Collaborative Testing Services, Inc.

Paper & Paperboard Testing Program

Summary Report #3092 G - December 2020

Introduction to the Paper & Paperboard Interlaboratory Program

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The CTS Paper & Paperboard Interlaboratory Program

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

About CTS

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

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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:

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.

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.

Web Code	Data Flag	Samples	Hunter L, a, b Color Values L	a	b	Color Difference Values ΔL	Δa	Δb	ΔE	Instr Code
2RVBGE		GA85	95.04	-0.82	3.96	-0.10	-0.01	0.00	0.10	EH
		GA86	94.94	-0.83	3.96					
43NAJ6		GA85	94.07	-1.08	4.26	-0.13	0.25	-0.09	0.30	HG
		GA86	93.94	-0.83	4.17					
793YVB		GA85	94.76	-0.63	4.25	-0.01	-0.01	-0.04	0.04	LS
		GA86	94.75	-0.64	4.21					
7CQBUF		GA85	92.97	-0.14	3.85	0.01	-0.13	0.12	0.18	TS
		GA86	92.98	-0.28	3.97					
7Y2ETH		GA85	93.52	-0.66	3.86	-0.03	0.01	0.03	0.04	TC
		GA86	93.50	-0.65	3.89					
9GVT7D		GA85	93.15	-0.47	3.73	-0.06	-0.12	0.02	0.14	TS
		GA86	93.09	-0.59	3.76					
BTZQ6X		GA85	93.58	-0.84	4.10	0.05	0.00	0.00	0.05	TC
		GA86	93.63	-0.84	4.10					
EMD8C7		GA85	94.84	-0.81	3.90	0.33	0.00	0.08	0.34 X	XS
		GA86	95.17	-0.82	3.97					
FD6XJ7		GA85	94.24	-0.79	4.00	-0.07	0.00	-0.03	0.08	HE
		GA86	94.16	-0.80	3.98					
GJ6YX7		GA85	95.02	-0.73	4.05	0.01	0.01	-0.03	0.03	TC
		GA86	95.04	-0.72	4.02					
HRY4Q8		GA85	94.96	-0.91	4.18	0.08	0.00	-0.04	0.09	LS
		GA86	95.04	-0.91	4.14					
J6LVQ2		GA85	93.52	-0.52	3.88	0.01	0.01	-0.04	0.04	LA
		GA86	93.53	-0.51	3.84					
T8ZHFR		GA85	92.00	-0.26	2.96	0.02	0.02	0.04	0.05	TS
		GA86	92.02	-0.24	3.00					
U9P7DD		GA85	93.01	-0.47	3.84	0.08	0.04	0.06	0.11	TS
		GA86	93.09	-0.43	3.90					
UCNGAD		GA85	93.75	-0.78	4.39	-0.02	0.00	0.07	0.08	VM
		GA86	93.72	-0.78	4.46					
UHFRJC		GA85	92.72	-0.17	3.78	0.05	-0.01	-0.02	0.05	TS
		GA86	92.76	-0.19	3.76					

Paper & Paperboard Interlaboratory Testing Program

Report #3092 G, December 2020

Analysis 350

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 L	a	b	Color Difference Values ΔL	Δa	Δb	ΔE	Instr Code
W7NC7J		**GA85**	93.76	-0.86	4.04	0.00	0.00	0.04	0.04	XX
		GA86	93.76	-0.86	4.08					

Summary Statistics

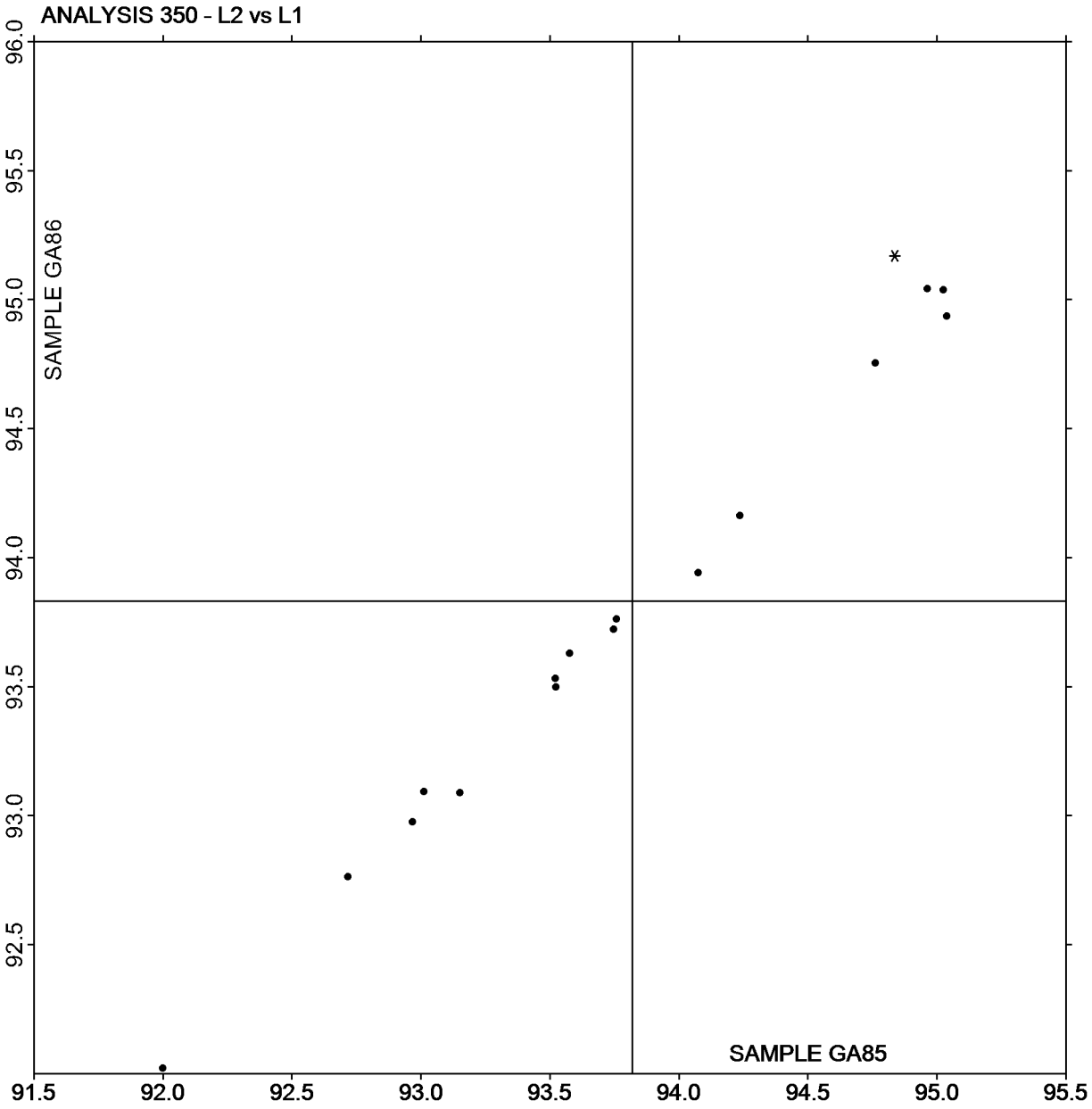
Grand Means							
GA85	93.818	-0.645	3.943	0.013	0.003	0.010	0.105
GA86	93.831	-0.641	3.954				
Stnd Dev Btwn Labs							
GA85	0.901	0.268	0.313	0.102	0.078	0.055	0.090
GA86	0.916	0.234	0.301				

Statistics based on 17 of 17 reporting participants

Key to Instrument Codes Reported by Participants

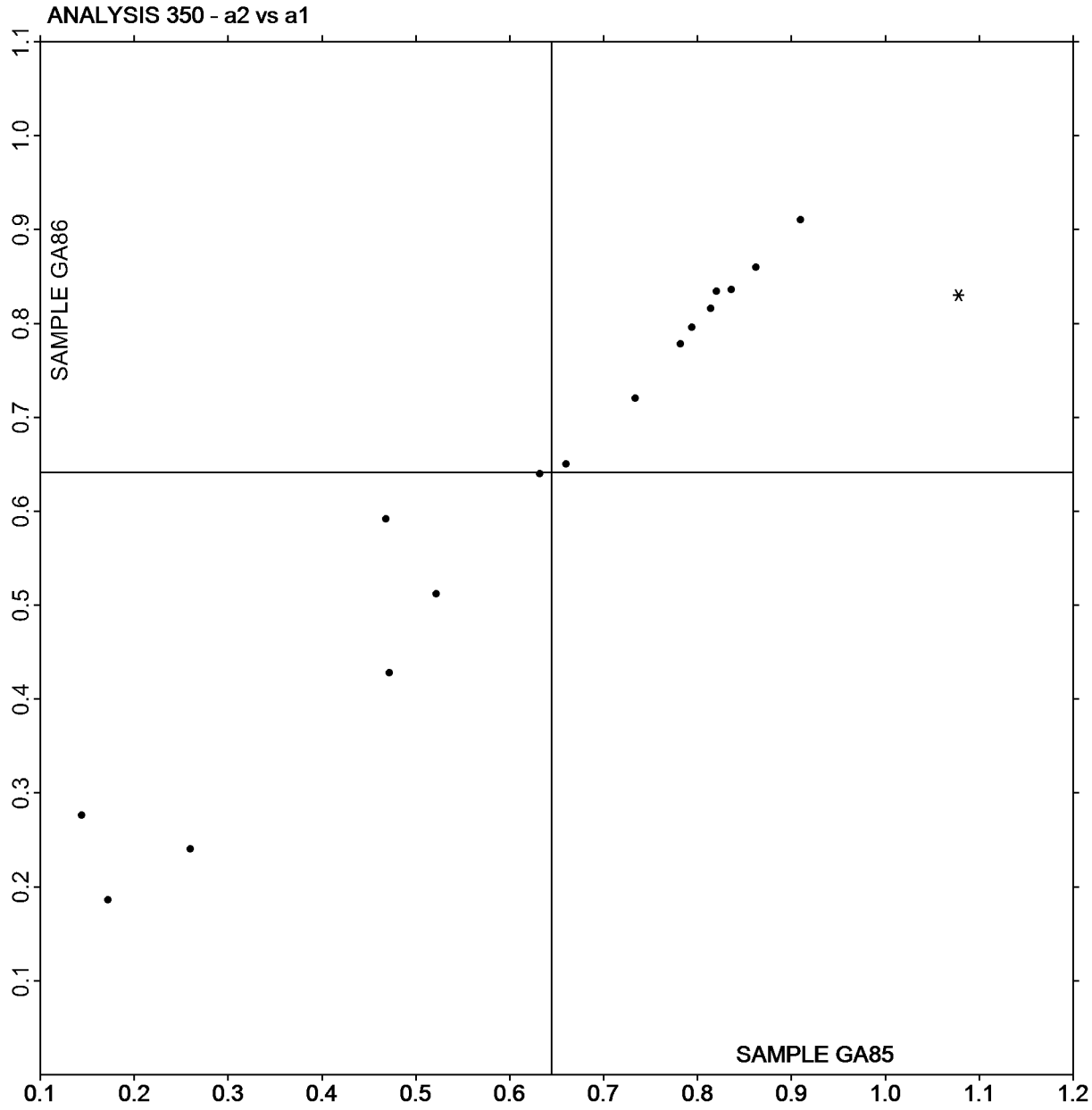
EH	Datacolor Elrepho SF450	HE	Hunter LabScan
HG	Hunter ColorQUEST	LA	L & W Elrepho AL300
LS	L & W Elrepho SE 070	TC	Technidyne Color Touch Series
TS	Technidyne Brightimeter Micro S-5	VM	Valmet PaperLab (was Kajaani/Robotest)
XS	X-Rite 938 Spectrodensitometer	XX	Instrument make/model not specified by lab

Plot of L values GA86 vs L values GA85



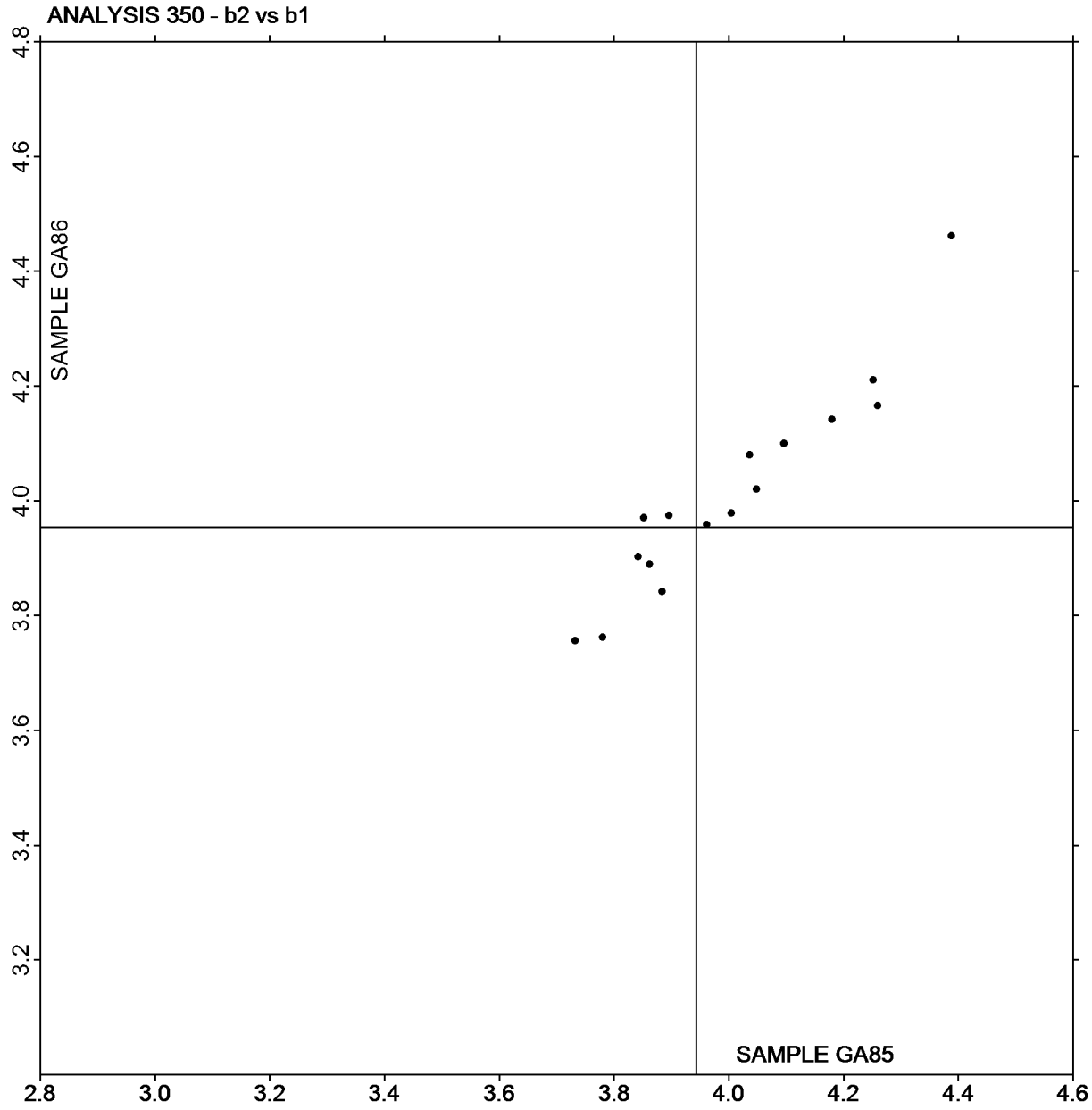
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

Plot of a values GA86 vs a values GA85



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

Plot of b values GA86 vs b values GA85



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 #3092 G, December 2020

Analysis 351

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 L*	a*	b*	Color Difference Values ΔL*	Δa*	Δb*	ΔE*	InstrCode
27FTAJ		GA85	95.22	-0.64	4.15	-0.03	-0.01	0.01	0.03	HT
		GA86	95.19	-0.65	4.16					
2RVBGE		GA85	95.04	-0.82	3.94	-0.06	-0.01	0.06	0.09	EH
		GA86	94.98	-0.83	4.00					
6AG264		GA85	95.02	-0.68	4.17	0.00	0.01	-0.02	0.02	EF
		GA86	95.03	-0.67	4.16					
793YVB		GA85	94.75	-0.63	4.20	-0.02	-0.01	0.09	0.09	LS
		GA86	94.73	-0.64	4.29					
AMF9AB		GA85	95.01	-0.86	4.16	-0.01	0.00	0.06	0.06	EH
		GA86	95.00	-0.87	4.22					
G34UWN		GA85	93.54	-0.54	3.74	-0.01	-0.01	0.01	0.02	XB
		GA86	93.53	-0.55	3.75					
HNG2LM		GA85	93.51	-0.69	3.98	0.01	0.00	0.06	0.06	TC
		GA86	93.52	-0.69	4.04					
NQ8GCJ		GA85	94.89	-0.62	4.30	0.01	-0.01	0.00	0.01	EH
		GA86	94.90	-0.64	4.31					
TLKZBG		GA85	95.06	-0.65	4.27	-0.05	0.00	-0.04	0.06	XC
		GA86	95.02	-0.65	4.23					
WH2CZR		GA85	94.03	-0.56	4.02	0.96	0.00	0.06	0.97 X	NG
		GA86	94.99	-0.56	4.07					
Y2QAFP		GA85	94.90	-0.66	4.27	-0.01	0.01	0.07	0.07	HT
		GA86	94.89	-0.65	4.34					
Y72MWN		GA85	94.93	-0.63	4.19	-0.02	0.01	0.06	0.07	LS
		GA86	94.91	-0.62	4.25					
ZM6G4M		GA85	94.28	-0.56	3.74	0.01	0.00	0.05	0.05	HE
		GA86	94.29	-0.55	3.79					

Summary Statistics

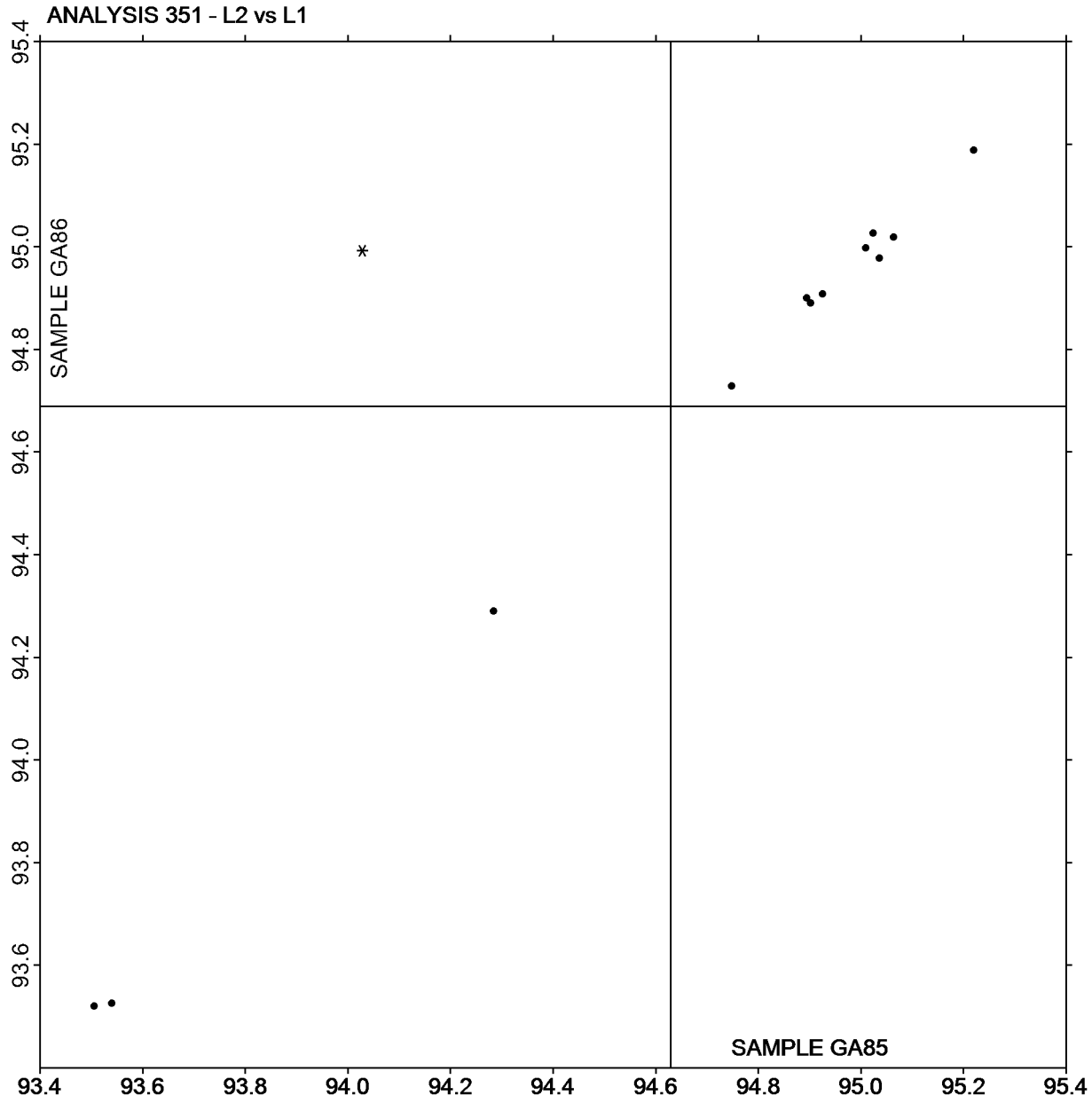
Grand Means							
GA85	94.629	-0.658	4.087	0.060	-0.001	0.037	0.123
GA86	94.689	-0.658	4.124				
Stnd Dev Btwn Labs							
GA85	0.590	0.094	0.190	0.272	0.007	0.038	0.255
GA86	0.559	0.095	0.187				

Statistics based on 13 of 13 reporting participants

Key to Instrument Codes Reported by Participants

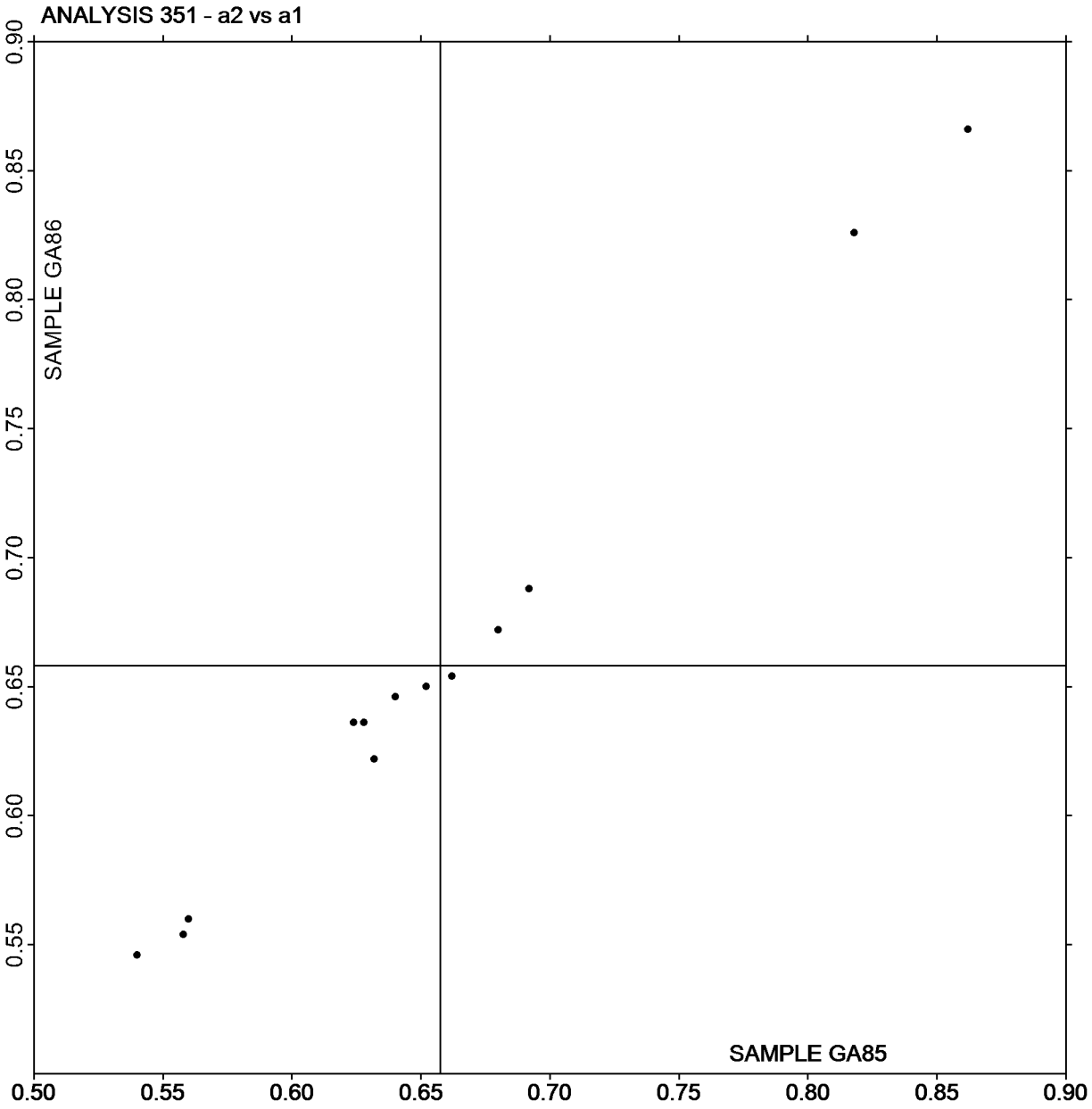
EF	Datacolor Elrepho 3000	EH	Datacolor Elrepho SF450
HE	Hunter LabScan	HT	Hunter UltraScan Vis
LS	L & W Elrepho SE 070	NG	Minolta CM-3700d Spectrophotometer
TC	Technidyne Color Touch Series	XB	X-Rite Ci7
XC	X-Rite eXact Series		

Plot of L values GA86 vs L values GA85



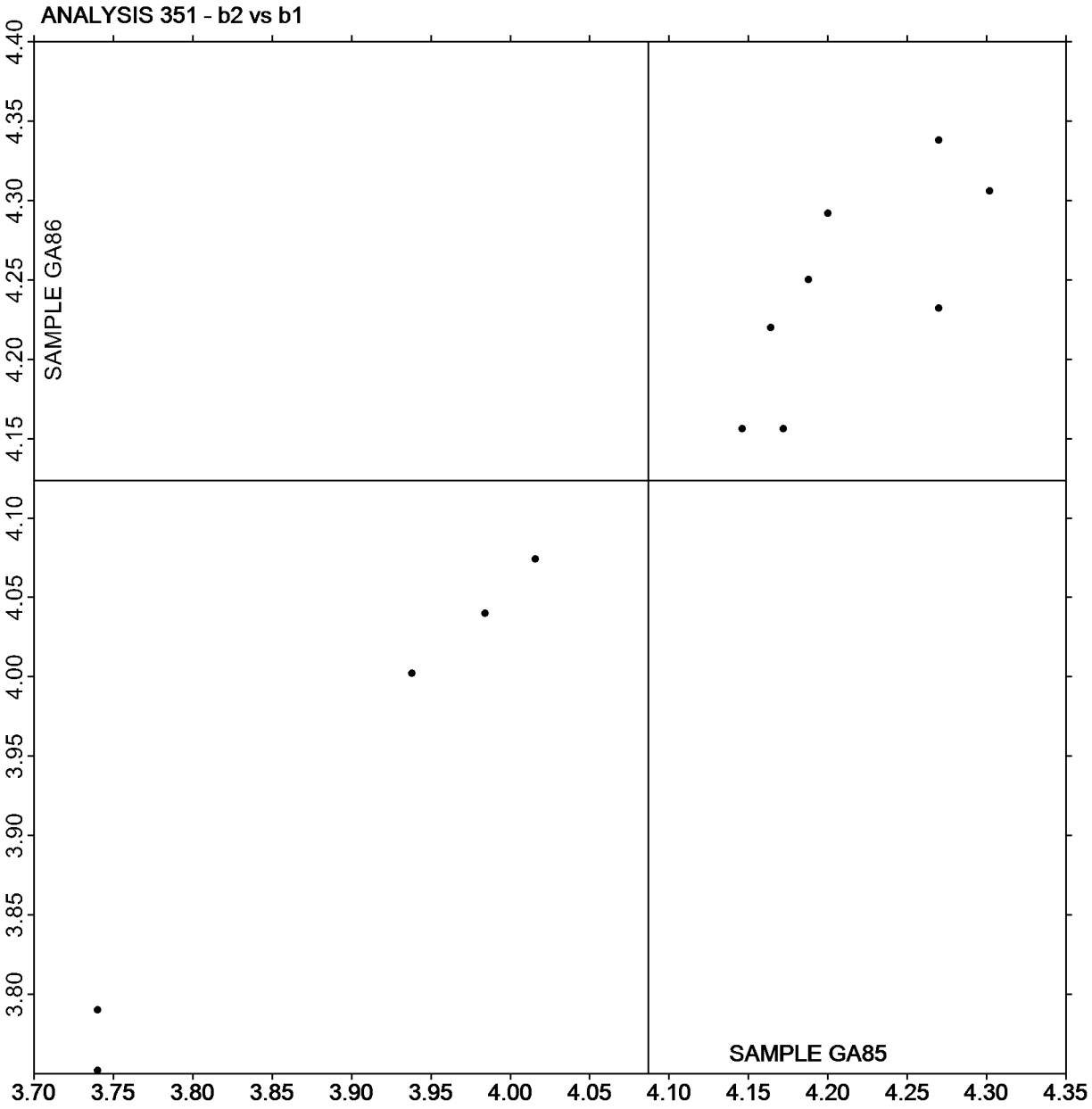
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

Plot of a values GA86 vs a values GA85



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

Plot of b values GA86 vs b values GA85



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

Paper & Paperboard Interlaboratory Testing Program

Analysis 360

Thickness (Caliper), Printing papers

TAPPI Official Test Method T411

WebCode	Data Flag	Sample GV85 Lab Mean	Sample GV85 Diff from Grand Mean	Sample GV85 CPV	Sample GV86 Lab Mean	Sample GV86 Diff from Grand Mean	Sample GV86 CPV	Instr Code
27FTAJ	*	5.104	0.143	1.64	4.951	0.000	0.00	EM
2RVBGE		5.026	0.065	0.74	4.986	0.035	0.49	EM
3GU3C3		5.056	0.095	1.09	5.033	0.082	1.14	EM
3HKAVE		4.842	-0.119	-1.36	4.878	-0.073	-1.01	PP
4FE4TD		4.922	-0.039	-0.45	4.902	-0.049	-0.68	TA
4H3ERJ		5.054	0.093	1.07	5.034	0.083	1.16	LW
4QBAMC		4.874	-0.087	-0.99	4.886	-0.065	-0.90	TM
4YRPEL		4.918	-0.043	-0.49	4.976	0.025	0.35	TM
79RZYF		5.012	0.051	0.58	4.947	-0.004	-0.05	PP
7CQBUF	X	4.620	-0.341	-3.91	4.679	-0.272	-3.78	TM
8WRN4E		4.973	0.012	0.14	4.909	-0.042	-0.58	PP
9E8G89		4.843	-0.118	-1.35	4.837	-0.114	-1.58	TA
9GVT7D		4.878	-0.083	-0.95	4.885	-0.066	-0.91	LA
9YB38E		5.024	0.063	0.73	5.012	0.061	0.85	LW
A9VT7C		5.035	0.074	0.85	5.012	0.061	0.85	TM
AWFYTX		4.949	-0.012	-0.14	4.900	-0.051	-0.70	PP
BPDAMD		4.997	0.036	0.41	5.000	0.049	0.68	LW
CBBZJ4		4.906	-0.055	-0.63	4.866	-0.085	-1.17	XX
CDYCHA		4.977	0.016	0.19	5.024	0.073	1.02	LW
EMD8C7		4.830	-0.131	-1.50	4.830	-0.121	-1.68	TM
G34UWN		4.920	-0.041	-0.47	4.908	-0.043	-0.59	TM
GJ6YX7		5.024	0.063	0.72	5.024	0.073	1.02	LA
HNG2LM		4.966	0.005	0.06	4.993	0.042	0.59	PP
HRY4Q8		4.978	0.017	0.20	5.025	0.074	1.03	LW
J6LVQ2		4.992	0.031	0.35	5.014	0.063	0.88	EM
JJ6DLQ		4.760	-0.201	-2.30	4.849	-0.102	-1.41	LW
L7ND23		5.013	0.052	0.60	4.994	0.044	0.61	LW
LN9422		4.984	0.023	0.26	4.968	0.017	0.24	TM
LWHTEZ		5.109	0.149	1.70	5.001	0.050	0.70	TM
N4CCVL		5.030	0.069	0.79	5.072	0.121	1.68	TA
NQ8GCJ		4.904	-0.057	-0.65	4.884	-0.067	-0.93	EM
PBU6KQ		4.912	-0.049	-0.56	4.939	-0.012	-0.16	PP
PETJ8F		4.814	-0.147	-1.68	4.861	-0.090	-1.25	EM
RH2L8G	*	5.111	0.150	1.72	4.931	-0.020	-0.27	LA
RW3G3N		5.000	0.039	0.45	4.930	-0.021	-0.29	LA
RYQT3T		5.057	0.097	1.11	5.018	0.067	0.93	LW
TBG6RC		4.966	0.005	0.06	4.937	-0.014	-0.20	PP
TLKZBG		4.953	-0.008	-0.09	4.953	0.002	0.03	LW
TY4MHU		4.931	-0.030	-0.34	4.992	0.041	0.57	LA
U9P7DD		4.899	-0.062	-0.71	4.859	-0.092	-1.27	EM
UQNHLE		4.966	0.005	0.06	4.952	0.001	0.02	TM

Paper & Paperboard Interlaboratory Testing Program

Analysis 360

Thickness (Caliper), Printing papers

TAPPI Official Test Method T411

WebCode	Data Flag	Sample GV85 Lab Mean	Sample GV85 Diff from Grand Mean	Sample GV85 CPV	Sample GV86 Lab Mean	Sample GV86 Diff from Grand Mean	Sample GV86 CPV	Instr Code
W7NC7J		4.980	0.019	0.22	4.990	0.039	0.55	XX
WE8H3Q	*	4.730	-0.231	-2.65	4.796	-0.155	-2.15	LW
WGTZKB		4.952	-0.009	-0.10	4.992	0.041	0.57	TA
WWMR4R		5.124	0.163	1.87	5.121	0.170	2.36	LW
X388AA		4.919	-0.042	-0.48	4.872	-0.079	-1.09	OK
XEJAV8		4.908	-0.053	-0.61	4.819	-0.132	-1.83	PP
XTGL4C		5.023	0.062	0.71	5.010	0.059	0.83	LW
Y2QAFP		5.079	0.118	1.35	5.039	0.088	1.23	EM
ZLCLGE		4.892	-0.069	-0.79	4.958	0.007	0.10	EM
ZM6G4M		4.930	-0.031	-0.35	4.968	0.017	0.24	PP

Summary Statistics	Sample GV85	Sample GV86
Grand Means	4.96 mils	4.95 mils
Stnd Dev Btwn Labs	0.09 mils	0.07 mils

Statistics based on 50 of 51 reporting participants.

Comments on Assigned Data Flags for Test #360

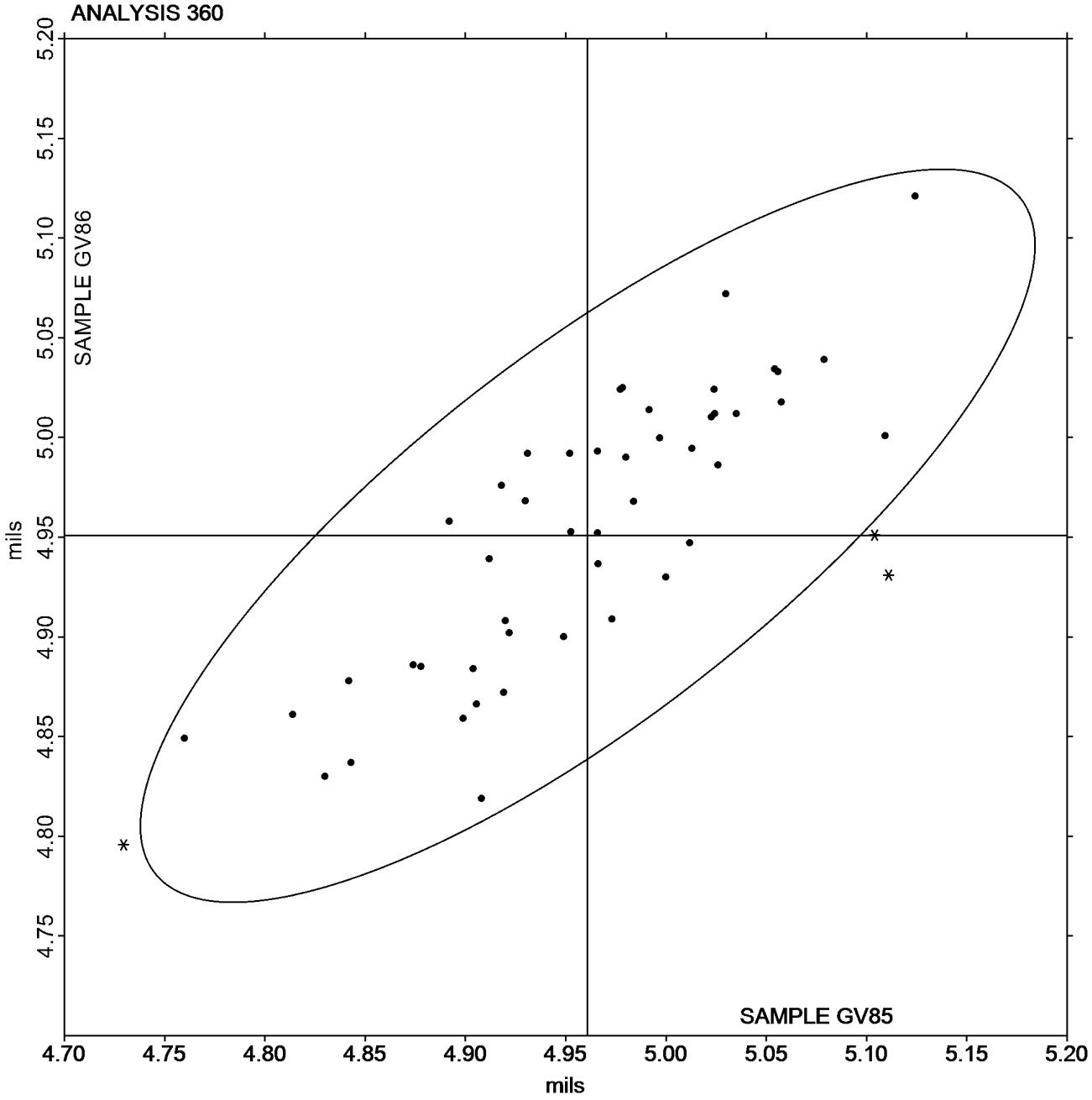
7CQBUF (X) - Data for both samples are low.

Key to Instrument Codes Reported by Participants

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

Grand Mean Sample GV85 = 4.9609 mils

Grand Mean Sample GV86 = 4.9507 mils



Paper & Paperboard Interlaboratory Testing Program

Analysis 361

Thickness (Caliper), Packaging papers

TAPPI Official Test Method T411

WebCode	Data Flag	Sample GY85 Lab Mean	Sample GY85 Diff from Grand Mean	Sample GY85 CPV	Sample GY86 Lab Mean	Sample GY86 Diff from Grand Mean	Sample GY86 CPV	Instr Code
287VE7		13.95	-0.10	-0.56	9.370	-0.084	-0.57	LW
3Z469M		13.66	-0.39	-2.15	9.190	-0.264	-1.79	TM
6TX8DE		13.77	-0.29	-1.57	9.160	-0.294	-1.99	TA
793YVB		14.01	-0.04	-0.24	9.421	-0.032	-0.22	TM
9E8G89		13.96	-0.09	-0.48	9.331	-0.123	-0.83	TA
AEK79Z		14.02	-0.04	-0.20	9.339	-0.115	-0.78	LA
B2QAJ7		13.92	-0.13	-0.72	9.480	0.026	0.18	TM
CDYCHA		14.10	0.05	0.27	9.527	0.073	0.50	LW
CMPXN8		14.17	0.11	0.61	9.571	0.117	0.79	LW
D88NZ9		14.07	0.01	0.08	9.482	0.028	0.19	EM
DTAFJU		14.41	0.36	1.97	9.657	0.204	1.38	TM
EKPVCZ		13.85	-0.20	-1.12	9.307	-0.147	-0.99	LA
FD6XJ7		14.02	-0.04	-0.19	9.452	-0.002	-0.01	EM
GC7C77		13.99	-0.06	-0.34	9.310	-0.144	-0.97	TA
GZGDE4		13.85	-0.20	-1.10	9.265	-0.189	-1.28	TA
J6LVQ2		14.24	0.19	1.02	9.599	0.145	0.99	EM
LRNQDL		14.05	0.00	0.01	9.492	0.038	0.26	LW
NK2KQY		14.14	0.09	0.47	9.522	0.068	0.46	EM
NQ8GCJ		14.03	-0.03	-0.15	9.335	-0.119	-0.81	EM
NU2BAK		14.19	0.14	0.75	9.671	0.217	1.47	LW
QKQRPR		14.50	0.44	2.42	9.799	0.345	2.34	PP
QME4NX		14.22	0.17	0.93	9.632	0.178	1.21	TM
T8ZHFR		13.94	-0.12	-0.64	9.353	-0.101	-0.68	OK
TBG6RC		14.19	0.14	0.74	9.480	0.027	0.18	LW
TY4MHU		14.04	-0.01	-0.05	9.458	0.004	0.03	LA
UCNGAD		13.82	-0.23	-1.27	9.325	-0.129	-0.87	VP
VVYV4D		14.05	0.00	-0.01	9.488	0.035	0.23	LA
WGTZKB		14.21	0.15	0.84	9.584	0.130	0.88	TA
WRVKKH	X	9.43	-4.63	-25.19	7.617	-1.836	-12.45	LW
Y72MWN		13.94	-0.11	-0.60	9.441	-0.013	-0.09	LW
ZWQLBM		14.29	0.23	1.27	9.570	0.116	0.79	LA

Summary Statistics	Sample GY85	Sample GY86
Grand Means	14.05 mils	9.45 mils
Stnd Dev Btwn Labs	0.18 mils	0.15 mils

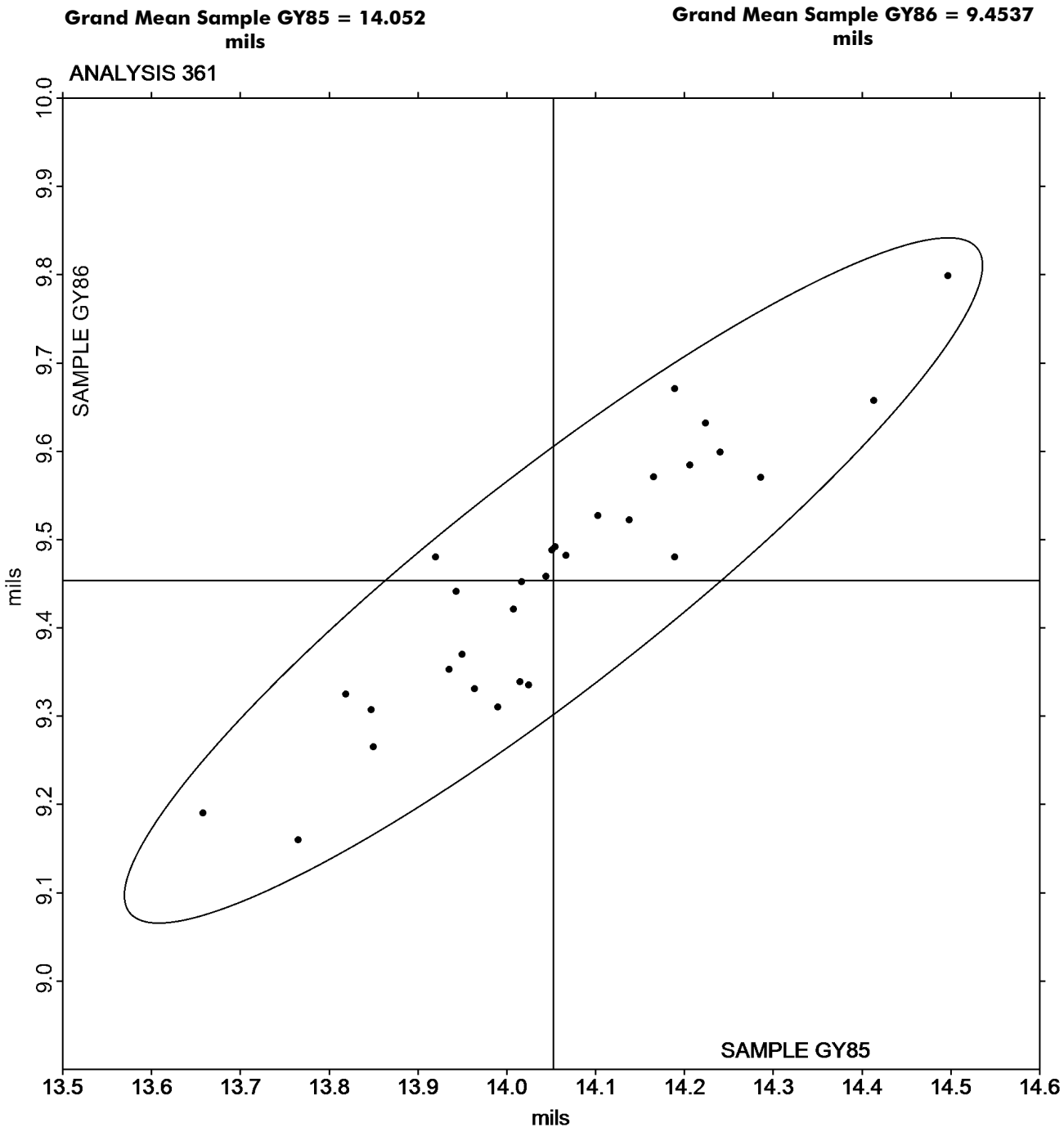
Statistics based on 30 of 31 reporting participants.

Comments on Assigned Data Flags for Test #361

WRVKKH (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

EM	Emveco	LA	L & W Autoline
LW	L & W	OK	Oakland
PP	Technidyne Profile/Plus	TA	Thwing-Albert
TM	TMI	VP	Valmet Paper Lab Automated Tester



Paper & Paperboard Interlaboratory Testing Program

Analysis 364

Coefficient of Static Friction - Horizontal Plane Method - Printing Papers

TAPPI Official Test Method T549

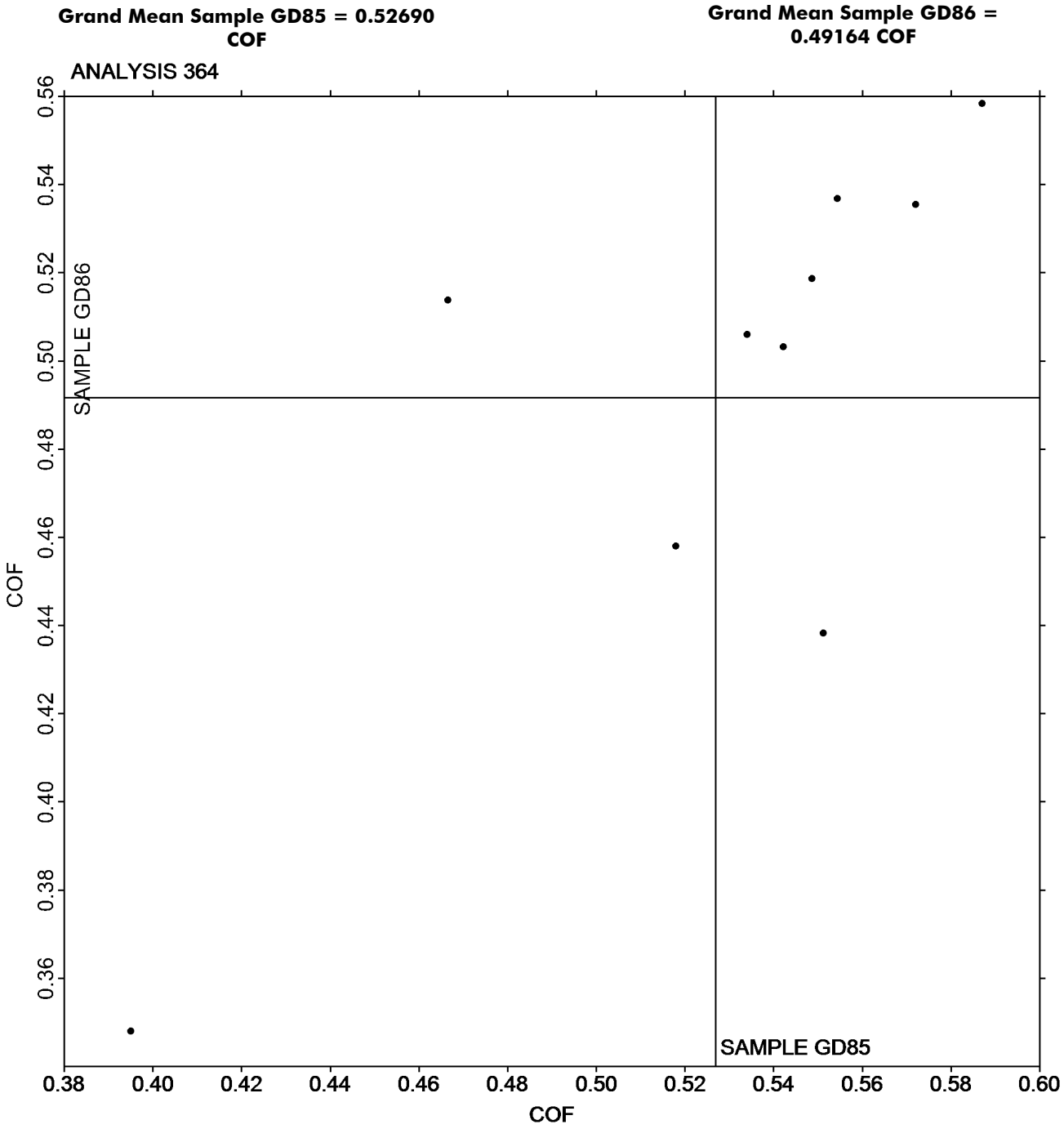
WebCode	Data Flag	Sample GD85 Lab Mean	Sample GD85 Diff from Grand Mean	Sample GD85 CPV	Sample GD86 Lab Mean	Sample GD86 Diff from Grand Mean	Sample GD86 CPV	Instr Code
3GU3C3		0.5340	0.0071	0.13	0.5060	0.0144	0.23	TA
49RD7H		0.5720	0.0451	0.80	0.5354	0.0438	0.71	TA
E2YMGQ		0.5512	0.0243	0.43	0.4382	-0.0534	-0.86	IT
EKPVCZ		0.5486	0.0217	0.38	0.5186	0.0270	0.43	TA
EMD8C7		0.3950	-0.1319	-2.33	0.3480	-0.1436	-2.32	XX
LRNQDL		0.5544	0.0275	0.49	0.5368	0.0452	0.73	TA
PETJ8F		0.5422	0.0153	0.27	0.5032	0.0116	0.19	TA
U9P7DD		0.5870	0.0601	1.06	0.5584	0.0668	1.08	TA
UHFRJC		0.4666	-0.0603	-1.06	0.5138	0.0222	0.36	TA
ZM6G4M		0.5180	-0.0089	-0.16	0.4580	-0.0336	-0.54	TA

Summary Statistics	Sample GD85	Sample GD86
Grand Means	0.53 COF	0.49 COF
Stnd Dev Btwn Labs	0.06 COF	0.06 COF

Statistics based on 10 of 10 reporting participants.

Key to Instrument Codes Reported by Participants

IT	IMASS SP-2100	TA	Thwing-Albert Friction Tester
XX	Instrument make/model not specified by lab		



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

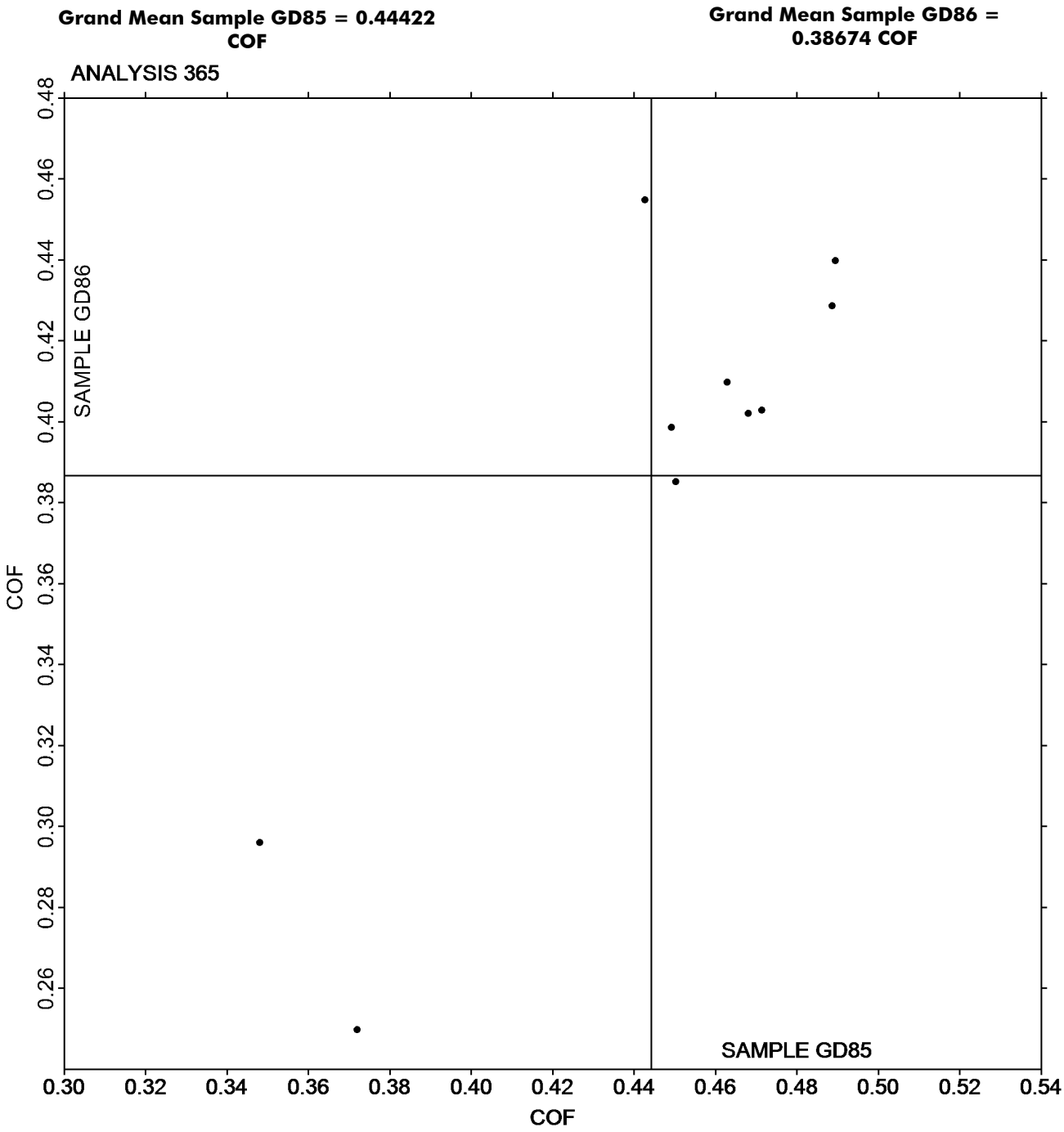
WebCode	Data Flag	Sample GD85 Lab Mean	Sample GD85 Diff from Grand Mean	Sample GD85 CPV	Sample GD86 Lab Mean	Sample GD86 Diff from Grand Mean	Sample GD86 CPV	Instr Code
3GU3C3		0.4680	0.0238	0.50	0.4020	0.0153	0.24	XX
49RD7H		0.4492	0.0050	0.11	0.3986	0.0119	0.18	TA
E2YMGQ		0.3720	-0.0722	-1.52	0.2498	-0.1369	-2.13	IR
EKPVCZ		0.4886	0.0444	0.94	0.4286	0.0419	0.65	TA
LRNQDL		0.4894	0.0452	0.95	0.4398	0.0531	0.82	TN
PETJ8F		0.4502	0.0060	0.13	0.3852	-0.0015	-0.02	TA
U9P7DD		0.4714	0.0272	0.57	0.4028	0.0161	0.25	TA
UHFRJC		0.4426	-0.0016	-0.03	0.4548	0.0681	1.06	TA
XEJAV8		0.4628	0.0186	0.39	0.4098	0.0231	0.36	TA
ZM6G4M		0.3480	-0.0962	-2.03	0.2960	-0.0907	-1.41	TA

Summary Statistics	Sample GD85	Sample GD86
Grand Means	0.44 COF	0.39 COF
Stnd Dev Btwn Labs	0.05 COF	0.06 COF

Statistics based on 10 of 10 reporting participants.

Key to Instrument Codes Reported by Participants

IR	IMASS SP-2000	TA	Thwing-Albert Friction Tester
TN	TMI 32-07 Monitor/Slip and Friction	XX	Instrument make/model not specified by lab



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

WebCode	Data Flag	Sample GE85 Lab Mean	Sample GE85 Diff from Grand Mean	Sample GE85 CPV	Sample GE86 Lab Mean	Sample GE86 Diff from Grand Mean	Sample GE86 CPV	Instr Code
27FTAJ		18.61	-0.21	-0.26	21.02	-0.42	-0.34	PP
287VE7	X	147.40	128.58	161.90	132.60	111.17	90.36	HM
2CMZBG		17.93	-0.89	-1.12	19.81	-1.62	-1.32	PP
2RVBGE		18.21	-0.61	-0.77	21.08	-0.35	-0.29	PP
3GU3C3		19.76	0.94	1.18	23.10	1.66	1.35	PP
3HKAVE	X	0.63	-18.19	-22.91	0.63	-20.81	-16.91	HG
49RD7H		19.04	0.22	0.28	21.65	0.22	0.18	WG
4YRPEL		19.19	0.37	0.47	21.98	0.55	0.44	HG
6AG264		19.57	0.75	0.95	22.72	1.29	1.05	LP
7CQBUF		19.30	0.48	0.61	21.09	-0.34	-0.28	LP
8WRN4E		17.84	-0.97	-1.23	20.66	-0.77	-0.63	PP
9CGBNW		18.35	-0.47	-0.59	21.85	0.42	0.34	LP
9GVT7D		18.23	-0.59	-0.74	19.81	-1.62	-1.32	LA
9P7AFY		18.07	-0.75	-0.94	20.01	-1.42	-1.16	LP
9T22NV		18.49	-0.33	-0.41	22.24	0.81	0.66	GL
9WMQ89		19.33	0.51	0.64	21.15	-0.28	-0.23	PP
AWFYTX		19.63	0.81	1.02	22.06	0.63	0.51	PP
BPDAMD		18.86	0.04	0.05	21.92	0.49	0.40	LP
CMPXN8		17.62	-1.20	-1.51	20.14	-1.29	-1.05	LP
EKPVCZ		18.20	-0.62	-0.78	21.95	0.52	0.42	LA
EMD8C7		18.30	-0.52	-0.65	19.70	-1.73	-1.41	GS
G34UWN		18.99	0.17	0.21	21.93	0.49	0.40	PP
HNG2LM		18.72	-0.10	-0.13	20.76	-0.67	-0.55	PP
HRY4Q8		18.73	-0.09	-0.11	20.82	-0.61	-0.50	LP
L7ND23		17.47	-1.35	-1.70	20.06	-1.37	-1.12	LP
RH2L8G		20.59	1.77	2.23	23.30	1.86	1.52	LA
TBG6RC		18.42	-0.40	-0.50	21.07	-0.36	-0.30	PP
TLKZBG		18.20	-0.62	-0.78	19.30	-2.13	-1.73	LW
UCNGAD		19.30	0.48	0.61	23.80	2.37	1.92	VM
VVYV4D		18.85	0.03	0.04	20.57	-0.87	-0.70	LA
W7NC7J		17.36	-1.46	-1.84	19.20	-2.23	-1.82	XX
WGTZKB		20.86	2.04	2.57	23.72	2.29	1.86	PP
WRVKKH	X	14.92	-3.90	-4.91	15.60	-5.83	-4.74	TL
WWMR4R		18.71	-0.11	-0.14	20.69	-0.74	-0.60	LP
WZ9ALC		18.51	-0.31	-0.39	22.50	1.07	0.87	TL
XR7JFR		19.81	0.99	1.25	22.20	0.77	0.62	XX
Y2QAFP		19.17	0.35	0.44	21.78	0.35	0.28	HG
ZC7JH9		19.65	0.83	1.05	21.85	0.42	0.34	TL
ZLCLGE		18.92	0.10	0.12	22.09	0.65	0.53	PP
ZM6G4M		19.49	0.68	0.85	23.50	2.06	1.68	PP

Summary Statistics	Sample GE85	Sample GE86
Grand Means	18.82 sec/100 cc	21.43 sec/100 cc
Stnd Dev Btwn Labs	0.79 sec/100 cc	1.23 sec/100 cc

Statistics based on 37 of 40 reporting participants.

Comments on Assigned Data Flags for Test #370

287VE7 (X) - Extreme Data.

3HKAVE (X) - Extreme Data.

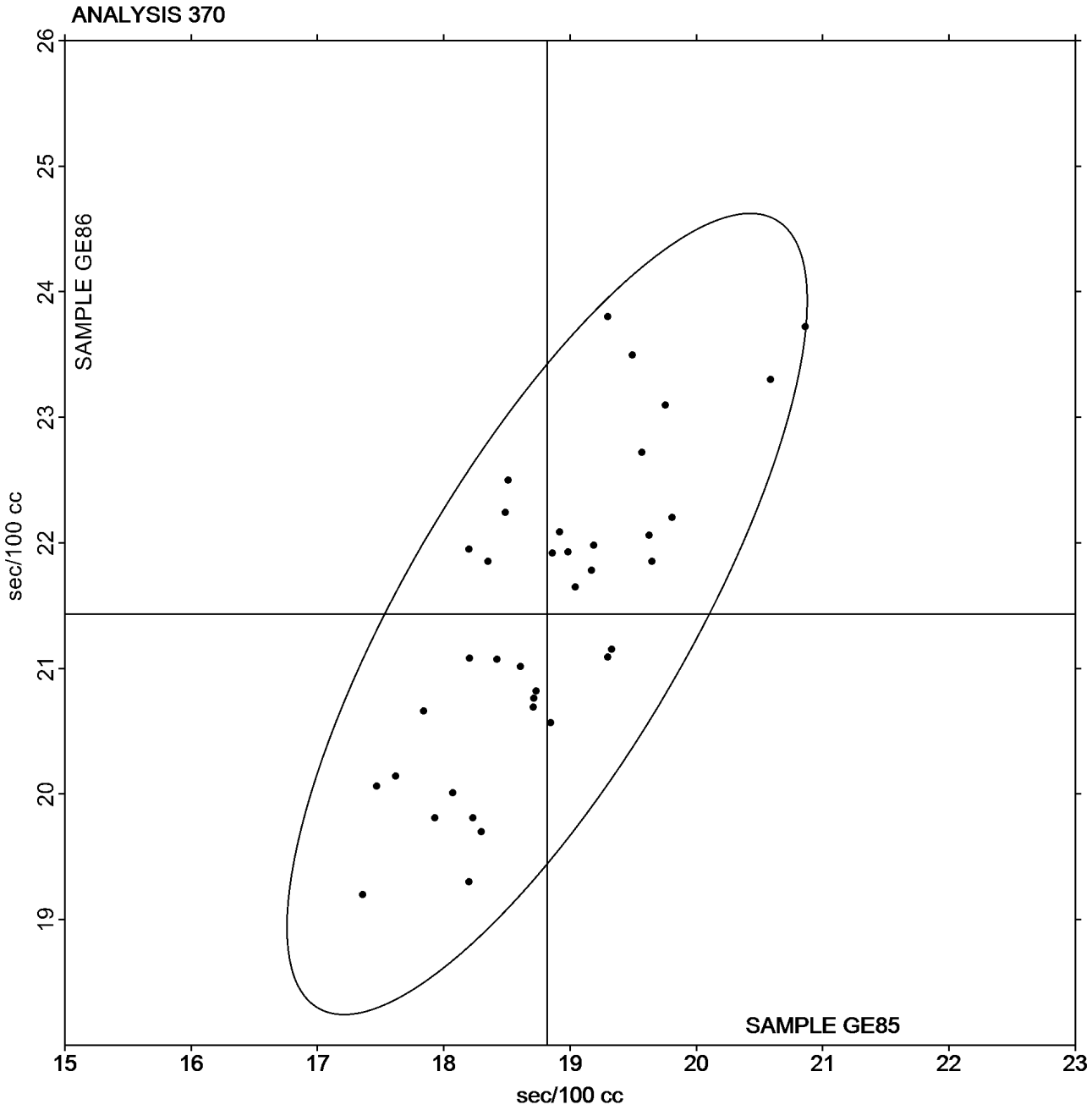
WRVKKH (X) - Data for both samples are low.

Key to Instrument Codes Reported by Participants

GL	Gurley #4110	GS	Gurley-Hill S-P-S Tester #4190
HG	Technidyne - Hagerty Model #1	HM	Technidyne - Hagerty Model #538
LA	L & W Autoline	LP	L & W Densometer, Air Permeance
LW	L & W Type Gurley Densometer, Oil Flotation	PP	Technidyne Profile/Plus
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

Grand Mean Sample GE85 = 18.818 sec/100 cc

Grand Mean Sample GE86 = 21.434 sec/100 cc



Paper & Paperboard Interlaboratory Testing Program

Analysis 372

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

TAPPI Official Test Method T547

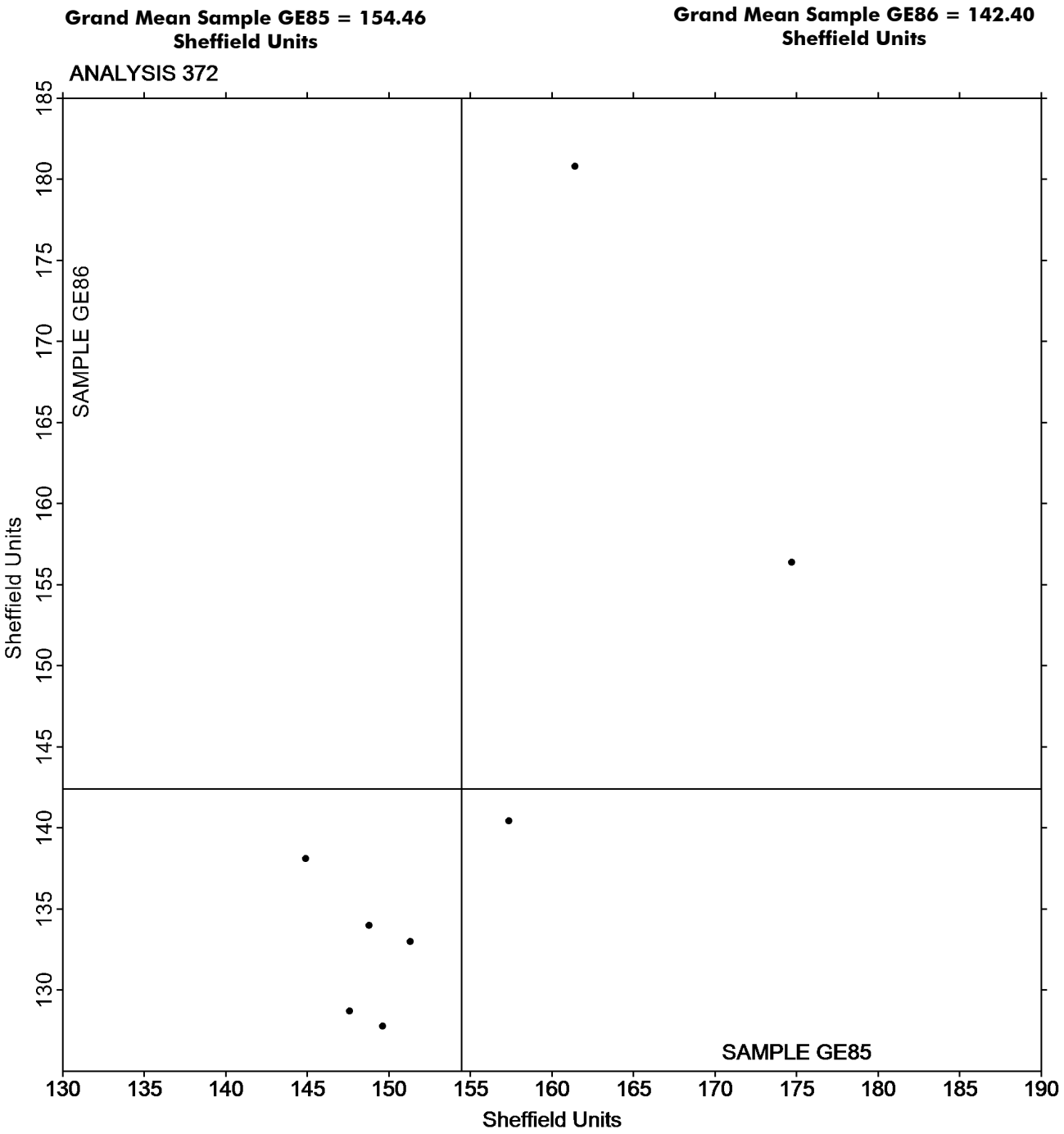
WebCode	Data Flag	Sample GE85 Lab Mean	Sample GE85 Diff from Grand Mean	Sample GE85 CPV	Sample GE86 Lab Mean	Sample GE86 Diff from Grand Mean	Sample GE86 CPV	Instr Code
8U4C49		161.4	6.9	0.71	180.8	38.4	2.14	LP
A9VT7C		144.9	-9.6	-0.98	138.1	-4.3	-0.24	SH
HNG2LM		149.6	-4.8	-0.49	127.8	-14.6	-0.81	PP
N4CCVL		148.8	-5.7	-0.58	134.0	-8.4	-0.47	HM
UCNGAD		174.7	20.2	2.07	156.4	14.0	0.78	PP
VRWXTK		157.4	2.9	0.30	140.4	-2.0	-0.11	LA
WGTZKB		147.6	-6.9	-0.70	128.7	-13.7	-0.76	PP
X388AA		151.3	-3.2	-0.32	133.0	-9.4	-0.52	LA

Summary Statistics	Sample GE85	Sample GE86
Grand Means	154.46 Sheffield Units	142.40 Sheffield Units
Stnd Dev Btwn Labs	9.78 Sheffield Units	17.94 Sheffield Units

Statistics based on 8 of 8 reporting participants.

Key to Instrument Codes Reported by Participants

HM	Technidyne - Hagerty Model #538	LA	L & W Roughness Sheffield - Autoline
LP	L & W Densometer, Air Permeance	PP	Technidyne Profile/Plus
SH	Sheffield		



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

WebCode	Data Flag	Sample GJ85 Lab Mean	Sample GJ85 Diff from Grand Mean	Sample GJ85 CPV	Sample GJ86 Lab Mean	Sample GJ86 Diff from Grand Mean	Sample GJ86 CPV	Instr Code
2AV2XH		0.9580	-0.0070	-0.07	0.9180	-0.0462	-0.38	ZZ
2RVBGE		0.9390	-0.0260	-0.25	0.9020	-0.0622	-0.52	ZZ
3HKAVE		1.0020	0.0370	0.35	0.9160	-0.0482	-0.40	ZZ
49RD7H		1.0140	0.0490	0.47	0.9650	0.0008	0.01	ZZ
793YVB		0.7840	-0.1810	-1.73	0.8810	-0.0832	-0.69	ZZ
79RZYF		1.2130	0.2480	2.37	1.2320	0.2678	2.22	ZZ
7CQBUF		0.9990	0.0340	0.32	1.0060	0.0418	0.35	ZZ
7Y2ETH		1.2040	0.2390	2.28	1.1640	0.1998	1.66	ZZ
BTZQ6X		0.9300	-0.0350	-0.33	0.9210	-0.0432	-0.36	ZZ
CDYCHA		0.8770	-0.0880	-0.84	0.9790	0.0148	0.12	ZZ
D88NZ9		0.9710	0.0060	0.06	0.9410	-0.0232	-0.19	ZZ
FD6XJ7		0.9720	0.0070	0.07	1.1210	0.1568	1.30	ZZ
GJ6YX7		1.1370	0.1720	1.64	0.9220	-0.0422	-0.35	ZZ
GPW7HZ		0.9600	-0.0050	-0.05	0.9810	0.0168	0.14	ZZ
HNG2LM		0.9860	0.0210	0.20	0.9340	-0.0302	-0.25	ZZ
JXZZPX		1.0590	0.0940	0.90	1.0100	0.0458	0.38	ZZ
NK2KQY		0.9200	-0.0450	-0.43	0.8500	-0.1142	-0.95	ZZ
NQ8GCJ		0.7810	-0.1840	-1.76	0.7320	-0.2322	-1.93	ZZ
RW3G3N		0.9230	-0.0420	-0.40	1.0260	0.0618	0.51	ZZ
RYQT3T		0.9870	0.0220	0.21	0.9330	-0.0312	-0.26	ZZ
T8ZHFR		0.8830	-0.0820	-0.78	1.0120	0.0478	0.40	ZZ
TY4MHU		0.8030	-0.1620	-1.55	0.7980	-0.1662	-1.38	ZZ
UCNGAD	*	0.8910	-0.0740	-0.71	1.1800	0.2158	1.79	ZZ
UHFRJC		1.0590	0.0940	0.90	0.8410	-0.1232	-1.02	ZZ
XTGL4C		0.9430	-0.0220	-0.21	0.8610	-0.1032	-0.86	ZZ
Y72MWN		0.9650	0.0000	0.00	0.9380	-0.0262	-0.22	ZZ
ZLCLGE		1.0410	0.0760	0.73	1.2100	0.2458	2.04	ZZ
ZM6G4M		0.8880	-0.0770	-0.73	0.8990	-0.0652	-0.54	ZZ
ZWQLBM		0.8950	-0.0700	-0.67	0.8900	-0.0742	-0.62	ZZ

Summary Statistics	Sample GJ85	Sample GJ86
Grand Means	0.96 Microns	0.96 Microns
Stnd Dev Btwn Labs	0.10 Microns	0.12 Microns

Statistics based on 29 of 29 reporting participants.

Analysis Notes:

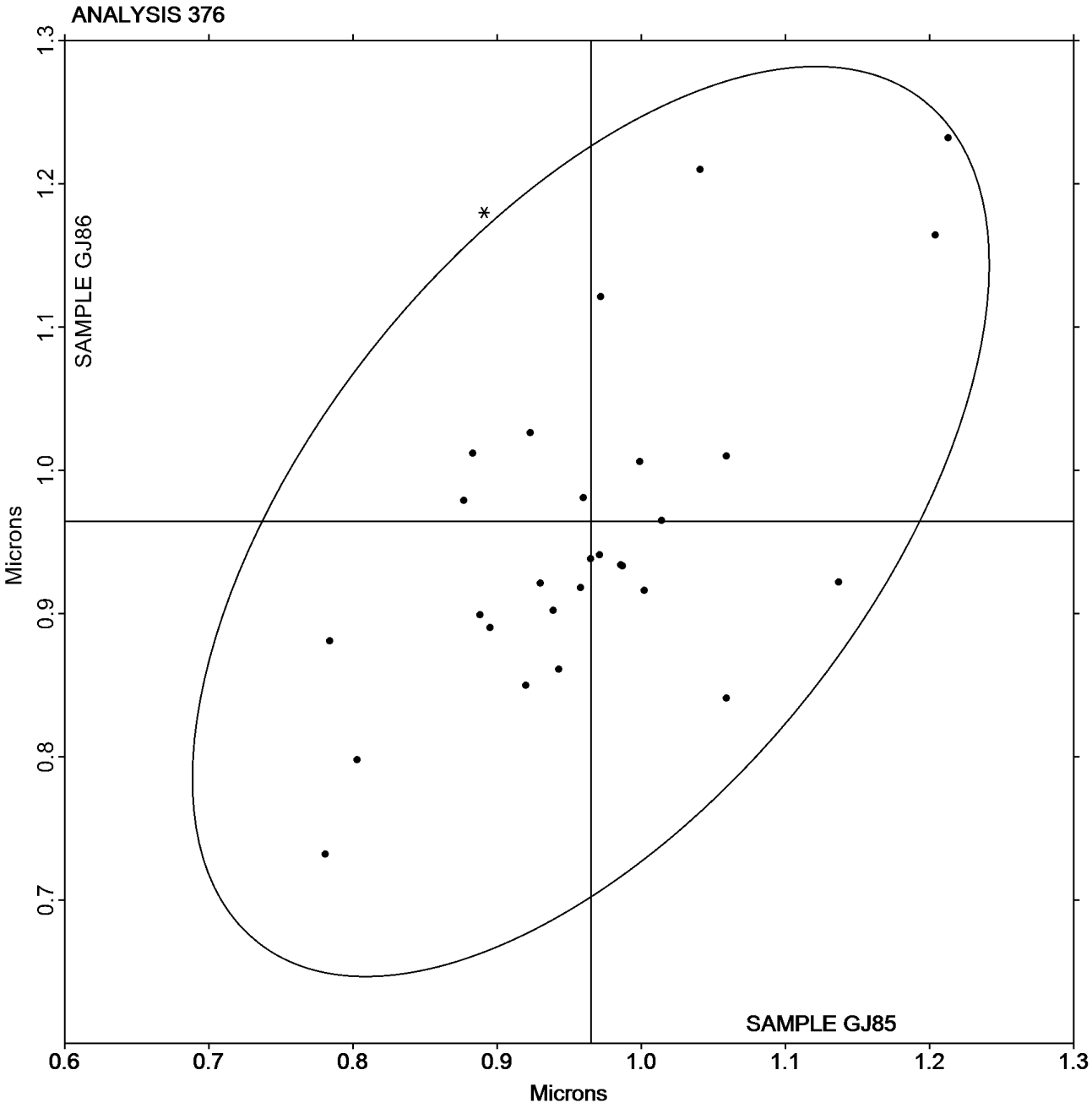
ZLCLGE - Data appears to be transposed between Analysis 376 (Roughness - Print Surf) and Analysis 378 (Roughness - Sheffield). CTS will not correct going forward.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Grand Mean Sample GJ85 = 0.96497 Microns

Grand Mean Sample GJ86 = 0.96424 Microns



Paper & Paperboard Interlaboratory Testing Program

Analysis 377

Roughness - Print Surf Method - 2.5 to 6.0 Microns

TAPPI Official Test Method T555

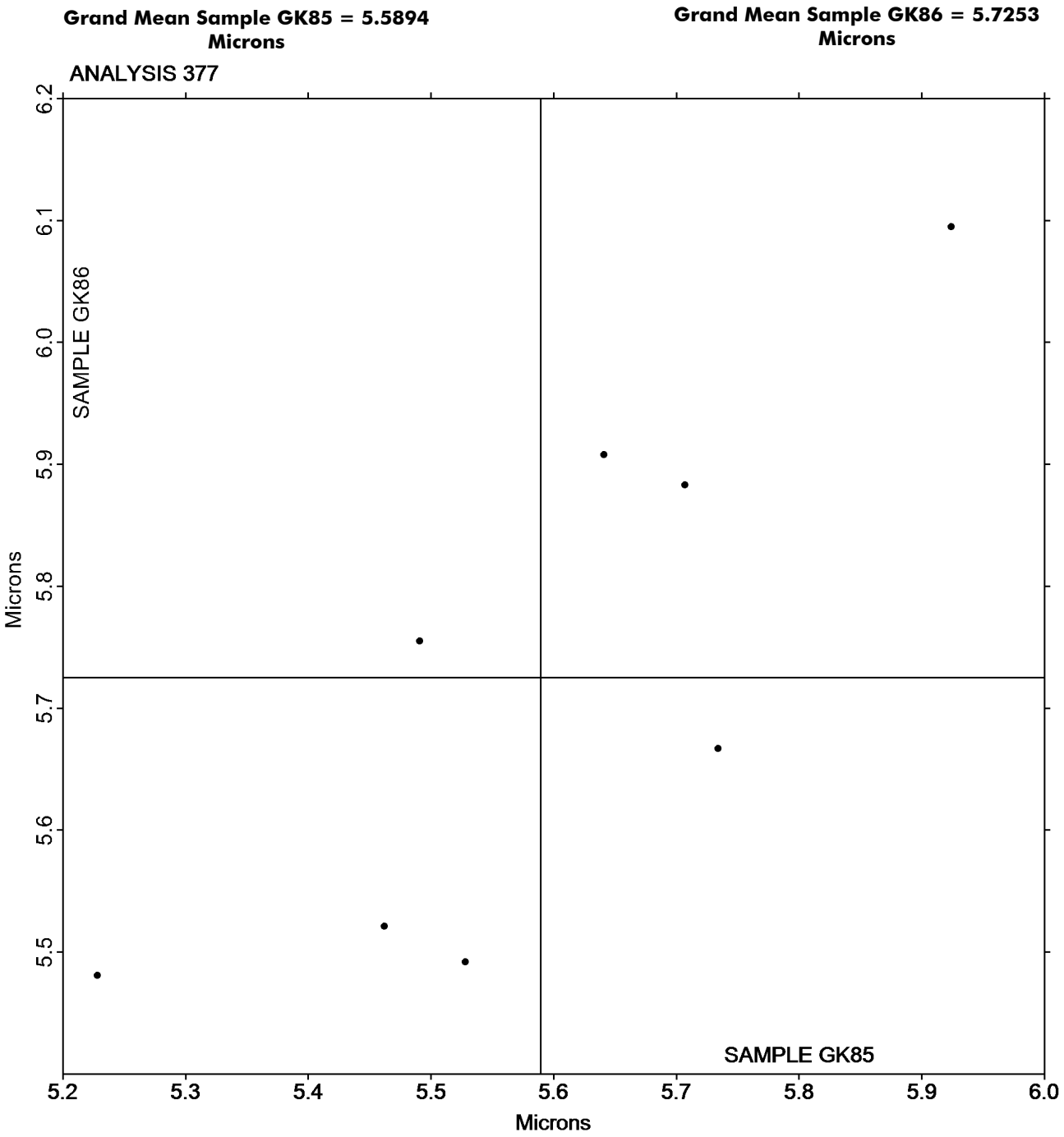
WebCode	Data Flag	Sample GK85 Lab Mean	Sample GK85 Diff from Grand Mean	Sample GK85 CPV	Sample GK86 Lab Mean	Sample GK86 Diff from Grand Mean	Sample GK86 CPV	Instr Code
3GU3C3		5.924	0.335	1.59	6.095	0.370	1.64	ZZ
49RD7H		5.528	-0.061	-0.29	5.492	-0.233	-1.04	ZZ
9GVT7D		5.228	-0.361	-1.72	5.481	-0.244	-1.08	ZZ
LRNQDL		5.641	0.052	0.25	5.908	0.183	0.81	ZZ
NQ8GCJ		5.462	-0.127	-0.61	5.521	-0.204	-0.91	ZZ
TBG6RC		5.491	-0.098	-0.47	5.755	0.030	0.13	ZZ
TY4MHU		5.734	0.145	0.69	5.667	-0.058	-0.26	ZZ
U9P7DD		5.707	0.118	0.56	5.883	0.158	0.70	ZZ

Summary Statistics	Sample GK85	Sample GK86
Grand Means	5.59 Microns	5.73 Microns
Stnd Dev Btwn Labs	0.21 Microns	0.23 Microns

Statistics based on 8 of 8 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



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

WebCode	Data Flag	Sample GL85 Lab Mean	Sample GL85 Diff from Grand Mean	Sample GL85 CPV	Sample GL86 Lab Mean	Sample GL86 Diff from Grand Mean	Sample GL86 CPV	Instr Code
27FTAJ		111.3	-6.6	-0.93	114.5	-5.5	-0.69	SH
287VE7		112.7	-5.2	-0.73	119.9	-0.1	-0.01	HM
2AV2XH		122.2	4.3	0.61	121.3	1.3	0.16	LW
2CMZBG		109.4	-8.5	-1.20	111.0	-9.0	-1.13	PP
3ENKCL		115.4	-2.5	-0.35	119.8	-0.2	-0.03	GA
3GU3C3		117.5	-0.4	-0.06	120.8	0.8	0.10	PP
3HKAVE	X	5.1	-112.8	-15.88	5.1	-114.9	-14.48	HM
49RD7H		134.2	16.3	2.30	136.3	16.3	2.05	XX
4YRPEL		121.4	3.5	0.50	125.4	5.4	0.68	TS
6AG264		110.5	-7.4	-1.04	117.6	-2.4	-0.30	LW
6TX8DE		112.1	-5.8	-0.81	113.7	-6.3	-0.79	PP
793YVB	X	144.9	27.0	3.81	144.7	24.7	3.11	TT
7CQBUF		115.2	-2.7	-0.38	112.8	-7.2	-0.91	TS
7Y2ETH		122.3	4.4	0.62	128.4	8.4	1.06	LW
8U4C49		115.6	-2.3	-0.32	118.8	-1.2	-0.15	LW
8WRN4E		116.3	-1.5	-0.22	115.5	-4.5	-0.57	PP
9GVT7D		123.5	5.6	0.79	131.9	11.9	1.50	LA
9WMQ89		117.5	-0.4	-0.05	116.7	-3.3	-0.41	PP
A9VT7C		122.1	4.2	0.60	122.1	2.1	0.26	TZ
AWFYTX	*	116.4	-1.5	-0.21	130.0	10.0	1.26	PP
CYHG3D		108.7	-9.2	-1.30	111.8	-8.2	-1.04	MP
D88NZ9		119.7	1.8	0.26	119.2	-0.8	-0.10	PP
FD6XJ7		114.5	-3.4	-0.48	115.5	-4.5	-0.57	PP
G34UWN		102.2	-15.7	-2.20	108.3	-11.7	-1.47	PP
GZGDE4		114.4	-3.5	-0.49	117.2	-2.8	-0.35	PP
HNG2LM	*	136.3	18.5	2.60	137.8	17.8	2.25	PP
JXZZPX		110.7	-7.2	-1.01	119.2	-0.8	-0.10	LW
LRNQDL		118.4	0.5	0.07	123.8	3.8	0.48	LW
NK2KQY		124.8	6.9	0.97	125.1	5.1	0.64	PP
NQ8GCJ		120.0	2.1	0.30	116.2	-3.8	-0.48	LW
PBU6KQ		109.9	-8.0	-1.12	114.3	-5.7	-0.72	PP
RAQJLF	X	142.8	24.9	3.51	126.9	6.9	0.87	LA
RH2L8G		118.8	0.9	0.13	112.2	-7.8	-0.98	LA
T8ZHFR	*	136.0	18.1	2.55	145.0	25.0	3.15	GL
TBG6RC		124.5	6.6	0.93	122.7	2.7	0.34	PP
TLKZBG		115.8	-2.1	-0.29	118.1	-1.9	-0.24	TS
TY4MHU		118.4	0.5	0.07	123.5	3.5	0.44	LA
U9P7DD		116.8	-1.1	-0.15	112.6	-7.4	-0.93	PP
UCNGAD	*	120.4	2.5	0.36	110.7	-9.3	-1.17	VM
UHFRJC		120.2	2.3	0.33	122.8	2.8	0.35	HM
V2MG8T		119.0	1.1	0.16	125.0	5.0	0.63	LA

Paper & Paperboard Interlaboratory Testing Program

Analysis 378
Roughness - Sheffield Type
TAPPI Official Test Method T538

WebCode	Data Flag	Sample GL85 Lab Mean	Sample GL85 Diff from Grand Mean	Sample GL85 CPV	Sample GL86 Lab Mean	Sample GL86 Diff from Grand Mean	Sample GL86 CPV	Instr Code
W7NC7J		116.9	-1.0	-0.14	121.7	1.7	0.21	XX
WGTZKB		114.9	-3.0	-0.42	114.6	-5.4	-0.68	PP
WTMF8R		130.1	12.2	1.72	131.6	11.6	1.46	TT
X388AA		109.0	-8.9	-1.25	107.8	-12.2	-1.54	LA
Y2QAFP		113.9	-4.0	-0.56	116.4	-3.6	-0.45	HM
Y72MWN		124.3	6.4	0.90	127.1	7.1	0.90	PP
ZLCLGE		111.0	-6.9	-0.97	112.8	-7.2	-0.90	PP
ZM6G4M		110.3	-7.5	-1.06	110.6	-9.4	-1.19	PP
ZWQLBM		124.5	6.6	0.93	119.8	-0.2	-0.03	LA

Summary Statistics	Sample GL85	Sample GL86
Grand Means	117.87 Sheffield	120.00 Sheffield
Stnd Dev Btwn Labs	7.10 Sheffield	7.93 Sheffield

Statistics based on 47 of 50 reporting participants.

Comments on Assigned Data Flags for Test #378

RAQJLF (X) - Data for sample GL85 are high. Inconsistent within the determinations of sample GL86.

793YVB (X) - Data for both samples are high. Possible Systematic Error.

3HKAVE (X) - Extreme Data.

Analysis Notes:

W7NC7J - One determination removed from the Lab Mean of Sample GL86 per Grubb's Test at 1% risk (TAPPI 1205).

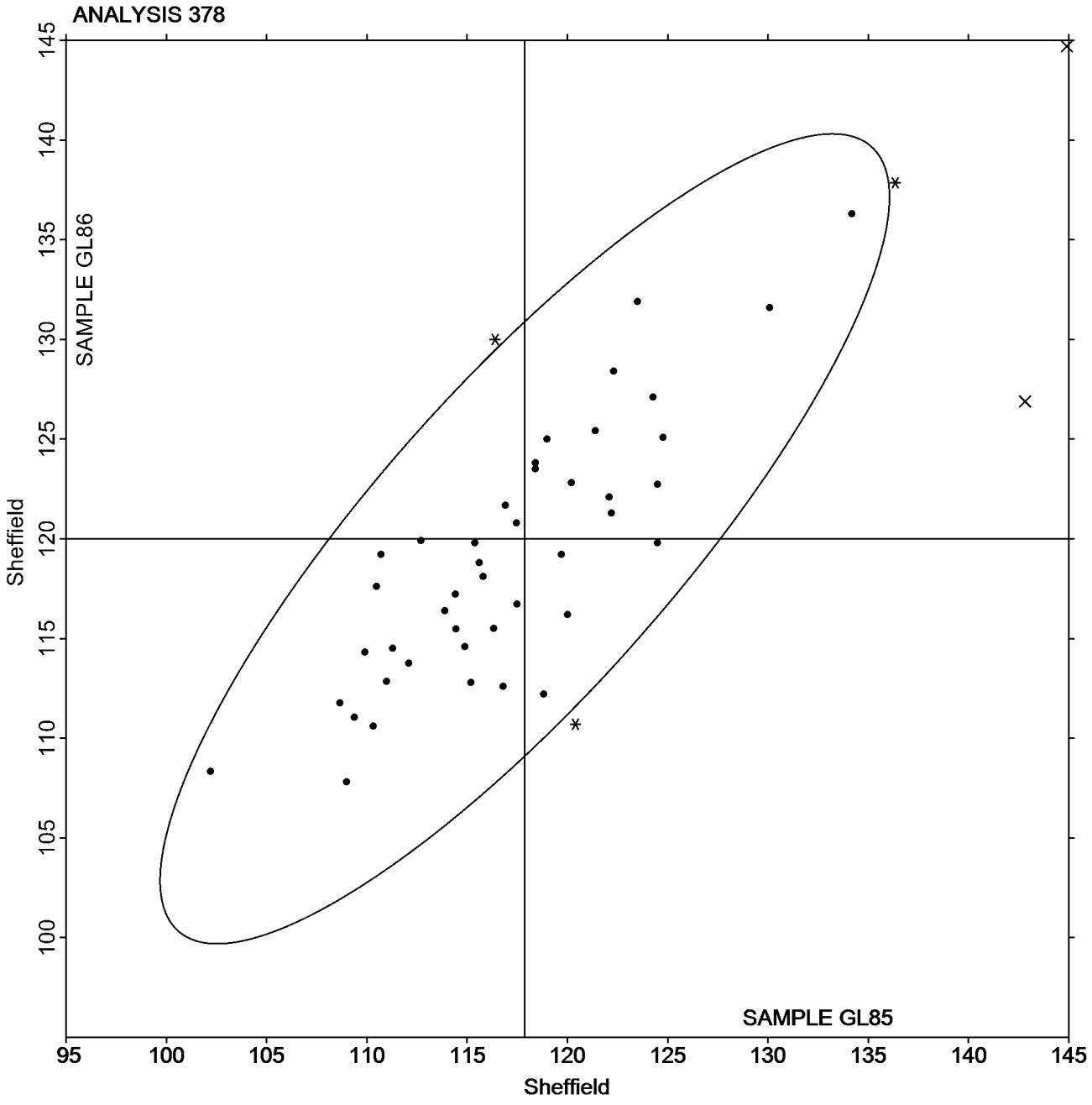
ZLCLGE - Data appears to be transposed between Analysis 376 (Roughness - Print Surf) and Analysis 378 (Roughness - Sheffield). CTS will not correct going forward.

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
TZ	TMI Sheffield Paper Tester, Model 58-25	VM	Valmet PaperLab (was Kajaani\Robotest)
XX	Instrument make/model not specified by lab		

Grand Mean Sample GL85 = 117.87
Sheffield

Grand Mean Sample GL86 = 120.00
Sheffield



Paper & Paperboard Interlaboratory Testing Program

Analysis 382
Moisture in Paper
TAPPI Official Test Method T412

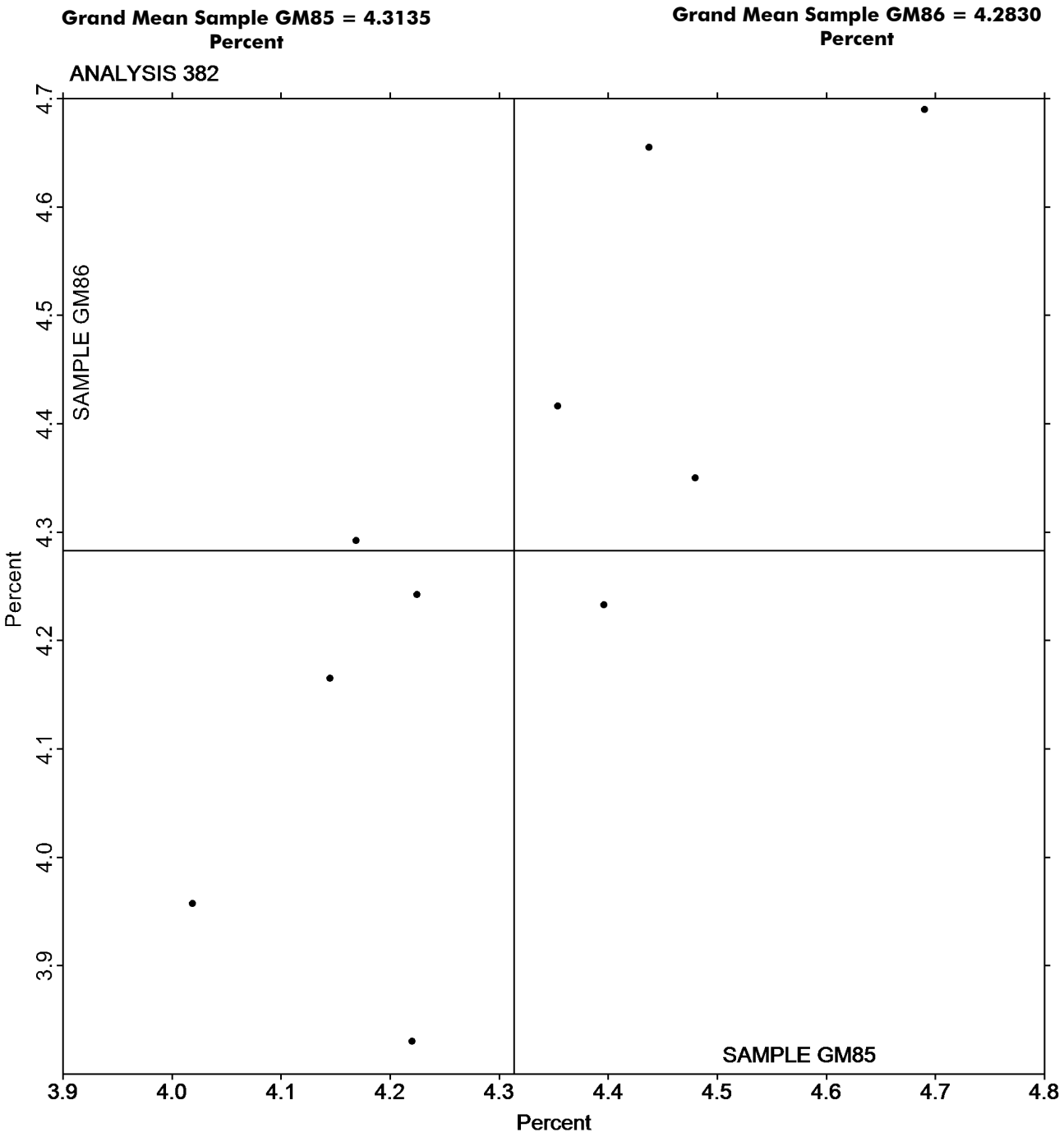
WebCode	Data Flag	Sample GM85 Lab Mean	Sample GM85 Diff from Grand Mean	Sample GM85 CPV	Sample GM86 Lab Mean	Sample GM86 Diff from Grand Mean	Sample GM86 CPV	Instr Code
3GU3C3		4.354	0.040	0.21	4.416	0.133	0.49	ZZ
793YVB		4.480	0.166	0.85	4.350	0.067	0.25	ZZ
8DFYQG		4.438	0.124	0.63	4.655	0.372	1.38	ZZ
F2UPJZ		4.225	-0.089	-0.45	4.242	-0.041	-0.15	ZZ
HRY4Q8		4.019	-0.295	-1.50	3.957	-0.326	-1.21	ZZ
QME4NX		4.169	-0.145	-0.74	4.292	0.009	0.03	ZZ
RYQT3T		4.396	0.082	0.42	4.233	-0.050	-0.19	ZZ
T34QAG		4.690	0.376	1.92	4.690	0.407	1.51	ZZ
VM324U		4.145	-0.169	-0.86	4.165	-0.118	-0.44	ZZ
WH2CZR		4.220	-0.094	-0.48	3.830	-0.453	-1.68	ZZ

Summary Statistics	Sample GM85	Sample GM86
Grand Means	4.31 Percent	4.28 Percent
Stnd Dev Btwn Labs	0.20 Percent	0.27 Percent

Statistics based on 10 of 10 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



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

Paper & Paperboard Interlaboratory Testing Program

Analysis 384

Opacity (89% Reflectance Backing) - Fine Papers

TAPPI Official Test Method T425

WebCode	Data Flag	Sample GN85 Lab Mean	Sample GN85 Diff from Grand Mean	Sample GN85 CPV	Sample GN86 Lab Mean	Sample GN86 Diff from Grand Mean	Sample GN86 CPV	Instr Code
27FTAJ		93.91	0.40	0.77	93.57	0.00	0.00	ZZ
2RVBGE		94.30	0.79	1.52	93.90	0.33	0.81	ZZ
3GU3C3		93.54	0.03	0.05	93.44	-0.13	-0.31	ZZ
3HKAVE		93.68	0.17	0.32	93.19	-0.38	-0.93	ZZ
4YRPEL		93.89	0.38	0.73	93.67	0.10	0.24	ZZ
9GVT7D		94.41	0.90	1.74	94.60	1.02	2.51	ZZ
A9VT7C		92.54	-0.97	-1.88	93.36	-0.21	-0.51	ZZ
AWFYTX		93.08	-0.43	-0.83	93.41	-0.16	-0.38	ZZ
BTZQ6X		93.77	0.26	0.50	93.38	-0.19	-0.47	ZZ
EMD8C7		92.95	-0.56	-1.09	92.74	-0.83	-2.03	ZZ
G34UWN		93.53	0.02	0.03	93.17	-0.40	-0.98	ZZ
GJ6YX7		93.94	0.43	0.83	94.04	0.47	1.16	ZZ
HNG2LM		93.97	0.46	0.88	93.28	-0.29	-0.71	ZZ
PB72PV		92.43	-1.09	-2.09	93.06	-0.52	-1.26	ZZ
PBU6KQ		93.32	-0.19	-0.37	93.30	-0.27	-0.66	ZZ
RBFQ4R		93.51	0.00	0.00	93.72	0.15	0.37	ZZ
RH2L8G	X	87.50	-6.01	-11.61	87.49	-6.08	-14.88	ZZ
RW3G3N		93.22	-0.29	-0.56	93.46	-0.11	-0.27	ZZ
TBG6RC		93.34	-0.18	-0.34	93.61	0.03	0.08	ZZ
TLKZBG		92.56	-0.95	-1.84	93.69	0.12	0.29	ZZ
U9P7DD		93.78	0.27	0.52	94.06	0.49	1.20	ZZ
UHFRJC		94.05	0.54	1.04	93.74	0.17	0.41	ZZ
WGTZKB		93.50	-0.01	-0.02	93.02	-0.55	-1.35	ZZ
X388AA		93.23	-0.28	-0.54	93.92	0.35	0.86	ZZ
Y2QAFP		93.54	0.03	0.05	94.06	0.49	1.20	ZZ
ZM6G4M		93.82	0.30	0.58	93.88	0.31	0.75	ZZ

Summary Statistics	Sample GN85	Sample GN86
Grand Means	93.51 Percent	93.57 Percent
Stnd Dev Btwn Labs	0.52 Percent	0.41 Percent

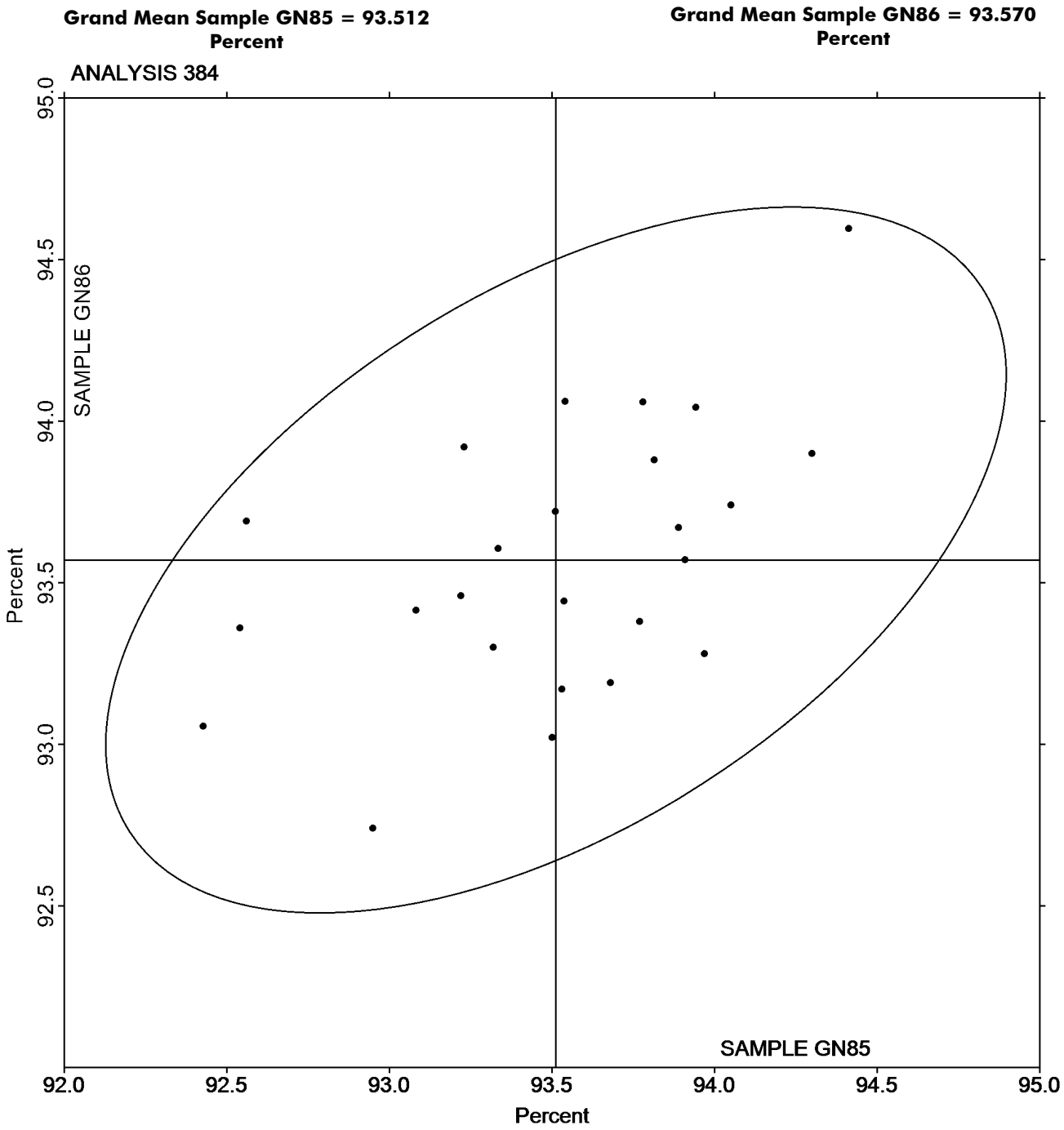
Statistics based on 25 of 26 reporting participants.

Comments on Assigned Data Flags for Test #384

RH2L8G (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



Paper & Paperboard Interlaboratory Testing Program

Analysis 386

Opacity (Paper Backing) - Fine Papers and Newsprint

TAPPI Official Test Method T519

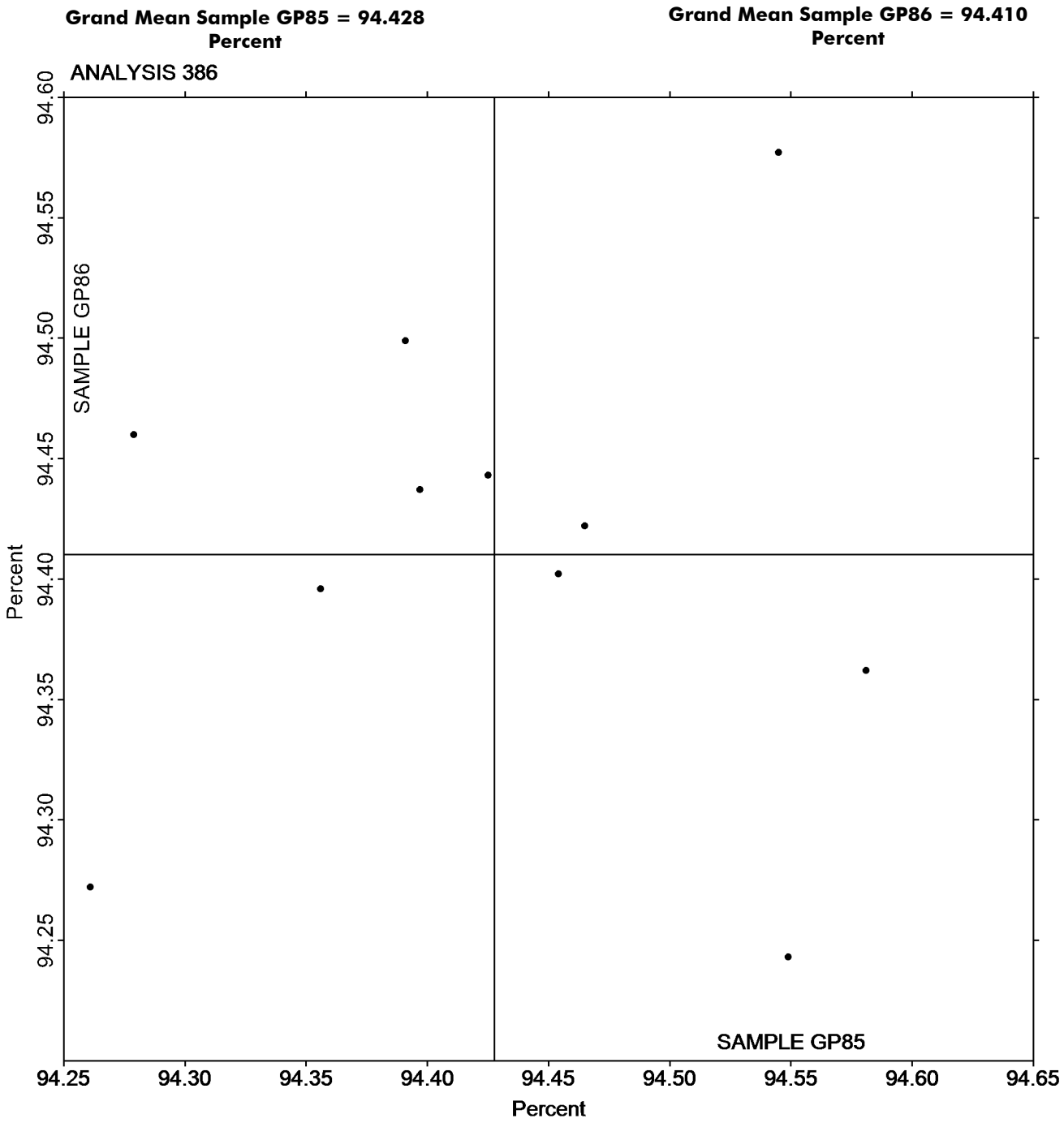
WebCode	Data Flag	Sample GP85 Lab Mean	Sample GP85 Diff from Grand Mean	Sample GP85 CPV	Sample GP86 Lab Mean	Sample GP86 Diff from Grand Mean	Sample GP86 CPV	Instr Code
9CGBNW		94.40	-0.03	-0.29	94.44	0.03	0.28	ZZ
9YB38E		94.55	0.12	1.15	94.24	-0.17	-1.77	ZZ
AMF9AB		94.55	0.12	1.11	94.58	0.17	1.76	ZZ
CDYCHA		94.28	-0.15	-1.41	94.46	0.05	0.52	ZZ
CMPXN8		94.36	-0.07	-0.68	94.40	-0.01	-0.15	ZZ
DTAFJU		94.26	-0.17	-1.58	94.27	-0.14	-1.46	ZZ
HRY4Q8		94.47	0.04	0.35	94.42	0.01	0.12	ZZ
J6LVQ2		94.39	-0.04	-0.35	94.50	0.09	0.94	ZZ
L7ND23		94.43	0.00	-0.02	94.44	0.03	0.35	ZZ
UQNHLE		94.45	0.03	0.25	94.40	-0.01	-0.09	ZZ
WWMR4R		94.58	0.15	1.45	94.36	-0.05	-0.51	ZZ

Summary Statistics	Sample GP85	Sample GP86
Grand Means	94.43 Percent	94.41 Percent
Stnd Dev Btwn Labs	0.11 Percent	0.09 Percent

Statistics based on 11 of 11 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



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

WebCode	Data Flag	Sample GR85 Lab Mean	Sample GR85 Diff from Grand Mean	Sample GR85 CPV	Sample GR86 Lab Mean	Sample GR86 Diff from Grand Mean	Sample GR86 CPV	Instr Code
2AV2XH		87.07	3.71	2.46	87.15	3.77	2.50	HZ
2RVBGE		82.69	-0.68	-0.45	82.54	-0.84	-0.56	TP
4YRPEL		82.28	-1.09	-0.73	82.26	-1.12	-0.74	TS
6TX8DE		82.69	-0.68	-0.45	82.70	-0.69	-0.46	TS
7Y2ETH		83.75	0.38	0.25	83.84	0.45	0.30	HG
9GVT7D		82.55	-0.82	-0.54	82.56	-0.83	-0.55	TS
A9VT7C		85.86	2.49	1.65	85.75	2.37	1.57	TS
AWFYTX		82.17	-1.20	-0.79	82.31	-1.07	-0.71	TP
D88NZ9		84.59	1.23	0.81	84.51	1.12	0.75	HG
EMD8C7		85.55	2.18	1.45	85.93	2.54	1.69	PE
FD6XJ7		84.71	1.34	0.89	84.68	1.29	0.86	TP
G34UWN	*	84.70	1.33	0.88	84.09	0.70	0.47	TT
GZGDE4		82.26	-1.11	-0.73	82.41	-0.98	-0.65	TS
NK2KQY		83.73	0.36	0.24	83.68	0.29	0.19	HG
NQ8GCJ		82.09	-1.28	-0.85	82.06	-1.32	-0.88	TT
PBU6KQ		83.04	-0.33	-0.22	82.93	-0.46	-0.30	XX
RW3G3N		81.76	-1.61	-1.07	81.70	-1.68	-1.12	TS
T8ZHFR		81.70	-1.67	-1.11	81.68	-1.71	-1.13	TS
UHFRJC		81.73	-1.63	-1.08	81.75	-1.63	-1.08	TS
W7NC7J		85.00	1.63	1.08	85.00	1.62	1.07	XX
W9F9TT		83.84	0.47	0.31	84.08	0.69	0.46	TS
WGTZKB		82.38	-0.99	-0.65	82.72	-0.66	-0.44	XC
Y72MWN		83.09	-0.28	-0.19	83.31	-0.07	-0.05	TA
ZM6G4M		81.62	-1.75	-1.16	81.61	-1.77	-1.18	PP

Summary Statistics	Sample GR85	Sample GR86
Grand Means	83.37 Percent	83.38 Percent
Stnd Dev Btwn Labs	1.51 Percent	1.51 Percent

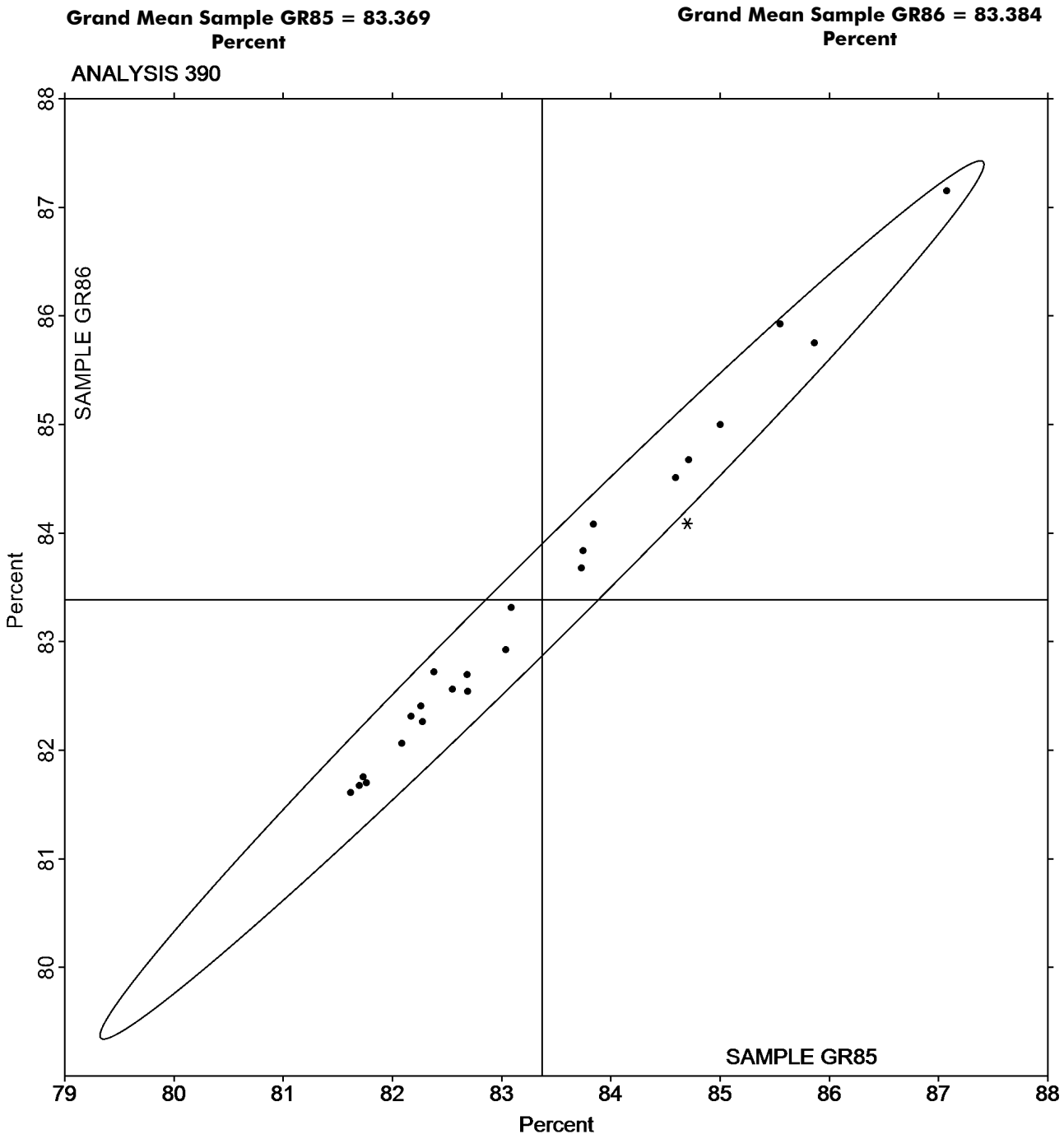
Statistics based on 24 of 24 reporting participants.

Analysis Notes:

T8ZHFR - One determination removed from the Lab Mean of Sample GR85 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
TA	Technidyne, Diano, M.S. S-4	TP	Technidyne Test/Plus
TS	Technidyne Brightimeter Micro S-5	TT	Technidyne Brightimeter Micro S4-M
XC	X-Rite Color i5	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

WebCode	Data Flag	Sample GZ85 Lab Mean	Sample GZ85 Diff from Grand Mean	Sample GZ85 CPV	Sample GZ86 Lab Mean	Sample GZ86 Diff from Grand Mean	Sample GZ86 CPV	Instr Code
3GU3C3		93.05	-0.06	-0.12	92.73	-0.10	-0.22	TS
3HKAVE		92.46	-0.65	-1.31	92.78	-0.05	-0.11	TT
4YRPEL		93.04	-0.07	-0.14	92.47	-0.36	-0.83	TS
AWFYTX		93.18	0.08	0.16	92.85	0.03	0.06	PP
BTZQ6X		92.51	-0.59	-1.20	92.44	-0.39	-0.89	PP
GJ6YX7		92.87	-0.23	-0.47	92.39	-0.44	-1.02	TS
RH2L8G		93.74	0.63	1.29	93.36	0.53	1.23	TT
TBG6RC		93.15	0.04	0.09	92.74	-0.08	-0.19	TS
TLKZBG		93.94	0.83	1.70	93.68	0.85	1.97	TS

Summary Statistics	Sample GZ85	Sample GZ86
Grand Means	93.11 Percent	92.83 Percent
Stnd Dev Btwn Labs	0.49 Percent	0.43 Percent

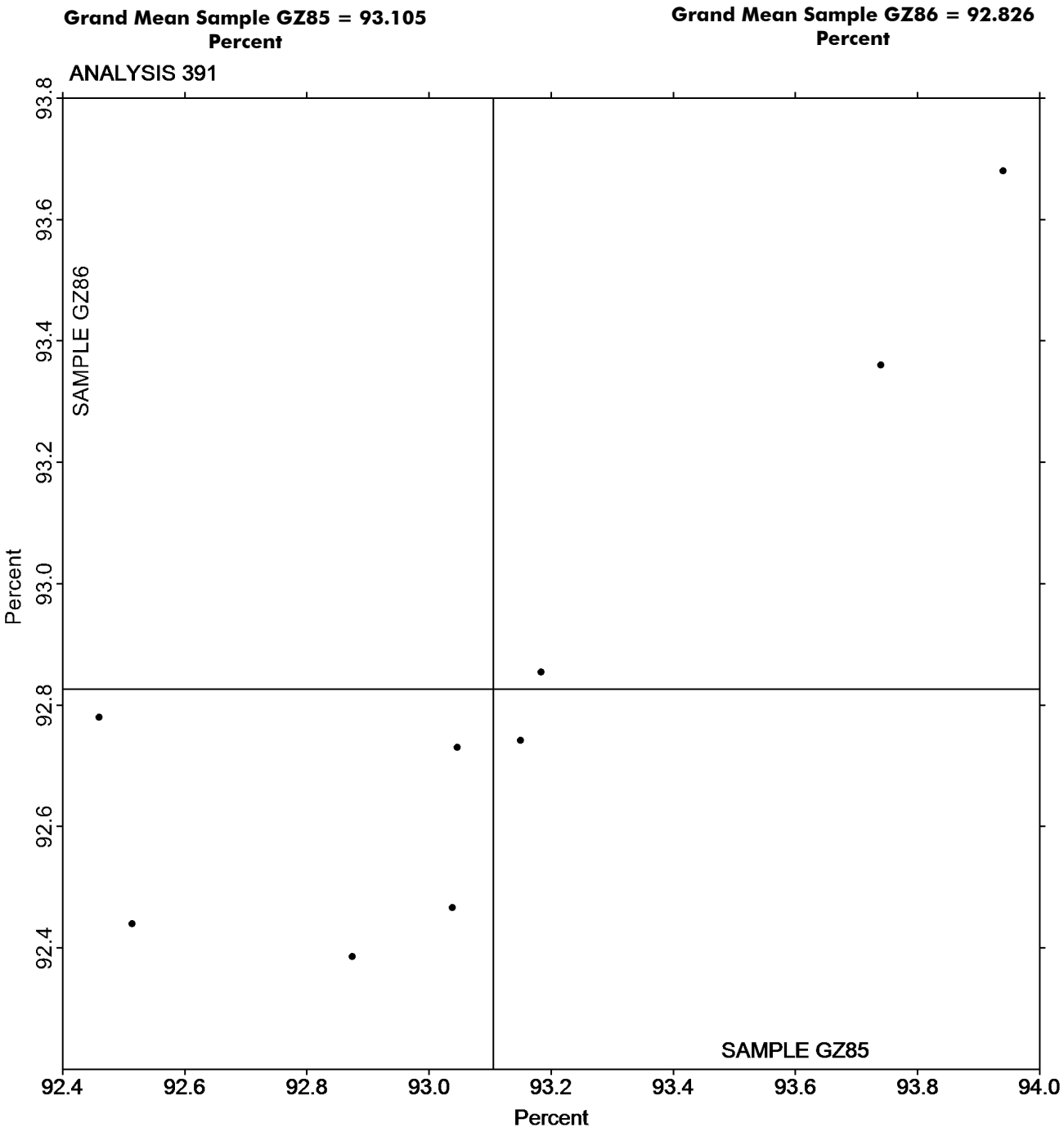
Statistics based on 9 of 9 reporting participants.

Key to Instrument Codes Reported by Participants

PP Technidyne Profile/Plus

TS Technidyne Brightimeter Micro S-5

TT Technidyne Brightimeter Micro S4-M



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 #3092G, December 2020

Analysis 392
Diffuse Brightness
TAPPI Official Test Method T525

WebCode	Data Flag	Sample GR85 Lab Mean	Sample GR85 Diff from Grand Mean	Sample GR85 CPV	Sample GR86 Lab Mean	Sample GR86 Diff from Grand Mean	Sample GR86 CPV	Instr Code
2CMZBG		82.76	0.08	0.46	82.64	-0.02	-0.09	TC
2UJMFK		82.61	-0.07	-0.39	82.45	-0.20	-0.93	TC
3P66X4		82.50	-0.18	-1.01	82.30	-0.36	-1.63	TL
6AG264		82.78	0.09	0.53	82.88	0.23	1.03	EF
793YVB	*	82.20	-0.48	-2.68	82.18	-0.48	-2.19	LE
79RZYF		82.55	-0.13	-0.74	82.50	-0.15	-0.70	TC
7Y2ETH	*	82.69	0.00	0.03	82.91	0.26	1.16	TC
9CGBNW		82.51	-0.17	-0.94	82.55	-0.11	-0.51	TC
9GVT7D		82.80	0.12	0.69	82.80	0.14	0.63	TC
9YB38E		82.93	0.24	1.37	82.94	0.28	1.29	LE
AMF9AB		82.49	-0.19	-1.05	82.49	-0.17	-0.77	EG
CDYCHA		82.79	0.11	0.61	82.76	0.10	0.45	AC
DTAFJU		83.07	0.39	2.19	83.14	0.48	2.19	TC
FD6XJ7		82.71	0.03	0.18	82.74	0.08	0.36	TL
HNG2LM		82.71	0.03	0.17	82.82	0.17	0.75	TC
HRY4Q8		82.62	-0.06	-0.33	82.55	-0.11	-0.51	LE
J6LVQ2		82.54	-0.14	-0.78	82.49	-0.17	-0.76	LA
JJ6DLQ		82.55	-0.13	-0.71	82.50	-0.15	-0.70	TC
NQ8GCJ		82.60	-0.08	-0.45	82.48	-0.18	-0.83	EG
PETJ8F		82.63	-0.05	-0.29	82.61	-0.05	-0.23	TC
UHFRJC		82.84	0.16	0.91	82.69	0.03	0.15	LT
UQNHLE		82.55	-0.13	-0.72	82.54	-0.12	-0.53	TC
VM324U		82.86	0.18	1.00	82.94	0.28	1.29	EE
WE8H3Q		82.87	0.19	1.07	82.83	0.17	0.76	LE
XTGL4C		82.87	0.19	1.04	82.80	0.14	0.65	TC
Y72MWN		82.65	-0.03	-0.15	82.58	-0.08	-0.36	LT

Summary Statistics	Sample GR85	Sample GR86
Grand Means	82.68 Percent	82.66 Percent
Stnd Dev Btwn Labs	0.18 Percent	0.22 Percent

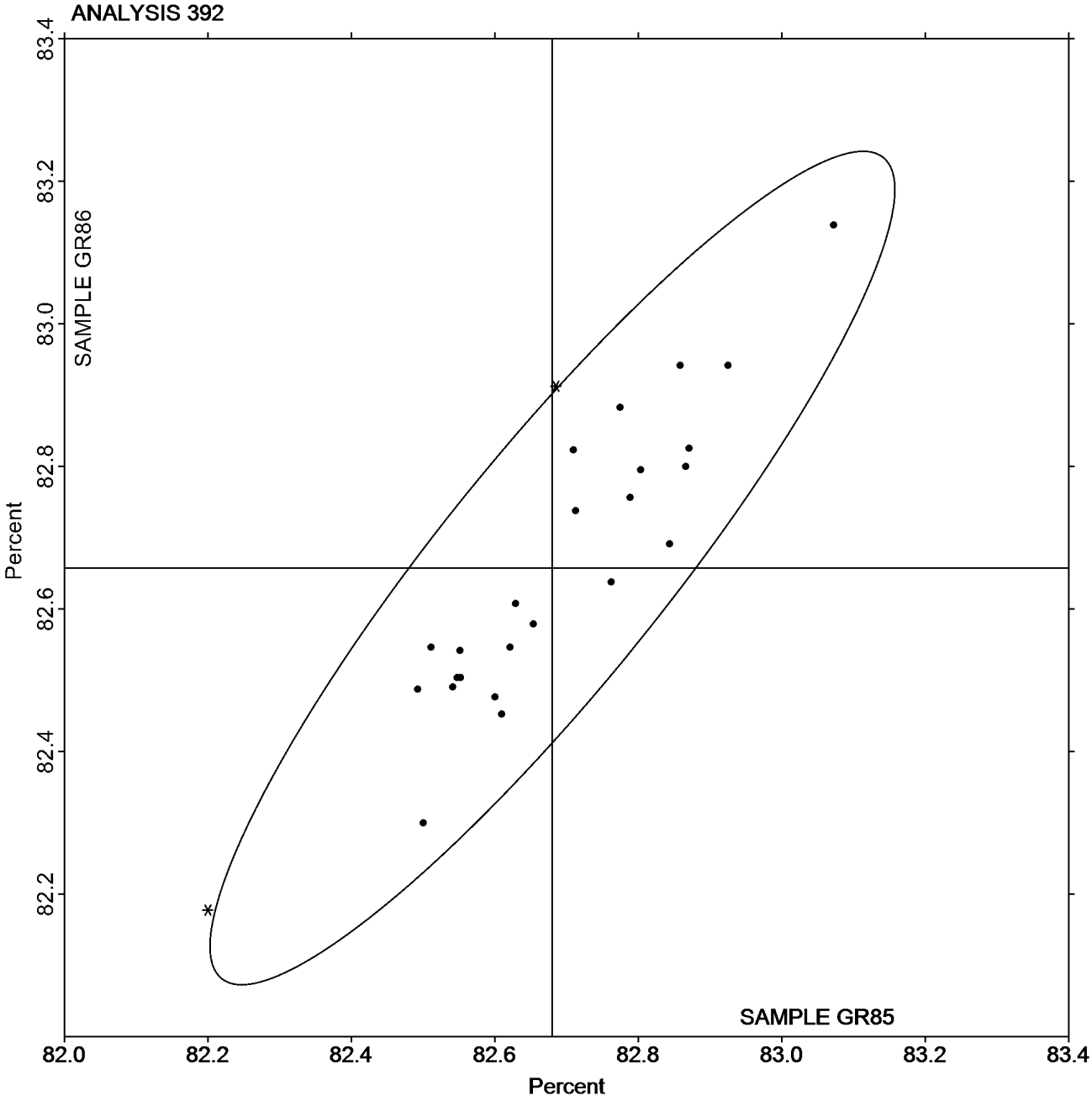
Statistics based on 26 of 26 reporting participants.

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		

Grand Mean Sample GR85 = 82.680
Percent

Grand Mean Sample GR86 = 82.657
Percent



Paper & Paperboard Interlaboratory Testing Program

Analysis 394

Fluorescent Component of Directional Brightness

TAPPI Official Test Method T452

WebCode	Data Flag	Sample GZ85 Lab Mean	Sample GZ85 Diff from Grand Mean	Sample GZ85 CPV	Sample GZ86 Lab Mean	Sample GZ86 Diff from Grand Mean	Sample GZ86 CPV	Instr Code
3GU3C3		6.022	-0.202	-0.70	5.996	-0.223	-0.78	TS
3HKAVE		6.200	-0.024	-0.08	6.240	0.021	0.07	TT
4YRPEL		6.380	0.156	0.54	6.402	0.183	0.64	TS
BTZQ6X		6.046	-0.178	-0.62	6.074	-0.145	-0.51	PP
GJ6YX7		5.864	-0.360	-1.25	5.808	-0.411	-1.44	TS
RH2L8G		6.740	0.516	1.78	6.660	0.441	1.55	TT
TBG6RC		6.318	0.094	0.32	6.352	0.133	0.47	TS

Summary Statistics	Sample GZ85	Sample GZ86
Grand Means	6.22 Percent	6.22 Percent
Stnd Dev Btwn Labs	0.29 Percent	0.28 Percent

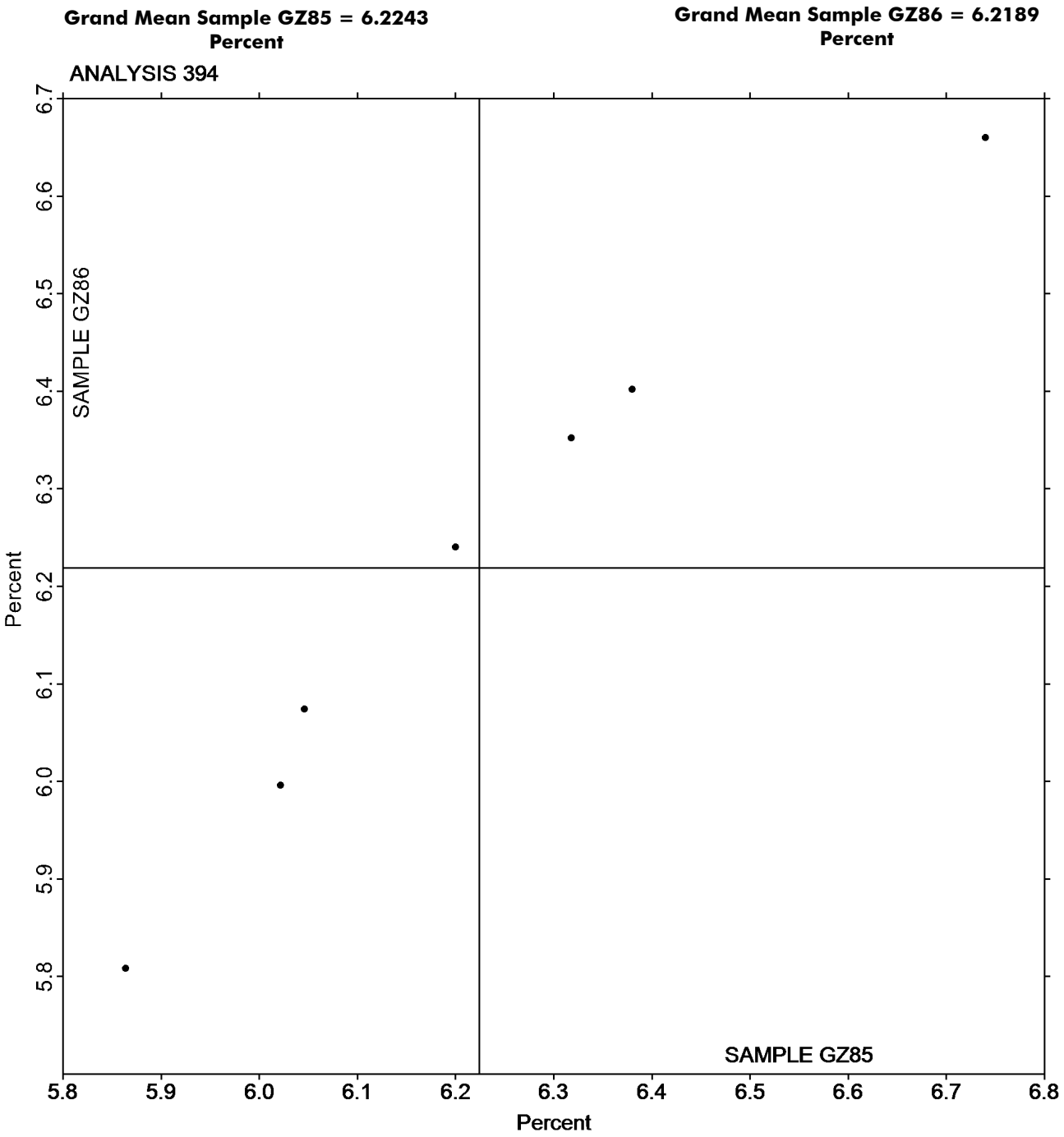
Statistics based on 7 of 7 reporting participants.

Key to Instrument Codes Reported by Participants

PP Technidyne Profile/Plus

TS Technidyne Brightimeter Micro S-5

TT Technidyne Brightimeter Micro S4-M



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

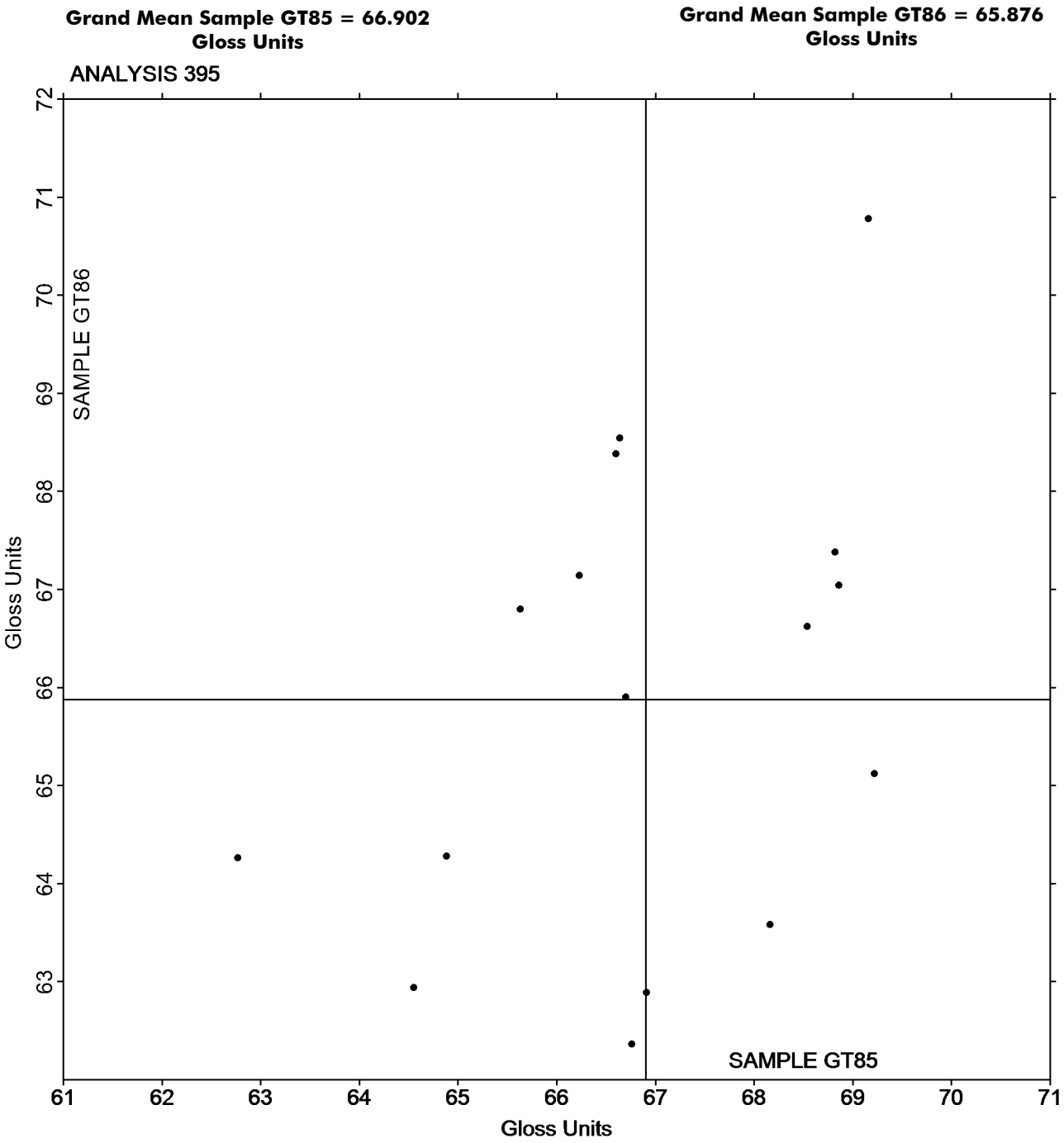
WebCode	Data Flag	Sample GT85 Lab Mean	Sample GT85 Diff from Grand Mean	Sample GT85 CPV	Sample GT86 Lab Mean	Sample GT86 Diff from Grand Mean	Sample GT86 CPV	Instr Code
2RVBGE		66.76	-0.14	-0.08	62.36	-3.52	-1.48	TH
3HKAVE		62.77	-4.13	-2.24	64.26	-1.62	-0.68	PP
4QBAMC		64.89	-2.02	-1.09	64.28	-1.60	-0.67	GM
7CQBUF		65.63	-1.27	-0.69	66.80	0.92	0.39	XX
BTZQ6X		66.91	0.01	0.00	62.89	-2.99	-1.25	PP
CDYCHA		68.86	1.96	1.06	67.04	1.16	0.49	LB
D88NZ9		68.16	1.26	0.68	63.58	-2.30	-0.96	TH
FD6XJ7		66.60	-0.30	-0.16	68.38	2.50	1.05	GM
GJ6YX7		66.23	-0.67	-0.36	67.14	1.26	0.53	LF
NK2KQY		66.64	-0.26	-0.14	68.54	2.66	1.12	TH
NQ8GCJ		68.54	1.64	0.89	66.62	0.74	0.31	TH
RW3G3N		69.16	2.26	1.22	70.78	4.90	2.06	LA
TY4MHU		68.82	1.92	1.04	67.38	1.50	0.63	LA
UCNGAD		66.70	-0.20	-0.11	65.90	0.02	0.01	GM
Y72MWN		64.55	-2.35	-1.27	62.94	-2.94	-1.23	GA
ZWQLBM		69.22	2.32	1.25	65.12	-0.76	-0.32	LF

Summary Statistics	Sample GT85	Sample GT86
Grand Means	66.90 Gloss Units	65.88 Gloss Units
Stnd Dev Btwn Labs	1.85 Gloss Units	2.38 Gloss Units

Statistics based on 16 of 16 reporting participants.

Key to Instrument Codes Reported by Participants

GA	BYK-Gardner (model not specified)	GM	BYK-Gardner micro-gloss
LA	L & W Gloss - Autoline 300	LB	L & W Gloss Tester Code 224
LF	L & W Autoline 400	PP	Technidyne Profile/Plus
TH	Technidyne T480A	XX	Instrument make/model not specified by lab



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 #3092G, December 2020

Analysis 396

Specular Gloss at 75 Degrees - Low Range

TAPPI Official Test Method T480

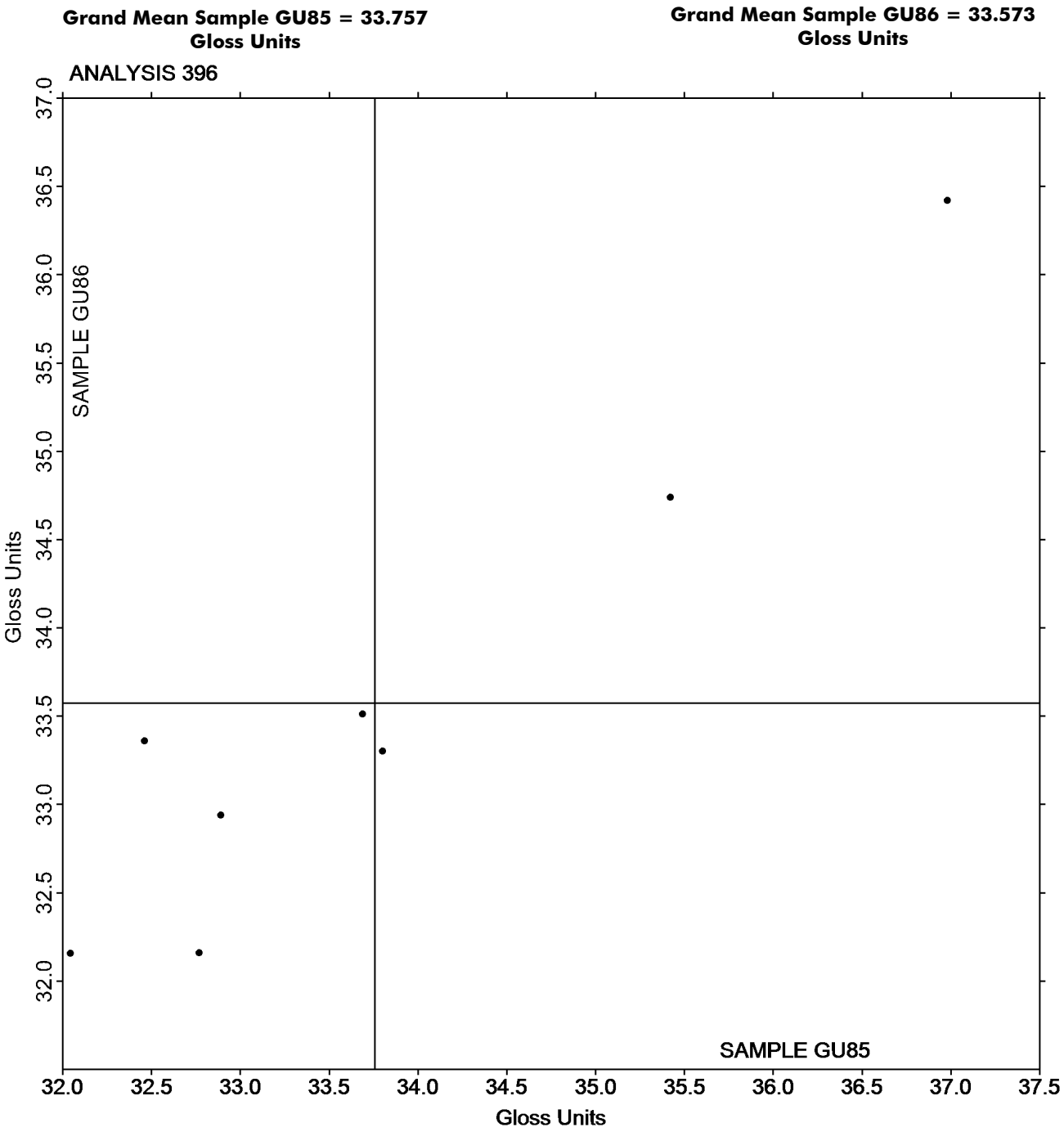
WebCode	Data Flag	Sample GU85 Lab Mean	Sample GU85 Diff from Grand Mean	Sample GU85 CPV	Sample GU86 Lab Mean	Sample GU86 Diff from Grand Mean	Sample GU86 CPV	Instr Code
2AV2XH		32.89	-0.87	-0.52	32.94	-0.63	-0.45	GS
793YVB		32.77	-0.99	-0.59	32.16	-1.41	-1.00	TH
7Y2ETH		35.42	1.66	1.00	34.74	1.17	0.83	PP
CDYCHA		33.69	-0.07	-0.04	33.51	-0.06	-0.04	LA
G34UWN		32.05	-1.71	-1.03	32.16	-1.42	-1.00	TH
HNG2LM		36.98	3.22	1.93	36.42	2.85	2.01	TH
U9P7DD		32.46	-1.30	-0.78	33.36	-0.21	-0.15	PP
WGTZKB		33.80	0.04	0.03	33.30	-0.27	-0.19	TH

Summary Statistics	Sample GU85	Sample GU86
Grand Means	33.76 Gloss Units	33.57 Gloss Units
Stnd Dev Btwn Labs	1.67 Gloss Units	1.41 Gloss Units

Statistics based on 8 of 8 reporting participants.

Key to Instrument Codes Reported by Participants

GS	BYK-Gardner Glossgard II	LA	L & W Gloss - Autoline 300
PP	Technidyne Profile/Plus	TH	Technidyne T480A



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

WebCode	Data Flag	Sample GW85 Lab Mean	Sample GW85 Diff from Grand Mean	Sample GW85 CPV	Sample GW86 Lab Mean	Sample GW86 Diff from Grand Mean	Sample GW86 CPV	Instr Code
27FTAJ	X	74.12	-1.09	-2.41	102.31	12.22	21.27	ZZ
3Z469M		74.53	-0.68	-1.51	89.45	-0.65	-1.13	ZZ
4QBAMC		75.11	-0.10	-0.23	89.79	-0.30	-0.52	ZZ
793YVB		74.70	-0.51	-1.13	89.90	-0.19	-0.33	ZZ
8DFYQG	*	76.30	1.09	2.41	91.57	1.48	2.57	ZZ
9CGBNW		75.44	0.23	0.52	90.43	0.34	0.59	ZZ
AEK79Z		75.38	0.17	0.38	90.47	0.38	0.66	ZZ
CBBZJ4		75.03	-0.18	-0.40	89.61	-0.48	-0.84	ZZ
CDYCHA		75.31	0.10	0.22	90.48	0.39	0.68	ZZ
CMPXN8		75.60	0.39	0.86	90.27	0.18	0.31	ZZ
EKPVCZ		75.00	-0.21	-0.46	90.60	0.51	0.88	ZZ
G34UWN	*	74.04	-1.17	-2.58	89.33	-0.77	-1.33	ZZ
HNG2LM		74.89	-0.32	-0.71	89.21	-0.88	-1.53	ZZ
HRY4Q8		75.10	-0.11	-0.24	90.28	0.19	0.33	ZZ
LWHTEZ		75.18	-0.03	-0.06	90.15	0.06	0.10	ZZ
N4CCVL		75.31	0.10	0.22	90.53	0.44	0.77	ZZ
PBU6KQ		74.95	-0.26	-0.57	90.06	-0.03	-0.05	ZZ
QME4NX		74.98	-0.23	-0.51	89.43	-0.66	-1.15	ZZ
RYQT3T		75.34	0.13	0.28	89.84	-0.25	-0.44	ZZ
TLKZBG		75.09	-0.12	-0.26	90.44	0.35	0.61	ZZ
VM324U		75.94	0.73	1.61	90.62	0.53	0.92	ZZ
W9F9TT		75.83	0.62	1.38	90.62	0.53	0.92	ZZ
WGTZKB		75.49	0.28	0.62	90.70	0.60	1.05	ZZ
WZL3YR		75.14	-0.07	-0.15	89.72	-0.37	-0.65	ZZ
X388AA	X	72.63	-2.58	-5.71	88.58	-1.51	-2.63	ZZ
X83XFL		75.20	-0.01	-0.02	89.31	-0.78	-1.36	ZZ
Y2QAFP		75.36	0.15	0.34	89.48	-0.61	-1.06	ZZ

Summary Statistics	Sample GW85	Sample GW86
Grand Means	75.21 g/sq m	90.09 g/sq m
Stnd Dev Btwn Labs	0.45 g/sq m	0.57 g/sq m

Statistics based on 25 of 27 reporting participants.

Comments on Assigned Data Flags for Test #398

X388AA (X) - Data for both samples are low. Inconsistent within the determinations of sample GW85.

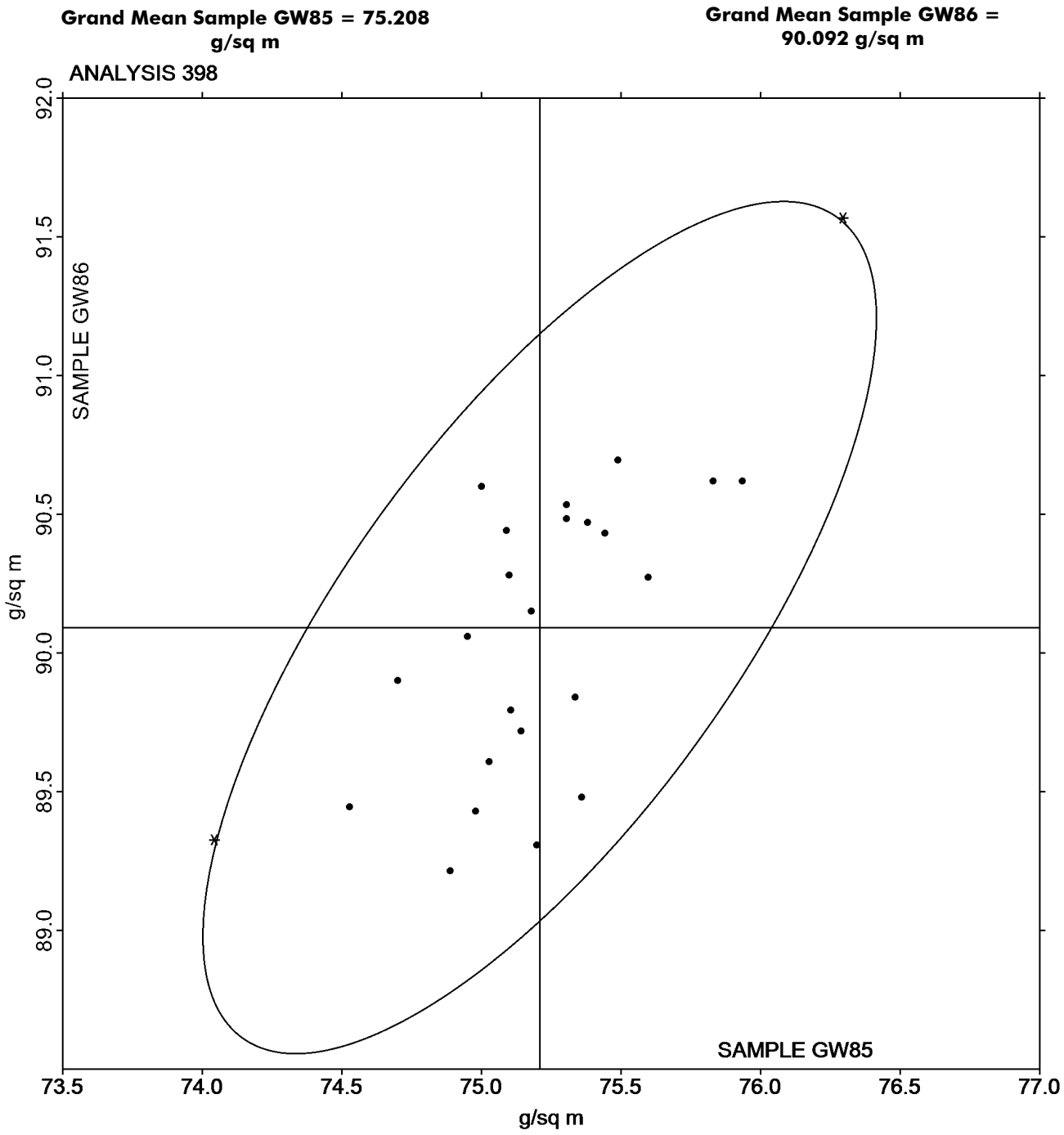
27FTAJ (X) - Extreme Data for Sample GW86.

Analysis Notes:

793YVB - Data appears to be transposed between samples. Data Switched by CTS.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



Paper & Paperboard Interlaboratory Testing Program

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

WebCode	Data Flag	Sample GX85 Lab Mean	Sample GX85 Diff from Grand Mean	Sample GX85 CPV	Sample GX86 Lab Mean	Sample GX86 Diff from Grand Mean	Sample GX86 CPV	Instr Code
4YRPEL		11.28	-0.95	-0.32	8.91	-2.07	-0.77	HE
6TX8DE		9.37	-2.86	-0.95	9.47	-1.51	-0.56	HE
7CQBUF		12.67	0.44	0.15	10.93	-0.05	-0.02	XX
8U4C49		15.29	3.06	1.02	13.49	2.51	0.94	HE
9E8G89		10.05	-2.18	-0.73	8.77	-2.21	-0.82	HE
9GVT7D		13.51	1.28	0.42	9.55	-1.43	-0.53	HE
A9VT7C		10.63	-1.60	-0.53	8.29	-2.69	-1.00	HE
AWFYTX		12.31	0.08	0.03	12.93	1.95	0.73	HE
EMD8C7		12.34	0.11	0.04	11.29	0.31	0.12	HE
GJ6YX7		12.54	0.31	0.10	12.00	1.02	0.38	HE
GZGDE4		9.36	-2.87	-0.96	9.78	-1.20	-0.45	HE
HNG2LM		18.81	6.58	2.19	14.78	3.80	1.42	HE
LRNQDL		11.93	-0.30	-0.10	9.36	-1.62	-0.60	HE
PBU6KQ		15.00	2.77	0.92	13.74	2.76	1.03	XX
TBG6RC		12.43	0.20	0.07	9.64	-1.34	-0.50	HE
TLKZBG		10.30	-1.93	-0.64	9.20	-1.78	-0.66	HE
U9P7DD		16.26	4.03	1.34	15.90	4.92	1.84	HE
UCNGAD		11.09	-1.14	-0.38	10.14	-0.84	-0.31	HE
UHFRJC		7.95	-4.28	-1.42	7.10	-3.88	-1.45	HE
VRWXTK		8.03	-4.20	-1.40	7.98	-3.00	-1.12	HE
VVYV4D		9.83	-2.40	-0.80	9.72	-1.26	-0.47	HE
W7NC7J		9.72	-2.51	-0.84	8.86	-2.12	-0.79	XX
X388AA		10.27	-1.96	-0.65	10.35	-0.63	-0.23	HE
XTGL4C		18.58	6.35	2.11	16.89	5.91	2.21	HE
ZM6G4M		16.28	4.05	1.35	15.34	4.36	1.63	HE

Summary Statistics	Sample GX85	Sample GX86
Grand Means	12.23 Seconds	10.98 Seconds
Stnd Dev Btwn Labs	3.01 Seconds	2.68 Seconds

Statistics based on 25 of 25 reporting participants.

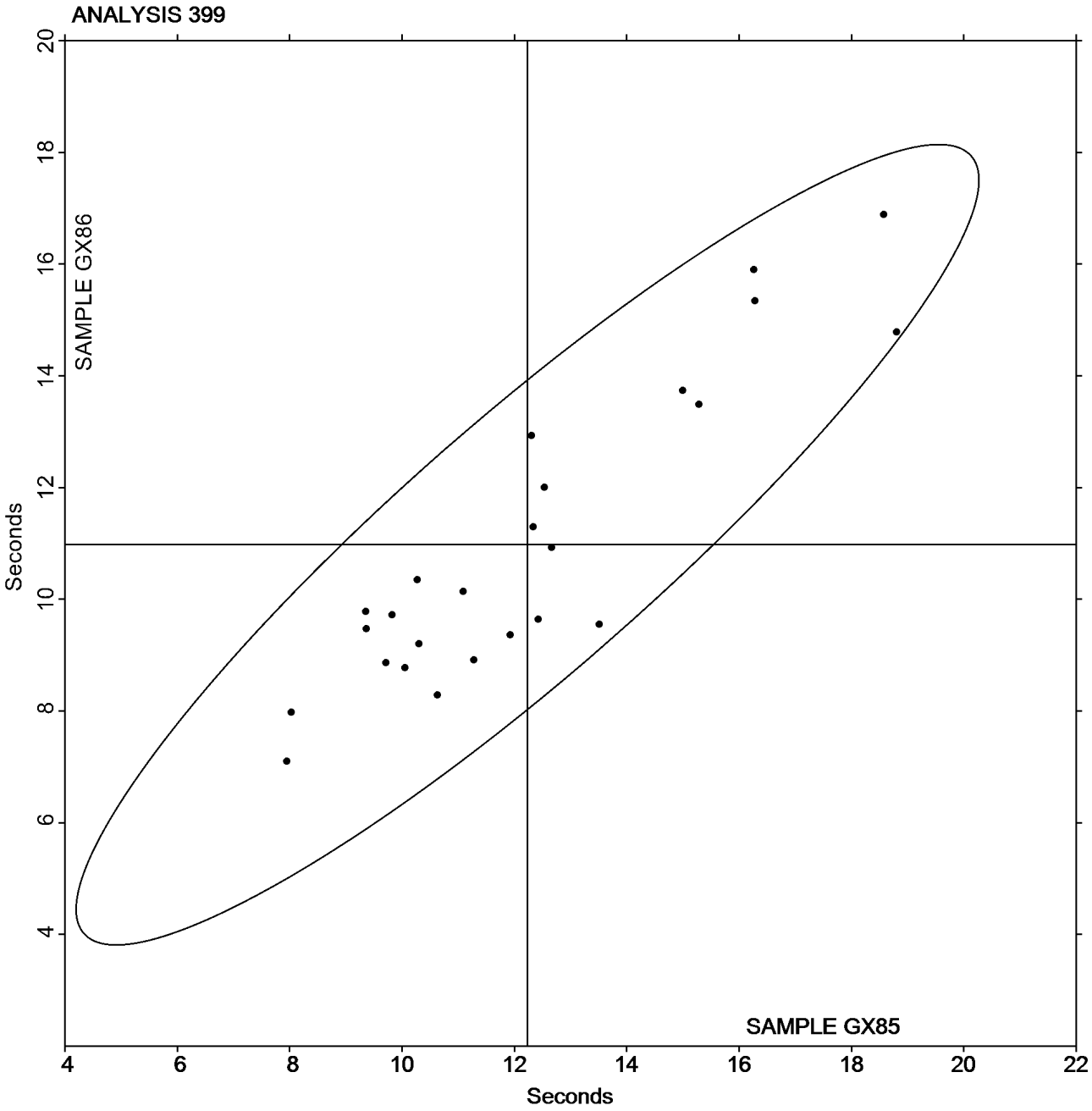
Key to Instrument Codes Reported by Participants

HE Hercules Sizing Tester

XX Instrument make/model not specified by lab

Grand Mean Sample GX85 = 12.233 Seconds

Grand Mean Sample GX86 = 10.976 Seconds



-End of Report-