Collaborative Testing Services, Inc.

Paper & Paperboard Testing Program

Summary Report #4391 - November 2025

Analysis	Analysis Name
3101	Thickness (Caliper), Printing papers
3111	Bursting Strength - Printing Papers
3113	Tearing Strength - Printing Papers
3115	Tensile Breaking Strength - Printing Papers
3116	Tensile Energy Absorption - Printing Papers
3117	Elongation to Break - Printing Papers
3121	Air Resistance - Gurley Oil Type
3123	Porosity - Sheffield Type - Sheffield Units for 3/4 inch Diameter Orifice
3131	Roughness - Print Surf Method - 2.5 to 6.0 Microns
3133	Roughness - Sheffield Type
3135	Grammage (Mass per Unit Area)
3141	Opacity (89% Reflectance Backing) - Fine Papers
3143	Opacity (Paper Backing) - Fine Papers and Newsprint
3145	Directional Brightness of Fluorescent Samples
3146	Fluorescent Component of Directional Brightness
3201	Bending Resistance, Taber Type - 0 to 10 Units
3203	Bending Resistance, Taber Type - 10 to 100 Taber Units
3205	Bending Resistance, Taber Type - 50 to 500 Taber Units - Recycled Paperboard
3207	Z-Direction Tensile, Recycled Paperboard
3209	Z-Direction Tensile
3211	Internal Bond Strength - Modified Scott Mechanics
3213	Internal Bond Strength - Scott Bond Models

The CTS Paper & Paperboard Interlaboratory Program

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

About CTS

Founded in 1971, Collaborative Testing Services, Inc. (CTS) is a privately - owned company that specializes in interlaboratory tests for a variety of industries including color, rubber, plastics, fasteners and metals, containerboard, paper, agriculture, hemp, and wine, as well as proficiency tests for forensic laboratories. All of the tests are designed to assist organizations in achieving and maintaining quality assurance objectives. Labs from the U.S., as well as more than 100 countries, currently participate in the CTS programs.

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

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

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

Key for Web Summary Reports (Page 1 of 2)

WebCode — Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Paper Report published on the CTS 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 CP47 Lab Mean	Sample CP47 Diff from Grand Mean	Sample CP47 CPV	Sample CP48 Lab Mean	Sample CP48 Diff from Grand Mean	Sample CP48 CPV	Instr Code
3T4MUC		4.050	0.054	0.81	4.024	0.031	0.44	EM
4J98HD		3.976	-0.020	-0.29	4.008	0.015	0.21	TA
4M8HED		4.110	0.115	1.71	4.102	0.110	1.54	TM
67YNKH	*	3.928	-0.068	-1.01	4.046	0.053	0.75	TM
6QAJEA		4.013	0.017	0.26	3.993	0.001	0.01	LW
6WEKCJ		4.056	0.061	0.90	4.086	0.093	1.31	LW
7HAHCM		4.022	0.026	0.39	4.010	0.017	0.25	LB
7TB76J		4.074	0.079	1.17	3.969	-0.023	-0.33	TA
8AE3ZN		4.026	0.030	0.45	3.983	-0.010	-0.14	LW
8FYX4D		3.929	-0.067	-0.99	3.899	-0.094	-1.32	TM
8GTLKM		4.065	0.069	1.03	4.054	0.061	0.85	TM
8VWACG		3.851	-0.145	-2.15	3.864	-0.129	-1.81	LW
99X79N		3.968	-0.028	-0.41	3.973	-0.020	-0.28	TA
9LL8QG		3.942	-0.054	-0.80	3.990	-0.003	-0.04	LA
9LZUZH		3.954	-0.041	-0.62	3.952	-0.040	-0.57	LW
ADPREG		4.089	0.093	1.39	4.104	0.111	1.56	PP
CBAAB3		3.957	-0.039	-0.58	3.904	-0.089	-1.25	EM
DKFBA9		4.129	0.133	1.99	4.073	0.080	1.13	LA
EBJZCH		4.004	0.008	0.12	3.994	0.001	0.02	EM
FHY297		3.988	-0.008	-0.11	3.970	-0.023	-0.32	LW
GV4E4C		3.936	-0.060	-0.89	3.916	-0.076	-1.07	LW
K37XRC		3.934	-0.062	-0.92	3.914	-0.079	-1.11	TA
LYQME9		4.049	0.053	0.79	4.081	0.088	1.24	LW
M6RL33		4.043	0.047	0.70	4.058	0.065	0.92	EM
MXR23T		4.011	0.015	0.23	4.037	0.044	0.62	PP
MZVWLV		3.929	-0.067	-0.99	3.921	-0.072	-1.01	TA
QH37D7		4.006	0.010	0.15	3.897	-0.096	-1.35	TA
TW2QUM		3.959	-0.037	-0.55	3.954	-0.039	-0.54	EM
UAG7BQ		3.968	-0.028	-0.41	3.927	-0.066	-0.92	PP
UAVXY2		3.890	-0.106	-1.57	3.992	-0.001	-0.01	TA
UDGH8Q		4.031	0.035	0.53	4.022	0.029	0.41	EM
W38RHK		4.033	0.037	0.56	4.064	0.071	1.00	EM
XFUHFU		3.961	-0.035	-0.52	4.011	0.018	0.26	LW
XN8A6R		4.043	0.048	0.71	3.993	0.001	0.01	LW
Y69GXY		4.065	0.069	1.03	4.119	0.126	1.77	EM
YUQWD3		3.854	-0.141	-2.11	3.835	-0.158	-2.22	MS

Paper & Paperboard Interlaboratory Testing Program

Analysis 3101

Thickness (Caliper), Printing papers

TAPPI Official Test Method T411

Summary Statistics	Sample CP47	Sample CP48
Grand Means	4.00 mils	3.99 mils
Stnd Dev Btwn Labs	0.07 mils	0.07 mils

Statistics based on 36 of 36 reporting participants.

Analysis Notes:

DKFBA9 - Data appear to be reported as mils, not micrometers as indicated on data entry form. CTS will not correct the Units going forward.

LYQME9 - One determination removed from the Lab Mean of Sample CP47 per Grubb's Test at 1% risk (TAPPI 1205).

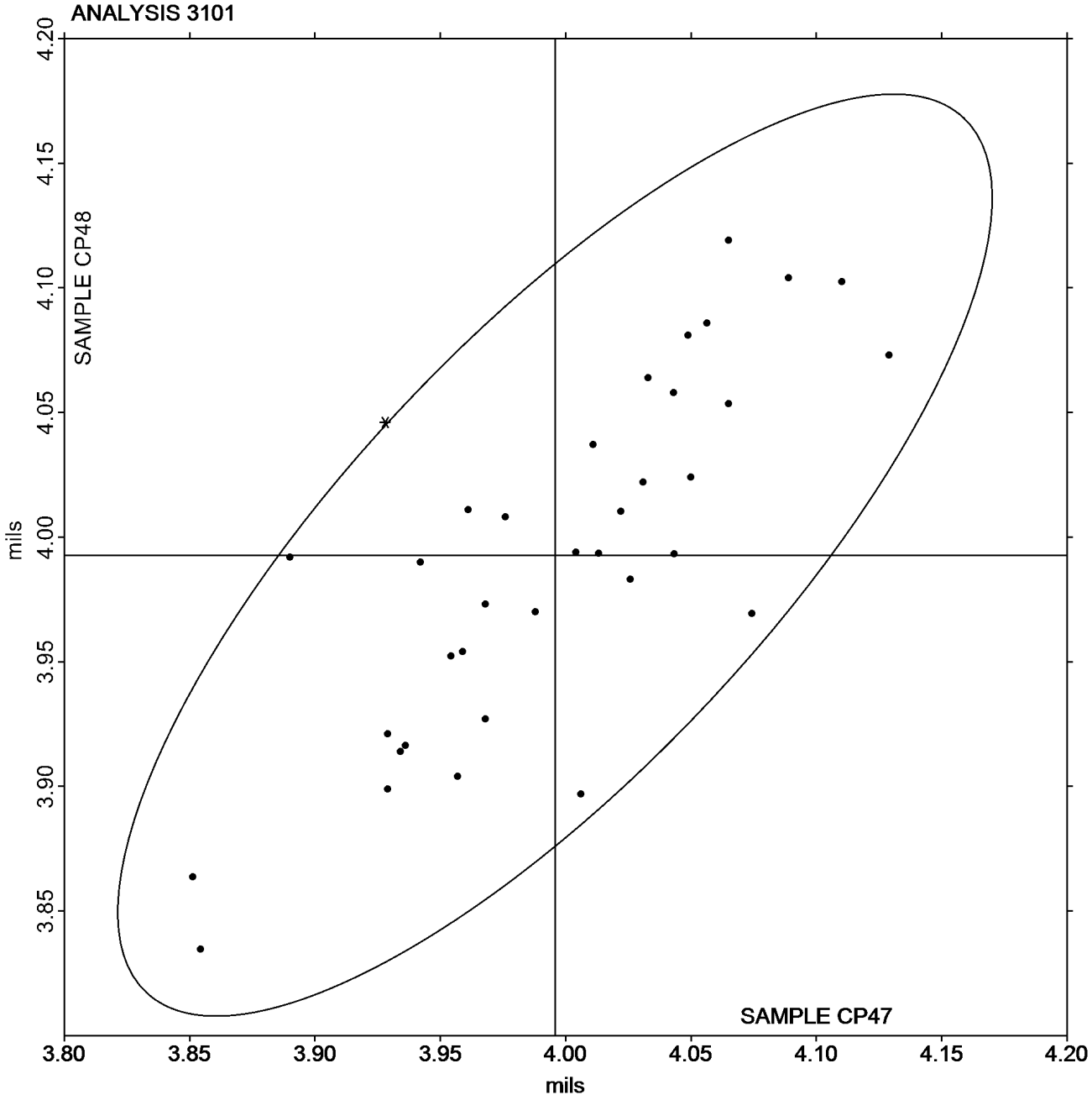
XFUHFU - One determination removed from the Lab Mean of Sample CP47 per Grubb's Test at 1% risk (TAPPI 1205).

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 CP47 = 3.9957 mils

Grand Mean Sample CP48 = 3.9928 mils



Paper & Paperboard Interlaboratory Testing Program

Analysis 3111

Bursting Strength - Printing Papers

TAPPI Official Test Method T403

WebCode	Data Flag	Sample BP47 Lab Mean	Sample BP47 Diff from Grand Mean	Sample BP47 CPV	Sample BP48 Lab Mean	Sample BP48 Diff from Grand Mean	Sample BP48 CPV	Instr Code
2AV79M		22.68	0.38	0.31	23.91	1.56	1.24	ZZ
3T4MUC		23.60	1.30	1.03	23.45	1.10	0.87	ZZ
3XXPVQ		22.79	0.49	0.39	23.37	1.01	0.80	ZZ
6QAJEA		23.11	0.81	0.65	23.27	0.92	0.73	ZZ
6WEKCJ		22.03	-0.27	-0.21	22.93	0.58	0.46	ZZ
8AE3ZN		21.71	-0.59	-0.47	21.94	-0.41	-0.33	ZZ
8FYX4D	X	30.80	8.50	6.77	31.80	9.45	7.50	ZZ
8GTLKM		21.12	-1.18	-0.94	20.97	-1.38	-1.10	ZZ
9LL8QG		21.80	-0.50	-0.40	21.95	-0.40	-0.32	ZZ
9LZUZH		21.46	-0.84	-0.67	20.06	-2.29	-1.82	ZZ
DKFBA9		22.01	-0.29	-0.23	22.83	0.47	0.37	ZZ
DPL644		22.35	0.05	0.04	23.12	0.77	0.61	ZZ
EBJZCH		20.60	-1.70	-1.35	21.30	-1.05	-0.84	ZZ
HTVND9		23.10	0.80	0.64	21.80	-0.55	-0.44	ZZ
K37XRC		22.40	0.10	0.08	23.55	1.20	0.95	ZZ
KW6LWF		23.23	0.93	0.74	22.06	-0.29	-0.23	ZZ
MXR23T		24.28	1.98	1.58	24.19	1.84	1.46	ZZ
QRUJER		22.20	-0.10	-0.08	22.50	0.15	0.12	ZZ
UAG7BQ		20.01	-2.29	-1.82	20.05	-2.30	-1.83	ZZ
Y69GXY		20.48	-1.82	-1.45	20.51	-1.84	-1.47	ZZ
YUTP9P		25.03	2.73	2.18	23.33	0.98	0.77	ZZ

Summary Statistics	Sample BP47	Sample BP48
Grand Means	22.30 psi	22.35 psi
Stnd Dev Btwn Labs	1.25 psi	1.26 psi

Statistics based on 20 of 21 reporting participants.

Comments on Assigned Data Flags for Test #3111

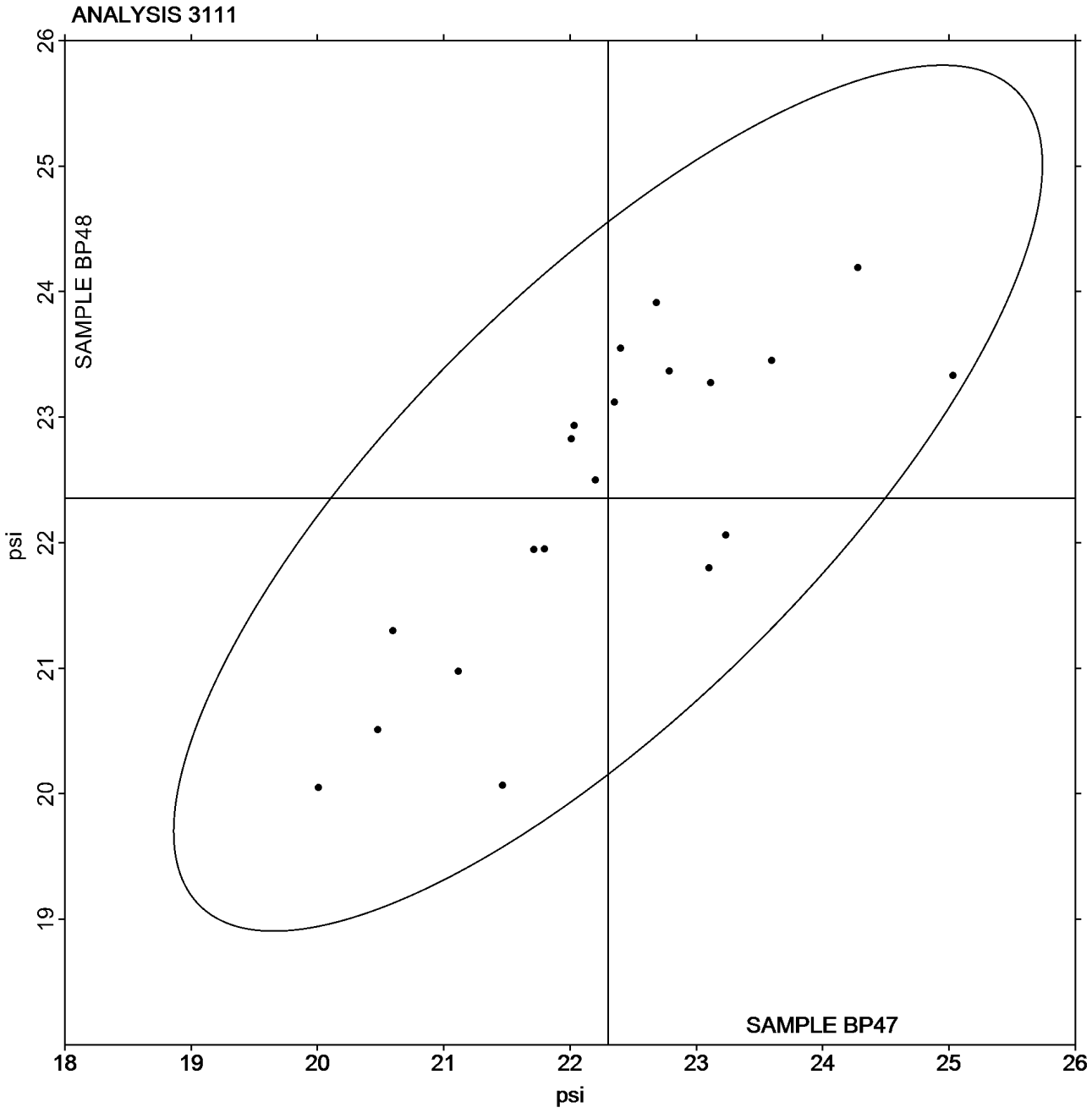
8FYX4D (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Grand Mean Sample BP47 = 22.300 psi

Grand Mean Sample BP48 = 22.355 psi



Paper & Paperboard Interlaboratory Testing Program

Analysis 3113

Tearing Strength - Printing Papers

TAPPI Official Test Method T414

WebCode	Data Flag	Sample RP47 Lab Mean	Sample RP47 Diff from Grand Mean	Sample RP47 CPV	Sample RP48 Lab Mean	Sample RP48 Diff from Grand Mean	Sample RP48 CPV	Instr Code
2AV79M		67.88	9.39	1.74	66.12	7.90	1.57	ZZ
3T4MUC		53.15	-5.34	-0.99	52.64	-5.58	-1.11	ZZ
3W27UP		56.47	-2.02	-0.37	58.61	0.39	0.08	ZZ
3XXPVQ		62.78	4.29	0.80	62.62	4.40	0.88	ZZ
6QAJEA		59.33	0.84	0.15	59.10	0.88	0.18	ZZ
6WEKCJ		58.48	-0.01	0.00	57.56	-0.66	-0.13	ZZ
8AE3ZN		58.74	0.25	0.05	57.62	-0.60	-0.12	ZZ
8GTLKM		57.98	-0.51	-0.10	58.09	-0.13	-0.03	ZZ
983M8M		51.77	-6.72	-1.25	51.92	-6.30	-1.26	ZZ
99X79N		58.42	-0.07	-0.01	61.20	2.98	0.59	ZZ
9LL8QG		62.52	4.03	0.75	60.62	2.40	0.48	ZZ
9LZUZH		57.28	-1.21	-0.22	56.02	-2.20	-0.44	ZZ
ADPREG		66.40	7.91	1.47	64.80	6.58	1.31	ZZ
EBJZCH		60.30	1.81	0.34	60.33	2.11	0.42	ZZ
HTVND9	*	74.20	15.71	2.91	73.00	14.78	2.95	ZZ
K37XRC		54.50	-3.99	-0.74	56.10	-2.12	-0.42	ZZ
LYQME9		56.82	-1.67	-0.31	54.89	-3.33	-0.66	ZZ
M6RL33		55.72	-2.77	-0.51	56.22	-2.00	-0.40	ZZ
MXR23T		56.60	-1.89	-0.35	58.00	-0.22	-0.04	ZZ
P93BGW		56.39	-2.10	-0.39	55.61	-2.61	-0.52	ZZ
QH37D7		47.36	-11.13	-2.06	49.36	-8.86	-1.77	ZZ
QTP2GT		55.23	-3.26	-0.60	55.41	-2.81	-0.56	ZZ
U7VL42		60.54	2.05	0.38	60.04	1.82	0.36	ZZ
UAG7BQ		60.12	1.63	0.30	59.56	1.34	0.27	ZZ
UAVXY2		54.15	-4.34	-0.80	51.64	-6.58	-1.31	ZZ
UDGH8Q		49.00	-9.49	-1.76	48.56	-9.66	-1.93	ZZ
W38RHK		61.88	3.39	0.63	59.82	1.60	0.32	ZZ
WD7P6K	X	60.39	1.90	0.35	52.86	-5.36	-1.07	ZZ
XFUHFU		53.18	-5.31	-0.98	53.16	-5.06	-1.01	ZZ
XN8A6R		60.84	2.35	0.44	60.60	2.38	0.47	ZZ
Y69GXY		64.30	5.81	1.08	63.10	4.88	0.97	ZZ
ZKVECY		62.86	4.37	0.81	63.44	5.22	1.04	ZZ
ZXNZHU		56.50	-1.99	-0.37	57.28	-0.94	-0.19	ZZ

Summary Statistics	Sample RP47	Sample RP48
Grand Means	58.49 Grams	58.22 Grams
Stnd Dev Btwn Labs	5.40 Grams	5.02 Grams

Statistics based on 32 of 33 reporting participants.

Comments on Assigned Data Flags for Test #3113

WD7P6K (X) - Inconsistent in testing between samples.

Analysis Notes:

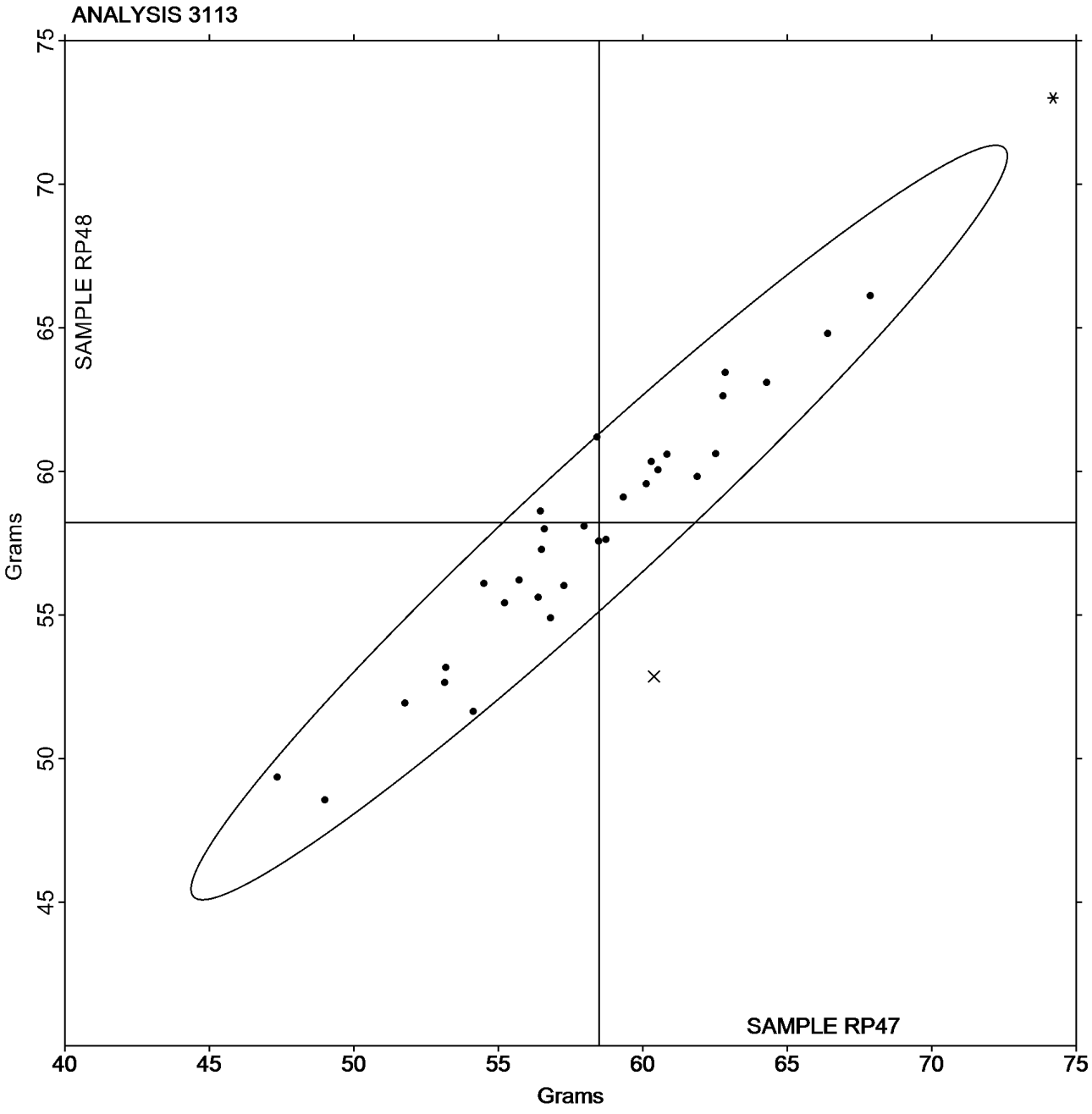
XFUHFU - Data appear to be off by a factor; data converted by CTS (x2). CTS will not correct the data going forward.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Grand Mean Sample RP47 = 58.490 Grams

Grand Mean Sample RP48 = 58.220 Grams



Paper & Paperboard Interlaboratory Testing Program

Report #4391, November 2025

Analysis 3115

Tensile Breaking Strength - Printing Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NP47 Lab Mean	Sample NP47 Diff from Grand Mean	Sample NP47 CPV	Sample NP48 Lab Mean	Sample NP48 Diff from Grand Mean	Sample NP48 CPV	Instr Code
3W27UP		3.670	0.049	0.15	3.748	0.152	0.49	LJ
3XXPVQ		3.360	-0.261	-0.79	3.312	-0.284	-0.92	IO
4FV4WG		3.260	-0.361	-1.09	3.220	-0.376	-1.21	TT
4M8HED		3.466	-0.155	-0.47	3.374	-0.222	-0.72	LY
6C7GEE		3.761	0.139	0.42	3.690	0.094	0.30	TQ
6QAJEA		3.433	-0.188	-0.57	3.411	-0.185	-0.60	TR
6WEKCJ		3.401	-0.220	-0.66	3.223	-0.373	-1.20	LI
8AE3ZN		3.375	-0.246	-0.74	3.409	-0.187	-0.60	LE
8GTLKM		3.376	-0.245	-0.74	3.579	-0.017	-0.05	LI
983M8M		3.790	0.169	0.51	3.751	0.155	0.50	LI
9LL8QG		3.847	0.226	0.68	3.887	0.291	0.94	LB
9LZUZH		3.415	-0.206	-0.62	3.449	-0.147	-0.48	LX
ADPREG		3.626	0.005	0.02	3.544	-0.053	-0.17	TQ
EBJZCH		3.548	-0.073	-0.22	3.355	-0.241	-0.78	LE
FHY297		4.021	0.400	1.21	3.786	0.190	0.61	LX
K37XRC		3.433	-0.188	-0.57	3.305	-0.291	-0.94	TQ
LYQME9		3.754	0.133	0.40	3.774	0.178	0.57	LI
M6RL33		3.585	-0.036	-0.11	3.593	-0.004	-0.01	TF
MXR23T		4.159	0.538	1.62	4.202	0.606	1.96	TO
NRXNEA		3.425	-0.196	-0.59	3.431	-0.165	-0.53	IM
PWAURV		3.713	0.092	0.28	3.863	0.267	0.86	TV
QH37D7	*	4.713	1.092	3.29	4.460	0.864	2.79	VM
RM9GKR		3.849	0.228	0.69	3.714	0.118	0.38	TQ
UAG7BQ		3.516	-0.105	-0.32	3.538	-0.059	-0.19	TF
UAVXY2	*	3.643	0.022	0.07	3.276	-0.320	-1.03	LB
UDGH8Q		3.443	-0.178	-0.54	3.433	-0.163	-0.53	TF
W38RHK		4.001	0.380	1.15	3.872	0.276	0.89	XX
WD7P6K		3.590	-0.031	-0.09	3.720	0.124	0.40	LH
XFUHFU		3.941	0.320	0.96	4.096	0.500	1.61	LX
Y69GXY		3.188	-0.433	-1.31	3.401	-0.195	-0.63	TB
ZXNZHU		2.953	-0.668	-2.02	3.061	-0.535	-1.73	LE

Summary Statistics	Sample NP47	Sample NP48
Grand Means	3.62 kN/m	3.60 kN/m
Stnd Dev Btwn Labs	0.33 kN/m	0.31 kN/m

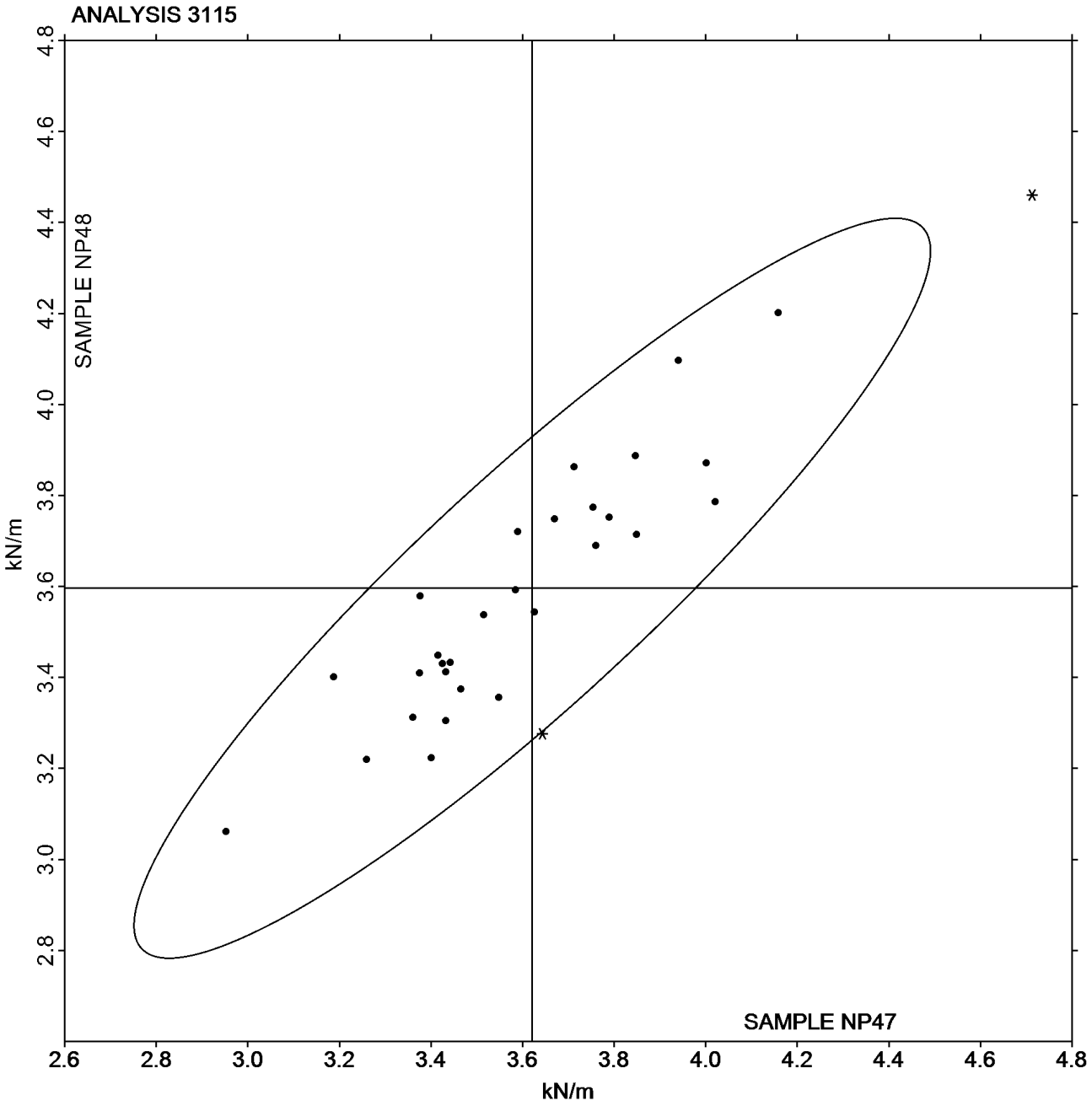
Statistics based on 31 of 31 reporting participants.

Key to Instrument Codes Reported by Participants

IM	Instron 5500 Series	IO	Instron 5900 Series
LB	L & W Tensile - Autoline 400	LE	L & W Tensile Tester 066
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	TR	Testometric 220D
TT	Tinius Olsen H10KT	TV	Thwing-Albert Vantage NX
VM	Valmet PaperLab (was Kajaani/Robotest)	XX	Instrument make/model not specified by lab

Grand Mean Sample NP47 = 3.6211 kN/m

Grand Mean Sample NP48 = 3.5961 kN/m



Paper & Paperboard Interlaboratory Testing Program

Analysis 3116

Tensile Energy Absorption - Printing Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NP47 Lab Mean	Sample NP47 Diff from Grand Mean	Sample NP47 CPV	Sample NP48 Lab Mean	Sample NP48 Diff from Grand Mean	Sample NP48 CPV	Instr Code
3W27UP		38.64	-0.83	-0.23	37.12	-0.97	-0.18	LJ
3XXPVQ		38.76	-0.72	-0.20	32.52	-5.56	-1.03	IO
4FV4WG		36.14	-3.34	-0.91	25.73	-12.36	-2.29	TT
4M8HED		41.12	1.64	0.45	40.29	2.20	0.41	LY
6WEKCJ		39.51	0.04	0.01	32.85	-5.23	-0.97	LI
8AE3ZN		39.36	-0.12	-0.03	41.13	3.05	0.56	LE
8GTLKM		38.44	-1.04	-0.28	41.87	3.78	0.70	LI
983M8M		33.42	-6.06	-1.65	28.60	-9.48	-1.76	LI
9LL8QG		43.50	4.03	1.10	43.33	5.25	0.97	LB
9LZUZH		39.99	0.51	0.14	40.06	1.98	0.37	LX
ADPREG		46.85	7.37	2.01	43.96	5.87	1.09	TQ
EBJZCH		38.34	-1.14	-0.31	36.44	-1.64	-0.30	LH
K37XRC		38.67	-0.81	-0.22	32.47	-5.61	-1.04	TQ
LYQME9		38.38	-1.09	-0.30	37.01	-1.07	-0.20	LI
MXR23T		32.24	-7.23	-1.97	35.11	-2.98	-0.55	TO
NRXNEA		36.54	-2.94	-0.80	42.09	4.01	0.74	IM
PWAURV		46.48	7.00	1.91	47.30	9.22	1.71	TV
UAG7BQ		45.76	6.28	1.71	43.61	5.52	1.02	TF
UAVXY2		36.30	-3.17	-0.86	33.63	-4.46	-0.83	LB
W38RHK		38.47	-1.01	-0.27	35.64	-2.44	-0.45	XX
WD7P6K		42.23	2.75	0.75	41.34	3.26	0.60	LH
XFUHFU		40.29	0.82	0.22	40.75	2.66	0.49	LX
Y69GXY		38.53	-0.95	-0.26	43.08	5.00	0.93	TB

Summary Statistics	Sample NP47	Sample NP48
Grand Means	39.48 Joules/sq m	38.08 Joules/sq m
Stnd Dev Btwn Labs	3.67 Joules/sq m	5.40 Joules/sq m

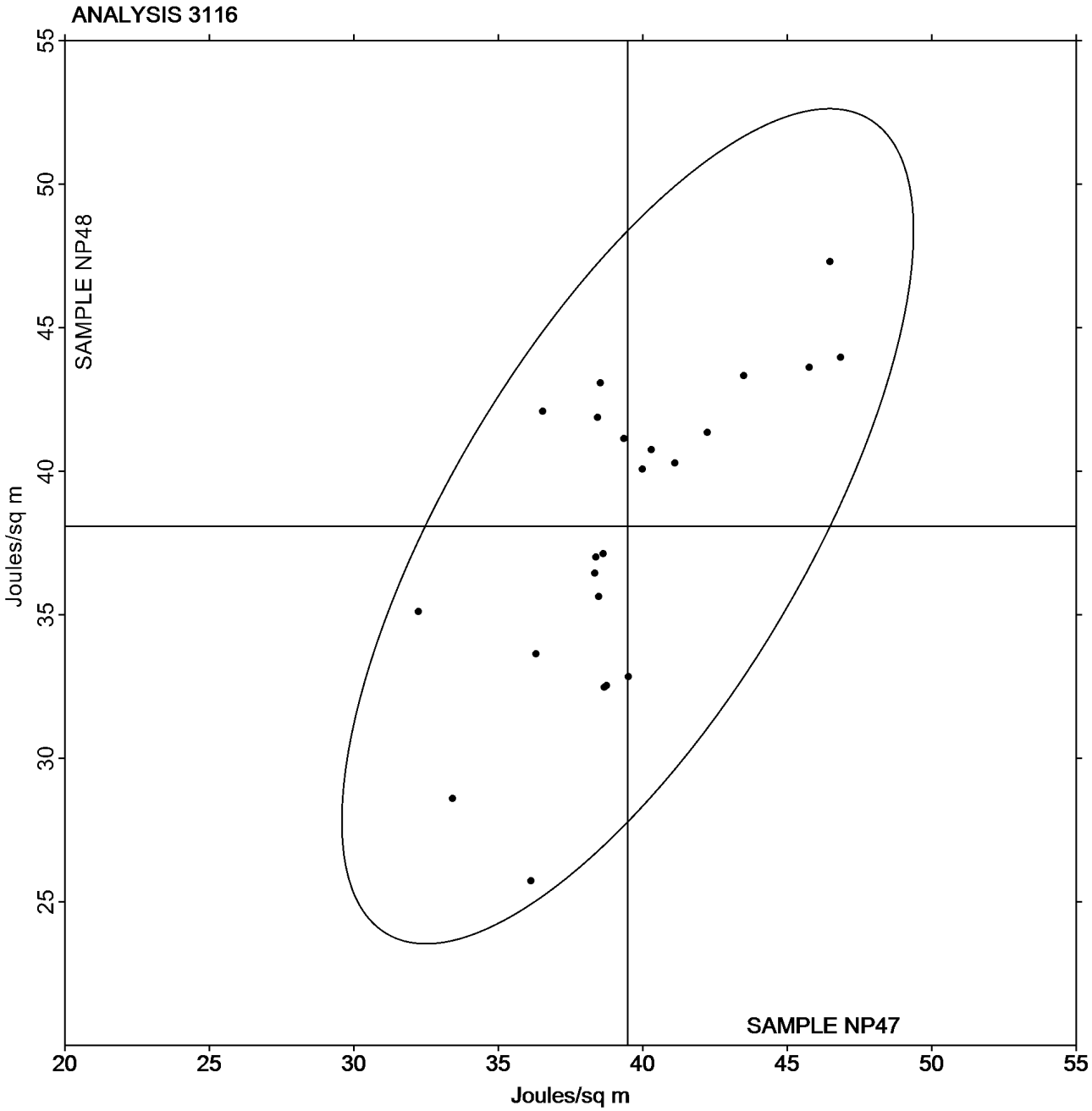
Statistics based on 23 of 23 reporting participants.

Key to Instrument Codes Reported by Participants

IM	Instron 5500 Series	IO	Instron 5900 Series
LB	L & W Tensile - Autoline 400	LE	L & W Tensile Tester 066
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	TT	Tinius Olsen H10KT
TV	Thwing-Albert Vantage NX	XX	Instrument make/model not specified by lab

Grand Mean Sample NP47 = 39.477 Joules/sq m

Grand Mean Sample NP48 = 38.083 Joules/sq m



Paper & Paperboard Interlaboratory Testing Program

Analysis 3117

Elongation to Break - Printing Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NP47 Lab Mean	Sample NP47 Diff from Grand Mean	Sample NP47 CPV	Sample NP48 Lab Mean	Sample NP48 Diff from Grand Mean	Sample NP48 CPV	Instr Code
3W27UP		1.546	-0.160	-0.72	1.474	-0.189	-0.79	LJ
3XXPVQ		1.703	-0.003	-0.01	1.475	-0.188	-0.79	IO
4FV4WG	*	1.797	0.091	0.41	1.377	-0.286	-1.20	TT
4M8HED		1.750	0.044	0.20	1.756	0.093	0.39	LY
6QAJEA		1.889	0.183	0.82	1.709	0.046	0.19	TR
6WEKCJ		1.697	-0.009	-0.04	1.510	-0.153	-0.64	LI
8AE3ZN		1.718	0.012	0.05	1.768	0.105	0.44	LE
8GTLKM		1.672	-0.034	-0.15	1.705	0.042	0.18	LI
983M8M		1.360	-0.346	-1.56	1.220	-0.443	-1.85	LI
9LL8QG		1.559	-0.147	-0.66	1.605	-0.058	-0.24	LB
9LZUZH		1.641	-0.065	-0.29	1.668	0.005	0.02	LX
ADPREG		1.930	0.224	1.01	1.842	0.179	0.75	TQ
EBJZCH		1.588	-0.118	-0.53	1.596	-0.067	-0.28	LH
K37XRC		1.705	-0.001	-0.01	1.516	-0.147	-0.61	TQ
LYQME9		1.533	-0.173	-0.78	1.466	-0.197	-0.82	LI
M6RL33		1.462	-0.244	-1.10	1.515	-0.148	-0.62	TF
MXR23T		2.172	0.466	2.10	2.280	0.617	2.58	TO
NRXNEA		1.670	-0.036	-0.16	1.840	0.177	0.74	IM
PWAURV		2.068	0.362	1.63	2.027	0.364	1.53	TV
QH37D7		1.310	-0.396	-1.79	1.420	-0.243	-1.02	VM
UAG7BQ		2.279	0.573	2.59	2.164	0.501	2.10	TF
UAVXY2		1.504	-0.202	-0.91	1.542	-0.121	-0.51	LB
UDGH8Q		1.592	-0.114	-0.52	1.570	-0.093	-0.39	TF
W38RHK		1.628	-0.078	-0.35	1.500	-0.163	-0.68	XX
WD7P6K		1.730	0.024	0.11	1.690	0.027	0.11	LH
XFUHFU		1.791	0.085	0.38	1.790	0.127	0.53	LX
Y69GXY		1.771	0.065	0.29	1.874	0.211	0.88	TB

Summary Statistics	Sample NP47	Sample NP48
Grand Means	1.71 Percent	1.66 Percent
Stnd Dev Btwn Labs	0.22 Percent	0.24 Percent

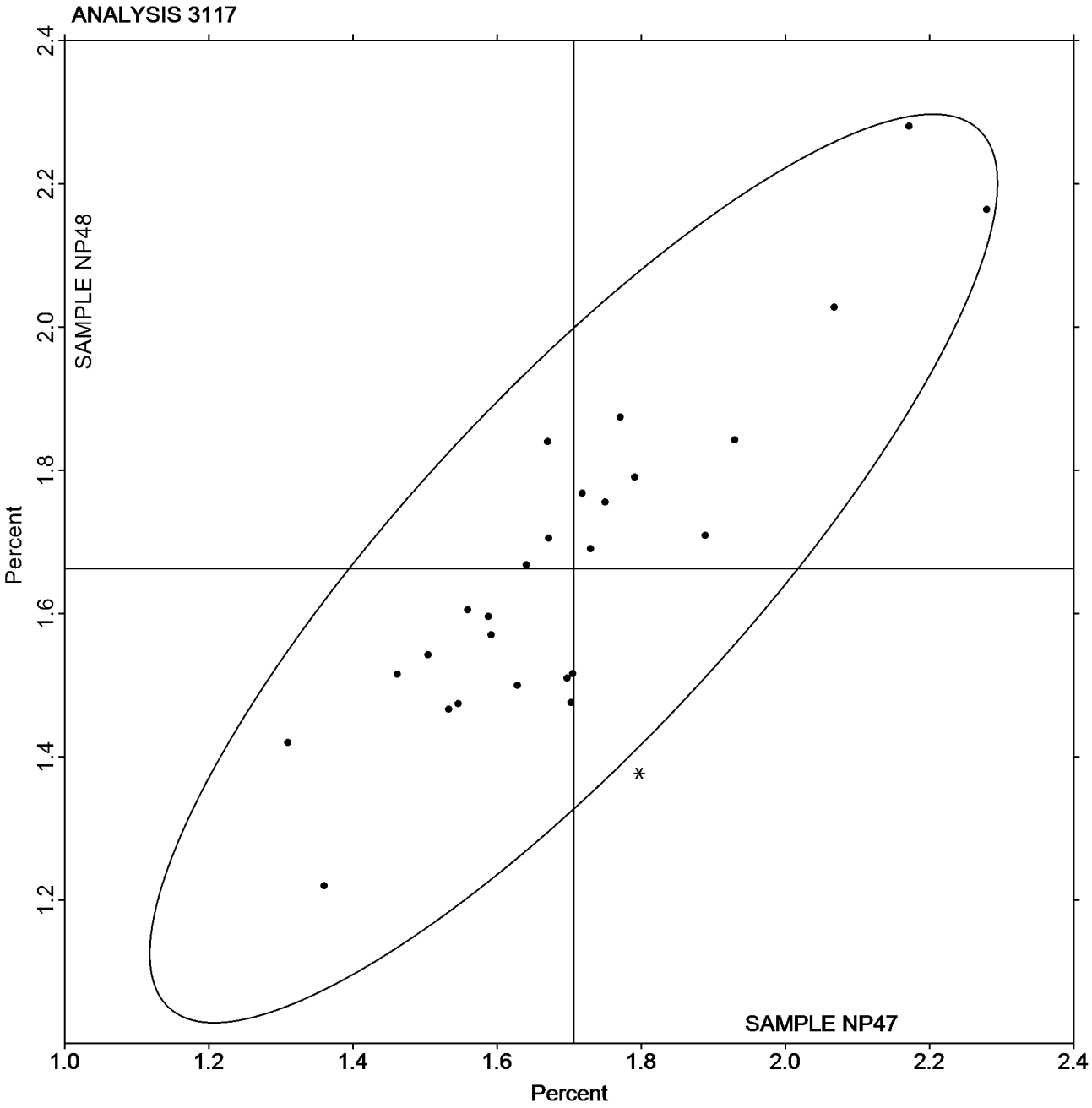
Statistics based on 27 of 27 reporting participants.

Key to Instrument Codes Reported by Participants

IM	Instron 5500 Series	IO	Instron 5900 Series
LB	L & W Tensile - Autoline 400	LE	L & W Tensile Tester 066
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	TR	Testometric 220D
TT	Tinius Olsen H10KT	TV	Thwing-Albert Vantage NX
VM	Valmet PaperLab (was Kajaani/Robotest)	XX	Instrument make/model not specified by lab

Grand Mean Sample NP47 = 1.7061
Percent

Grand Mean Sample NP48 = 1.6629
Percent



Paper & Paperboard Interlaboratory Testing Program

Analysis 3121

Air Resistance - Gurley Oil Type

TAPPI Official Test Method T460

WebCode	Data Flag	Sample PP47 Lab Mean	Sample PP47 Diff from Grand Mean	Sample PP47 CPV	Sample PP48 Lab Mean	Sample PP48 Diff from Grand Mean	Sample PP48 CPV	Instr Code
2AV79M		8.683	-0.219	-0.53	8.665	-0.196	-0.52	PP
32GG8T	*	9.873	0.971	2.35	9.273	0.412	1.09	LR
3T4MUC		8.671	-0.231	-0.56	8.487	-0.374	-0.99	PP
3XXPVQ		8.970	0.068	0.16	9.080	0.219	0.58	WG
4CAKNR		8.561	-0.341	-0.82	8.523	-0.338	-0.89	LP
67YNKH		8.990	0.088	0.21	8.870	0.009	0.02	HG
6WEKCJ		8.988	0.086	0.21	9.236	0.375	0.99	LP
83CQ6Q	X	3.390	-5.512	-13.32	3.400	-5.461	-14.39	PP
99X79N		9.351	0.449	1.08	8.700	-0.161	-0.42	PP
ADPREG		8.286	-0.616	-1.49	8.551	-0.310	-0.82	PP
CBAAB3		8.623	-0.279	-0.67	8.523	-0.338	-0.89	WG
DPL644		9.070	0.168	0.41	9.090	0.229	0.60	LA
HTVND9		9.600	0.698	1.69	9.400	0.539	1.42	GS
K37XRC		8.900	-0.002	-0.01	8.890	0.029	0.08	GA
KW6LWF		8.300	-0.602	-1.46	8.500	-0.361	-0.95	GG
M6RL33		9.069	0.167	0.40	9.151	0.290	0.76	PP
MXR23T		8.709	-0.193	-0.47	8.675	-0.186	-0.49	PP
PWAURV		8.682	-0.220	-0.53	8.753	-0.108	-0.28	PP
QH37D7		8.338	-0.564	-1.36	8.444	-0.417	-1.10	PP
QRUJER		8.942	0.040	0.10	8.788	-0.073	-0.19	LR
QTNAK7		8.880	-0.022	-0.05	9.030	0.169	0.45	TL
R3LPLV		8.900	-0.002	-0.01	8.840	-0.021	-0.05	GL
UAG7BQ	*	9.285	0.383	0.93	9.721	0.860	2.27	PP
UDGH8Q		9.086	0.184	0.44	8.987	0.126	0.33	PP
W38RHK		8.625	-0.277	-0.67	8.436	-0.425	-1.12	PP
WD7P6K		8.390	-0.512	-1.24	8.190	-0.671	-1.77	LP
Y69GXY		9.683	0.781	1.89	9.577	0.716	1.89	PP

Summary Statistics	Sample PP47	Sample PP48
Grand Means	8.90 sec/100 cc	8.86 sec/100 cc
Stnd Dev Btwn Labs	0.41 sec/100 cc	0.38 sec/100 cc

Statistics based on 26 of 27 reporting participants.

Comments on Assigned Data Flags for Test #3121

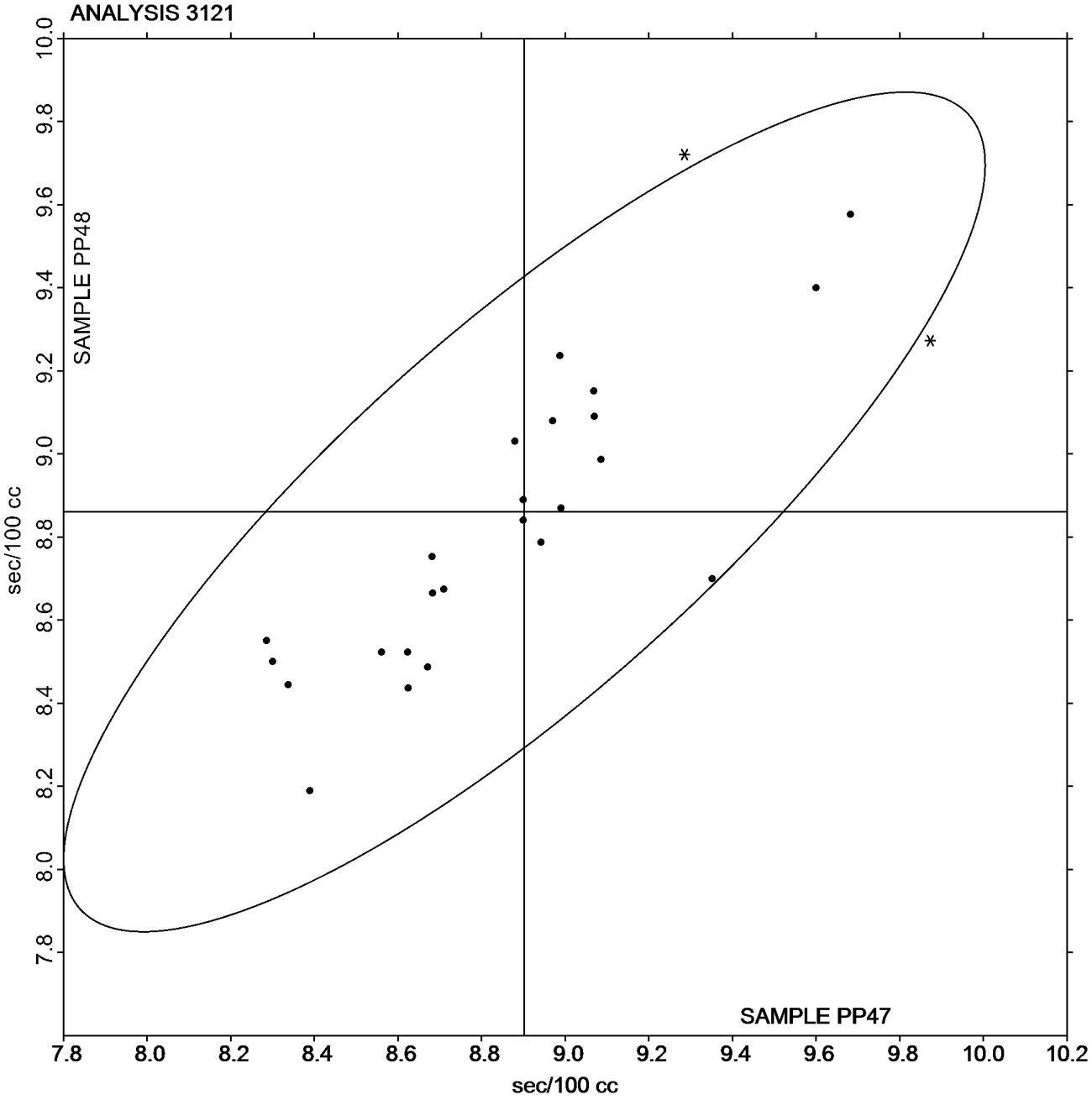
83CQ6Q (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

GA	Gurley Precision #4340 Automatic Densometer	GG	Gurley Precision Model #4320
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	TL	Gurley Densometer #4110, Oil Flotation
WG	W & LE Gurley Tester		

Grand Mean Sample PP47 = 8.9021 sec/100 cc

Grand Mean Sample PP48 = 8.8608 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

Due to the consistently low population, this test is being discontinued following this cycle.

WebCode	Data Flag	Sample PP47 Lab Mean	Sample PP47 Diff from Grand Mean	Sample PP47 CPV	Sample PP48 Lab Mean	Sample PP48 Diff from Grand Mean	Sample PP48 CPV	Instr Code
99X79N		277.8	8.5	0.21	278.2	13.2	0.36	TA
HTVND9		224.9	-44.4	-1.09	223.7	-41.3	-1.13	SH
UAVXY2		305.1	35.8	0.88	293.2	28.2	0.77	LB

Summary Statistics	Sample PP47	Sample PP48
Grand Means	269.27 Sheffield Units	265.04 Sheffield Units
Stnd Dev Btwn Labs	40.78 Sheffield Units	36.58 Sheffield Units

Statistics based on 3 of 3 reporting participants.

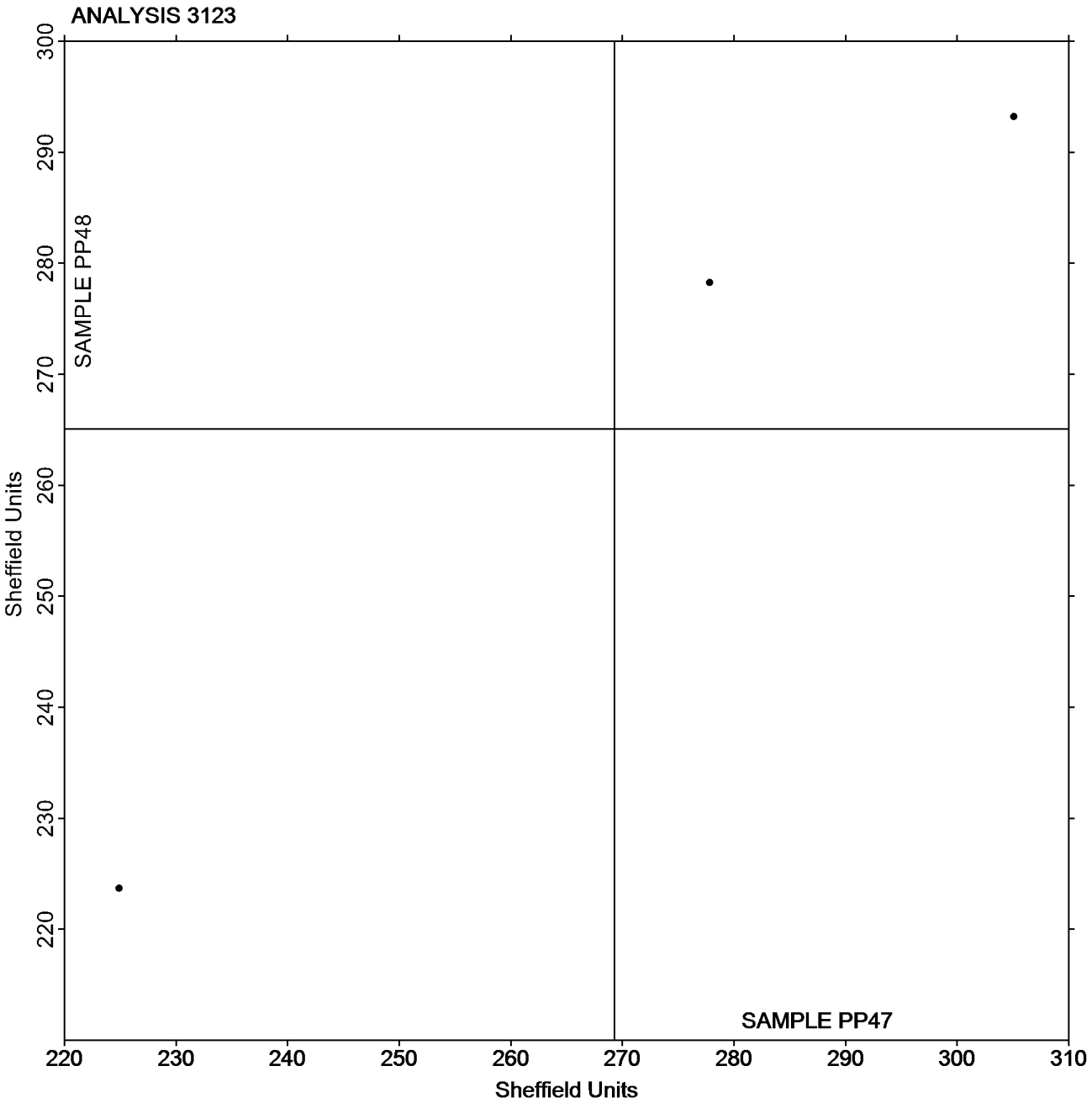
Key to Instrument Codes Reported by Participants

LB	L & W Air Permeance - Autoline	SH	Sheffield
TA	Thwing-Albert Porosity Tester		

Due to the consistently low population, this test is being discontinued following this cycle.

Grand Mean Sample PP47 = 269.27 Sheffield Units

Grand Mean Sample PP48 = 265.04 Sheffield Units



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

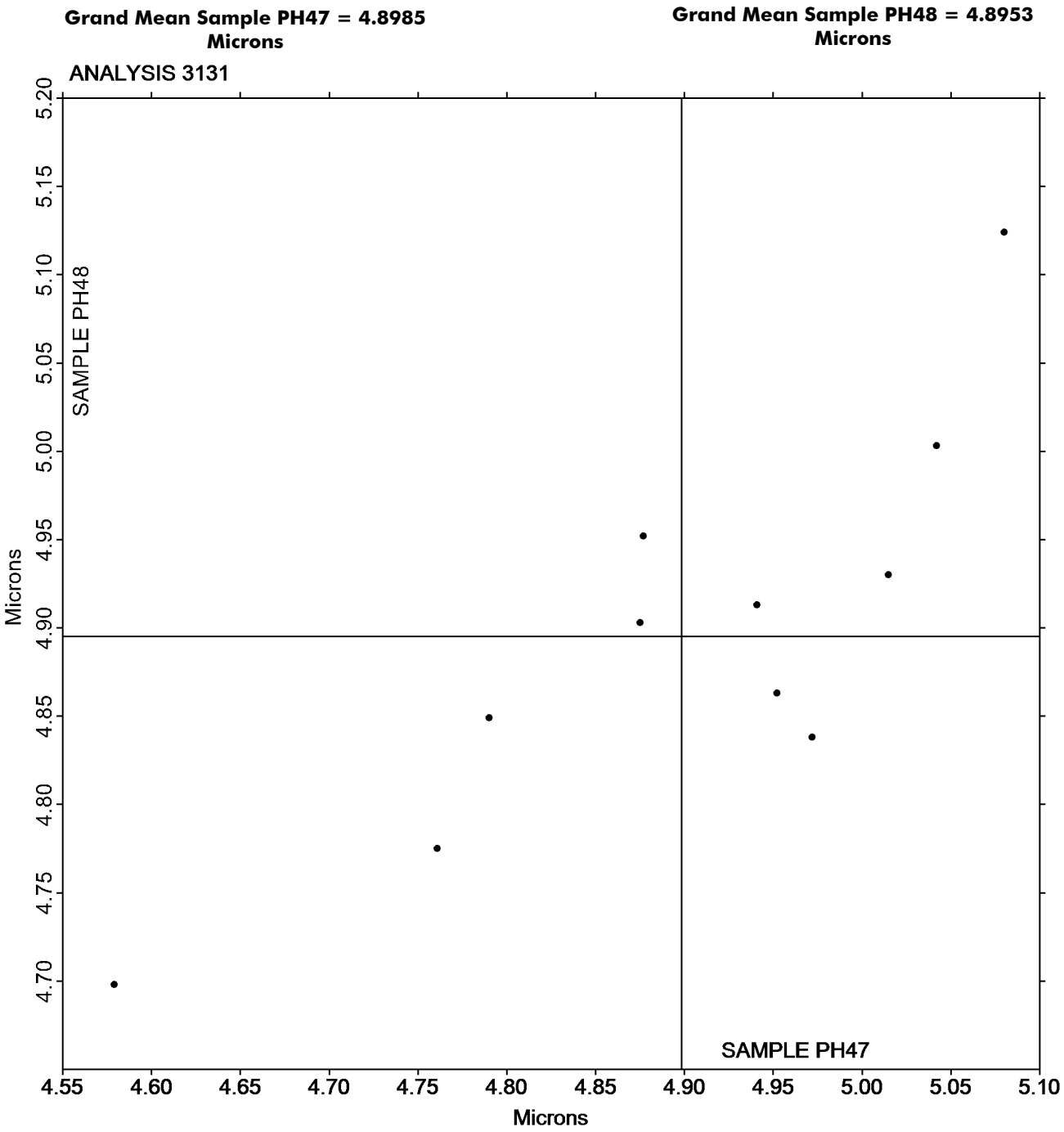
WebCode	Data Flag	Sample PH47 Lab Mean	Sample PH47 Diff from Grand Mean	Sample PH47 CPV	Sample PH48 Lab Mean	Sample PH48 Diff from Grand Mean	Sample PH48 CPV	Instr Code
2AV79M		5.015	0.116	0.80	4.930	0.035	0.31	ZZ
3XXPVQ		4.790	-0.109	-0.75	4.849	-0.046	-0.41	ZZ
7HAHCM		4.972	0.073	0.51	4.838	-0.057	-0.51	ZZ
83CQ6Q		4.952	0.053	0.37	4.863	-0.032	-0.28	ZZ
EBJZCH		4.875	-0.024	-0.16	4.903	0.008	0.07	ZZ
GV4E4C		4.761	-0.138	-0.95	4.775	-0.120	-1.06	ZZ
MXPCWB		4.579	-0.320	-2.20	4.698	-0.197	-1.74	ZZ
X3N6KN		5.080	0.181	1.25	5.124	0.229	2.02	ZZ
XN8A6R		4.877	-0.022	-0.15	4.952	0.057	0.50	ZZ
Y69GXY		5.042	0.143	0.99	5.003	0.108	0.95	ZZ
Z7Y34V		4.941	0.042	0.29	4.913	0.018	0.16	ZZ

Summary Statistics	Sample PH47	Sample PH48
Grand Means	4.90 Microns	4.90 Microns
Stnd Dev Btwn Labs	0.15 Microns	0.11 Microns

Statistics based on 11 of 11 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



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

Paper & Paperboard Interlaboratory Testing Program

Analysis 3133

Roughness - Sheffield Type

TAPPI Official Test Method T538

WebCode	Data Flag	Sample SR47 Lab Mean	Sample SR47 Diff from Grand Mean	Sample SR47 CPV	Sample SR48 Lab Mean	Sample SR48 Diff from Grand Mean	Sample SR48 CPV	Instr Code
2AV79M		182.9	-9.7	-0.77	185.4	-10.0	-0.87	LW
32GG8T		175.8	-16.8	-1.33	188.0	-7.4	-0.64	LW
3T4MUC		179.4	-13.1	-1.04	173.3	-22.1	-1.91	PP
3XXPVQ		219.0	26.4	2.10	219.0	23.6	2.04	PG
67YNKH		194.2	1.6	0.13	203.8	8.4	0.73	PP
7HAHCM		191.0	-1.6	-0.12	190.8	-4.6	-0.40	LB
83CQ6Q	*	204.7	12.1	0.96	224.0	28.6	2.48	PP
8FYX4D		205.5	12.9	1.03	209.5	14.1	1.22	HM
99X79N		190.6	-2.0	-0.15	190.4	-5.0	-0.43	PP
9DP8EA		180.8	-11.8	-0.93	202.8	7.4	0.64	LW
ADPREG		166.7	-25.9	-2.05	170.8	-24.7	-2.14	PP
CBAAB3		207.6	15.0	1.19	204.6	9.2	0.80	SS
DPL644		173.2	-19.4	-1.54	179.6	-15.8	-1.37	LA
EBJZCH		200.3	7.7	0.61	196.2	0.7	0.06	PP
FHY297		198.4	5.8	0.46	199.6	4.1	0.36	PP
G983V7	X	236.5	44.0	3.49	238.5	43.1	3.74	VM
GV4E4C		197.7	5.1	0.41	200.5	5.1	0.44	LW
HTVND9		180.8	-11.8	-0.93	180.7	-14.7	-1.28	XX
K37XRC		172.1	-20.4	-1.62	192.2	-3.2	-0.28	GA
M6RL33		198.6	6.0	0.48	193.5	-1.9	-0.17	SH
MXPCWB		206.4	13.8	1.10	195.6	0.2	0.02	LA
MXR23T		213.5	21.0	1.67	204.0	8.6	0.75	PP
MYLR98		206.0	13.4	1.06	203.8	8.4	0.73	PP
P22YKZ		192.6	0.0	0.00	195.3	-0.1	-0.01	LA
PWAURV		191.2	-1.3	-0.11	195.1	-0.4	-0.03	PP
QH37D7		192.2	-0.3	-0.03	205.2	9.8	0.85	PP
QRUJER		208.8	16.2	1.29	193.4	-2.0	-0.17	LW
RBGPX3		196.1	3.5	0.28	191.9	-3.5	-0.30	PP
TMCZ9U		197.7	5.1	0.41	190.3	-5.1	-0.44	PP
UAG7BQ		183.2	-9.4	-0.74	194.5	-0.9	-0.08	PP
UAVXY2		188.6	-4.0	-0.31	188.1	-7.3	-0.63	LA
UDGH8Q		176.0	-16.6	-1.31	183.1	-12.3	-1.07	SH
W38RHK		192.7	0.1	0.01	197.2	1.8	0.16	HM
X3N6KN		197.0	4.4	0.35	189.4	-6.0	-0.52	PP
X74WAV	*	181.1	-11.4	-0.91	207.9	12.5	1.08	PP
XFUHFU		212.6	20.1	1.59	213.8	18.4	1.60	PP
Y69GXY		201.9	9.3	0.74	202.3	6.9	0.60	PP
ZJ2QVP		183.5	-9.1	-0.72	185.5	-9.9	-0.86	LW
ZKVECY		185.4	-7.2	-0.57	200.7	5.3	0.46	HM
ZQNGHK		183.9	-8.7	-0.69	179.4	-16.0	-1.39	LW

Summary Statistics	Sample SR47	Sample SR48
Grand Means	192.56 Sheffield	195.42 Sheffield
Stnd Dev Btwn Labs	12.60 Sheffield	11.53 Sheffield

Statistics based on 39 of 40 reporting participants.

Comments on Assigned Data Flags for Test #3133

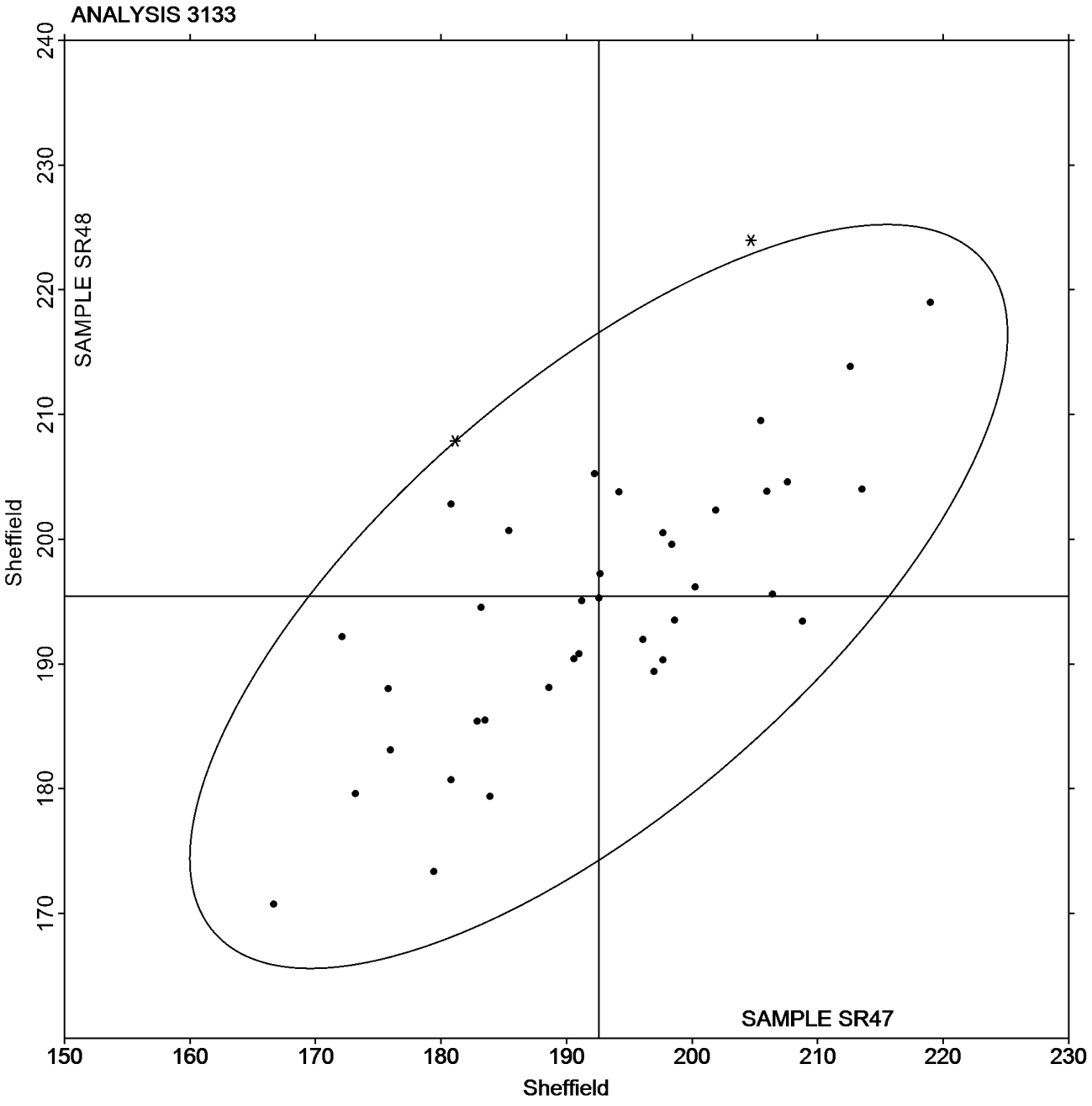
G983V7 (X) - Data for both samples are high. Possible Systematic Error.

Key to Instrument Codes Reported by Participants

GA	Gurley Precision #4340 Automatic Densometer	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 SR47 = 192.56
Sheffield

Grand Mean Sample SR48 = 195.42
Sheffield



Paper & Paperboard Interlaboratory Testing Program

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

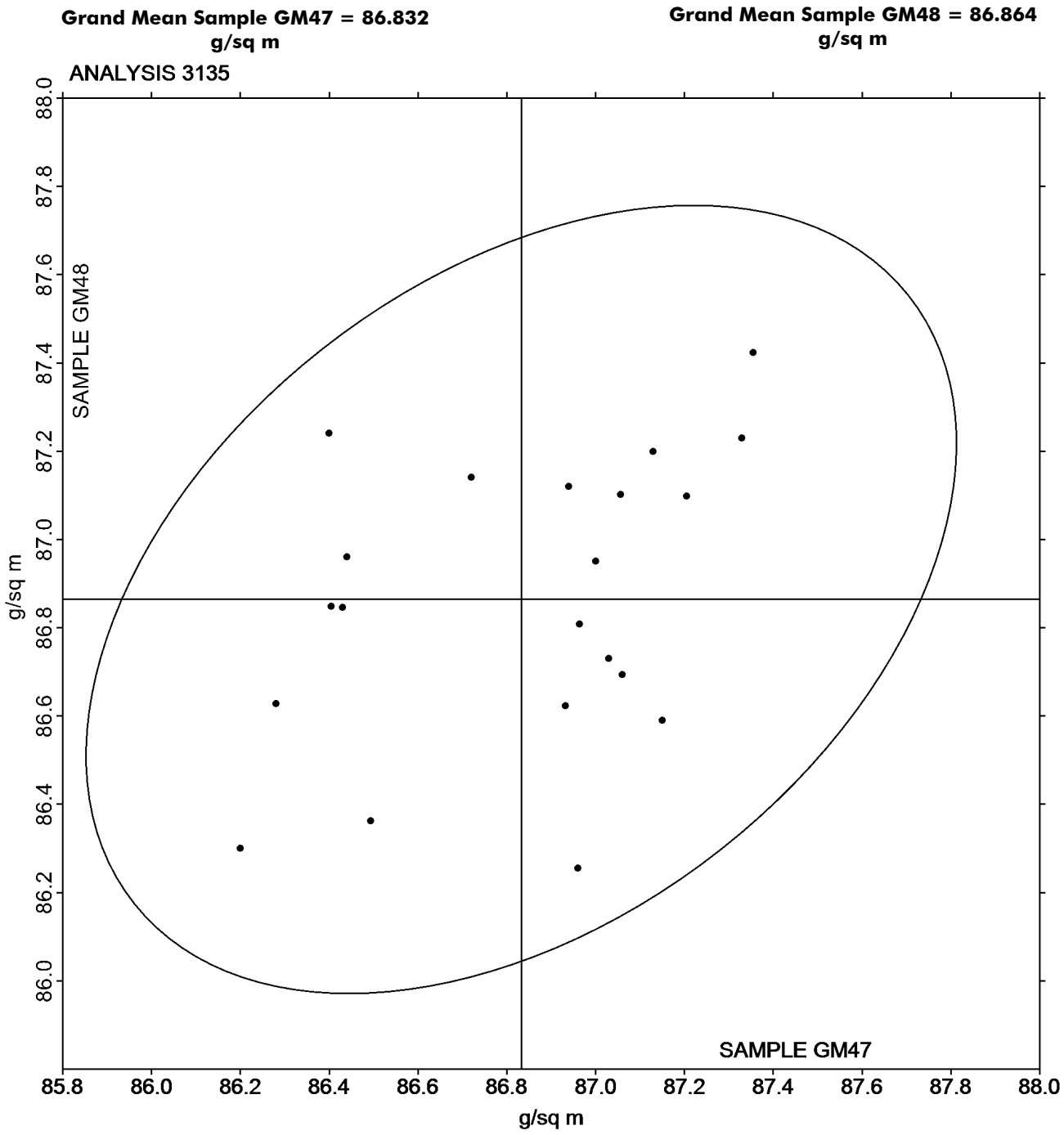
WebCode	Data Flag	Sample GM47 Lab Mean	Sample GM47 Diff from Grand Mean	Sample GM47 CPV	Sample GM48 Lab Mean	Sample GM48 Diff from Grand Mean	Sample GM48 CPV	Instr Code
23UUCP		86.93	0.10	0.28	86.62	-0.24	-0.74	ZZ
3T4MUC		87.15	0.32	0.88	86.59	-0.27	-0.84	ZZ
4FV4WG		87.13	0.30	0.83	87.20	0.33	1.02	ZZ
4M8HED		86.41	-0.43	-1.19	86.85	-0.02	-0.05	ZZ
6QAJEA		87.06	0.22	0.62	87.10	0.24	0.73	ZZ
99X79N		87.21	0.37	1.04	87.10	0.23	0.71	ZZ
9LZUZH		87.06	0.23	0.63	86.69	-0.17	-0.52	ZZ
DKFBA9		87.03	0.20	0.55	86.73	-0.13	-0.41	ZZ
FHY297		87.00	0.17	0.47	86.95	0.09	0.26	ZZ
H6LHNG		87.33	0.50	1.38	87.23	0.37	1.12	ZZ
K37XRC		86.28	-0.55	-1.53	86.63	-0.24	-0.72	ZZ
M6RL33		86.44	-0.39	-1.09	86.96	0.10	0.29	ZZ
NRXNEA		87.36	0.52	1.45	87.42	0.56	1.70	ZZ
NVJ9LY		86.49	-0.34	-0.94	86.36	-0.50	-1.53	ZZ
UAVXY2		86.72	-0.11	-0.31	87.14	0.28	0.84	ZZ
UDGH8Q		86.40	-0.43	-1.20	87.24	0.38	1.15	ZZ
WD7P6K		86.94	0.11	0.30	87.12	0.26	0.78	ZZ
XFP2GV		86.96	0.13	0.37	86.81	-0.06	-0.17	ZZ
XN8A6R		86.96	0.13	0.35	86.26	-0.61	-1.86	ZZ
Y6AATL		86.43	-0.40	-1.12	86.85	-0.02	-0.05	ZZ
YUQWD3		86.20	-0.63	-1.76	86.30	-0.56	-1.72	ZZ

Summary Statistics	Sample GM47	Sample GM48
Grand Means	86.83 g/sq m	86.86 g/sq m
Stnd Dev Btwn Labs	0.36 g/sq m	0.33 g/sq m

Statistics based on 21 of 21 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



Paper & Paperboard Interlaboratory Testing Program

Analysis 3141

Opacity (89% Reflectance Backing) - Fine Papers

TAPPI Official Test Method T425

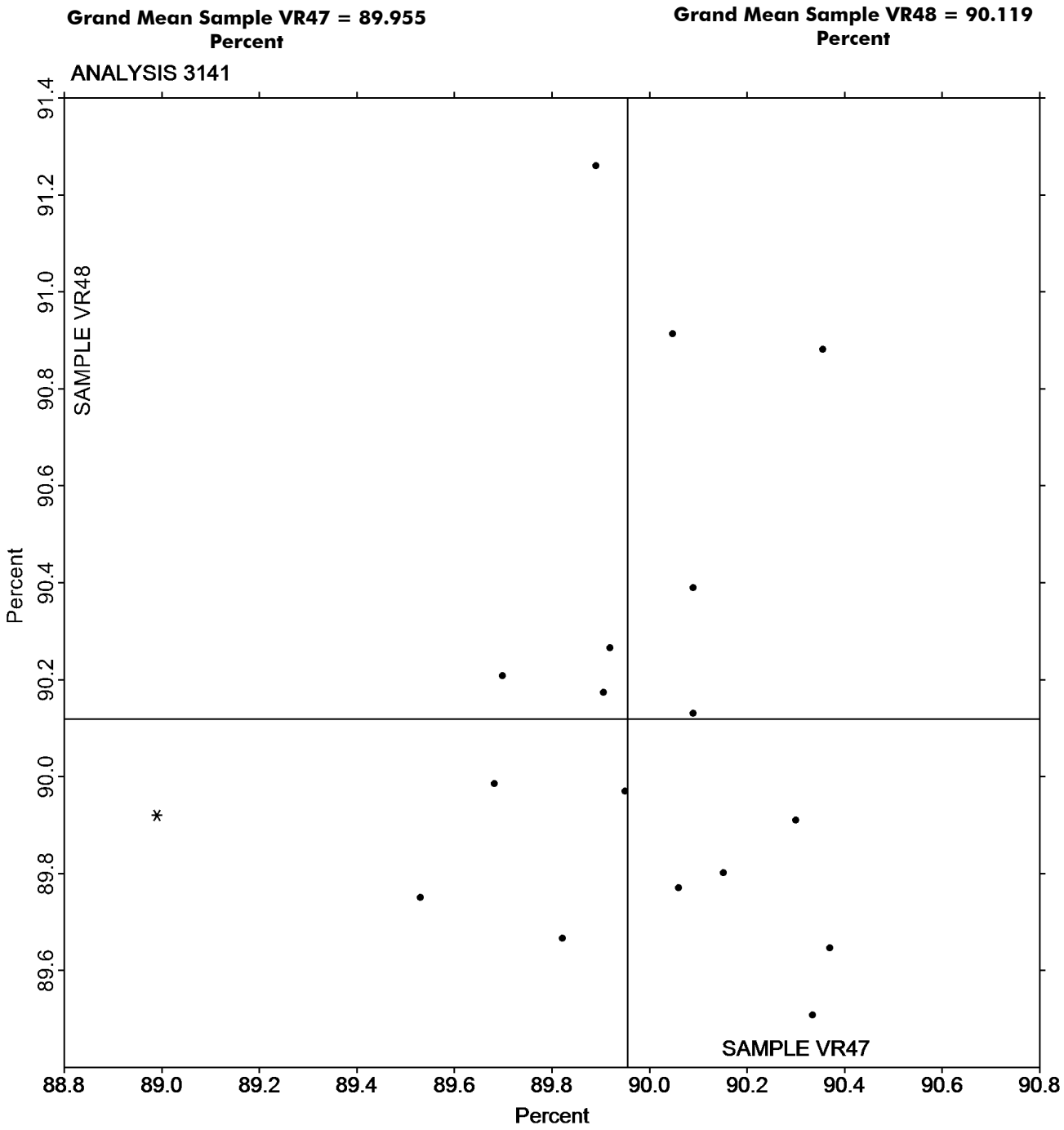
WebCode	Data Flag	Sample VR47 Lab Mean	Sample VR47 Diff from Grand Mean	Sample VR47 CPV	Sample VR48 Lab Mean	Sample VR48 Diff from Grand Mean	Sample VR48 CPV	Instr Code
3T4MUC		89.68	-0.27	-0.80	89.99	-0.13	-0.28	ZZ
983M8M		89.92	-0.04	-0.11	90.27	0.15	0.30	ZZ
99X79N		89.53	-0.42	-1.25	89.75	-0.37	-0.77	ZZ
9LL8QG		90.05	0.09	0.27	90.91	0.79	1.66	ZZ
CBAAB3		89.95	0.00	-0.01	89.97	-0.15	-0.31	ZZ
EBJZCH		89.70	-0.26	-0.75	90.21	0.09	0.19	ZZ
FHY297		90.30	0.35	1.01	89.91	-0.21	-0.44	ZZ
HTVND9		90.15	0.20	0.58	89.80	-0.32	-0.66	ZZ
K37XRC		90.09	0.14	0.40	90.13	0.01	0.02	ZZ
M6RL33	*	88.99	-0.96	-2.84	89.92	-0.20	-0.42	ZZ
MXR23T		90.37	0.42	1.22	89.65	-0.47	-0.99	ZZ
UAG7BQ		90.33	0.38	1.11	89.51	-0.61	-1.28	ZZ
UAVXY2		89.89	-0.06	-0.19	91.26	1.14	2.38	ZZ
UDGH8Q		90.06	0.11	0.31	89.77	-0.35	-0.73	ZZ
X3N6KN		90.36	0.40	1.18	90.88	0.76	1.59	ZZ
XFP2GV		89.82	-0.13	-0.39	89.67	-0.45	-0.95	ZZ
Y69GXY		89.91	-0.05	-0.14	90.17	0.05	0.11	ZZ
ZKVECY		90.09	0.14	0.40	90.39	0.27	0.57	ZZ

Summary Statistics	Sample VR47	Sample VR48
Grand Means	89.95 Percent	90.12 Percent
Stnd Dev Btwn Labs	0.34 Percent	0.48 Percent

Statistics based on 18 of 18 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.

Due to the consistently low population, this test is being discontinued following this cycle.

		Sample VP47			Sample VP48			
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	Instr Code
WD7P6K		92.38			92.25			ZZ

Summary Statistics	Sample VP47	Sample VP48
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.

Due to the consistently low population, this test is being discontinued following this cycle.

Grand Mean Sample VP47 = Percent

Grand Mean Sample VP48 = 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 BF47 Lab Mean	Sample BF47 Diff from Grand Mean	Sample BF47 CPV	Sample BF48 Lab Mean	Sample BF48 Diff from Grand Mean	Sample BF48 CPV	Instr Code
3T4MUC		95.84	-0.64	-0.49	97.35	0.68	0.45	TE
8FYX4D		95.82	-0.66	-0.50	95.54	-1.13	-0.74	TT
983M8M		95.64	-0.84	-0.64	95.58	-1.09	-0.72	PP
9LL8QG		94.71	-1.77	-1.35	94.45	-2.22	-1.45	TE
K37XRC		96.69	0.22	0.16	96.64	-0.03	-0.02	TD
X3N6KN		99.11	2.63	2.01	99.45	2.78	1.82	TD
XFP2GV		96.04	-0.44	-0.33	96.06	-0.61	-0.40	TS
XFUHFU		97.84	1.37	1.04	98.30	1.63	1.07	TS
Y69GXY		96.61	0.13	0.10	96.64	-0.03	-0.02	TD

Summary Statistics	Sample BF47	Sample BF48
Grand Means	96.48 Percent	96.67 Percent
Stnd Dev Btwn Labs	1.31 Percent	1.53 Percent

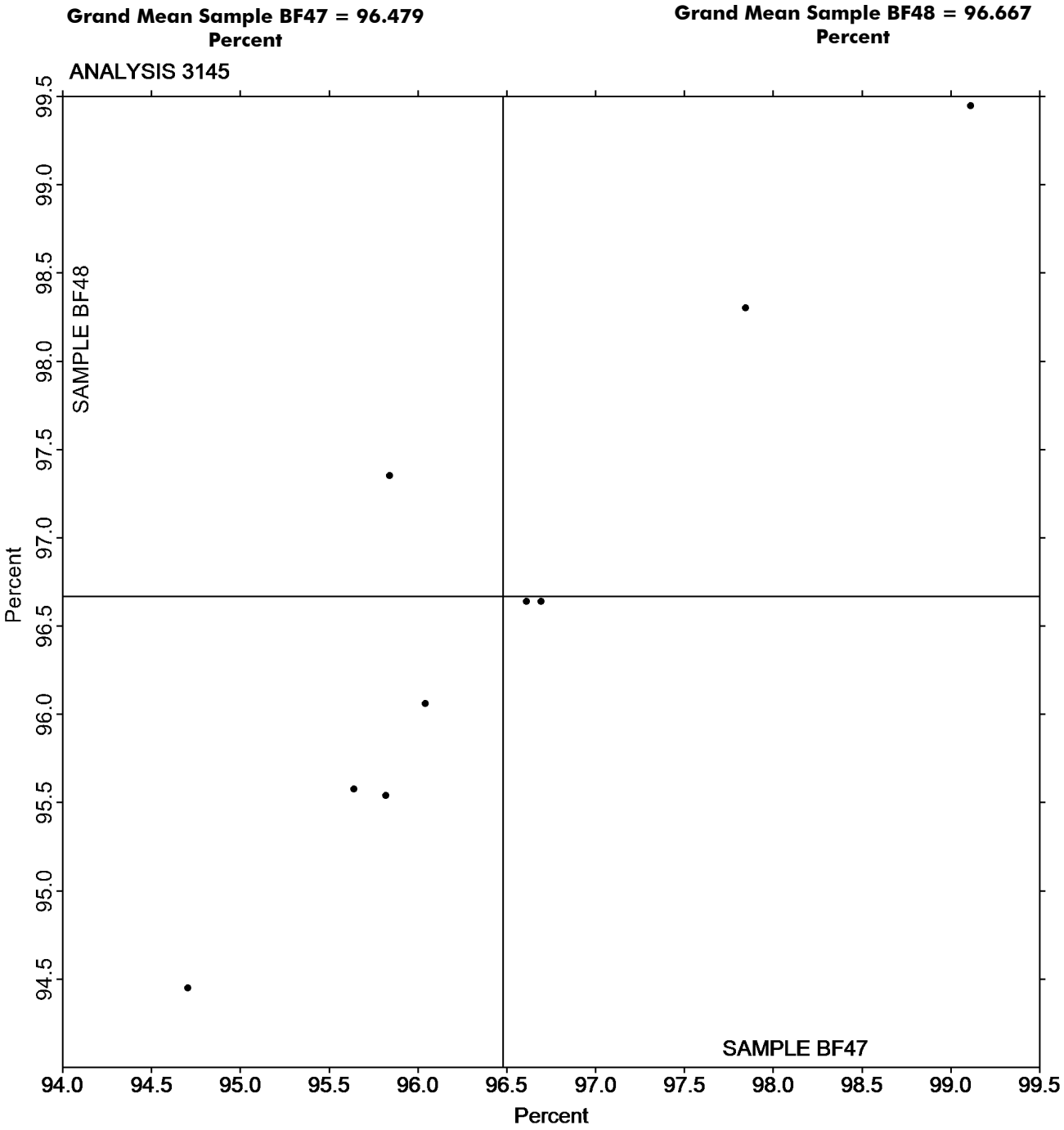
Statistics based on 9 of 9 reporting participants.

Analysis Notes:

XFUHFU - Data appears to be transposed between Analysis 3145 (Directional Brightness) and Analysis 3146 (Fluorescent Component). CTS will not correct going forward.

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
TT	Technidyne Brightimeter Micro S4-M		



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

Paper & Paperboard Interlaboratory Testing Program

Analysis 3146

Fluorescent Component of Directional Brightness

TAPPI Official Test Method T452

WebCode	Data Flag	Sample BF47 Lab Mean	Sample BF47 Diff from Grand Mean	Sample BF47 CPV	Sample BF48 Lab Mean	Sample BF48 Diff from Grand Mean	Sample BF48 CPV	Instr Code
3T4MUC		7.994	0.114	0.30	8.200	0.319	0.71	TE
8FYX4D		7.740	-0.140	-0.37	7.800	-0.081	-0.18	XX
983M8M		7.424	-0.456	-1.19	7.404	-0.477	-1.07	PP
9LL8QG		7.358	-0.522	-1.36	7.178	-0.703	-1.58	TE
K37XRC		8.322	0.442	1.15	8.230	0.349	0.78	TD
X3N6KN		8.198	0.318	0.83	8.304	0.423	0.95	TD
XFUHFU		7.696	-0.184	-0.48	7.616	-0.265	-0.60	TS
Y69GXY		8.308	0.428	1.12	8.320	0.438	0.98	TD

Summary Statistics	Sample BF47	Sample BF48
Grand Means	7.88 Percent	7.88 Percent
Stnd Dev Btwn Labs	0.38 Percent	0.45 Percent

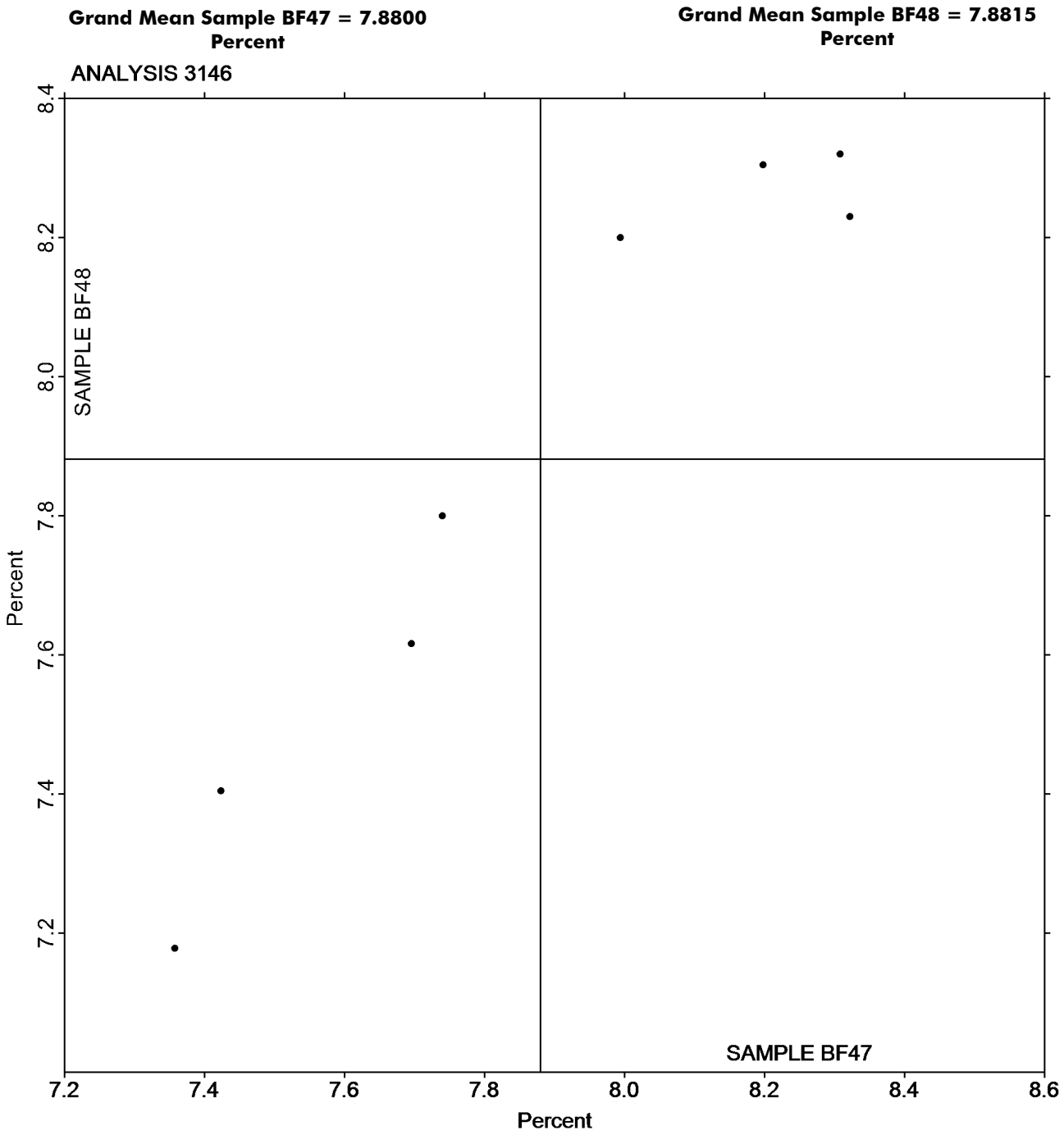
Statistics based on 8 of 8 reporting participants.

Analysis Notes:

XFUHFU - Data appears to be transposed between Analysis 3145 (Directional Brightness) and Analysis 3146 (Fluorescent Component). CTS will not correct going forward.

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 TP47 Lab Mean	Sample TP47 Diff from Grand Mean	Sample TP47 CPV	Sample TP48 Lab Mean	Sample TP48 Diff from Grand Mean	Sample TP48 CPV	Instr Code
32GG8T		1.896	-0.201	-0.72	1.893	-0.167	-0.87	ZZ
8AE3ZN		2.290	0.193	0.70	2.120	0.061	0.32	ZZ
FHY297		2.236	0.139	0.50	2.256	0.197	1.02	ZZ
HTVND9		2.444	0.348	1.26	2.270	0.211	1.10	ZZ
MXR23T		2.015	-0.082	-0.29	2.021	-0.038	-0.20	ZZ
Y69GXY		1.699	-0.398	-1.44	1.797	-0.262	-1.36	ZZ

Summary Statistics	Sample TP47	Sample TP48
Grand Means	2.10 Taber Units	2.06 Taber Units
Stnd Dev Btwn Labs	0.28 Taber Units	0.19 Taber Units

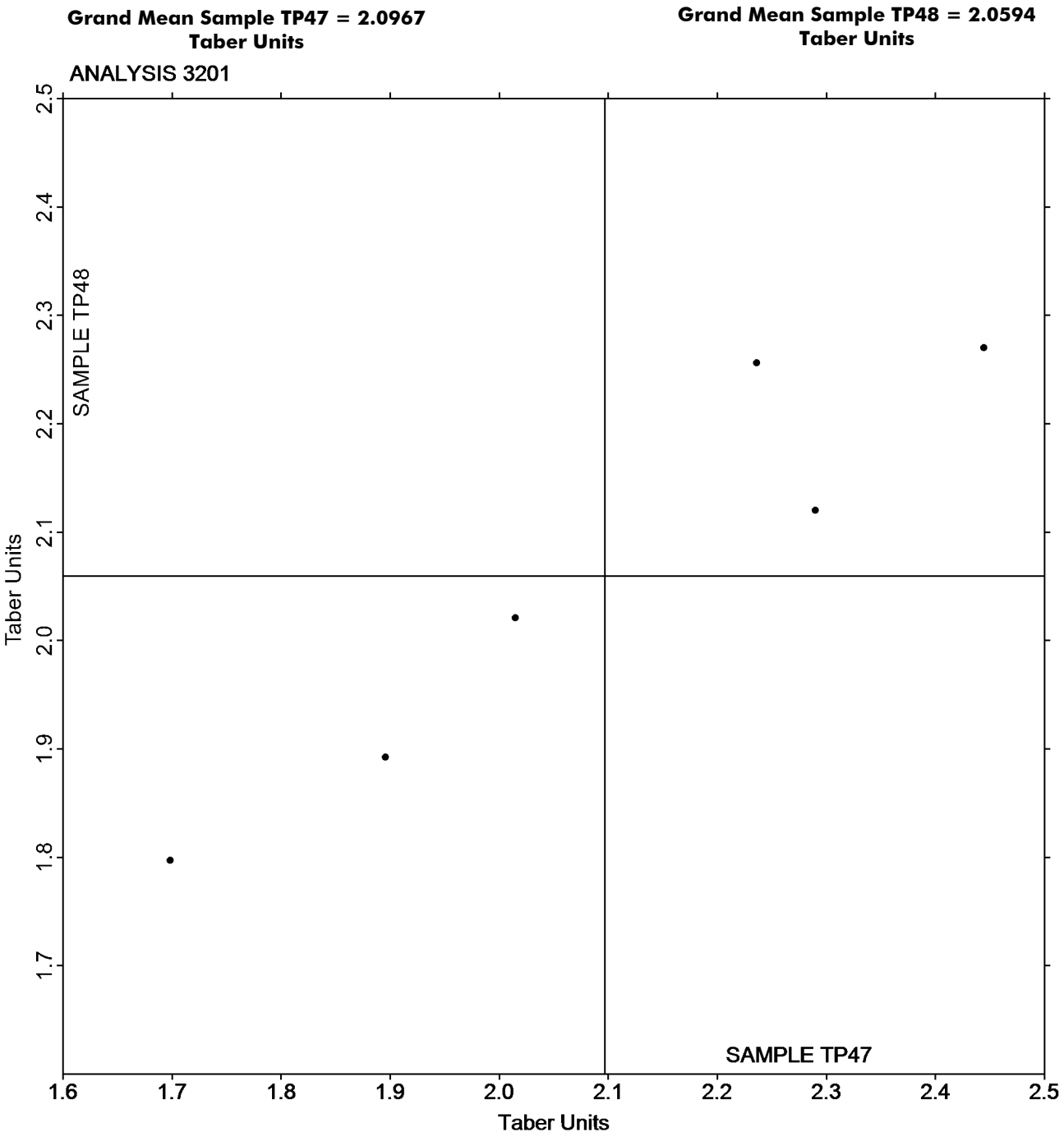
Statistics based on 6 of 6 reporting participants.

Analysis Notes:

HTVND9 - One determination removed from the Lab Mean of Sample TP47 per Grubb's Test at 1% risk (TAPPI 1205).

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 TC47 Lab Mean	Sample TC47 Diff from Grand Mean	Sample TC47 CPV	Sample TC48 Lab Mean	Sample TC48 Diff from Grand Mean	Sample TC48 CPV	Instr Code
3XXPVQ		54.93	-2.41	-0.90	55.90	-1.88	-0.73	ZZ
7HAHCM		56.81	-0.52	-0.20	60.23	2.46	0.96	ZZ
83CQ6Q		55.50	-1.83	-0.69	55.25	-2.53	-0.99	ZZ
9LL8QG		55.25	-2.08	-0.78	56.22	-1.56	-0.61	ZZ
GV4E4C		57.43	0.10	0.04	58.04	0.26	0.10	ZZ
K37XRC		53.80	-3.53	-1.33	54.00	-3.78	-1.47	ZZ
KZ7PN2	X	30.09	-27.24	-10.23	30.10	-27.68	-10.78	ZZ
MXR23T		60.00	2.67	1.00	58.29	0.51	0.20	ZZ
MYLR98		61.33	4.00	1.50	60.46	2.68	1.04	ZZ
X74WAV		61.13	3.80	1.43	62.12	4.34	1.69	ZZ
Z7Y34V		57.15	-0.18	-0.07	57.27	-0.51	-0.20	ZZ

Summary Statistics	Sample TC47	Sample TC48
Grand Means	57.33 Taber Units	57.78 Taber Units
Stnd Dev Btwn Labs	2.66 Taber Units	2.57 Taber Units

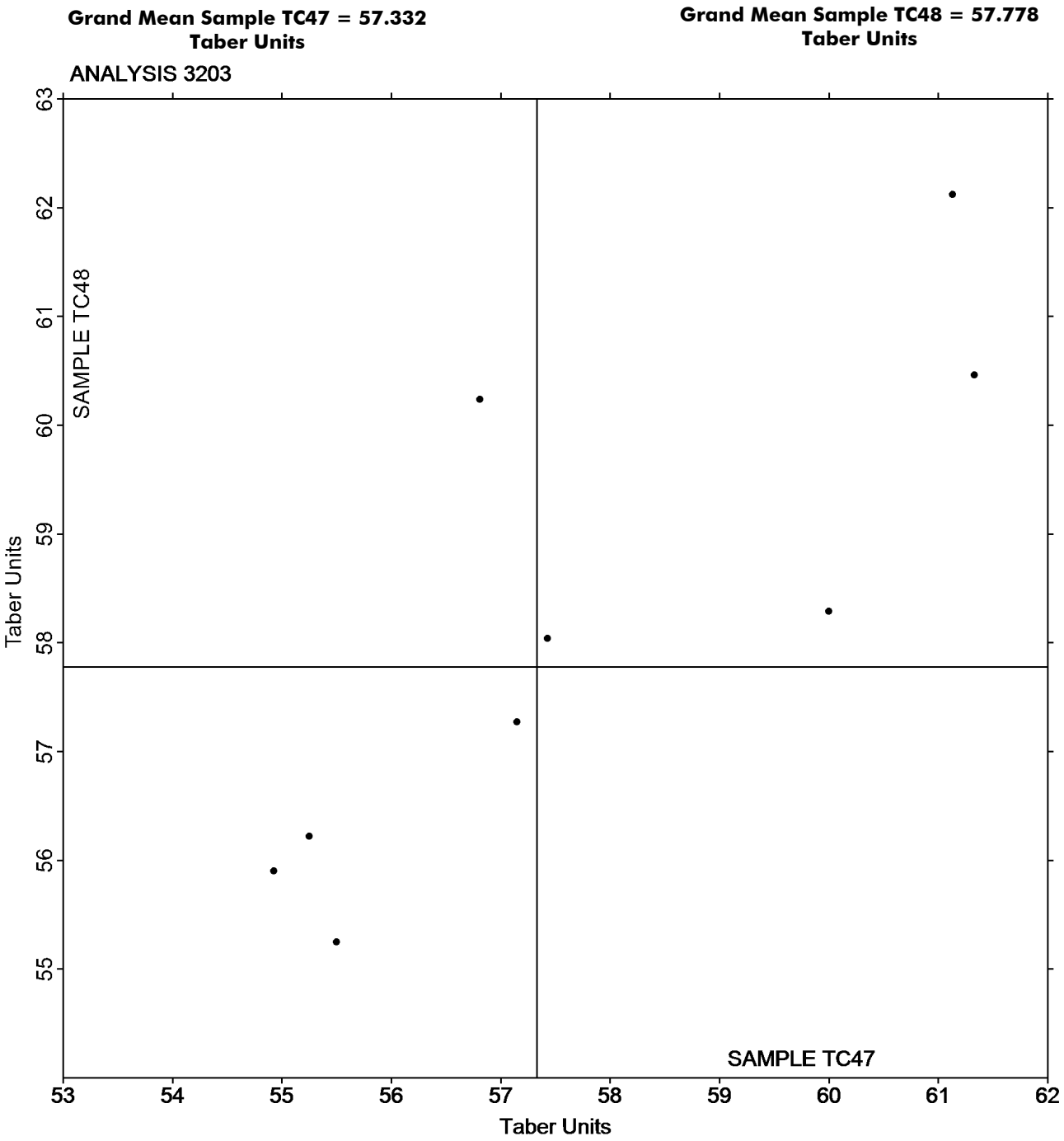
Statistics based on 10 of 11 reporting participants.

Comments on Assigned Data Flags for Test #3203

KZ7PN2 (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 3205

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

TAPPI Official Test Method T489

WebCode	Data Flag	Sample TR47 Lab Mean	Sample TR47 Diff from Grand Mean	Sample TR47 CPV	Sample TR48 Lab Mean	Sample TR48 Diff from Grand Mean	Sample TR48 CPV	Instr Code
2AV79M		173.0	-1.0	-0.21	168.1	-5.8	-1.03	ZZ
3XXPVQ		177.4	3.4	0.69	176.0	2.0	0.36	ZZ
7HAHCM		177.4	3.4	0.70	176.6	2.6	0.47	ZZ
9DP8EA		168.5	-5.5	-1.13	168.4	-5.5	-0.98	ZZ
GV4E4C		175.5	1.5	0.30	177.3	3.3	0.59	ZZ
MXPCWB		180.9	6.8	1.40	183.5	9.5	1.69	ZZ
RBGPX3		177.3	3.3	0.68	180.1	6.2	1.09	ZZ
TMCZ9U		170.5	-3.5	-0.72	167.6	-6.3	-1.13	ZZ
UDFPB4		178.7	4.6	0.95	174.0	0.0	0.00	ZZ
XEVBBG		169.2	-4.8	-0.99	175.7	1.7	0.31	ZZ
ZJ2QVP	X	19.2	-154.8	-31.84	20.7	-153.3	-27.22	ZZ
ZKVECY		165.9	-8.1	-1.67	166.2	-7.7	-1.37	ZZ

Summary Statistics	Sample TR47	Sample TR48
Grand Means	174.02 Taber Units	173.94 Taber Units
Stnd Dev Btwn Labs	4.86 Taber Units	5.63 Taber Units

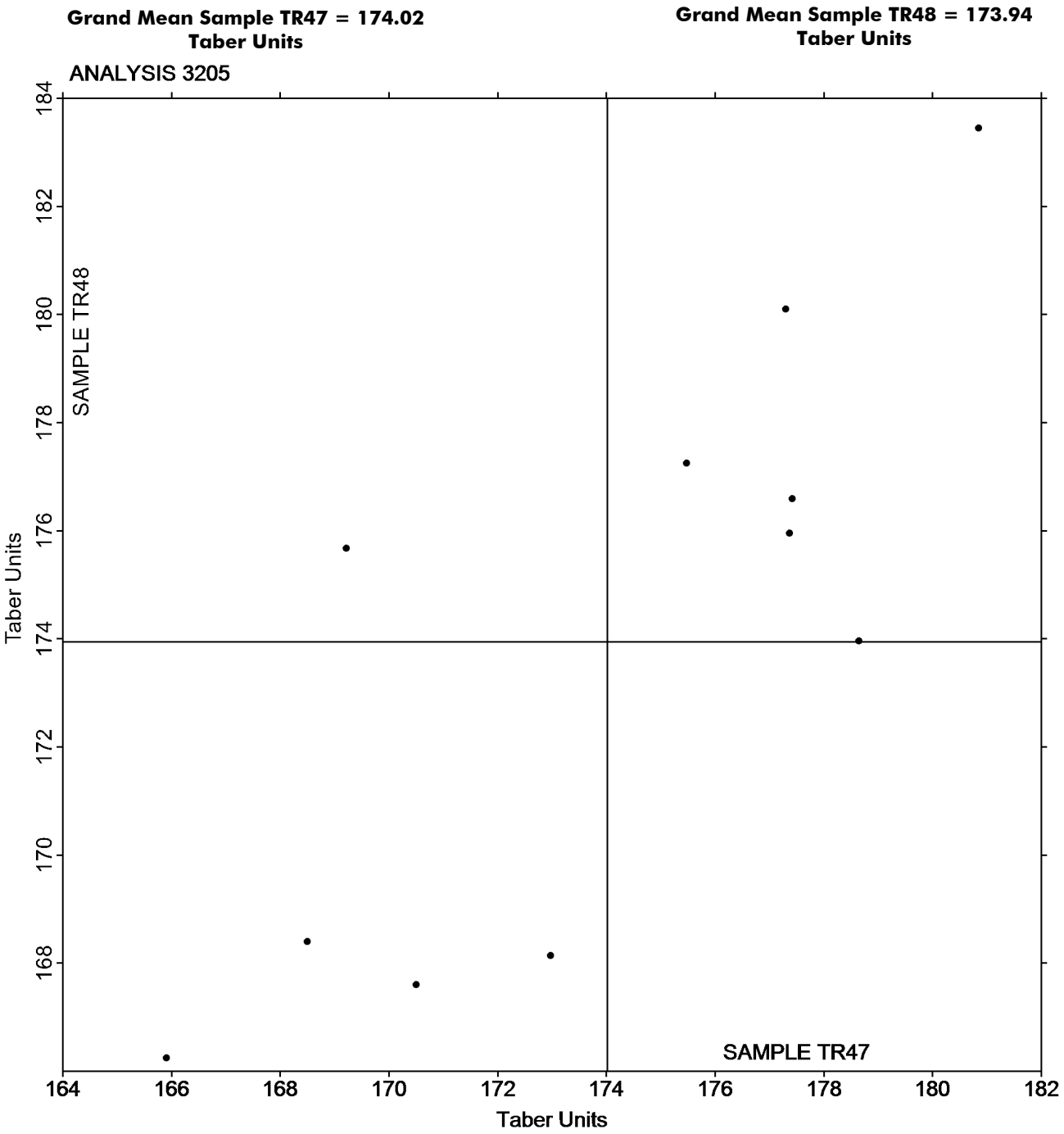
Statistics based on 11 of 12 reporting participants.

Comments on Assigned Data Flags for Test #3205

ZJ2QVP (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 3207
Z-Direction Tensile, Recycled Paperboard
TAPPI Official Test Method T541

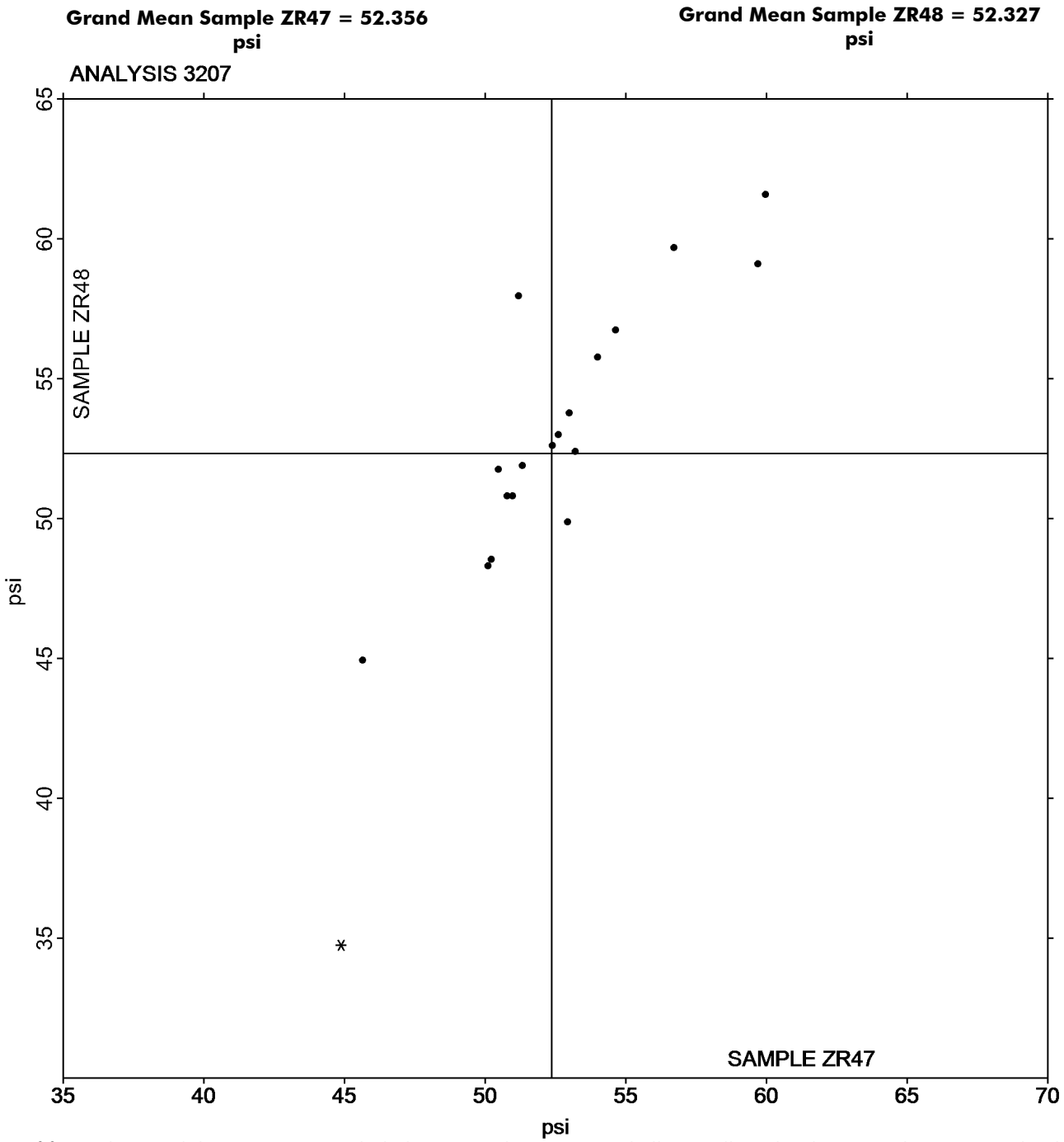
WebCode	Data Flag	Sample ZR47 Lab Mean	Sample ZR47 Diff from Grand Mean	Sample ZR47 CPV	Sample ZR48 Lab Mean	Sample ZR48 Diff from Grand Mean	Sample ZR48 CPV	Instr Code
2AV79M		54.00	1.64	0.43	55.76	3.43	0.57	CD
3XXPVQ		50.48	-1.88	-0.49	51.76	-0.57	-0.09	CD
6336HK		52.94	0.58	0.15	49.88	-2.45	-0.41	TA
64D4CT		50.22	-2.14	-0.56	48.54	-3.79	-0.63	LW
7TB76J		50.78	-1.58	-0.41	50.80	-1.53	-0.25	DT
9DP8EA		51.32	-1.04	-0.27	51.88	-0.45	-0.07	TA
GV4E4C		52.60	0.24	0.06	53.00	0.67	0.11	LW
LDNWZT		50.10	-2.26	-0.59	48.30	-4.03	-0.67	LW
MXPCWB		52.40	0.04	0.01	52.60	0.27	0.05	CA
P88U6Z		50.98	-1.38	-0.36	50.80	-1.53	-0.25	XX
PW82W9		59.69	7.34	1.93	59.10	6.77	1.12	LW
R3LPLV		51.19	-1.17	-0.31	57.95	5.62	0.93	CH
TAL9L6		59.97	7.62	2.00	61.58	9.25	1.53	LW
XEVBBG	*	44.88	-7.48	-1.96	34.74	-17.58	-2.91	LW
XU9L2P		56.72	4.36	1.15	59.68	7.35	1.22	CH
YUTP9P		54.64	2.28	0.60	56.74	4.41	0.73	DP
ZJ2QVP		53.00	0.64	0.17	53.76	1.43	0.24	CA
ZKVECY		45.64	-6.72	-1.76	44.94	-7.39	-1.22	CD
ZQNGHK		53.20	0.84	0.22	52.40	0.07	0.01	CD

Summary Statistics	Sample ZR47	Sample ZR48
Grand Means	52.36 psi	52.33 psi
Stnd Dev Btwn Labs	3.81 psi	6.04 psi

Statistics based on 19 of 19 reporting participants.

Key to Instrument Codes Reported by Participants

CA	CSI CS-163	CD	CSI CS-163D
CH	Chatillon Ametek	DP	Dek-Tron XP Series
DT	Dek-Tron DCS-163D ZDT Tester	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 ZP47 Lab Mean	Sample ZP47 Diff from Grand Mean	Sample ZP47 CPV	Sample ZP48 Lab Mean	Sample ZP48 Diff from Grand Mean	Sample ZP48 CPV	Instr Code
GV4E4C		74.38	2.53	0.36	77.06	4.22	0.58	LW
KZ7PN2		75.20	3.35	0.48	74.40	1.57	0.22	TA
MYLR98		72.12	0.27	0.04	73.64	0.81	0.11	CD
RBGPX3		70.24	-1.61	-0.23	70.72	-2.11	-0.29	CD
TMCZ9U		84.40	12.55	1.79	86.18	13.35	1.84	LW
X74WAV		72.12	0.27	0.04	71.84	-0.99	-0.14	CD
YTW78N		65.80	-6.05	-0.87	67.80	-5.03	-0.69	TA
Z7Y34V		60.54	-11.31	-1.62	61.04	-11.79	-1.62	CD

Summary Statistics	Sample ZP47	Sample ZP48
Grand Means	71.85 psi	72.84 psi
Stnd Dev Btwn Labs	6.99 psi	7.26 psi

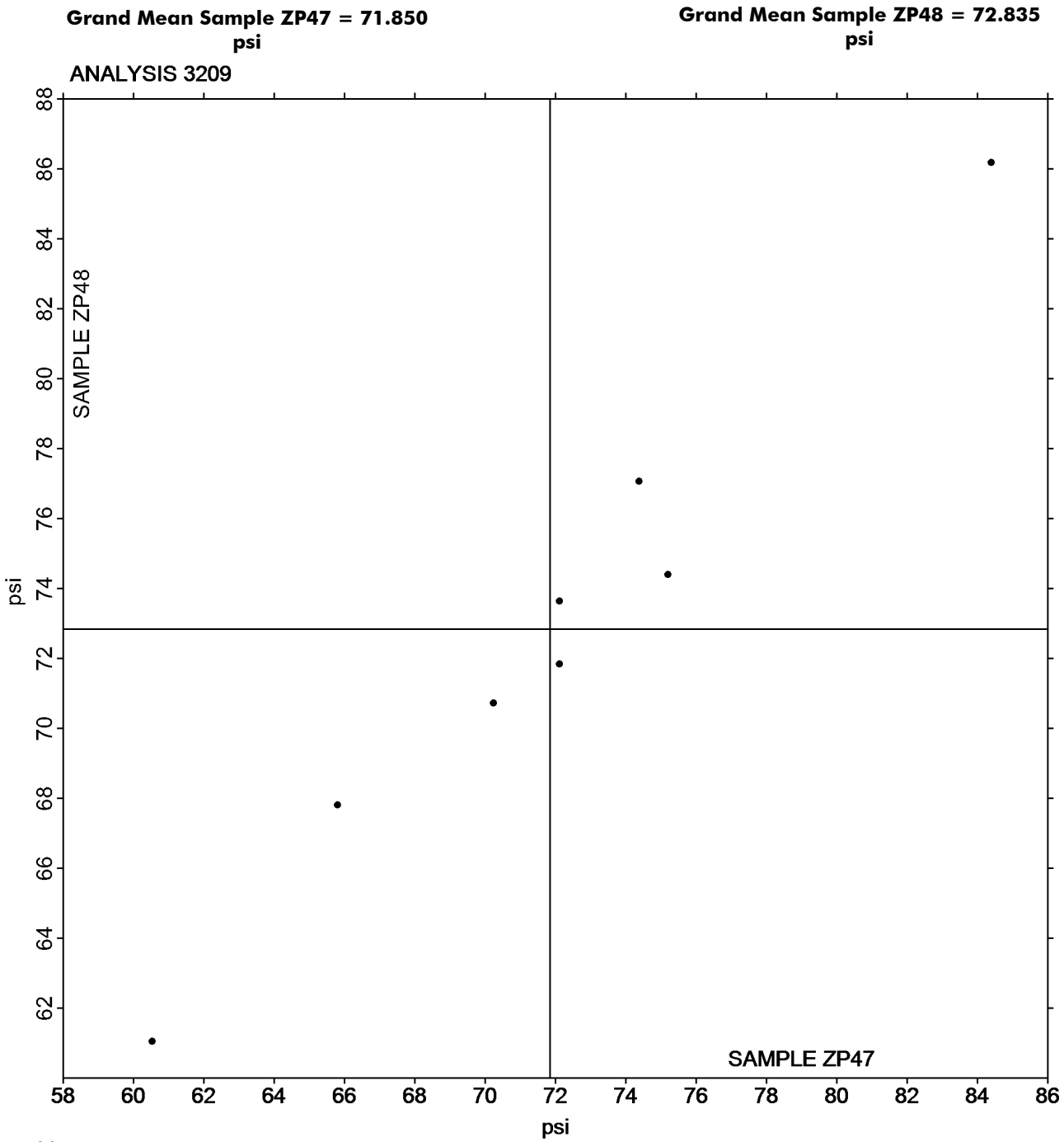
Statistics based on 8 of 8 reporting participants.

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

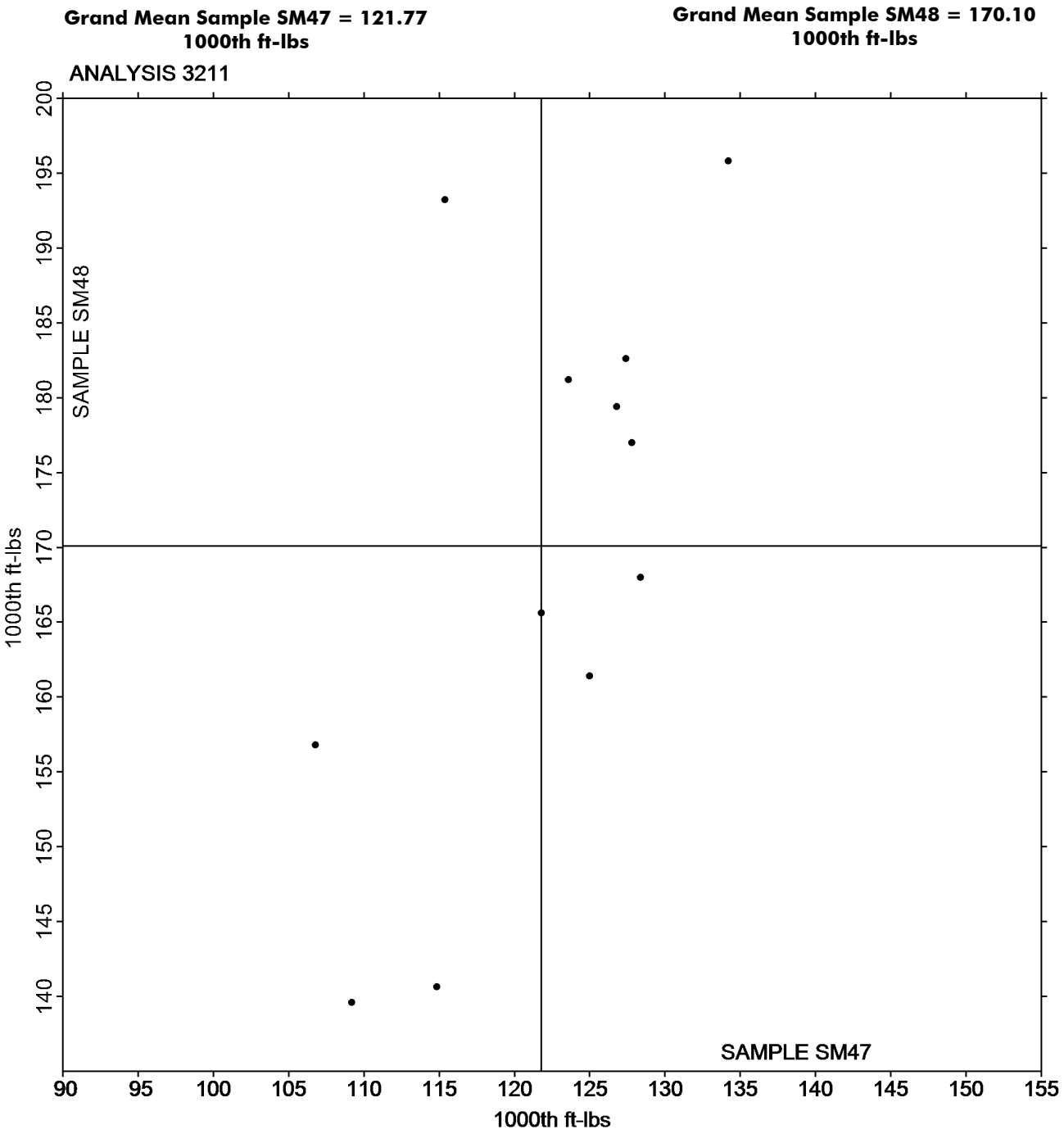
WebCode	Data Flag	Sample SM47 Lab Mean	Sample SM47 Diff from Grand Mean	Sample SM47 CPV	Sample SM48 Lab Mean	Sample SM48 Diff from Grand Mean	Sample SM48 CPV	Instr Code
2AV79M		127.4	5.6	0.67	182.6	12.5	0.68	XX
3T4MUC		114.9	-6.9	-0.82	140.6	-29.5	-1.61	HX
8AE3ZN		106.8	-15.0	-1.78	156.8	-13.3	-0.73	KR
8FYX4D		125.0	3.2	0.38	161.4	-8.7	-0.48	HX
ADPREG		121.8	0.0	0.00	165.6	-4.5	-0.25	HZ
GV4E4C		128.4	6.6	0.79	168.0	-2.1	-0.11	HZ
KZ7PN2		126.8	5.0	0.60	179.4	9.3	0.51	HZ
MYLR98		127.8	6.0	0.72	177.0	6.9	0.38	HY
QH37D7		115.4	-6.4	-0.76	193.2	23.1	1.26	HY
TMCZ9U		109.2	-12.6	-1.50	139.6	-30.5	-1.67	HZ
UAG7BQ		123.6	1.8	0.22	181.2	11.1	0.61	HY
X74WAV		134.2	12.4	1.48	195.8	25.7	1.40	HY

Summary Statistics	Sample SM47	Sample SM48
Grand Means	121.77 1000th ft-lbs	170.10 1000th ft-lbs
Stnd Dev Btwn Labs	8.40 1000th ft-lbs	18.30 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

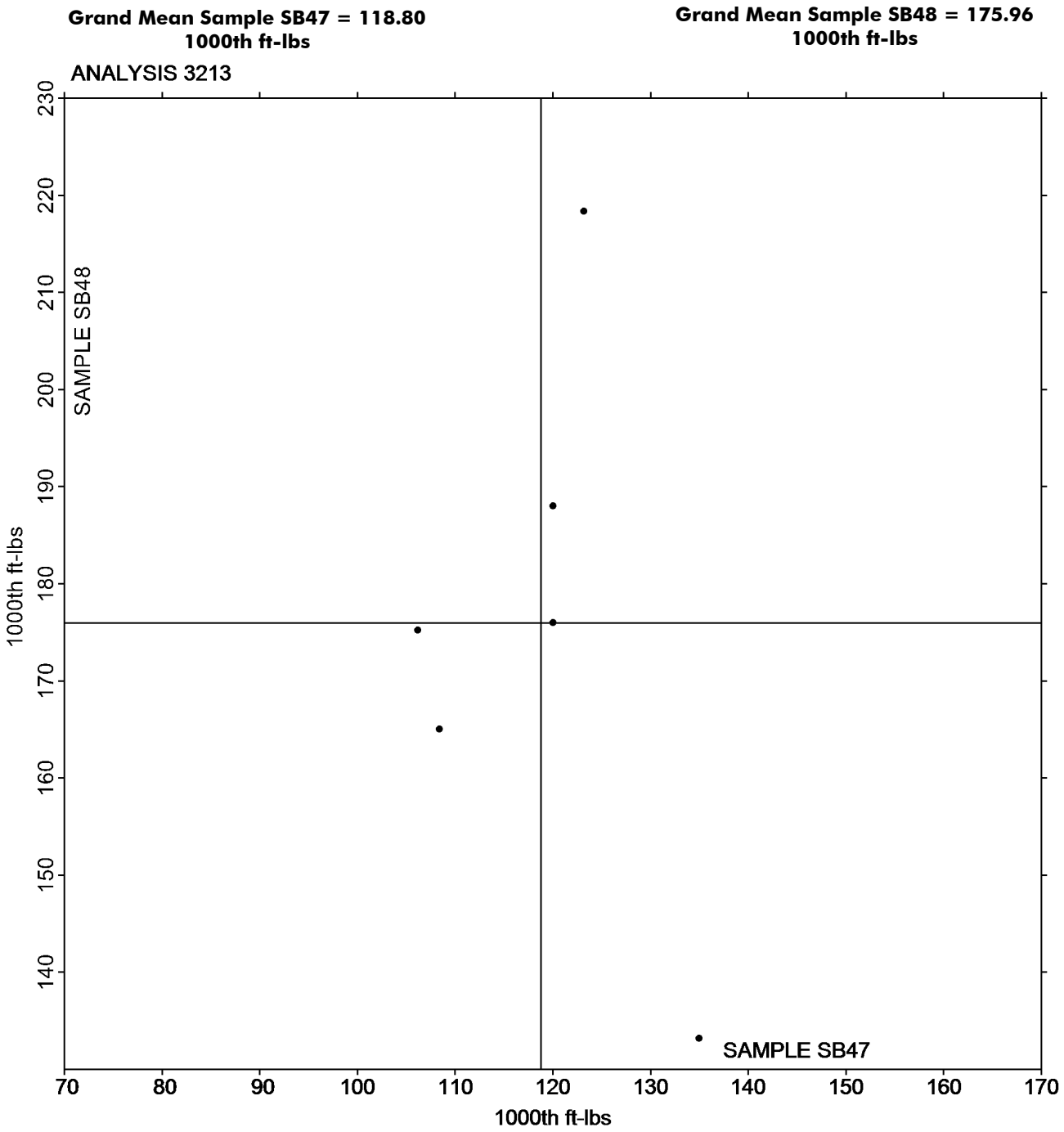
WebCode	Data Flag	Sample SB47 Lab Mean	Sample SB47 Diff from Grand Mean	Sample SB47 CPV	Sample SB48 Lab Mean	Sample SB48 Diff from Grand Mean	Sample SB48 CPV	Instr Code
83CQ6Q		123.2	4.4	0.42	218.4	42.4	1.52	ID
DPL644		108.4	-10.4	-0.99	165.0	-11.0	-0.39	TM
F9CZQB		106.2	-12.6	-1.20	175.2	-0.8	-0.03	TM
QRUJER		120.0	1.2	0.11	188.0	12.0	0.43	TM
R3LPLV		135.0	16.2	1.54	133.2	-42.8	-1.53	TM
UAG7BQ		120.0	1.2	0.11	176.0	0.0	0.00	TM

Summary Statistics	Sample SB47	Sample SB48
Grand Means	118.80 1000th ft-lbs	175.96 1000th ft-lbs
Stnd Dev Btwn Labs	10.50 1000th ft-lbs	27.90 1000th ft-lbs

Statistics based on 6 of 6 reporting participants.

Key to Instrument Codes Reported by Participants

ID	IDM Internal Bond Tester	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-