Collaborative Testing Services, Inc.

Paper & Paperboard Testing Program

Summary Report #4272 - December 2023

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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 industries including color, rubber, plastics, fasteners and metals, containerboard, paper, agriculture, hemp, 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 100 countries, currently participate in the CTS programs.

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

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Key for Web Summary Reports (Page 1 of 2)

WebCode — Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Paper Report published on the CTS Website. 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.

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.

Paper & Paperboard Interlaboratory Testing Program

Analysis 3501

Thickness (Caliper), Packaging papers

TAPPI Official Test Method T411

WebCode	Data Flag	Sample CK23 Lab Mean	Sample CK23 Diff from Grand Mean	Sample CK23 CPV	Sample CK24 Lab Mean	Sample CK24 Diff from Grand Mean	Sample CK24 CPV	Instr Code
2EY67U		9.049	0.080	0.57	8.954	-0.014	-0.10	XX
3LDD7B		8.953	-0.016	-0.12	8.937	-0.031	-0.22	LC
3MMJ6X		9.100	0.131	0.93	9.112	0.144	1.02	LB
3X62W4	*	8.748	-0.221	-1.57	8.992	0.024	0.17	LW
4Z7NPY		8.978	0.008	0.06	9.044	0.076	0.54	LW
6CB8ZY		8.985	0.016	0.11	9.063	0.095	0.67	EM
6GQENX		8.745	-0.224	-1.59	8.704	-0.264	-1.86	XX
8X4XAU		8.842	-0.127	-0.90	8.909	-0.059	-0.42	EM
8XNEPW		9.043	0.074	0.53	9.037	0.069	0.49	EM
9F3DAK		9.032	0.062	0.44	8.969	0.000	0.00	LW
AMK37Z		8.989	0.020	0.14	8.918	-0.050	-0.35	OK
EW9MET	*	8.775	-0.194	-1.38	9.004	0.036	0.25	TA
FNXKUD		8.884	-0.085	-0.61	8.850	-0.118	-0.83	EM
GUUYTK		9.078	0.109	0.77	9.097	0.129	0.91	LW
HMRCEP		8.980	0.011	0.08	9.008	0.040	0.28	TM
MXZD47		9.106	0.137	0.97	9.086	0.118	0.83	PP
N9NWVG		9.000	0.031	0.22	8.870	-0.098	-0.69	LW
Q8RZJR		9.128	0.159	1.13	9.178	0.210	1.48	LW
QC2GTF		9.026	0.057	0.40	9.096	0.128	0.90	XX
RW4RCA		9.170	0.201	1.43	9.157	0.189	1.33	LW
TJWXKX		9.075	0.106	0.75	8.995	0.027	0.19	LW
U6B68B		9.120	0.151	1.07	9.060	0.092	0.65	LC
WL948A	X	8.380	-0.589	-4.19	8.370	-0.598	-4.22	TM
WT7WF4		8.980	0.011	0.08	8.979	0.011	0.08	EM
XE4MCU		9.221	0.252	1.79	9.217	0.249	1.76	PP
XFLGD4		9.094	0.125	0.89	9.014	0.046	0.32	TA
XJH6UB		8.762	-0.207	-1.47	8.706	-0.262	-1.85	XX
YB4X9R		8.770	-0.199	-1.42	8.790	-0.178	-1.26	LW
YEJ7WR		8.863	-0.106	-0.75	8.847	-0.121	-0.85	LA
YL48C4		8.830	-0.139	-0.99	8.800	-0.168	-1.19	XX
YT3WT9		8.704	-0.265	-1.89	8.631	-0.337	-2.38	XX
ZK4NRE		9.013	0.044	0.31	8.985	0.017	0.12	LW

Summary Statistics	Sample CK23	Sample CK24
Grand Means	8.97 mils	8.97 mils
Stnd Dev Btwn Labs	0.14 mils	0.14 mils

Statistics based on 31 of 32 reporting participants.

Comments on Assigned Data Flags for Test #3501

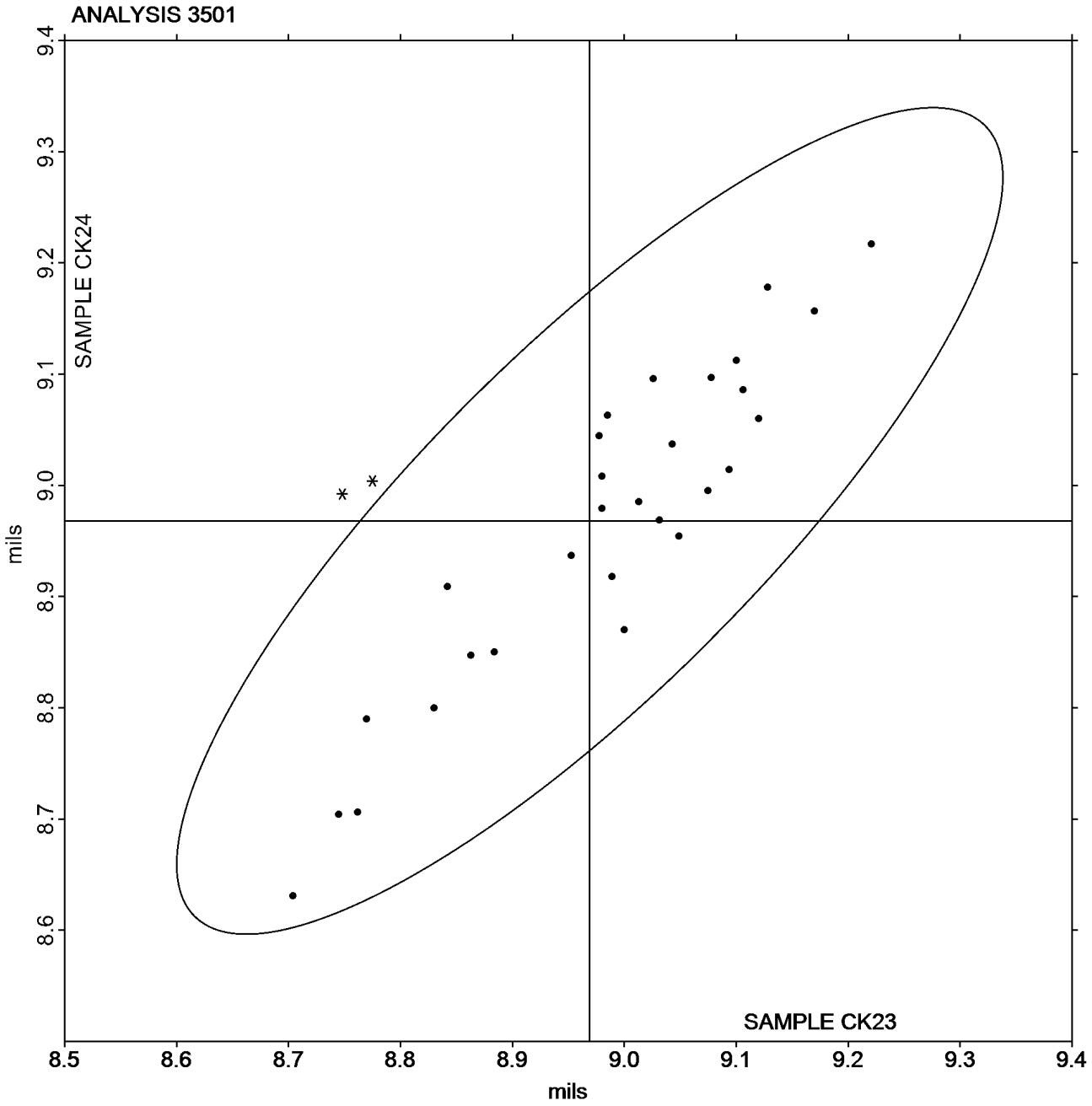
WL948A (X) - Data for both samples are low. Possible Systematic Error.

Key to Instrument Codes Reported by Participants

EM	Emveco	LA	L & W Autoline
LB	L & W Autoline 600	LC	L & W Autoline 400
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 CK23 = 8.9691 mils

Grand Mean Sample CK24 = 8.9680 mils



Paper & Paperboard Interlaboratory Testing Program

Analysis 3511

Bursting Strength - Packaging Papers

TAPPI Official Test Method T403

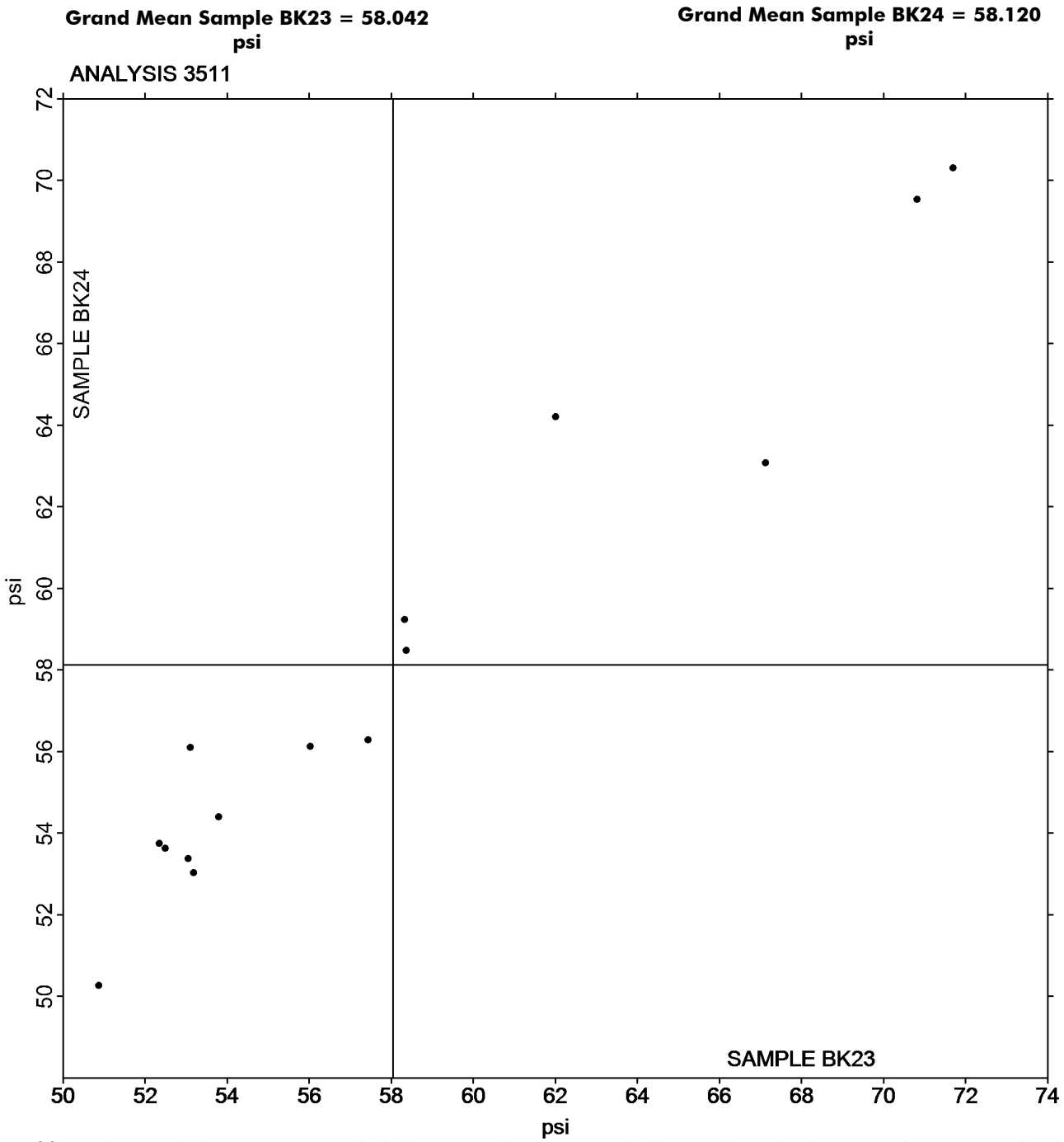
WebCode	Data Flag	Sample BK23 Lab Mean	Sample BK23 Diff from Grand Mean	Sample BK23 CPV	Sample BK24 Lab Mean	Sample BK24 Diff from Grand Mean	Sample BK24 CPV	Instr Code
4M3YER		62.00	3.96	0.58	64.20	6.08	1.00	ZZ
4Z7NPY		56.02	-2.02	-0.29	56.13	-1.99	-0.33	ZZ
9F3DAK		58.32	0.28	0.04	59.23	1.11	0.18	ZZ
AMK37Z		58.36	0.32	0.05	58.48	0.36	0.06	ZZ
AZ7HAZ		67.12	9.08	1.32	63.08	4.96	0.82	ZZ
D7JPZU		71.70	13.66	1.99	70.30	12.18	2.01	ZZ
EW9MET		52.35	-5.69	-0.83	53.75	-4.37	-0.72	ZZ
GUUYTK		57.43	-0.61	-0.09	56.29	-1.83	-0.30	ZZ
HMRCEP		70.82	12.78	1.86	69.53	11.41	1.88	ZZ
Q8RZJR		50.86	-7.18	-1.05	50.27	-7.85	-1.29	ZZ
RW4RCA		52.50	-5.54	-0.81	53.62	-4.50	-0.74	ZZ
TA8AMA		53.18	-4.86	-0.71	53.04	-5.08	-0.84	ZZ
URL98X		53.06	-4.99	-0.73	53.37	-4.75	-0.78	ZZ
YB4X9R		53.10	-4.94	-0.72	56.10	-2.02	-0.33	ZZ
YNNDCR		53.80	-4.24	-0.62	54.40	-3.72	-0.61	ZZ

Summary Statistics	Sample BK23	Sample BK24
Grand Means	58.04 psi	58.12 psi
Stnd Dev Btwn Labs	6.86 psi	6.07 psi

Statistics based on 15 of 15 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 3513

Tearing Strength - Packaging Papers

TAPPI Official Test Method T414

WebCode	Data Flag	Sample RK23 Lab Mean	Sample RK23 Diff from Grand Mean	Sample RK23 CPV	Sample RK24 Lab Mean	Sample RK24 Diff from Grand Mean	Sample RK24 CPV	Instr Code
2VG6XQ		150.2	13.5	0.75	181.4	20.1	0.96	ZZ
3LDD7B		142.1	5.4	0.30	161.4	0.2	0.01	ZZ
4M3YER		118.6	-18.1	-1.01	138.2	-23.1	-1.11	ZZ
4Z7NPY		134.6	-2.2	-0.12	159.5	-1.7	-0.08	ZZ
6GQENX		117.5	-19.2	-1.07	135.8	-25.4	-1.22	ZZ
7FW49P		136.0	-0.8	-0.04	166.7	5.4	0.26	ZZ
8X4XAU	*	193.8	57.1	3.18	231.0	69.7	3.33	ZZ
8XNEPW		127.4	-9.3	-0.52	153.8	-7.4	-0.36	ZZ
AMK37Z		135.3	-1.4	-0.08	168.0	6.7	0.32	ZZ
DBEJYF		147.3	10.5	0.59	166.4	5.1	0.25	ZZ
DGZCD2		125.0	-11.8	-0.66	148.7	-12.6	-0.60	ZZ
FMJD9W		161.7	25.0	1.39	192.1	30.8	1.48	ZZ
GUUYTK		126.5	-10.3	-0.57	160.5	-0.8	-0.04	ZZ
HMRCEP	*	144.8	8.1	0.45	148.2	-13.1	-0.63	ZZ
KYJDCB		123.1	-13.7	-0.76	147.3	-14.0	-0.67	ZZ
LZLVLQ		138.4	1.7	0.09	158.7	-2.5	-0.12	ZZ
Q8RZJR		133.7	-3.0	-0.17	160.5	-0.8	-0.04	ZZ
QC2GTF		160.1	23.4	1.30	192.3	31.0	1.49	ZZ
RW4RCA		147.8	11.1	0.62	170.1	8.8	0.42	ZZ
TA8AMA		122.0	-14.7	-0.82	149.0	-12.3	-0.59	ZZ
TJWXKX		128.3	-8.4	-0.47	147.0	-14.3	-0.69	ZZ
WT7WF4		113.2	-23.6	-1.31	145.4	-15.9	-0.76	ZZ
WVXT6X		104.7	-32.0	-1.79	123.2	-38.1	-1.82	ZZ
XE4MCU		143.8	7.1	0.39	173.6	12.3	0.59	ZZ
XFLGD4		130.4	-6.3	-0.35	157.0	-4.3	-0.20	ZZ
YB4X9R		122.4	-14.3	-0.80	142.8	-18.5	-0.88	ZZ
YEJ7WR		149.3	12.6	0.70	172.9	11.6	0.56	ZZ
YL48C4		158.0	21.3	1.19	176.8	15.5	0.74	ZZ
ZK4NRE		129.6	-7.2	-0.40	148.8	-12.5	-0.60	ZZ

Summary Statistics	Sample RK23	Sample RK24
Grand Means	136.74 Grams	161.28 Grams
Stnd Dev Btwn Labs	17.93 Grams	20.90 Grams

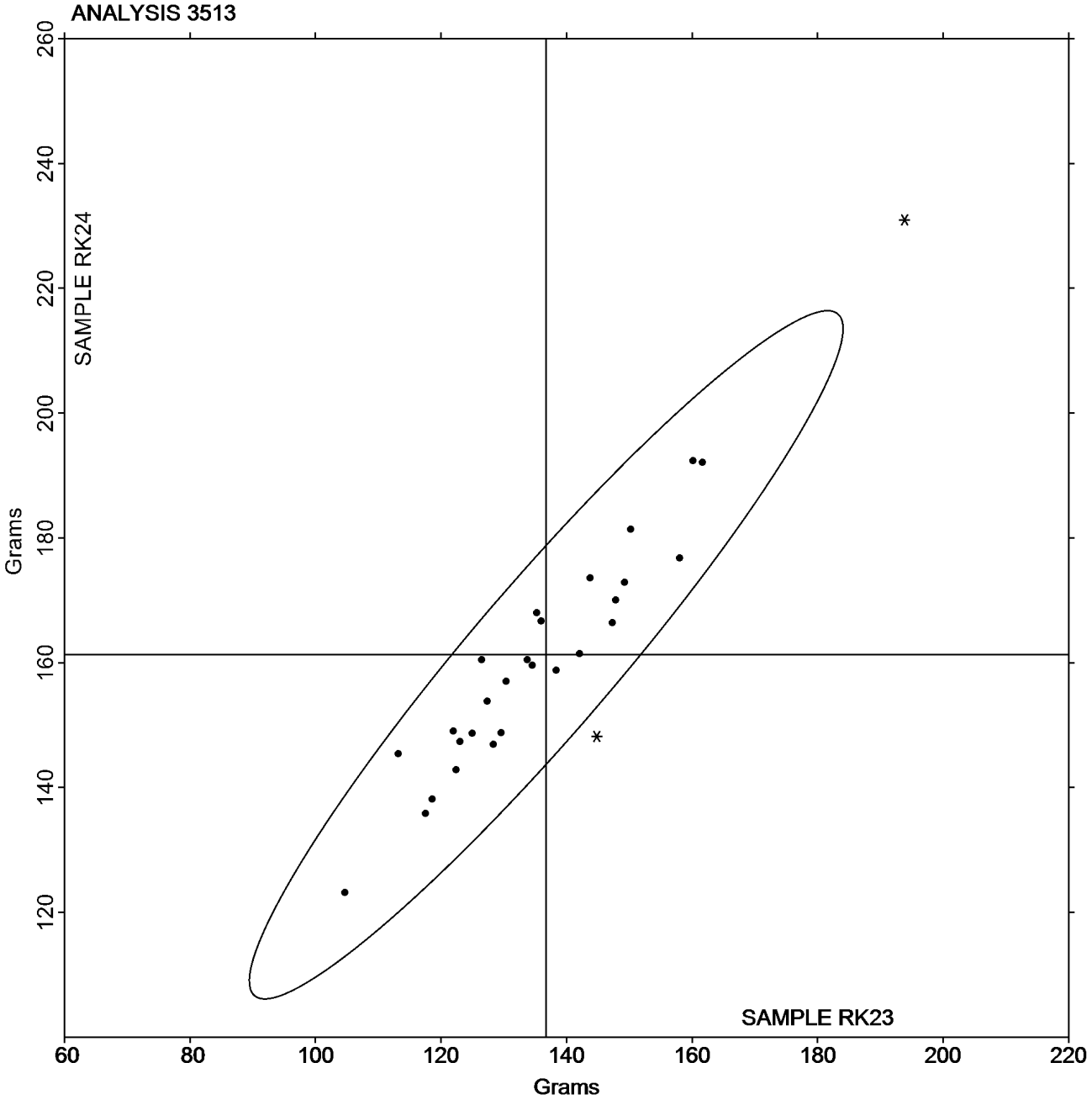
Statistics based on 29 of 29 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Grand Mean Sample RK23 = 136.74 Grams

Grand Mean Sample RK24 = 161.28 Grams



Paper & Paperboard Interlaboratory Testing Program

Analysis 3515

Tensile Breaking Strength - Packaging Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NK23 Lab Mean	Sample NK23 Diff from Grand Mean	Sample NK23 CPV	Sample NK24 Lab Mean	Sample NK24 Diff from Grand Mean	Sample NK24 CPV	Instr Code
2VG6XQ		12.26	1.50	1.71	11.51	0.81	1.07	LA
3LDD7B		10.39	-0.37	-0.43	9.71	-0.99	-1.30	IF
3MMJ6X		11.87	1.11	1.26	11.49	0.79	1.04	LC
4M3YER		10.45	-0.31	-0.36	10.62	-0.08	-0.11	LE
4Z7NPY		10.45	-0.31	-0.36	10.92	0.22	0.29	LH
62FT69		10.38	-0.38	-0.44	9.95	-0.74	-0.98	IR
6CB8ZY		11.69	0.93	1.06	11.39	0.69	0.91	LE
6MX6Q4	*	11.59	0.82	0.94	12.33	1.63	2.15	TH
7FW49P		10.25	-0.52	-0.59	9.99	-0.71	-0.93	LE
8X4XAU		10.45	-0.32	-0.36	10.13	-0.56	-0.74	LW
AQX34R		9.84	-0.93	-1.06	9.83	-0.87	-1.14	LH
BBMGK2		10.01	-0.75	-0.86	9.89	-0.81	-1.06	IM
DNKCQT		12.23	1.46	1.67	11.87	1.17	1.54	LA
EW9MET		11.45	0.69	0.78	11.48	0.78	1.03	TV
FMJD9W		10.68	-0.08	-0.10	10.37	-0.33	-0.43	TR
GUUYTK		10.51	-0.25	-0.29	10.37	-0.32	-0.43	LE
GZL7CT		9.14	-1.63	-1.86	9.36	-1.34	-1.76	TT
KYJDCB		11.09	0.33	0.37	11.10	0.40	0.52	LE
LH7LKQ		10.35	-0.41	-0.47	10.07	-0.63	-0.83	TS
LZLVLQ		9.46	-1.30	-1.49	10.21	-0.49	-0.64	XX
N9NWVG		11.00	0.24	0.27	10.99	0.29	0.38	TH
NHYYGG		12.59	1.82	2.08	11.73	1.03	1.36	LI
Q8RZJR		10.62	-0.15	-0.17	10.19	-0.51	-0.67	IM
QC2GTF		10.59	-0.18	-0.20	10.46	-0.23	-0.31	ID
RW4RCA		11.19	0.43	0.49	10.77	0.08	0.10	LE
TA8AMA		9.98	-0.78	-0.89	10.38	-0.32	-0.42	TX
TJWXKX		10.60	-0.17	-0.19	11.12	0.42	0.56	LE
URL98X		11.68	0.91	1.04	10.97	0.27	0.36	LW
XE4MCU	*	8.47	-2.30	-2.62	9.34	-1.35	-1.78	TH
XFLGD4		10.38	-0.38	-0.43	10.33	-0.37	-0.49	TB
XJH6UB		10.76	-0.01	-0.01	10.95	0.25	0.34	TB
YB4X9R	*	11.55	0.78	0.89	12.30	1.61	2.11	LX
YEJ7WR		11.19	0.43	0.49	10.85	0.15	0.19	LA
YL48C4		11.11	0.35	0.39	11.02	0.32	0.43	XX
ZK4NRE		10.51	-0.26	-0.29	10.44	-0.26	-0.34	LW

Paper & Paperboard Interlaboratory Testing Program

Analysis 3515

Tensile Breaking Strength - Packaging Papers

TAPPI Official Test Method T494

Summary Statistics	Sample NK23	Sample NK24
Grand Means	10.76 kN/m	10.70 kN/m
Stnd Dev Btwn Labs	0.88 kN/m	0.76 kN/m

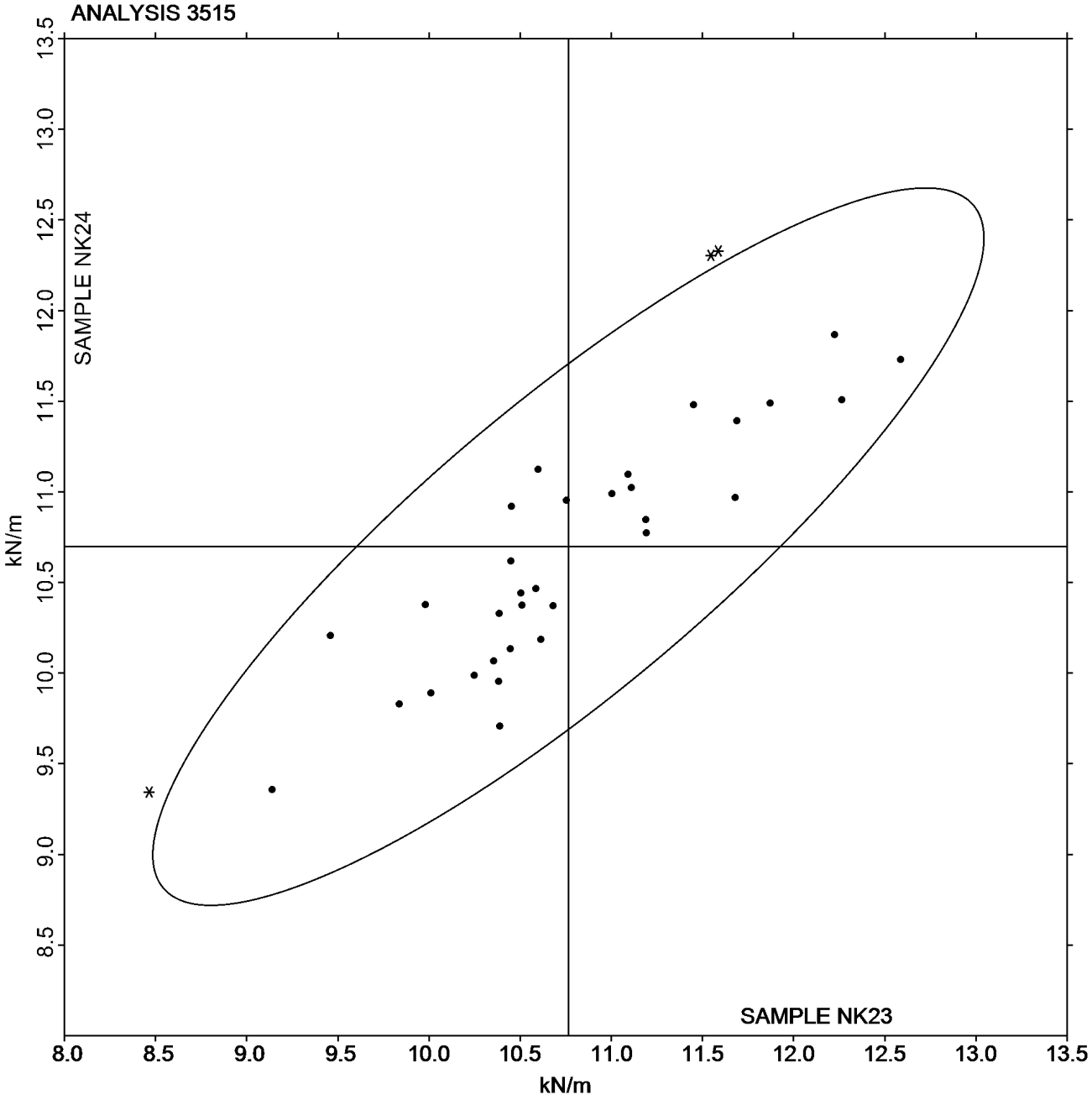
Statistics based on 35 of 35 reporting participants.

Key to Instrument Codes Reported by Participants

ID	Instron 4200 Series	IF	Instron 3340 Series
IM	Instron 5500 Series	IR	Instron 5900 Series
LA	L & W Autoline	LC	L & W Tensile - Autoline 600
LE	L & W Tensile Tester 066	LH	L & W Alwetron TH1 (Horizontal) SE 060
LI	LLoyds Instruments	LW	L & W Tensile Tester SE062
LX	L & W (model not specified)	TB	Thwing-Albert EJA/1000
TH	Thwing-Albert QC-3A	TR	TMI Horizontal Tensile Tester
TS	TMI Horizontal Tensile Tester 84-58	TT	Tinius Olsen Model MHT
TV	Thwing-Albert Vantage NX	TX	Thwing-Albert (model not specified)
XX	Instrument make/model not specified by lab		

Grand Mean Sample NK23 = 10.764 kN/m

Grand Mean Sample NK24 = 10.698 kN/m



Paper & Paperboard Interlaboratory Testing Program

Analysis 3516

Tensile Energy Absorption - Packaging Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NK23 Lab Mean	Sample NK23 Diff from Grand Mean	Sample NK23 CPV	Sample NK24 Lab Mean	Sample NK24 Diff from Grand Mean	Sample NK24 CPV	Instr Code
2VG6XQ		133.4	12.2	0.97	186.3	7.6	0.53	LC
3LDD7B		144.4	23.2	1.84	195.6	16.9	1.17	IF
3MMJ6X		121.4	0.2	0.02	179.4	0.7	0.05	LC
4Z7NPY		123.5	2.2	0.18	173.5	-5.3	-0.36	LH
62FT69		110.6	-10.7	-0.85	149.4	-29.3	-2.03	IR
6CB8ZY		135.3	14.1	1.12	194.2	15.5	1.07	LE
7FW49P		105.3	-15.9	-1.26	159.6	-19.1	-1.32	LE
8X4XAU		107.8	-13.4	-1.07	168.6	-10.1	-0.70	LW
AQX34R		101.7	-19.5	-1.55	162.2	-16.5	-1.14	LH
BBMGK2		108.3	-12.9	-1.03	153.8	-24.9	-1.72	IM
DNKCQT		130.4	9.2	0.73	191.0	12.3	0.85	LA
EW9MET		132.4	11.2	0.89	197.3	18.6	1.28	TO
FMJD9W		117.3	-4.0	-0.32	167.5	-11.2	-0.77	TR
GUUYTK		109.3	-11.9	-0.94	167.6	-11.1	-0.77	LE
GZL7CT		114.8	-6.4	-0.51	166.2	-12.5	-0.86	TT
KYJDCB		115.9	-5.3	-0.42	177.8	-1.0	-0.07	LE
LH7LKQ		125.6	4.4	0.35	176.2	-2.5	-0.17	TS
LZLVLQ		111.8	-9.4	-0.75	184.6	5.8	0.40	XX
N9NWVG		132.7	11.5	0.91	192.9	14.2	0.98	TH
Q8RZJR		136.2	15.0	1.19	188.0	9.3	0.64	IM
RW4RCA		127.3	6.1	0.48	185.5	6.8	0.47	LE
TA8AMA	X	324.7	203.5	16.16	494.7	316.0	21.86	TX
TJWXKX		101.2	-20.0	-1.59	175.0	-3.7	-0.26	LE
URL98X		130.2	9.0	0.71	182.7	4.0	0.28	LW
XJH6UB		121.6	0.3	0.03	185.8	7.0	0.49	TB
YB4X9R	*	121.9	0.6	0.05	204.5	25.7	1.78	TH
YEJ7WR		147.3	26.0	2.07	202.7	24.0	1.66	LA
YL48C4		119.4	-1.8	-0.14	168.7	-10.0	-0.69	XX
ZK4NRE		107.2	-14.0	-1.11	167.7	-11.0	-0.76	LW

Summary Statistics	Sample NK23	Sample NK24
Grand Means	121.22 Joules/sq m	178.72 Joules/sq m
Stnd Dev Btwn Labs	12.59 Joules/sq m	14.46 Joules/sq m

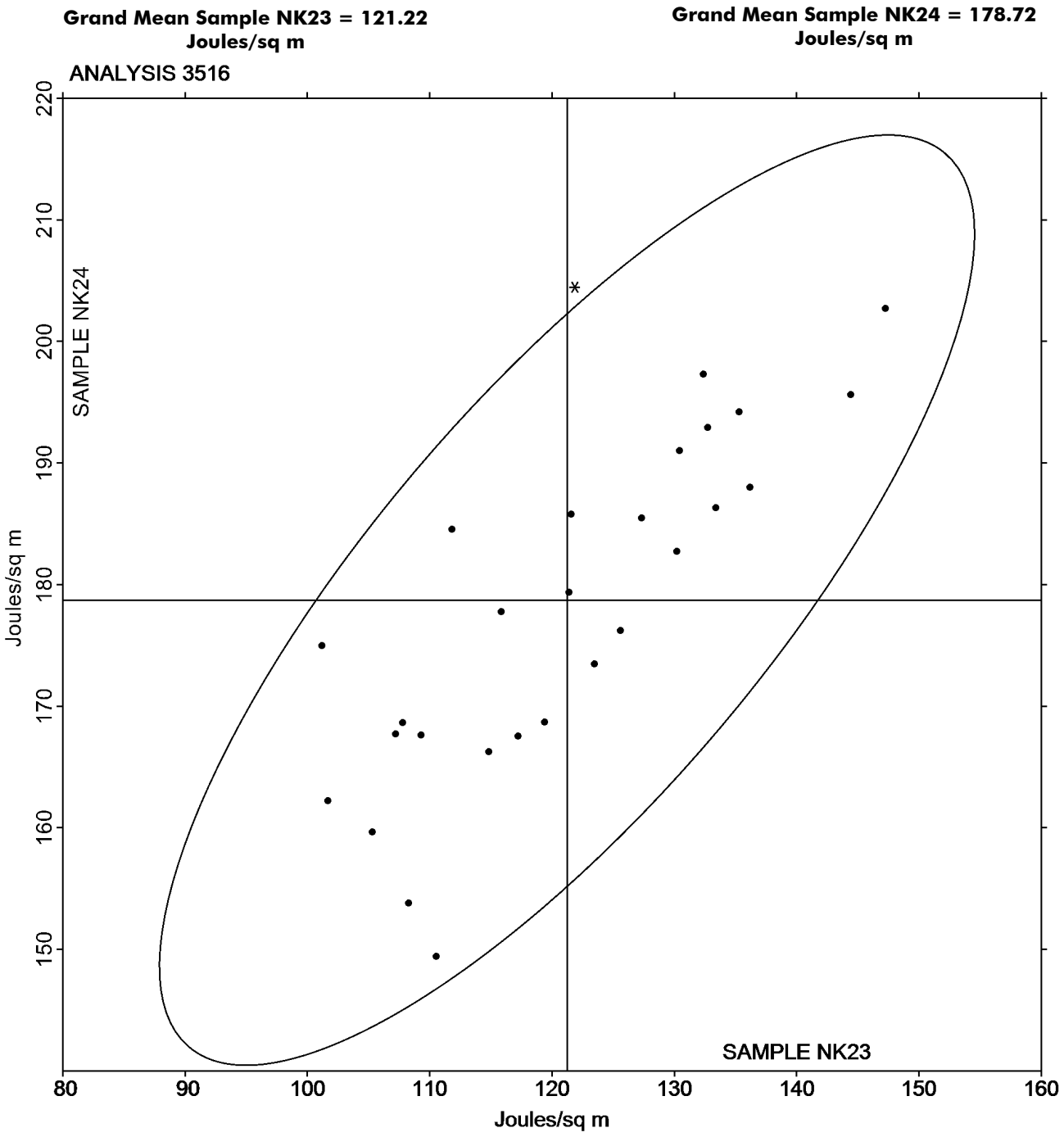
Statistics based on 28 of 29 reporting participants.

Comments on Assigned Data Flags for Test #3516

TA8AMA (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

IF	Instron 3340 Series	IM	Instron 5500 Series
IR	Instron 5900 Series	LA	L & W Autoline
LC	L & W Tensile - Autoline 600	LE	L & W Tensile Tester 066
LH	L & W Alwetron TH1 (Horizontal) SE 060	LW	L & W Tensile Tester SE062
TB	Thwing-Albert EJA/1000	TH	Thwing-Albert QC-3A
TO	Thwing-Albert QC-1000	TR	TMI Horizontal Tensile Tester
TS	TMI Horizontal Tensile Tester 84-58	TT	Tinius Olsen Model MHT
TX	Thwing-Albert (model not specified)	XX	Instrument make/model not specified by lab



Paper & Paperboard Interlaboratory Testing Program

Analysis 3517

Elongation to Break - Packaging Papers

TAPPI Official Test Method T494

Report #4272, December 2023

WebCode	Data Flag	Sample NK23 Lab Mean	Sample NK23 Diff from Grand Mean	Sample NK23 CPV	Sample NK24 Lab Mean	Sample NK24 Diff from Grand Mean	Sample NK24 CPV	Instr Code
2VG6XQ		1.673	-0.120	-0.68	2.325	-0.201	-0.99	LC
3LDD7B		2.199	0.406	2.29	2.988	0.462	2.27	XX
3MMJ6X		1.517	-0.276	-1.56	2.189	-0.337	-1.65	LC
4Z7NPY		1.805	0.012	0.07	2.514	-0.012	-0.06	LX
62FT69		1.652	-0.141	-0.80	2.209	-0.317	-1.56	XX
6CB8ZY		1.835	0.042	0.24	2.525	-0.001	-0.01	LE
7FW49P		1.614	-0.179	-1.01	2.347	-0.179	-0.88	LE
8X4XAU		1.635	-0.158	-0.89	2.448	-0.078	-0.38	LW
AQX34R		1.626	-0.167	-0.94	2.421	-0.105	-0.52	LH
BBMGK2		1.905	0.112	0.63	2.628	0.102	0.50	IM
DNKCQT		1.658	-0.135	-0.76	2.326	-0.200	-0.98	XX
EW9MET		1.910	0.117	0.66	2.658	0.132	0.65	TO
FMJD9W		1.861	0.068	0.38	2.518	-0.008	-0.04	TR
GUUYTK		1.626	-0.167	-0.94	2.361	-0.165	-0.81	LE
GZL7CT		2.150	0.357	2.01	2.829	0.303	1.49	TT
KYJDCB		1.665	-0.128	-0.72	2.402	-0.124	-0.61	LE
LH7LKQ		1.917	0.124	0.70	2.637	0.111	0.54	TS
LZLVLQ		1.889	0.096	0.54	2.707	0.181	0.89	XX
N9NWVG		2.023	0.230	1.30	2.747	0.221	1.08	TH
Q8RZJR		2.044	0.250	1.41	2.761	0.235	1.15	IM
QC2GTF		1.759	-0.034	-0.19	2.584	0.058	0.28	XX
RW4RCA	X	0.069	-1.724	-9.73	0.098	-2.428	-11.91	LE
TA8AMA	X	0.661	-1.132	-6.39	1.125	-1.401	-6.88	TX
TJWXKX		1.534	-0.259	-1.46	2.345	-0.181	-0.89	LE
URL98X		1.758	-0.035	-0.20	2.438	-0.088	-0.43	LW
XFLGD4		1.688	-0.105	-0.59	2.503	-0.023	-0.11	TB
XJH6UB		1.815	0.022	0.12	2.562	0.036	0.18	XX
YB4X9R		1.930	0.137	0.77	2.710	0.184	0.90	LX
YEJ7WR	*	1.953	0.160	0.90	2.897	0.371	1.82	LX
YL48C4		1.738	-0.055	-0.31	2.277	-0.249	-1.22	XX
ZK4NRE		1.625	-0.168	-0.95	2.403	-0.123	-0.60	LW

Summary Statistics	Sample NK23	Sample NK24
Grand Means	1.79 Percent	2.53 Percent
Stnd Dev Btwn Labs	0.18 Percent	0.20 Percent

Statistics based on 29 of 31 reporting participants.

Comments on Assigned Data Flags for Test #3517

RW4RCA (X) - Extreme Data.

TA8AMA (X) - Extreme Data.

Analysis Notes:

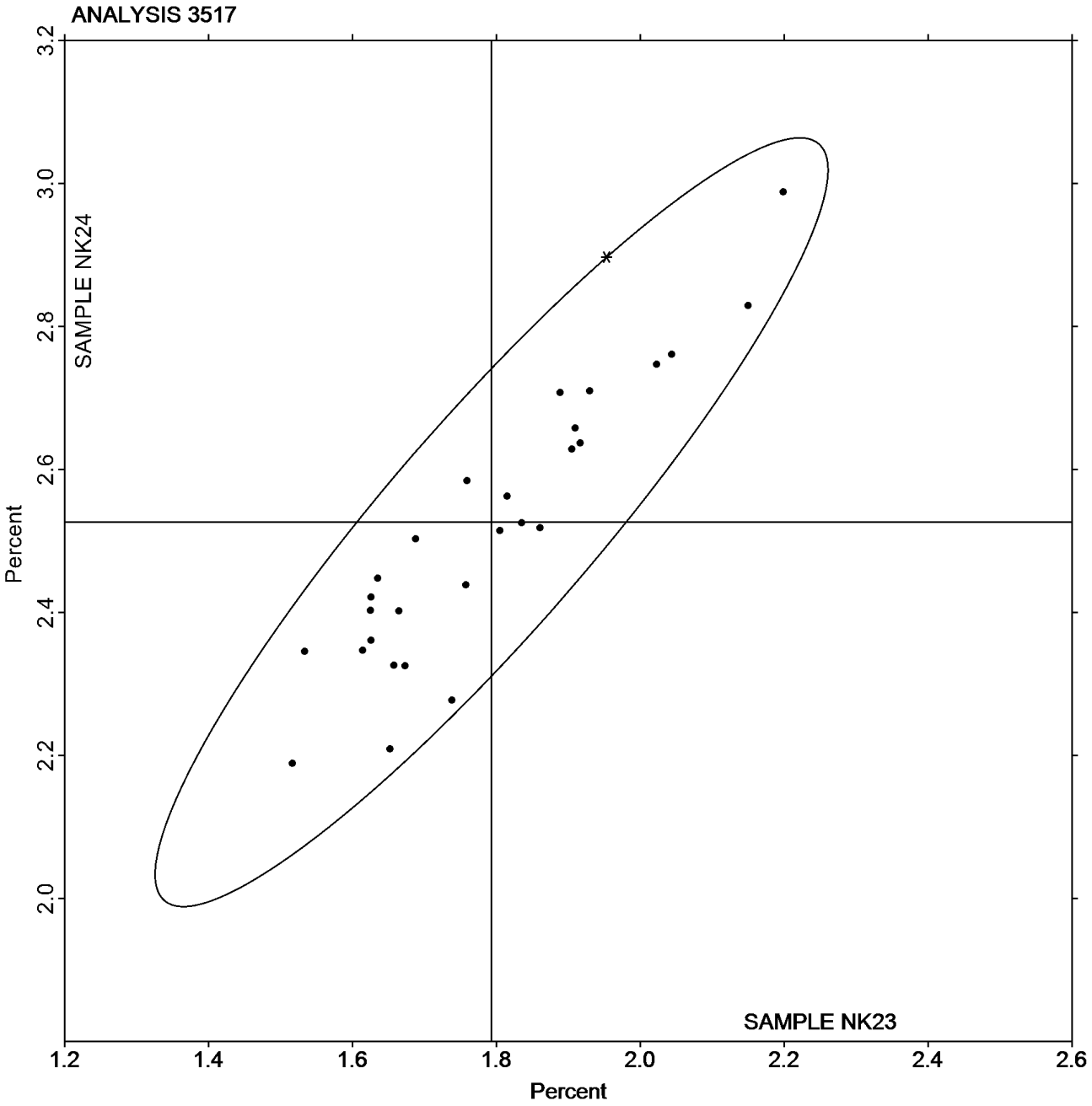
XJH6UB - One determination removed from the Lab Mean of Sample NK24 per Grubb's Test at 1% risk (TAPPI 1205).

Key to Instrument Codes Reported by Participants

IM	Instron 5500 Series	LC	L & W Tensile - Autoline 600
LE	L & W Tensile Tester 066	LH	L & W Alwetron TH1 (Horizontal) SE 060
LW	L & W Tensile Tester SE062	LX	L & W (model not specified)
TB	Thwing-Albert EJA/1000	TH	Thwing-Albert QC-3A
TO	Thwing-Albert QC-1000	TR	TMI Horizontal Tensile Tester
TS	TMI Horizontal Tensile Tester 84-58	TT	Tinius Olsen Model MHT
TX	Thwing-Albert (model not specified)	XX	Instrument make/model not specified by lab

Grand Mean Sample NK23 = 1.7932 Percent

Grand Mean Sample NK24 = 2.5262 Percent



Paper & Paperboard Interlaboratory Testing Program

Analysis 3531

Roughness - Print Surf Method - 0.5 to 4.0 Microns

TAPPI Official Test Method T555

WebCode	Data Flag	Sample PS23 Lab Mean	Sample PS23 Diff from Grand Mean	Sample PS23 CPV	Sample PS24 Lab Mean	Sample PS24 Diff from Grand Mean	Sample PS24 CPV	Instr Code
2TCK86		2.258	0.132	0.94	2.470	0.095	0.54	ZZ
3B7ZK2		1.821	-0.305	-2.17	2.095	-0.280	-1.58	ZZ
3MMJ6X		2.240	0.114	0.81	2.343	-0.032	-0.18	ZZ
46ZHPL		2.251	0.125	0.89	2.680	0.305	1.73	ZZ
4Z7NPY		2.101	-0.025	-0.18	2.342	-0.033	-0.18	ZZ
6CB8ZY		2.093	-0.033	-0.23	2.348	-0.027	-0.15	ZZ
6GQENX		2.212	0.086	0.61	2.563	0.188	1.07	ZZ
86NZEC		2.114	-0.012	-0.08	2.383	0.008	0.05	ZZ
8X4XAU		1.873	-0.253	-1.80	2.005	-0.370	-2.09	ZZ
8XNEPW		2.151	0.025	0.18	2.447	0.072	0.41	ZZ
AMK37Z		2.251	0.125	0.89	2.527	0.152	0.86	ZZ
CL2XPD		1.930	-0.196	-1.39	2.190	-0.185	-1.04	ZZ
CZX8DJ		2.251	0.125	0.89	2.597	0.222	1.26	ZZ
E9LMBM		2.292	0.166	1.18	2.586	0.211	1.20	ZZ
EGVEFB		2.207	0.081	0.58	2.344	-0.031	-0.17	ZZ
HMRCEP		2.017	-0.109	-0.77	2.376	0.001	0.01	ZZ
HXARHR		2.137	0.011	0.08	2.363	-0.012	-0.07	ZZ
LH7LKQ		2.101	-0.025	-0.18	2.319	-0.056	-0.31	ZZ
MZZL9F		2.195	0.069	0.49	2.406	0.031	0.18	ZZ
N9NWVG		2.269	0.143	1.02	2.512	0.137	0.78	ZZ
PF9EQ4	X	1.331	-0.795	-5.65	1.370	-1.005	-5.69	ZZ
RPRDRT		2.023	-0.103	-0.73	2.194	-0.181	-1.02	ZZ
U6B68B		1.810	-0.316	-2.24	1.966	-0.409	-2.31	ZZ
VCPD9C		2.170	0.044	0.32	2.465	0.090	0.51	ZZ
WT7WF4		2.187	0.061	0.44	2.433	0.058	0.33	ZZ
XJH6UB		2.188	0.062	0.44	2.410	0.035	0.20	ZZ

Summary Statistics	Sample PS23	Sample PS24
Grand Means	2.13 Microns	2.37 Microns
Stnd Dev Btwn Labs	0.14 Microns	0.18 Microns

Statistics based on 25 of 26 reporting participants.

Comments on Assigned Data Flags for Test #3531

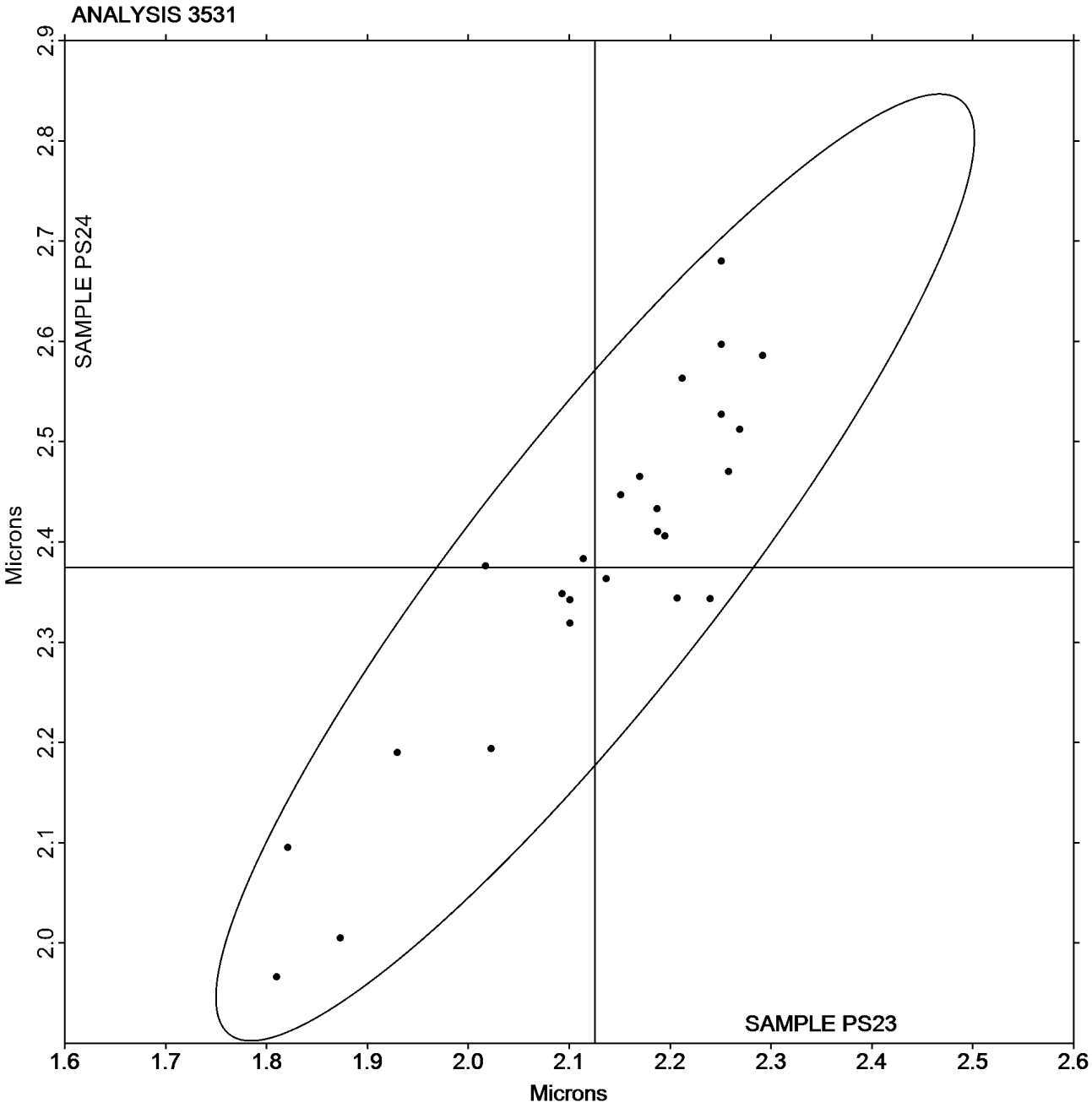
PF9EQ4 (X) - Data for both samples are low.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Grand Mean Sample PS23 = 2.1257 Microns

Grand Mean Sample PS24 = 2.3746 Microns



Paper & Paperboard Interlaboratory Testing Program

Report #4272, December 2023

Analysis 3545
Directional Brightness
TAPPI Official Test Method T452

WebCode	Data Flag	Sample BR23 Lab Mean	Sample BR23 Diff from Grand Mean	Sample BR23 CPV	Sample BR24 Lab Mean	Sample BR24 Diff from Grand Mean	Sample BR24 CPV	Instr Code
6CB8ZY		85.11	-0.30	-0.27	85.12	-0.33	-0.30	HG
6GQENX	X	73.31	-12.09	-11.07	73.71	-11.74	-10.46	XX
78D3LK		84.94	-0.47	-0.43	85.08	-0.38	-0.33	XX
8X4XAU		87.48	2.08	1.90	87.82	2.37	2.11	TP
8XNEPW		84.14	-1.27	-1.16	84.09	-1.36	-1.21	HG
AMK37Z		86.11	0.71	0.65	86.18	0.73	0.65	HG
CL2XPD		84.79	-0.62	-0.56	84.93	-0.53	-0.47	TD
CZX8DJ		84.40	-1.00	-0.92	84.38	-1.07	-0.96	PP
EGVEFB		86.94	1.53	1.40	87.21	1.76	1.57	TD
HXARHR		84.92	-0.48	-0.44	84.99	-0.46	-0.41	TP
J8GN4A		87.23	1.82	1.67	87.01	1.56	1.39	TP
L46VYL		84.50	-0.90	-0.83	84.23	-1.23	-1.09	TS
LH7LKQ		84.76	-0.65	-0.59	84.79	-0.66	-0.59	TS
N9NWVG		85.00	-0.40	-0.37	85.20	-0.25	-0.22	TP
PF9EQ4		84.76	-0.65	-0.59	84.77	-0.68	-0.61	HZ
QBRCFR		84.92	-0.49	-0.45	84.82	-0.63	-0.56	XX
WT7WF4		87.43	2.02	1.85	87.31	1.86	1.66	TP
XFLGD4		85.06	-0.35	-0.32	85.31	-0.14	-0.12	XD
YL48C4		85.84	0.43	0.39	85.77	0.32	0.28	XX
ZK4NRE		84.39	-1.01	-0.93	84.56	-0.89	-0.79	TS

Summary Statistics	Sample BR23	Sample BR24
Grand Means	85.40 Percent	85.45 Percent
Stnd Dev Btwn Labs	1.09 Percent	1.12 Percent

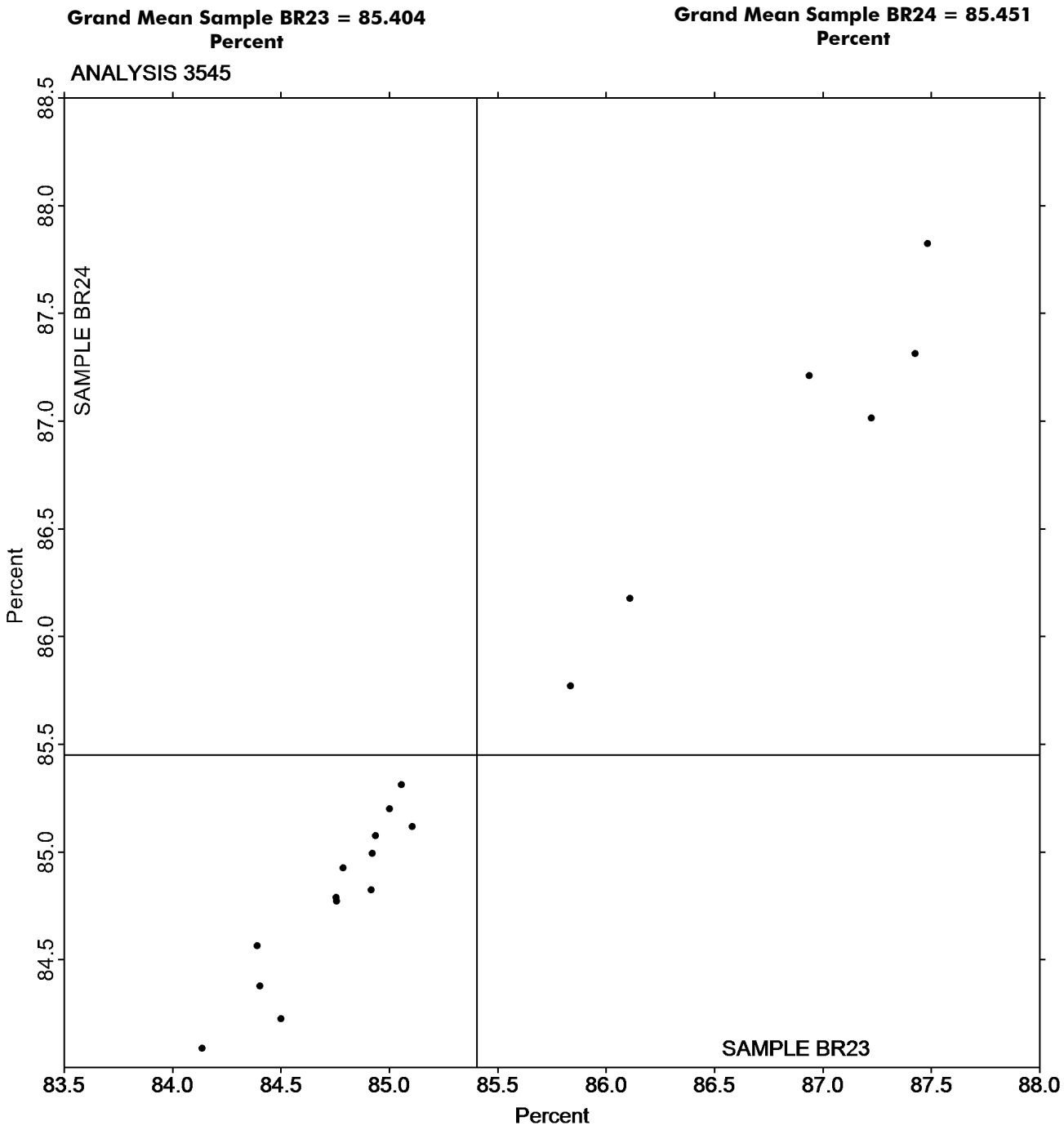
Statistics based on 19 of 20 reporting participants.

Comments on Assigned Data Flags for Test #3545

6GQENX (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

HG	Hunter Labscan / XE	HZ	Hunter Lab ColorFlex EZ Series
PP	Technidyne Profile/Plus	TD	Technidyne Color Touch 45X
TP	Technidyne Test/Plus	TS	Technidyne Brightimeter Micro S-5
XD	X-Rite Color Ci7600	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 3547
Diffuse Brightness
TAPPI Official Test Method T525

WebCode	Data Flag	Sample BR23 Lab Mean	Sample BR23 Diff from Grand Mean	Sample BR23 CPV	Sample BR24 Lab Mean	Sample BR24 Diff from Grand Mean	Sample BR24 CPV	Instr Code
4Z7NPY		83.75	-1.03	-2.18	83.74	-1.11	-1.91	LT
8X4XAU		84.44	-0.34	-0.72	84.48	-0.37	-0.63	EA
AMK37Z		84.76	-0.02	-0.05	84.81	-0.04	-0.08	TC
AVEBRQ	X	68.08	-16.71	-35.34	68.48	-16.38	-28.03	TC
E9LMBM	X	68.41	-16.37	-34.62	68.43	-16.42	-28.11	TC
EGVEFB		84.78	-0.01	-0.01	84.76	-0.09	-0.15	TC
FMJD9W		85.07	0.28	0.60	84.98	0.12	0.21	TC
GB4QVP		84.89	0.10	0.22	84.92	0.07	0.12	LE
HMRCEP	X	29.50	-55.28	-116.92	29.88	-54.98	-94.09	LA
LH7LKQ		85.75	0.97	2.05	86.25	1.40	2.40	LT
N9NWVG		84.69	-0.10	-0.20	84.68	-0.18	-0.30	LT
RPRDRT		84.84	0.06	0.13	84.91	0.06	0.10	TC
WT7WF4		84.75	-0.04	-0.07	84.89	0.04	0.07	TC
ZHYZB4		84.90	0.12	0.25	84.95	0.10	0.16	LE

Summary Statistics	Sample BR23	Sample BR24
Grand Means	84.78 Percent	84.85 Percent
Stnd Dev Btwn Labs	0.47 Percent	0.58 Percent

Statistics based on 11 of 14 reporting participants.

Comments on Assigned Data Flags for Test #3547

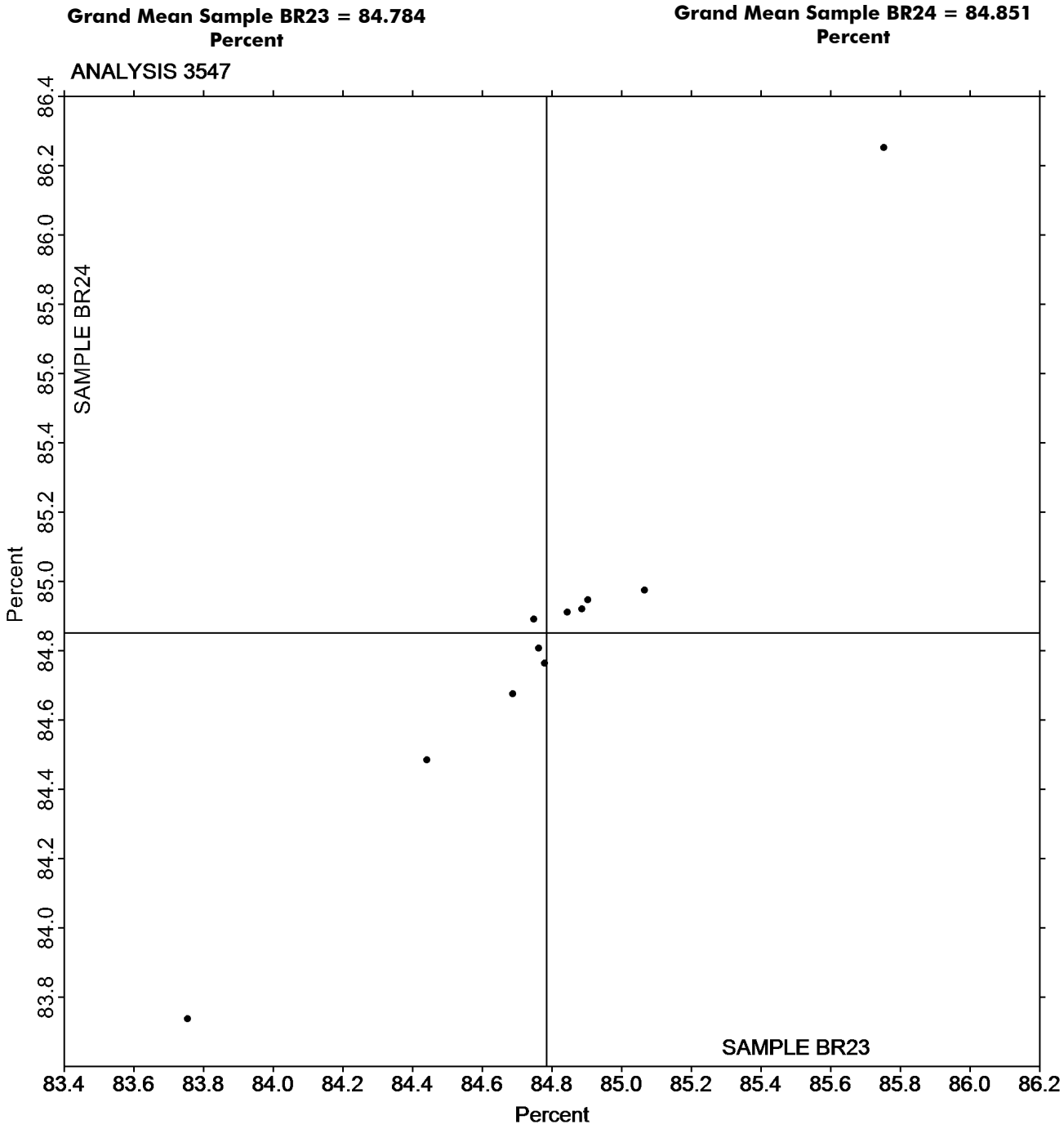
E9LMBM (X) - Extreme Data.

AVEBRQ (X) - Extreme Data.

HMRCEP (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

EA	Datacolor Elrepho	LA	L & W Elrepho - Autoline
LE	L & W Elrepho	LT	L & W Elrepho SE 071
TC	Technidyne Color Touch Series		



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 #4272, December 2023

Analysis 3549

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
2TCK86		CA23	94.75	-0.58	1.87	0.03	-0.01	0.01	0.03	TC
		CA24	94.79	-0.59	1.88					
6CB8ZY		CA23	93.89	-0.45	1.51	0.01	0.00	0.01	0.01	HK
		CA24	93.90	-0.45	1.52					
6GQENX	X	CA23	86.43 X	-0.25 *	-0.03 X	-0.69 X	0.13 X	0.01	0.70 X	XX
		CA24	85.75	-0.12	-0.02					
8XNEPW		CA23	94.17	-0.40	1.60	0.03	0.01	0.01	0.03	HK
		CA24	94.20	-0.40	1.62					
AMK37Z		CA23	94.06	-0.40	1.89	-0.02	0.00	0.00	0.02	HF
		CA24	94.03	-0.40	1.89					
CL2XPD		CA23	92.64	-0.09	1.24 *	-0.04	0.01	0.06	0.07	TC
		CA24	92.60	-0.08	1.30					
CZX8DJ		CA23	93.31	-0.55	1.97	-0.02	0.03	-0.01	0.03	TC
		CA24	93.29	-0.52	1.97					
EGVEFB		CA23	93.27	-0.60	1.97	0.03	-0.01	-0.01	0.03	TC
		CA24	93.30	-0.61	1.95					
FNXKUD		CA23	94.79	-0.49	2.05	0.01	0.02	0.01	0.03	TC
		CA24	94.81	-0.47	2.06					
GYB8GJ	X	CA23	91.76	0.04 X	1.71	0.26 X	0.03	0.03	0.26 X	TS
		CA24	92.01	0.07	1.74					
HMRCEP		CA23	94.68	-0.52	2.02	0.01	0.01	0.00	0.01	XX
		CA24	94.69	-0.51	2.02					
LH7LKQ	X	CA23	92.45	-0.04 X	1.34	0.14 X	0.06 X	-0.08	0.18	TS
		CA24	92.59	0.02	1.26					
QT8KFT	X	CA23	92.64	0.42 X	1.58	0.16 X	-0.01	-0.03	0.16	TS
		CA24	92.79	0.41	1.55					
WT7WF4		CA23	93.33	-0.60	1.99	-0.01	-0.01	0.02	0.03	TC
		CA24	93.32	-0.62	2.01					
YL48C4		CA23	94.91	-0.61	1.16	-0.18 X	-0.01	-0.12 X	0.22 X	XX
		CA24	94.73	-0.62	1.04					
ZHYZB4		CA23	94.81	-0.55	1.87	0.02	0.01	-0.03	0.04	LS
		CA24	94.83	-0.54	1.84					

Summary Statistics

Grand Means							
CA23	93.696	-0.469	1.719	-0.010	0.004	-0.004	0.047
CA24	93.725	-0.456	1.710				
Stnd Dev Btwn Labs							
CA23	1.015	0.154	0.298	0.058	0.012	0.042	0.055
CA24	0.952	0.176	0.317				

Statistics based on 12 of 16 reporting participants

Comments on Assigned Data Flags for Test #3549

LH7LKQ (X) - High "a" values for both samples. Inconsistent within replicate readings of "a" for both samples. Large delta L & a.

QT8KFT (X) - Very high "a" values for both samples. Inconsistent within replicate readings of "a" for sample CA23. Large delta L.

GYB8GJ (X) - High "a" values for both samples. Inconsistent within replicate readings of "a" for sample CA23. Large delta L & E.

6GQENX (X) - Extreme data for both "L" values. Very low "b" values for both samples. Small delta L, large delta a & E.

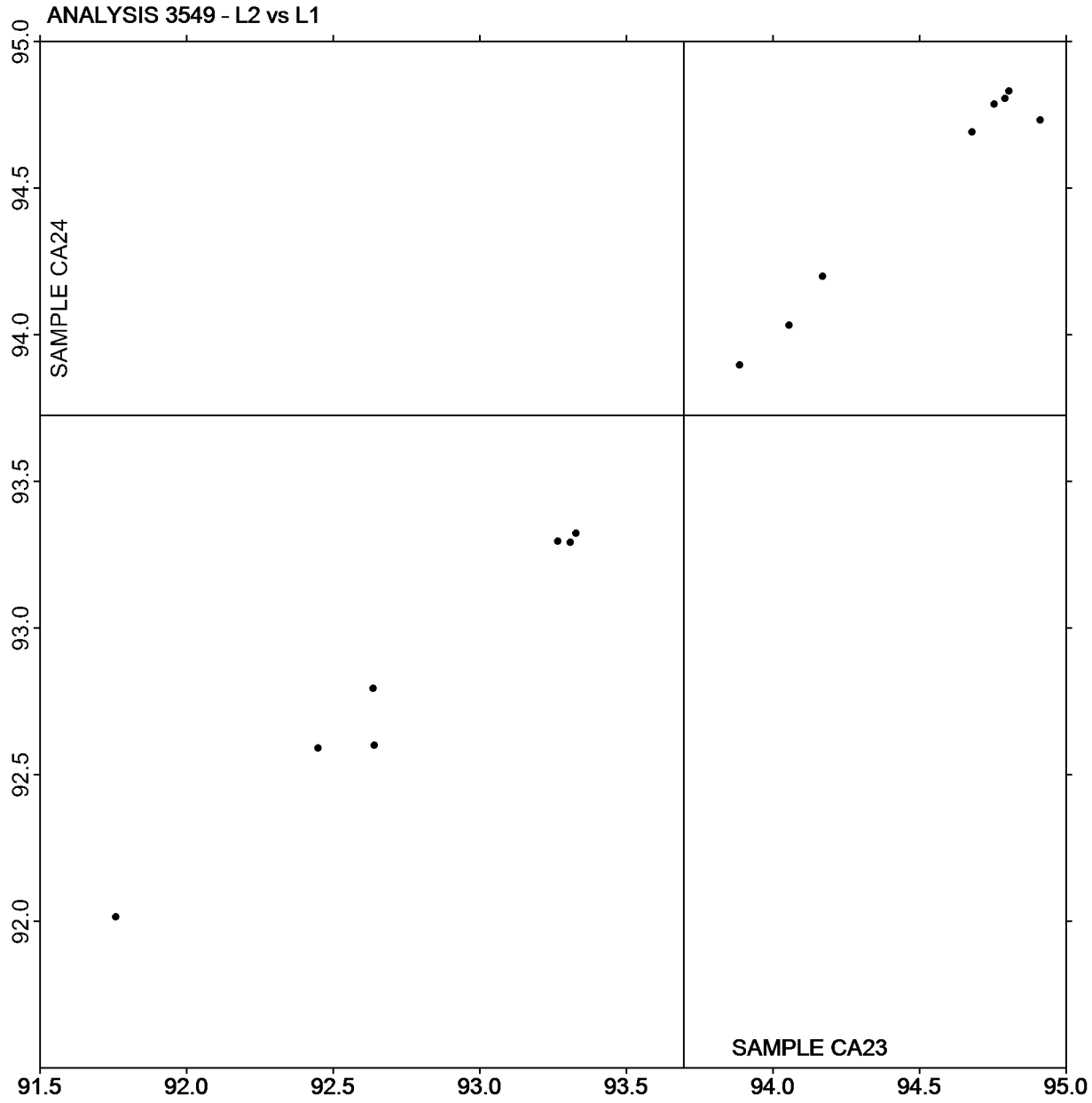
Analysis Notes:

QT8KFT - Due to CTS graphs using Absolute Values, data Flag is located within consensus data. However, "a" data is higher than the negative Grand Mean as shown above graphs.

Key to Instrument Codes Reported by Participants

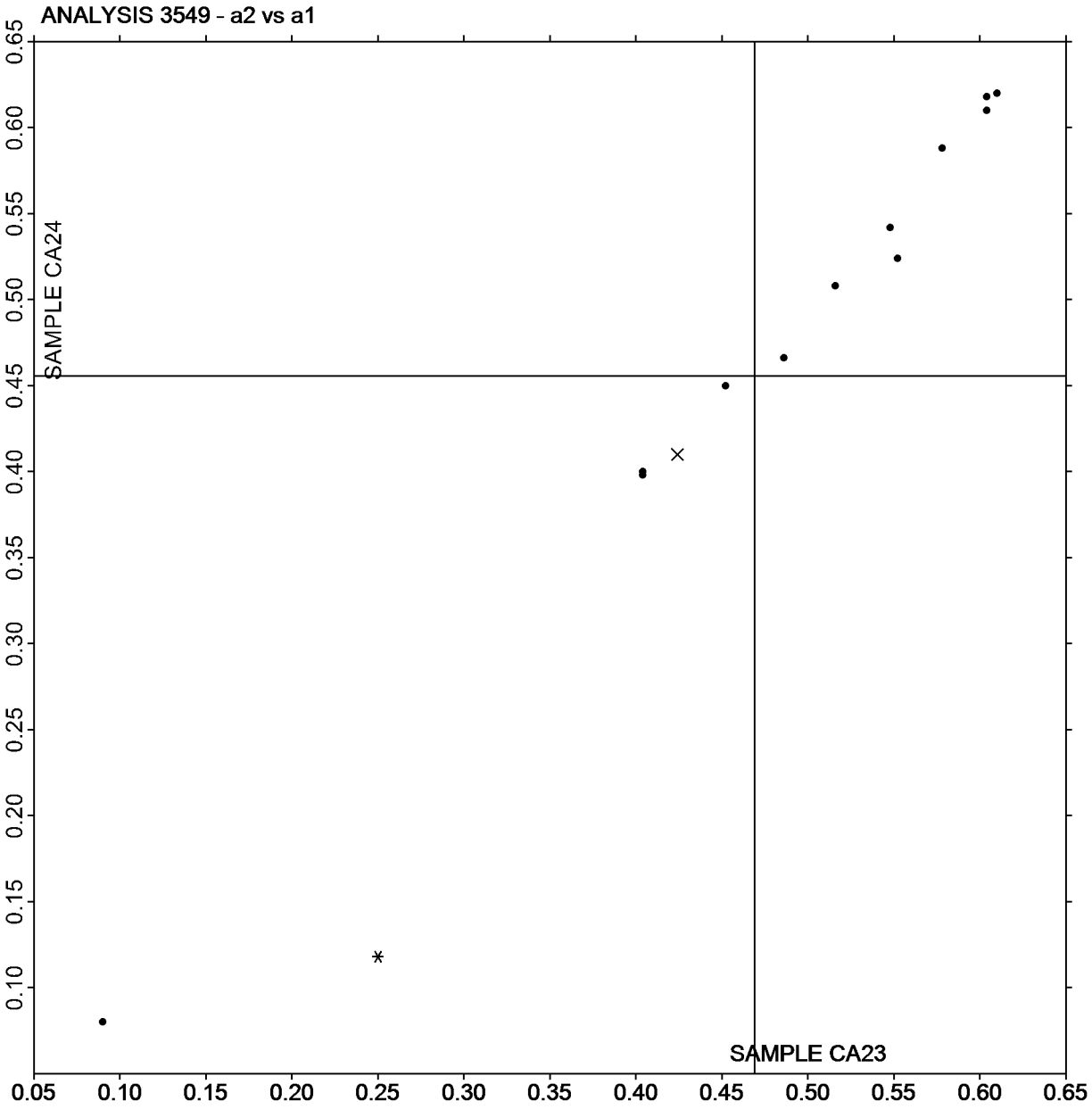
HF	Hunter LabScan II	HK	Hunter LabScan XE
LS	L & W Elrepho SE 070	TC	Technidyne Color Touch Series
TS	Technidyne Brightimeter Micro S-5	XX	Instrument make/model not specified by lab

Plot of L values CA24 vs L values CA23



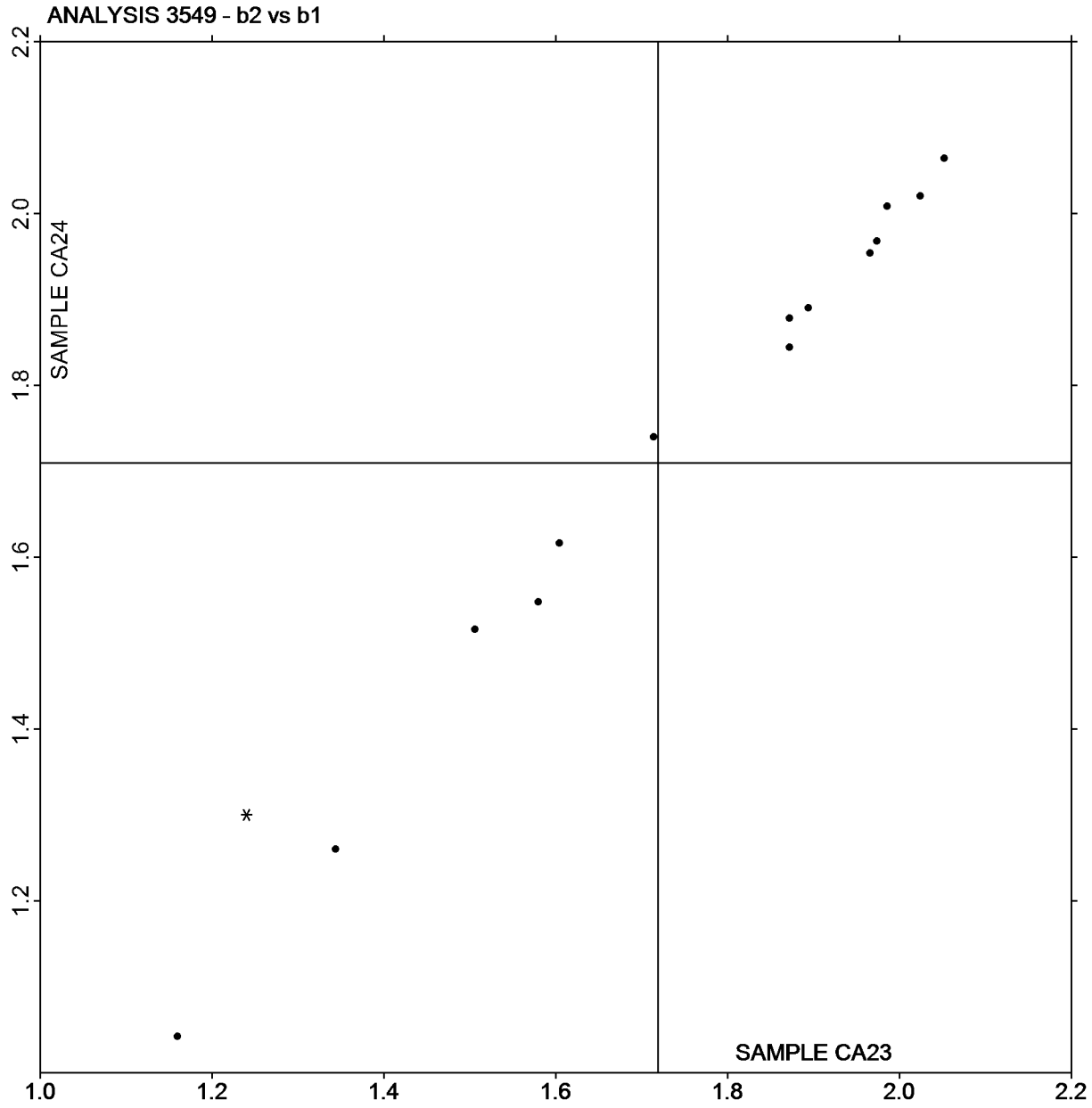
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

Plot of a values CA24 vs a values CA23



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 CA24 vs b values CA23



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 3551

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

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

Report #4272, December 2023

Web Code	Data Flag	Samples	Hunter L, a, b Color Values L	a	b	Color Difference Values ΔL	Δa	Δb	ΔE	Instr Code
78D3LK		CA23	94.91	-0.52	2.32	0.01	-0.01	0.00	0.01	XX
		CA24	94.92	-0.53	2.32					
8X4XAU		CA23	94.64	-0.53	2.08	0.01	0.01	0.01	0.01	EG
		CA24	94.64	-0.52	2.08					
AMK37Z		CA23	93.28	-0.68	1.85	-0.03	0.00	0.03	0.04	TC
		CA24	93.26	-0.68	1.88					
B8YAVY		CA23	94.86	-0.49	2.14	0.00	-0.01	-0.01	0.01	XX
		CA24	94.86	-0.50	2.13					
FG98R6		CA23	95.01	-0.64	1.81	-0.04	0.00	0.01	0.04	XC
		CA24	94.96	-0.64	1.82					
HMRCEP		CA23	94.68	-0.51	2.02	0.02	0.00	0.01	0.02	LS
		CA24	94.70	-0.51	2.03					
HXARHR		CA23	94.13 *	-0.39	1.78	-0.49 X	-0.01	0.01	0.49	HE
		CA24	93.64	-0.39	1.79					
JBCH2B		CA23	94.82	-0.62	1.79	-0.07	0.02	0.11	0.13	TC
		CA24	94.75	-0.59	1.90					
MXZD47		CA23	94.78	-0.52	2.19	0.00	0.01	-0.02	0.02	MN
		CA24	94.78	-0.51	2.17					
N9NWVG		CA23	94.78	-0.56	2.02	0.00	0.01	0.05	0.05	LT
		CA24	94.77	-0.55	2.07					
R8NXBY		CA23	95.70	-0.66 *	1.60 *	-0.27	-0.27 X	0.70 X	0.80 X	XC
		CA24	95.44	-0.93	2.30					
UGZ299		CA23	94.95	-0.46	1.84	-0.02	-0.03	0.00	0.04	NF
		CA24	94.93	-0.48	1.83					
VGK6G9		CA23	94.96	-0.57	2.00	-0.02	0.01	-0.01	0.02	XX
		CA24	94.94	-0.56	1.99					

Summary Statistics

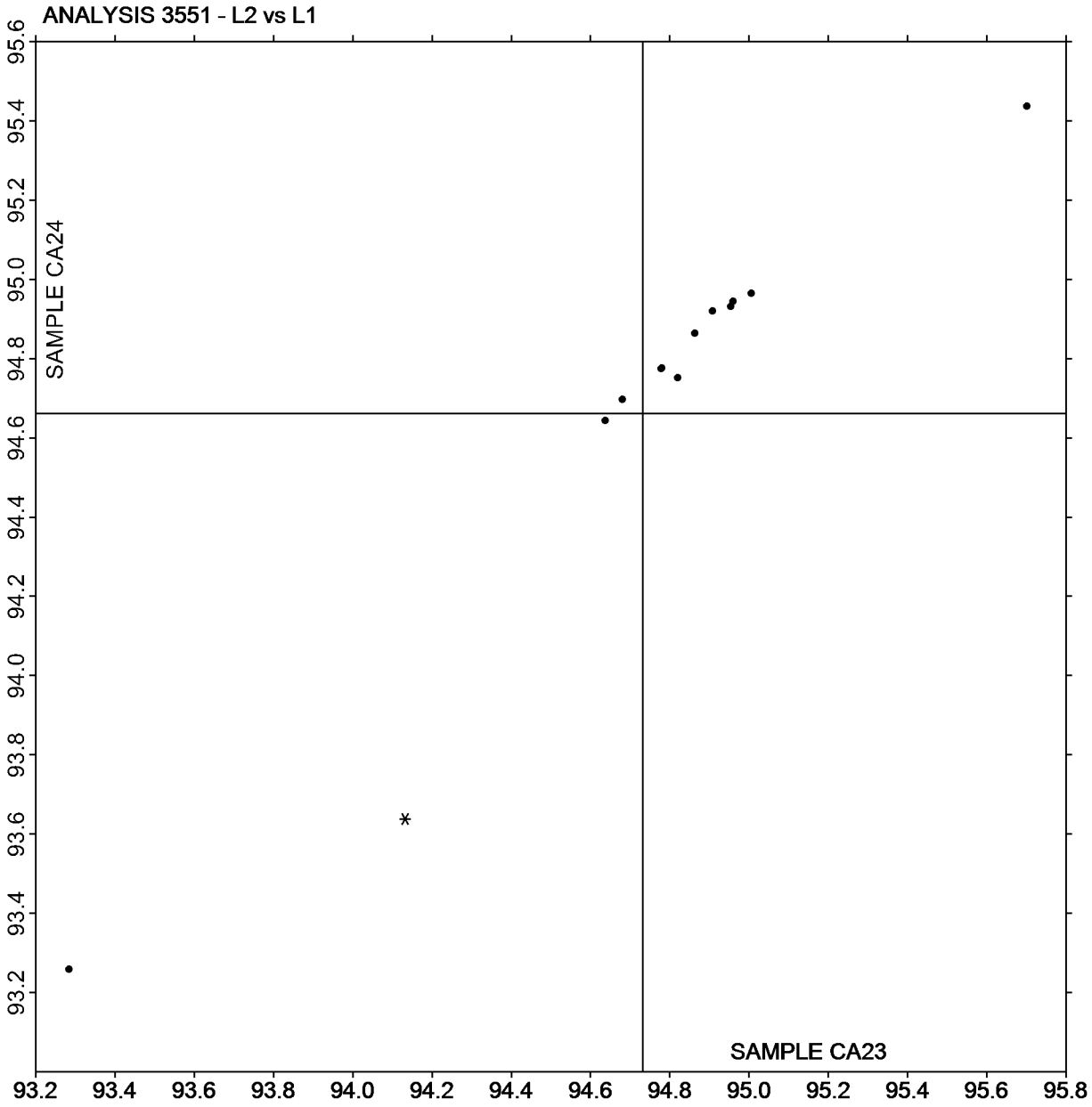
Grand Means							
CA23	94.731	-0.550	1.958	-0.070	-0.019	0.068	0.130
CA24	94.661	-0.569	2.025				
Stnd Dev Btwn Labs							
CA23	0.551	0.084	0.199	0.147	0.078	0.192	0.239
CA24	0.578	0.130	0.176				

Statistics based on 13 of 13 reporting participants

Analysis Notes:

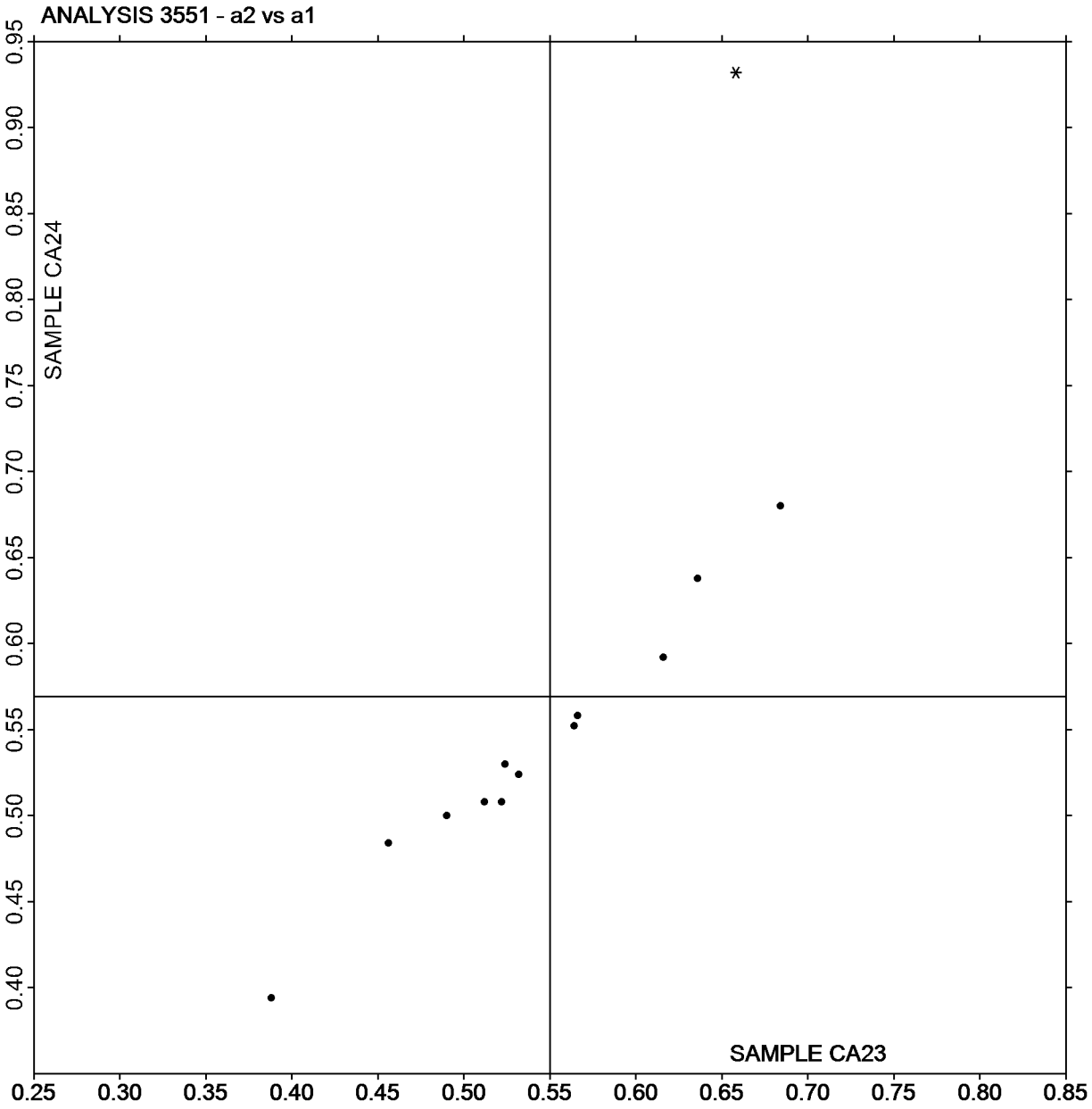
Key to Instrument Codes Reported by Participants			
EG	Datacolor Elrepho	HE	Hunter LabScan
LS	L & W Elrepho SE 070	LT	L & W Elrepho SE 071
MN	Minolta (model not specified)	NF	Minolta CM-3600d Spectrophotometer
TC	Technidyne Color Touch Series	XC	X-Rite eXact Series
XX	Instrument make/model not specified by lab		

Plot of L values CA24 vs L values CA23



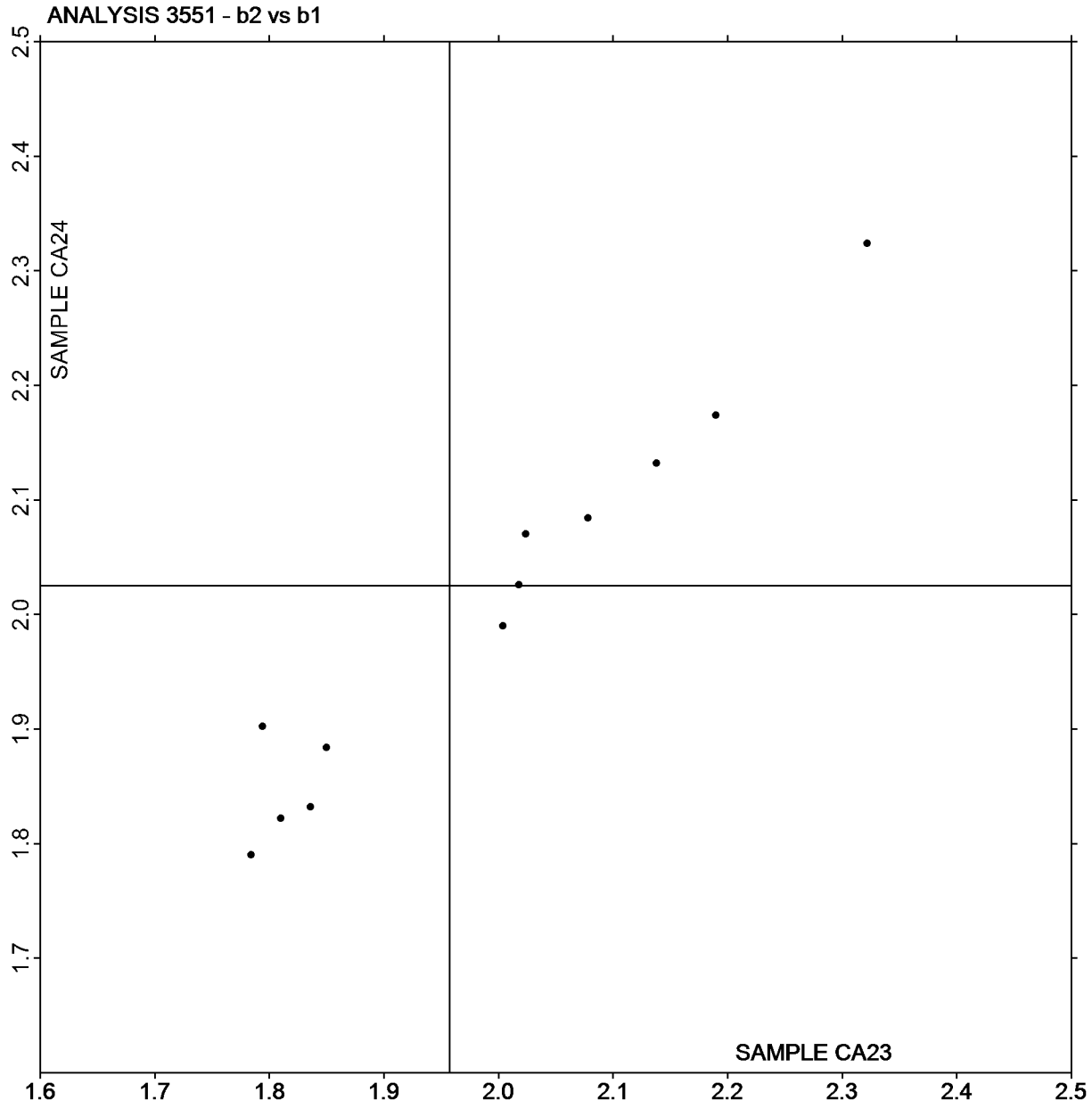
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

Plot of a values CA24 vs a values CA23



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 CA24 vs b values CA23



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 #4272, December 2023

Analysis 3553

Specular Gloss at 75 Degrees - High Range

TAPPI Official Test Method T480

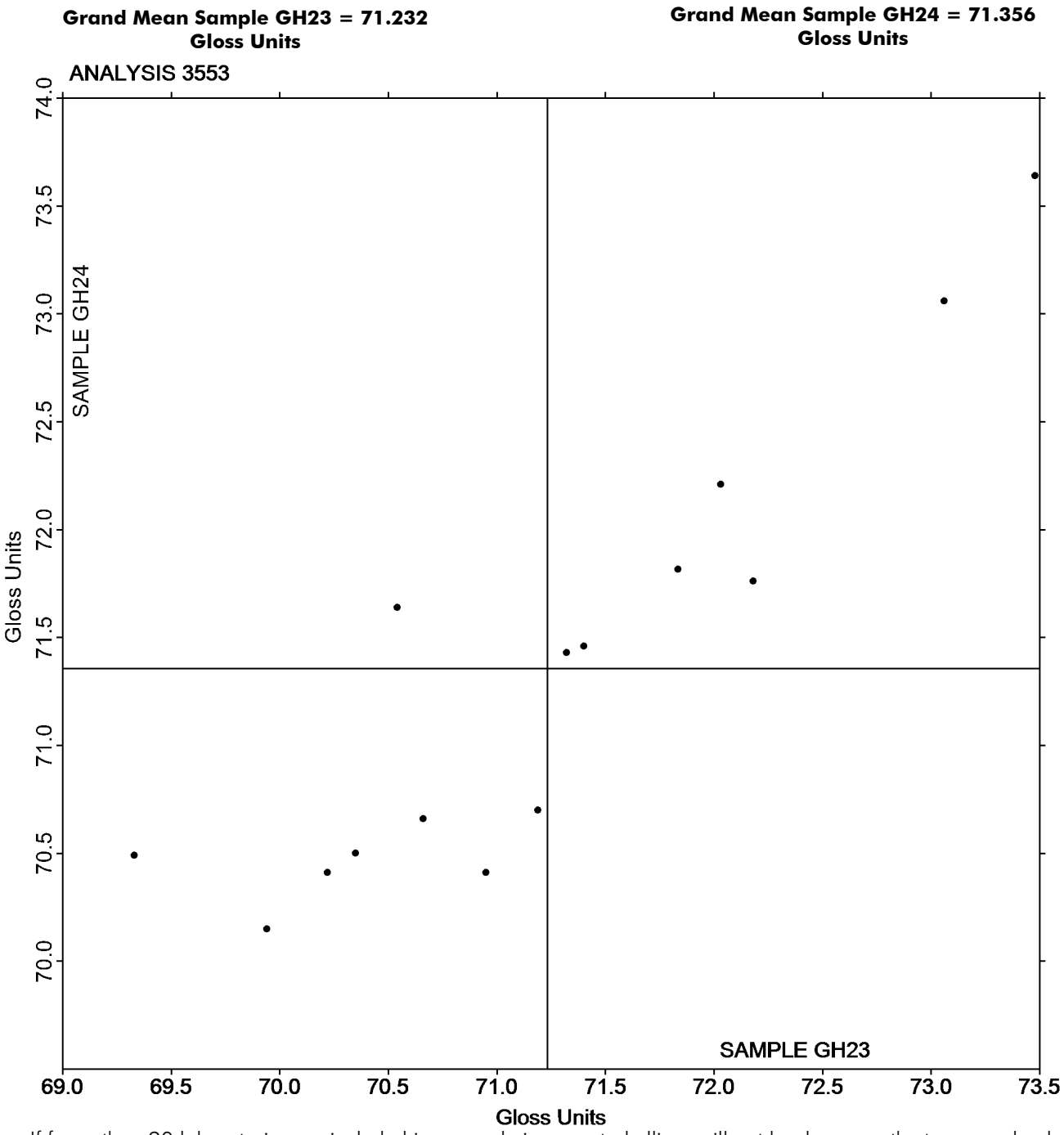
WebCode	Data Flag	Sample GH23 Lab Mean	Sample GH23 Diff from Grand Mean	Sample GH23 CPV	Sample GH24 Lab Mean	Sample GH24 Diff from Grand Mean	Sample GH24 CPV	Instr Code
2TCK86		70.22	-1.01	-0.89	70.41	-0.95	-0.91	LF
3MMJ6X		69.33	-1.90	-1.66	70.49	-0.87	-0.84	LG
4Z7NPY		72.03	0.80	0.70	72.21	0.85	0.83	LW
6CB8ZY		72.18	0.95	0.83	71.76	0.40	0.39	PP
86NZEC		71.32	0.09	0.08	71.43	0.07	0.07	VM
8X4XAU		73.48	2.25	1.97	73.64	2.28	2.21	TH
8XNEPW		70.35	-0.88	-0.77	70.50	-0.86	-0.83	TP
CL2XPD		69.94	-1.29	-1.13	70.15	-1.21	-1.17	LA
CZX8DJ		71.84	0.60	0.53	71.82	0.46	0.44	PP
EGVEFB		70.54	-0.69	-0.61	71.64	0.28	0.28	TA
GYB8GJ		70.66	-0.57	-0.50	70.66	-0.70	-0.67	PT
N9NWVG		71.19	-0.04	-0.04	70.70	-0.66	-0.63	GA
RT8Z7X		70.95	-0.28	-0.25	70.41	-0.95	-0.91	GM
U6B68B		73.06	1.83	1.60	73.06	1.70	1.65	LF
WT7WF4		71.40	0.17	0.15	71.46	0.10	0.10	GM

Summary Statistics	Sample GH23	Sample GH24
Grand Means	71.23 Gloss Units	71.36 Gloss Units
Stnd Dev Btwn Labs	1.14 Gloss Units	1.03 Gloss Units

Statistics based on 15 of 15 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	LF	L & W Autoline 400
LG	L & W Autoline 600	LW	L & W Gloss Tester
PP	Technidyne Profile/Plus	PT	PTA Line Gloss Meter
TA	Technidyne Test Plus Gloss 75 degree	TH	Technidyne T480A
TP	Technidyne Profile Plus	VM	Valmet PaperLab (was Kajaani/Robotest)



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 #4272, December 2023

Analysis 3555

Specular Gloss at 75 Degrees - Low Range

TAPPI Official Test Method T480

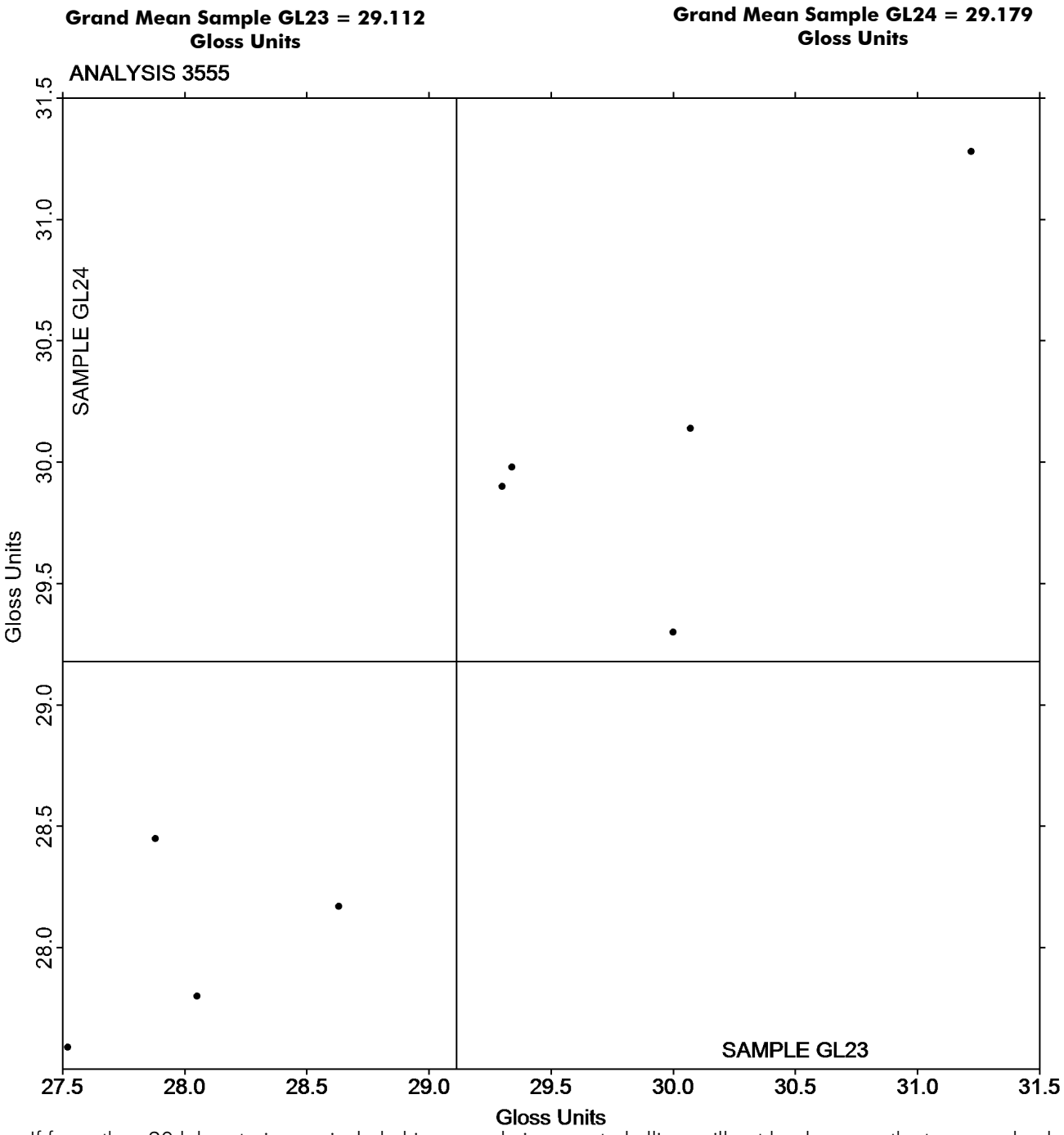
WebCode	Data Flag	Sample GL23 Lab Mean	Sample GL23 Diff from Grand Mean	Sample GL23 CPV	Sample GL24 Lab Mean	Sample GL24 Diff from Grand Mean	Sample GL24 CPV	Instr Code
4Z7NPY		29.34	0.23	0.19	29.98	0.80	0.64	LW
AMK37Z		31.22	2.11	1.75	31.28	2.10	1.68	PP
EGVEFB		28.63	-0.48	-0.40	28.17	-1.01	-0.81	TA
HMRCEP		29.30	0.19	0.16	29.90	0.72	0.58	TG
MZZL9F		27.88	-1.23	-1.02	28.45	-0.73	-0.58	WJ
PF9EQ4		28.05	-1.06	-0.88	27.80	-1.38	-1.10	GS
QT8KFT		30.07	0.96	0.79	30.14	0.96	0.77	TP
TJWXKX		27.52	-1.59	-1.32	27.59	-1.59	-1.27	GM
XFLGD4		30.00	0.89	0.74	29.30	0.12	0.10	TH

Summary Statistics	Sample GL23	Sample GL24
Grand Means	29.11 Gloss Units	29.18 Gloss Units
Stnd Dev Btwn Labs	1.21 Gloss Units	1.25 Gloss Units

Statistics based on 9 of 9 reporting participants.

Key to Instrument Codes Reported by Participants

GM	BYK-Gardner micro-gloss	GS	BYK-Gardner Glossgard II
LW	L & W Gloss Tester	PP	Technidyne Profile/Plus
TA	Technidyne Test Plus Gloss 75 degree	TG	Technidyne T480
TH	Technidyne T480A	TP	Technidyne Profile Plus
WJ	Zehntner ZLR 1020		



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 3601
Folding Endurance (MIT) - Double Folds
TAPPI Official Test Method T511

WebCode	Data Flag	Sample MT23 Lab Mean	Sample MT23 Diff from Grand Mean	Sample MT23 CPV	Sample MT24 Lab Mean	Sample MT24 Diff from Grand Mean	Sample MT24 CPV	Instr Code
3B7ZK2		38.30	-8.04	-0.58	53.10	4.72	0.38	MT
86NZEC		26.50	-19.84	-1.44	31.80	-16.58	-1.35	MT
8X4XAU		48.00	1.66	0.12	55.60	7.22	0.59	MT
DNZVBQ		57.10	10.76	0.78	47.30	-1.08	-0.09	MT
J8VEPY		71.80	25.46	1.85	70.60	22.22	1.80	XX
N9NWVG		34.90	-11.44	-0.83	35.40	-12.98	-1.05	MT
Q8RZJR		49.40	3.06	0.22	56.50	8.12	0.66	MT
VGK6G9	X	29.14	-17.20	-1.25	1,507.80	1,459.42	118.42	XX
WL948A		54.30	7.96	0.58	48.40	0.02	0.00	MT
XFLGD4		36.80	-9.54	-0.69	36.70	-11.68	-0.95	MT

Summary Statistics	Sample MT23	Sample MT24
Grand Means	46.34 Double Folds	48.38 Double Folds
Stnd Dev Btwn Labs	13.78 Double Folds	12.32 Double Folds

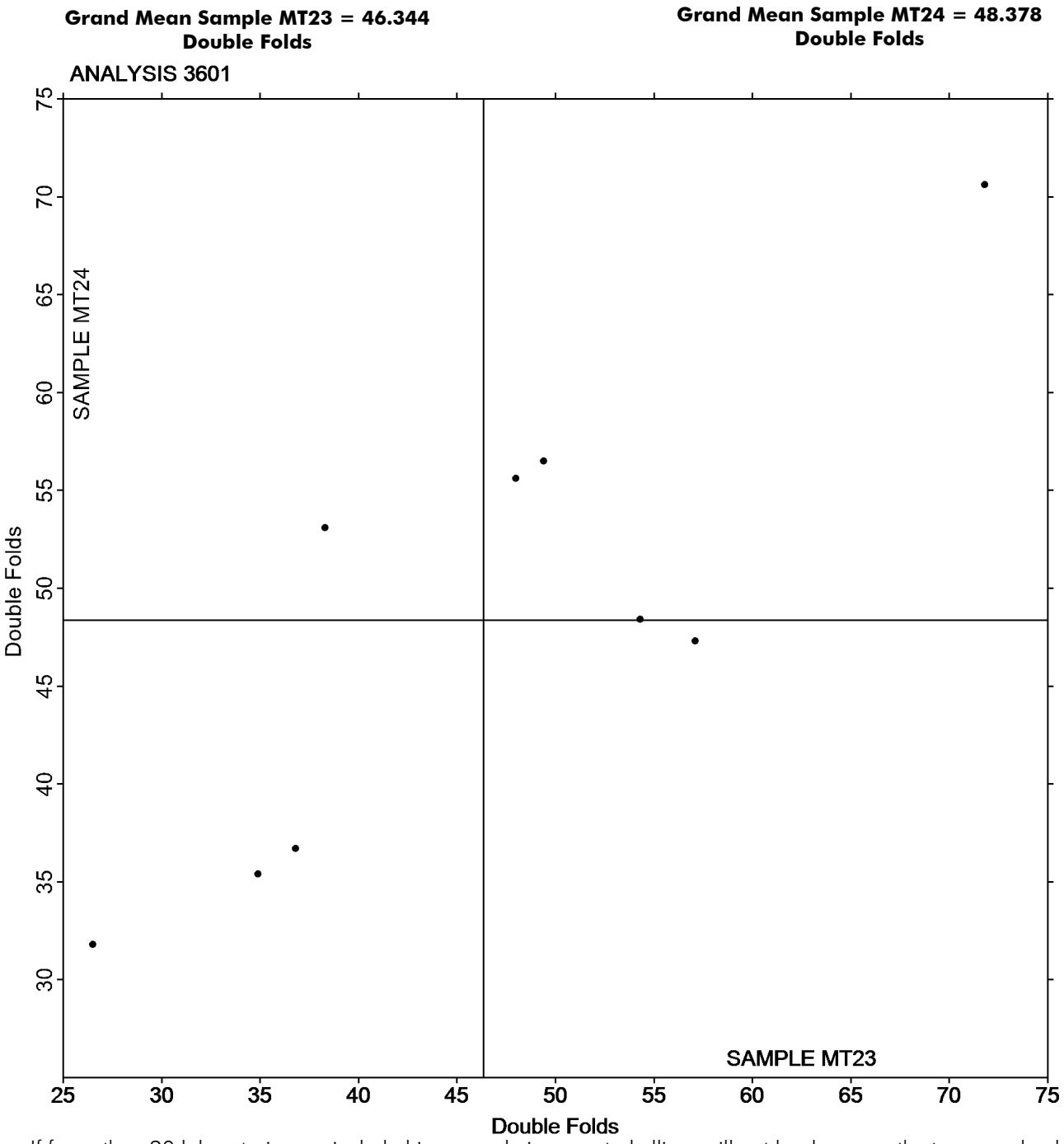
Statistics based on 9 of 10 reporting participants.

Comments on Assigned Data Flags for Test #3601

VGK6G9 (X) - Extreme Data for Sample MT24.

Key to Instrument Codes Reported by Participants

MT	MIT - Tinius Olsen	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 3603
Bending Resistance, Gurley Type
TAPPI Official Test Method T543

WebCode	Data Flag	Sample BG23 Lab Mean	Sample BG23 Diff from Grand Mean	Sample BG23 CPV	Sample BG24 Lab Mean	Sample BG24 Diff from Grand Mean	Sample BG24 CPV	Instr Code
3B7ZK2		125.7	-18.1	-2.03	133.9	-10.8	-1.26	ZZ
86NZEC	X	69.7	-74.1	-8.30	168.4	23.7	2.77	ZZ
FG98R6		150.7	6.9	0.78	146.4	1.7	0.20	ZZ
FVUFUW		147.9	4.1	0.46	150.5	5.8	0.68	ZZ
HFRQPB		146.5	2.7	0.31	145.9	1.2	0.15	ZZ
HXARHR		140.3	-3.4	-0.39	134.5	-10.2	-1.19	ZZ
MXZD47	X	59.1	-84.7	-9.49	58.5	-86.2	-10.07	ZZ
Q8RZJR		142.5	-1.2	-0.14	154.1	9.4	1.10	ZZ
QBRCFR		158.2	14.4	1.61	158.1	13.5	1.57	ZZ
RPRDRT		140.3	-3.4	-0.39	140.3	-4.4	-0.51	ZZ
XFLGD4		141.8	-2.0	-0.22	138.4	-6.3	-0.73	ZZ

Summary Statistics	Sample BG23	Sample BG24
Grand Means	143.75 Gurley Units	144.68 Gurley Units
Stnd Dev Btwn Labs	8.92 Gurley Units	8.56 Gurley Units

Statistics based on 9 of 11 reporting participants.

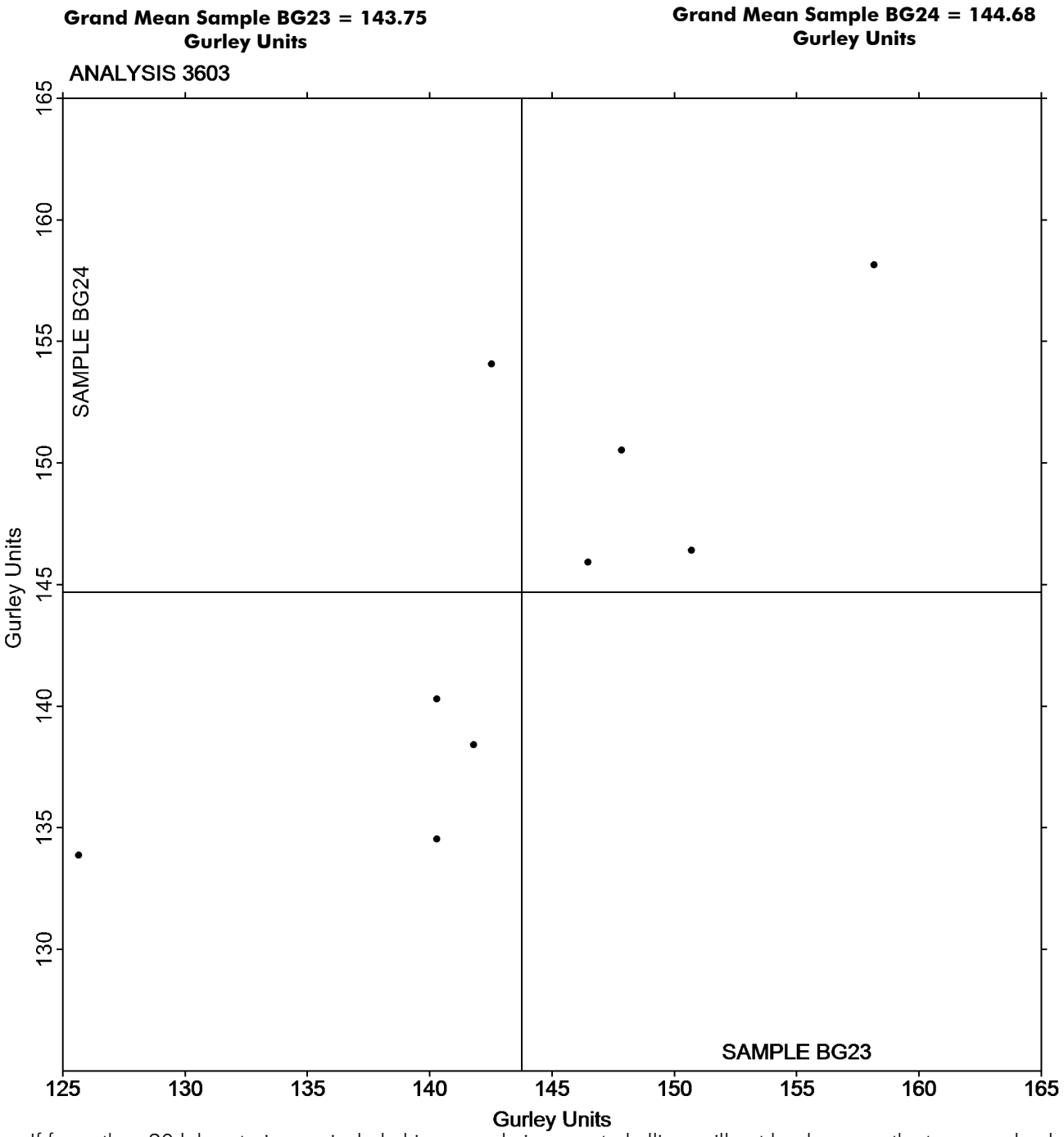
Comments on Assigned Data Flags for Test #3603

86NZEC (X) - Extreme Data.

MXZD47 (X) - Extreme Data.

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 3611

Coefficient of Static Friction - Horizontal Plane Method - Printing Papers

TAPPI Official Test Method T549

WebCode	Data Flag	Sample CF23 Lab Mean	Sample CF23 Diff from Grand Mean	Sample CF23 CPV	Sample CF24 Lab Mean	Sample CF24 Diff from Grand Mean	Sample CF24 CPV	Instr Code
2VG6XQ		0.5860	-0.0232	-0.26	0.6304	0.0041	0.05	TA
3B7ZK2		0.6686	0.0594	0.67	0.7038	0.0775	1.01	TA
FVUFUW		0.6200	0.0108	0.12	0.6300	0.0037	0.05	TA
HXARHR		0.3948	-0.2144	-2.42	0.4830	-0.1433	-1.87	TA
LH7LKQ		0.6336	0.0244	0.28	0.6930	0.0667	0.87	TA
MXZD47		0.6960	0.0868	0.98	0.6680	0.0417	0.54	TP
Q8RZJR		0.6602	0.0510	0.58	0.6618	0.0355	0.46	TM
QT8KFT		0.6432	0.0340	0.38	0.6516	0.0253	0.33	TA
YL48C4		0.5800	-0.0292	-0.33	0.5150	-0.1113	-1.45	XX
ZLWEXT	X	49.4000	48.7908	550.29	45.4000	44.7737	583.85	TA

Summary Statistics	Sample CF23	Sample CF24
Grand Means	0.61 COF	0.63 COF
Stnd Dev Btwn Labs	0.09 COF	0.08 COF

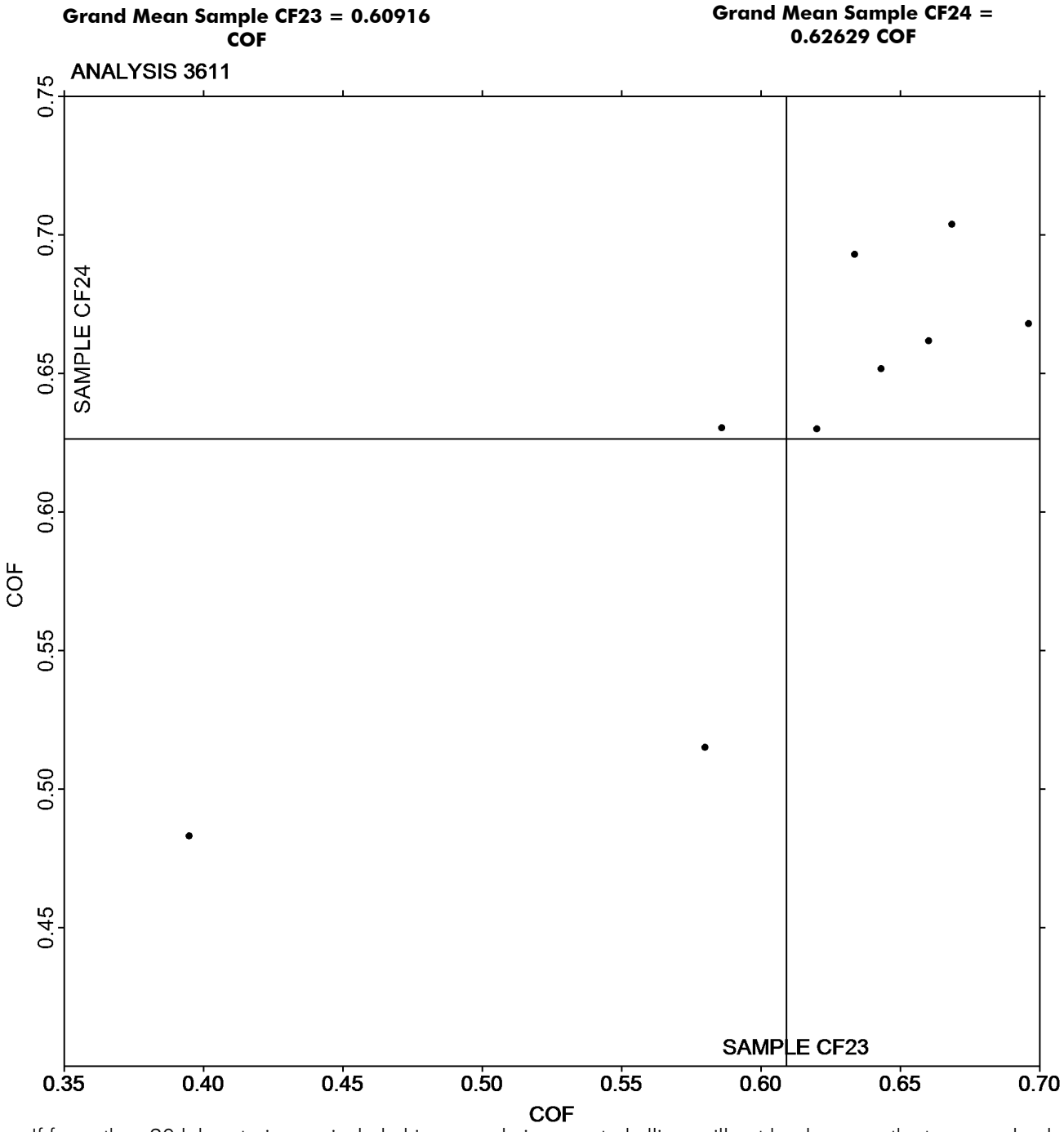
Statistics based on 9 of 10 reporting participants.

Comments on Assigned Data Flags for Test #3611

ZLWEXT (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

TA	Thwing-Albert Friction Tester	TM	TMI 32-06 Monitor/Slip and Friction
TP	TMI 32-25 COF Tester (Inclined Plane)	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 3612

Coefficient of Kinetic Friction - Horizontal Plane Method - Printing Papers

TAPPI Official Test Method T549

WebCode	Data Flag	Sample CF23 Lab Mean	Sample CF23 Diff from Grand Mean	Sample CF23 CPV	Sample CF24 Lab Mean	Sample CF24 Diff from Grand Mean	Sample CF24 CPV	Instr Code
2VG6XQ		0.5386	0.0157	0.25	0.5648	0.0352	0.60	TA
3B7ZK2		0.5404	0.0175	0.28	0.5438	0.0142	0.24	TA
FVUFUW		0.5320	0.0091	0.15	0.5400	0.0104	0.18	TA
HXARHR		0.3816	-0.1413	-2.24	0.4426	-0.0870	-1.48	TA
LH7LKQ		0.5696	0.0467	0.74	0.6142	0.0846	1.43	TA
Q8RZJR		0.5912	0.0683	1.08	0.5724	0.0428	0.73	TM
QT8KFT		0.5038	-0.0191	-0.30	0.5046	-0.0250	-0.42	TA
YL48C4		0.5256	0.0028	0.04	0.4546	-0.0750	-1.27	XX
ZLWEXT	X	44.4000	43.8772	696.01	40.8000	40.2704	682.69	TA

Summary Statistics	Sample CF23	Sample CF24
Grand Means	0.52 COF	0.53 COF
Stnd Dev Btwn Labs	0.06 COF	0.06 COF

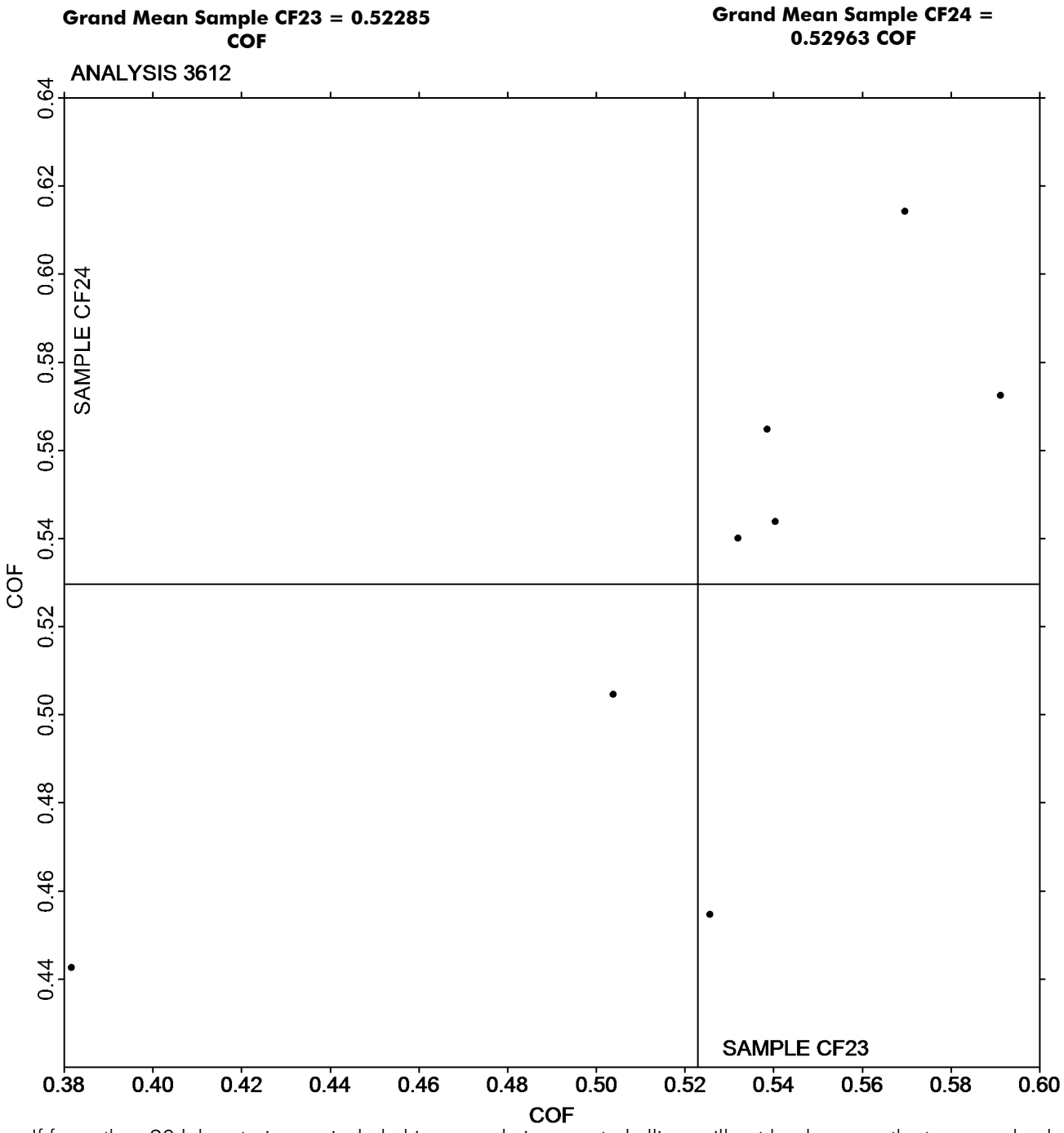
Statistics based on 8 of 9 reporting participants.

Comments on Assigned Data Flags for Test #3612

ZLWEXT (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

TA	Thwing-Albert Friction Tester	TM	TMI 32-06 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.

Paper & Paperboard Interlaboratory Testing Program

Analysis 3613
Moisture in Paper
TAPPI Official Test Method T412

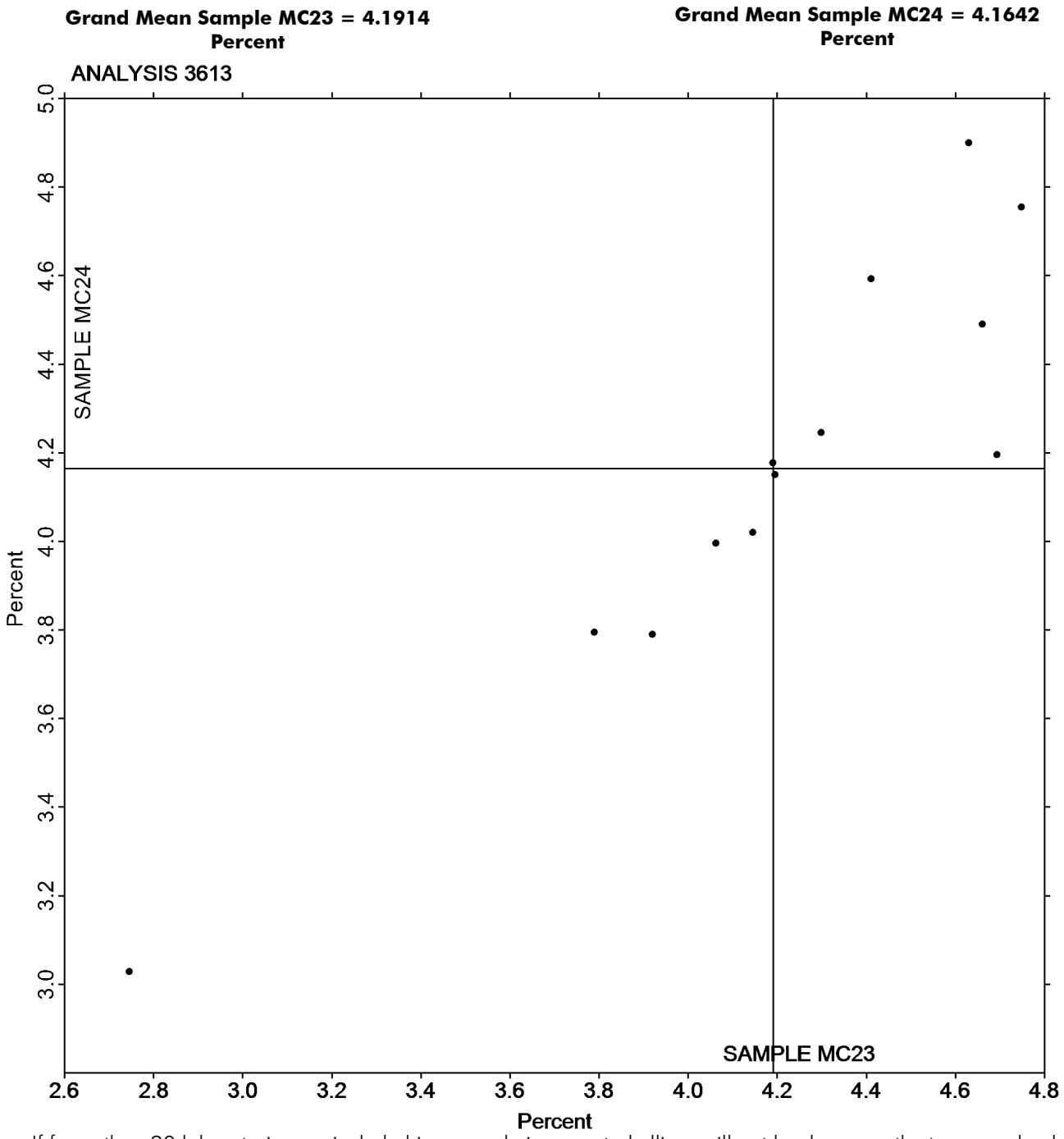
WebCode	Data Flag	Sample MC23 Lab Mean	Sample MC23 Diff from Grand Mean	Sample MC23 CPV	Sample MC24 Lab Mean	Sample MC24 Diff from Grand Mean	Sample MC24 CPV	Instr Code
C3KREG		4.660	0.469	0.88	4.490	0.326	0.67	ZZ
FVUFUW		4.062	-0.130	-0.24	3.996	-0.168	-0.35	ZZ
GZL7CT		4.411	0.220	0.41	4.592	0.428	0.89	ZZ
HFRQPB		4.299	0.107	0.20	4.245	0.081	0.17	ZZ
HMRCEP		4.748	0.557	1.05	4.755	0.591	1.22	ZZ
HQRKJY		4.693	0.502	0.95	4.196	0.032	0.07	ZZ
KYJDCB		4.630	0.439	0.83	4.900	0.736	1.52	ZZ
MZZL9F		3.790	-0.401	-0.76	3.795	-0.369	-0.76	ZZ
QC2GTF		4.195	0.004	0.01	4.150	-0.014	-0.03	ZZ
UGZ299		3.920	-0.271	-0.51	3.790	-0.374	-0.77	ZZ
WLTKPX		4.145	-0.046	-0.09	4.021	-0.144	-0.30	ZZ
YW4WVQ		4.190	-0.001	0.00	4.177	0.013	0.03	ZZ
ZHYZB4		2.746	-1.445	-2.73	3.028	-1.136	-2.35	ZZ

Summary Statistics	Sample MC23	Sample MC24
Grand Means	4.19 Percent	4.16 Percent
Stnd Dev Btwn Labs	0.53 Percent	0.48 Percent

Statistics based on 13 of 13 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 3615
Sizing Test (Hercules Type)
TAPPI Official Test Method T530

WebCode	Data Flag	Sample HS23 Lab Mean	Sample HS23 Diff from Grand Mean	Sample HS23 CPV	Sample HS24 Lab Mean	Sample HS24 Diff from Grand Mean	Sample HS24 CPV	Instr Code
2TCK86		92.48	19.17	0.81	93.46	24.24	1.15	HE
3LDD7B		52.46	-20.85	-0.88	58.16	-11.06	-0.52	XX
4M3YER		56.26	-17.05	-0.72	54.48	-14.74	-0.70	HE
78D3LK		72.57	-0.74	-0.03	80.91	11.69	0.55	XX
86NZEC		29.30	-44.01	-1.86	29.80	-39.42	-1.87	HE
FG98R6		81.60	8.29	0.35	59.50	-9.72	-0.46	HE
FNXKUD		64.96	-8.35	-0.35	61.49	-7.73	-0.37	HE
FVUFUW		63.49	-9.82	-0.42	60.73	-8.49	-0.40	HE
GYB8GJ		89.30	15.99	0.68	74.20	4.98	0.24	HE
HXARHR		100.51	27.20	1.15	99.39	30.17	1.43	HE
JBCH2B		48.32	-24.99	-1.06	48.23	-21.00	-0.99	HE
L46VYL		66.20	-7.11	-0.30	69.09	-0.13	-0.01	HE
LH7LKQ		24.27	-49.04	-2.08	21.42	-47.80	-2.26	HE
M3RKLE		49.00	-24.31	-1.03	49.10	-20.12	-0.95	HE
MXZD47		85.00	11.69	0.50	79.40	10.18	0.48	HE
QBRCFR		101.54	28.23	1.20	99.91	30.69	1.45	XX
QT8KFT		97.10	23.79	1.01	90.47	21.25	1.01	HE
R8NXBY		74.82	1.51	0.06	73.12	3.90	0.18	XX
RPRDRT		101.78	28.47	1.21	91.81	22.59	1.07	HE
TJWXKX		110.74	37.43	1.59	89.81	20.59	0.97	HE
WL948A	X	457.80	384.49	16.29	408.70	339.48	16.07	HE
YEJ7WR		70.60	-2.71	-0.11	66.70	-2.52	-0.12	HE
ZLWEXT		80.44	7.13	0.30	71.77	2.55	0.12	HE

Summary Statistics	Sample HS23	Sample HS24
Grand Means	73.31 Seconds	69.22 Seconds
Stnd Dev Btwn Labs	23.61 Seconds	21.12 Seconds

Statistics based on 22 of 23 reporting participants.

Comments on Assigned Data Flags for Test #3615

WL948A (X) - Extreme Data.

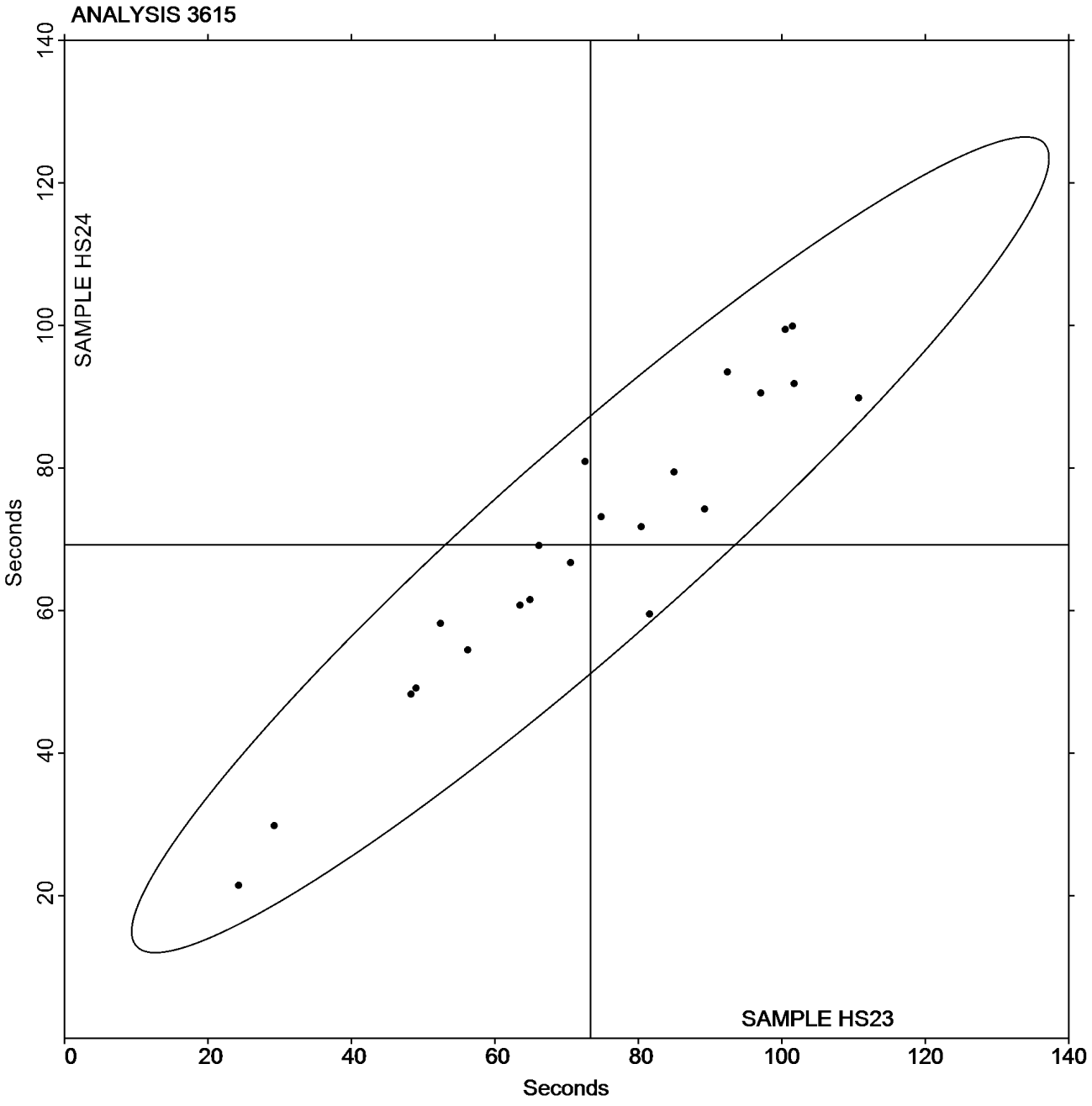
Key to Instrument Codes Reported by Participants

HE Hercules Sizing Tester

XX Instrument make/model not specified by lab

Grand Mean Sample HS23 = 73.306 Seconds

Grand Mean Sample HS24 = 69.225 Seconds



-End of Report-