lab Mean	Sample GW43 Diff from Grand Mean	Sample GW43 CPV	Sample GW44 Lab Mean	Sample GW44 Diff from Grand Mean	Sample GW44 CPV
3FDE64		74.12	0.62	1.29	89.65	0.40	0.57
64YWUC		73.90	0.40	0.83	89.80	0.55	0.78
76MUC3		73.07	-0.42	-0.87	89.06	-0.19	-0.27
77K6AQ		74.39	0.90	1.85	90.16	0.90	1.29
7LC3CL		73.22	-0.28	-0.58	88.95	-0.30	-0.42
7NEHPV	*	74.25	0.75	1.55	88.78	-0.47	-0.67
8VJUM2		73.39	-0.11	-0.22	89.78	0.53	0.75
8ZQHZ3		73.37	-0.12	-0.26	89.18	-0.07	-0.10
C4URDF		73.37	-0.13	-0.26	89.17	-0.08	-0.12
CJ9BQ2		74.53	1.04	2.14	89.92	0.67	0.96
D64CHV		73.71	0.21	0.44	89.34	0.09	0.12
EL8AXC	*	74.09	0.59	1.22	91.10	1.84	2.62
GPEXQK		73.64	0.14	0.30	90.13	0.88	1.25
HM8HYR		73.38	-0.11	-0.24	88.59	-0.66	-0.94
J4BVRL		72.96	-0.53	-1.10	88.74	-0.51	-0.73
JHBBTN		73.31	-0.19	-0.38	89.38	0.13	0.18
KW68KK		73.07	-0.43	-0.88	88.30	-0.95	-1.36
LANNVG		73.33	-0.16	-0.34	88.67	-0.58	-0.83
LFGQYG		73.41	-0.09	-0.18	88.53	-0.72	-1.03
LY7PX8		73.34	-0.16	-0.32	89.37	0.12	0.17
PM7ZV3		73.03	-0.46	-0.96	88.83	-0.43	-0.61
QVTHLG		73.75	0.26	0.53	90.47	1.22	1.74
UQQFBC		73.68	0.18	0.38	89.27	0.01	0.02
X3AH3E		73.51	0.02	0.03	89.01	-0.24	-0.34
XG8BR3	X	36.80	-36.70	-75.63	44.70	-44.55	-63.38
XJDWF3		73.49	0.00	0.00	89.51	0.25	0.36
YPWGZU		73.46	-0.04	-0.07	89.33	0.08	0.11
Z8YE6B		72.34	-1.16	-2.39	87.72	-1.54	-2.18
ZF4PQ8		72.70	-0.80	-1.65	88.47	-0.79	-1.12
ZZBX67		73.56	0.06	0.13	89.13	-0.12	-0.17

Summary Statistics

	Sample GW43	Sample GW44
Grand Means	73.496 g/sq m	89.253 g/sq m
SD Btwn Labs	0.485 g/sq m	0.703 g/sq m

Statistics based on 29 of 30 reporting participants

Comments on Assigned Data Flags for Test #398

XG8BR3 (X) - Extreme Data.

Copyright © 2017 CTS, Inc

Analysis Notes:

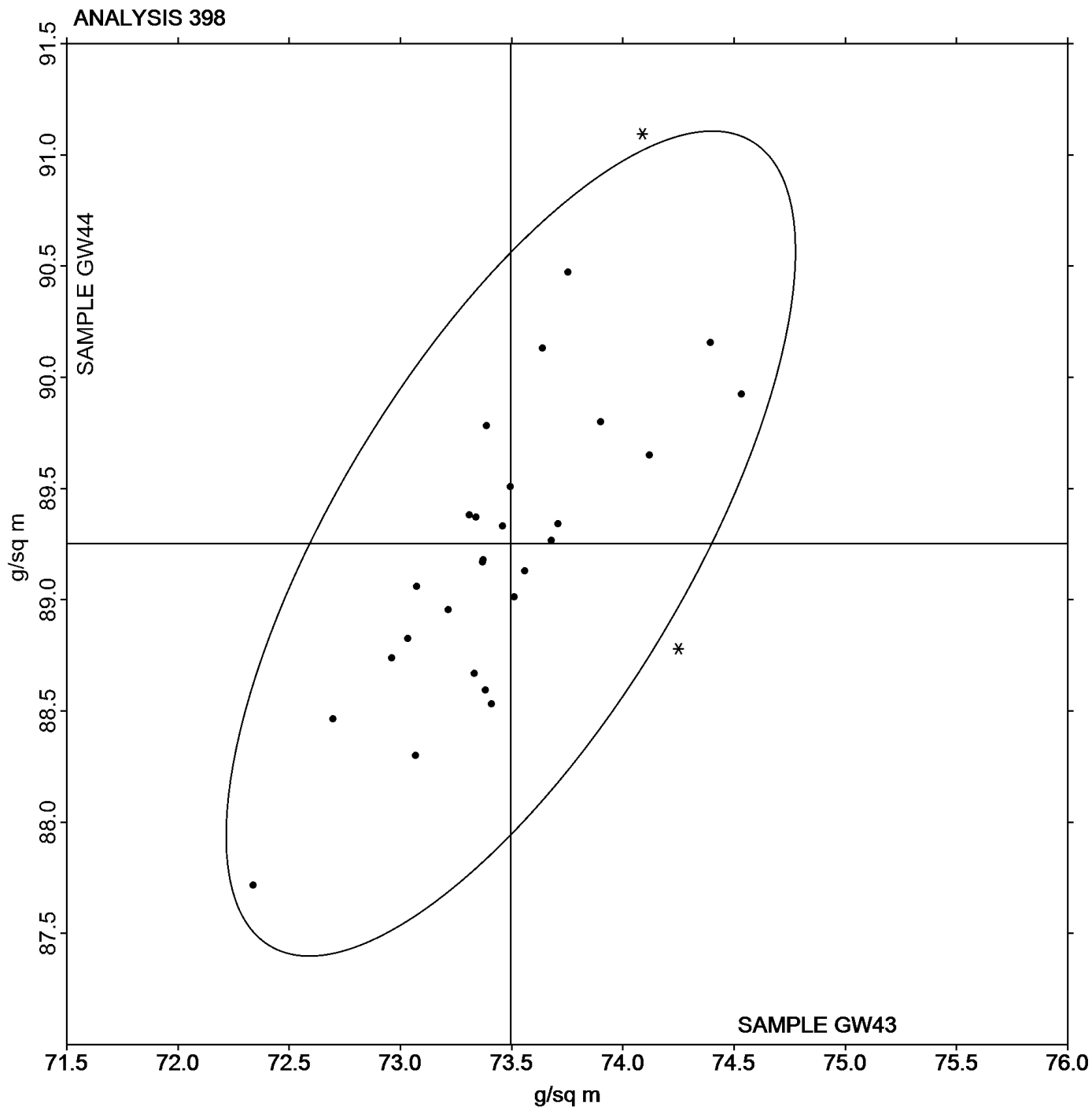
LANNVG - Data appear to be off by a factor of .01; data converted by CTS (x100).

 Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GW43** = 73.496 g/sq m

Grand Mean Sample **GW44** = 89.253 g/sq m



Copyright © 2017 CTS, Inc

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

WebCode	Data Flag	Sample GX43 Lab Mean	Sample GX43 Diff from Grand Mean	Sample GX43 CPV	Sample GX44 Lab Mean	Sample GX44 Diff from Grand Mean	Sample GX44 CPV
2DELXZ		19.83	1.01	0.17	22.97	6.00	1.25
3N9EJV		25.10	6.28	1.07	20.00	3.03	0.63
48484U		16.93	-1.89	-0.32	13.75	-3.22	-0.67
49W3Q3		14.54	-4.28	-0.73	12.58	-4.39	-0.91
4MWUGD		9.78	-9.04	-1.54	12.31	-4.66	-0.97
4UTEGZ		12.79	-6.03	-1.03	9.72	-7.25	-1.51
676GGC		20.68	1.86	0.32	22.26	5.29	1.10
7J88YA		21.92	3.10	0.53	18.25	1.28	0.27
9Z9UE2		12.42	-6.40	-1.09	12.14	-4.83	-1.01
AGDH68		18.16	-0.66	-0.11	15.62	-1.35	-0.28
AZ377M		28.43	9.61	1.63	21.56	4.59	0.95
BN2ZRE		24.77	5.95	1.01	20.21	3.24	0.67
BPJR4K		21.26	2.44	0.41	16.92	-0.05	-0.01
CJ9BQ2		23.93	5.11	0.87	21.27	4.30	0.89
F79LMW		22.20	3.38	0.57	23.60	6.63	1.38
FY99JM		13.00	-5.82	-0.99	11.56	-5.41	-1.13
G8ZYMU	X	17.38	-1.44	-0.25	27.67	10.70	2.23
GLEA6P		19.62	0.80	0.14	14.07	-2.90	-0.60
GMPBTA	X	22.05	3.23	0.55	30.72	13.75	2.86
JHBBTN		11.40	-7.42	-1.26	11.30	-5.67	-1.18
JM3FMR		30.72	11.90	2.02	26.39	9.42	1.96
KKTYKE		9.82	-9.00	-1.53	9.16	-7.81	-1.63
LANNVG		24.16	5.34	0.91	18.53	1.56	0.32
LFGQYG		24.10	5.28	0.90	24.00	7.03	1.46
MEXMZ3		15.20	-3.62	-0.62	13.80	-3.17	-0.66
MRPDHK		17.01	-1.81	-0.31	14.49	-2.48	-0.52
NFNATG		13.81	-5.02	-0.85	12.65	-4.33	-0.90
QHAQ7M		29.10	10.28	1.75	22.07	5.10	1.06
UDJTZU		16.95	-1.87	-0.32	19.90	2.93	0.61
YWKWWD		14.72	-4.10	-0.70	14.12	-2.85	-0.59
Z8YE6B		13.57	-5.25	-0.89	17.05	0.08	0.02

Summary Statistics

	Sample GX43	Sample GX44
Grand Means	18.825 Seconds	16.974 Seconds
SD Btwn Labs	5.885 Seconds	4.807 Seconds

Statistics based on 29 of 31 reporting participants

Comments on Assigned Data Flags for Test #399

G8ZYMU (X) - Inconsistent in testing between samples. Inconsistent within the determinations of sample GX44.

GMPBTA (X) - Data for sample GX44 are high. Inconsistent within the determinations of sample GX44.

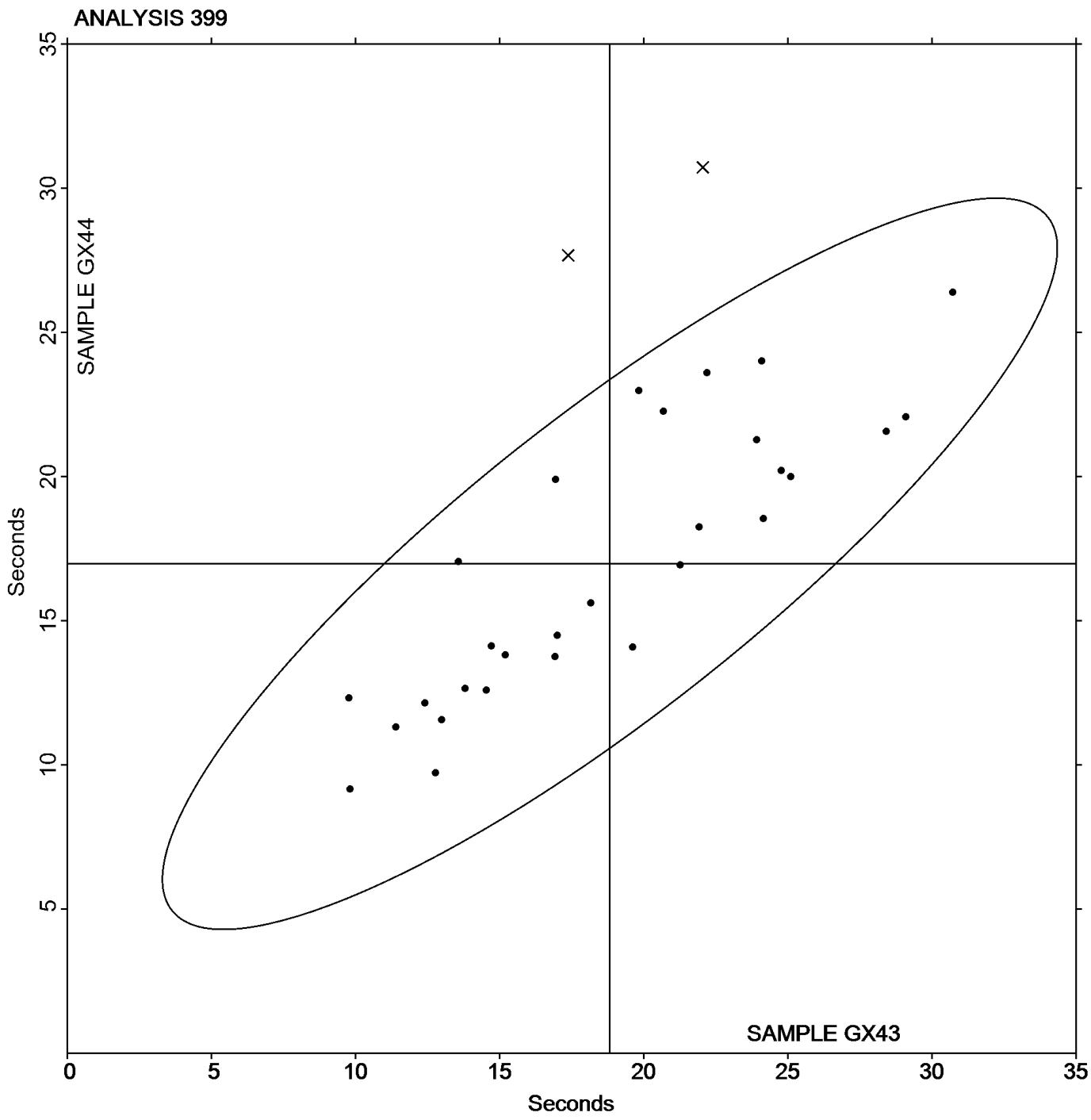
Copyright © 2017 CTS, Inc

 Copyright © 2017 CTS, Inc

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

Grand Mean Sample **GX43** = 18.825 Seconds

Grand Mean Sample **GX44** = 16.974 Seconds



Copyright © 2017 CTS, Inc