Collaborative Testing Services, Inc.

Paper & Paperboard Testing Program

Summary Report #4351 - March 2025

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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 3101

Thickness (Caliper), Printing papers

TAPPI Official Test Method T411

WebCode	Data Flag	Sample CP39 Lab Mean	Sample CP39 Diff from Grand Mean	Sample CP39 CPV	Sample CP40 Lab Mean	Sample CP40 Diff from Grand Mean	Sample CP40 CPV	Instr Code
2APC6K		3.996	0.004	0.06	4.003	0.020	0.25	EM
2FV722		3.949	-0.043	-0.56	3.974	-0.009	-0.10	EM
2HY2HJ		4.086	0.095	1.24	4.117	0.134	1.64	LW
2WWD9V		3.986	-0.006	-0.07	3.956	-0.027	-0.32	EM
3PD66C		4.061	0.069	0.91	4.018	0.035	0.43	TA
3TV8CG		4.062	0.070	0.92	4.032	0.050	0.61	MS
6FGGGR		3.944	-0.048	-0.62	3.908	-0.075	-0.91	EM
6XJQ8W	*	3.836	-0.156	-2.04	3.772	-0.211	-2.57	TM
9TWB7U	X	4.391	0.399	5.24	4.373	0.390	4.77	TA
9WBQX7		3.996	0.004	0.06	4.000	0.017	0.21	TA
BJELH6		4.069	0.077	1.01	4.080	0.098	1.19	TM
BTNFRK		4.007	0.015	0.20	4.027	0.044	0.54	EM
CFEPAQ		4.050	0.058	0.77	3.990	0.007	0.09	PP
CK47N2		3.900	-0.092	-1.20	3.888	-0.095	-1.16	TA
CYPLR2		4.013	0.021	0.28	4.036	0.053	0.65	PP
E7HDDZ		4.027	0.035	0.46	3.966	-0.017	-0.20	EM
F8AU33		4.060	0.068	0.90	4.070	0.087	1.07	EM
GKUT9U		3.876	-0.116	-1.52	3.909	-0.074	-0.90	PP
HA6LNV		3.938	-0.054	-0.70	3.956	-0.027	-0.32	TA
HUYZNU		3.973	-0.019	-0.24	3.955	-0.028	-0.34	EM
J6Q7WJ		3.949	-0.043	-0.56	3.941	-0.042	-0.51	TM
JLVDAZ		4.104	0.112	1.47	4.074	0.091	1.12	PP
KXPE2U		3.979	-0.012	-0.16	3.985	0.003	0.03	EM
LENQ8A		4.004	0.012	0.16	4.012	0.029	0.36	TM
MDRUZR		3.998	0.006	0.08	4.005	0.022	0.27	LB
NHKGL8		3.971	-0.021	-0.27	3.915	-0.068	-0.83	PP
NWYJQU	*	4.196	0.204	2.68	4.186	0.203	2.49	TM
QWVGDV		4.022	0.030	0.40	3.997	0.014	0.18	PP
RCK4WT		3.921	-0.071	-0.93	3.971	-0.012	-0.14	LA
RMNLP4		4.043	0.052	0.68	4.012	0.029	0.36	PP
TCF749		3.853	-0.139	-1.82	3.833	-0.149	-1.83	LW
TMFE8K		3.881	-0.110	-1.44	3.902	-0.080	-0.98	LW
W2LYWE		3.894	-0.098	-1.28	3.831	-0.152	-1.86	MS
X92ZRH		4.036	0.044	0.58	4.014	0.031	0.38	LW
Z2C44J		3.999	0.008	0.10	4.006	0.023	0.28	LW
Z8JPRF		4.026	0.035	0.46	4.050	0.067	0.82	LW

Summary Statistics	Sample CP39	Sample CP40
Grand Means	3.99 mils	3.98 mils
Stnd Dev Btwn Labs	0.08 mils	0.08 mils

Statistics based on 35 of 36 reporting participants.

Comments on Assigned Data Flags for Test #3101

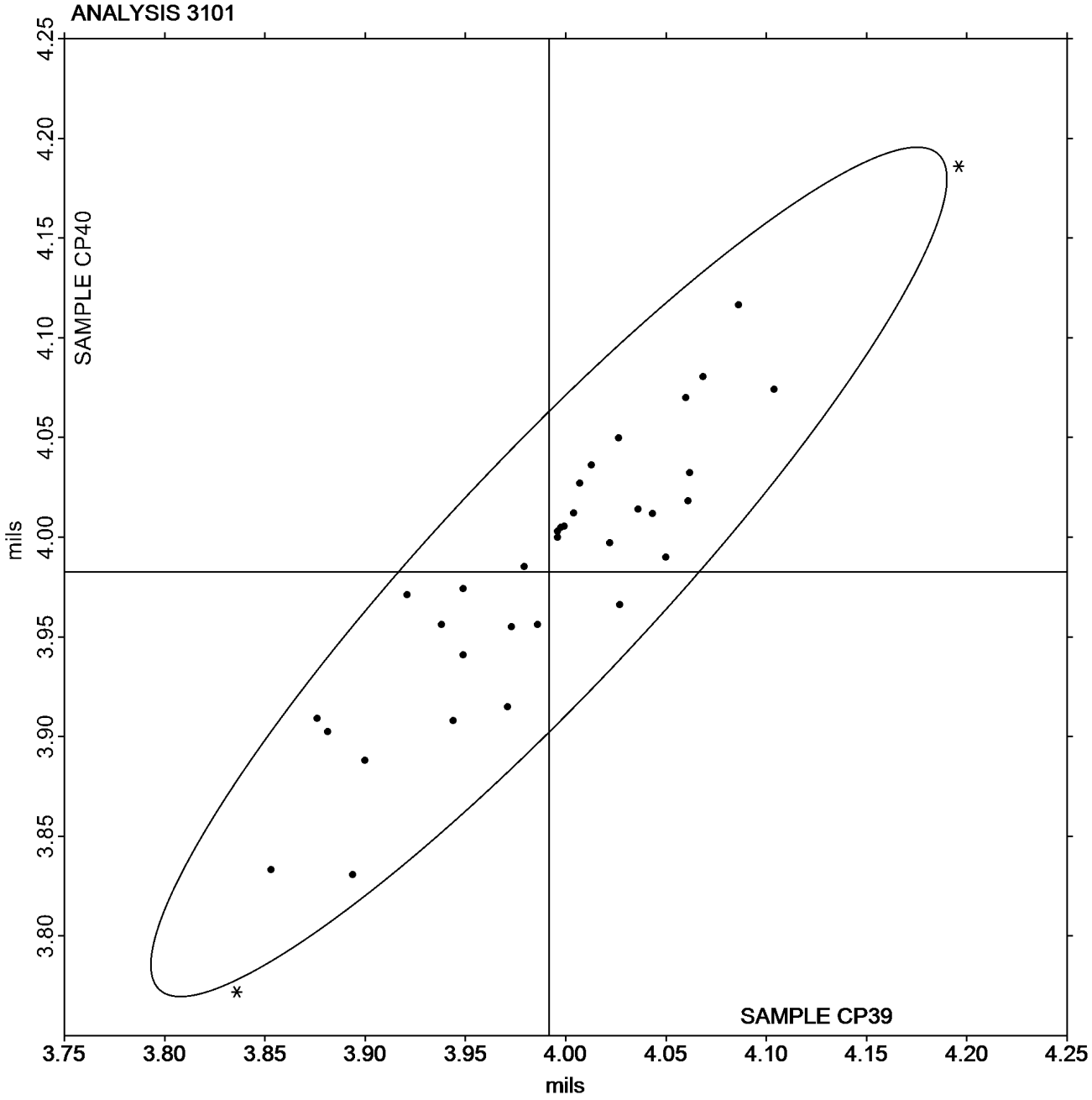
9TWB7U (X) - Data for both samples are high. Possible Systematic Error.

Key to Instrument Codes Reported by Participants

EM	Emveco	LA	L & W Autoline
LB	L & W Autoline 600	LW	L & W
MS	Messmer	PP	Technidyne Profile/Plus
TA	Thwing-Albert	TM	TMI

Grand Mean Sample CP39 = 3.9916 mils

Grand Mean Sample CP40 = 3.9826 mils



Paper & Paperboard Interlaboratory Testing Program

Analysis 3111

Bursting Strength - Printing Papers

TAPPI Official Test Method T403

WebCode	Data Flag	Sample BP39 Lab Mean	Sample BP39 Diff from Grand Mean	Sample BP39 CPV	Sample BP40 Lab Mean	Sample BP40 Diff from Grand Mean	Sample BP40 CPV	Instr Code
2HY2HJ		23.13	-0.28	-0.12	21.93	-1.29	-0.72	ZZ
2TFL42		20.80	-2.62	-1.13	22.30	-0.92	-0.51	ZZ
2WWD9V		24.62	1.20	0.52	24.46	1.25	0.69	ZZ
4KYPCY		22.95	-0.47	-0.20	22.66	-0.56	-0.31	ZZ
6XJQ8W	X	31.80	8.38	3.61	32.00	8.78	4.90	ZZ
9WBQX7		26.10	2.68	1.16	24.70	1.48	0.83	ZZ
AVDWD8		21.10	-2.32	-1.00	21.00	-2.22	-1.24	ZZ
BJELH6		21.58	-1.83	-0.79	20.65	-2.56	-1.43	ZZ
BTNFRK		24.00	0.58	0.25	23.10	-0.12	-0.07	ZZ
CYPLR2		24.94	1.52	0.66	24.05	0.83	0.46	ZZ
E7HDDZ		21.90	-1.52	-0.65	22.20	-1.02	-0.57	ZZ
EM9GVP		23.51	0.09	0.04	23.81	0.59	0.33	ZZ
F2K2LF		25.65	2.23	0.96	24.95	1.73	0.97	ZZ
GKUT9U		25.56	2.14	0.92	24.98	1.76	0.98	ZZ
HUYZNU		20.76	-2.66	-1.14	21.69	-1.53	-0.85	ZZ
LENQ8A		26.83	3.41	1.47	25.35	2.13	1.19	ZZ
QWVGDV		18.54	-4.88	-2.10	19.84	-3.38	-1.89	ZZ
RXZNUT		28.49	5.07	2.19	27.19	3.97	2.22	ZZ
TMFE8K		22.21	-1.21	-0.52	22.60	-0.62	-0.35	ZZ
UJDVHR		22.79	-0.63	-0.27	22.82	-0.40	-0.22	ZZ
VN4RKM		24.49	1.07	0.46	25.43	2.21	1.23	ZZ
VYM4XL		23.43	0.01	0.00	23.15	-0.06	-0.04	ZZ
ZZXUQC		21.78	-1.64	-0.71	21.94	-1.28	-0.72	ZZ

Summary Statistics	Sample BP39	Sample BP40
Grand Means	23.42 psi	23.22 psi
Stnd Dev Btwn Labs	2.32 psi	1.79 psi

Statistics based on 22 of 23 reporting participants.

Comments on Assigned Data Flags for Test #3111

6XJQ8W (X) - Data for both samples are high.

Analysis Notes:

2HY2HJ - Data appear to be reported as kPa, not psi as indicated on data entry form. CTS will not correct the Units going forward.

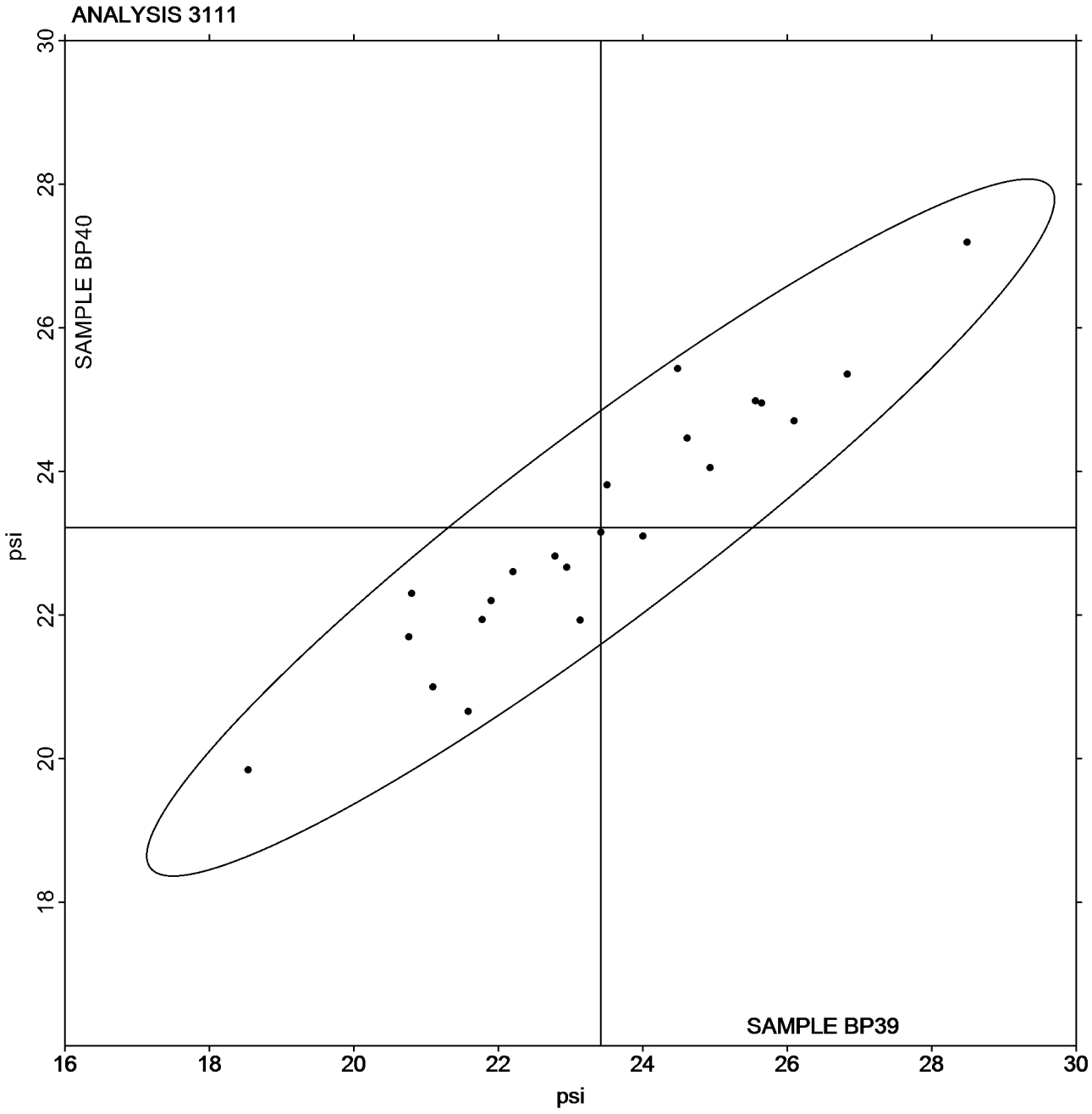
GKUT9U - Data appear to be reported as psi, not kPa as indicated on data entry form. CTS will not correct the Units going forward.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Grand Mean Sample BP39 = 23.415 psi

Grand Mean Sample BP40 = 23.218 psi



Paper & Paperboard Interlaboratory Testing Program

Analysis 3113

Tearing Strength - Printing Papers

TAPPI Official Test Method T414

WebCode	Data Flag	Sample RP39 Lab Mean	Sample RP39 Diff from Grand Mean	Sample RP39 CPV	Sample RP40 Lab Mean	Sample RP40 Diff from Grand Mean	Sample RP40 CPV	Instr Code
2APC6K		53.10	-5.48	-0.89	49.36	-8.54	-1.34	ZZ
2FV722		60.53	1.95	0.32	52.77	-5.13	-0.81	ZZ
2HY2HJ		59.77	1.19	0.19	59.16	1.26	0.20	ZZ
2WWD9V		50.01	-8.57	-1.40	51.64	-6.26	-0.98	ZZ
3P9M7D		53.64	-4.94	-0.81	58.32	0.42	0.07	ZZ
3PD66C		53.97	-4.61	-0.75	54.45	-3.45	-0.54	ZZ
9WBQX7		58.30	-0.28	-0.05	57.50	-0.40	-0.06	ZZ
AVDWD8		71.60	13.02	2.12	74.40	16.50	2.59	ZZ
BJELH6		60.00	1.42	0.23	59.62	1.72	0.27	ZZ
BT7YJQ		54.09	-4.49	-0.73	53.10	-4.80	-0.75	ZZ
BTNFRK		50.20	-8.38	-1.37	50.40	-7.50	-1.18	ZZ
CFEPAQ		67.52	8.93	1.46	58.61	0.71	0.11	ZZ
CH34YZ		62.38	3.80	0.62	59.64	1.74	0.27	ZZ
CK47N2		46.64	-11.94	-1.95	46.40	-11.50	-1.80	ZZ
CYPLR2		58.80	0.22	0.04	55.27	-2.63	-0.41	ZZ
E7HDDZ		60.54	1.96	0.32	59.79	1.89	0.30	ZZ
F2K2LF		49.56	-9.03	-1.47	48.56	-9.35	-1.47	ZZ
F8AU33		54.14	-4.44	-0.72	53.58	-4.32	-0.68	ZZ
GKUT9U	*	72.55	13.97	2.28	75.81	17.91	2.81	ZZ
GY9LRE	X	0.39	-58.19	-9.48	0.39	-57.51	-9.02	ZZ
HA6LNV		62.26	3.68	0.60	54.96	-2.94	-0.46	ZZ
HUYZNU		67.24	8.66	1.41	66.56	8.66	1.36	ZZ
J4VNUH		59.00	0.42	0.07	62.40	4.50	0.71	ZZ
JLVDAZ		65.10	6.52	1.06	57.70	-0.20	-0.03	ZZ
LENQ8A		53.35	-5.23	-0.85	53.61	-4.29	-0.67	ZZ
PTGGJP		61.89	3.31	0.54	62.50	4.60	0.72	ZZ
QWVGDV		58.94	0.36	0.06	61.82	3.92	0.61	ZZ
RCK4WT		66.20	7.62	1.24	58.36	0.46	0.07	ZZ
RMNLP4		66.50	7.92	1.29	66.11	8.21	1.29	ZZ
TMFE8K		57.67	-0.91	-0.15	59.69	1.79	0.28	ZZ
TWKLMK		57.82	-0.76	-0.12	57.68	-0.22	-0.03	ZZ
UJDVHR		60.04	1.46	0.24	62.20	4.30	0.67	ZZ
VN4RKM		55.50	-3.08	-0.50	52.90	-5.00	-0.78	ZZ
VYM4XL		60.38	1.80	0.29	64.24	6.34	0.99	ZZ
X92ZRH		58.65	0.07	0.01	60.58	2.68	0.42	ZZ
YQ2ABE		50.76	-7.82	-1.27	50.33	-7.57	-1.19	ZZ
Z2C44J		54.56	-4.02	-0.66	55.88	-2.02	-0.32	ZZ
Z8JPRF		54.31	-4.27	-0.70	56.43	-1.47	-0.23	ZZ

Summary Statistics	Sample RP39	Sample RP40
Grand Means	58.58 Grams	57.90 Grams
Stnd Dev Btwn Labs	6.14 Grams	6.38 Grams

Statistics based on 37 of 38 reporting participants.

Comments on Assigned Data Flags for Test #3113

GY9LRE (X) - Extreme Data.

Analysis Notes:

2WWD9V - Data appear to be reported as gf, not mN as indicated on data entry form. CTS will not correct the Units going forward.

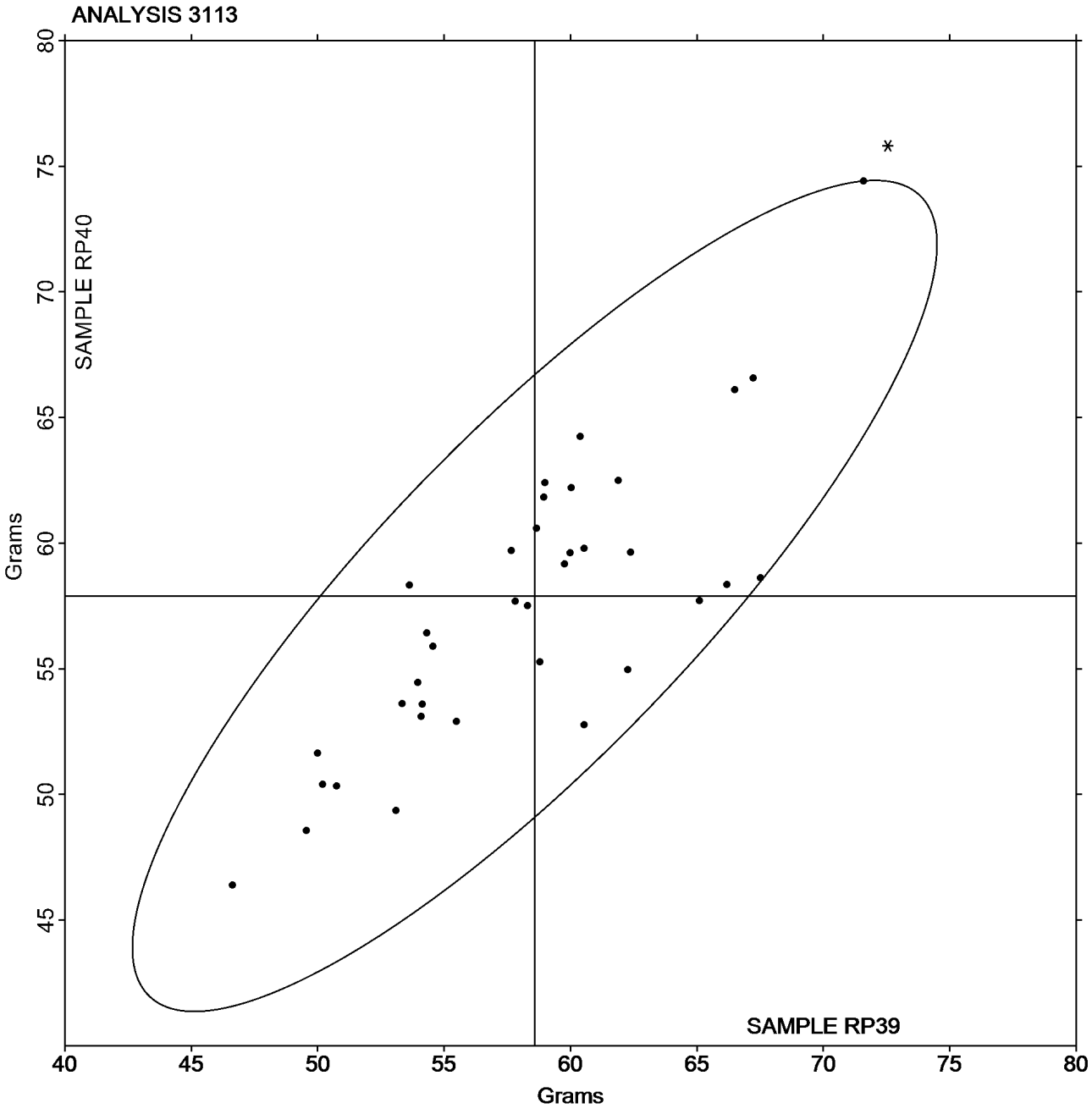
Z2C44J - Data appear to be reported as mN, not gf as indicated on data entry form. CTS will not correct the Units going forward.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Grand Mean Sample RP39 = 58.581 Grams

Grand Mean Sample RP40 = 57.901 Grams



Paper & Paperboard Interlaboratory Testing Program

Analysis 3115

Tensile Breaking Strength - Printing Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NP39 Lab Mean	Sample NP39 Diff from Grand Mean	Sample NP39 CPV	Sample NP40 Lab Mean	Sample NP40 Diff from Grand Mean	Sample NP40 CPV	Instr Code
2APC6K		3.405	-0.242	-0.69	3.457	-0.142	-0.47	TF
2FV722	*	4.437	0.790	2.25	3.991	0.392	1.30	XX
2HY2HJ		3.169	-0.478	-1.36	3.305	-0.294	-0.97	LI
3P9M7D		4.062	0.415	1.18	3.848	0.249	0.82	LJ
3PD66C		3.658	0.011	0.03	3.374	-0.225	-0.75	LB
3TV8CG		3.343	-0.304	-0.86	3.442	-0.157	-0.52	LF
9WBQX7		3.230	-0.417	-1.19	3.249	-0.350	-1.16	TQ
BJELH6		3.719	0.072	0.20	3.665	0.066	0.22	LI
BTNFRK		3.960	0.314	0.89	3.942	0.343	1.14	TO
CFEPAQ		3.611	-0.036	-0.10	3.460	-0.139	-0.46	LA
CK47N2		4.045	0.398	1.13	3.968	0.369	1.22	VM
CYPLR2		3.989	0.342	0.97	3.786	0.187	0.62	TJ
E7HDDZ		3.587	-0.060	-0.17	3.522	-0.077	-0.26	LE
F8AU33		2.781	-0.866	-2.46	2.984	-0.615	-2.04	TF
GKUT9U		3.651	0.004	0.01	3.526	-0.073	-0.24	TQ
HUYZNU		3.304	-0.343	-0.98	3.366	-0.233	-0.77	TB
J6Q7WJ		3.287	-0.360	-1.03	3.450	-0.149	-0.49	LY
JLVDAZ		3.886	0.239	0.68	3.855	0.256	0.85	TQ
KXPE2U		3.717	0.070	0.20	3.515	-0.084	-0.28	LI
LENQ8A		3.493	-0.154	-0.44	3.583	-0.016	-0.05	IN
MDRUZR		4.268	0.621	1.77	4.318	0.719	2.38	LC
QWVGDV		3.616	-0.031	-0.09	3.334	-0.265	-0.88	TF
RCK4WT		3.886	0.239	0.68	3.876	0.277	0.92	LB
RMNLP4		3.299	-0.348	-0.99	3.329	-0.270	-0.89	TO
TCF749		3.665	0.018	0.05	3.765	0.166	0.55	LX
TMFE8K		3.759	0.112	0.32	3.688	0.089	0.29	LE
TVCWD4		3.329	-0.318	-0.90	3.276	-0.323	-1.07	MA
TWKLMK		3.499	-0.148	-0.42	3.289	-0.310	-1.03	LE
U3676Q		3.725	0.078	0.22	3.625	0.026	0.08	TV
VN4RKM		3.467	-0.180	-0.51	3.495	-0.104	-0.34	LX
VYM4XL		3.463	-0.184	-0.52	3.287	-0.312	-1.03	IO
X92ZRH		4.283	0.636	1.81	4.210	0.611	2.03	LX
YQ2ABE		3.897	0.250	0.71	4.022	0.424	1.40	LI
Z8JPRF		3.508	-0.139	-0.40	3.563	-0.036	-0.12	LI

Summary Statistics	Sample NP39	Sample NP40
Grand Means	3.65 kN/m	3.60 kN/m
Stnd Dev Btwn Labs	0.35 kN/m	0.30 kN/m

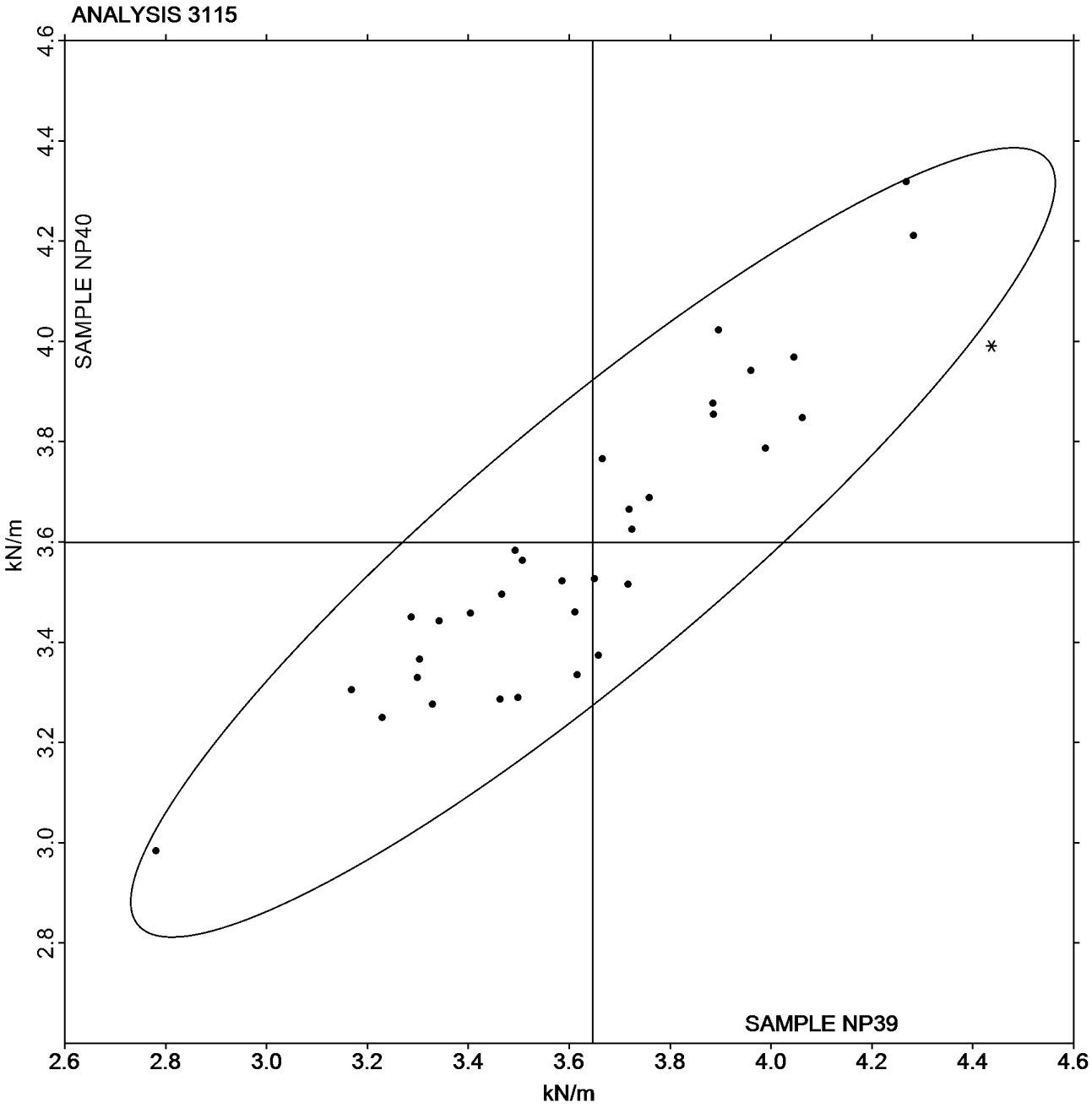
Statistics based on 34 of 34 reporting participants.

Key to Instrument Codes Reported by Participants

IN	Instron 3340 series	IO	Instron 5900 Series
LA	L & W Tensile - Autoline 300	LB	L & W Tensile - Autoline 400
LC	L & W Tensile - Autoline 600	LE	L & W Tensile Tester 066
LF	L & W Tensile/Fracture Toughness Tester SE 064	LI	L & W Tensile Tester SE 062
LJ	L & W Tensile Tester SE 063	LX	L & W (model not specified)
LY	Lloyd TCD500	MA	MTS Criterion Model 43
TB	Thwing-Albert EJA/1000	TF	Thwing-Albert EJA Vantage-1
TJ	Thwing-Albert QC II-XS	TO	Thwing-Albert QC-1000
TQ	Thwing-Albert QC 3A	TV	Thwing-Albert Vantage NX
VM	Valmet PaperLab (was Kajaani/Robotest)	XX	Instrument make/model not specified by lab

Grand Mean Sample NP39 = 3.6470 kN/m

Grand Mean Sample NP40 = 3.5990 kN/m



Paper & Paperboard Interlaboratory Testing Program

Report #4351, March 2025

Analysis 3116

Tensile Energy Absorption - Printing Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NP39 Lab Mean	Sample NP39 Diff from Grand Mean	Sample NP39 CPV	Sample NP40 Lab Mean	Sample NP40 Diff from Grand Mean	Sample NP40 CPV	Instr Code
2FV722		37.45	-2.72	-0.55	33.17	-6.16	-1.61	XX
2HY2HJ		32.69	-7.48	-1.51	35.02	-4.31	-1.13	LI
3P9M7D		43.35	3.18	0.64	41.35	2.03	0.53	LJ
3PD66C		32.71	-7.46	-1.51	35.80	-3.53	-0.92	LB
3TV8CG		38.91	-1.26	-0.25	37.40	-1.93	-0.50	LF
9WBQX7		34.29	-5.88	-1.19	35.86	-3.46	-0.90	TQ
BJELH6		42.62	2.45	0.50	42.64	3.32	0.87	LI
BTNFRK		36.78	-3.38	-0.68	33.39	-5.94	-1.55	TO
CFEPAQ		42.68	2.51	0.51	42.20	2.87	0.75	LA
E7HDDZ		41.21	1.04	0.21	39.87	0.54	0.14	LH
HUYZNU		41.86	1.69	0.34	40.80	1.48	0.39	TB
J6Q7WJ	X	59.16	18.99	3.84	62.00	22.68	5.92	LY
JLVDAZ		49.90	9.73	1.97	46.76	7.43	1.94	TQ
KXPE2U		40.78	0.61	0.12	38.50	-0.83	-0.22	LI
LENQ8A		33.18	-6.99	-1.41	35.82	-3.51	-0.92	IN
MDRUZR		49.72	9.55	1.93	48.12	8.79	2.29	LC
QWVGDV		43.64	3.47	0.70	39.58	0.25	0.07	TF
RCK4WT		44.18	4.01	0.81	41.67	2.34	0.61	LB
RMNLP4		40.13	-0.04	-0.01	38.24	-1.09	-0.29	TO
TCF749		37.70	-2.47	-0.50	38.24	-1.09	-0.29	LX
TMFE8K		44.13	3.96	0.80	43.49	4.16	1.09	LE
TVCWD4		38.17	-2.00	-0.40	36.38	-2.95	-0.77	MA
U3676Q		47.90	7.73	1.56	43.87	4.54	1.18	TV
VN4RKM		39.19	-0.98	-0.20	39.76	0.43	0.11	LX
VYM4XL		37.77	-2.40	-0.48	40.03	0.71	0.18	IO
X92ZRH		44.58	4.41	0.89	41.74	2.41	0.63	LX
YQ2ABE		32.84	-7.33	-1.48	34.02	-5.31	-1.39	LI
Z8JPRF		36.21	-3.96	-0.80	38.16	-1.17	-0.31	LI

Summary Statistics	Sample NP39	Sample NP40
Grand Means	40.17 Joules/sq m	39.33 Joules/sq m
Stnd Dev Btwn Labs	4.95 Joules/sq m	3.83 Joules/sq m

Statistics based on 27 of 28 reporting participants.

Comments on Assigned Data Flags for Test #3116

J6Q7WJ (X) - Data for both samples are high.

Analysis Notes:

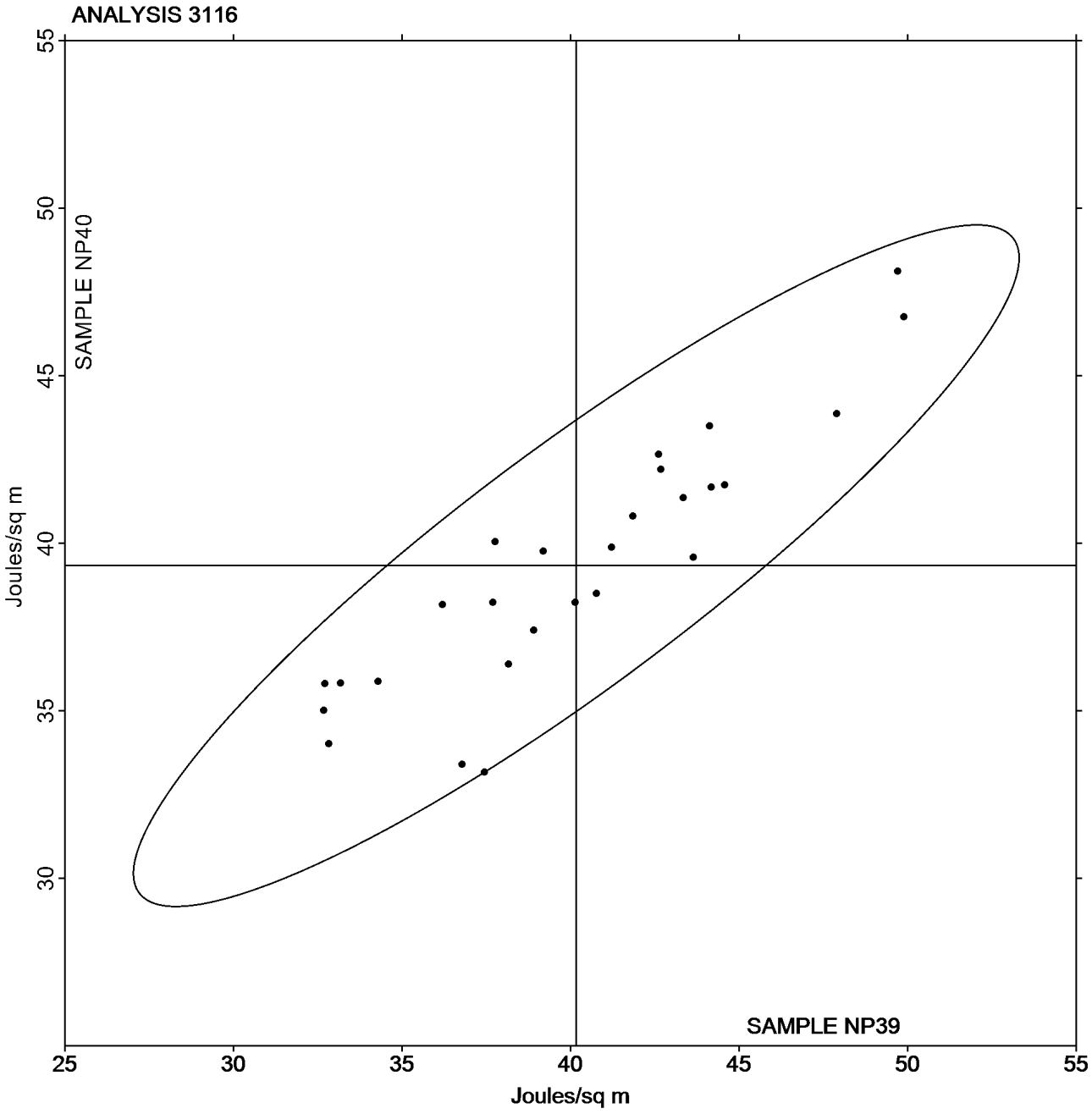
X92ZRH - One determination removed from the Lab Mean of Sample NP39 per Grubb's Test at 1% risk (TAPPI 1205).

Key to Instrument Codes Reported by Participants

IN	Instron 3340 series	IO	Instron 5900 Series
LA	L & W Tensile - Autoline 300	LB	L & W Tensile - Autoline 400
LC	L & W Tensile - Autoline 600	LE	L & W Tensile Tester 066
LF	L & W Tensile/Fracture Toughness Tester SE 064	LH	L & W Alwetron TH1 (Horizontal) SE 060/065F
LI	L & W Tensile Tester SE 062	LJ	L & W Tensile Tester SE 063
LX	L & W (model not specified)	LY	Lloyd TCD500
MA	MTS Criterion Model 43	TB	Thwing-Albert EJA/1000
TF	Thwing-Albert EJA Vantage-1	TO	Thwing-Albert QC-1000
TQ	Thwing-Albert QC 3A	TV	Thwing-Albert Vantage NX
XX	Instrument make/model not specified by lab		

Grand Mean Sample NP39 = 40.168 Joules/sq m

Grand Mean Sample NP40 = 39.329 Joules/sq m



Paper & Paperboard Interlaboratory Testing Program

Analysis 3117
Elongation to Break - Printing Papers
TAPPI Official Test Method T494

Report #4351, March 2025

		Sample NP39			Sample NP40			
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	Instr Code
2APC6K		1.639	-0.030	-0.12	1.503	-0.145	-0.66	TF
2FV722		1.308	-0.361	-1.45	1.255	-0.393	-1.79	XX
2HY2HJ		1.514	-0.155	-0.62	1.555	-0.093	-0.42	LI
3P9M7D		1.606	-0.063	-0.25	1.586	-0.062	-0.28	LJ
3PD66C		1.409	-0.260	-1.04	1.580	-0.068	-0.31	LB
3TV8CG		1.650	-0.019	-0.08	1.549	-0.099	-0.45	LF
9WBQX7		1.636	-0.033	-0.13	1.664	0.016	0.07	TQ
BJELH6		1.685	0.016	0.06	1.710	0.062	0.28	LI
BTNFRK	*	2.334	0.665	2.67	2.173	0.525	2.39	TO
CFEPAQ		1.589	-0.080	-0.32	1.630	-0.018	-0.08	LA
CK47N2		1.370	-0.299	-1.20	1.370	-0.278	-1.26	VM
E7HDDZ		1.678	0.009	0.04	1.655	0.007	0.03	LH
F8AU33		1.106	-0.563	-2.26	1.158	-0.490	-2.23	TF
HUYZNU		1.872	0.203	0.82	1.801	0.153	0.70	TB
J6Q7WJ		1.614	-0.055	-0.22	1.604	-0.044	-0.20	LY
JLVDAZ		1.962	0.293	1.18	1.807	0.159	0.72	TQ
KXPE2U	X	1.646	-0.023	-0.09	2.638	0.990	4.51	LI
LENQ8A		1.588	-0.081	-0.32	1.645	-0.003	-0.01	IN
MDRUZR		1.659	-0.010	-0.04	1.574	-0.074	-0.34	LC
QWVGDV		1.997	0.328	1.32	1.971	0.323	1.47	TF
RCK4WT		1.624	-0.045	-0.18	1.566	-0.082	-0.37	LB
RMNLP4		1.994	0.325	1.31	1.997	0.349	1.59	TO
TCF749		1.607	-0.062	-0.25	1.540	-0.108	-0.49	LX
TMFE8K		1.747	0.078	0.31	1.764	0.116	0.53	LE
TVCWD4		1.814	0.145	0.58	1.721	0.073	0.33	XX
U3676Q		2.096	0.427	1.72	2.018	0.370	1.68	TV
VN4RKM		1.762	0.093	0.37	1.563	-0.085	-0.39	LX
VYM4XL		1.632	-0.037	-0.15	1.757	0.109	0.50	IO
X92ZRH		1.707	0.038	0.15	1.788	0.140	0.64	LX
YQ2ABE		1.320	-0.349	-1.40	1.326	-0.322	-1.46	LI
Z8JPRF		1.548	-0.121	-0.49	1.603	-0.045	-0.20	LI

Summary Statistics	Sample NP39	Sample NP40
Grand Means	1.67 Percent	1.65 Percent
Stnd Dev Btwn Labs	0.25 Percent	0.22 Percent

Statistics based on 30 of 31 reporting participants.

Comments on Assigned Data Flags for Test #3117

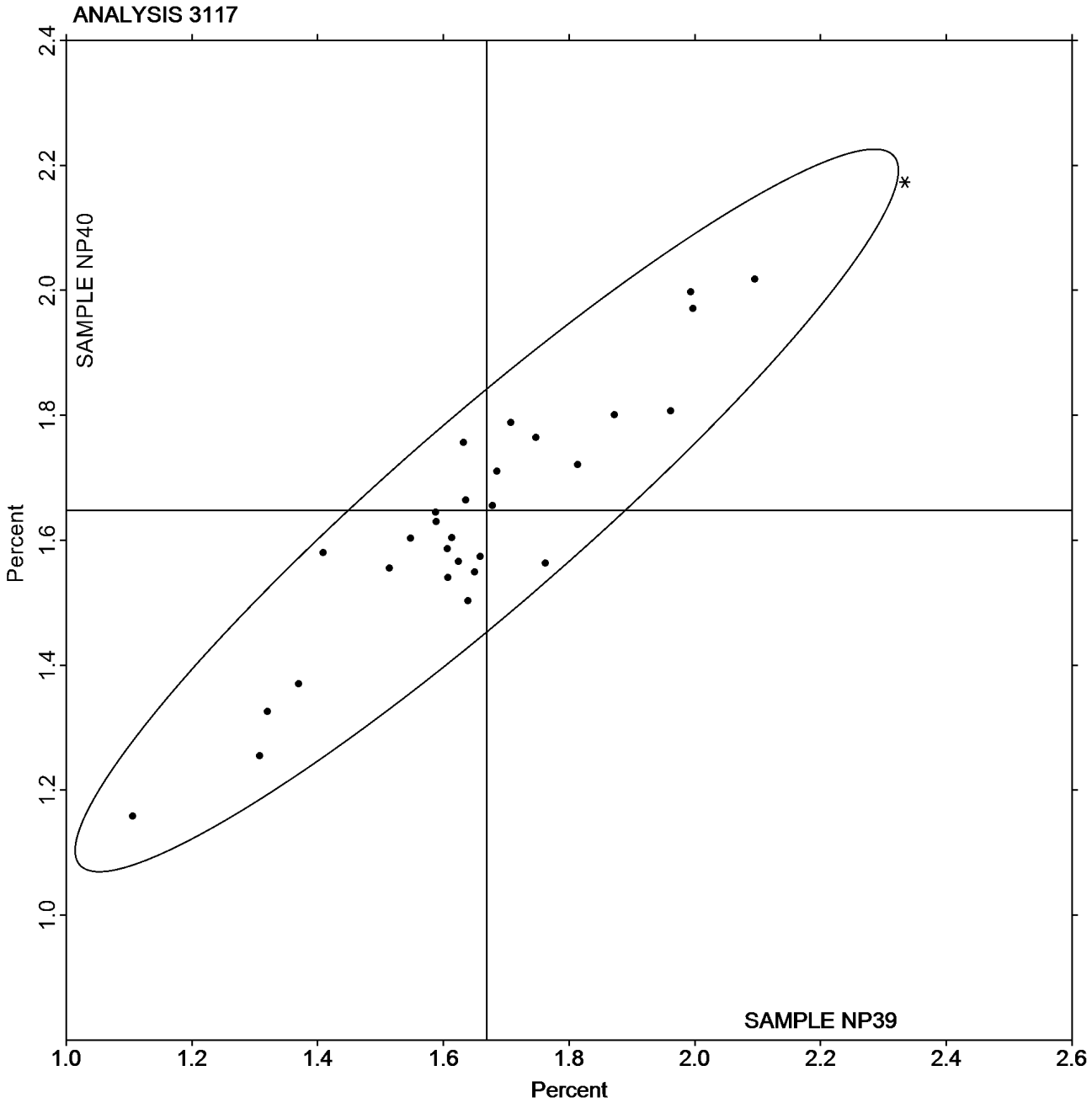
KXPE2U (X) - Data for sample NP40 are high. Inconsistent within the determinations of sample NP40.

Key to Instrument Codes Reported by Participants

IN	Instron 3340 Series	IO	Instron 5900 Series
LA	L & W Tensile - Autoline 300	LB	L & W Tensile - Autoline 400
LC	L & W Tensile - Autoline 600	LE	L & W Tensile Tester 066
LF	L & W Tensile/Fracture Toughness Tester SE 064	LH	L & W Alwetron TH1 (Horizontal) SE 060/065F
LI	L & W Tensile Tester SE 062	LJ	L & W Tensile Tester SE 063
LX	L & W (model not specified)	LY	Lloyd TCD500
TB	Thwing-Albert EJA/1000	TF	Thwing-Albert EJA Vantage-1
TO	Thwing-Albert QC-1000	TQ	Thwing-Albert QC 3A
TV	Thwing-Albert Vantage NX	VM	Valmet PaperLab (was Kajaani/Robotest)
XX	Instrument make/model not specified by lab		

Grand Mean Sample NP39 = 1.6689 Percent

Grand Mean Sample NP40 = 1.6478 Percent



Paper & Paperboard Interlaboratory Testing Program

Analysis 3121

Air Resistance - Gurley Oil Type

TAPPI Official Test Method T460

WebCode	Data Flag	Sample PP39 Lab Mean	Sample PP39 Diff from Grand Mean	Sample PP39 CPV	Sample PP40 Lab Mean	Sample PP40 Diff from Grand Mean	Sample PP40 CPV	Instr Code
2APC6K		35.09	-0.16	-0.10	35.94	0.60	0.31	PP
2FV722	X	9.72	-25.53	-15.44	5.76	-29.58	-15.45	PP
2HY2HJ		33.54	-1.71	-1.03	34.51	-0.83	-0.43	LP
2TFL42		35.40	0.15	0.09	34.95	-0.39	-0.20	LP
2WWD9V	X	60.70	25.45	15.39	62.38	27.04	14.12	PP
2Y3BNB		33.54	-1.71	-1.03	32.18	-3.16	-1.65	PP
4KYPCY		36.76	1.51	0.91	36.87	1.53	0.80	LR
6FGGGR		31.65	-3.60	-2.18	31.67	-3.67	-1.92	WG
79VFJ8		35.48	0.23	0.14	36.18	0.84	0.44	XX
8GJTWB		37.08	1.83	1.11	37.14	1.80	0.94	GL
9WBQX7		37.17	1.92	1.16	35.35	0.01	0.01	GA
AVDWD8		36.20	0.95	0.57	36.60	1.26	0.66	GS
BTNFRK		33.85	-1.40	-0.85	33.76	-1.58	-0.83	PP
C3NXM2		37.40	2.15	1.30	38.38	3.04	1.59	LR
CK47N2		34.61	-0.64	-0.39	35.95	0.61	0.32	PP
CYPLR2		35.36	0.10	0.06	35.91	0.57	0.30	PP
EM9GVP		35.46	0.21	0.13	36.97	1.63	0.85	LA
F8AU33		36.14	0.89	0.54	35.61	0.27	0.14	PP
GKUT9U	X	53.55	18.30	11.07	55.88	20.54	10.73	PP
HA6LNV		34.98	-0.27	-0.16	34.81	-0.53	-0.28	PP
HUYZNU		37.38	2.13	1.29	36.83	1.49	0.78	PP
JLVDAZ		34.91	-0.34	-0.21	34.31	-1.03	-0.54	PP
LENQ8A		33.82	-1.43	-0.87	33.51	-1.83	-0.96	PP
NWYJQU		35.26	0.01	0.01	36.30	0.96	0.50	HG
Q48R7M		32.83	-2.42	-1.46	31.50	-3.84	-2.01	GA
QWVGDV		32.16	-3.09	-1.87	33.00	-2.34	-1.22	PP
RMNLP4		37.05	1.80	1.09	36.99	1.65	0.86	PP
U3676Q		37.32	2.07	1.25	35.19	-0.15	-0.08	PP
UJDVHR		33.95	-1.30	-0.79	33.91	-1.43	-0.75	PP
VYM4XL		36.30	1.05	0.63	35.87	0.53	0.28	WG
WC77TH		33.75	-1.50	-0.91	33.03	-2.31	-1.21	LP
X87GPG		38.00	2.75	1.66	38.09	2.75	1.44	XX
ZZXUQC	*	35.11	-0.14	-0.09	38.89	3.55	1.85	XX

Summary Statistics	Sample PP39	Sample PP40
Grand Means	35.25 sec/100 cc	35.34 sec/100 cc
Stnd Dev Btwn Labs	1.65 sec/100 cc	1.91 sec/100 cc

Statistics based on 30 of 33 reporting participants.

Comments on Assigned Data Flags for Test #3121

GKUT9U (X) - Extreme Data.

2FV722 (X) - Extreme Data.

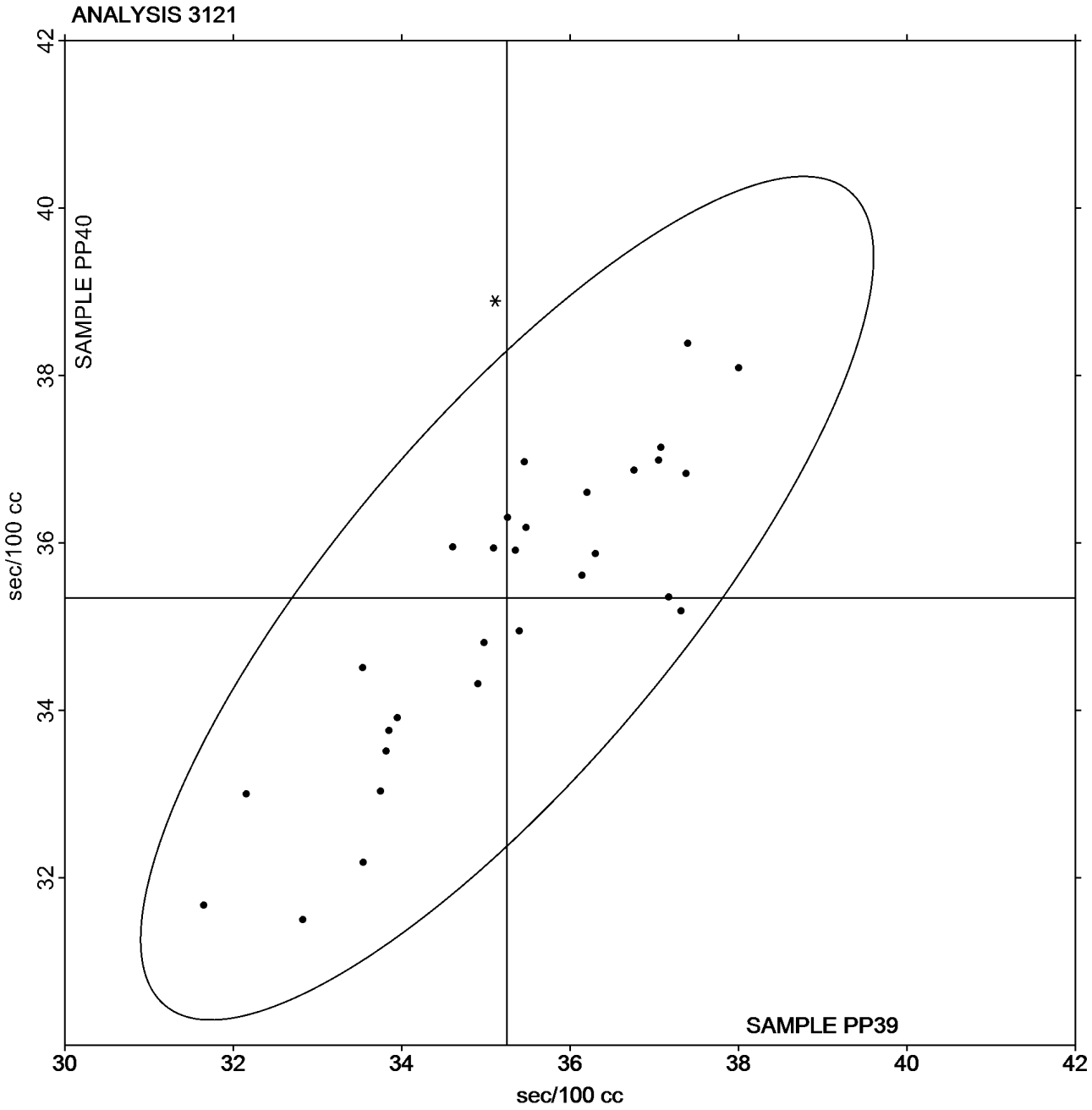
2WWD9V (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

GA	Gurley Precision #4340 Automatic Densometer	GL	Gurley #4110
GS	Gurley-Hill S-P-S Tester #4190	HG	Technidyne - Hagerty Model #1
LA	L & W Autoline	LP	L & W Densometer, Air Permeance
LR	L & W Air Permeance	PP	Technidyne Profile/Plus
WG	W & LE Gurley Tester	XX	Instrument make/model not specified by lab

Grand Mean Sample PP39 = 35.252 sec/100 cc

Grand Mean Sample PP40 = 35.340 sec/100 cc



Paper & Paperboard Interlaboratory Testing Program

Analysis 3123

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

TAPPI Official Test Method T547

WebCode	Data Flag	Sample PP39 Lab Mean	Sample PP39 Diff from Grand Mean	Sample PP39 CPV	Sample PP40 Lab Mean	Sample PP40 Diff from Grand Mean	Sample PP40 CPV	Instr Code
3PD66C		87.30	-3.06	-0.36	88.30	-2.31	-0.23	LB
AVDWD8		100.00	9.64	1.13	101.50	10.89	1.10	SH
CFEPAQ	X	1.40	-88.96	-10.43	1.45	-89.16	-8.97	PP
HA6LNV		83.79	-6.57	-0.77	82.03	-8.58	-0.86	GA

Summary Statistics	Sample PP39	Sample PP40
Grand Means	90.36 Sheffield Units	90.61 Sheffield Units
Stnd Dev Btwn Labs	8.53 Sheffield Units	9.94 Sheffield Units

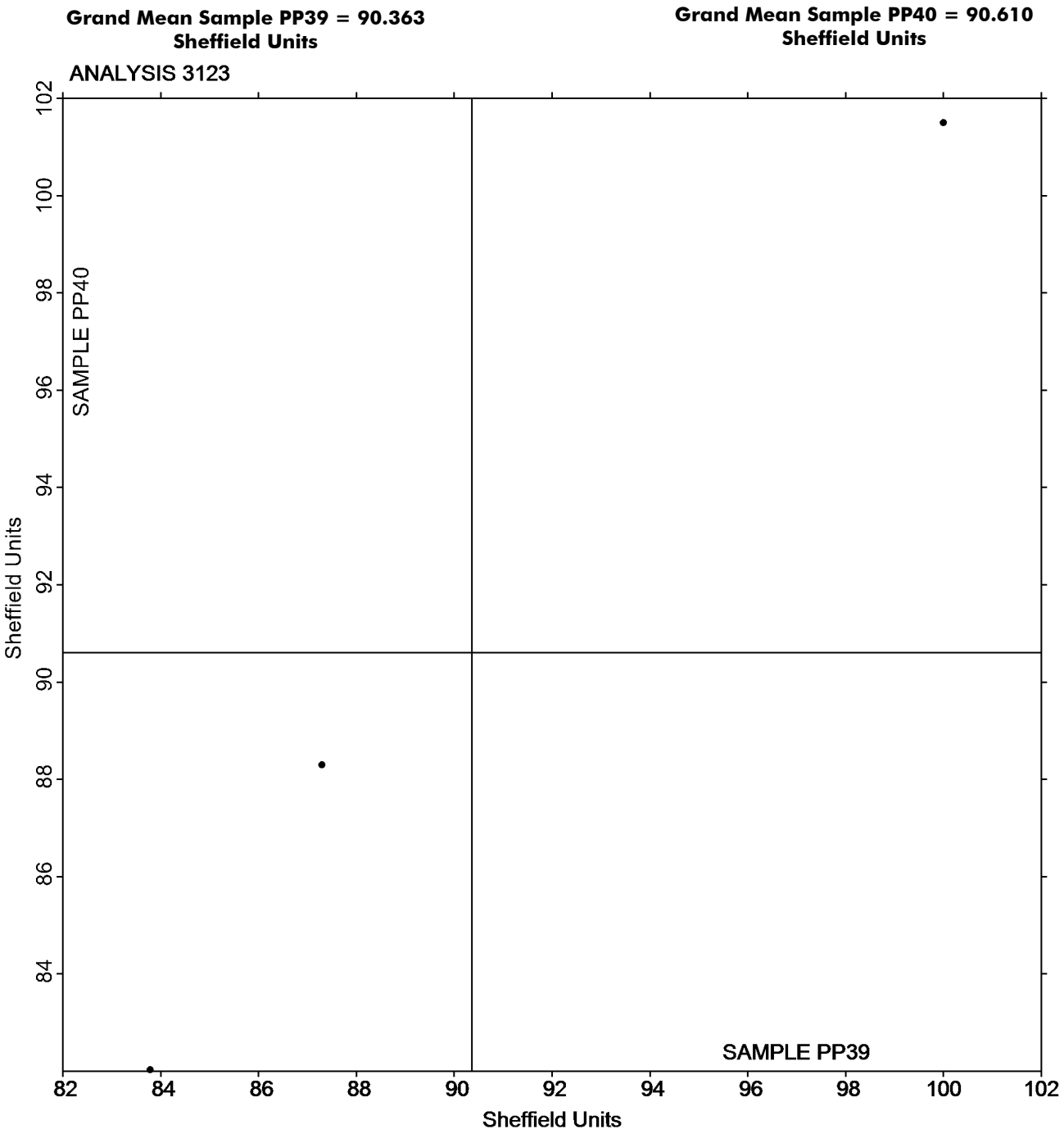
Statistics based on 3 of 4 reporting participants.

Comments on Assigned Data Flags for Test #3123

CFEPAQ (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

GA	Gurley Precision #4340 Automatic Densometer	LB	L & W Air Permeance - Autoline
PP	Technidyne Profile/Plus	SH	Sheffield



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

Paper & Paperboard Interlaboratory Testing Program

Analysis 3131

Roughness - Print Surf Method - 2.5 to 6.0 Microns

TAPPI Official Test Method T555

WebCode	Data Flag	Sample PH39 Lab Mean	Sample PH39 Diff from Grand Mean	Sample PH39 CPV	Sample PH40 Lab Mean	Sample PH40 Diff from Grand Mean	Sample PH40 CPV	Instr Code
2HHKPB	X	109.800	104.073	465.80	111.000	105.233	455.07	ZZ
2Y3BNB		5.218	-0.509	-2.28	5.230	-0.537	-2.32	ZZ
6YRZX9		5.737	0.010	0.04	5.677	-0.090	-0.39	ZZ
9TWB7U		5.860	0.133	0.59	6.087	0.320	1.38	ZZ
BTNFRK		5.878	0.151	0.67	5.790	0.023	0.10	ZZ
E7HDDZ		5.817	0.090	0.40	5.848	0.081	0.35	ZZ
HUYZNU		5.863	0.136	0.61	5.841	0.074	0.32	ZZ
KDZVAH		6.064	0.337	1.51	6.016	0.249	1.08	ZZ
KXPE2U		5.545	-0.182	-0.82	5.664	-0.103	-0.45	ZZ
MDRUZR		5.541	-0.186	-0.83	5.850	0.083	0.36	ZZ
UJDVHR		5.893	0.166	0.74	5.866	0.099	0.43	ZZ
VYM4XL		5.612	-0.115	-0.52	5.484	-0.283	-1.22	ZZ
Z2C44J		5.699	-0.028	-0.13	5.853	0.086	0.37	ZZ

Summary Statistics	Sample PH39	Sample PH40
Grand Means	5.73 Microns	5.77 Microns
Stnd Dev Btwn Labs	0.22 Microns	0.23 Microns

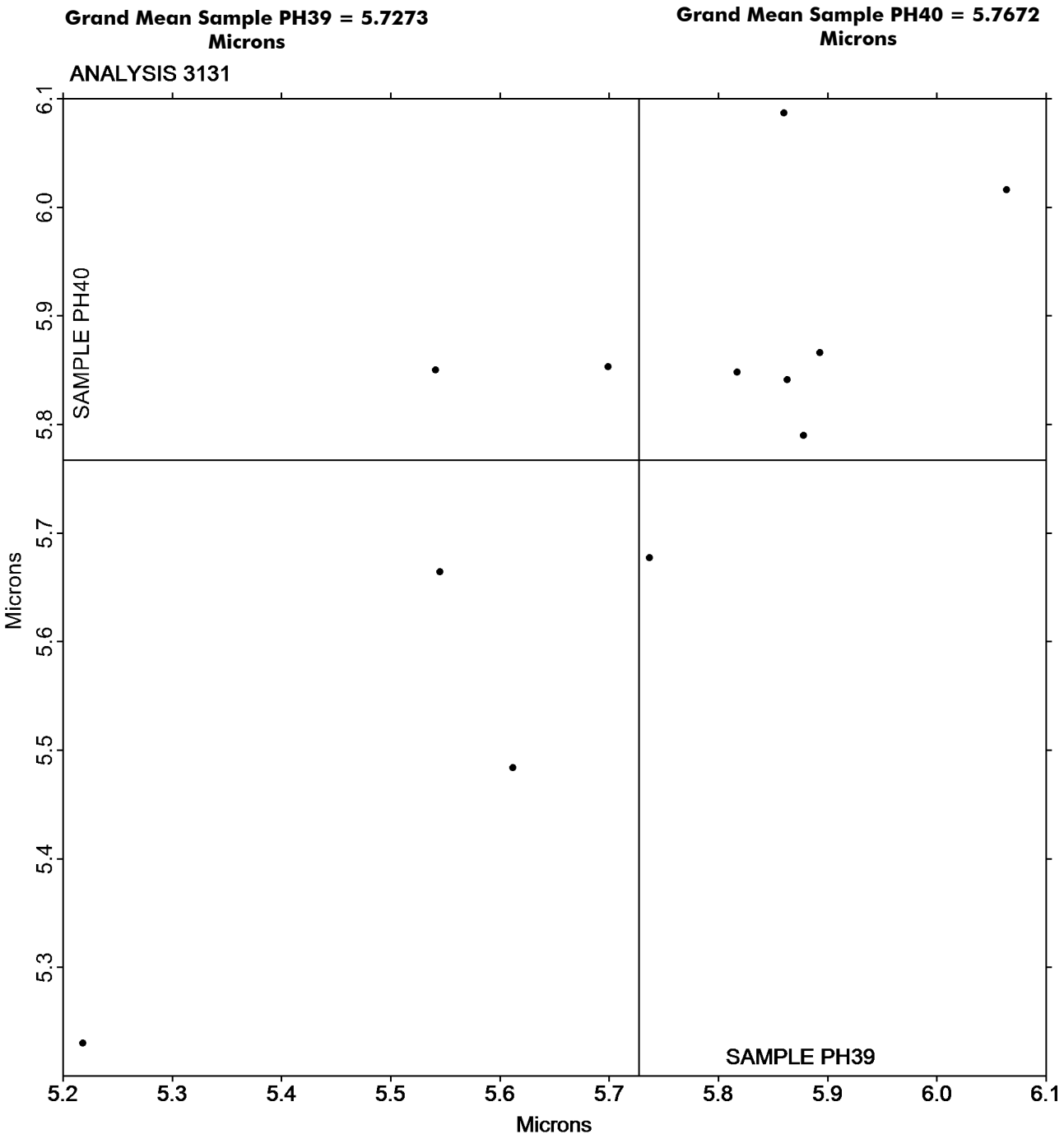
Statistics based on 12 of 13 reporting participants.

Comments on Assigned Data Flags for Test #3131

2HHKPB (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 3133

Roughness - Sheffield Type

TAPPI Official Test Method T538

WebCode	Data Flag	Sample SR39 Lab Mean	Sample SR39 Diff from Grand Mean	Sample SR39 CPV	Sample SR40 Lab Mean	Sample SR40 Diff from Grand Mean	Sample SR40 CPV	Instr Code
2A6WPH		186.0	-5.1	-0.39	118.5	-2.2	-0.26	GA
2APC6K		186.9	-4.2	-0.32	108.3	-12.4	-1.45	SH
2FV722	X	70.5	-120.7	-9.19	48.9	-71.8	-8.37	HM
2HHKPB	X	121.7	-69.4	-5.28	125.1	4.4	0.51	XX
2WWD9V		173.3	-17.8	-1.36	102.5	-18.2	-2.12	PP
2Y3BNB		197.0	5.9	0.45	126.2	5.5	0.64	PP
3PD66C		189.0	-2.1	-0.16	119.2	-1.5	-0.18	LA
47UTTX		191.8	0.7	0.05	110.5	-10.2	-1.19	LW
4KYPCY		192.3	1.2	0.09	132.2	11.5	1.34	LW
4U34VC		204.7	13.5	1.03	126.5	5.8	0.67	PP
6FGGGR		207.5	16.4	1.25	130.5	9.8	1.14	SS
82RT6C		224.4	33.3	2.53	133.0	12.3	1.43	VM
9WBQX7		182.2	-8.9	-0.68	123.7	2.9	0.34	GA
AVDWD8		183.4	-7.7	-0.59	121.5	0.8	0.09	XX
BTNFRK	X	308.1	116.9	8.90	151.8	31.1	3.63	PP
C3NXM2		183.8	-7.3	-0.56	112.4	-8.3	-0.97	LW
CH34YZ		194.7	3.6	0.27	125.7	5.0	0.58	HM
CK47N2		205.8	14.7	1.12	118.1	-2.6	-0.31	PP
CRNAV4		176.3	-14.8	-1.13	109.3	-11.4	-1.32	PP
CYPLR2		163.0	-28.1	-2.14	119.1	-1.6	-0.19	PP
E7HDDZ		195.1	4.0	0.30	129.3	8.6	1.00	PP
EM9GVP		182.1	-9.0	-0.69	112.9	-7.8	-0.91	LA
F8AU33		203.6	12.5	0.95	113.2	-7.5	-0.87	SH
HA6LNV		171.5	-19.6	-1.49	112.2	-8.5	-0.99	PP
HUYZNU		192.9	1.8	0.14	112.4	-8.3	-0.97	PP
JLVDAZ		186.2	-4.9	-0.37	110.5	-10.2	-1.19	PP
KDZVAH		187.6	-3.5	-0.27	113.3	-7.5	-0.87	PP
KXPE2U		194.5	3.4	0.26	121.8	1.1	0.13	LW
LENQ8A		211.3	20.2	1.54	133.6	12.9	1.50	PP
LNVPJW		191.0	-0.1	-0.01	120.2	-0.5	-0.06	LA
MDRUZR		189.6	-1.5	-0.12	118.4	-2.3	-0.27	LB
NWYJQU		192.5	1.4	0.10	121.7	1.0	0.12	PP
QWVGDV	*	198.1	7.0	0.53	142.7	22.0	2.57	PP
RMNLP4		185.3	-5.8	-0.44	124.2	3.5	0.41	PP
TCF749		192.3	1.1	0.09	120.3	-0.5	-0.05	PP
TQGKLQ		197.3	6.2	0.47	118.5	-2.2	-0.26	PP
TUHLMN		205.0	13.9	1.06	126.3	5.6	0.66	PP
U3676Q		171.2	-19.9	-1.52	115.1	-5.7	-0.66	PP
UELQPM	X	482.0	290.9	22.14	247.5	126.8	14.78	GL
UJDVHR		198.6	7.5	0.57	123.6	2.9	0.34	LW

Paper & Paperboard Interlaboratory Testing Program

Analysis 3133
Roughness - Sheffield Type
TAPPI Official Test Method T538

WebCode	Data Flag	Sample SR39 Lab Mean	Sample SR39 Diff from Grand Mean	Sample SR39 CPV	Sample SR40 Lab Mean	Sample SR40 Diff from Grand Mean	Sample SR40 CPV	Instr Code
VYM4XL	*	164.0	-27.1	-2.06	125.5	4.8	0.56	PG
X8RP27		210.9	19.8	1.50	134.1	13.4	1.56	LW
X92ZRH	X	432.8	241.7	18.39	434.9	314.2	36.62	PP

Summary Statistics	Sample SR39	Sample SR40
Grand Means	191.13 Sheffield	120.71 Sheffield
Stnd Dev Btwn Labs	13.14 Sheffield	8.58 Sheffield

Statistics based on 38 of 43 reporting participants.

Comments on Assigned Data Flags for Test #3133

2HHKPB (X) - Data for sample SR39 are low.

X92ZRH (X) - Extreme Data.

UELQPM (X) - Extreme Data.

2FV722 (X) - Extreme Data.

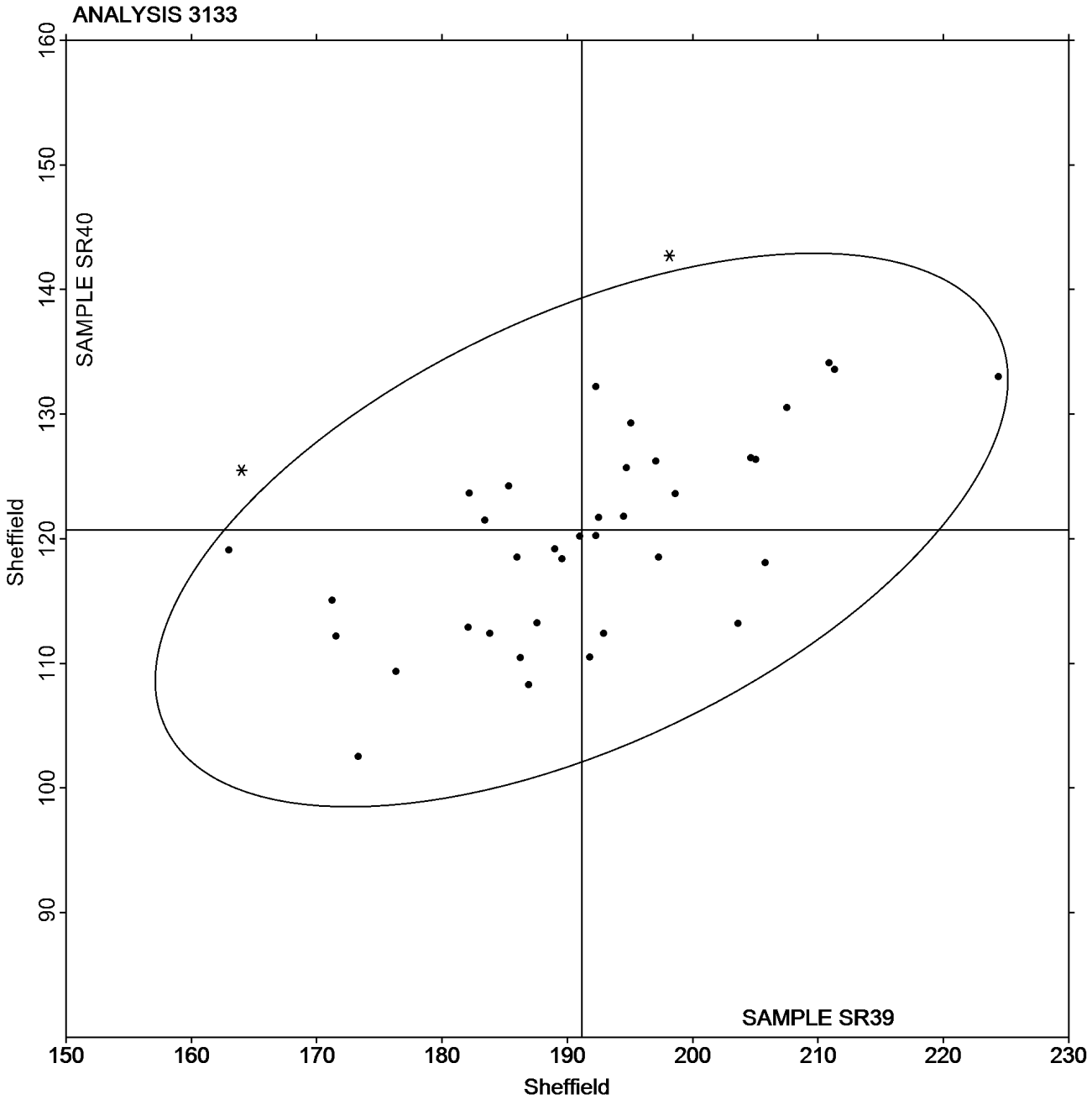
BTNFRK (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

GA	Gurley Precision #4340 Automatic Densometer	GL	Giddings and Lewis Sheffield
HM	Technidyne - Hagerty Model #538	LA	L & W Roughness Sheffield - Autoline
LB	L & W - Autoline 600	LW	L & W Roughness Tester
PG	Precision Gage Smoothcheck	PP	Technidyne Profile/Plus
SH	Sheffield (Bendix Precisionaire)	SS	Sheffield Smoothchek Tester
VM	Valmet PaperLab (was Kajaani\Robotest)	XX	Instrument make/model not specified by lab

Grand Mean Sample SR39 = 191.13
Sheffield

Grand Mean Sample SR40 = 120.71
Sheffield



Paper & Paperboard Interlaboratory Testing Program

Analysis 3135
Grammage (Mass per Unit Area)
TAPPI Official Test Method T410

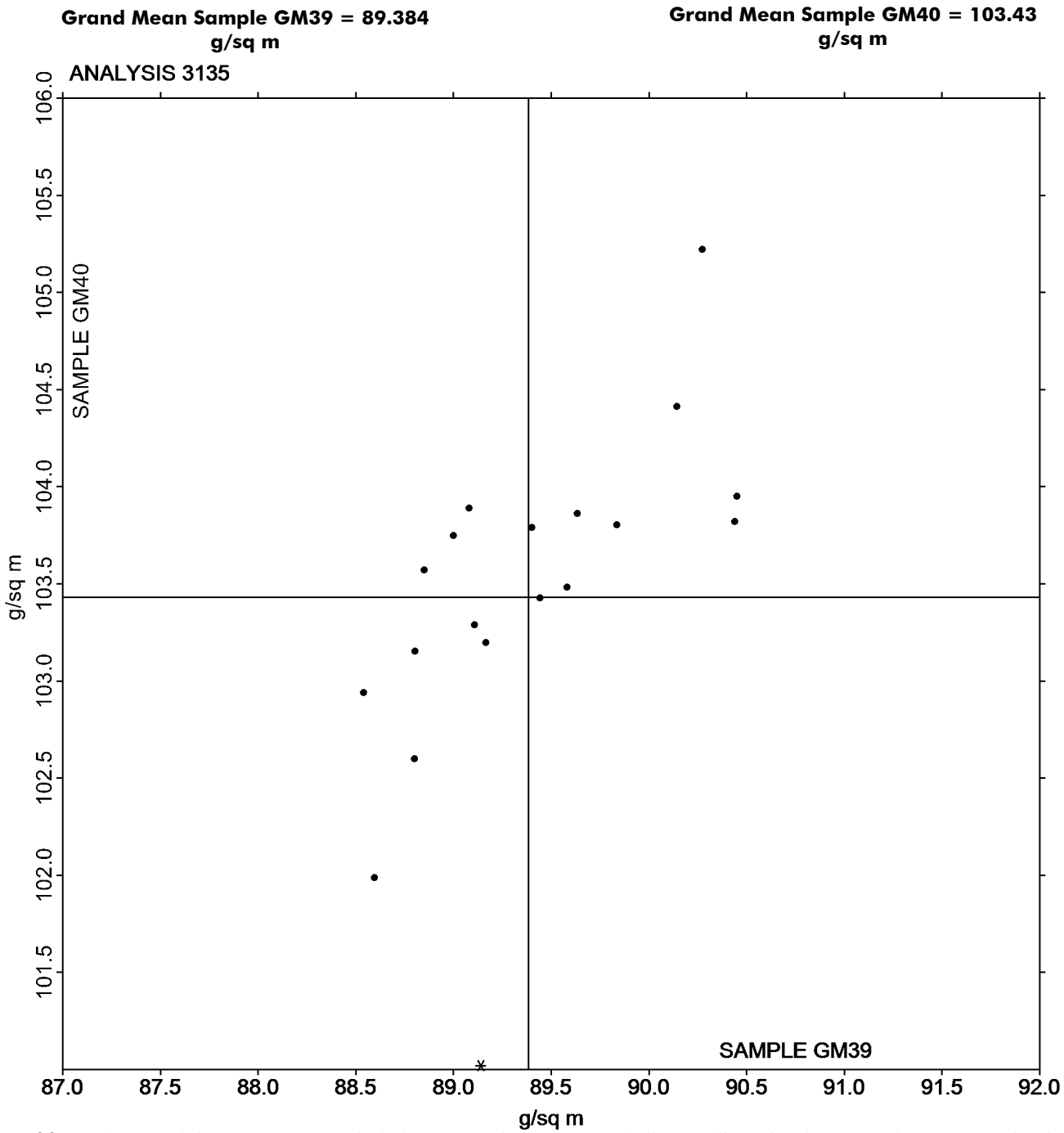
WebCode	Data Flag	Sample GM39 Lab Mean	Sample GM39 Diff from Grand Mean	Sample GM39 CPV	Sample GM40 Lab Mean	Sample GM40 Diff from Grand Mean	Sample GM40 CPV	Instr Code
2APC6K		88.54	-0.84	-1.39	102.9	-0.5	-0.55	ZZ
2WWD9V		88.60	-0.79	-1.29	102.0	-1.4	-1.61	ZZ
3PD66C		89.08	-0.30	-0.50	103.9	0.5	0.52	ZZ
3TV8CG		89.44	0.06	0.10	103.4	0.0	0.00	ZZ
4PRJ3T		89.00	-0.38	-0.63	103.7	0.3	0.36	ZZ
8QUVHC		89.17	-0.22	-0.36	103.2	-0.2	-0.26	ZZ
8R28YD		89.64	0.25	0.41	103.9	0.4	0.48	ZZ
9WBQX7		89.40	0.02	0.03	103.8	0.4	0.40	ZZ
9YFDBB		90.45	1.07	1.76	104.0	0.5	0.58	ZZ
BVV8PK		88.81	-0.58	-0.95	103.2	-0.3	-0.31	ZZ
DPVVKY	*	89.14	-0.24	-0.40	101.0	-2.4	-2.70	ZZ
F8AU33		90.44	1.06	1.74	103.8	0.4	0.44	ZZ
HA6LNV		89.84	0.45	0.74	103.8	0.4	0.42	ZZ
J6Q7WJ		89.11	-0.27	-0.45	103.3	-0.1	-0.16	ZZ
LENQ8A		90.15	0.76	1.25	104.4	1.0	1.10	ZZ
NVQ89T		90.27	0.89	1.46	105.2	1.8	2.01	ZZ
TCF749		88.85	-0.53	-0.88	103.6	0.1	0.16	ZZ
W2LYWE		88.80	-0.58	-0.96	102.6	-0.8	-0.93	ZZ
Z2C44J		89.58	0.20	0.32	103.5	0.1	0.06	ZZ

Summary Statistics	Sample GM39	Sample GM40
Grand Means	89.38 g/sq m	103.43 g/sq m
Stnd Dev Btwn Labs	0.61 g/sq m	0.89 g/sq m

Statistics based on 19 of 19 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 3141

Opacity (89% Reflectance Backing) - Fine Papers

TAPPI Official Test Method T425

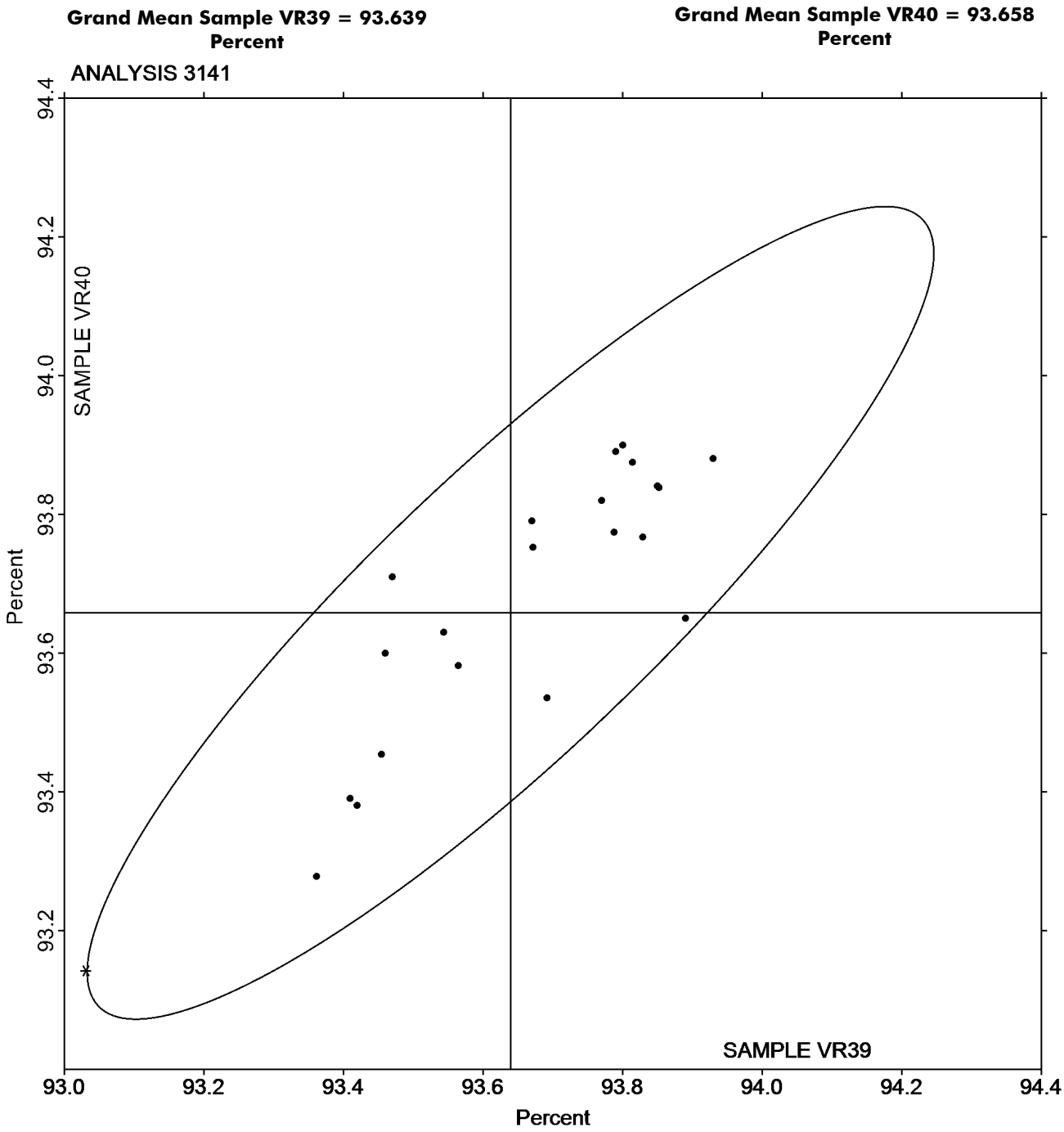
WebCode	Data Flag	Sample VR39 Lab Mean	Sample VR39 Diff from Grand Mean	Sample VR39 CPV	Sample VR40 Lab Mean	Sample VR40 Diff from Grand Mean	Sample VR40 CPV	Instr Code
2APC6K		93.42	-0.22	-0.98	93.38	-0.28	-1.29	ZZ
2WWD9V		93.54	-0.10	-0.43	93.63	-0.03	-0.13	ZZ
3PD66C		93.47	-0.17	-0.76	93.71	0.05	0.24	ZZ
6FGGGR		93.77	0.13	0.58	93.82	0.16	0.75	ZZ
9WBQX7		93.67	0.03	0.14	93.79	0.13	0.61	ZZ
AVDWD8	*	93.03	-0.61	-2.72	93.14	-0.52	-2.39	ZZ
BTNFRK		93.81	0.17	0.78	93.88	0.22	1.00	ZZ
CFEPAQ		93.80	0.16	0.72	93.90	0.24	1.12	ZZ
CH34YZ		93.46	-0.18	-0.80	93.60	-0.06	-0.27	ZZ
CYPLR2		93.57	-0.07	-0.33	93.58	-0.08	-0.35	ZZ
E7HDDZ		93.79	0.15	0.66	93.77	0.12	0.54	ZZ
F8AU33		93.41	-0.23	-1.02	93.39	-0.27	-1.24	ZZ
HA6LNV		93.89	0.25	1.12	93.65	-0.01	-0.04	ZZ
HUYZNU		93.67	0.03	0.15	93.75	0.09	0.43	ZZ
KDZVAH		93.85	0.21	0.94	93.84	0.18	0.85	ZZ
LENQ8A		93.93	0.29	1.30	93.88	0.22	1.03	ZZ
NVQ89T		93.36	-0.28	-1.24	93.28	-0.38	-1.76	ZZ
QWVGDV		93.46	-0.18	-0.82	93.45	-0.20	-0.94	ZZ
RCK4WT		93.69	0.05	0.24	93.54	-0.12	-0.57	ZZ
RMNLP4		93.85	0.21	0.95	93.84	0.18	0.83	ZZ
TCF749		93.79	0.15	0.67	93.89	0.23	1.07	ZZ
YQ2ABE		93.83	0.19	0.85	93.77	0.11	0.50	ZZ

Summary Statistics	Sample VR39	Sample VR40
Grand Means	93.64 Percent	93.66 Percent
Stnd Dev Btwn Labs	0.22 Percent	0.22 Percent

Statistics based on 22 of 22 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



		Sample VP39			Sample VP40			
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	Instr Code
2HY2HJ		92.91			92.82			ZZ

Summary Statistics	Sample VP39	Sample VP40
Grand Means	Percent	Percent
Stnd Dev Btwn Labs	Percent	Percent

Statistics based on of 1 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.

Grand Mean Sample VP39 = Percent

Grand Mean Sample VP40 = Percent

No graph is available due to the low population of participants reporting numeric data.

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 3145

Directional Brightness of Fluorescent Samples

TAPPI Official Test Method T452

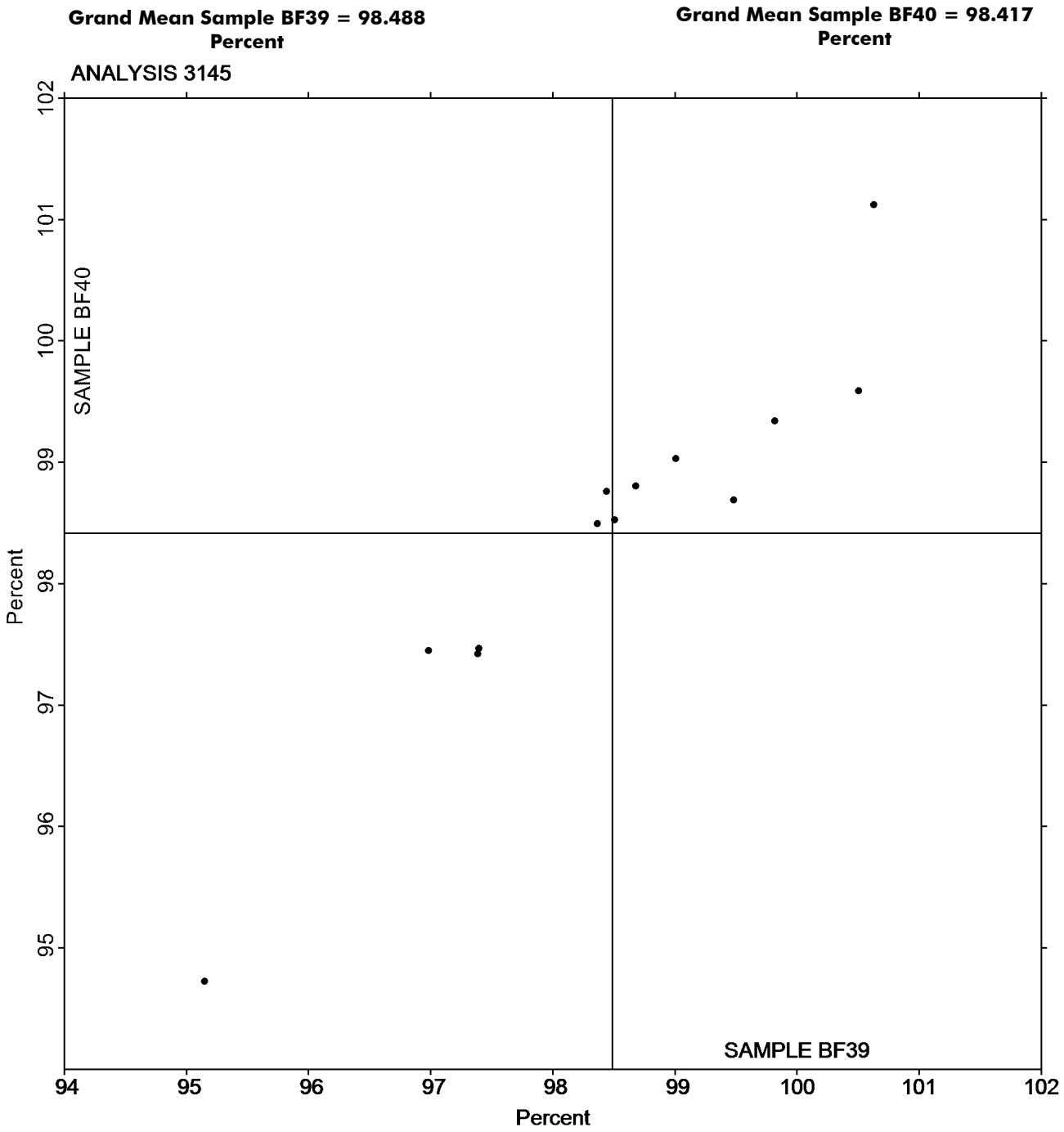
WebCode	Data Flag	Sample BF39 Lab Mean	Sample BF39 Diff from Grand Mean	Sample BF39 CPV	Sample BF40 Lab Mean	Sample BF40 Diff from Grand Mean	Sample BF40 CPV	Instr Code
2WWD9V		98.36	-0.12	-0.08	98.49	0.08	0.05	TE
6XJQ8W		98.44	-0.05	-0.03	98.76	0.34	0.23	XX
9WBQX7		99.48	0.99	0.65	98.69	0.27	0.18	TD
BTNFRK		99.01	0.52	0.34	99.03	0.62	0.41	TC
CFEPAQ		99.82	1.33	0.88	99.34	0.92	0.62	TD
CYPLR2		95.15	-3.34	-2.20	94.73	-3.69	-2.47	PP
HUYZNU		98.51	0.02	0.01	98.53	0.11	0.07	TS
KDZVAH		100.50	2.02	1.33	99.59	1.17	0.79	TD
NVQ89T		98.68	0.19	0.13	98.81	0.39	0.26	TS
RCK4WT		97.39	-1.10	-0.73	97.42	-0.99	-0.67	TE
RMNLP4		100.63	2.14	1.41	101.12	2.70	1.81	TE
X92ZRH		97.40	-1.09	-0.72	97.47	-0.95	-0.64	TS
YQ2ABE		96.98	-1.51	-0.99	97.45	-0.97	-0.65	PP

Summary Statistics	Sample BF39	Sample BF40
Grand Means	98.49 Percent	98.42 Percent
Stnd Dev Btwn Labs	1.52 Percent	1.49 Percent

Statistics based on 13 of 13 reporting participants.

Key to Instrument Codes Reported by Participants

PP	Technidyne Profile/Plus	TC	Technidyne Color Touch Series
TD	Technidyne Color Touch X-45	TE	Technidyne TEST/Plus TAPPI Brightness
TS	Technidyne Brightimeter Micro S-5	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 3146

Fluorescent Component of Directional Brightness

TAPPI Official Test Method T452

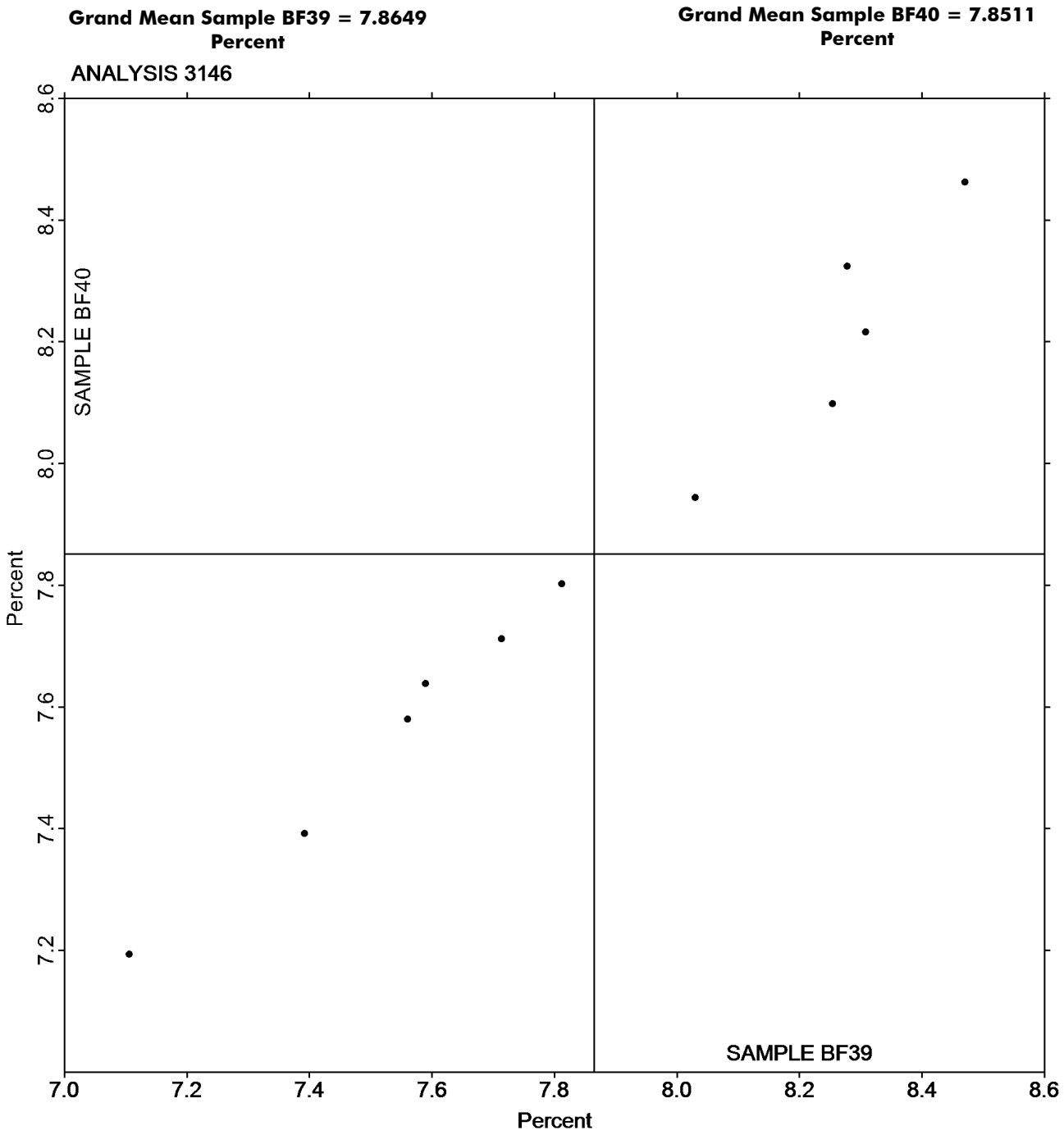
WebCode	Data Flag	Sample BF39 Lab Mean	Sample BF39 Diff from Grand Mean	Sample BF39 CPV	Sample BF40 Lab Mean	Sample BF40 Diff from Grand Mean	Sample BF40 CPV	Instr Code
2WWD9V		8.254	0.389	0.89	8.098	0.247	0.62	TE
6XJQ8W		7.560	-0.305	-0.70	7.580	-0.271	-0.68	XX
9WBQX7		8.308	0.443	1.02	8.216	0.365	0.92	TD
BTNFRK		8.470	0.605	1.39	8.462	0.611	1.54	TE
CYPLR2		7.714	-0.151	-0.35	7.712	-0.139	-0.35	XX
HUYZNU		7.812	-0.053	-0.12	7.802	-0.049	-0.12	TS
KDZVAH		8.030	0.165	0.38	7.944	0.093	0.23	TD
RCK4WT		7.106	-0.759	-1.74	7.194	-0.657	-1.65	TE
RMNLP4		8.278	0.413	0.95	8.324	0.473	1.19	TE
X92ZRH		7.392	-0.473	-1.08	7.392	-0.459	-1.15	TS
YQ2ABE		7.590	-0.275	-0.63	7.638	-0.213	-0.54	PP

Summary Statistics	Sample BF39	Sample BF40
Grand Means	7.86 Percent	7.85 Percent
Stnd Dev Btwn Labs	0.44 Percent	0.40 Percent

Statistics based on 11 of 11 reporting participants.

Key to Instrument Codes Reported by Participants

PP	Technidyne Profile/Plus	TD	Technidyne Color Touch X-45
TE	Technidyne TEST/Plus TAPPI Brightness	TS	Technidyne Brightimeter Micro S-5
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 3201

Bending Resistance, Taber Type - 0 to 10 Units

TAPPI Official Test Method T566

WebCode	Data Flag	Sample TP39 Lab Mean	Sample TP39 Diff from Grand Mean	Sample TP39 CPV	Sample TP40 Lab Mean	Sample TP40 Diff from Grand Mean	Sample TP40 CPV	Instr Code
3PD66C		3.121	1.066	2.33	2.774	0.766	2.16	ZZ
AVDWD8		1.980	-0.075	-0.16	2.060	0.052	0.15	ZZ
BTNFRK		1.591	-0.464	-1.01	1.621	-0.386	-1.09	ZZ
C3NXM2		2.360	0.304	0.66	2.100	0.092	0.26	ZZ
CYPLR2		1.812	-0.244	-0.53	1.788	-0.220	-0.62	ZZ
HUYZNU		1.772	-0.284	-0.62	1.723	-0.285	-0.80	ZZ
RMNLP4		1.890	-0.165	-0.36	1.892	-0.116	-0.33	ZZ
TCF749		1.821	-0.234	-0.51	1.822	-0.186	-0.52	ZZ
TMFE8K		2.150	0.095	0.21	2.290	0.282	0.80	ZZ

Summary Statistics	Sample TP39	Sample TP40
Grand Means	2.06 Taber Units	2.01 Taber Units
Stnd Dev Btwn Labs	0.46 Taber Units	0.35 Taber Units

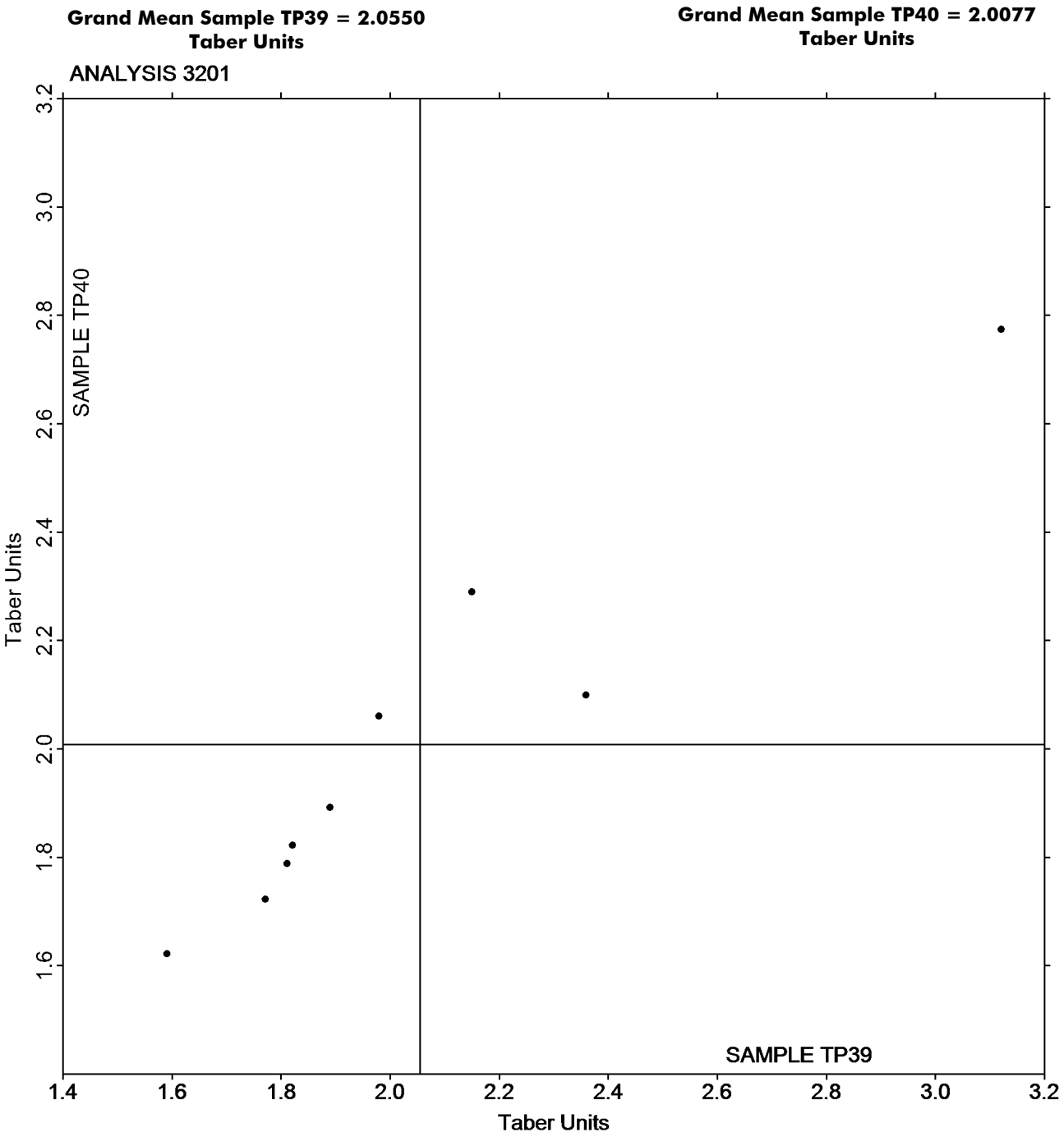
Statistics based on 9 of 9 reporting participants.

Analysis Notes:

BTNFRK - Data appear to be reported as mN-m, not g-cm as indicated on data entry form. CTS will not correct the Units going forward.

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 3203

Bending Resistance, Taber Type - 10 to 100 Taber Units

TAPPI Official Test Method T489

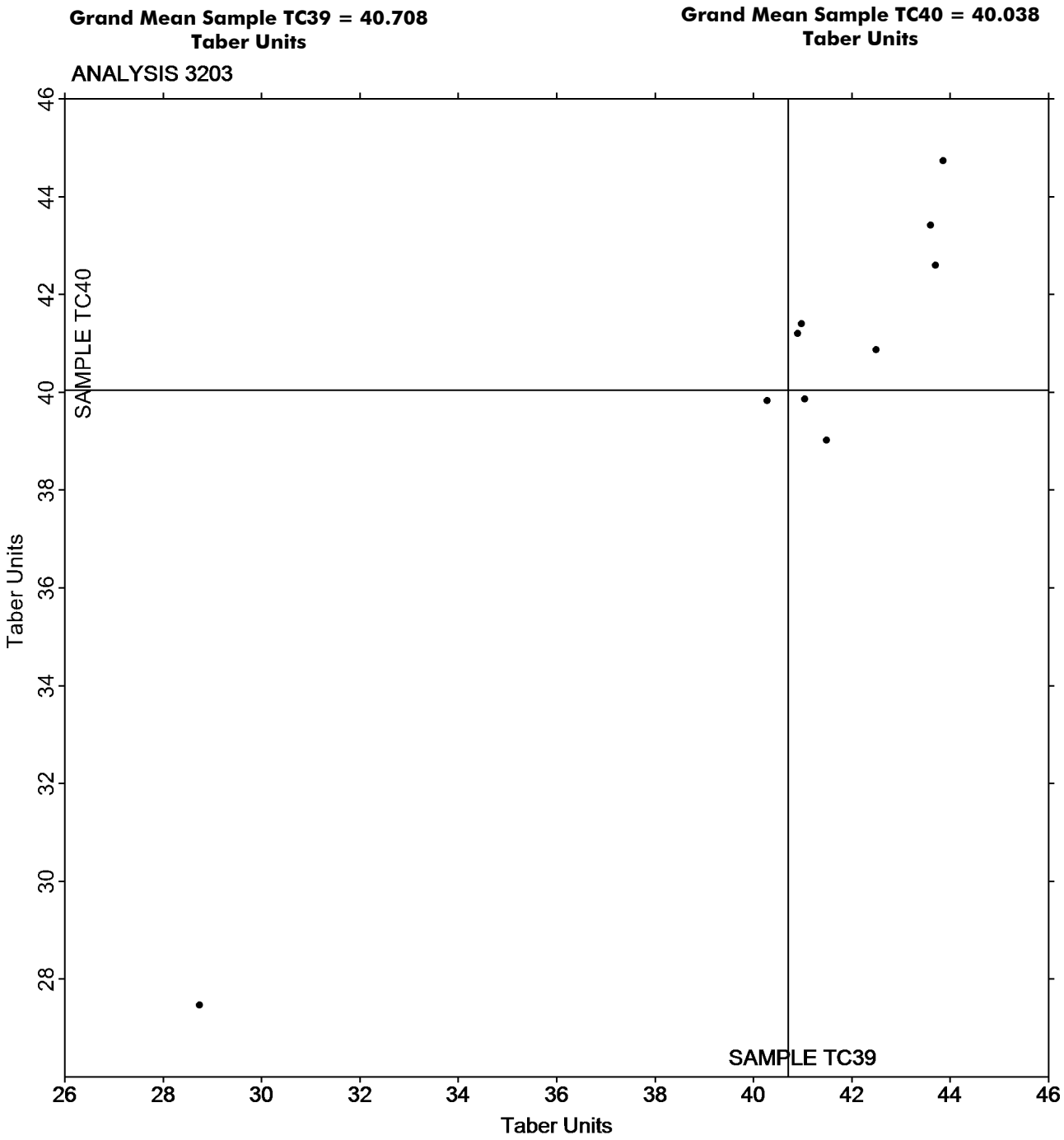
WebCode	Data Flag	Sample TC39 Lab Mean	Sample TC39 Diff from Grand Mean	Sample TC39 CPV	Sample TC40 Lab Mean	Sample TC40 Diff from Grand Mean	Sample TC40 CPV	Instr Code
2Y3BNB		40.90	0.19	0.04	41.20	1.16	0.24	ZZ
4U34VC		43.70	2.99	0.68	42.60	2.56	0.54	ZZ
6YRZX9		41.04	0.33	0.08	39.86	-0.18	-0.04	ZZ
9WBQX7		40.28	-0.43	-0.10	39.83	-0.21	-0.04	ZZ
BTNFRK		28.74	-11.97	-2.72	27.47	-12.57	-2.65	ZZ
KXPE2U		40.98	0.27	0.06	41.40	1.36	0.29	ZZ
MDRUZR		43.60	2.89	0.66	43.41	3.37	0.71	ZZ
TUHLMN		43.86	3.15	0.72	44.73	4.69	0.99	ZZ
VYM4XL		42.49	1.78	0.40	40.87	0.83	0.18	ZZ
YLMUJ2		41.49	0.78	0.18	39.02	-1.02	-0.21	ZZ

Summary Statistics	Sample TC39	Sample TC40
Grand Means	40.71 Taber Units	40.04 Taber Units
Stnd Dev Btwn Labs	4.41 Taber Units	4.75 Taber Units

Statistics based on 10 of 10 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



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

Paper & Paperboard Interlaboratory Testing Program

Analysis 3205

Bending Resistance, Taber Type - 50 to 500 Taber Units - Recycled Paperboard

TAPPI Official Test Method T489

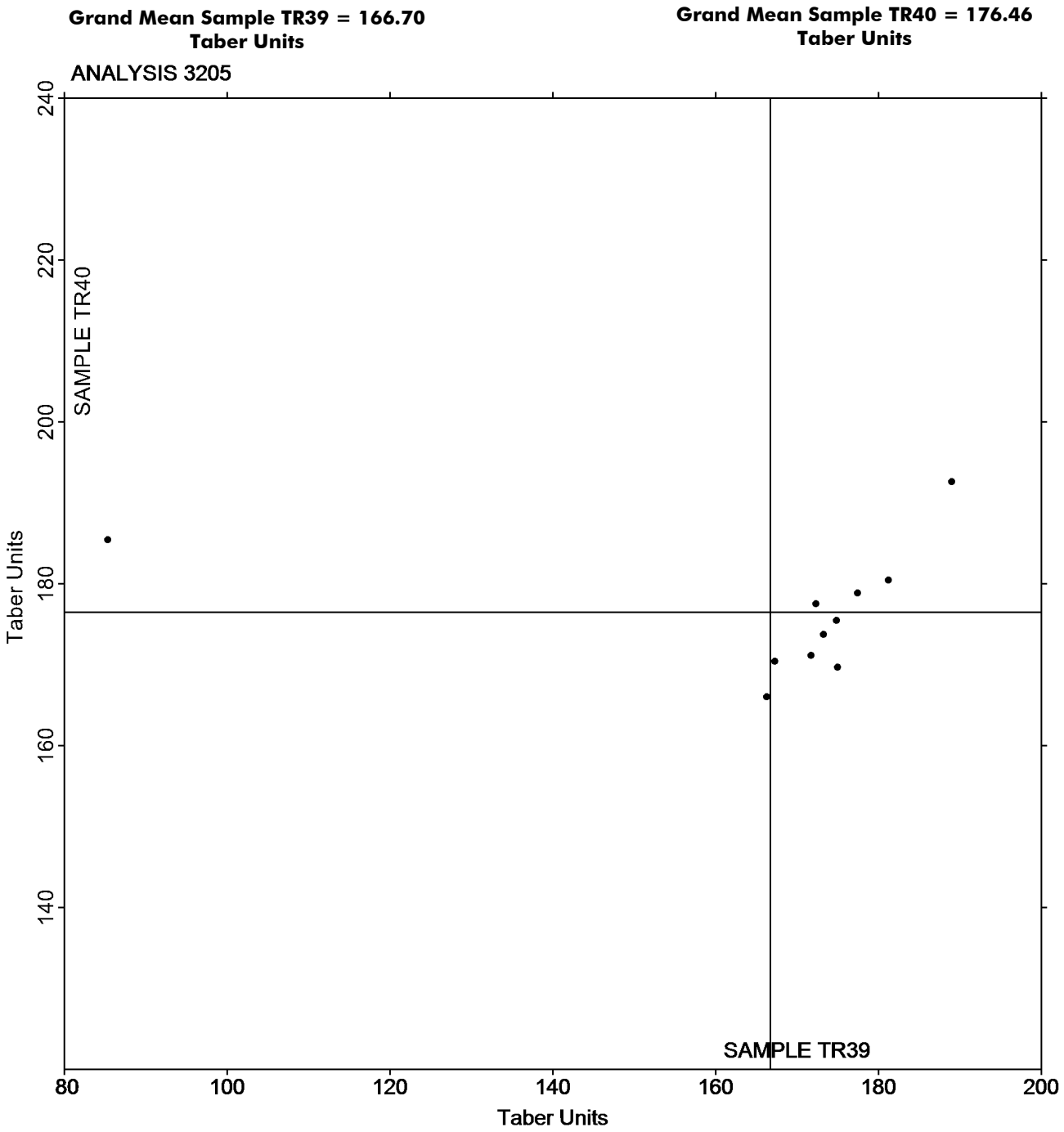
WebCode	Data Flag	Sample TR39 Lab Mean	Sample TR39 Diff from Grand Mean	Sample TR39 CPV	Sample TR40 Lab Mean	Sample TR40 Diff from Grand Mean	Sample TR40 CPV	Instr Code
72VVGB		181.2	14.5	0.52	180.4	3.9	0.51	ZZ
CH34YZ		173.3	6.6	0.24	173.8	-2.7	-0.35	ZZ
CRNAV4		166.3	-0.4	-0.01	166.0	-10.5	-1.36	ZZ
KXPE2U		175.0	8.3	0.30	169.7	-6.8	-0.88	ZZ
MDRUZR		177.4	10.7	0.39	178.8	2.4	0.31	ZZ
RFKETT		171.8	5.1	0.18	171.1	-5.3	-0.69	ZZ
TQGKLQ		189.0	22.3	0.81	192.6	16.1	2.10	ZZ
UELQPM		85.4	-81.3	-2.94	185.4	8.9	1.16	ZZ
UJDVHR		172.3	5.6	0.20	177.5	1.0	0.13	ZZ
VYM4XL		174.8	8.1	0.29	175.5	-1.0	-0.13	ZZ
X8RP27		167.3	0.6	0.02	170.4	-6.1	-0.79	ZZ

Summary Statistics	Sample TR39	Sample TR40
Grand Means	166.70 Taber Units	176.46 Taber Units
Stnd Dev Btwn Labs	27.70 Taber Units	7.69 Taber Units

Statistics based on 11 of 11 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



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

Paper & Paperboard Interlaboratory Testing Program

Report #4351, March 2025

Analysis 3207

Z-Direction Tensile, Recycled Paperboard

TAPPI Official Test Method T541

WebCode	Data Flag	Sample ZR39 Lab Mean	Sample ZR39 Diff from Grand Mean	Sample ZR39 CPV	Sample ZR40 Lab Mean	Sample ZR40 Diff from Grand Mean	Sample ZR40 CPV	Instr Code
2HHKPB		53.20	0.05	0.01	53.80	1.71	0.44	XX
2V4ZTB		59.78	6.63	1.58	55.94	3.85	0.99	LW
47UTTX		56.80	3.65	0.87	56.40	4.31	1.11	CD
72VVGB		52.20	-0.95	-0.23	52.60	0.51	0.13	TA
79UH9B		52.20	-0.95	-0.23	51.92	-0.17	-0.04	XX
8GJTWB	*	43.16	-9.99	-2.38	41.49	-10.60	-2.73	CH
CH34YZ		47.72	-5.43	-1.30	48.00	-4.09	-1.05	CD
J8EKKT		49.00	-4.15	-0.99	47.80	-4.29	-1.11	CA
JMTD4D		50.76	-2.39	-0.57	50.82	-1.27	-0.33	LW
KXPE2U		53.00	-0.15	-0.04	52.84	0.75	0.19	LW
NXCQEW		54.36	1.21	0.29	50.46	-1.63	-0.42	TA
PPE988		50.26	-2.89	-0.69	49.95	-2.14	-0.55	LW
RFKETT		53.69	0.54	0.13	51.94	-0.15	-0.04	CH
RXZNUT		58.66	5.51	1.32	56.38	4.29	1.11	DP
UELQPM		54.76	1.61	0.38	55.72	3.63	0.94	CA
UJDVHR		52.00	-1.15	-0.27	50.80	-1.29	-0.33	CA
UV7EYH		59.26	6.11	1.46	57.82	5.73	1.48	LW
VYM4XL		57.62	4.47	1.07	54.88	2.79	0.72	CD
WJQ7BG	X	142.28	89.13	21.27	144.80	92.71	23.89	LW
X8RP27		51.42	-1.73	-0.41	50.14	-1.95	-0.50	TA

Summary Statistics	Sample ZR39	Sample ZR40
Grand Means	53.15 psi	52.09 psi
Stnd Dev Btwn Labs	4.19 psi	3.88 psi

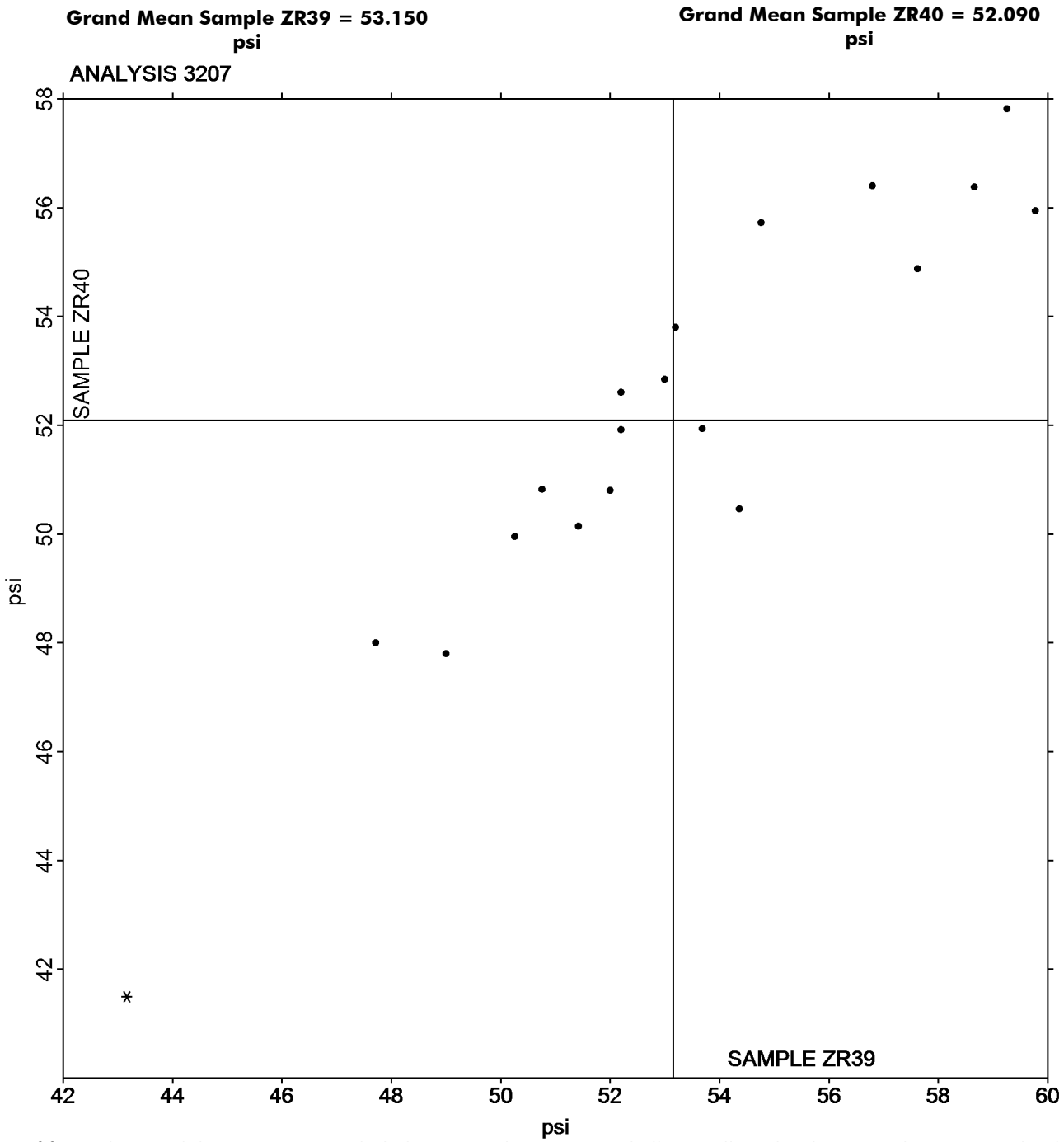
Statistics based on 19 of 20 reporting participants.

Comments on Assigned Data Flags for Test #3207

WJQ7BG (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

CA	CSI CS-163	CD	CSI CS-163D
CH	Chatillon Ametek	DP	Dek-Tron XP Series
LW	L & W ZD Tensile Tester	TA	Thwing-Albert Tensile Tester
XX	Instrument make/model not specified by lab		



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

Paper & Paperboard Interlaboratory Testing Program

Analysis 3209
Z-Direction Tensile
TAPPI Official Test Method T541

WebCode	Data Flag	Sample ZP39 Lab Mean	Sample ZP39 Diff from Grand Mean	Sample ZP39 CPV	Sample ZP40 Lab Mean	Sample ZP40 Diff from Grand Mean	Sample ZP40 CPV	Instr Code
4U34VC		81.60	1.78	0.23	95.28	8.57	0.74	CD
4XYPMF		79.40	-0.42	-0.06	85.60	-1.11	-0.10	TA
6YRZX9		72.12	-7.70	-1.01	72.64	-14.07	-1.21	CD
CRNAV4		72.48	-7.34	-0.96	70.48	-16.23	-1.39	CD
KXPE2U		88.70	8.88	1.16	99.28	12.57	1.08	LW
TQGKLQ		92.44	12.62	1.65	98.78	12.07	1.04	LW
TUHLMN		79.24	-0.58	-0.08	93.16	6.45	0.55	CD
YLMUJ2		72.58	-7.24	-0.95	78.46	-8.25	-0.71	TA

Summary Statistics	Sample ZP39	Sample ZP40
Grand Means	79.82 psi	86.71 psi
Stnd Dev Btwn Labs	7.63 psi	11.65 psi

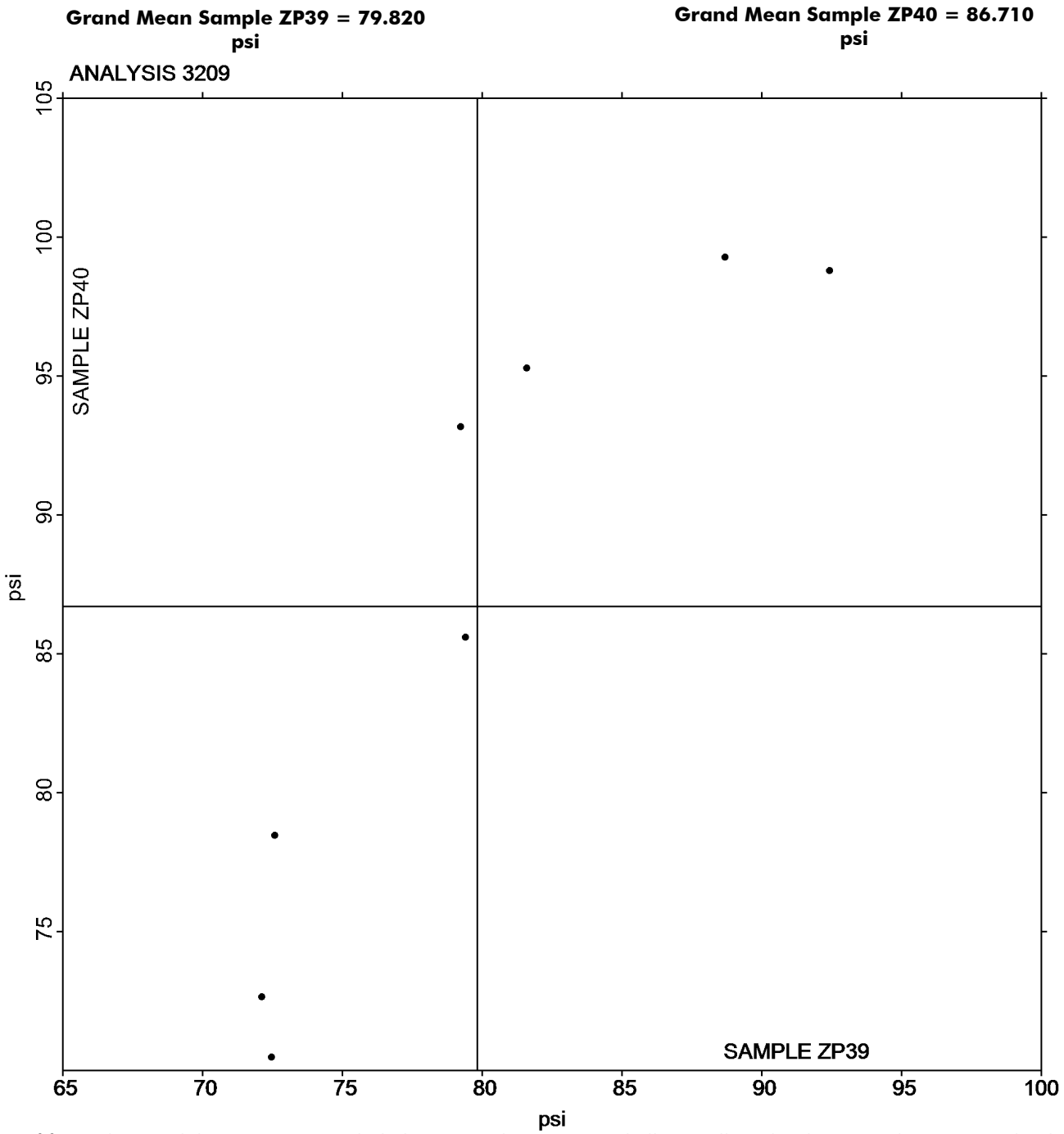
Statistics based on 8 of 8 reporting participants.

Key to Instrument Codes Reported by Participants

CD CSI CS-163D

LW L & W ZD Tensile Tester

TA Thwing-Albert Tensile Tester



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 3211

Internal Bond Strength - Modified Scott Mechanics

TAPPI Provisional Test Method T569

WebCode	Data Flag	Sample SM39 Lab Mean	Sample SM39 Diff from Grand Mean	Sample SM39 CPV	Sample SM40 Lab Mean	Sample SM40 Diff from Grand Mean	Sample SM40 CPV	Instr Code
2WWD9V		119.0	-5.5	-0.63	92.6	-9.2	-0.85	HX
4U34VC		133.4	8.9	1.00	113.2	11.4	1.06	HY
6XJQ8W		119.2	-5.3	-0.60	110.6	8.8	0.82	HX
CK47N2		131.6	7.1	0.80	109.6	7.8	0.73	HY
JLVDAZ		108.4	-16.1	-1.82	95.8	-6.0	-0.55	HZ
KXPE2U		133.6	9.1	1.02	113.0	11.2	1.04	HZ
QWVGDV		122.8	-1.7	-0.20	105.2	3.4	0.32	HY
TMFE8K		115.2	-9.3	-1.05	88.8	-13.0	-1.20	KR
TQGKLQ		115.8	-8.7	-0.99	78.8	-23.0	-2.13	HZ
TUHLMN		133.0	8.5	0.96	106.6	4.8	0.45	HY
UJDVHR		132.6	8.1	0.91	99.6	-2.2	-0.20	XX
YLMUJ2		129.8	5.3	0.60	107.4	5.6	0.52	HZ

Summary Statistics	Sample SM39	Sample SM40
Grand Means	124.53 1000th ft-lbs	101.77 1000th ft-lbs
Stnd Dev Btwn Labs	8.85 1000th ft-lbs	10.80 1000th ft-lbs

Statistics based on 12 of 12 reporting participants.

Key to Instrument Codes Reported by Participants

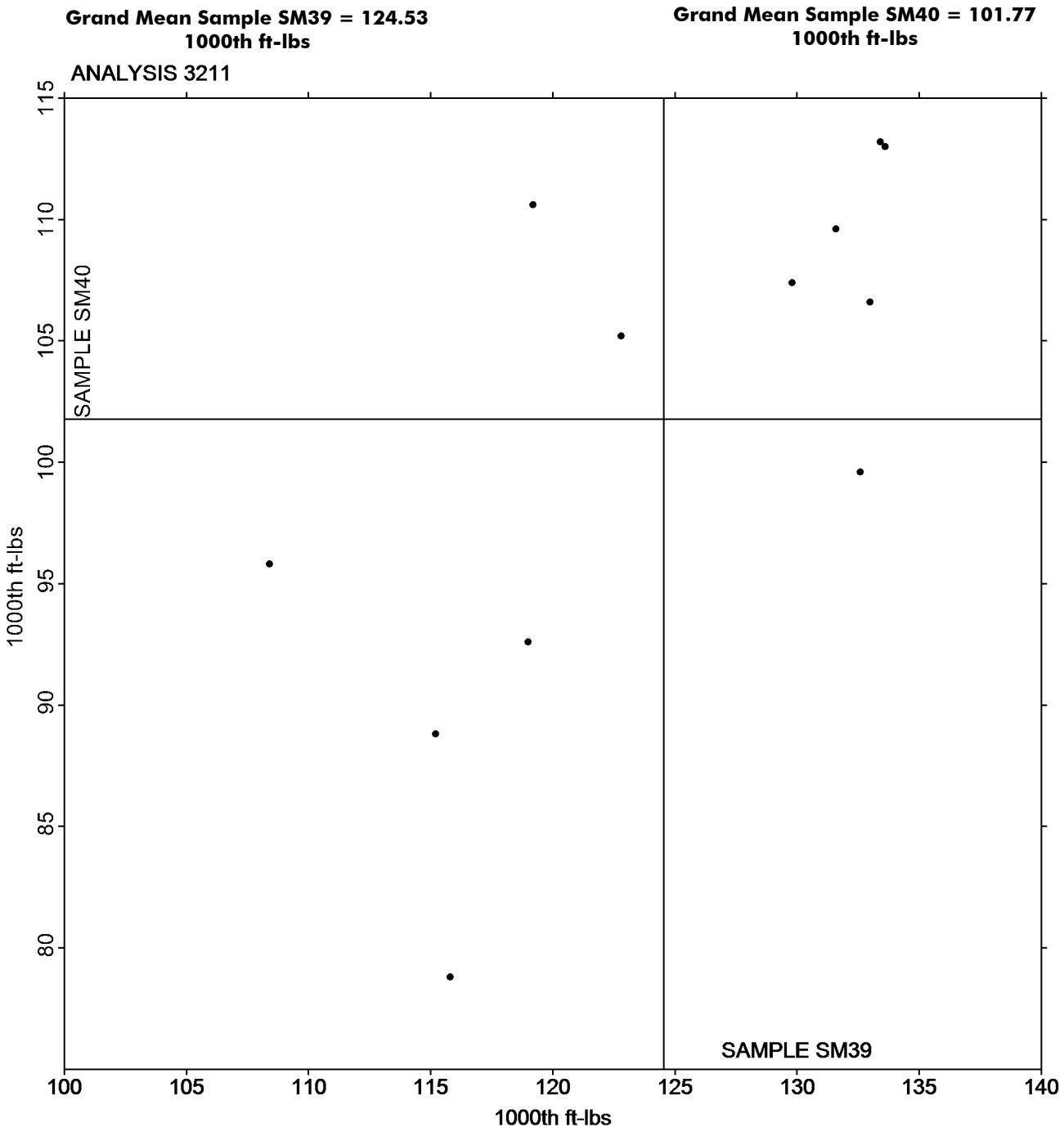
HX Huygen Internal Scott Bond Tester

HY Huygen Digitized Internal Scott Bond Tester

HZ Huygen Internal Bond Tester with AccuPress

KR Kumagai Riki Kogyo Internal Bond Tester

XX Instrument make/model not specified by lab



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

Paper & Paperboard Interlaboratory Testing Program

Analysis 3213

Internal Bond Strength - Scott Bond Models

TAPPI Provisional Test Method T569

WebCode	Data Flag	Sample SB39 Lab Mean	Sample SB39 Diff from Grand Mean	Sample SB39 CPV	Sample SB40 Lab Mean	Sample SB40 Diff from Grand Mean	Sample SB40 CPV	Instr Code
2Y3BNB		117.4	-0.1	-0.01	89.80	-5.95	-0.42	ID
4KYPCY		121.6	4.1	0.33	96.00	0.25	0.02	TM
8GJTWB		116.2	-1.3	-0.11	91.00	-4.75	-0.34	TM
BTNFRK		133.4	15.9	1.29	121.20	25.45	1.81	SC
CFEPAQ		138.0	20.5	1.67	114.20	18.45	1.31	TM
EM9GVP		102.2	-15.3	-1.25	77.40	-18.35	-1.31	TM
HUYZNU		104.8	-12.7	-1.04	76.80	-18.95	-1.35	TM
RMNLP4		102.0	-15.5	-1.26	101.00	5.25	0.37	SC
VN4RKM		116.8	-0.8	-0.06	94.12	-1.63	-0.12	TM
ZNQPZJ		123.0	5.5	0.44	96.00	0.25	0.02	TM

Summary Statistics	Sample SB39	Sample SB40
Grand Means	117.54 1000th ft-lbs	95.75 1000th ft-lbs
Stnd Dev Btwn Labs	12.28 1000th ft-lbs	14.03 1000th ft-lbs

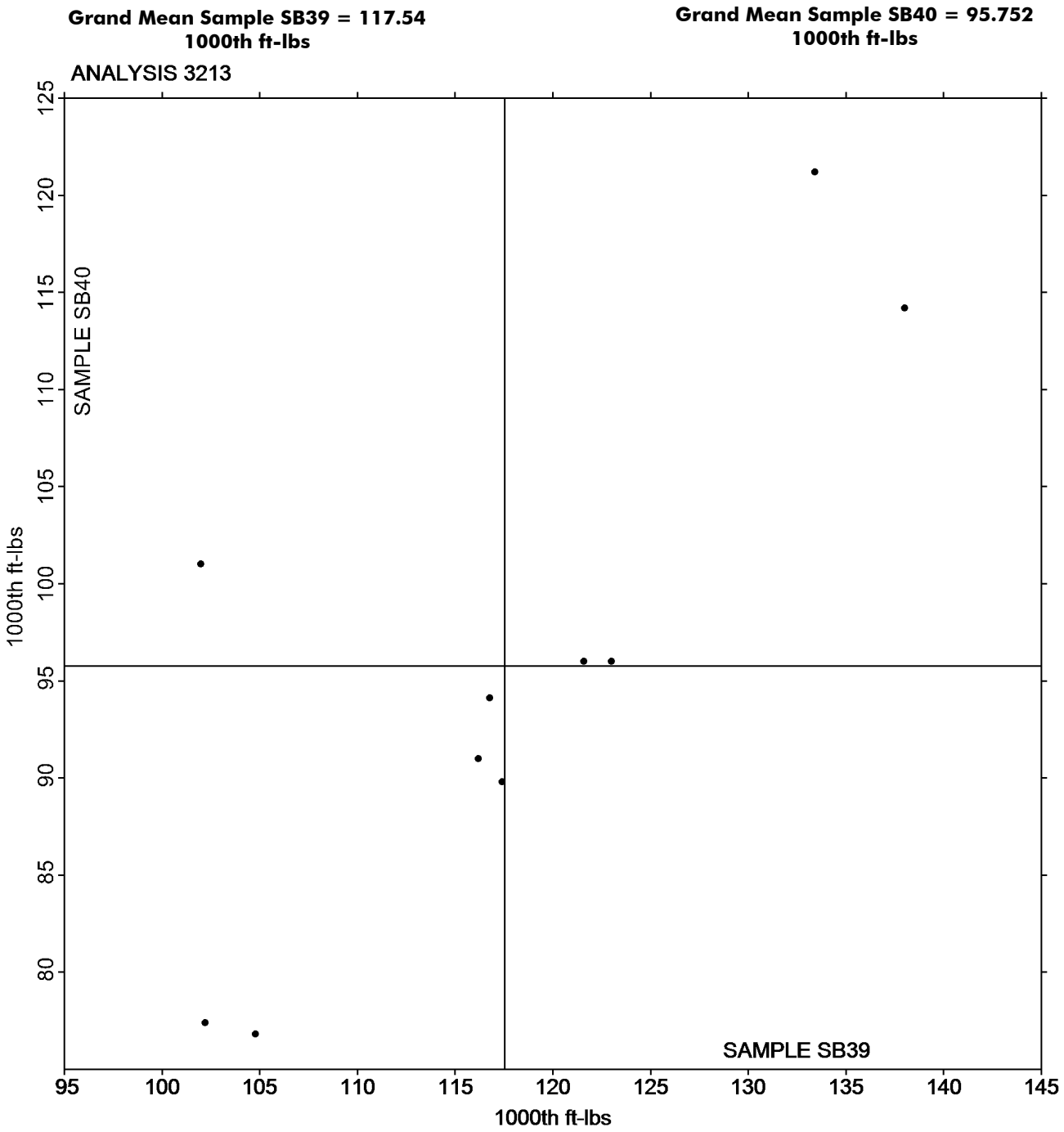
Statistics based on 10 of 10 reporting participants.

Key to Instrument Codes Reported by Participants

ID IDM Internal Bond Tester

SC Scott Internal Bond Tester (Manual)

TM TMI Monitor/Internal Bond Tester



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

-End of Report-