Collaborative Testing Services, Inc.

Paper & Paperboard Testing Program

Summary Report #4332 - December 2024

Introduction to the Paper & Paperboard Interlaboratory Program

Explanation of Tables and Definitions of Terms

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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.

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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 CK35 Lab Mean	Sample CK35 Diff from Grand Mean	Sample CK35 CPV	Sample CK36 Lab Mean	Sample CK36 Diff from Grand Mean	Sample CK36 CPV	Instr Code
2B9QZT		9.736	0.277	1.55	7.906	0.275	1.59	PP
3LQMMC		9.656	0.197	1.10	7.774	0.143	0.83	XX
78WCKP		9.435	-0.024	-0.14	7.595	-0.036	-0.21	PP
7GK4BN	X	9.433	-0.026	-0.15	8.793	1.162	6.72	LC
7NY68C	*	8.960	-0.499	-2.80	7.100	-0.531	-3.07	LW
89NLB6		9.405	-0.054	-0.31	7.642	0.011	0.06	EM
8EP46N		9.408	-0.051	-0.29	7.560	-0.071	-0.41	EM
8LDK38		9.044	-0.415	-2.33	7.200	-0.431	-2.49	XX
9J4W39		9.135	-0.324	-1.82	7.340	-0.291	-1.68	PP
9KC8TK		9.536	0.076	0.43	7.634	0.003	0.02	LC
ACGNT3		9.564	0.105	0.59	7.612	-0.019	-0.11	EM
CEGGZ7		9.546	0.087	0.49	7.754	0.123	0.71	PP
DJ6L7F		9.635	0.176	0.99	7.843	0.212	1.22	LW
E7DBWE		9.478	0.019	0.10	7.717	0.086	0.50	XX
EPPZCX		9.551	0.092	0.51	7.728	0.097	0.56	EM
EWBWD2		9.500	0.041	0.23	7.790	0.159	0.92	LW
F2YV63	*	9.515	0.056	0.31	7.483	-0.148	-0.86	TB
FBYQZC		9.248	-0.211	-1.19	7.500	-0.131	-0.76	MS
GG94KW		9.380	-0.079	-0.45	7.660	0.029	0.17	XX
H3382U		9.354	-0.105	-0.59	7.527	-0.104	-0.60	EM
HUR7FT		9.421	-0.038	-0.21	7.680	0.048	0.28	LB
J48H7W		9.300	-0.159	-0.89	7.620	-0.011	-0.07	XX
L2VLFP		9.518	0.059	0.33	7.688	0.057	0.33	TA
MQBCQV		9.523	0.064	0.36	7.599	-0.032	-0.19	XX
NDLX3L		9.689	0.229	1.29	7.853	0.222	1.28	LW
R4KG4R		9.474	0.015	0.08	7.644	0.013	0.07	LA
RK9W8N		9.600	0.141	0.79	7.730	0.099	0.57	LC
RZ4C8H		9.493	0.034	0.19	7.659	0.028	0.16	LW
UEWQKG		9.694	0.235	1.32	7.791	0.160	0.93	LW
UHV7NX		9.504	0.044	0.25	7.697	0.066	0.38	LW
VDYWZH		9.559	0.100	0.56	7.708	0.077	0.45	LW
WBNCPM		9.537	0.078	0.44	7.661	0.029	0.17	LW
WXZCXK		9.304	-0.155	-0.87	7.506	-0.125	-0.72	OK

Summary Statistics	Sample CK35	Sample CK36
Grand Means	9.46 mils	7.63 mils
Stnd Dev Btwn Labs	0.18 mils	0.17 mils

Statistics based on 32 of 33 reporting participants.

Comments on Assigned Data Flags for Test #3501

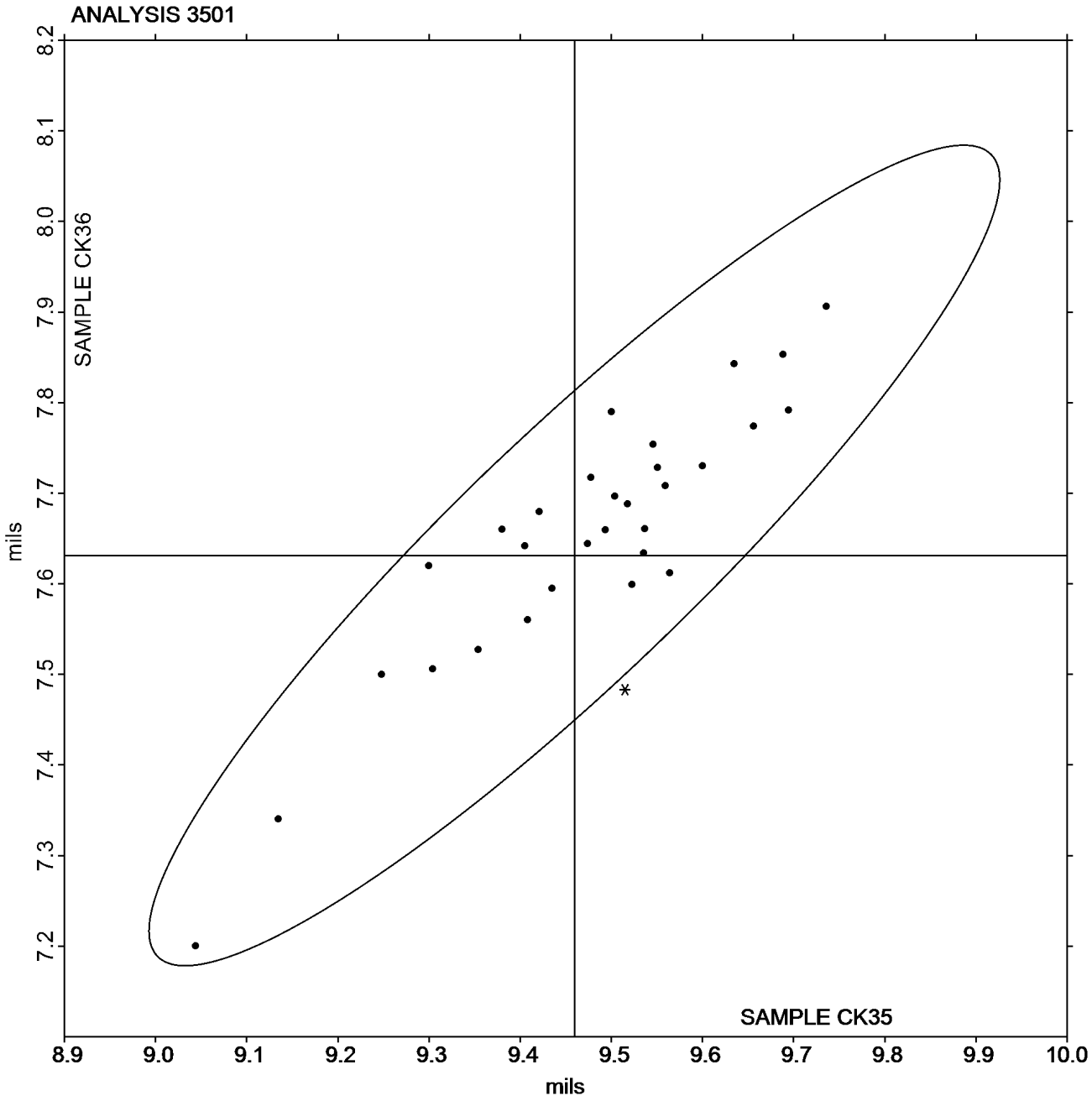
7GK4BN (X) - Extreme Data for sample CK36.

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	MS	Messmer
OK	Oakland	PP	Technidyne Profile/Plus
TA	Thwing-Albert	TB	Thwing-Albert 89-100
XX	Instrument make/model not specified by lab		

Grand Mean Sample CK35 = 9.4594 mils

Grand Mean Sample CK36 = 7.6313 mils



Paper & Paperboard Interlaboratory Testing Program

Analysis 3511

Bursting Strength - Packaging Papers

TAPPI Official Test Method T403

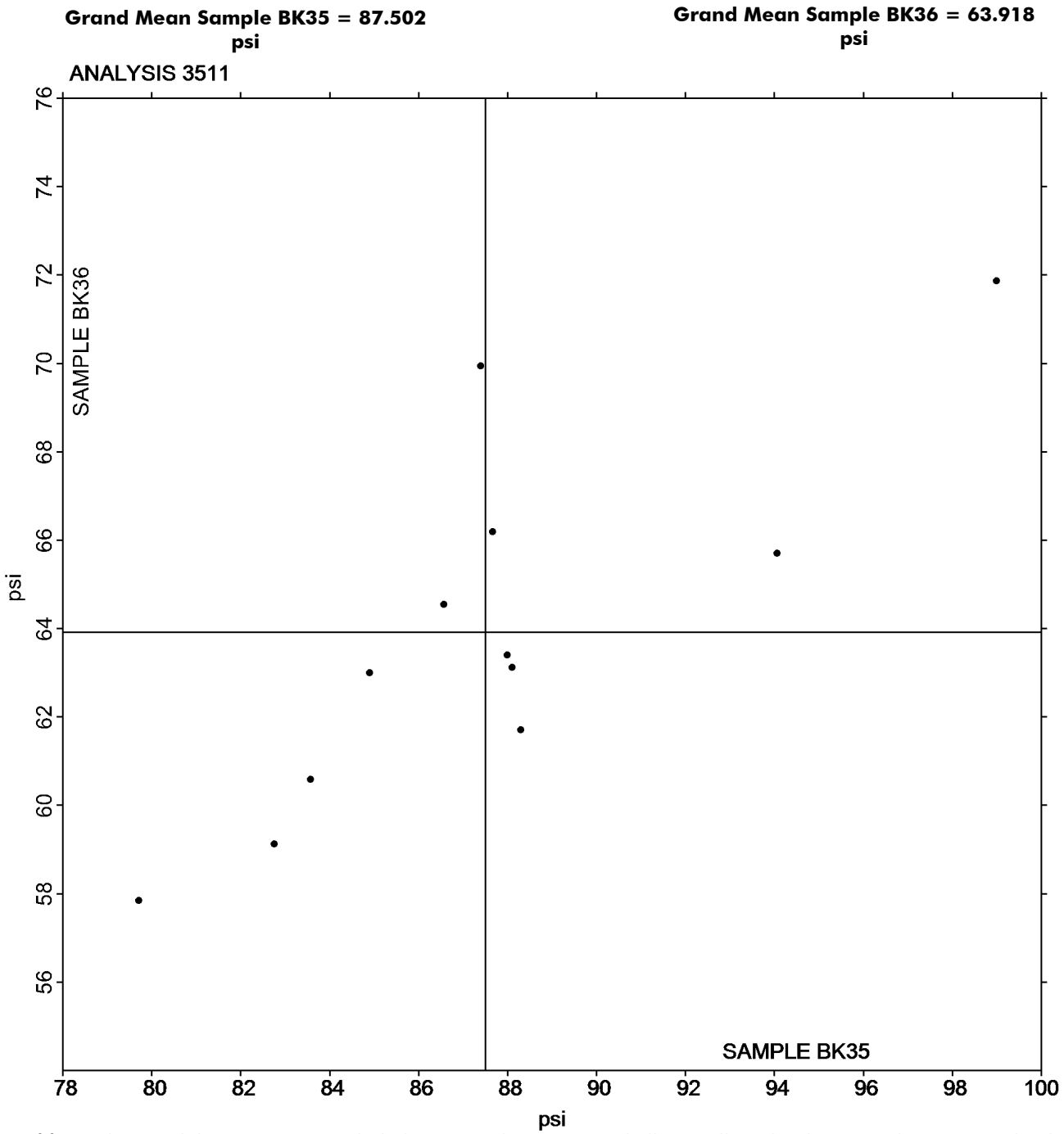
WebCode	Data Flag	Sample BK35 Lab Mean	Sample BK35 Diff from Grand Mean	Sample BK35 CPV	Sample BK36 Lab Mean	Sample BK36 Diff from Grand Mean	Sample BK36 CPV	Instr Code
8EP46N		87.66	0.16	0.03	66.19	2.27	0.55	ZZ
ACC8V4		88.11	0.60	0.12	63.12	-0.80	-0.19	ZZ
F2YV63		94.06	6.56	1.29	65.70	1.78	0.43	ZZ
G9TMQ2		84.90	-2.60	-0.51	63.00	-0.92	-0.22	ZZ
MNPTLR		88.30	0.80	0.16	61.70	-2.22	-0.54	ZZ
NDLX3L		82.76	-4.74	-0.94	59.12	-4.79	-1.17	ZZ
QTBJLJ		88.00	0.50	0.10	63.40	-0.52	-0.13	ZZ
THYBQ3		83.57	-3.93	-0.78	60.58	-3.33	-0.81	ZZ
UEWQKG		79.71	-7.79	-1.54	57.85	-6.07	-1.48	ZZ
UHV7NX		98.99	11.49	2.27	71.87	7.95	1.93	ZZ
VDYWZH		86.57	-0.93	-0.18	64.54	0.62	0.15	ZZ
WXZCXK		87.39	-0.11	-0.02	69.95	6.03	1.47	ZZ

Summary Statistics	Sample BK35	Sample BK36
Grand Means	87.50 psi	63.92 psi
Stnd Dev Btwn Labs	5.07 psi	4.11 psi

Statistics based on 12 of 12 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 RK35 Lab Mean	Sample RK35 Diff from Grand Mean	Sample RK35 CPV	Sample RK36 Lab Mean	Sample RK36 Diff from Grand Mean	Sample RK36 CPV	Instr Code
2B9QZT		213.2	4.9	0.24	158.8	-0.5	-0.04	ZZ
3LQMMC		226.0	17.7	0.87	169.9	10.6	0.71	ZZ
7GK4BN		171.8	-36.5	-1.80	147.5	-11.8	-0.79	ZZ
7NY68C	*	198.6	-9.7	-0.48	177.2	17.9	1.20	ZZ
89NLB6		185.1	-23.2	-1.14	135.6	-23.7	-1.60	ZZ
9KC8TK		208.9	0.6	0.03	159.1	-0.2	-0.01	ZZ
ACC8V4		197.8	-10.5	-0.52	141.0	-18.3	-1.23	ZZ
ACGNT3		200.9	-7.4	-0.36	150.6	-8.7	-0.58	ZZ
BJVWRH		214.3	6.0	0.29	157.1	-2.2	-0.15	ZZ
C7G4XG		253.6	45.3	2.23	194.7	35.4	2.38	ZZ
DJ6L7F		204.3	-4.0	-0.20	156.1	-3.2	-0.21	ZZ
DKZ49G		222.1	13.8	0.68	169.3	9.9	0.67	ZZ
G3NNEB		185.9	-22.4	-1.10	146.9	-12.5	-0.84	ZZ
GG94KW		238.0	29.7	1.46	182.0	22.7	1.53	ZZ
H3382U	X	280.9	72.6	3.57	257.3	98.0	6.59	ZZ
L2VLFP		203.0	-5.3	-0.26	154.8	-4.5	-0.30	ZZ
LN6PDQ		196.4	-11.9	-0.58	150.8	-8.5	-0.57	ZZ
LVPTJ9		217.7	9.4	0.46	168.4	9.1	0.61	ZZ
MNPTLR		175.3	-33.0	-1.62	131.4	-27.9	-1.88	ZZ
N7Y6QM		187.1	-21.2	-1.04	141.9	-17.4	-1.17	ZZ
NDLX3L		224.9	16.6	0.82	177.3	18.0	1.21	ZZ
QTBJLJ		206.3	-2.0	-0.10	153.7	-5.6	-0.38	ZZ
QXEVA4		211.4	3.1	0.15	160.9	1.6	0.11	ZZ
R4KG4R		210.7	2.4	0.12	156.8	-2.5	-0.17	ZZ
RZ4C8H		232.1	23.9	1.17	164.8	5.5	0.37	ZZ
UEWQKG		230.1	21.8	1.07	181.1	21.8	1.46	ZZ
VDYWZH		215.0	6.7	0.33	164.3	5.0	0.34	ZZ
WBNCPM		227.0	18.7	0.92	160.8	1.5	0.10	ZZ
WXZCXK		217.7	9.4	0.46	167.8	8.5	0.57	ZZ
ZWT73U		165.6	-42.7	-2.10	139.6	-19.7	-1.32	ZZ

Summary Statistics	Sample RK35	Sample RK36
Grand Means	208.30 Grams	159.30 Grams
Stnd Dev Btwn Labs	20.35 Grams	14.88 Grams

Statistics based on 29 of 30 reporting participants.

Comments on Assigned Data Flags for Test #3513

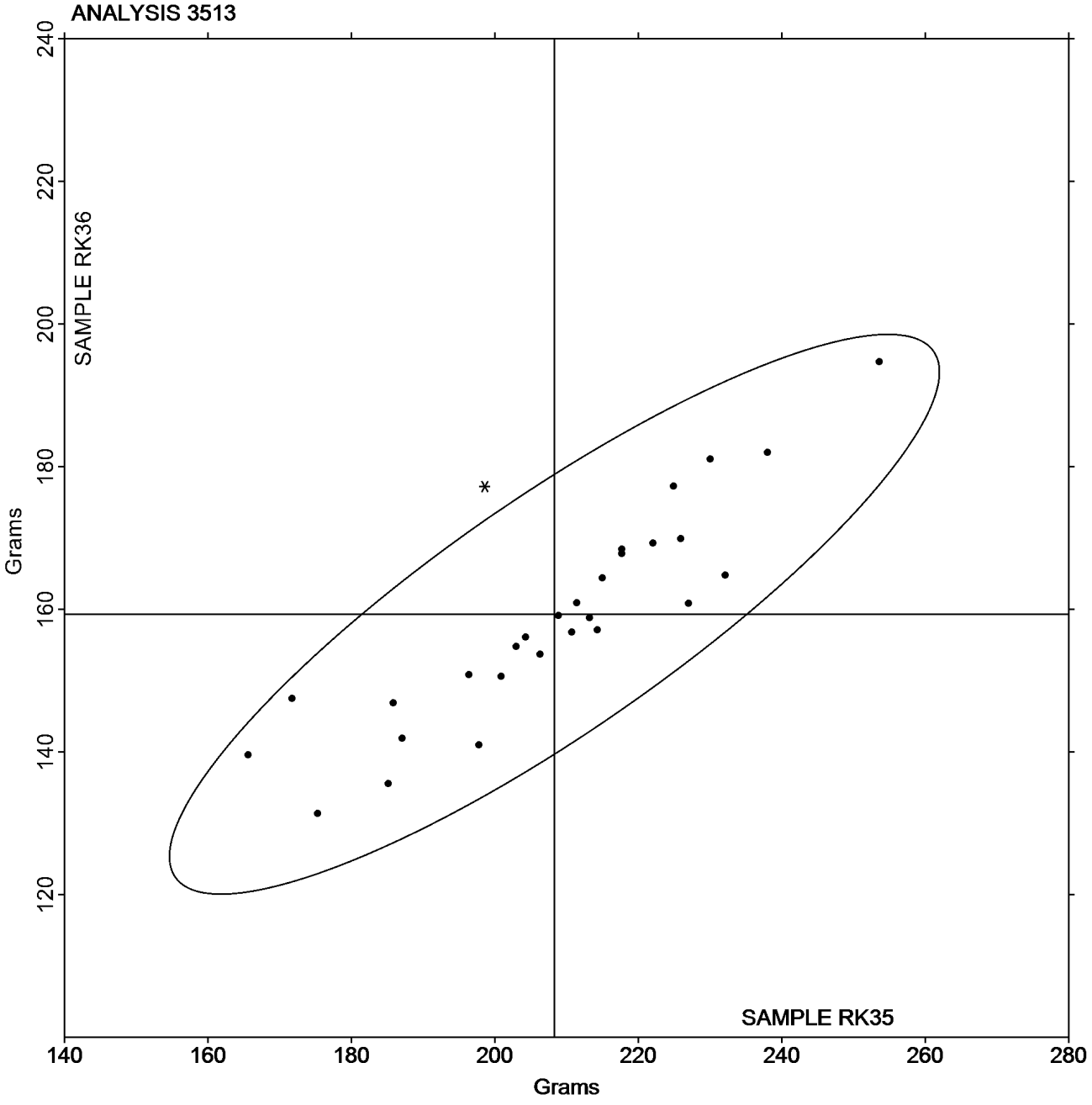
H3382U (X) - Data for both samples are high. Possible Systematic Error.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Grand Mean Sample RK35 = 208.30 Grams

Grand Mean Sample RK36 = 159.30 Grams



Paper & Paperboard Interlaboratory Testing Program

Analysis 3515

Tensile Breaking Strength - Packaging Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NK35 Lab Mean	Sample NK35 Diff from Grand Mean	Sample NK35 CPV	Sample NK36 Lab Mean	Sample NK36 Diff from Grand Mean	Sample NK36 CPV	Instr Code
2B9QZT	*	11.58	-2.12	-2.53	8.67	-1.91	-2.58	TH
388ZDD		14.85	1.14	1.36	11.60	1.01	1.36	LA
3LQMMC		13.19	-0.52	-0.62	10.22	-0.37	-0.49	ID
7NY68C	X	30.65	16.94	20.17	10.78	0.20	0.27	LX
8YXZ78		13.96	0.26	0.30	10.66	0.07	0.10	DM
9KC8TK		13.00	-0.71	-0.84	10.06	-0.53	-0.71	IN
ACC8V4		12.67	-1.04	-1.23	9.85	-0.74	-0.99	TX
BJVWRH		13.50	-0.20	-0.24	10.44	-0.14	-0.19	LE
D2KU8F		12.81	-0.90	-1.07	10.12	-0.47	-0.63	TS
DJ6L7F		13.72	0.02	0.02	10.19	-0.40	-0.53	LW
DKZ49G		13.17	-0.53	-0.63	9.88	-0.71	-0.96	XX
DXKJBF		12.86	-0.84	-1.01	9.49	-1.10	-1.49	IM
EPPZCX		14.90	1.20	1.42	11.46	0.87	1.18	LE
EWBWD2		14.42	0.71	0.85	10.88	0.29	0.40	TH
F2YV63		13.72	0.02	0.02	11.12	0.53	0.72	TV
GG94KW		14.46	0.76	0.90	11.05	0.47	0.63	XX
H3382U		13.38	-0.33	-0.39	9.97	-0.62	-0.83	LW
HUR7FT	*	15.81	2.11	2.51	12.07	1.49	2.01	LC
J48H7W		13.64	-0.07	-0.08	10.28	-0.30	-0.41	XX
L2VLFP		13.20	-0.50	-0.59	10.31	-0.28	-0.38	TB
L3ANLX		14.40	0.70	0.83	10.93	0.35	0.47	LA
LN6PDQ		14.08	0.38	0.45	11.01	0.42	0.57	XX
LVPTJ9		13.29	-0.41	-0.49	9.93	-0.66	-0.89	LE
MNPTLR		14.60	0.89	1.06	11.47	0.88	1.19	TO
MQBCQV	X	10.55	-3.15	-3.75	12.26	1.67	2.25	TB
MQQWBT		14.76	1.06	1.26	11.56	0.97	1.31	LI
N7Y6QM		13.03	-0.68	-0.81	10.71	0.12	0.16	LH
NDLX3L		13.00	-0.71	-0.84	9.92	-0.66	-0.90	IM
QXEVA4	X	10.47	-3.23	-3.85	9.52	-1.07	-1.44	TH
R4KG4R		13.86	0.16	0.19	10.81	0.22	0.30	LA
RZ4C8H		13.38	-0.32	-0.39	10.55	-0.04	-0.05	LW
THYBQ3	*	14.56	0.86	1.02	12.08	1.49	2.02	LW
TZJ3P2		14.68	0.98	1.16	11.14	0.55	0.75	LE
UEWQKG		12.89	-0.81	-0.97	9.85	-0.74	-1.00	LE
VDYWZH		13.63	-0.07	-0.09	10.56	-0.03	-0.04	LH
WBNCPM		13.74	0.03	0.04	10.89	0.30	0.41	LE
WH6TGW		13.21	-0.49	-0.59	10.24	-0.34	-0.46	IR

Paper & Paperboard Interlaboratory Testing Program

Analysis 3515

Tensile Breaking Strength - Packaging Papers

TAPPI Official Test Method T494

Summary Statistics	Sample NK35	Sample NK36
Grand Means	13.70 kN/m	10.59 kN/m
Stnd Dev Btwn Labs	0.84 kN/m	0.74 kN/m

Statistics based on 34 of 37 reporting participants.

Comments on Assigned Data Flags for Test #3515

MQBCQV (X) - Data for sample NK35 are low. Inconsistent within the determinations of sample NK36.

7NY68C (X) - Extreme Data for sample NK35.

QXEVA4 (X) - Data for sample NK35 are low.

Analysis Notes:

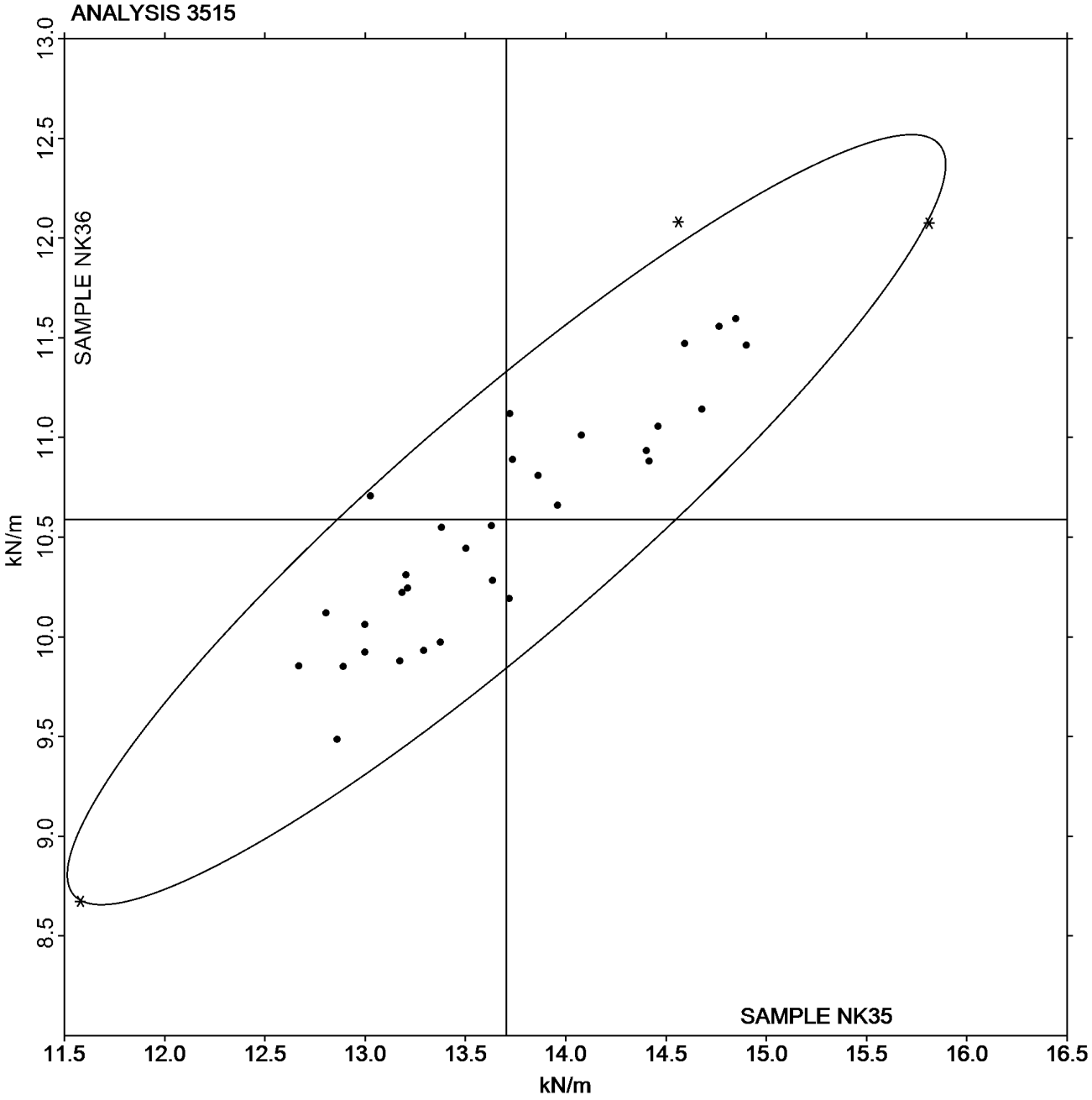
MNPTLR - Data appear to be reported as lb/inch, not kN/m as indicated on data entry form. CTS will not correct the Units going forward.

Key to Instrument Codes Reported by Participants

DM	IDM MTC-100 Tensile Tester	ID	Instron 4200 Series
IM	Instron 5500 Series	IN	Instron 3360 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
TO	Thwing-Albert QC-1000	TS	TMI Horizontal Tensile Tester 84-58
TV	Thwing-Albert Vantage NX	TX	Thwing-Albert (model not specified)
XX	Instrument make/model not specified by lab		

Grand Mean Sample NK35 = 13.704 kN/m

Grand Mean Sample NK36 = 10.588 kN/m



Paper & Paperboard Interlaboratory Testing Program

Report #4332, December 2024

Analysis 3516

Tensile Energy Absorption - Packaging Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NK35 Lab Mean	Sample NK35 Diff from Grand Mean	Sample NK35 CPV	Sample NK36 Lab Mean	Sample NK36 Diff from Grand Mean	Sample NK36 CPV	Instr Code
388ZDD		182.6	-0.6	-0.03	139.0	12.2	0.88	LA
7NY68C		215.0	31.7	1.66	125.5	-1.3	-0.09	TH
8YXZ78		230.8	47.6	2.48	145.1	18.2	1.31	DM
9KC8TK		167.8	-15.5	-0.81	125.0	-1.8	-0.13	IN
ACC8V4		183.3	0.0	0.00	131.2	4.4	0.32	TX
BJVWRH		177.6	-5.6	-0.29	118.2	-8.7	-0.62	LE
D2KU8F		177.8	-5.5	-0.29	124.0	-2.8	-0.20	TS
DJ6L7F		180.7	-2.5	-0.13	116.4	-10.4	-0.75	LW
DKZ49G		204.3	21.1	1.10	129.9	3.1	0.22	XX
DXKJBF		172.1	-11.1	-0.58	107.1	-19.7	-1.41	IM
EPPZCX		206.0	22.8	1.19	142.9	16.1	1.16	LE
EWBWD2		191.7	8.5	0.44	125.4	-1.4	-0.10	TH
F2YV63		211.0	27.8	1.45	146.2	19.4	1.39	TV
GG94KW		182.7	-0.5	-0.03	122.2	-4.6	-0.33	XX
H3382U		154.8	-28.5	-1.48	110.2	-16.6	-1.19	LW
HUR7FT		187.4	4.2	0.22	134.4	7.6	0.54	LC
J48H7W		141.6	-41.7	-2.17	94.0	-32.8	-2.36	TH
L3ANLX		186.4	3.2	0.17	131.3	4.5	0.32	LC
LN6PDQ		192.3	9.0	0.47	132.8	5.9	0.43	XX
LVPTJ9		176.4	-6.8	-0.35	113.7	-13.1	-0.94	LE
MQBCQV	X	134.4	-48.8	-2.55	149.1	22.3	1.60	TB
N7Y6QM		162.7	-20.6	-1.07	122.9	-3.9	-0.28	LH
NDLX3L		198.4	15.2	0.79	132.3	5.5	0.40	IM
R4KG4R	*	197.2	13.9	0.73	159.8	33.0	2.37	LA
RZ4C8H		171.7	-11.5	-0.60	123.8	-3.0	-0.22	LE
THYBQ3		190.8	7.6	0.40	149.5	22.7	1.63	LW
TZJ3P2		184.4	1.2	0.06	136.0	9.2	0.66	LE
UEWQKG		163.6	-19.6	-1.02	114.0	-12.8	-0.92	LE
VDYWZH		183.9	0.7	0.03	120.7	-6.1	-0.44	LH
WBNCPM		156.5	-26.7	-1.40	111.2	-15.6	-1.12	LE
WH6TGW		165.7	-17.5	-0.91	119.8	-7.0	-0.51	IR

Summary Statistics	Sample NK35	Sample NK36
Grand Means	183.24 Joules/sq m	126.82 Joules/sq m
Stnd Dev Btwn Labs	19.17 Joules/sq m	13.94 Joules/sq m

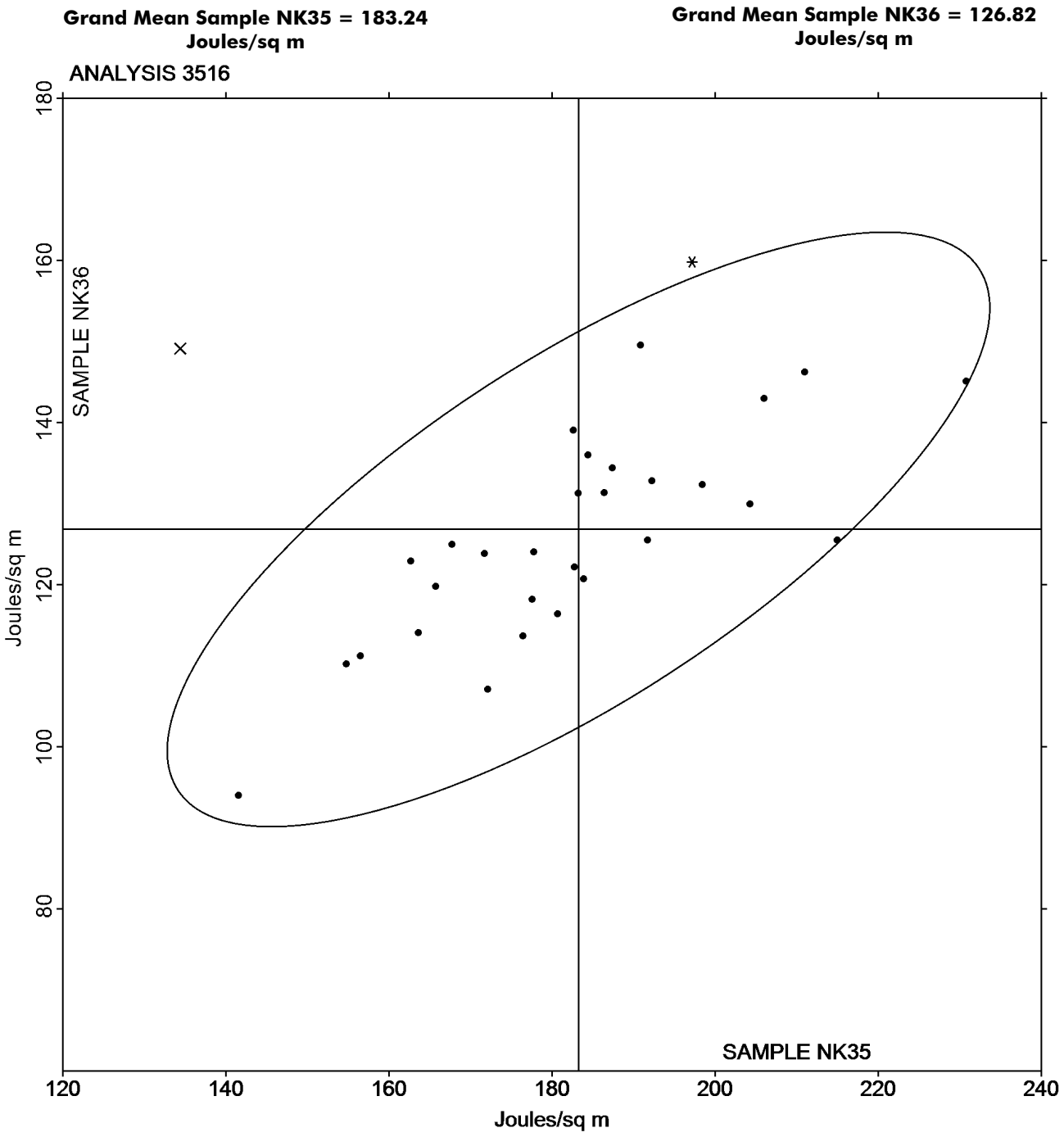
Statistics based on 30 of 31 reporting participants.

Comments on Assigned Data Flags for Test #3516

MQBCQV (X) - Inconsistent in testing between samples. Inconsistent within the determinations of both samples.

Key to Instrument Codes Reported by Participants

DM	IDM MTC-100 Tensile Tester	IM	Instron 5500 Series
IN	Instron 3360 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	TS	TMI Horizontal Tensile Tester 84-58
TV	Thwing-Albert Vantage NX	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 #4332, December 2024

WebCode	Data Flag	Sample NK35 Lab Mean	Sample NK35 Diff from Grand Mean	Sample NK35 CPV	Sample NK36 Lab Mean	Sample NK36 Diff from Grand Mean	Sample NK36 CPV	Instr Code
388ZDD		1.865	-0.200	-0.94	1.811	-0.057	-0.34	XX
3LQMMC		2.179	0.114	0.54	1.902	0.034	0.20	XX
7NY68C	X	3.050	0.985	4.62	2.200	0.332	1.97	LX
8YXZ78	*	2.600	0.535	2.51	2.149	0.281	1.67	DM
9KC8TK		2.029	-0.036	-0.17	1.941	0.073	0.43	IN
ACC8V4		2.227	0.162	0.76	2.041	0.173	1.03	TX
BJVWRH		2.021	-0.044	-0.21	1.753	-0.115	-0.68	LE
D2KU8F		2.216	0.151	0.71	1.963	0.095	0.56	TS
DJ6L7F		2.029	-0.036	-0.17	1.807	-0.061	-0.36	LW
DKZ49G		2.329	0.264	1.24	2.046	0.178	1.06	XX
DXKJBF		2.418	0.353	1.66	2.091	0.223	1.32	IM
EPPZCX		2.149	0.084	0.39	1.938	0.070	0.41	LE
EWBWD2		2.171	0.106	0.50	1.875	0.007	0.04	TH
F2YV63		2.489	0.424	1.99	2.166	0.298	1.77	TV
GG94KW		1.983	-0.082	-0.38	1.683	-0.185	-1.10	XX
H3382U		1.832	-0.233	-1.09	1.749	-0.119	-0.71	LW
HUR7FT		1.759	-0.306	-1.43	1.651	-0.217	-1.29	LC
J48H7W		1.750	-0.315	-1.48	1.590	-0.278	-1.65	XX
L2VLFP		2.028	-0.037	-0.17	1.791	-0.077	-0.46	TB
L3ANLX		1.908	-0.157	-0.74	1.766	-0.102	-0.61	LC
LN6PDQ		2.086	0.021	0.10	1.849	-0.019	-0.11	XX
LVPTJ9		2.009	-0.056	-0.26	1.749	-0.119	-0.71	LE
MNPTLR	X	0.113	-1.952	-9.16	0.109	-1.760	-10.45	TO
MQBCQV		1.941	-0.124	-0.58	1.921	0.053	0.31	XX
N7Y6QM		1.943	-0.122	-0.57	1.801	-0.067	-0.40	LH
NDLX3L		2.384	0.319	1.50	2.089	0.221	1.31	IM
R4KG4R	*	2.231	0.166	0.78	2.239	0.371	2.20	LX
RZ4C8H		1.832	-0.233	-1.09	1.602	-0.266	-1.58	LW
THYBQ3		2.025	-0.040	-0.19	1.911	0.043	0.25	LW
TZJ3P2		1.974	-0.091	-0.43	1.935	0.067	0.40	LE
UEWQKG		1.948	-0.117	-0.55	1.777	-0.091	-0.54	LE
VDYWZH		2.010	-0.055	-0.26	1.775	-0.093	-0.55	LX
WBNCPM		1.778	-0.287	-1.35	1.615	-0.253	-1.50	LE
WH6TGW		1.932	-0.133	-0.62	1.807	-0.061	-0.36	XX

Summary Statistics	Sample NK35	Sample NK36
Grand Means	2.06 Percent	1.87 Percent
Stnd Dev Btwn Labs	0.21 Percent	0.17 Percent

Statistics based on 32 of 34 reporting participants.

Comments on Assigned Data Flags for Test #3517

MNPTLR (X) - Extreme Data.

7NY68C (X) - Data for sample NK35 are high. Inconsistent within the determinations of sample NK35.

Analysis Notes:

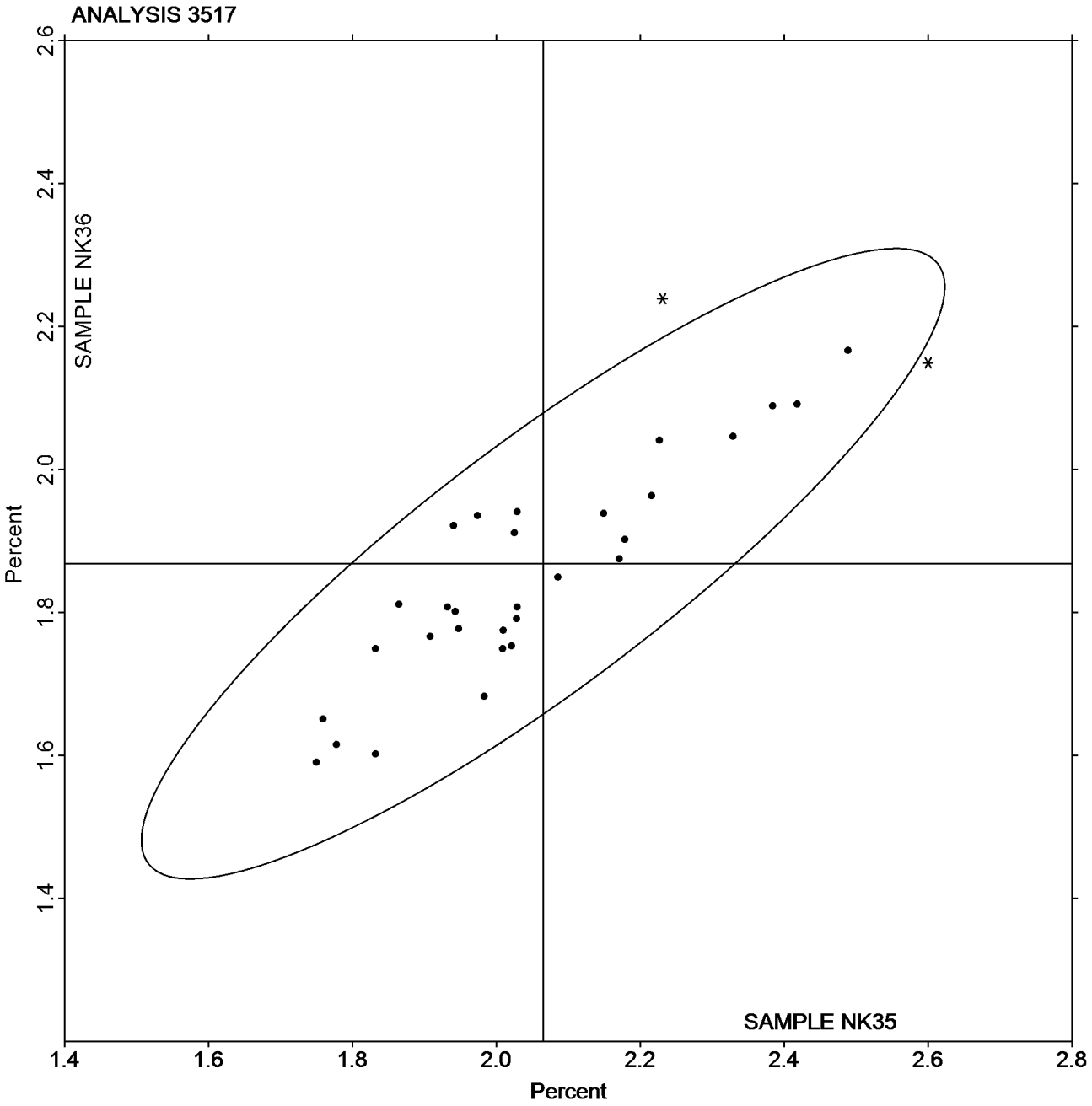
RZ4C8H - Data appears to be transposed between samples. CTS will not correct the data going forward.

Key to Instrument Codes Reported by Participants

DM	IDM MTC-100 Tensile Tester	IM	Instron 5500 Series
IN	Instron 3360 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	TS	TMI Horizontal Tensile Tester 84-58
TV	Thwing-Albert Vantage NX	TX	Thwing-Albert (model not specified)
XX	Instrument make/model not specified by lab		

Grand Mean Sample NK35 = 2.0648 Percent

Grand Mean Sample NK36 = 1.8682 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 PS35 Lab Mean	Sample PS35 Diff from Grand Mean	Sample PS35 CPV	Sample PS36 Lab Mean	Sample PS36 Diff from Grand Mean	Sample PS36 CPV	Instr Code
4PFNXP		2.047	-0.265	-1.65	2.142	-0.188	-1.20	ZZ
6EZRYD		2.452	0.140	0.87	2.307	-0.023	-0.15	ZZ
89NLB6		2.402	0.090	0.56	2.407	0.077	0.50	ZZ
ACGNT3		2.420	0.108	0.67	2.443	0.113	0.73	ZZ
D2KU8F		2.309	-0.003	-0.02	2.317	-0.013	-0.08	ZZ
DDZK97		2.450	0.138	0.86	2.573	0.243	1.56	ZZ
DM6RM7		2.298	-0.014	-0.09	2.400	0.070	0.45	ZZ
EB4L9X		2.050	-0.262	-1.63	2.176	-0.154	-0.99	ZZ
EEQ6E3		2.357	0.045	0.28	2.496	0.166	1.07	ZZ
EPPZCX		2.274	-0.038	-0.24	2.317	-0.013	-0.08	ZZ
EWBWD2		2.338	0.026	0.16	2.290	-0.040	-0.25	ZZ
H3382U		1.971	-0.341	-2.13	2.017	-0.313	-2.00	ZZ
HUR7FT		2.246	-0.066	-0.41	2.320	-0.010	-0.06	ZZ
LCVRUW		2.387	0.075	0.47	2.219	-0.111	-0.71	ZZ
MQBCQV		2.533	0.221	1.38	2.467	0.137	0.88	ZZ
P89CRU		2.450	0.138	0.86	2.596	0.266	1.71	ZZ
RK9W8N		2.291	-0.021	-0.13	2.218	-0.112	-0.72	ZZ
VDYWZH		2.222	-0.090	-0.56	2.419	0.089	0.57	ZZ
VULD4E		2.127	-0.185	-1.15	2.058	-0.272	-1.74	ZZ
WXZCXK		2.232	-0.080	-0.50	2.190	-0.140	-0.90	ZZ
Y8ZJTB		2.608	0.296	1.84	2.460	0.130	0.84	ZZ
ZXPH8A		2.401	0.089	0.55	2.420	0.090	0.58	ZZ

Summary Statistics	Sample PS35	Sample PS36
Grand Means	2.31 Microns	2.33 Microns
Stnd Dev Btwn Labs	0.16 Microns	0.16 Microns

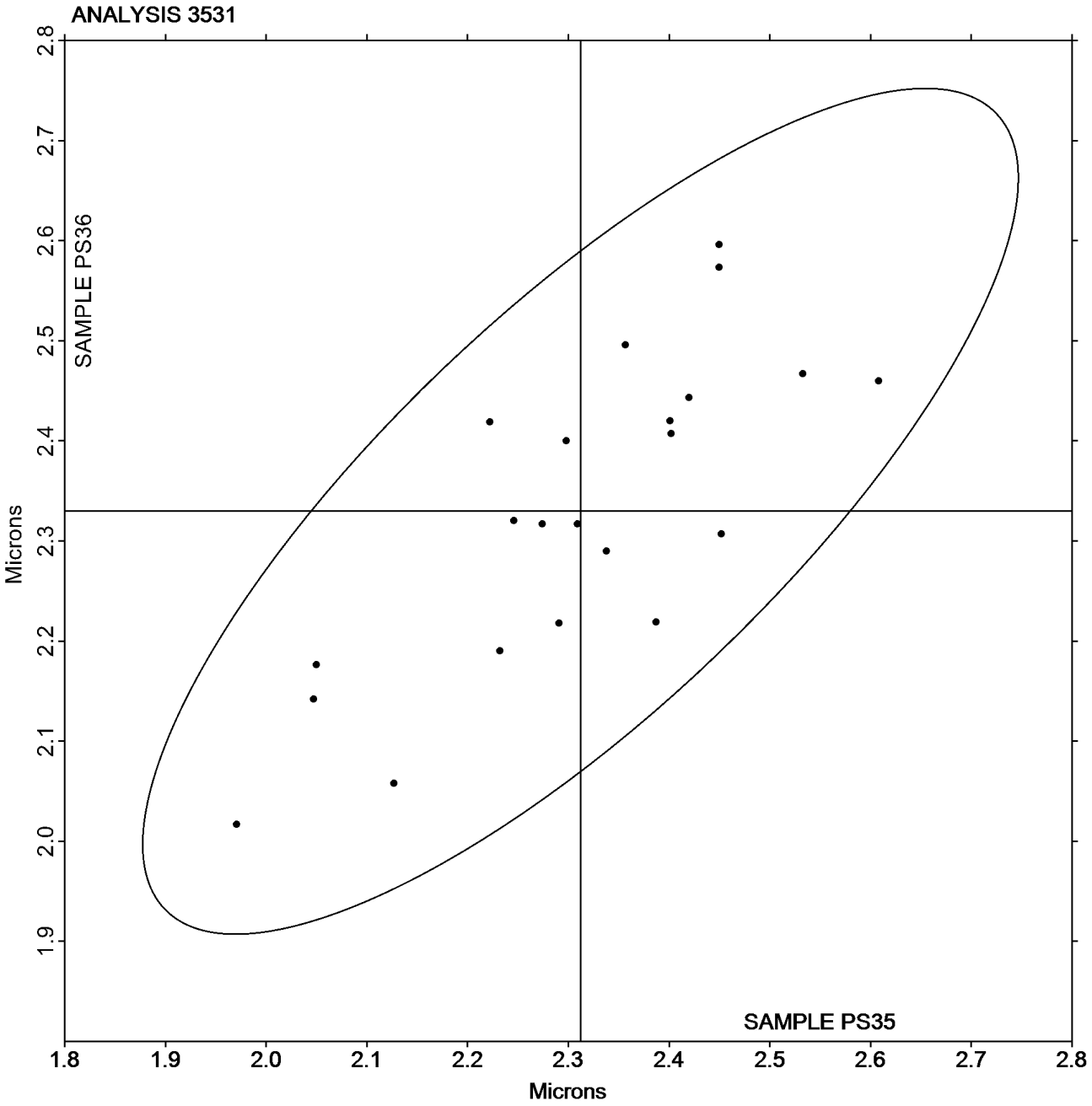
Statistics based on 22 of 22 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Grand Mean Sample PS35 = 2.3120 Microns

Grand Mean Sample PS36 = 2.3296 Microns



Paper & Paperboard Interlaboratory Testing Program

Analysis 3545
Directional Brightness
TAPPI Official Test Method T452

Report #4332, December 2024

WebCode	Data Flag	Sample BR35 Lab Mean	Sample BR35 Diff from Grand Mean	Sample BR35 CPV	Sample BR36 Lab Mean	Sample BR36 Diff from Grand Mean	Sample BR36 CPV	Instr Code
4PFNXP		76.29	-0.93	-0.45	76.45	-0.88	-0.42	HZ
6EZRYD		75.55	-1.67	-0.81	75.81	-1.52	-0.73	TP
7GK4BN		71.74	-5.48	-2.66	71.73	-5.60	-2.70	LA
89NLB6		78.27	1.05	0.51	78.57	1.23	0.59	TP
9J4W39	X	69.57	-7.65	-3.71	71.51	-5.82	-2.81	TP
ACGNT3		79.76	2.54	1.23	79.79	2.46	1.18	HG
D2KU8F		76.57	-0.66	-0.32	76.61	-0.72	-0.35	TS
DDZK97		78.65	1.43	0.69	78.62	1.29	0.62	TD
DJ6L7F		77.14	-0.08	-0.04	77.15	-0.18	-0.09	TS
EHNNF2		76.21	-1.01	-0.49	75.86	-1.47	-0.71	TS
EPPZCX		80.00	2.78	1.35	79.87	2.54	1.22	HG
EWBWD2		75.78	-1.45	-0.70	75.95	-1.38	-0.67	TP
GG94KW		77.78	0.55	0.27	78.16	0.82	0.40	XX
H3382U		80.19	2.97	1.44	80.16	2.83	1.36	TP
L2VLFP	*	76.84	-0.38	-0.19	77.66	0.33	0.16	XD
LXHG4N	X	65.84	-11.38	-5.52	75.78	-1.56	-0.75	XX
VM4U2Z		79.59	2.37	1.15	79.75	2.42	1.17	TP
WXZCXK		77.59	0.37	0.18	77.81	0.48	0.23	HG
Y8ZJTB		76.15	-1.07	-0.52	76.13	-1.20	-0.58	PP
Z6TNKR		75.90	-1.32	-0.64	75.88	-1.46	-0.70	TT

Summary Statistics	Sample BR35	Sample BR36
Grand Means	77.22 Percent	77.33 Percent
Stnd Dev Btwn Labs	2.06 Percent	2.08 Percent

Statistics based on 18 of 20 reporting participants.

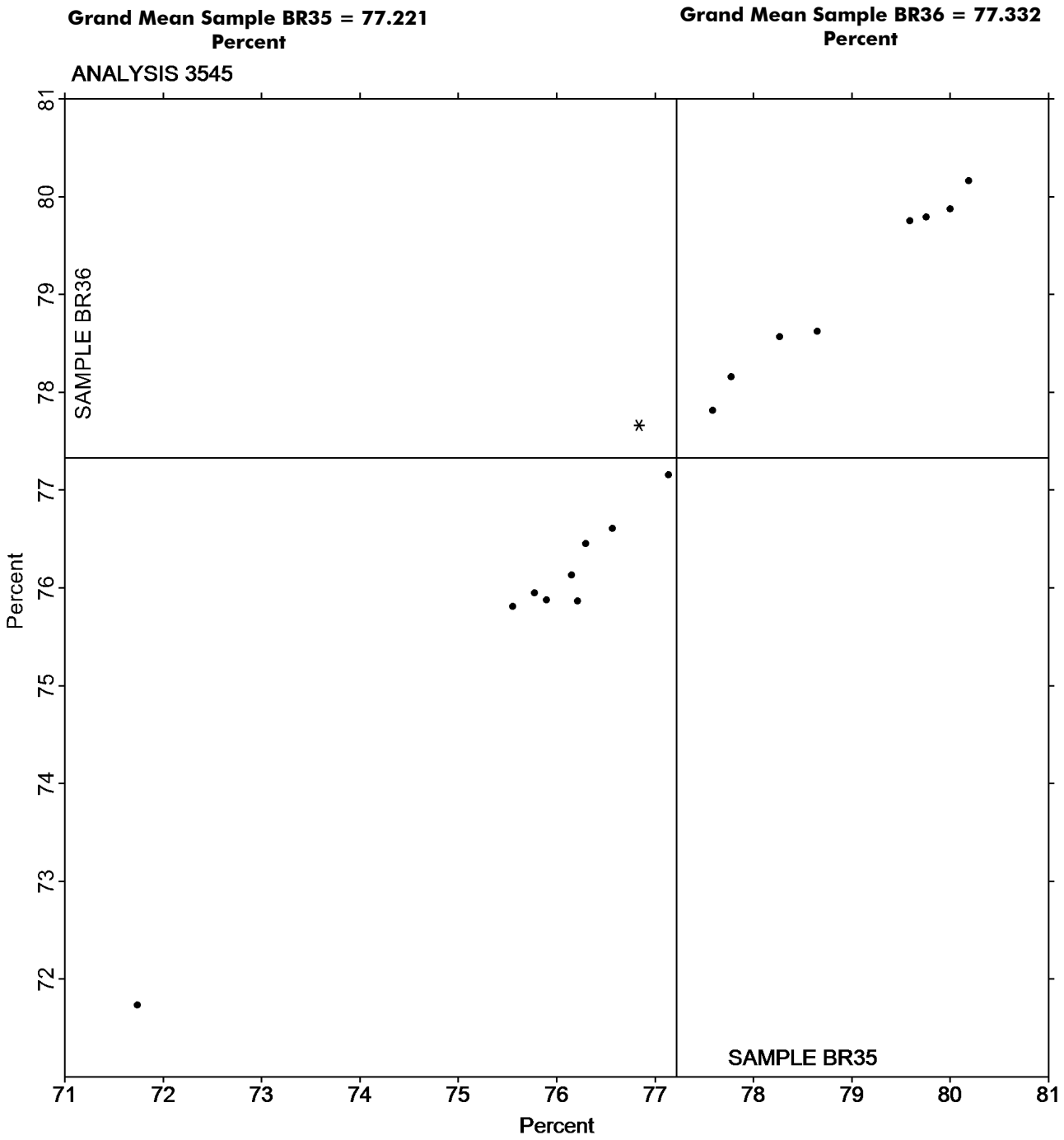
Comments on Assigned Data Flags for Test #3545

LXHG4N (X) - Data for sample BR35 are low. Inconsistent within the determinations of sample BR35.

9J4W39 (X) - Data for both samples are low. Inconsistent within the determinations of both samples.

Key to Instrument Codes Reported by Participants

HG	Hunter Labscan / XE	HZ	Hunter Lab ColorFlex EZ Series
LA	L & W Elrepho - Autoline	PP	Technidyne Profile/Plus
TD	Technidyne Color Touch 45X	TP	Technidyne Test/Plus
TS	Technidyne Brightimeter Micro S-5	TT	Technidyne Brightimeter Micro S4-M
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

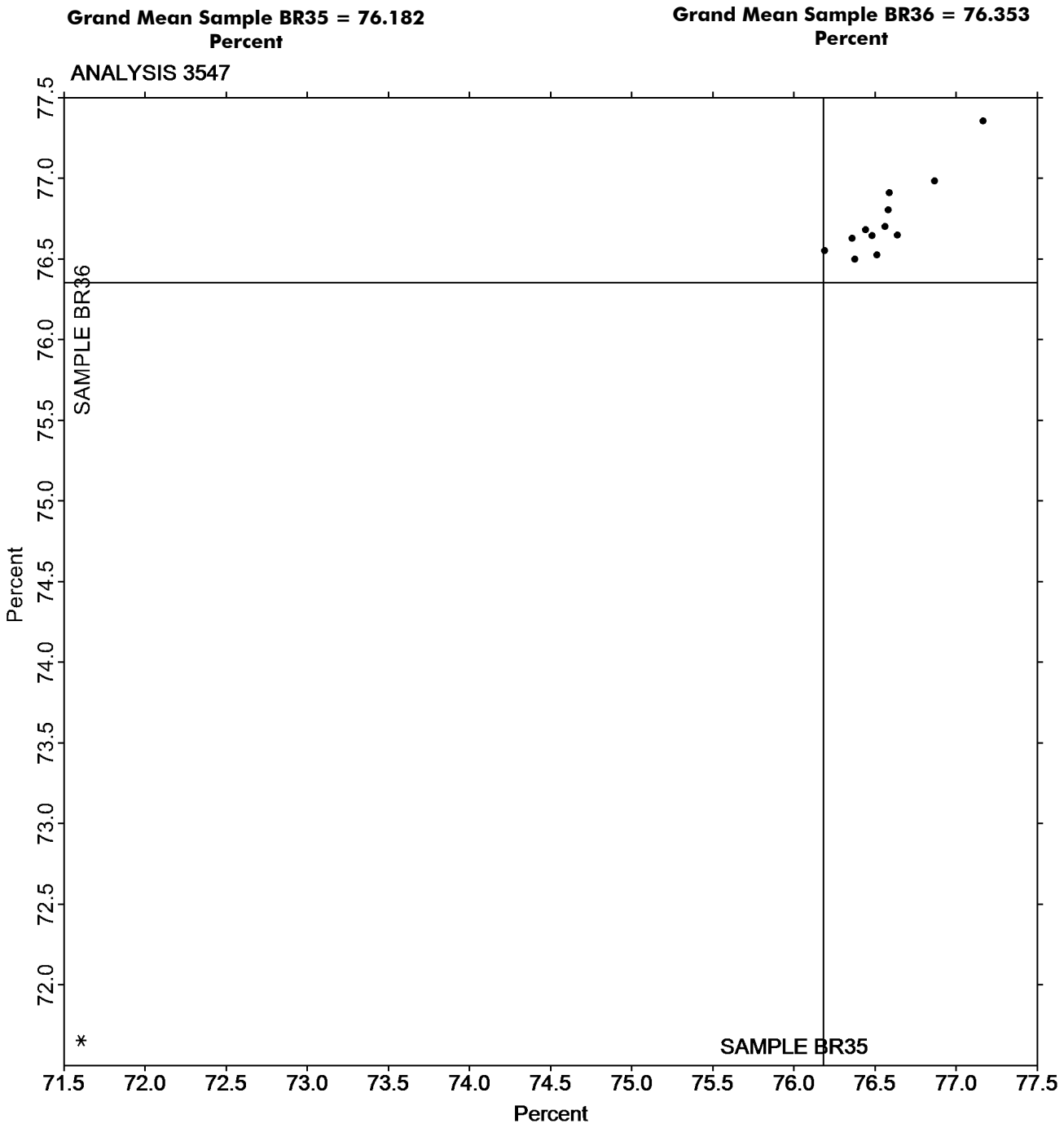
WebCode	Data Flag	Sample BR35 Lab Mean	Sample BR35 Diff from Grand Mean	Sample BR35 CPV	Sample BR36 Lab Mean	Sample BR36 Diff from Grand Mean	Sample BR36 CPV	Instr Code
83XB28		76.38	0.19	0.14	76.50	0.15	0.10	LE
89NLB6		76.58	0.40	0.29	76.80	0.45	0.32	TC
8REYNA	*	71.61	-4.58	-3.28	71.66	-4.70	-3.28	LE
D2KU8F		77.17	0.98	0.70	77.36	1.00	0.70	LT
DDZK97		76.48	0.30	0.21	76.64	0.29	0.20	TD
ETNC9X		76.56	0.38	0.27	76.70	0.35	0.24	TP
EWBWD2		76.51	0.33	0.24	76.53	0.17	0.12	LT
H3382U		76.36	0.18	0.13	76.63	0.28	0.19	EA
KKYE9R		76.59	0.41	0.29	76.91	0.56	0.39	XX
RZ4C8H		76.44	0.26	0.19	76.68	0.33	0.23	LT
VDYWZH		76.19	0.01	0.00	76.55	0.20	0.14	LT
WXZCXK		76.64	0.46	0.33	76.65	0.30	0.21	TC
ZXPH8A		76.87	0.69	0.49	76.98	0.63	0.44	TC

Summary Statistics	Sample BR35	Sample BR36
Grand Means	76.18 Percent	76.35 Percent
Stnd Dev Btwn Labs	1.40 Percent	1.43 Percent

Statistics based on 13 of 13 reporting participants.

Key to Instrument Codes Reported by Participants

EA	Datacolor Elrepho	LE	L & W Elrepho
LT	L & W Elrepho SE 071	TC	Technidyne Color Touch Series
TD	Technidyne Color Touch X	TP	Technidyne Test/Plus
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 #4332, December 2024

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
7GK4BN		**CA35**	86.90	-0.06	0.07	-0.01	0.00	0.02	0.02	XX
		CA36	86.89	-0.06	0.09					
7ZC646		**CA35**	85.01	1.35	-0.68	0.44	-0.22	0.62	0.79	TS
		CA36	85.45	1.13	-0.06					
83XB28		**CA35**	89.51	0.33	-0.45	0.06	-0.05	0.23	0.25	LS
		CA36	89.57	0.28	-0.22					
89NLB6		**CA35**	87.02	0.29	-0.30	-0.10	-0.05	0.11	0.16	TC
		CA36	86.92	0.24	-0.19					
8EP46N		**CA35**	89.70	0.48	-0.35	0.06	0.05	-0.09	0.12	TC
		CA36	89.76	0.53	-0.44					
ACGNT3		**CA35**	87.08	0.63	-0.48	0.03	0.00	-0.07	0.07	HK
		CA36	87.11	0.64	-0.55					
D2KU8F		**CA35**	85.54	1.54	-1.34	0.47	-0.24	0.37	0.64	TS
		CA36	86.01	1.30	-0.97					
DDZK97		**CA35**	89.70	0.25	-0.28	-0.23	0.04	-0.10	0.25	TC
		CA36	89.47	0.29	-0.38					
DM6RM7		**CA35**	88.32	0.86	-1.13	0.26	-0.06	0.33	0.42	TC
		CA36	88.57	0.80	-0.80					
EEQ6E3		**CA35**	89.87	0.22	-0.21	-0.15	-0.02	-0.01	0.15	TC
		CA36	89.73	0.20	-0.22					
EPPZCX		**CA35**	87.52	0.77	-0.75	0.07	0.02	-0.01	0.08	HK
		CA36	87.59	0.79	-0.76					
GG94KW		**CA35**	90.03	0.29	-0.75	0.32	-0.08	0.24	0.40	XX
		CA36	90.34	0.21	-0.51					
KKYE9R		**CA35**	89.70	-0.54	-0.06	0.16	0.01	0.22	0.28	TC
		CA36	89.86	-0.53	0.17					
WXZCXK		**CA35**	87.31	0.82	-0.65	0.25	-0.09	0.33	0.43	HK
		CA36	87.56	0.72	-0.32					
WZ433E		**CA35**	89.54	-0.38	0.07	0.12	-0.02	0.26	0.28	NH
		CA36	89.66	-0.40	0.32					
Y8ZJTB		**CA35**	82.70 *	0.28	-0.31	4.30 X	-0.10	0.27	4.31 X	TC
		CA36	86.99	0.18	-0.04					

Summary Statistics

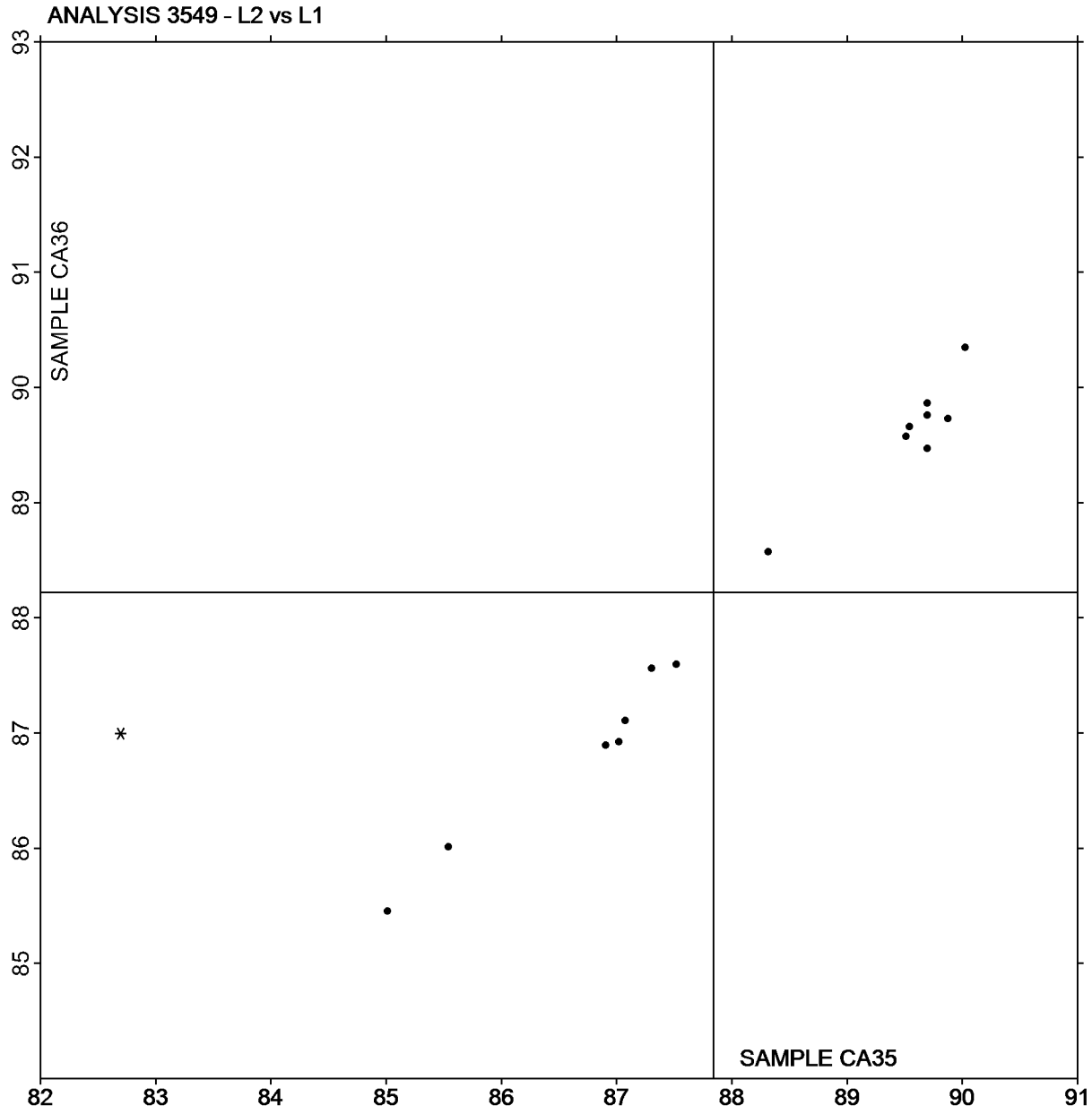
Grand Means							
CA35	87.840	0.446	-0.476	0.378	-0.050	0.170	0.541
CA36	88.219	0.396	-0.306				
Stnd Dev Btwn Labs							
CA35	2.121	0.550	0.396	1.063	0.083	0.202	1.026
CA36	1.570	0.499	0.361				

Statistics based on 16 of 16 reporting participants

Key to Instrument Codes Reported by Participants

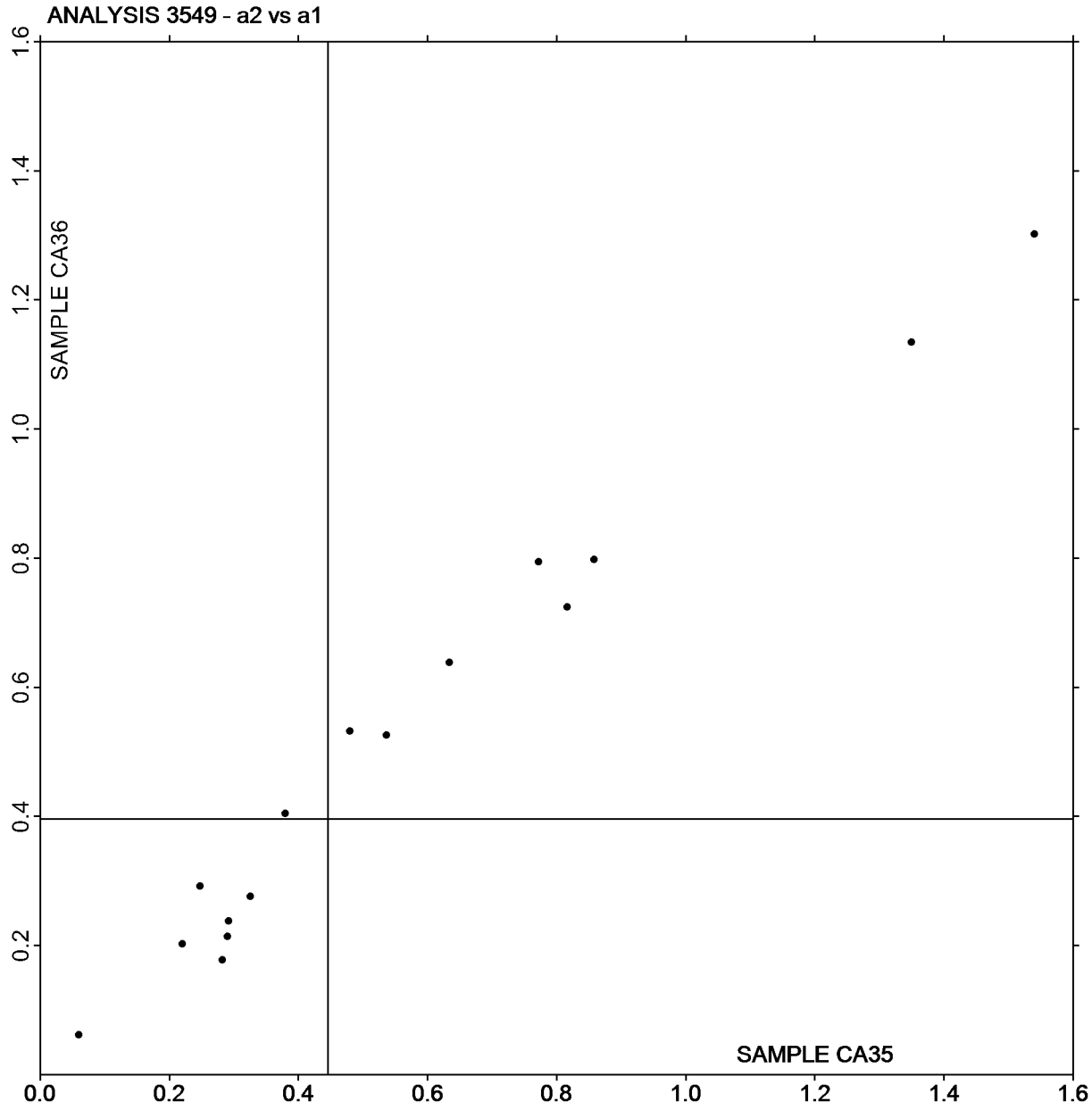
HK	Hunter LabScan XE	LS	L & W Elrepho SE 070
NH	Minolta CM-3700A Spectrophotometer	TC	Technidyne Color Touch Series
TS	Technidyne Brightimeter Micro S-5	XX	Instrument make/model not specified by lab

Plot of L values CA36 vs L values CA35



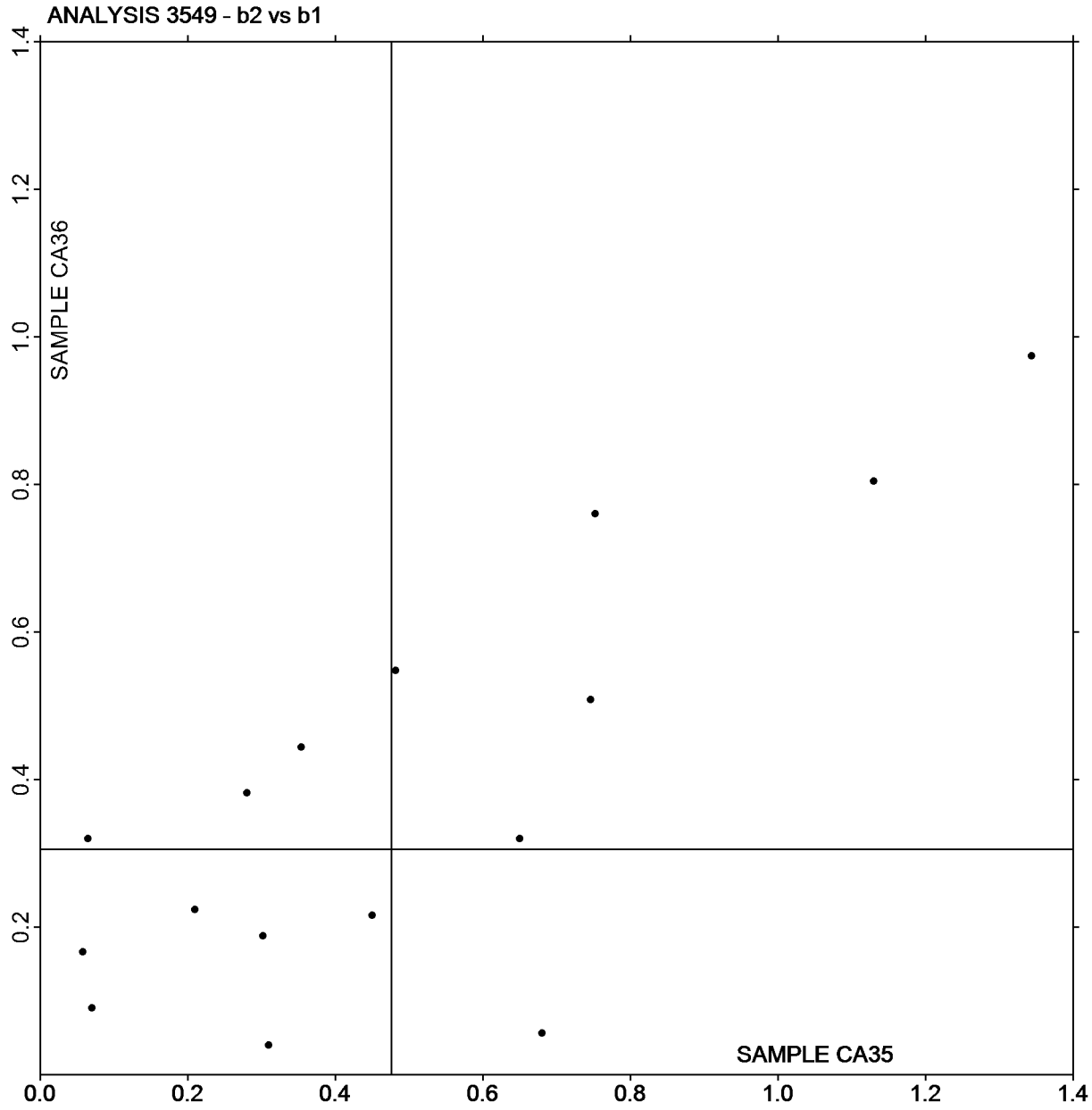
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

Plot of a values CA36 vs a values CA35



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 CA36 vs b values CA35



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

Web Code	Data Flag	Samples	Hunter L, a, b Color Values L	a	b	Color Difference Values ΔL	Δa	Δb	ΔE	Instr Code
6EZRYD		CA35	87.74	-0.52	-0.17	0.35	-0.01	0.23	0.42	HL
		CA36	88.09	-0.54	0.06					
6JVLWE		CA35	90.29	-0.56	-0.13	-0.17	-0.01	-0.08	0.19	XC
		CA36	90.12	-0.57	-0.21					
78WCKP		CA35	89.87	-0.36	0.34	-0.11	-0.04	0.05	0.13	NH
		CA36	89.76	-0.40	0.39					
7UCQJ4		CA35	89.03	-0.60	-0.17	0.19	0.01	0.34	0.39	XC
		CA36	89.22	-0.59	0.16					
EW7EE3		CA35	89.66	-0.54	-0.03	0.20	-0.05	0.28	0.35	XX
		CA36	89.86	-0.59	0.25					
EWBWD2		CA35	89.64	-0.48	0.09	0.07	-0.04	0.20	0.22	LT
		CA36	89.72	-0.51	0.30					
GWHTXW		CA35	89.92	-0.53	0.05	-0.13	-0.01	-0.05	0.14	XX
		CA36	89.78	-0.54	-0.01					
H3382U		CA35	89.85	-0.54	0.19	-0.20	0.00	-0.10	0.23	EG
		CA36	89.64	-0.54	0.09					
LD8VY9		CA35	89.89	-0.50	0.03	-0.11	0.02	-0.23	0.26	TC
		CA36	89.78	-0.48	-0.20					
RZ4C8H		CA35	89.55	-0.56	-0.28	0.21	-0.08	0.28	0.36	LS
		CA36	89.76	-0.63	0.00					
WXZCXK		CA35	86.99	-0.58	-0.10	0.03	0.07	-0.12	0.14	TC
		CA36	87.02	-0.51	-0.22					
YHXK6E		CA35	89.88	-0.32	-0.45	0.42	-0.01	0.25	0.48	NF
		CA36	90.29	-0.32	-0.21					
Z6TNKR		CA35	87.64	-0.25	0.00	-0.18	-0.01	-0.07	0.19	XB
		CA36	87.46	-0.26	-0.06					

Summary Statistics

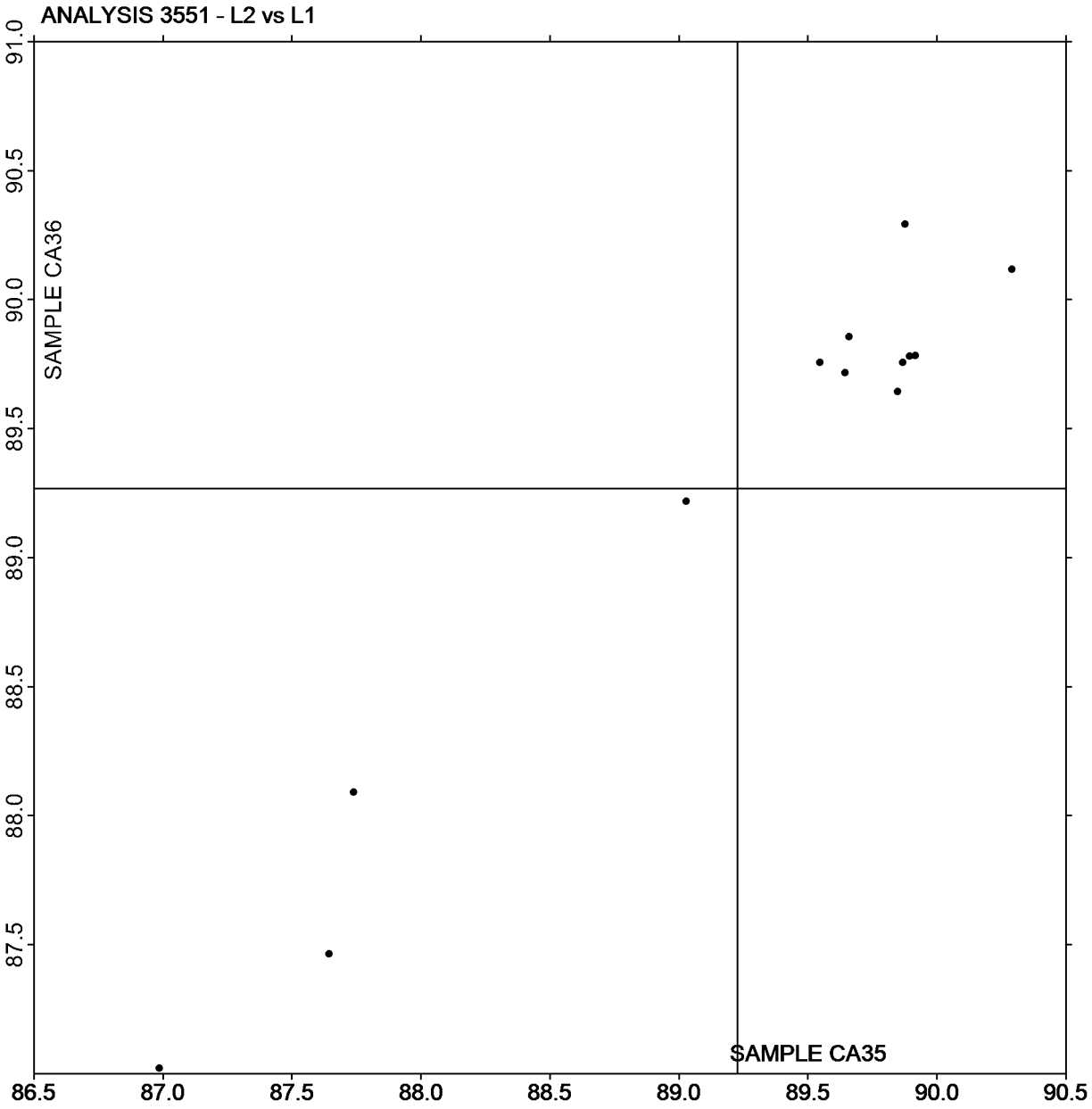
Grand Means							
CA35	89.226	-0.488	-0.049	0.043	-0.012	0.075	0.268
CA36	89.269	-0.500	0.026				
Stnd Dev Btwn Labs							
CA35	1.061	0.109	0.204	0.213	0.036	0.192	0.117
CA36	1.047	0.109	0.207				

Statistics based on 13 of 13 reporting participants

Key to Instrument Codes Reported by Participants

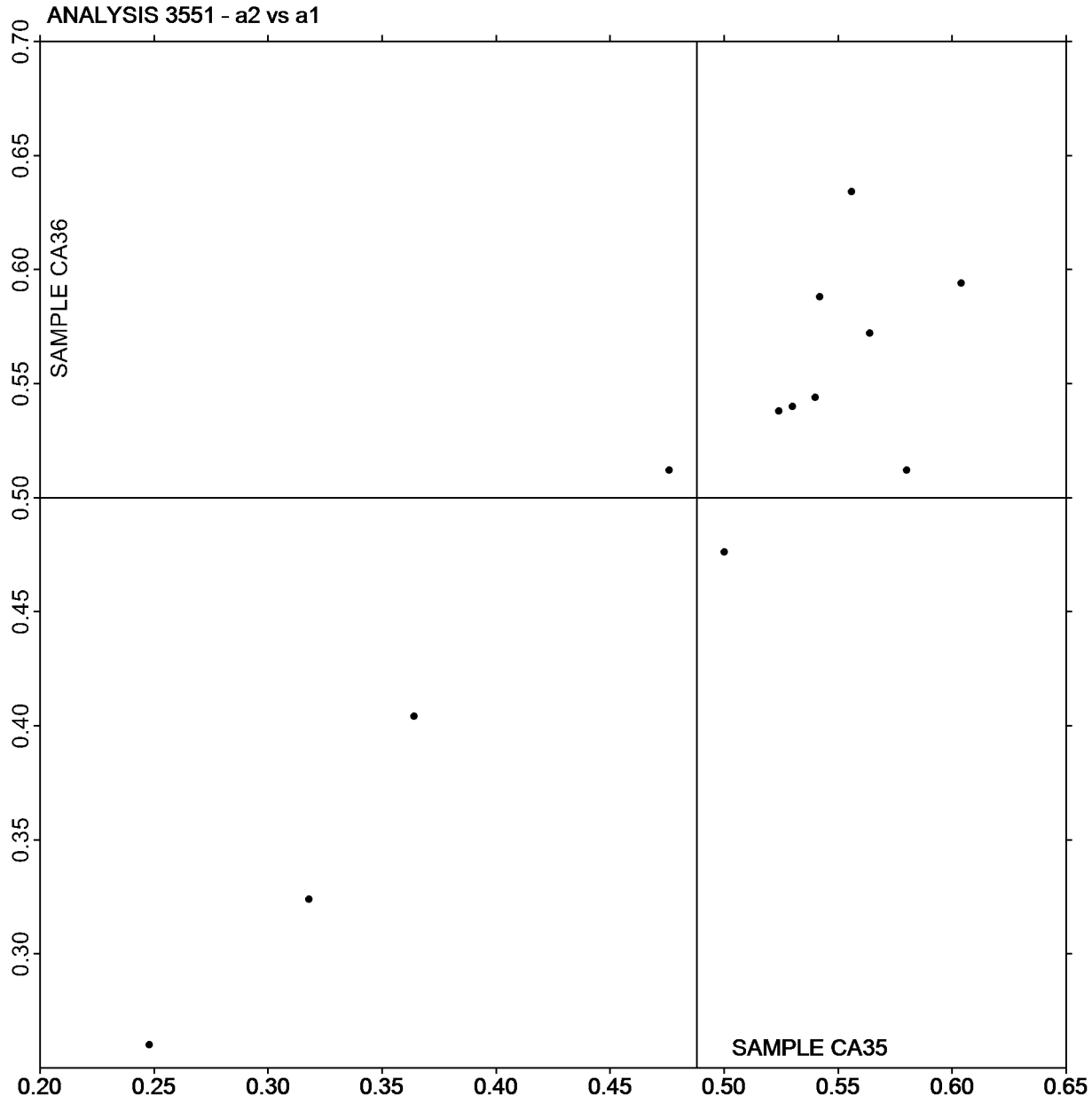
EG	Datacolor Elrepho	HL	Hunter Agera
LS	L & W Elrepho SE 070	LT	L & W Elrepho SE 071
NF	Minolta CM-3600d Spectrophotometer	NH	Minolta CM-3700A Spectrophotometer
TC	Technidyne Color Touch Series	XB	X-Rite Ci7
XC	X-Rite eXact Series	XX	Instrument make/model not specified by lab

Plot of L values CA36 vs L values CA35



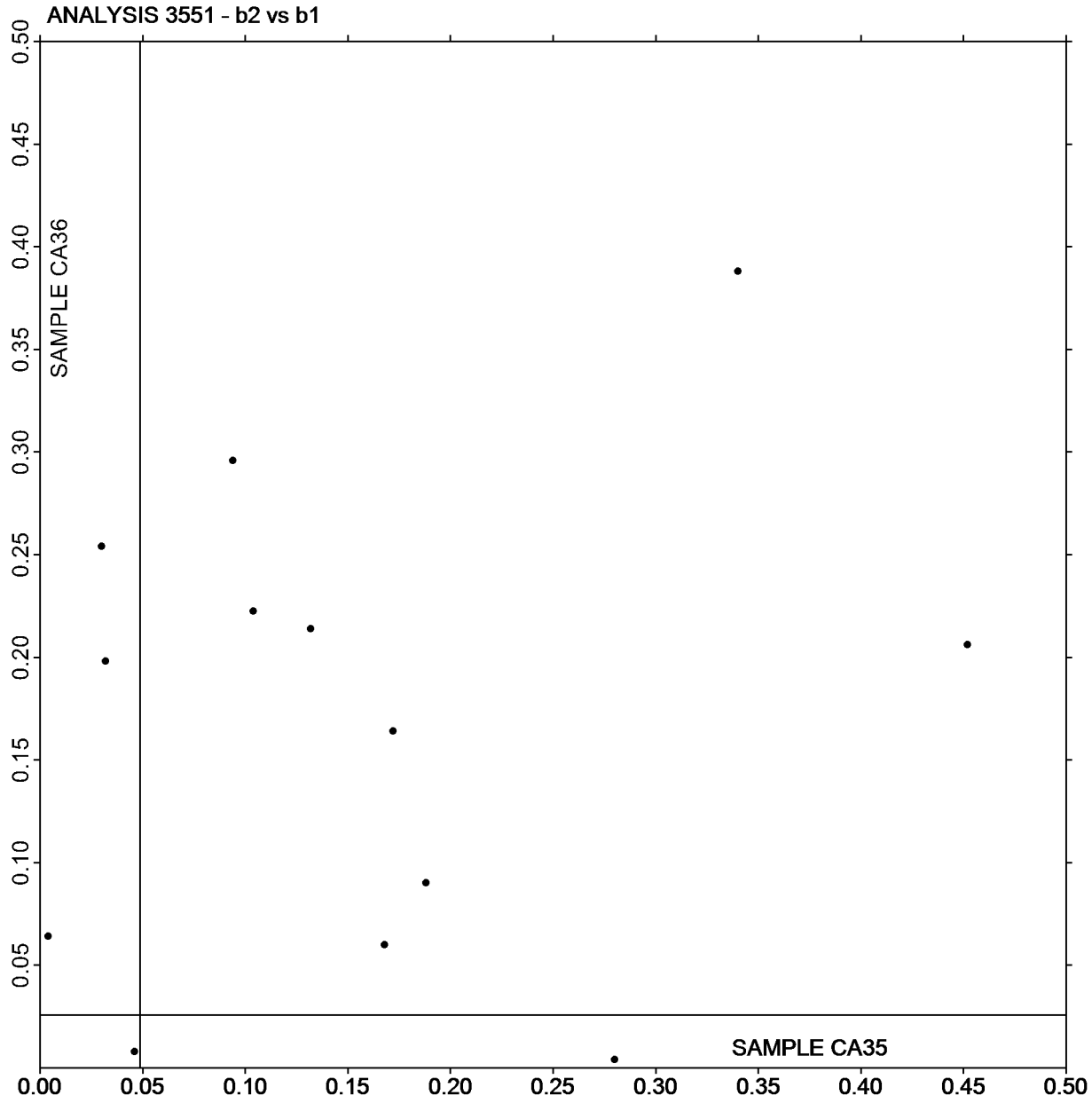
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

Plot of a values CA36 vs a values CA35



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 CA36 vs b values CA35



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 #4332, December 2024

Analysis 3553

Specular Gloss at 75 Degrees - High Range

TAPPI Official Test Method T480

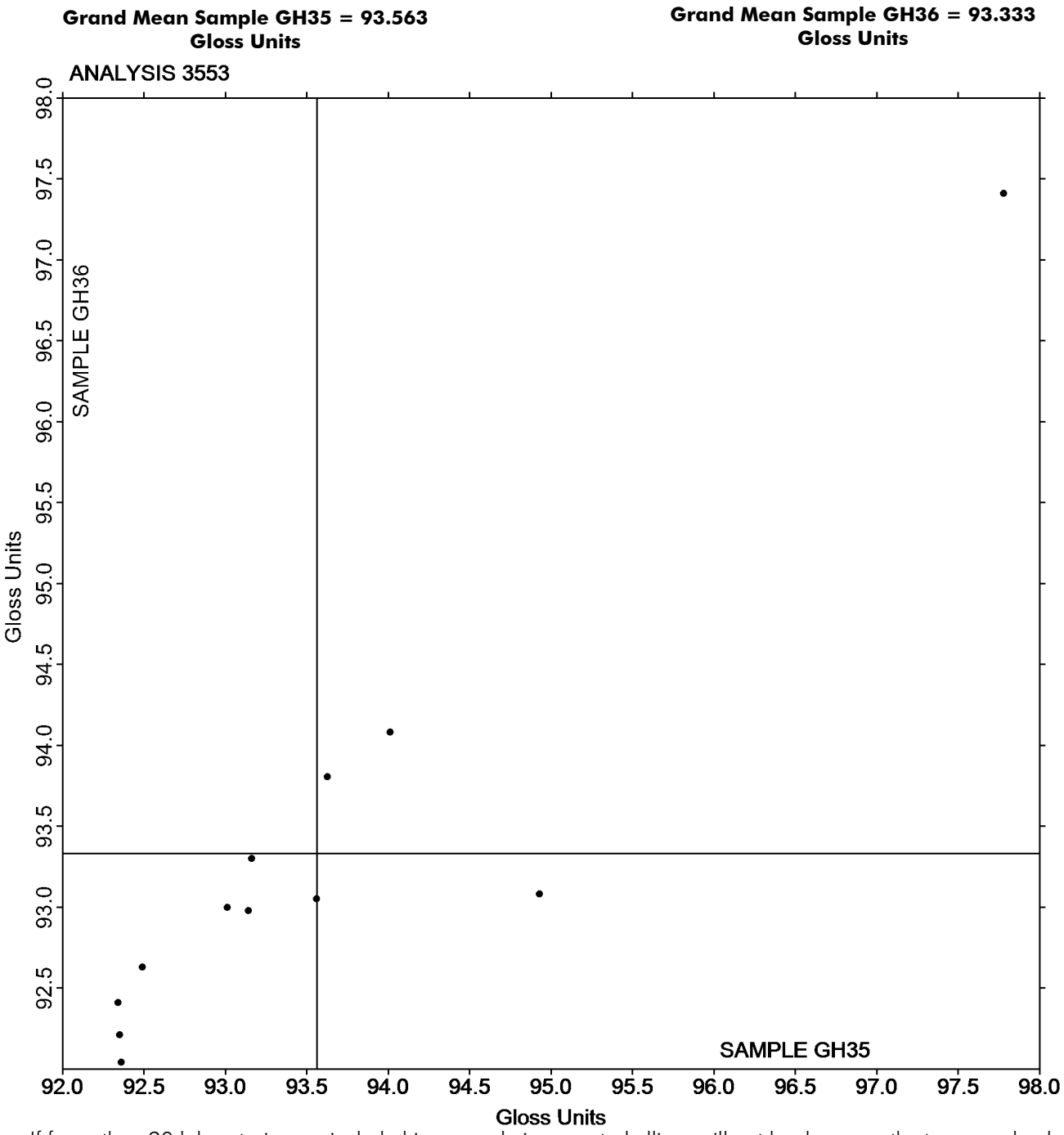
WebCode	Data Flag	Sample GH35 Lab Mean	Sample GH35 Diff from Grand Mean	Sample GH35 CPV	Sample GH36 Lab Mean	Sample GH36 Diff from Grand Mean	Sample GH36 CPV	Instr Code
89NLB6		94.93	1.37	0.89	93.08	-0.25	-0.18	GM
ACGNT3		92.34	-1.22	-0.79	92.41	-0.92	-0.65	TP
DDZK97		92.36	-1.20	-0.78	92.04	-1.29	-0.91	TA
EEQ6E3		93.14	-0.42	-0.27	92.98	-0.35	-0.25	LF
EPPZCX		92.35	-1.21	-0.79	92.21	-1.12	-0.79	PP
EWBWD2		93.01	-0.55	-0.36	93.00	-0.33	-0.24	GA
H3382U		93.56	0.00	0.00	93.05	-0.28	-0.20	TH
HUR7FT		93.16	-0.40	-0.26	93.30	-0.03	-0.02	LG
RK9W8N		97.78	4.22	2.74	97.41	4.08	2.88	LF
VDYWZH		92.49	-1.07	-0.70	92.63	-0.70	-0.50	LW
VULD4E		94.01	0.45	0.29	94.08	0.75	0.53	VM
Y8ZJTB		93.63	0.06	0.04	93.81	0.47	0.33	PP

Summary Statistics	Sample GH35	Sample GH36
Grand Means	93.56 Gloss Units	93.33 Gloss Units
Stnd Dev Btwn Labs	1.54 Gloss Units	1.42 Gloss Units

Statistics based on 12 of 12 reporting participants.

Key to Instrument Codes Reported by Participants

GA	BYK-Gardner (model not specified)	GM	BYK-Gardner micro-gloss
LF	L & W Autoline 400	LG	L & W Autoline 600
LW	L & W Gloss Tester	PP	Technidyne Profile/Plus
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 #4332, December 2024

Analysis 3555

Specular Gloss at 75 Degrees - Low Range

TAPPI Official Test Method T480

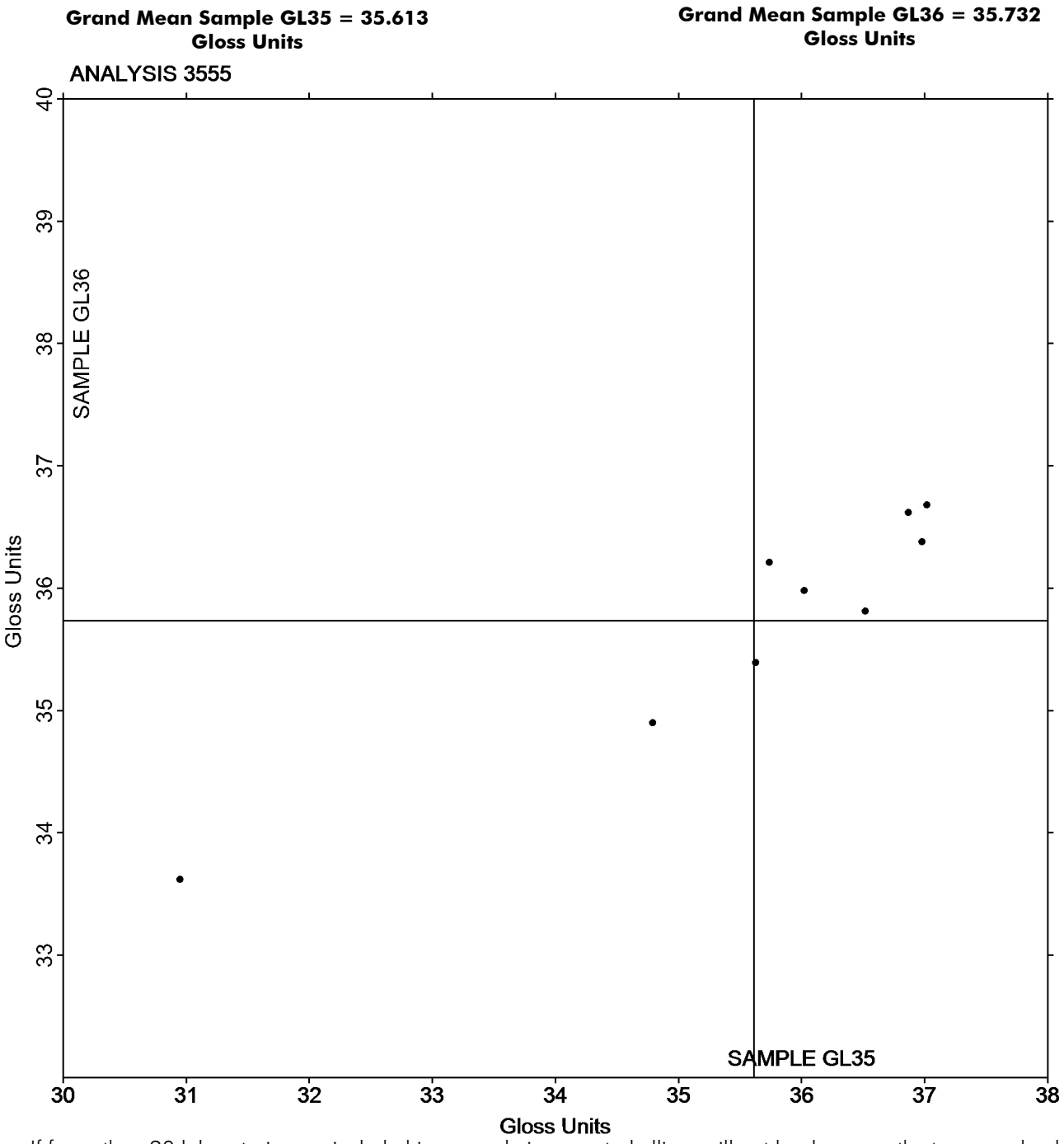
WebCode	Data Flag	Sample GL35 Lab Mean	Sample GL35 Diff from Grand Mean	Sample GL35 CPV	Sample GL36 Lab Mean	Sample GL36 Diff from Grand Mean	Sample GL36 CPV	Instr Code
4PFNXP		34.79	-0.82	-0.43	34.90	-0.83	-0.85	GS
7ZC646		36.52	0.91	0.48	35.81	0.08	0.08	TP
8KH2Z7		35.74	0.13	0.07	36.21	0.48	0.49	WJ
DDZK97		30.95	-4.66	-2.46	33.62	-2.11	-2.16	TA
L2VLFP		36.87	1.26	0.66	36.62	0.89	0.91	TH
VDYWZH		36.02	0.41	0.21	35.98	0.25	0.25	LW
WBNCPM		35.63	0.02	0.01	35.39	-0.34	-0.35	GM
WXZCXK		37.02	1.41	0.74	36.68	0.95	0.97	PP
Z6TNKR		36.98	1.37	0.72	36.38	0.65	0.66	TH

Summary Statistics	Sample GL35	Sample GL36
Grand Means	35.61 Gloss Units	35.73 Gloss Units
Stnd Dev Btwn Labs	1.90 Gloss Units	0.98 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	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

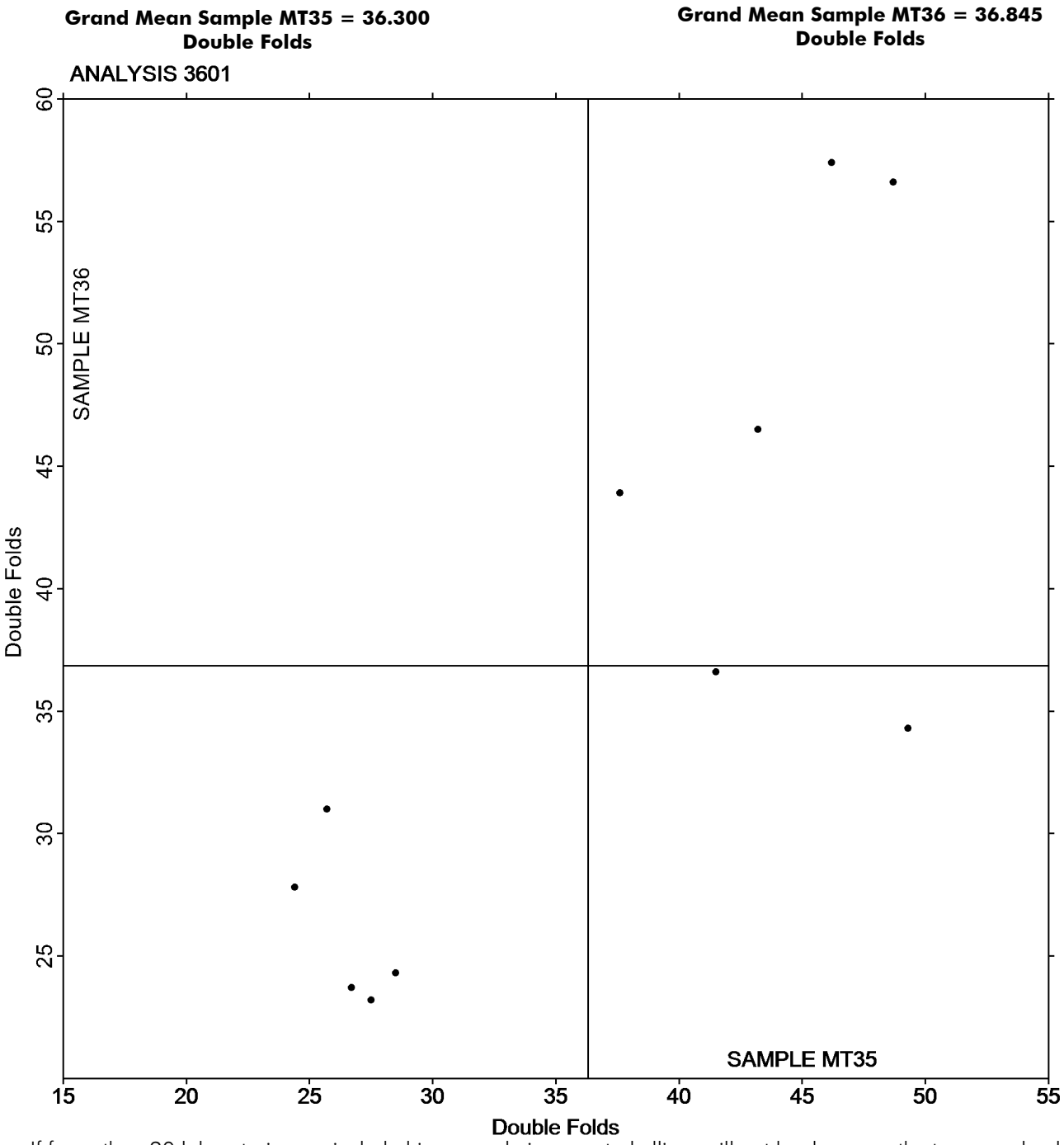
WebCode	Data Flag	Sample MT35 Lab Mean	Sample MT35 Diff from Grand Mean	Sample MT35 CPV	Sample MT36 Lab Mean	Sample MT36 Diff from Grand Mean	Sample MT36 CPV	Instr Code
7CRYJ6		49.30	13.00	1.31	34.30	-2.55	-0.20	XX
EB4L9X		43.20	6.90	0.70	46.50	9.65	0.76	MT
EWBWD2		26.70	-9.60	-0.97	23.70	-13.15	-1.04	MT
GWHTXW		27.50	-8.80	-0.89	23.20	-13.65	-1.08	XX
H3382U		48.70	12.40	1.25	56.60	19.75	1.56	MT
L2VLFP		25.70	-10.60	-1.07	31.00	-5.85	-0.46	MT
NDLX3L		24.40	-11.90	-1.20	27.80	-9.05	-0.72	MT
VULD4E		28.50	-7.80	-0.79	24.30	-12.55	-0.99	MT
X2E6ND		41.50	5.20	0.52	36.60	-0.25	-0.02	MT
XAAAHE		46.20	9.90	1.00	57.40	20.55	1.63	MT
Z6TNKR		37.60	1.30	0.13	43.90	7.05	0.56	MT

Summary Statistics	Sample MT35	Sample MT36
Grand Means	36.30 Double Folds	36.85 Double Folds
Stnd Dev Btwn Labs	9.91 Double Folds	12.63 Double Folds

Statistics based on 11 of 11 reporting participants.

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 BG35 Lab Mean	Sample BG35 Diff from Grand Mean	Sample BG35 CPV	Sample BG36 Lab Mean	Sample BG36 Diff from Grand Mean	Sample BG36 CPV	Instr Code
3CLF6Q		126.5	6.6	0.30	135.4	16.8	0.77	ZZ
6EZRYD		112.3	-7.6	-0.34	117.7	-1.0	-0.05	ZZ
78WCKP		132.5	12.6	0.56	127.8	9.2	0.42	ZZ
7UCQJ4		82.3	-37.6	-1.68	77.8	-40.9	-1.87	ZZ
CEGGZ7		120.5	0.6	0.03	119.9	1.2	0.06	ZZ
EB4L9X		113.2	-6.7	-0.30	111.9	-6.8	-0.31	ZZ
L2VLFP		161.4	41.5	1.85	146.7	28.0	1.28	ZZ
LXHG4N		142.1	22.2	0.99	142.0	23.4	1.07	ZZ
PRGLP7		117.9	-2.0	-0.09	115.9	-2.7	-0.13	ZZ
VULD4E		75.4	-44.5	-1.98	72.5	-46.2	-2.11	ZZ
WZ433E	X	4.3	-115.6	-5.15	4.8	-113.9	-5.21	ZZ
X2E6ND		120.1	0.2	0.01	119.1	0.4	0.02	ZZ
Z6TNKR		129.7	9.8	0.44	127.0	8.3	0.38	ZZ
ZXPH8A		124.8	4.9	0.22	129.0	10.3	0.47	ZZ

Summary Statistics	Sample BG35	Sample BG36
Grand Means	119.89 Gurley Units	118.67 Gurley Units
Stnd Dev Btwn Labs	22.43 Gurley Units	21.85 Gurley Units

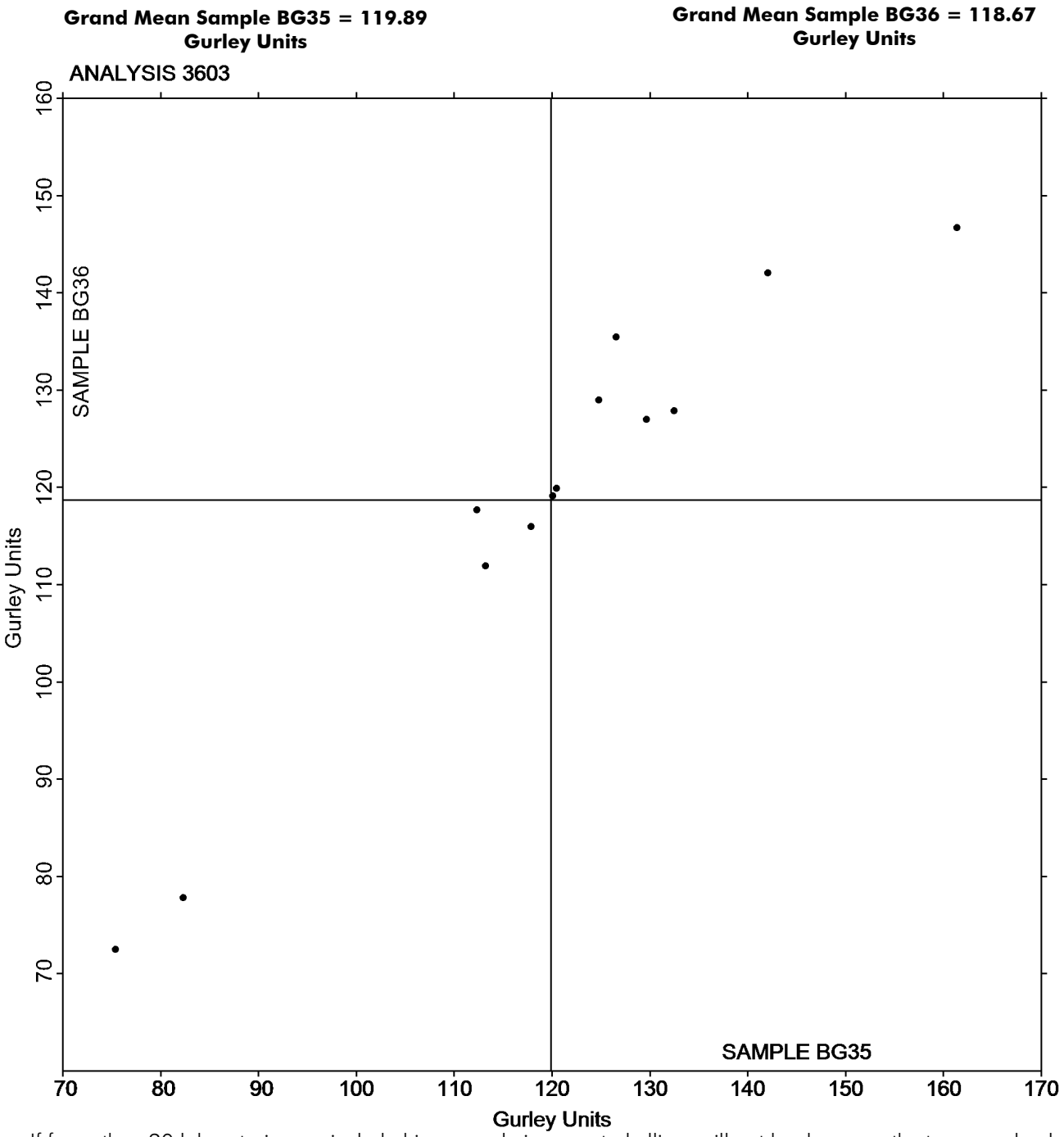
Statistics based on 13 of 14 reporting participants.

Comments on Assigned Data Flags for Test #3603

WZ433E (X) - Data for both samples are low.

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

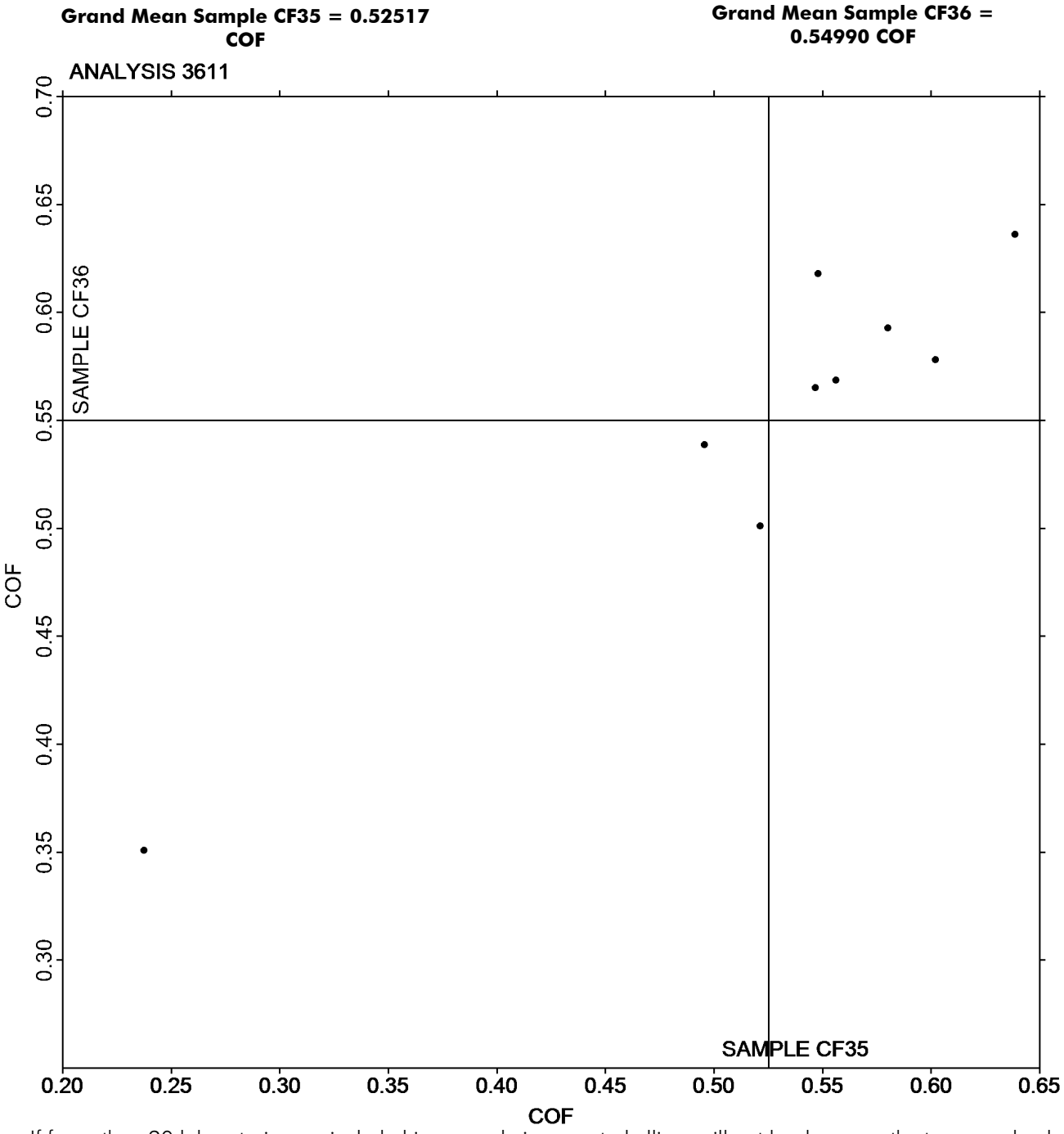
WebCode	Data Flag	Sample CF35 Lab Mean	Sample CF35 Diff from Grand Mean	Sample CF35 CPV	Sample CF36 Lab Mean	Sample CF36 Diff from Grand Mean	Sample CF36 CPV	Instr Code
3CLF6Q		0.6020	0.0768	0.66	0.5780	0.0281	0.33	TA
78WCKP		0.5480	0.0228	0.20	0.6180	0.0681	0.80	TP
7ZC646		0.5802	0.0550	0.48	0.5928	0.0429	0.51	TA
D2KU8F		0.5562	0.0310	0.27	0.5686	0.0187	0.22	TA
EB4L9X		0.6386	0.1134	0.98	0.6362	0.0863	1.02	TA
GG94KW		0.5214	-0.0038	-0.03	0.5010	-0.0489	-0.58	XX
MPFUPU		0.4957	-0.0294	-0.25	0.5387	-0.0112	-0.13	TN
NDLX3L		0.5468	0.0216	0.19	0.5650	0.0151	0.18	TM
WZ433E		0.2376	-0.2876	-2.48	0.3508	-0.1991	-2.35	TX

Summary Statistics	Sample CF35	Sample CF36
Grand Means	0.53 COF	0.55 COF
Stnd Dev Btwn Labs	0.12 COF	0.08 COF

Statistics based on 9 of 9 reporting participants.

Key to Instrument Codes Reported by Participants

TA	Thwing-Albert Friction Tester	TM	TMI 32-06 Monitor/Slip and Friction
TN	TMI 32-07 Monitor/Slip and Friction	TP	TMI 32-25 COF Tester (Inclined Plane)
TX	TMI (model not specified)	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

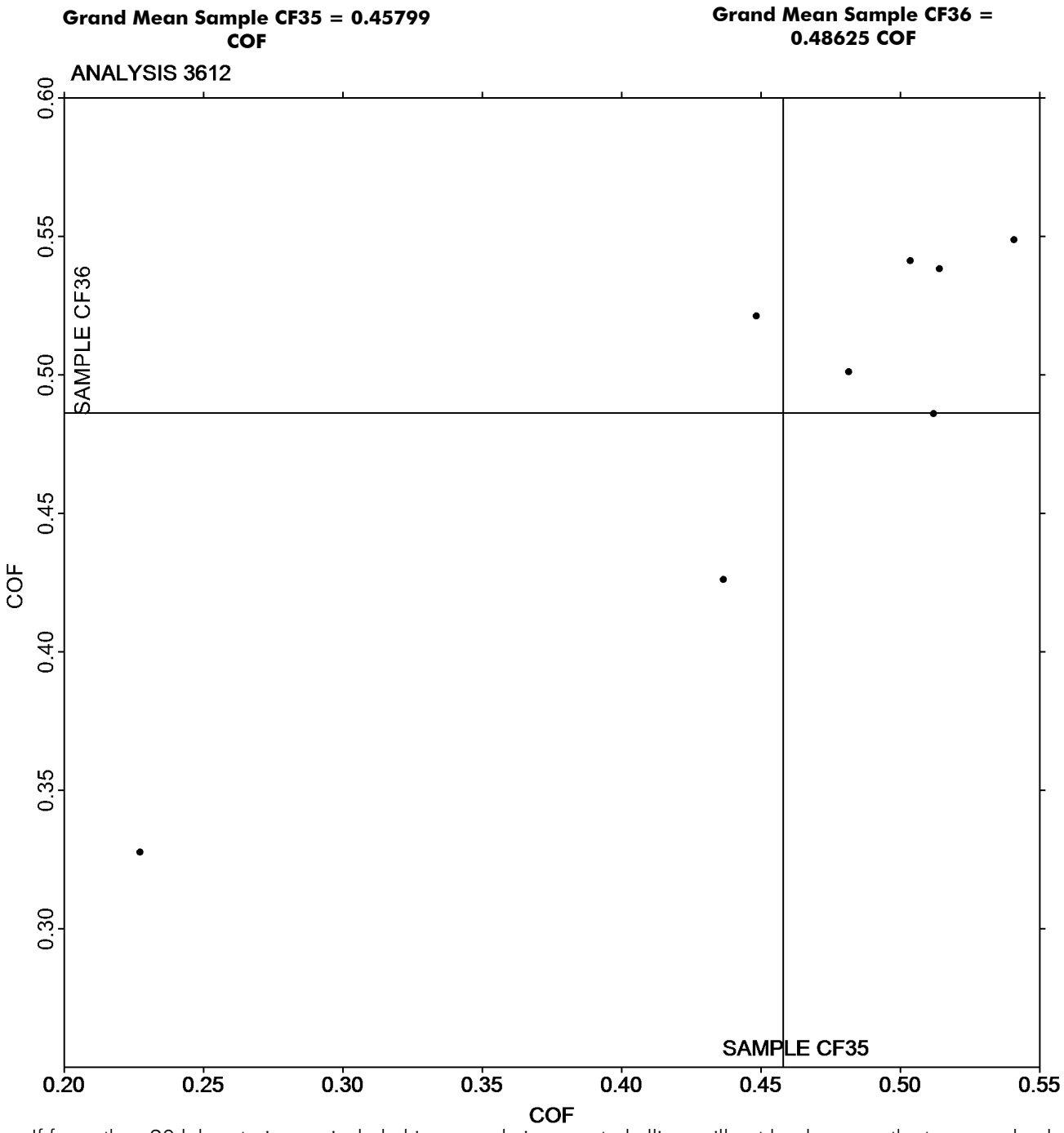
WebCode	Data Flag	Sample CF35 Lab Mean	Sample CF35 Diff from Grand Mean	Sample CF35 CPV	Sample CF36 Lab Mean	Sample CF36 Diff from Grand Mean	Sample CF36 CPV	Instr Code
3CLF6Q		0.5120	0.0540	0.54	0.4860	-0.0002	0.00	TA
7ZC646		0.5140	0.0560	0.56	0.5382	0.0520	0.69	TA
D2KU8F		0.5408	0.0828	0.83	0.5488	0.0626	0.83	TA
EB4L9X		0.4814	0.0234	0.24	0.5010	0.0148	0.20	TA
GG94KW		0.4366	-0.0214	-0.21	0.4260	-0.0602	-0.80	XX
MPFUPU		0.4483	-0.0097	-0.10	0.5212	0.0349	0.46	TN
NDLX3L		0.5036	0.0456	0.46	0.5412	0.0550	0.73	TM
WZ433E		0.2272	-0.2308	-2.32	0.3276	-0.1586	-2.10	TX

Summary Statistics	Sample CF35	Sample CF36
Grand Means	0.46 COF	0.49 COF
Stnd Dev Btwn Labs	0.10 COF	0.08 COF

Statistics based on 8 of 8 reporting participants.

Key to Instrument Codes Reported by Participants

TA	Thwing-Albert Friction Tester	TM	TMI 32-06 Monitor/Slip and Friction
TN	TMI 32-07 Monitor/Slip and Friction	TX	TMI (model not specified)
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 MC35 Lab Mean	Sample MC35 Diff from Grand Mean	Sample MC35 CPV	Sample MC36 Lab Mean	Sample MC36 Diff from Grand Mean	Sample MC36 CPV	Instr Code
3CLF6Q		4.869	0.084	0.15	4.934	0.203	0.33	ZZ
3LQMMC		4.607	-0.178	-0.31	4.607	-0.124	-0.20	ZZ
83XB28		4.203	-0.582	-1.02	4.245	-0.486	-0.79	ZZ
8KH2Z7	M	4.238	-0.547	-0.96	No data reported for this sample			ZZ
BJVWRH		4.880	0.095	0.17	3.970	-0.761	-1.23	ZZ
CRZ7TG		4.880	0.095	0.17	5.370	0.639	1.03	ZZ
N2RNB7		5.273	0.488	0.86	5.577	0.846	1.37	ZZ
PRGLP7		4.464	-0.321	-0.56	4.472	-0.259	-0.42	ZZ
TZJ3P2		4.856	0.071	0.13	4.959	0.228	0.37	ZZ
X2E6ND		6.108	1.323	2.32	5.573	0.842	1.36	ZZ
YHXK6E		4.540	-0.245	-0.43	4.590	-0.141	-0.23	ZZ
ZKG2RR		3.952	-0.833	-1.46	3.743	-0.988	-1.60	ZZ

Summary Statistics	Sample MC35	Sample MC36
Grand Means	4.78 Percent	4.73 Percent
Stnd Dev Btwn Labs	0.57 Percent	0.62 Percent

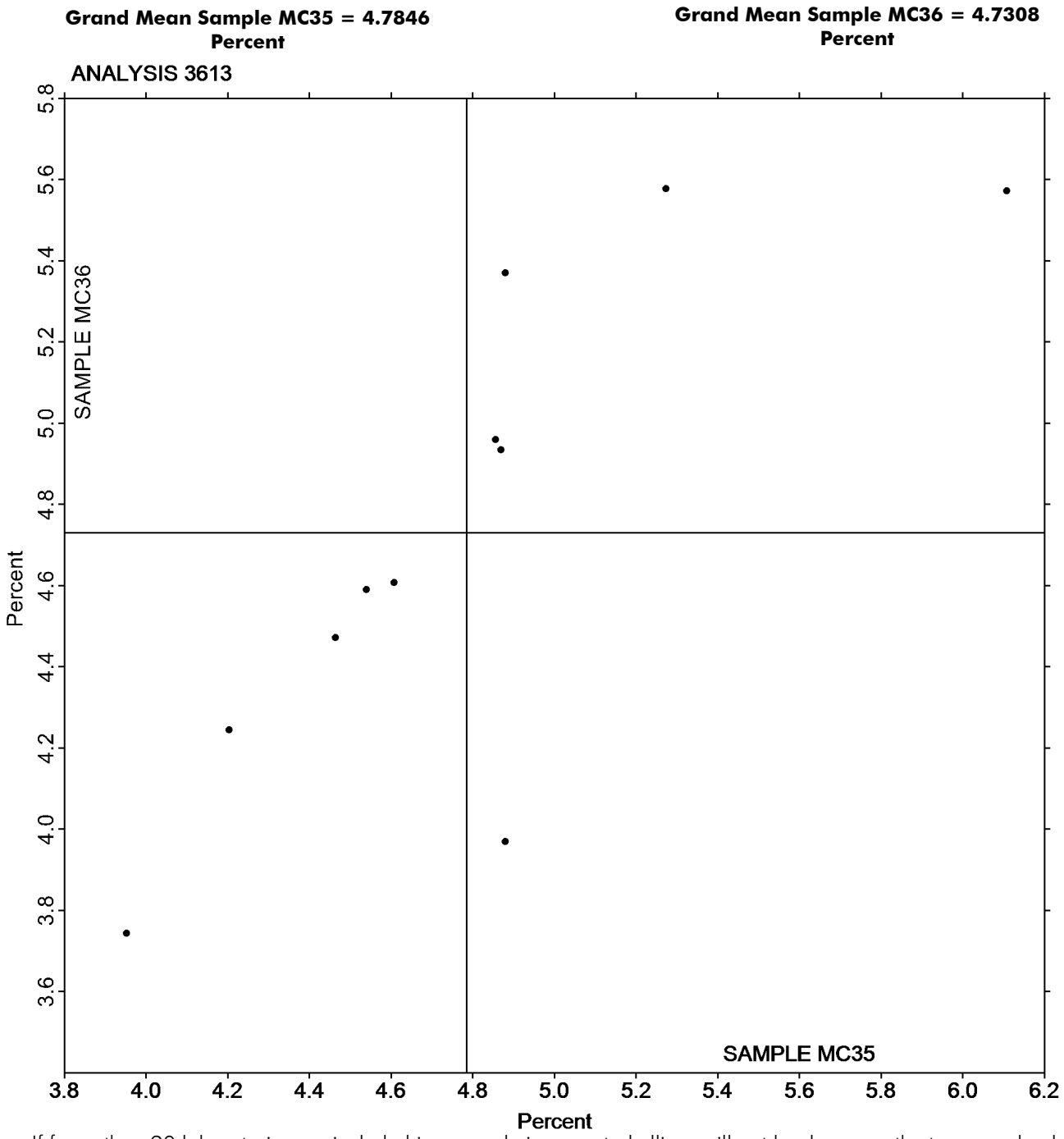
Statistics based on 11 of 12 reporting participants.

Comments on Assigned Data Flags for Test #3613

8KH2Z7 (M) - Participant did not submit data for sample MC36.

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 HS35 Lab Mean	Sample HS35 Diff from Grand Mean	Sample HS35 CPV	Sample HS36 Lab Mean	Sample HS36 Diff from Grand Mean	Sample HS36 CPV	Instr Code
3CLF6Q		57.71	3.55	0.11	45.86	-5.86	-0.19	HE
6EZRYD		100.61	46.45	1.47	103.69	51.97	1.72	HE
6JVLWE		21.88	-32.28	-1.02	17.97	-33.75	-1.12	HE
6RQLB7		46.90	-7.26	-0.23	42.80	-8.92	-0.30	HE
78WCKP		20.90	-33.26	-1.05	19.80	-31.92	-1.06	HE
7UCQJ4		51.80	-2.36	-0.07	51.80	0.08	0.00	HE
7ZC646		78.46	24.30	0.77	74.15	22.43	0.74	HE
8EP46N		12.73	-41.43	-1.31	11.76	-39.96	-1.32	HE
9KC8TK		19.87	-34.29	-1.09	19.26	-32.46	-1.08	HE
D2KU8F		18.88	-35.28	-1.12	17.93	-33.79	-1.12	HE
EEQ6E3		80.80	26.64	0.84	80.00	28.28	0.94	HE
EHNNF2		40.58	-13.58	-0.43	35.94	-15.78	-0.52	HE
LD8VY9		112.92	58.76	1.86	104.02	52.30	1.73	HE
LXHG4N		89.04	34.88	1.10	78.59	26.87	0.89	XX
QTBJLJ		36.56	-17.60	-0.56	34.29	-17.43	-0.58	HE
R4KG4R		50.20	-3.96	-0.13	55.40	3.68	0.12	HE
VULD4E		18.20	-35.96	-1.14	17.60	-34.12	-1.13	HE
WBNCPM		73.84	19.68	0.62	74.40	22.68	0.75	HE
WZ433E		49.60	-4.56	-0.14	58.80	7.08	0.23	HE
ZXPH8A		101.80	47.64	1.51	90.36	38.64	1.28	HE

Summary Statistics	Sample HS35	Sample HS36
Grand Means	54.16 Seconds	51.72 Seconds
Stnd Dev Btwn Labs	31.59 Seconds	30.19 Seconds

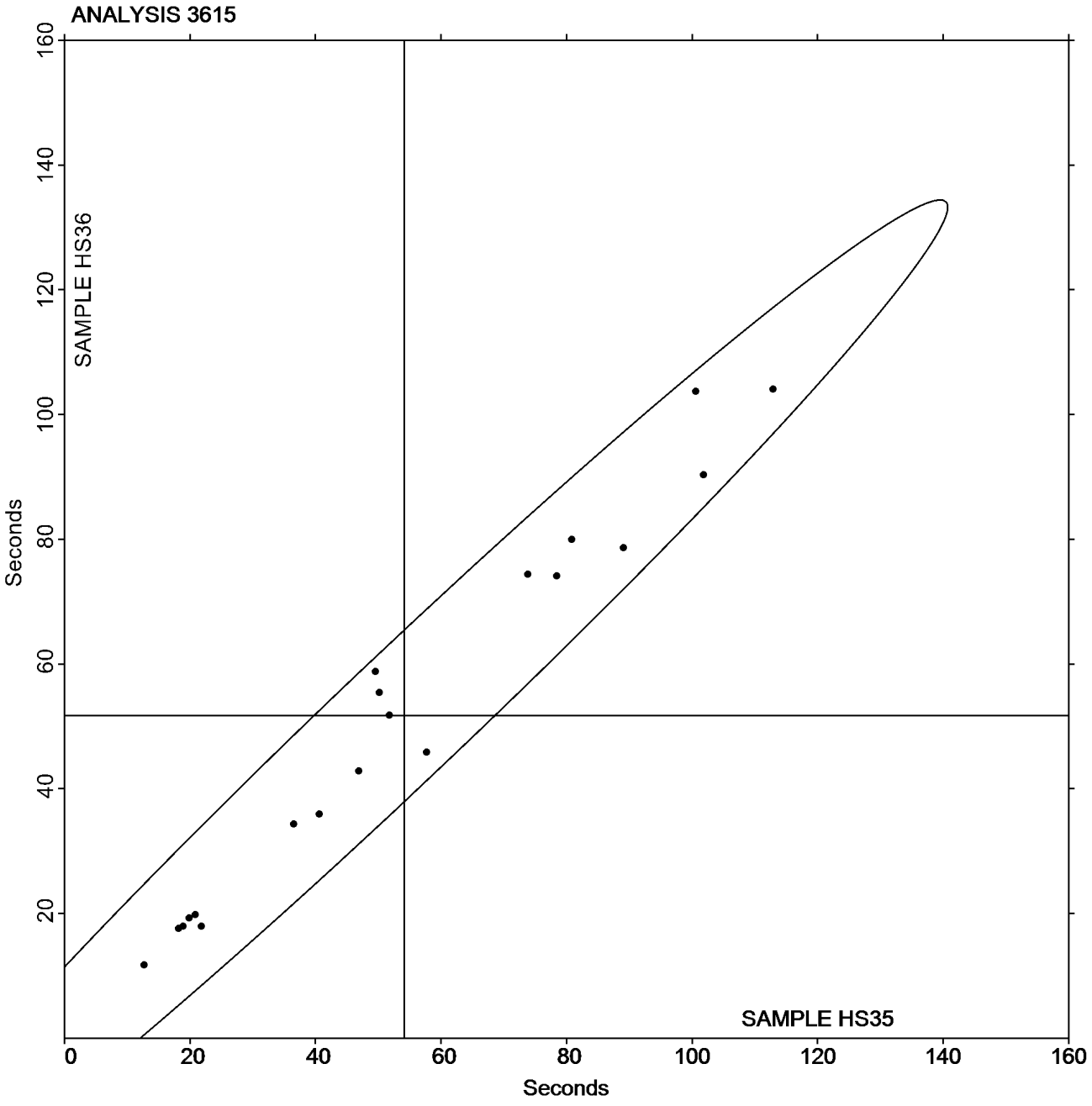
Statistics based on 20 of 20 reporting participants.

Key to Instrument Codes Reported by Participants

HE	Hercules Sizing Tester	XX	Instrument make/model not specified by lab

Grand Mean Sample HS35 = 54.164 Seconds

Grand Mean Sample HS36 = 51.721 Seconds



-End of Report-