Paper & Paperboard Testing Program

Summary Report #4221 JA - January 2023

Introduction to the Paper & Paperboard Interlaboratory Program

Explanation of Tables and Definitions of Terms

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3111	Bursting Strength - Printing Papers
3113	Tearing Strength - Printing Papers
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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 sectors: including color, rubber, plastics, fasteners and metals, containerboard, paper, agriculture, hemp, and wine, as well as proficiency tests for forensic laboratories. All of the tests are designed to assist organizations in achieving and maintaining quality assurance objectives. Labs from the U.S., as well as more than 100 countries, currently participate in the CTS programs.

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

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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.

<center>**Common Problems Highlighted in Footnotes**</center>

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

Report #4221JA, January 2023

		Sample CP13			Sample CP14		
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
28KVWE		4.983	0.013	0.15	4.947	-0.027	-0.33
29EGRQ		4.928	-0.042	-0.48	4.988	0.014	0.17
3JRYYN		4.994	0.024	0.28	4.968	-0.006	-0.07
3KLGK3		4.941	-0.029	-0.33	4.921	-0.053	-0.66
3QRKLH		5.024	0.054	0.63	5.043	0.069	0.85
3R3TZP		4.951	-0.019	-0.22	5.000	0.026	0.32
4EPJKX		4.825	-0.145	-1.68	4.856	-0.118	-1.46
69MQA3		5.046	0.077	0.89	5.064	0.090	1.11
6QHKHJ		4.902	-0.068	-0.79	4.933	-0.041	-0.51
7C2P3M	*	4.993	0.023	0.27	5.105	0.131	1.62
8QT9QN	*	4.733	-0.237	-2.74	4.823	-0.151	-1.87
ACQCP2		5.064	0.094	1.09	5.030	0.056	0.69
ATWGAT		5.042	0.072	0.83	4.976	0.002	0.03
AU8HWR		5.001	0.031	0.36	4.986	0.012	0.15
BLRZGY		5.040	0.070	0.81	5.022	0.048	0.59
BQ48FH		5.021	0.051	0.59	5.016	0.042	0.52
BZP7BU		5.032	0.062	0.72	5.013	0.039	0.48
C4RAXA		4.937	-0.033	-0.38	4.954	-0.020	-0.25
C79TH4	*	4.741	-0.229	-2.66	4.720	-0.253	-3.14
DQ8LT2		4.774	-0.196	-2.27	4.864	-0.110	-1.36
DQA7PG		5.031	0.062	0.71	5.024	0.050	0.62
EF6H94	*	5.141	0.171	1.98	5.189	0.215	2.66
ERY2MA		4.864	-0.106	-1.23	4.873	-0.101	-1.25
EY62AD		4.925	-0.045	-0.52	4.909	-0.064	-0.80
F6NNGN		4.928	-0.042	-0.48	4.997	0.023	0.29
FMPDV7		4.947	-0.023	-0.26	4.915	-0.059	-0.73
G7U3E2		4.988	0.018	0.21	4.984	0.010	0.12
H7C8TT		5.016	0.046	0.53	4.970	-0.004	-0.05
HBPJFE		4.909	-0.061	-0.70	4.859	-0.115	-1.42
HWLTJV		5.075	0.105	1.22	5.059	0.085	1.05
KFE964		5.034	0.064	0.74	5.059	0.085	1.05
LHWRKR		4.933	-0.036	-0.42	4.988	0.014	0.17
METCRV		5.077	0.107	1.24	5.021	0.047	0.58
MYWUH4		4.951	-0.019	-0.22	5.005	0.031	0.38
NFYDRJ		4.956	-0.014	-0.16	4.968	-0.006	-0.07
NUYRVF		4.941	-0.029	-0.33	4.933	-0.041	-0.51
PD6KD8		4.891	-0.079	-0.91	4.933	-0.041	-0.51
PW2DC8		5.046	0.076	0.88	5.000	0.026	0.32
Q4YWZ2		4.989	0.020	0.23	4.977	0.003	0.04
QV6R8Z		4.911	-0.059	-0.68	4.948	-0.026	-0.32

Paper & Paperboard Interlaboratory Testing Program
Analysis 3101
Thickness (Caliper), Printing papers
TAPPI Official Test Method T411

Report #4221JA, January 2023

WebCode	Data Flag	Sample CP13			Sample CP14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
R9MGQG		4.931	-0.039	-0.45	4.906	-0.068	-0.84
RGJ8FY		5.121	0.151	1.75	5.089	0.115	1.43
TEBFJ3		4.997	0.027	0.32	4.944	-0.030	-0.37
TRUZ3B		4.921	-0.049	-0.56	4.957	-0.017	-0.21
VVMYBQ		5.053	0.083	0.96	5.084	0.110	1.36
W9PWQB	*	4.998	0.028	0.33	4.881	-0.093	-1.15
WR2JCH		5.004	0.034	0.40	5.039	0.065	0.81
YBNHJ7		4.999	0.029	0.34	5.009	0.035	0.43

| Summary Statistics	Sample CP13	Sample CP14
Grand Means	4.97 mils	4.97 mils
Stnd Dev Btwn Labs	0.09 mils	0.08 mils

Statistics based on 48 of 48 reporting participants.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3101
Thickness (Caliper), Printing papers
TAPPI Official Test Method T411

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Grand Mean Sample CP13 = 4.9698 mils

Grand Mean Sample CP14 = 4.9740 mils
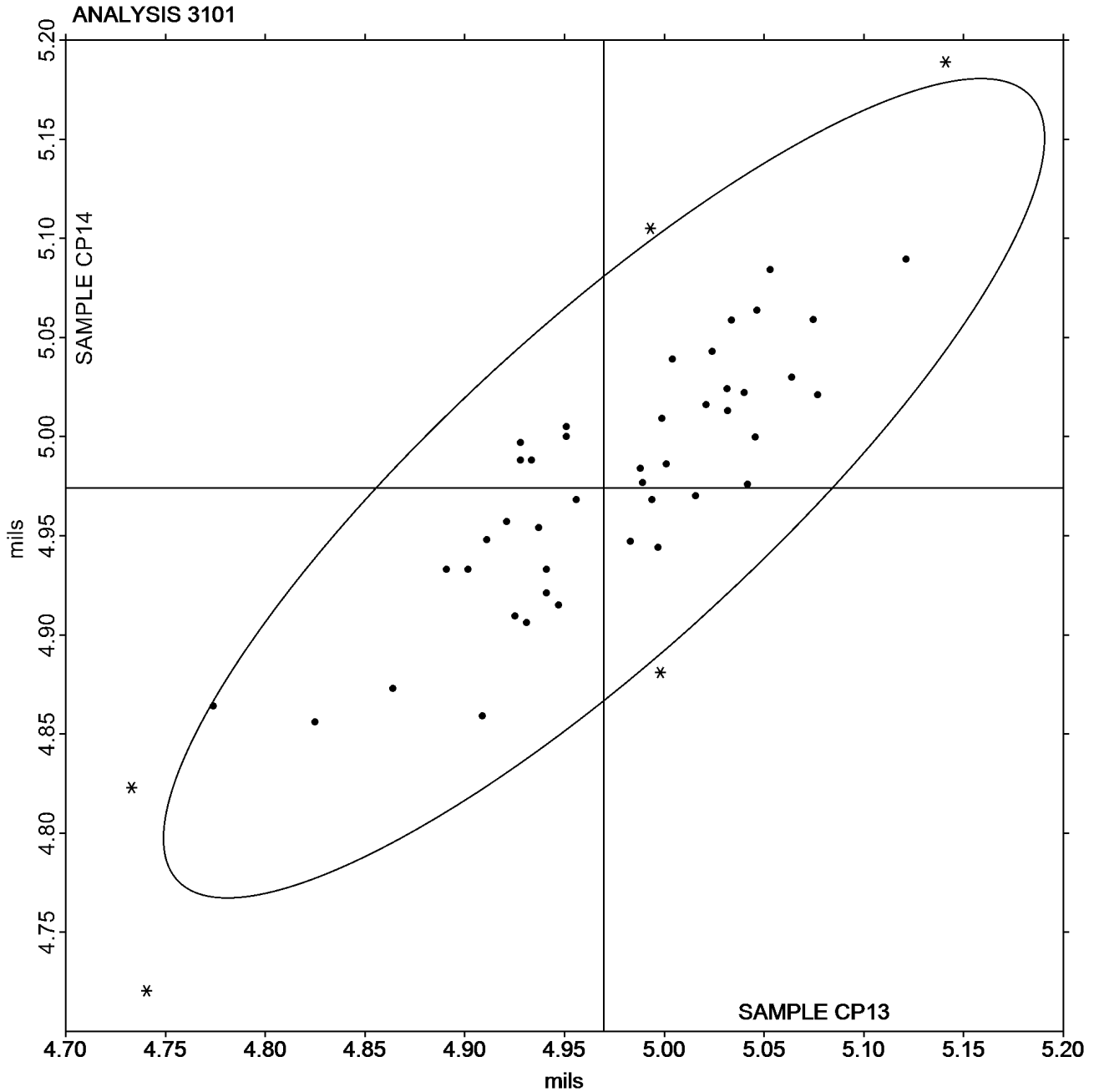
ANALYSIS 3101

SAMPLE CP14

SAMPLE CP13

mils

mils

Paper & Paperboard Interlaboratory Testing Program

Analysis 3111
Bursting Strength - Printing Papers
TAPPI Official Test Method T403

WebCode	Data Flag	Sample BP13 Lab Mean	Sample BP13 Diff from Grand Mean	Sample BP13 CPV	Sample BP14 Lab Mean	Sample BP14 Diff from Grand Mean	Sample BP14 CPV
29VXHD		43.97	-0.56	-0.18	43.85	-0.50	-0.16
3A3AZF		43.63	-0.90	-0.28	44.76	0.42	0.13
3KLGK3		45.00	0.47	0.15	45.10	0.75	0.24
3QRKLH		45.61	1.08	0.34	44.02	-0.33	-0.10
4EPJKX		49.91	5.38	1.69	50.47	6.12	1.92
69MQA3		44.51	-0.01	0.00	42.24	-2.11	-0.66
7PJKA7		43.50	-1.03	-0.32	43.80	-0.55	-0.17
ACQCP2		44.00	-0.53	-0.17	43.00	-1.35	-0.42
B2LLHK		45.15	0.62	0.20	43.26	-1.09	-0.34
BQ48FH		42.54	-1.99	-0.62	42.96	-1.39	-0.43
BZP7BU		39.31	-5.22	-1.64	39.35	-5.00	-1.57
C4RAXA	*	54.46	9.93	3.12	53.15	8.80	2.76
CT2PBN		41.55	-2.98	-0.94	41.60	-2.75	-0.86
EF6H94		45.22	0.69	0.22	44.47	0.12	0.04
FMPDV7		40.84	-3.69	-1.16	41.55	-2.80	-0.88
HNQFE8		41.89	-2.64	-0.83	42.39	-1.96	-0.61
KRLGHF		49.20	4.67	1.47	50.00	5.65	1.77
MREV2Q		44.10	-0.43	-0.13	43.85	-0.50	-0.16
MYWUH4		45.90	1.37	0.43	46.54	2.19	0.69
NFYDRJ		44.50	-0.03	-0.01	45.08	0.74	0.23
NUYRVF		48.20	3.67	1.16	46.00	1.65	0.52
PD6KD8		46.48	1.96	0.62	46.61	2.26	0.71
PW2DC8		41.02	-3.51	-1.10	41.12	-3.23	-1.01
Q4YWZ2		44.08	-0.45	-0.14	42.71	-1.63	-0.51
TBP278		45.18	0.66	0.21	45.27	0.92	0.29
TEBFJ3		43.58	-0.95	-0.30	43.43	-0.92	-0.29
V77HMB		41.47	-3.06	-0.96	43.62	-0.73	-0.23
YBNHJ7		46.60	2.07	0.65	48.00	3.65	1.14
ZHMVR8		39.90	-4.63	-1.46	37.90	-6.45	-2.02

Summary Statistics	Sample BP13	Sample BP14
Grand Means	44.53 psi	44.35 psi
Stnd Dev Btwn Labs	3.18 psi	3.19 psi

Statistics based on 29 of 29 reporting participants.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3111
Bursting Strength - Printing Papers
TAPPI Official Test Method T403

Report #4221JA,
January 2023

Grand Mean Sample BP13 = 44.527 psi

Grand Mean Sample BP14 = 44.349 psi

ANALYSIS 3111

SAMPLE BP14

psi

SAMPLE BP13

psi

WebCode	Data Flag	Sample RP13			Sample RP14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
24JHYU		64.16	-0.19	-0.04	63.92	2.23	0.44
39R3MR		60.15	-4.20	-0.85	56.70	-4.99	-0.99
3A3AZF		61.58	-2.78	-0.56	60.60	-1.09	-0.22
3KLGK3		63.10	-1.25	-0.25	58.80	-2.89	-0.58
3QRKLH		57.50	-6.85	-1.39	53.90	-7.79	-1.55
69MQA3	M	67.06	2.71	0.55	No data reported for this sample		
8HYZ6X		58.81	-5.54	-1.12	55.65	-6.04	-1.20
8QT9QN	X	86.28	21.93	4.45	82.84	21.15	4.21
ACQCP2		58.80	-5.55	-1.13	54.00	-7.69	-1.53
AU8HWR		61.50	-2.85	-0.58	57.36	-4.33	-0.86
B2LLHK		65.54	1.19	0.24	62.86	1.17	0.23
BABENP	*	78.70	14.35	2.91	75.78	14.09	2.80
BLRZGY		64.20	-0.15	-0.03	60.70	-0.99	-0.20
BZP7BU		66.90	2.55	0.52	63.49	1.80	0.36
C4RAXA		64.42	0.07	0.01	63.36	1.67	0.33
DQ8LT2		60.61	-3.74	-0.76	57.47	-4.22	-0.84
DQA7PG		61.71	-2.64	-0.54	58.29	-3.40	-0.68
E8XCJ9		66.78	2.43	0.49	62.88	1.19	0.24
EA2EKQ		64.96	0.61	0.12	62.24	0.55	0.11
EF6H94		71.78	7.43	1.51	70.49	8.80	1.75
EY62AD		59.60	-4.75	-0.96	58.80	-2.89	-0.58
F6NNGN		68.80	4.45	0.90	62.60	0.91	0.18
FMPDV7		64.39	0.04	0.01	61.62	-0.07	-0.01
HBPJFE		59.64	-4.71	-0.96	54.19	-7.50	-1.49
JE3CVT		75.57	11.22	2.28	73.09	11.40	2.27
KFE964		65.64	1.29	0.26	64.98	3.28	0.65
KRLGHF		71.60	7.25	1.47	69.40	7.71	1.53
LHWRKR		71.26	6.91	1.40	68.17	6.48	1.29
METCRV		60.92	-3.43	-0.70	58.98	-2.71	-0.54
MYWUH4		66.09	1.74	0.35	62.71	1.02	0.20
NFYDRJ		63.16	-1.19	-0.24	61.02	-0.67	-0.13
NUYRVF		64.32	-0.03	-0.01	61.88	0.19	0.04
PD6KD8	*	56.04	-8.31	-1.69	57.56	-4.13	-0.82
PUD2D2		56.42	-7.93	-1.61	53.02	-8.67	-1.73
PW2DC8		69.94	5.59	1.13	66.37	4.67	0.93
Q4YWZ2		68.14	3.79	0.77	64.60	2.91	0.58
RGJ8FY		66.12	1.77	0.36	64.99	3.30	0.66
TBP278		64.44	0.09	0.02	59.32	-2.37	-0.47
TEBFJ3		63.56	-0.79	-0.16	62.72	1.03	0.20
TWM37B		61.50	-2.85	-0.58	58.92	-2.77	-0.55

Paper & Paperboard Interlaboratory Testing Program
Analysis 3113
Tearing Strength - Printing Papers
TAPPI Official Test Method T414

Report #4221JA,
January 2023

WebCode	Data Flag	Sample RP13			Sample RP14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
V9UULF		62.90	-1.45	-0.30	59.69	-2.00	-0.40
VVMYBQ		57.18	-7.17	-1.46	54.84	-6.85	-1.36
WR2JCH		60.09	-4.26	-0.86	60.79	-0.90	-0.18
Y4MTT9		66.86	2.51	0.51	64.45	2.75	0.55
YBNHJ7		67.46	3.11	0.63	65.32	3.63	0.72
YUY8W4		68.58	4.23	0.86	65.94	4.24	0.84

Summary Statistics	Sample RP13	Sample RP14
Grand Means	64.35 Grams	61.69 Grams
Stnd Dev Btwn Labs	4.93 Grams	5.02 Grams

Statistics based on 44 of 46 reporting participants.

Comments on Assigned Data Flags for Test #3113

69MQA3 (M) - Participant did not submit data for sample RP14.

8QT9QN (X) - Data for both samples are high. Possible Systematic Error. Inconsistent within the determinations of both samples.

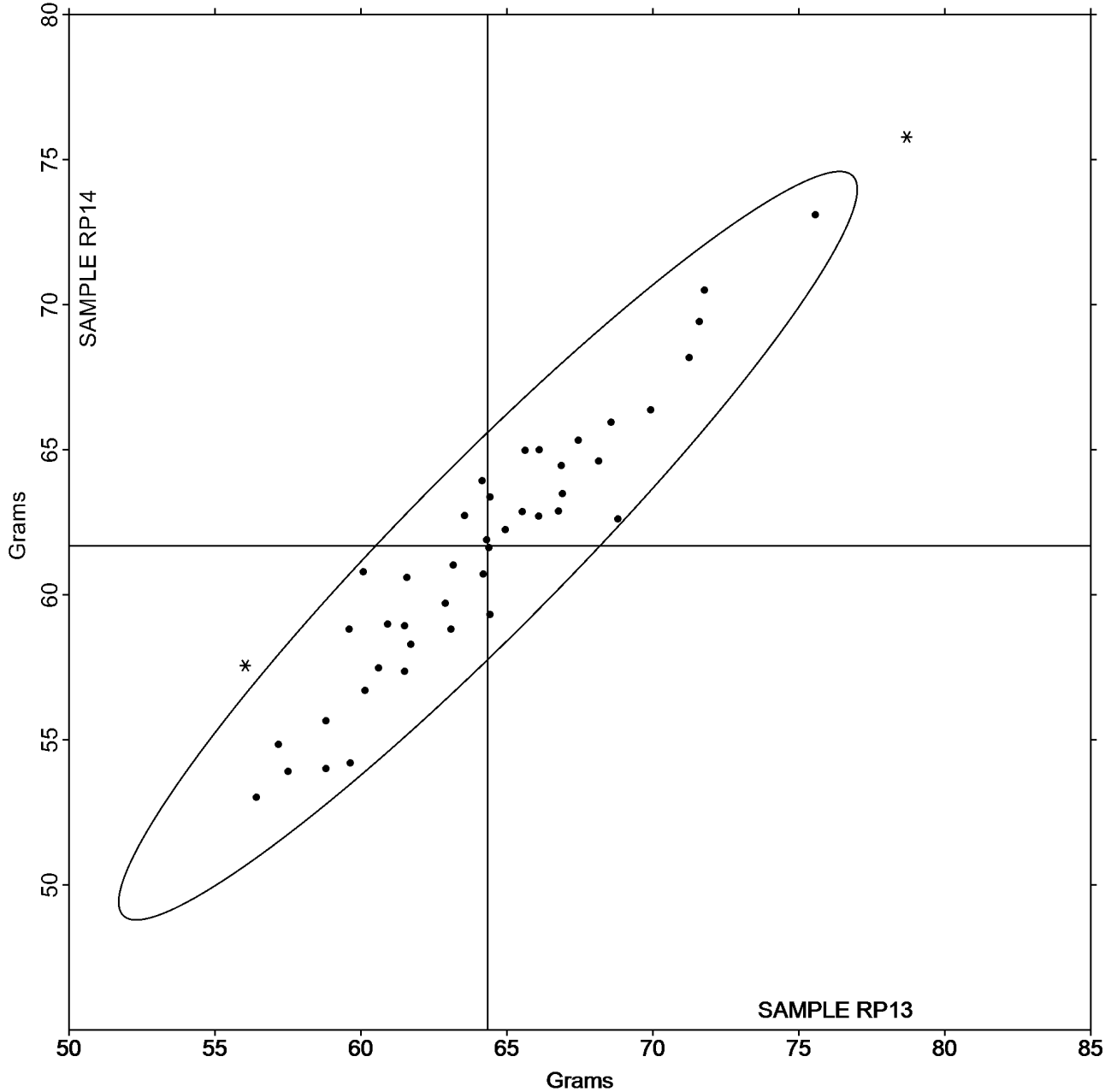**Paper & Paperboard Interlaboratory Testing Program**
Analysis 3113
Tearing Strength - Printing Papers
TAPPI Official Test Method T414

Report #4221JA,
January 2023

Grand Mean Sample RP13 = 64.350 Grams

Grand Mean Sample RP14 = 61.692 Grams

ANALYSIS 3113

SAMPLE RP14

Grams

SAMPLE RP13

Grams

Paper & Paperboard Interlaboratory Testing Program
Analysis 3115
Tensile Breaking Strength - Printing Papers
TAPPI Official Test Method T494

**Report #4221JA,
January 2023**

		Sample NP13				Sample NP14		
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV		Lab Mean	Diff from Grand Mean	CPV
24JHYU		6.835	-0.190	-0.48		6.773	-0.214	-0.47
29EGRQ		6.822	-0.203	-0.51		6.744	-0.243	-0.53
29VXHD		6.750	-0.275	-0.69		6.834	-0.153	-0.34
39R3MR		7.483	0.458	1.16		7.548	0.562	1.23
3A3AZF		6.599	-0.425	-1.07		6.598	-0.389	-0.85
3QRKLH		7.463	0.439	1.11		7.486	0.499	1.10
3R3TZP		6.301	-0.724	-1.83		6.248	-0.739	-1.62
4EPJKX		7.314	0.289	0.73		7.467	0.480	1.05
622YFU		6.994	-0.031	-0.08		7.062	0.075	0.16
69MQA3		7.070	0.045	0.11		7.292	0.305	0.67
6QHKHJ		7.145	0.120	0.30		7.065	0.078	0.17
6ZTKG2		7.331	0.306	0.77		7.043	0.056	0.12
7C2P3M		7.787	0.762	1.92		7.665	0.678	1.49
8HYZ6X		7.378	0.353	0.89		7.294	0.307	0.67
8QT9QN		7.619	0.595	1.50		7.726	0.739	1.62
AU8HWR		6.475	-0.550	-1.39		6.637	-0.350	-0.77
B2LLHK		6.611	-0.414	-1.04		6.459	-0.528	-1.16
BABENP		6.933	-0.091	-0.23		6.709	-0.278	-0.61
BLRZGY		7.224	0.200	0.50		7.179	0.192	0.42
BZP7BU		7.198	0.173	0.44		6.695	-0.292	-0.64
C4RAXA		7.122	0.097	0.25		7.035	0.048	0.11
DQ8LT2		7.124	0.099	0.25		6.906	-0.081	-0.18
DQA7PG		7.345	0.320	0.81		7.432	0.445	0.98
EF6H94	*	8.135	1.111	2.80		8.027	1.041	2.28
EY62AD	*	6.701	-0.323	-0.82		5.949	-1.038	-2.28
F6NNGN		7.744	0.719	1.81		7.943	0.956	2.10
FMPDV7		6.713	-0.312	-0.79		6.560	-0.427	-0.94
H7C8TT		6.473	-0.552	-1.39		6.598	-0.389	-0.85
HBPJFE		7.114	0.089	0.22		6.616	-0.371	-0.81
KFE964		6.530	-0.495	-1.25		6.622	-0.365	-0.80
LHWRKR		6.651	-0.373	-0.94		6.699	-0.288	-0.63
MYWUH4		7.034	0.009	0.02		7.067	0.080	0.18
NFYDRJ		6.982	-0.043	-0.11		6.762	-0.225	-0.49
NUYRVF		6.411	-0.614	-1.55		6.615	-0.372	-0.82
PD6KD8	*	6.881	-0.144	-0.36		7.571	0.584	1.28
PUD2D2		7.537	0.512	1.29		7.622	0.635	1.39
PW2DC8		6.975	-0.049	-0.12		6.833	-0.154	-0.34
Q4YWZ2		6.824	-0.201	-0.51		7.022	0.035	0.08
R9MGQG		7.312	0.287	0.72		7.376	0.389	0.86
TBP278		7.019	-0.006	-0.01		6.884	-0.103	-0.23

Paper & Paperboard Interlaboratory Testing Program
Analysis 3115
Tensile Breaking Strength - Printing Papers
TAPPI Official Test Method T494

Report #4221JA,
January 2023

WebCode	Data Flag	Sample NP13			Sample NP14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
TEBFJ3		6.860	-0.165	-0.42	6.733	-0.254	-0.56
V9UULF		6.660	-0.365	-0.92	6.730	-0.257	-0.56
VATVUT		6.740	-0.285	-0.72	6.734	-0.253	-0.56
VVMYBQ		6.461	-0.563	-1.42	6.362	-0.625	-1.37
W9PWQB		7.138	0.114	0.29	7.473	0.486	1.07
WR2JCH		7.159	0.135	0.34	7.126	0.139	0.31
YBNHJ7		7.180	0.155	0.39	6.565	-0.422	-0.93

Summary Statistics	Sample NP13	Sample NP14
Grand Means	7.02 kN/m	6.99 kN/m
Stnd Dev Btwn Labs	0.40 kN/m	0.46 kN/m

Statistics based on 47 of 47 reporting participants.

Analysis Notes:

DQ8LT2 - Data appears to be transposed between Analysis 3115 (Tensile Breaking Strength) & Analysis 3117 (Elongation to Break). CTS will not correct going forward.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3115
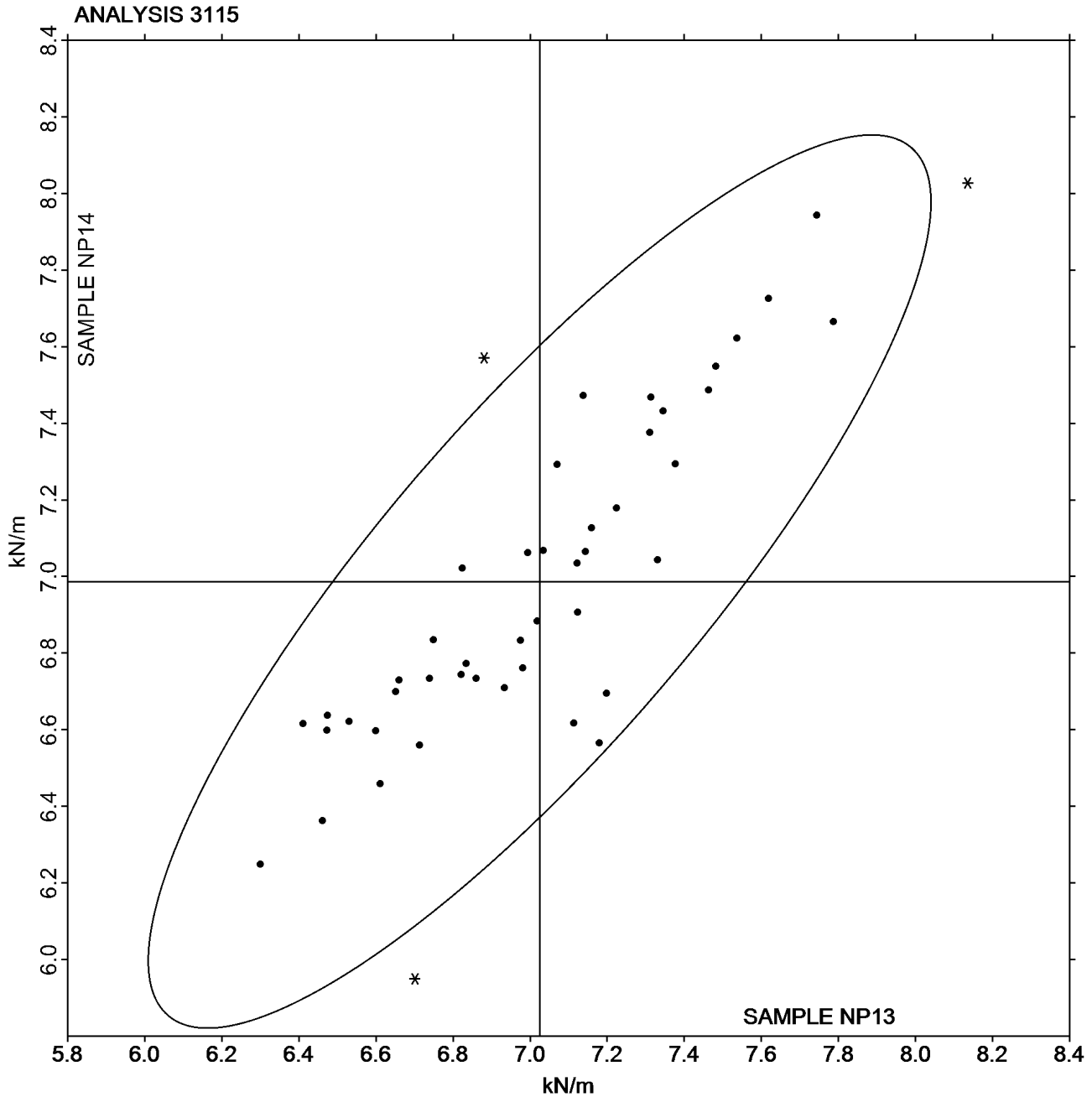**Tensile Breaking Strength - Printing Papers**
TAPPI Official Test Method T494

Report #4221JA,
January 2023

Grand Mean Sample NP13 = 7.0246 kN/m

Grand Mean Sample NP14 = 6.9869 kN/m

ANALYSIS 3115

SAMPLE NP14

kN/m

SAMPLE NP13

kN/m

Paper & Paperboard Interlaboratory Testing Program
Analysis 3116
Tensile Energy Absorption - Printing Papers
TAPPI Official Test Method T494

WebCode	Data Flag	Sample NP13 Lab Mean	Sample NP13 Diff from Grand Mean	Sample NP13 CPV	Sample NP14 Lab Mean	Sample NP14 Diff from Grand Mean	Sample NP14 CPV
29EGRQ		93.0	-7.5	-0.60	89.43	-8.47	-0.76
29VXHD		98.2	-2.3	-0.18	97.94	0.04	0.00
39R3MR		82.1	-18.4	-1.48	80.94	-16.96	-1.53
3QRKLH		82.5	-18.0	-1.45	80.00	-17.90	-1.61
3R3TZP		100.0	-0.5	-0.04	98.04	0.13	0.01
622YFU		114.0	13.5	1.09	113.22	15.32	1.38
69MQA3	*	100.8	0.3	0.02	109.47	11.57	1.04
6QHKHJ		98.1	-2.4	-0.19	96.53	-1.38	-0.12
6ZTKG2		120.7	20.2	1.63	107.88	9.98	0.90
7C2P3M		109.6	9.1	0.74	109.46	11.56	1.04
8HYZ6X		100.1	-0.3	-0.03	97.49	-0.41	-0.04
8QT9QN		93.5	-6.9	-0.56	92.89	-5.01	-0.45
B2LLHK		99.8	-0.7	-0.06	97.22	-0.68	-0.06
BABENP		118.9	18.5	1.49	107.85	9.95	0.89
BLRZGY		116.0	15.5	1.25	113.58	15.68	1.41
BZP7BU		98.7	-1.8	-0.15	94.60	-3.30	-0.30
C4RAXA		120.6	20.2	1.63	114.71	16.81	1.51
DQ8LT2		101.5	1.0	0.08	95.02	-2.88	-0.26
DQA7PG		83.8	-16.7	-1.35	78.78	-19.12	-1.72
EF6H94	*	139.8	39.4	3.17	133.10	35.19	3.16
F6NNGN		102.0	1.5	0.12	98.37	0.47	0.04
FMPDV7		105.3	4.8	0.38	97.29	-0.61	-0.05
H7C8TT		86.8	-13.7	-1.10	92.22	-5.68	-0.51
KFE964		90.5	-9.9	-0.80	88.89	-9.02	-0.81
LHWRKR		98.4	-2.1	-0.17	99.24	1.34	0.12
MYWUH4		107.7	7.2	0.58	105.65	7.75	0.70
NFYDRJ		91.9	-8.6	-0.69	91.30	-6.60	-0.59
NUYRVF		99.0	-1.4	-0.12	99.50	1.60	0.14
PUD2D2		83.3	-17.2	-1.39	83.06	-14.84	-1.33
PW2DC8		100.6	0.1	0.01	100.05	2.15	0.19
Q4YWZ2		101.1	0.6	0.05	100.47	2.57	0.23
R9MGQG		90.9	-9.6	-0.78	91.52	-6.38	-0.57
TBP278		91.7	-8.8	-0.71	88.87	-9.03	-0.81
TEBFJ3		100.1	-0.3	-0.03	90.39	-7.51	-0.67
V9UULF		94.7	-5.8	-0.47	93.40	-4.50	-0.40
VATVUT		113.7	13.2	1.06	107.95	10.05	0.90
WR2JCH	X	133.0	32.6	2.63	139.78	41.88	3.76
YBNHJ7		88.5	-12.0	-0.97	86.03	-11.87	-1.07

Paper & Paperboard Interlaboratory Testing Program
Analysis 3116
Tensile Energy Absorption - Printing Papers
TAPPI Official Test Method T494

Report #4221JA,
January 2023

Summary Statistics	Sample NP13	Sample NP14
Grand Means	100.49 Joules/sq m	97.90 Joules/sq m
Stnd Dev Btwn Labs	12.40 Joules/sq m	11.12 Joules/sq m

Statistics based on 37 of 38 reporting participants.

Comments on Assigned Data Flags for Test #3116

WR2JCH (X) - Data for sample NP14 are high.

Analysis Notes:

DQ8LT2 - Data appears to be transposed between Analysis 3116 (TEA) & Analysis 3115 (Tensile Breaking Strength). CTS will not correct going forward.

R9MGQG - Data appears to be transposed between Analysis 3116 (TEA) & Analysis 3117 (Elongation to Break). CTS will not correct going forward.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3116
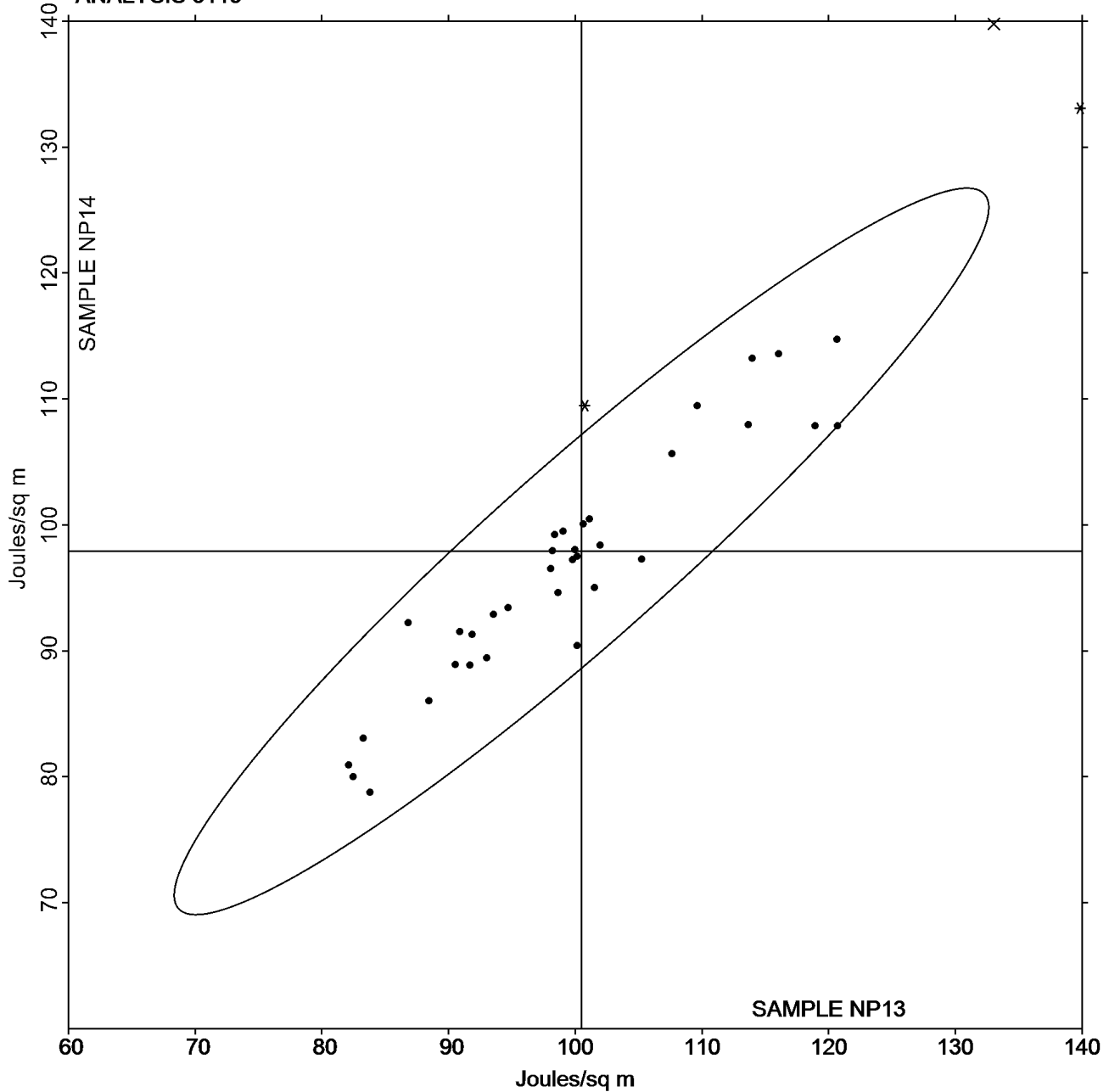**Tensile Energy Absorption - Printing Papers**
TAPPI Official Test Method T494

Report #4221JA,
January 2023

Grand Mean Sample NP13 = 100.49
Joules/sq m

Grand Mean Sample NP14 = 97.901
Joules/sq m

ANALYSIS 3116

SAMPLE NP14

Joules/sq m

SAMPLE NP13

Joules/sq m

WebCode	Data Flag	Sample NP13			Sample NP14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
29EGRQ		2.132	-0.097	-0.34	2.079	-0.104	-0.36
29VXHD		2.260	0.031	0.11	2.240	0.057	0.20
39R3MR		1.746	-0.483	-1.69	1.707	-0.476	-1.66
3QRKLH		2.670	0.441	1.54	2.607	0.424	1.48
3R3TZP		2.440	0.211	0.74	2.404	0.221	0.77
622YFU		2.559	0.330	1.15	2.527	0.344	1.20
69MQA3		2.176	-0.053	-0.19	2.284	0.101	0.35
6QHKHJ		2.152	-0.077	-0.27	2.151	-0.032	-0.11
6ZTKG2		2.559	0.330	1.15	2.371	0.188	0.66
7C2P3M		2.159	-0.070	-0.25	2.185	0.002	0.01
8HYZ6X		2.175	-0.054	-0.19	2.151	-0.032	-0.11
8QT9QN		1.854	-0.375	-1.31	1.861	-0.322	-1.12
AU8HWR		2.237	0.008	0.03	2.182	-0.001	0.00
B2LLHK		2.312	0.082	0.29	2.295	0.112	0.39
BABENP		2.639	0.410	1.43	2.443	0.260	0.91
BLRZGY		2.536	0.307	1.07	2.499	0.316	1.10
BZP7BU		1.903	-0.326	-1.14	1.876	-0.307	-1.07
C4RAXA		2.660	0.431	1.51	2.564	0.381	1.33
DQ8LT2		1.994	-0.235	-0.82	1.910	-0.273	-0.95
DQA7PG		1.775	-0.454	-1.59	1.665	-0.518	-1.80
EF6H94		2.419	0.190	0.66	2.289	0.106	0.37
F6NNGN		2.043	-0.186	-0.65	1.902	-0.281	-0.98
FMPDV7		2.446	0.217	0.76	2.331	0.148	0.52
H7C8TT		2.036	-0.193	-0.68	2.119	-0.064	-0.22
HBPJFE		1.930	-0.299	-1.05	1.880	-0.303	-1.06
KFE964		2.100	-0.129	-0.45	2.037	-0.146	-0.51
LHWRKR	*	2.568	0.339	1.19	2.696	0.513	1.79
MYWUH4		2.488	0.259	0.91	2.445	0.262	0.91
NFYDRJ		1.994	-0.235	-0.82	1.936	-0.247	-0.86
NUYRVF		2.406	0.177	0.62	2.348	0.165	0.58
PUD2D2		1.706	-0.523	-1.83	1.688	-0.495	-1.72
PW2DC8		2.209	-0.020	-0.07	2.222	0.039	0.14
Q4YWZ2		2.236	0.007	0.02	2.176	-0.007	-0.02
R9MGQG		1.904	-0.325	-1.14	1.904	-0.279	-0.97
TBP278		1.996	-0.233	-0.82	1.962	-0.221	-0.77
TEBFJ3		2.223	-0.006	-0.02	2.047	-0.136	-0.47
V9UULF		2.240	0.011	0.04	2.210	0.027	0.09
VATVUT		2.644	0.415	1.45	2.508	0.325	1.13
VVMYBQ		2.012	-0.217	-0.76	1.888	-0.295	-1.03
WR2JCH	*	2.830	0.601	2.10	2.909	0.726	2.53

Paper & Paperboard Interlaboratory Testing Program
Analysis 3117
Elongation to Break - Printing Papers
TAPPI Official Test Method T494

Report #4221JA,
January 2023

WebCode	Data Flag	Sample NP13			Sample NP14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
YBNHJ7		2.031	-0.198	-0.69	2.002	-0.181	-0.63

Summary Statistics	Sample NP13	Sample NP14
Grand Means	2.23 Percent	2.18 Percent
Stnd Dev Btwn Labs	0.29 Percent	0.29 Percent

Statistics based on 41 of 41 reporting participants.

Analysis Notes:

DQ8LT2 -   Data appears to be transposed between Analysis 3117 (Elongation to Break) & Analysis 3116 (TEA). CTS will not correct going forward.

R9MGQG -   Data appears to be transposed between Analysis 3117 (Elongation to Break) & Analysis 3116 (TEA). CTS will not correct going forward.

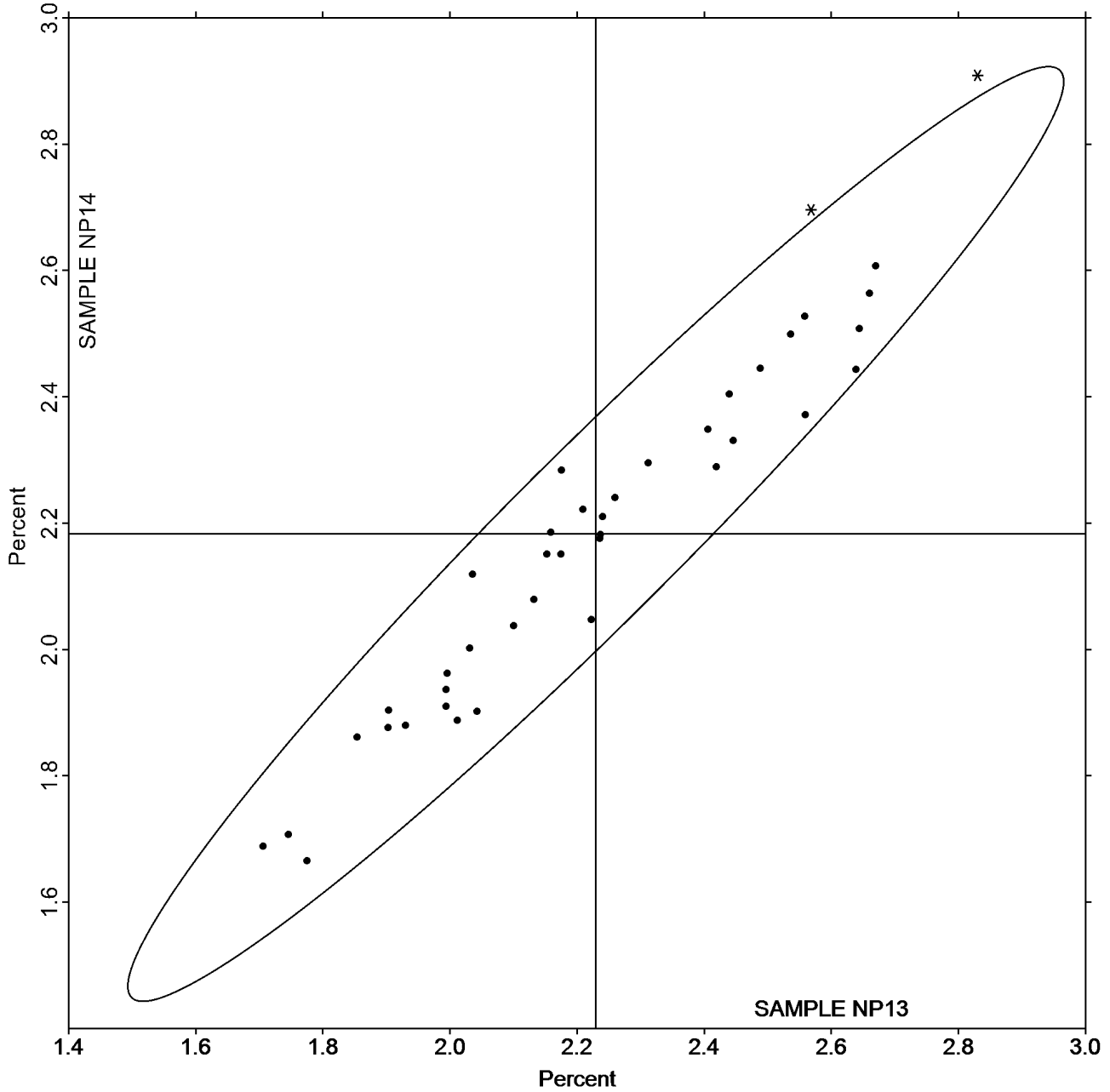**Paper & Paperboard Interlaboratory Testing Program**
Analysis 3117
Elongation to Break - Printing Papers
TAPPI Official Test Method T494

Report #4221JA,
January 2023

Grand Mean Sample NP13 = 2.2292 Percent

Grand Mean Sample NP14 = 2.1829 Percent

ANALYSIS 3117

SAMPLE NP14 / Percent (y-axis)

SAMPLE NP13 / Percent (x-axis)

Paper & Paperboard Interlaboratory Testing Program
Analysis 3121
Air Resistance - Gurley Oil Type
TAPPI Official Test Method T460

Report #4221JA, January 2023

		Sample PP13			Sample PP14		
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
28KVWE		20.92	0.17	0.18	18.33	-0.61	-0.62
3KLGK3		21.38	0.63	0.68	19.75	0.81	0.82
3QRKLH		21.84	1.09	1.18	19.50	0.56	0.56
622YFU		21.30	0.55	0.60	19.61	0.67	0.67
69MQA3		21.19	0.44	0.48	18.39	-0.55	-0.56
6TBPHY	*	18.41	-2.34	-2.54	16.38	-2.56	-2.58
73QZ8G		19.71	-1.04	-1.13	18.88	-0.06	-0.06
7N8DXH		20.28	-0.47	-0.51	18.78	-0.16	-0.16
7PJKA7		20.02	-0.73	-0.79	18.85	-0.09	-0.09
9V74CD		21.68	0.93	1.01	19.03	0.09	0.09
A4W8VZ		20.69	-0.06	-0.07	19.32	0.38	0.38
A8UX9K		18.94	-1.81	-1.97	17.90	-1.04	-1.05
ACQCP2		20.53	-0.22	-0.24	20.33	1.39	1.40
AU8HWR		21.53	0.78	0.85	19.10	0.16	0.16
B2LLHK		21.75	1.00	1.09	20.87	1.93	1.95
BLRZGY		20.88	0.13	0.15	18.44	-0.50	-0.51
BQ48FH	*	22.56	1.81	1.96	21.52	2.58	2.60
BZP7BU		21.15	0.40	0.43	18.92	-0.02	-0.02
C4RAXA		19.79	-0.96	-1.04	18.00	-0.94	-0.95
CMJUJD		21.00	0.25	0.27	18.57	-0.37	-0.37
CWP8P3		20.87	0.12	0.13	19.30	0.36	0.36
EF6H94		22.66	1.91	2.08	19.96	1.02	1.02
EY62AD		19.80	-0.95	-1.03	17.80	-1.14	-1.15
FMPDV7		21.51	0.76	0.83	19.26	0.32	0.32
HBPJFE		19.27	-1.48	-1.61	16.77	-2.17	-2.19
HNQFE8		21.61	0.86	0.93	18.98	0.04	0.04
KFE964		20.36	-0.39	-0.42	18.74	-0.20	-0.20
KRLGHF		19.90	-0.85	-0.92	18.10	-0.84	-0.85
LHWRKR		21.70	0.95	1.03	20.07	1.13	1.14
MDT7UE		20.06	-0.69	-0.75	17.74	-1.20	-1.21
MREV2Q		21.05	0.30	0.33	18.92	-0.02	-0.02
MYWUH4		20.64	-0.11	-0.12	18.69	-0.26	-0.26
NUYRVF		21.27	0.52	0.56	19.61	0.67	0.67
PD6KD8		20.95	0.20	0.22	18.91	-0.04	-0.04
QV6R8Z		21.50	0.75	0.81	20.68	1.74	1.75
RGJ8FY		19.67	-1.08	-1.17	18.57	-0.37	-0.37
TBP278		21.06	0.31	0.34	18.49	-0.45	-0.46
TEBFJ3		19.85	-0.90	-0.98	18.80	-0.15	-0.15
V77HMB		21.31	0.56	0.61	19.30	0.36	0.36
V9UULF		19.27	-1.48	-1.61	17.31	-1.63	-1.65

Paper & Paperboard Interlaboratory Testing Program
Analysis 3121
Air Resistance - Gurley Oil Type
TAPPI Official Test Method T460

Report #4221JA,
January 2023

| WebCode | Data Flag | Sample PP13 | | | Sample PP14 | | |
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
VATVUT		21.38	0.63	0.68	19.93	0.99	1.00
VVMYBQ		21.13	0.38	0.41	18.64	-0.30	-0.30
WR2JCH		20.20	-0.55	-0.60	19.41	0.47	0.47
ZHMVR8		20.43	-0.32	-0.35	18.99	0.05	0.05

Summary Statistics	Sample PP13	Sample PP14
Grand Means	20.75 sec/100 cc	18.94 sec/100 cc
Stnd Dev Btwn Labs	0.92 sec/100 cc	0.99 sec/100 cc

Statistics based on 44 of 44 reporting participants.

Analysis Notes:

AU8HWR - Data appears to be transposed between Analysis 3123 (Porosity, Sheffield Type) & Analysis 3121 (Air Resistance, Gurley Oil Type). CTS will not correct going forward.

VVMYBQ - Data appears to be transposed between Analysis 3123 (Porosity, Sheffield Type) & Analysis 3121 (Air Resistance, Gurley Oil Type). CTS will not correct going forward.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3121
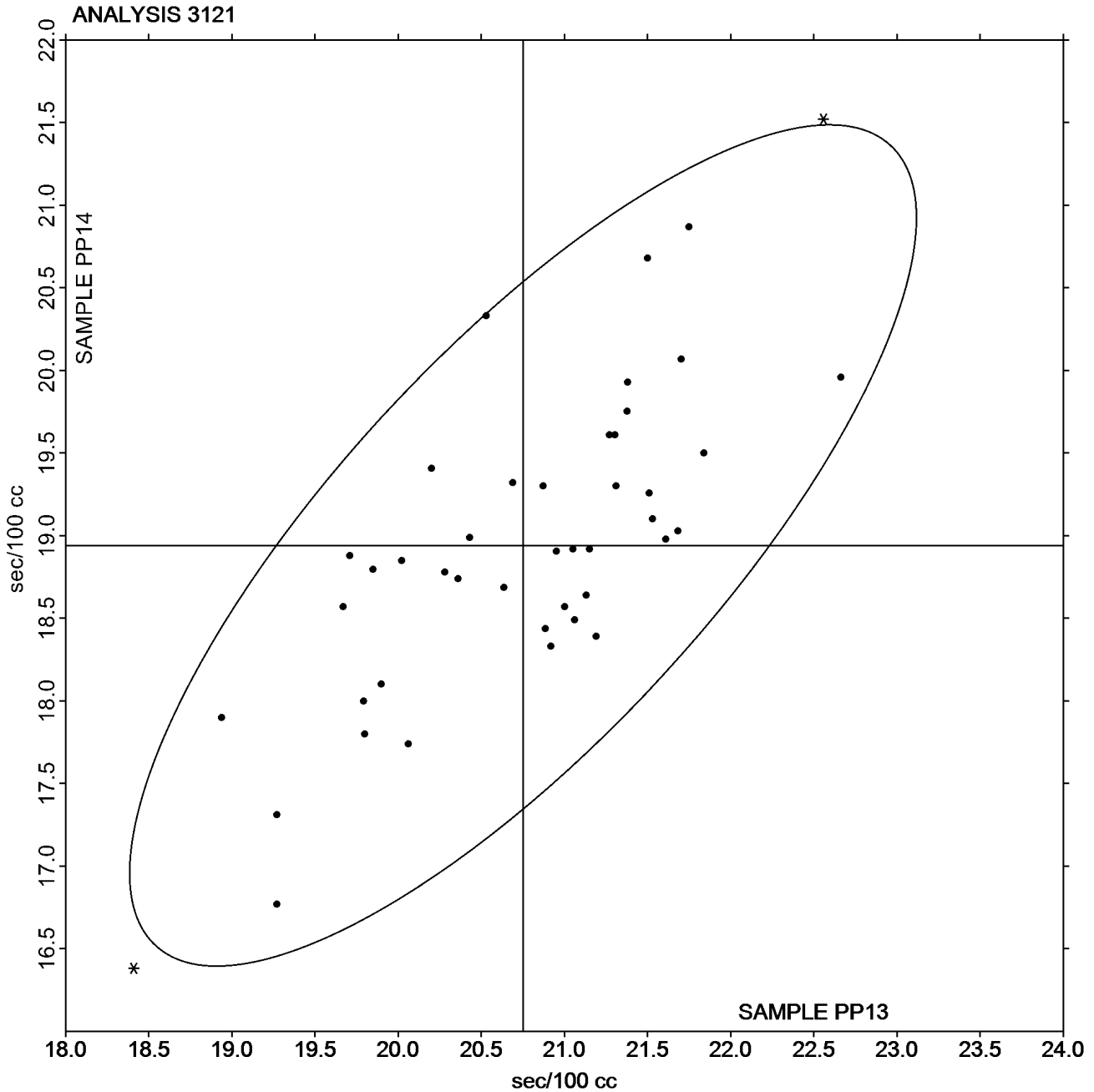**Air Resistance - Gurley Oil Type**
TAPPI Official Test Method T460

**Report #4221JA,
January 2023**

**Grand Mean Sample PP13 = 20.750
sec/100 cc**

**Grand Mean Sample PP14 = 18.941
sec/100 cc**

ANALYSIS 3121

SAMPLE PP14

sec/100 cc

SAMPLE PP13

sec/100 cc

Paper & Paperboard Interlaboratory Testing Program

Report #4221JA, January 2023

Analysis 3123
Porosity - Sheffield Type - Sheffield Units for 3/4 inch Diameter Orifice
TAPPI Official Test Method T547

WebCode	Data Flag	Sample PP13			Sample PP14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3KLGK3		134.0	-0.8	-0.48	142.1	-3.2	-0.42
3R3TZP		133.9	-0.9	-0.54	147.4	2.1	0.28
4EPJKX	X	22.4	-112.4	-69.48	19.9	-125.4	-16.65
F6NNGN		137.2	2.4	1.50	154.6	9.3	1.24
KRLGHF		134.0	-0.8	-0.48	137.0	-8.3	-1.10

Summary Statistics	Sample PP13	Sample PP14
Grand Means	134.78 Sheffield Units	145.28 Sheffield Units
Stnd Dev Btwn Labs	1.62 Sheffield Units	7.53 Sheffield Units
	Statistics based on 4 of 5 reporting participants.	

Comments on Assigned Data Flags for Test #3123

4EPJKX (X) - Extreme Data.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3123
Porosity - Sheffield Type - Sheffield Units for 3/4 inch Diameter Orifice
TAPPI Official Test Method T547

Report #4221JA,
January 2023

Grand Mean Sample PP13 = 134.78
Sheffield Units

Grand Mean Sample PP14 = 145.28
Sheffield Units

ANALYSIS 3123

SAMPLE PP14

Sheffield Units

SAMPLE PP13

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

Report #4221JA,
January 2023

WebCode	Data Flag	Sample PH13			Sample PH14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
29EGRQ		5.479	-0.401	-1.70	5.770	-0.177	-0.86
3QRKLH		5.806	-0.074	-0.31	5.916	-0.031	-0.15
7C2P3M		5.972	0.092	0.39	5.945	-0.002	-0.01
9V74CD		6.271	0.391	1.66	6.365	0.418	2.03
B2LLHK		5.708	-0.172	-0.73	5.642	-0.305	-1.48
CMJUJD		5.702	-0.178	-0.75	5.943	-0.004	-0.02
FMPDV7		6.103	0.223	0.94	6.136	0.189	0.92
HHJP9F		5.952	0.072	0.30	5.881	-0.066	-0.32
YBNHJ7		5.928	0.048	0.20	5.926	-0.021	-0.10

Summary Statistics	Sample PH13	Sample PH14
Grand Means	5.88 Microns	5.95 Microns
Stnd Dev Btwn Labs	0.24 Microns	0.21 Microns

Statistics based on 9 of 9 reporting participants.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3131
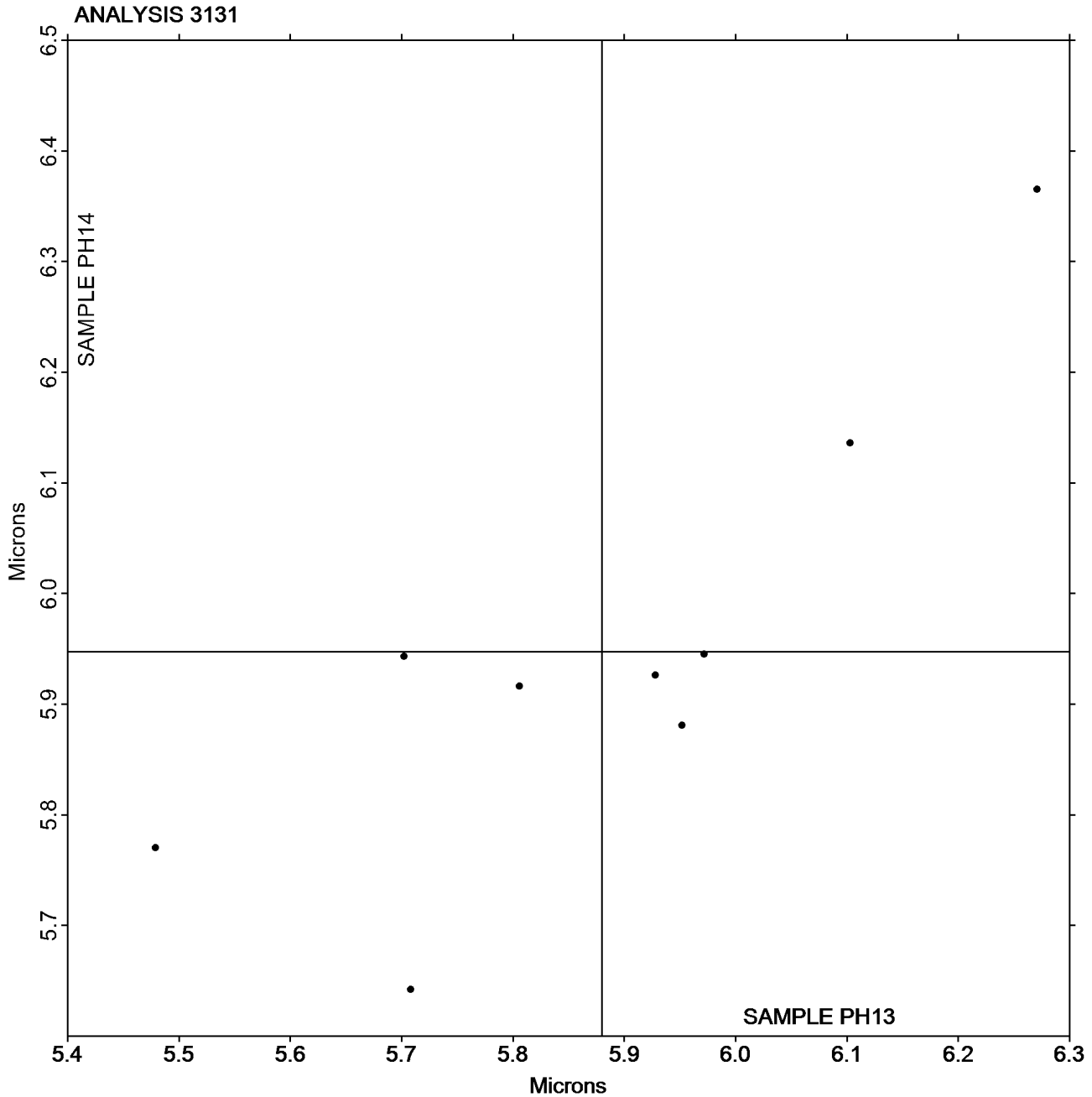**Roughness - Print Surf Method - 2.5 to 6.0 Microns**
TAPPI Official Test Method T555

**Report #4221JA,
January 2023**

**Grand Mean Sample PH13 = 5.8801
Microns**

**Grand Mean Sample PH14 = 5.9471
Microns**

ANALYSIS 3131

SAMPLE PH14

Microns

SAMPLE PH13

Microns

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

WebCode	Data Flag	Sample SR13			Sample SR14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
28KVWE		129.0	10.6	1.60	132.5	13.3	1.83
3KLGK3		116.3	-2.0	-0.31	114.9	-4.3	-0.59
3QRKLH		114.8	-3.6	-0.54	119.8	0.6	0.08
622YFU		111.1	-7.3	-1.10	111.9	-7.3	-1.01
69MQA3		130.9	12.5	1.89	134.6	15.4	2.12
7PJKA7	*	124.3	5.9	0.89	117.0	-2.2	-0.30
8QT9QN		112.9	-5.5	-0.83	115.5	-3.7	-0.51
9V74CD		125.8	7.4	1.12	122.1	2.9	0.40
ACQCP2		125.8	7.4	1.12	124.6	5.4	0.74
AU8HWR		112.4	-6.0	-0.90	117.3	-1.9	-0.26
B2LLHK	*	136.0	17.6	2.66	140.5	21.3	2.93
B9L4XW		116.4	-2.0	-0.30	119.4	0.2	0.03
BLRZGY		113.8	-4.6	-0.69	113.6	-5.6	-0.77
BQ48FH		105.4	-13.0	-1.96	104.0	-15.2	-2.10
C4RAXA		127.5	9.1	1.37	129.0	9.8	1.36
CDRWP7		119.9	1.5	0.23	128.5	9.3	1.28
CMJUJD		123.1	4.8	0.72	122.4	3.2	0.44
E8XCJ9		125.6	7.2	1.09	127.0	7.8	1.07
EF6H94		121.9	3.5	0.53	128.5	9.3	1.28
EY62AD		116.2	-2.2	-0.33	118.7	-0.5	-0.07
F6NNGN		117.0	-1.4	-0.21	120.0	0.8	0.11
FMPDV7		119.0	0.6	0.09	120.2	1.0	0.14
GH6FRV		119.7	1.3	0.20	120.9	1.7	0.23
HBPJFE		116.8	-1.6	-0.24	121.7	2.5	0.34
J378PE		108.8	-9.6	-1.45	108.0	-11.2	-1.54
KRLGHF		113.7	-4.7	-0.71	115.0	-4.2	-0.58
LHWRKR		112.8	-5.6	-0.84	115.3	-3.9	-0.54
MREV2Q		112.8	-5.6	-0.84	112.5	-6.7	-0.92
MYWUH4		109.8	-8.6	-1.29	110.6	-8.6	-1.19
NA89VA		125.1	6.7	1.01	121.3	2.1	0.29
NUYRVF		127.1	8.7	1.32	124.4	5.2	0.72
P8ZB2R		120.8	2.4	0.36	119.7	0.5	0.07
PD6KD8		121.5	3.1	0.47	116.1	-3.2	-0.43
QV6R8Z		114.2	-4.2	-0.63	116.2	-3.0	-0.41
R9MGQG		115.2	-3.2	-0.49	118.2	-1.0	-0.13
R9PYV8		113.6	-4.8	-0.72	113.4	-5.8	-0.80
TEBFJ3		121.4	3.0	0.45	122.9	3.7	0.51
TP9CL6		121.9	3.5	0.53	121.5	2.3	0.32
TRXH72		112.4	-6.0	-0.90	114.6	-4.6	-0.64
VB4XFR	X	170.0	51.6	7.79	152.9	33.7	4.64

WebCode	Data Flag	Sample SR13			Sample SR14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
VVMYBQ		115.1	-3.3	-0.50	111.4	-7.8	-1.08
W9PWQB		115.1	-3.2	-0.49	116.3	-2.9	-0.40
WK6K4H		121.0	2.6	0.39	119.8	0.6	0.08
WR2JCH		107.1	-11.3	-1.71	106.1	-13.1	-1.81
YBNHJ7		118.0	-0.4	-0.06	117.2	-2.0	-0.27
Z47V29	X	183.0	64.6	9.75	183.0	63.8	8.79

Summary Statistics	Sample SR13	Sample SR14
Grand Means	118.38 Sheffield	119.21 Sheffield
Stnd Dev Btwn Labs	6.63 Sheffield	7.26 Sheffield
		Statistics based on 44 of 46 reporting participants.

Comments on Assigned Data Flags for Test #3133

Z47V29 (X) - Extreme Data.

VB4XFR (X) - Extreme Data.

Analysis Notes:

3KLGK3 - One determination removed from the Lab Mean of Sample SR13 per Grubb's Test at 1% risk (TAPPI 1205).

W9PWQB - One determination removed from the Lab Mean of Sample SR13 per Grubb's Test at 1% risk (TAPPI 1205).

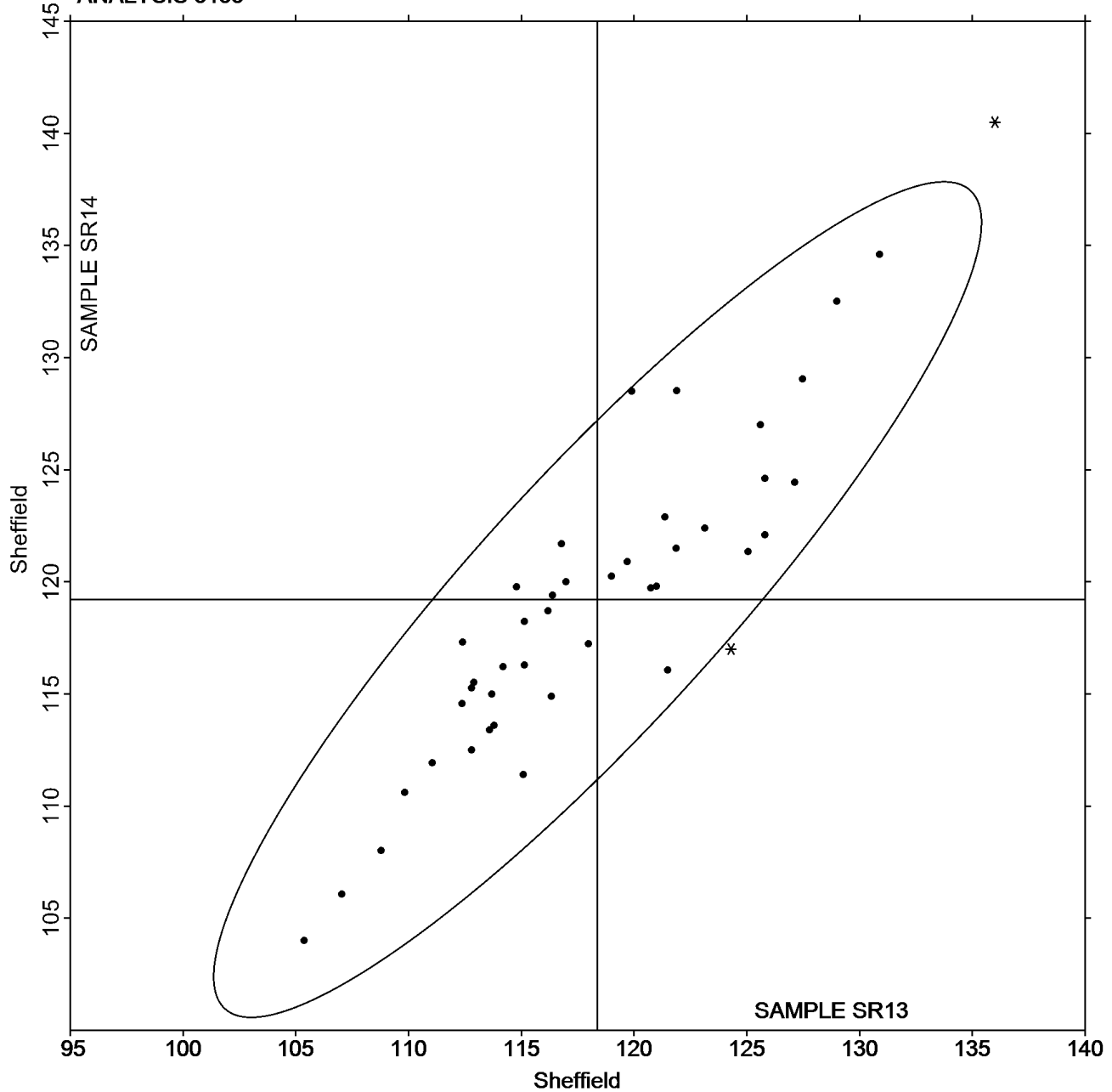**Paper & Paperboard Interlaboratory Testing Program**
Analysis 3133
Roughness - Sheffield Type
TAPPI Official Test Method T538

Report #4221JA,
January 2023

Grand Mean Sample SR13 = 118.38 Sheffield

Grand Mean Sample SR14 = 119.21 Sheffield

Paper & Paperboard Interlaboratory Testing Program
Analysis 3135
Grammage (Mass per Unit Area)
TAPPI Official Test Method T410

WebCode	Data Flag	Sample GM13			Sample GM14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
29VXHD		89.66	-0.42	-0.60	103.5	0.3	0.35
3KLGK3		90.39	0.32	0.46	103.8	0.6	0.80
3R3TZP		90.11	0.04	0.05	103.0	-0.2	-0.26
69MQA3		90.52	0.45	0.65	103.8	0.6	0.72
6QHKHJ		90.68	0.61	0.89	104.4	1.2	1.49
73QZ8G		89.58	-0.50	-0.72	102.7	-0.5	-0.59
AU8HWR		89.62	-0.45	-0.66	103.1	-0.2	-0.20
ERY2MA		89.55	-0.52	-0.75	101.8	-1.4	-1.84
EY62AD		89.86	-0.21	-0.31	104.1	0.9	1.10
F6NNGN		91.08	1.01	1.47	102.8	-0.5	-0.59
HWLTJV		89.08	-0.99	-1.44	102.4	-0.9	-1.10
JFTFLE		89.51	-0.56	-0.82	102.7	-0.5	-0.70
JW3UW3		91.40	1.33	1.93	103.4	0.2	0.24
KA3MRQ		91.64	1.57	2.28	105.0	1.7	2.23
MPREMC		89.56	-0.51	-0.74	103.3	0.1	0.12
MYWUH4		90.33	0.26	0.38	104.2	1.0	1.27
NFYDRJ		90.27	0.20	0.29	103.0	-0.2	-0.26
NUYRVF		90.25	0.18	0.27	103.1	-0.1	-0.19
RGJ8FY		90.09	0.02	0.02	103.8	0.6	0.78
TBP278		90.13	0.06	0.09	103.1	-0.1	-0.15
UWP6EF		89.18	-0.89	-1.30	102.6	-0.6	-0.81
V77HMB		90.95	0.88	1.28	104.2	0.9	1.19
V9UULF		89.94	-0.13	-0.19	103.3	0.1	0.12
VVMYBQ		89.66	-0.41	-0.60	102.5	-0.7	-0.94
W9PWQB		89.97	-0.10	-0.15	102.3	-1.0	-1.23
XQ6G7E		88.85	-1.22	-1.78	102.0	-1.2	-1.58

| Summary Statistics	Sample GM13	Sample GM14
Grand Means	90.07 g/sq m	103.21 g/sq m
Stnd Dev Btwn Labs	0.69 g/sq m	0.78 g/sq m

Statistics based on 26 of 26 reporting participants.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3135
Grammage (Mass per Unit Area)
TAPPI Official Test Method T410

Report #4221JA, January 2023

Grand Mean Sample GM13 = 90.071 g/sq m

Grand Mean Sample GM14 = 103.21 g/sq m
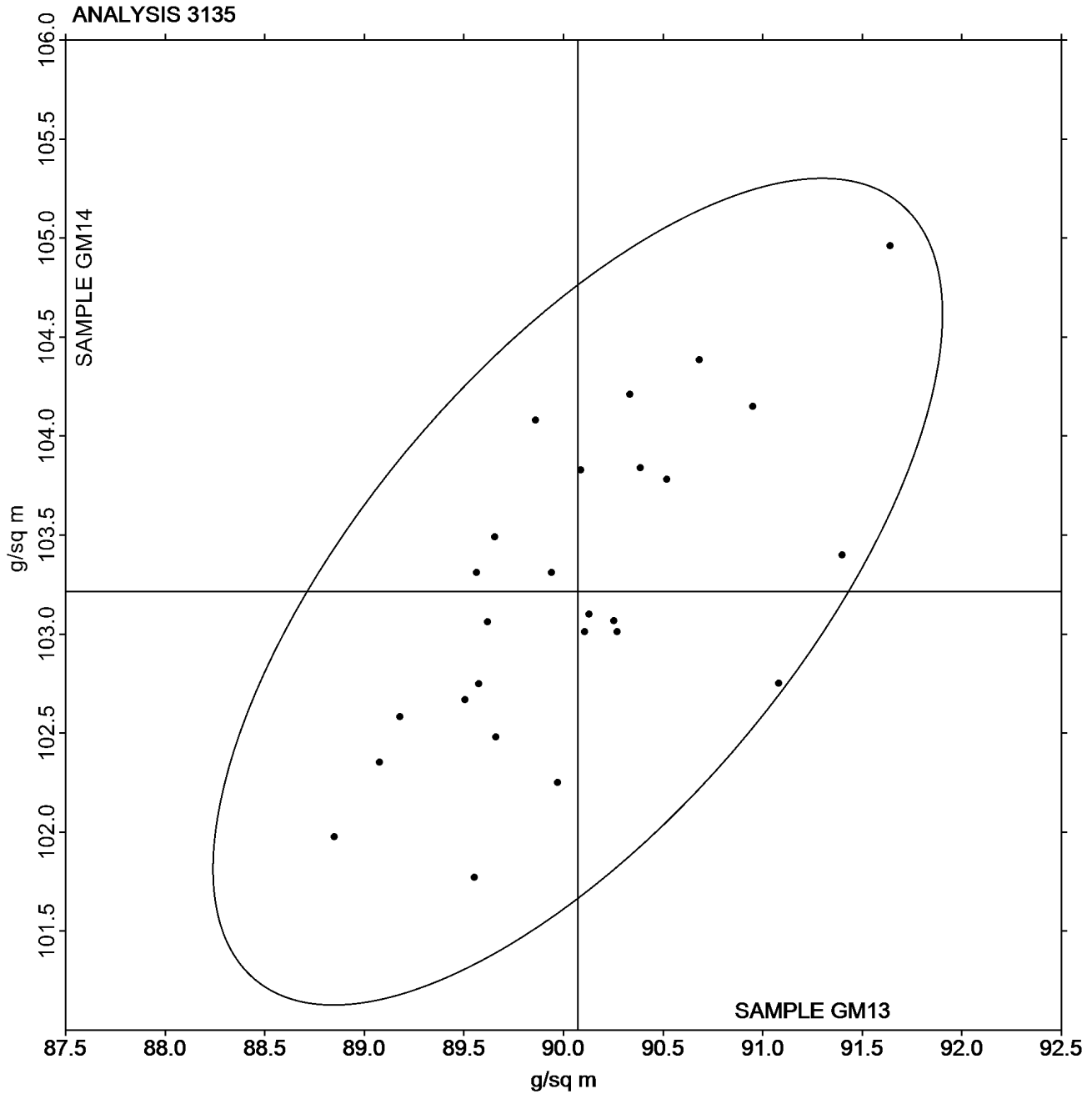
Paper & Paperboard Interlaboratory Testing Program
Analysis 3141
Opacity (89% Reflectance Backing) - Fine Papers
TAPPI Official Test Method T425

WebCode	Data Flag	Sample VR13			Sample VR14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
28KVWE		92.95	-0.57	-1.24	92.96	-0.54	-1.48
39R3MR		94.07	0.55	1.19	93.61	0.11	0.31
3KLGK3		93.51	-0.01	-0.02	93.71	0.21	0.58
3QRKLH		93.58	0.06	0.13	93.11	-0.39	-1.07
4EPJKX	*	94.66	1.14	2.47	94.49	0.99	2.73
AU8HWR		93.05	-0.47	-1.02	93.06	-0.44	-1.21
C4RAXA		93.44	-0.08	-0.18	93.59	0.09	0.26
CWP8P3		93.40	-0.12	-0.26	93.28	-0.22	-0.60
DH44NQ		93.58	0.06	0.13	93.60	0.10	0.29
DQ8LT2		93.12	-0.40	-0.87	93.39	-0.11	-0.30
E8XCJ9		93.90	0.38	0.82	93.96	0.46	1.27
EF6H94	*	92.54	-0.99	-2.14	93.59	0.09	0.25
ERY2MA		93.57	0.05	0.11	93.60	0.10	0.27
EY62AD		92.50	-1.02	-2.21	92.99	-0.51	-1.40
F6NNGN	X	88.20	-5.32	-11.54	88.41	-5.09	-14.01
FMPDV7		93.60	0.07	0.16	93.54	0.04	0.12
KRLGHF	X	88.89	-4.63	-10.04	88.40	-5.10	-14.04
LHWRKR		93.61	0.09	0.19	93.51	0.01	0.03
METCRV		93.96	0.44	0.95	93.80	0.31	0.84
MYWUH4		93.45	-0.07	-0.15	93.67	0.17	0.47
PD6KD8		93.83	0.31	0.67	93.29	-0.20	-0.56
R9MGQG		93.73	0.21	0.45	93.97	0.47	1.30
TEBFJ3		93.63	0.11	0.24	93.13	-0.37	-1.01
VVMYBQ		93.65	0.13	0.28	93.01	-0.49	-1.34
W9PWQB		93.55	0.02	0.05	93.43	-0.07	-0.19
YBNHJ7		93.64	0.11	0.25	93.66	0.16	0.43

Summary Statistics	Sample VR13	Sample VR14
Grand Means	93.52 Percent	93.50 Percent
Stnd Dev Btwn Labs	0.46 Percent	0.36 Percent

Statistics based on 24 of 26 reporting participants.

Comments on Assigned Data Flags for Test #3141

F6NNGN (X) - Extreme Data.

KRLGHF (X) - Extreme Data.

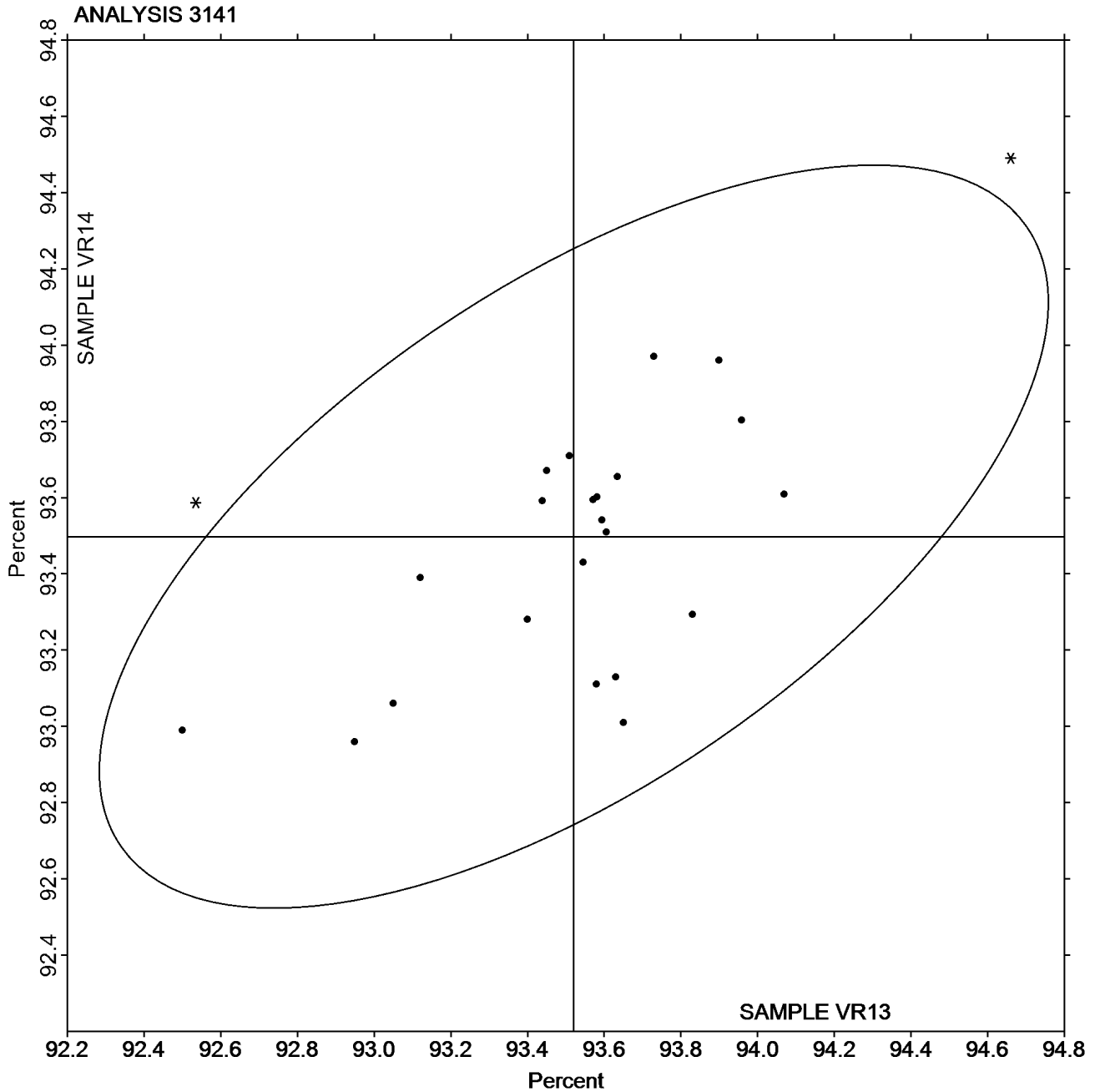**Paper & Paperboard Interlaboratory Testing Program**
Analysis 3141
Opacity (89% Reflectance Backing) - Fine Papers
TAPPI Official Test Method T425

**Report #4221JA,
January 2023**

**Grand Mean Sample VR13 = 93.521
Percent**

**Grand Mean Sample VR14 = 93.498
Percent**

ANALYSIS 3141

SAMPLE VR14

SAMPLE VR13

Percent

Percent

WebCode	Data Flag	Sample VP13			Sample VP14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
29VXHD		93.99	-0.42	-2.33	93.98	-0.40	-2.38
64PBEZ		94.47	0.06	0.33	94.50	0.12	0.72
69MQA3		94.56	0.15	0.84	94.48	0.10	0.62
73QZ8G		94.36	-0.05	-0.26	94.44	0.06	0.37
KFE964		94.41	0.00	0.01	94.37	-0.01	-0.06
NFYDRJ		94.48	0.07	0.41	94.41	0.04	0.21
TBP278		94.50	0.09	0.50	94.46	0.08	0.48
V9UULF		94.50	0.09	0.50	94.38	0.00	0.03

Summary Statistics	Sample VP13	Sample VP14
Grand Means	94.41 Percent	94.38 Percent
Stnd Dev Btwn Labs	0.18 Percent	0.17 Percent

Statistics based on 8 of 8 reporting participants.

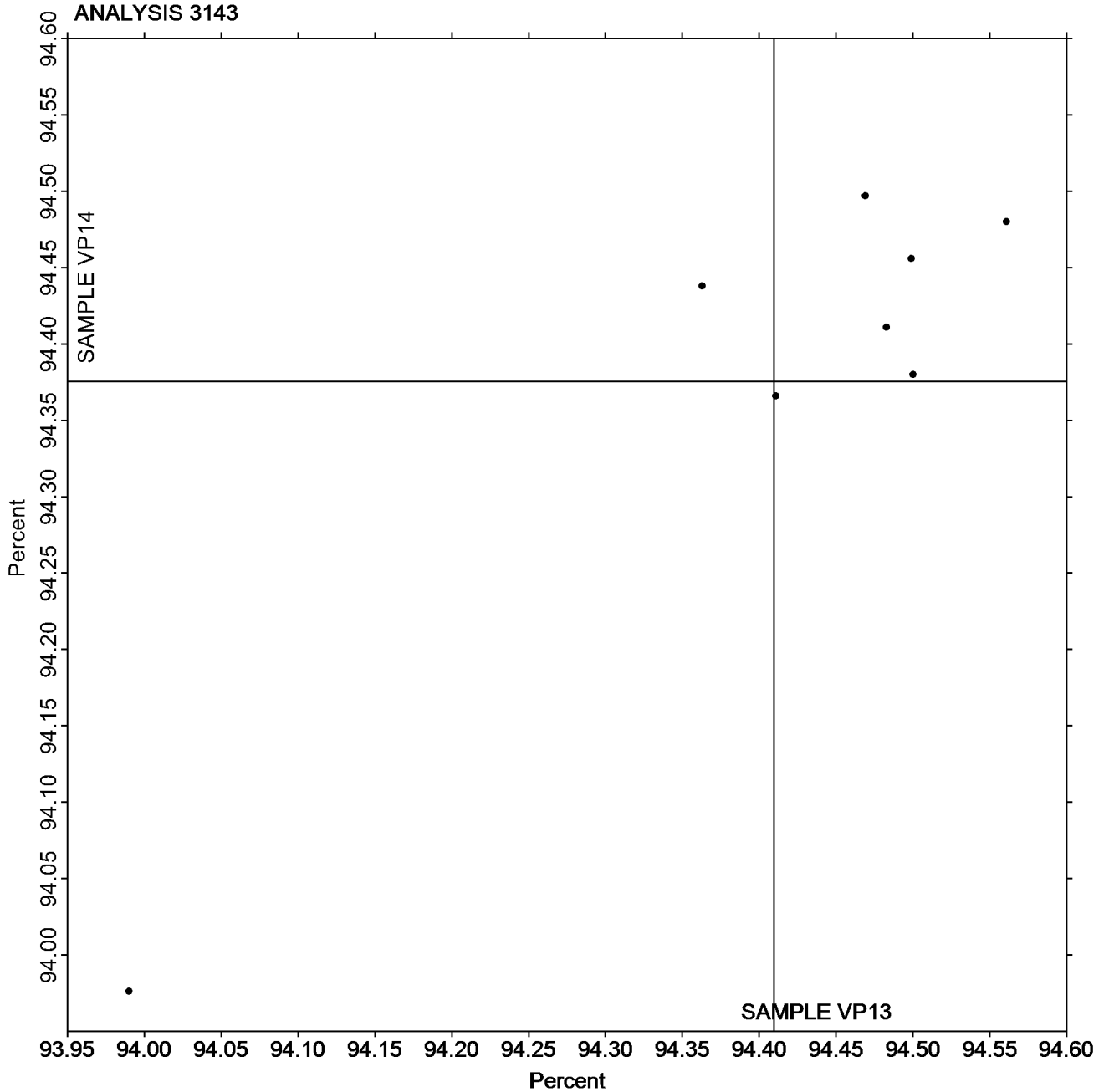**Paper & Paperboard Interlaboratory Testing Program**
Analysis 3143
Opacity (Paper Backing) - Fine Papers and Newsprint
TAPPI Official Test Method T519

Report #4221JA, January 2023

Grand Mean Sample VP13 = 94.410 Percent

Grand Mean Sample VP14 = 94.376 Percent

ANALYSIS 3143

SAMPLE VP14

SAMPLE VP13

Percent

Percent

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

Report #4221JA, January 2023

WebCode	Data Flag	Sample BF13			Sample BF14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
39R3MR		86.73	-5.26	-1.77	86.73	-5.34	-1.78
3QRKLH		94.00	2.01	0.68	93.90	1.83	0.61
ACQCP2		92.78	0.79	0.27	92.88	0.81	0.27
EF6H94		85.64	-6.35	-2.14	85.75	-6.32	-2.11
ERY2MA		92.88	0.89	0.30	92.93	0.85	0.28
EY62AD		92.88	0.89	0.30	92.74	0.67	0.22
FMPDV7		92.82	0.84	0.28	93.09	1.01	0.34
LHWRKR		92.94	0.95	0.32	93.50	1.43	0.48
METCRV		93.16	1.18	0.40	93.16	1.09	0.36
PD6KD8		92.83	0.85	0.28	92.65	0.57	0.19
TEBFJ3		95.19	3.20	1.08	95.49	3.42	1.14

Summary Statistics	Sample BF13	Sample BF14
Grand Means	91.99 Percent	92.07 Percent
Stnd Dev Btwn Labs	2.97 Percent	3.00 Percent

Statistics based on 11 of 11 reporting participants.

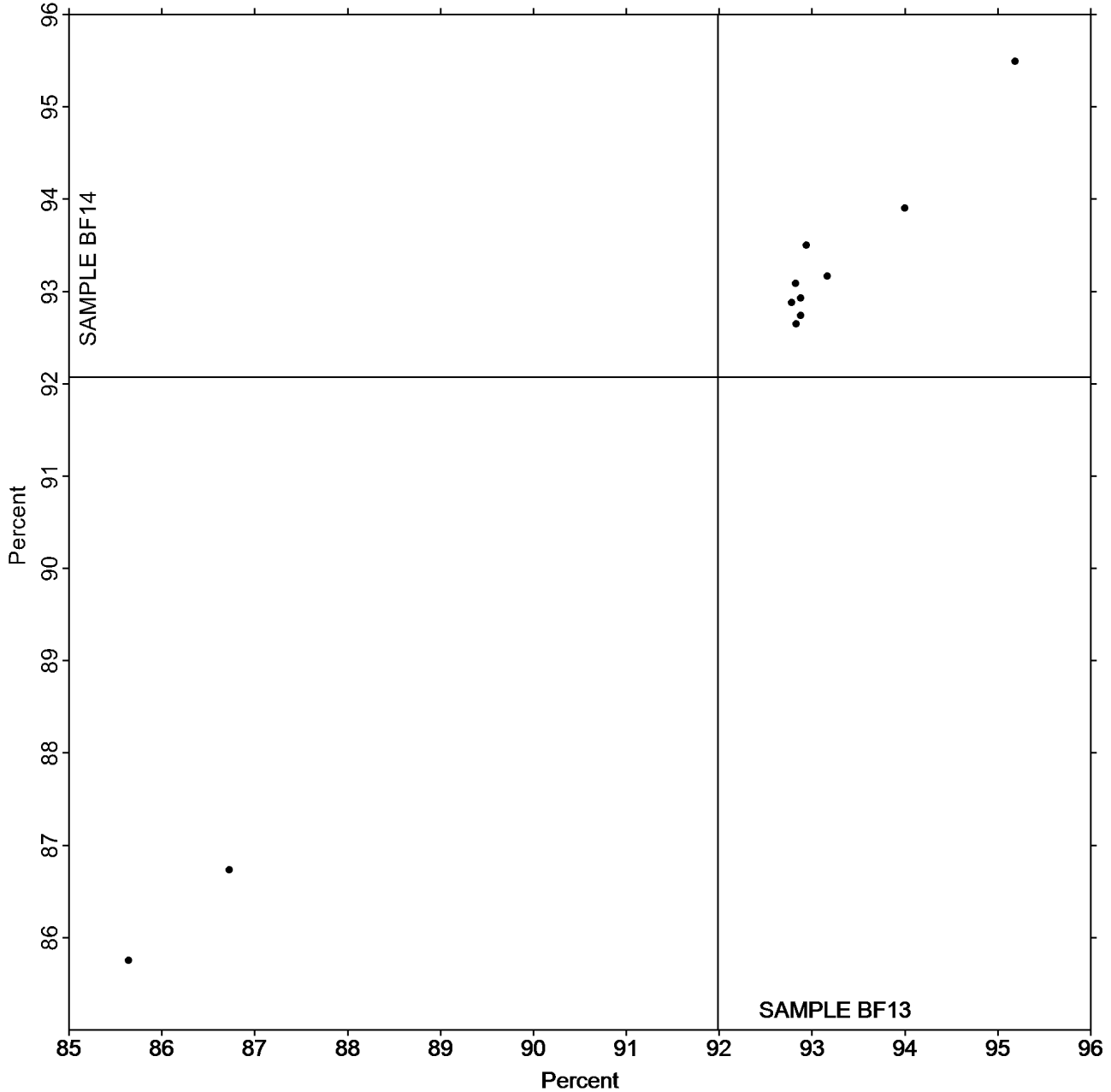**Paper & Paperboard Interlaboratory Testing Program**
Analysis 3145
Directional Brightness of Fluorescent Samples
TAPPI Official Test Method T452

Report #4221JA,
January 2023

Grand Mean Sample BF13 = 91.986 Percent

Grand Mean Sample BF14 = 92.074 Percent

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

**Report #4221JA,
January 2023**

		Sample BF13			Sample BF14		
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
39R3MR		6.094	-0.196	-0.24	6.052	-0.267	-0.32
ACQCP2		6.200	-0.090	-0.11	6.180	-0.139	-0.16
EF6H94		5.180	-1.110	-1.35	5.200	-1.119	-1.32
ERY2MA		6.122	-0.168	-0.20	6.258	-0.061	-0.07
FMPDV7		6.062	-0.228	-0.28	6.018	-0.301	-0.36
LHWRKR		6.200	-0.090	-0.11	6.320	0.001	0.00
METCRV		6.226	-0.064	-0.08	6.158	-0.161	-0.19
PD6KD8		6.230	-0.060	-0.07	6.304	-0.015	-0.02
TEBFJ3		8.294	2.004	2.44	8.382	2.063	2.44

Summary Statistics	**Sample BF13**	**Sample BF14**
Grand Means	6.29 Percent	6.32 Percent
Stnd Dev Btwn Labs	0.82 Percent	0.85 Percent

Statistics based on 9 of 9 reporting participants.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3146
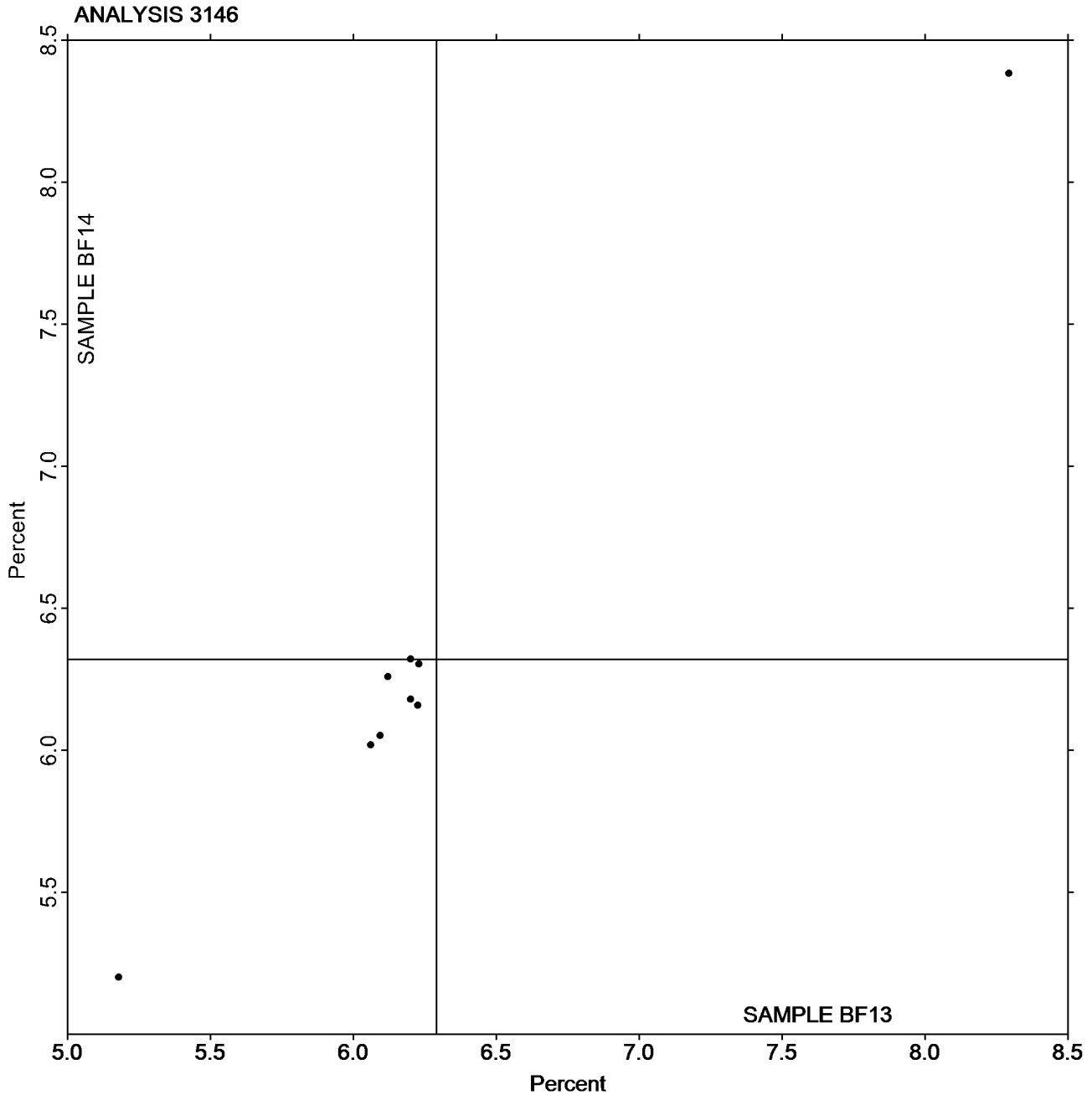**Fluorescent Component of Directional Brightness**
TAPPI Official Test Method T452

**Report #4221JA,
January 2023**

**Grand Mean Sample BF13 = 6.2898
Percent**

**Grand Mean Sample BF14 = 6.3191
Percent**

ANALYSIS 3146

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

Report #4221JA, January 2023

WebCode	Data Flag	Sample TP13 Lab Mean	Sample TP13 Diff from Grand Mean	Sample TP13 CPV	Sample TP14 Lab Mean	Sample TP14 Diff from Grand Mean	Sample TP14 CPV
3QRKLH		4.103	0.035	0.07	4.076	-0.125	-0.20
EF6H94		2.959	-1.109	-2.08	2.929	-1.272	-2.07
F6NNGN		4.947	0.879	1.65	5.534	1.333	2.16
FMPDV7		3.688	-0.380	-0.71	3.980	-0.221	-0.36
KRLGHF		4.020	-0.048	-0.09	4.230	0.029	0.05
LHWRKR		3.972	-0.096	-0.18	3.978	-0.223	-0.36
PD6KD8		3.768	-0.301	-0.56	4.268	0.067	0.11
Q4YWZ2		4.200	0.132	0.25	4.405	0.204	0.33
QV6R8Z		4.320	0.252	0.47	4.210	0.009	0.01
R9MGQG		4.780	0.712	1.33	4.633	0.432	0.70
W9PWQB		3.994	-0.074	-0.14	3.973	-0.228	-0.37

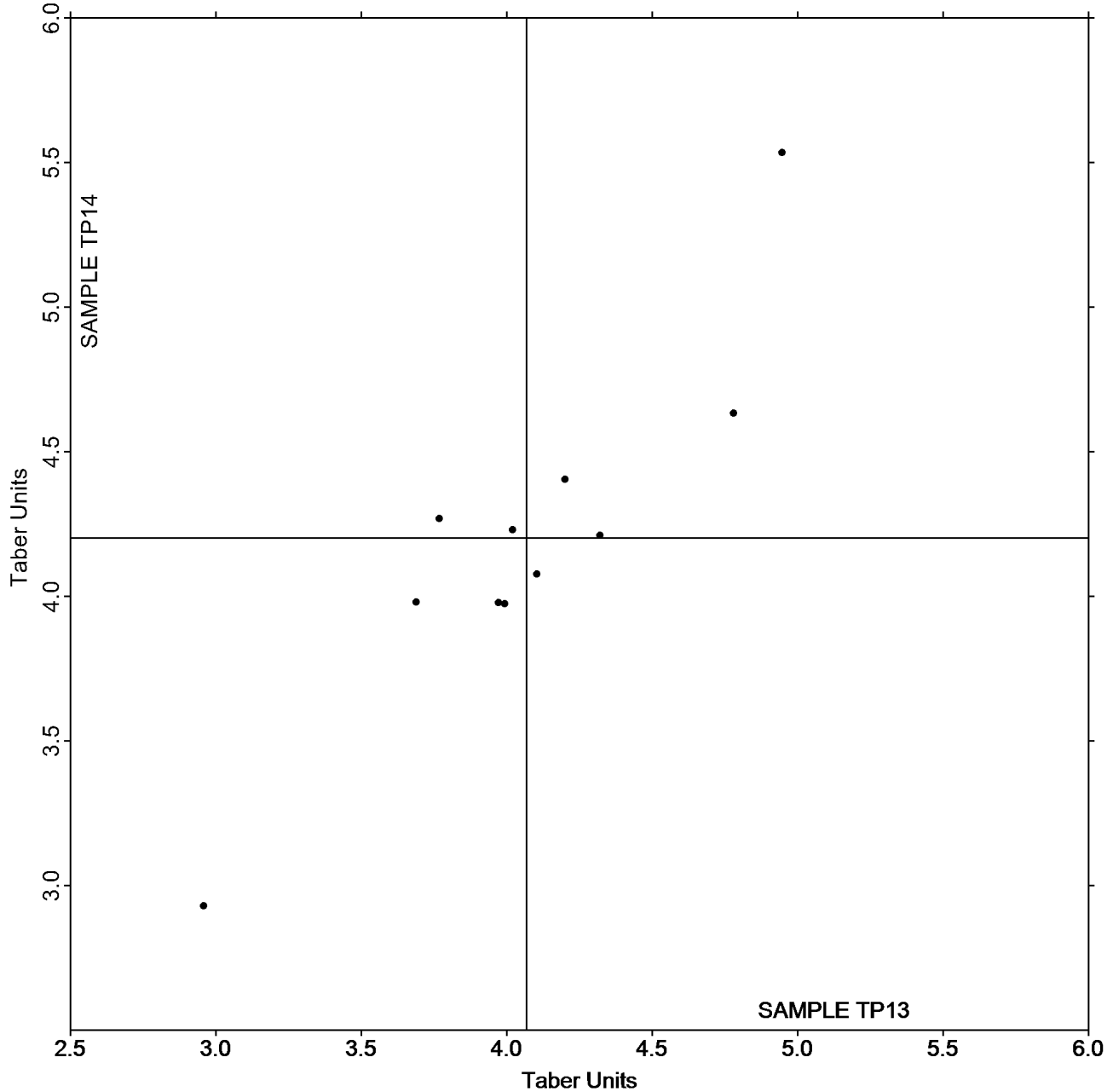| Summary Statistics	Sample TP13	Sample TP14
Grand Means	4.07 Taber Units	4.20 Taber Units
Stnd Dev Btwn Labs	0.53 Taber Units	0.62 Taber Units

Statistics based on 11 of 11 reporting participants.

Grand Mean Sample TP13 = 4.0682 Taber Units

Grand Mean Sample TP14 = 4.2015 Taber Units

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

WebCode	Data Flag	Sample TC13			Sample TC14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
29EGRQ		16.62	-1.46	-1.07	16.93	-1.52	-1.27
3QRKLH		17.32	-0.76	-0.56	17.46	-0.99	-0.83
B2LLHK		18.23	0.15	0.11	18.96	0.51	0.42
CMJUJD		19.65	1.57	1.15	20.00	1.55	1.29
FQ4JJM		17.03	-1.05	-0.77	17.92	-0.53	-0.45
HHJP9F		17.09	-0.99	-0.72	17.46	-0.99	-0.83
NA89VA		20.07	1.99	1.46	19.87	1.42	1.18
NUYRVF		17.02	-1.06	-0.78	17.72	-0.73	-0.61
TP9CL6		19.69	1.61	1.18	19.76	1.31	1.09

Summary Statistics	Sample TC13	Sample TC14
Grand Means	18.08 Taber Units	18.45 Taber Units
Stnd Dev Btwn Labs	1.37 Taber Units	1.20 Taber Units

Statistics based on 9 of 9 reporting participants.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3203
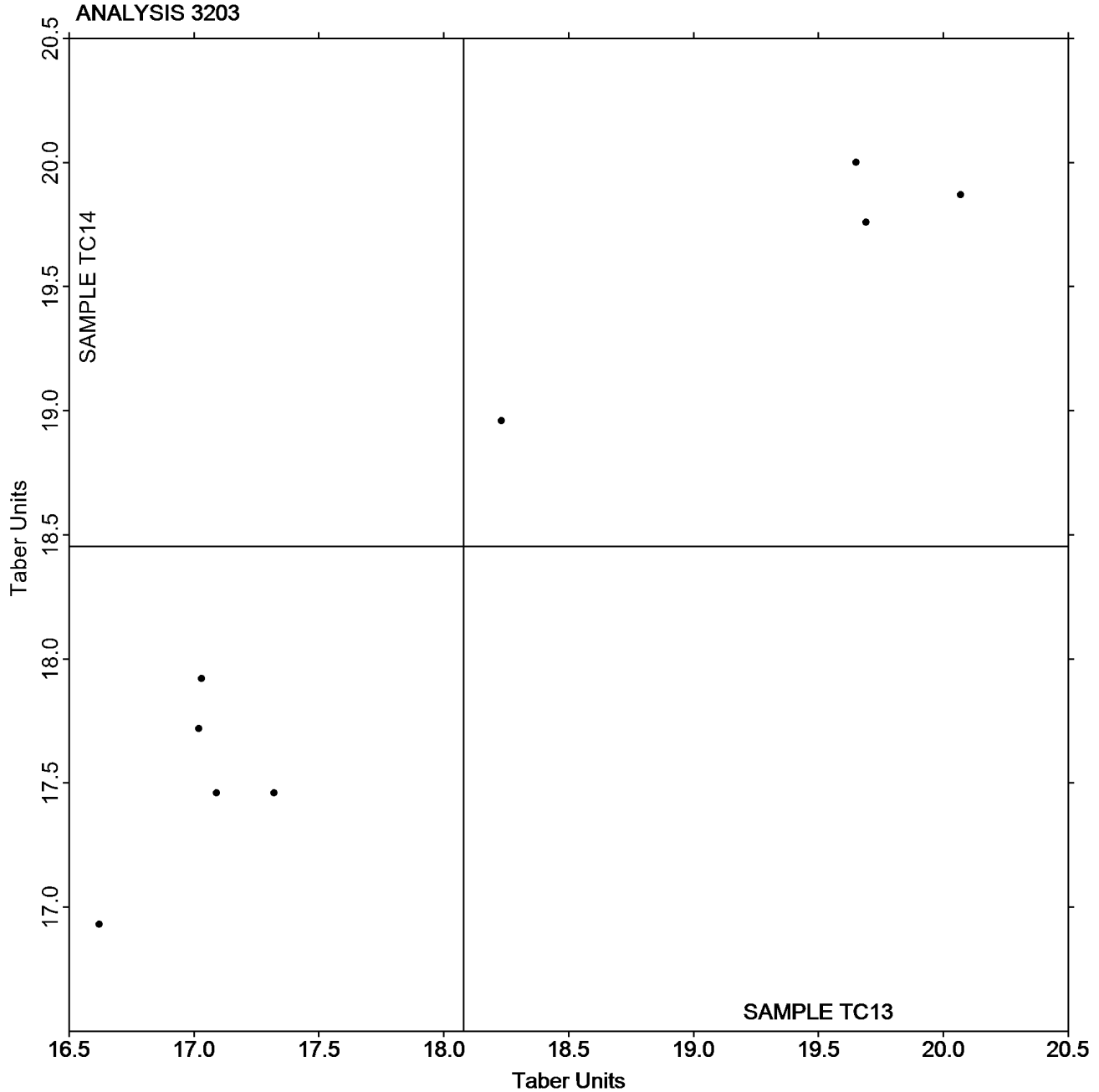### Bending Resistance, Taber Type - 10 to 100 Taber Units
TAPPI Official Test Method T489

Report #4221JA, January 2023

Grand Mean Sample TC13 = 18.080 Taber Units

Grand Mean Sample TC14 = 18.453 Taber 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 3205
Bending Resistance, Taber Type - 50 to 500 Taber Units - Recycled Paperboard
TAPPI Official Test Method T489

Report #4221JA, January 2023

WebCode	Data Flag	Sample TR13			Sample TR14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
29EGRQ		175.3	-0.8	-0.14	177.6	3.7	0.58
73QZ8G		165.1	-10.9	-1.96	163.8	-10.1	-1.56
9V74CD		174.9	-1.2	-0.21	177.0	3.1	0.49
B2LLHK		180.4	4.3	0.78	173.0	-0.9	-0.14
DHGX6Q		175.7	-0.4	-0.06	173.5	-0.4	-0.06
E8XCJ9		173.4	-2.6	-0.47	171.2	-2.7	-0.42
FVJ72Y		183.8	7.7	1.39	182.2	8.3	1.30
GH6FRV		169.3	-6.8	-1.22	169.2	-4.7	-0.73
HDAZHE		175.1	-1.0	-0.17	171.5	-2.4	-0.37
P8ZB2R		175.9	-0.2	-0.03	164.8	-9.1	-1.41
R9PYV8		185.0	8.9	1.60	185.3	11.4	1.78
VB4XFR	X	247.0	70.9	12.71	245.9	72.0	11.20
Z47V29		178.9	2.8	0.50	177.4	3.5	0.54

Summary Statistics	Sample TR13	Sample TR14
Grand Means	176.06 Taber Units	173.87 Taber Units
Stnd Dev Btwn Labs	5.58 Taber Units	6.43 Taber Units

Statistics based on 12 of 13 reporting participants.

Comments on Assigned Data Flags for Test #3205

VB4XFR (X) - Extreme Data.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3205
Bending Resistance, Taber Type - 50 to 500 Taber Units - Recycled Paperboard
TAPPI Official Test Method T489

Report #4221JA,
January 2023

Grand Mean Sample TR13 = 176.06
Taber Units

Grand Mean Sample TR14 = 173.87
Taber Units

ANALYSIS 3205

SAMPLE TR14

Taber Units

SAMPLE TR13

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

WebCode	Data Flag	Sample ZR13			Sample ZR14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
29EGRQ		56.38	-7.17	-1.06	57.48	-6.89	-1.16
7N8DXH	*	68.78	5.23	0.77	74.90	10.53	1.78
8CCGFG		54.60	-8.95	-1.32	58.60	-5.77	-0.97
9V74CD		64.80	1.25	0.18	66.80	2.43	0.41
A4W8VZ		67.36	3.81	0.56	68.55	4.17	0.70
B2LLHK		65.46	1.91	0.28	65.40	1.03	0.17
B7VKCX	X	59.22	-4.33	-0.64	44.28	-20.09	-3.39
BENPQC		75.48	11.93	1.76	71.56	7.19	1.21
DHGX6Q		62.40	-1.15	-0.17	63.40	-0.97	-0.16
E8XCJ9		68.00	4.45	0.66	66.76	2.39	0.40
FVJ72Y		51.76	-11.79	-1.74	57.06	-7.31	-1.23
GH6FRV		56.94	-6.61	-0.97	55.06	-9.31	-1.57
HELBJ6		75.10	11.55	1.70	73.80	9.43	1.59
J378PE		66.20	2.65	0.39	67.00	2.63	0.44
PDQMYA		61.20	-2.35	-0.35	60.00	-4.37	-0.74
R9PYV8		61.80	-1.75	-0.26	61.20	-3.17	-0.54
VATVUT		70.62	7.07	1.04	70.06	5.69	0.96
WMRQCX		55.18	-8.37	-1.23	58.16	-6.21	-1.05
Y68ADG		66.64	3.09	0.46	66.82	2.45	0.41
Z47V29		58.68	-4.87	-0.72	60.48	-3.89	-0.66

Summary Statistics	Sample ZR13	Sample ZR14
Grand Means	63.55 psi	64.37 psi
Stnd Dev Btwn Labs	6.78 psi	5.92 psi

Statistics based on 19 of 20 reporting participants.

Comments on Assigned Data Flags for Test #3207

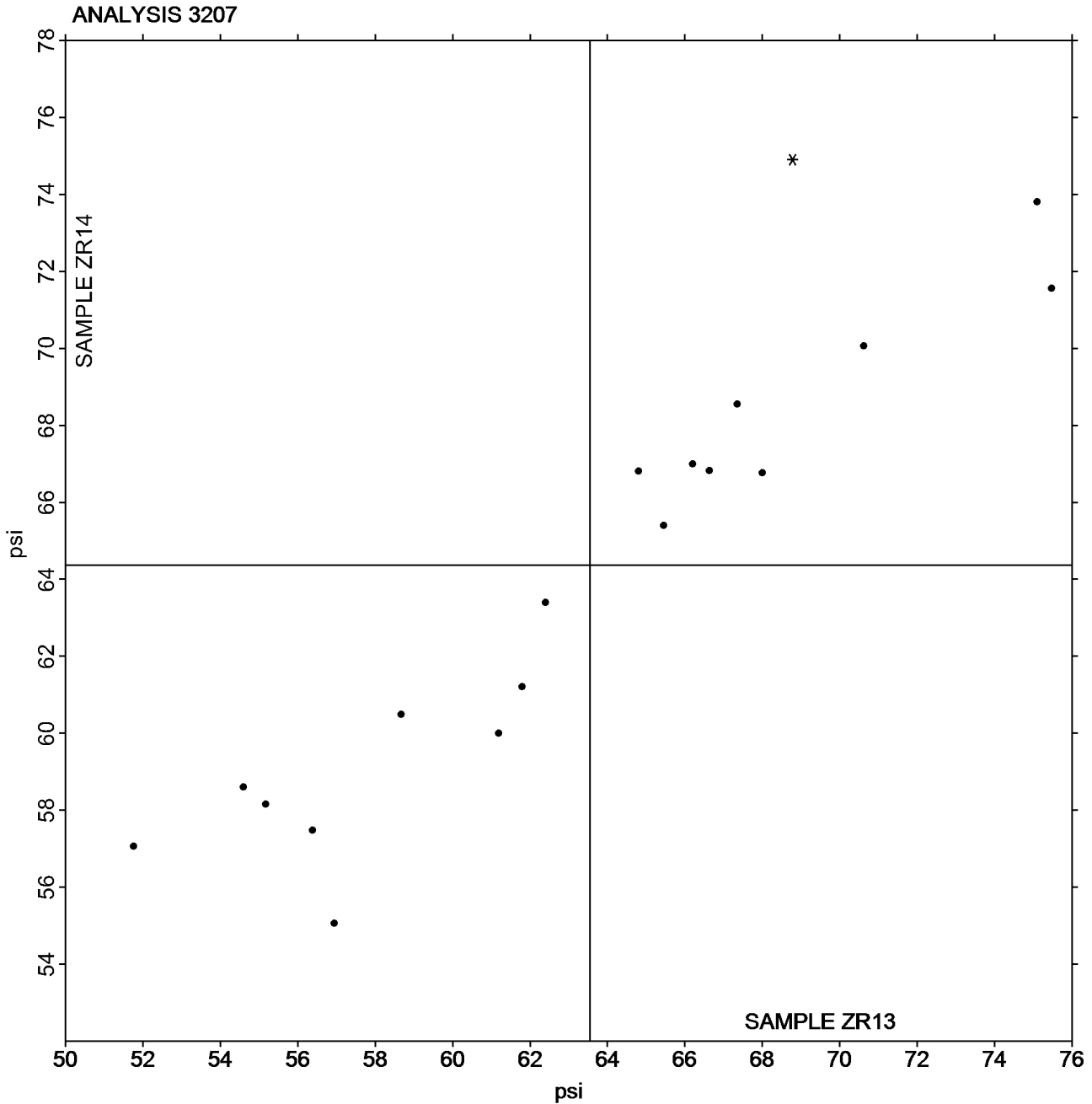B7VKCX (X) - Data for sample ZR14 are low. Inconsistent within the determinations of sample ZR14.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3207
Z-Direction Tensile, Recycled Paperboard
TAPPI Official Test Method T541

Report #4221JA, January 2023

Grand Mean Sample ZR13 = 63.546 psi

Grand Mean Sample ZR14 = 64.373 psi

ANALYSIS 3207

SAMPLE ZR14

SAMPLE ZR13

psi

psi

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 ZP13			Sample ZP14		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
29EGRQ		111.52	17.49	0.92	107.64	14.58	0.75
69MQA3		76.99	-17.04	-0.90	78.03	-15.03	-0.78
FQ4JJM		100.00	5.97	0.31	101.14	8.08	0.42
HDAZHE		62.87	-31.16	-1.64	61.96	-31.10	-1.61
HHJP9F		76.00	-18.03	-0.95	73.48	-19.58	-1.01
HPNUE2		86.00	-8.03	-0.42	81.40	-11.66	-0.60
NA89VA		113.36	19.33	1.02	113.28	20.22	1.04
P8ZB2R		112.26	18.23	0.96	111.02	17.96	0.93
TP9CL6		107.28	13.25	0.70	109.60	16.54	0.85

Summary Statistics	**Sample ZP13**	**Sample ZP14**
Grand Means	94.03 psi	93.06 psi
Stnd Dev Btwn Labs	18.95 psi	19.35 psi

Statistics based on 9 of 9 reporting participants.

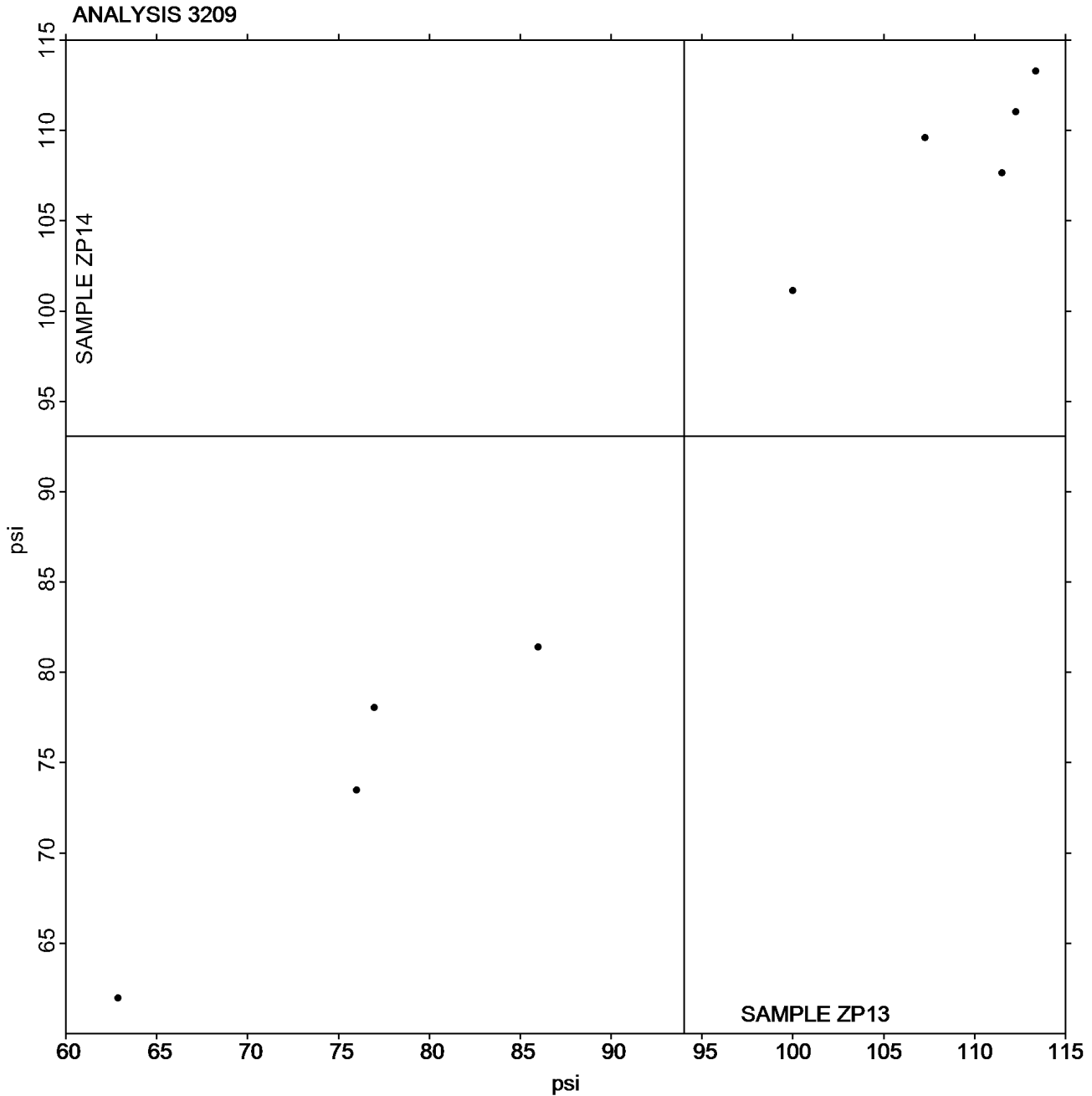**Paper & Paperboard Interlaboratory Testing Program**
Analysis 3209
Z-Direction Tensile
TAPPI Official Test Method T541

Report #4221JA,
January 2023

Grand Mean Sample ZP13 = 94.030 psi

Grand Mean Sample ZP14 = 93.062 psi

ANALYSIS 3209

SAMPLE ZP14

SAMPLE ZP13

psi

psi

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

Report #4221JA, January 2023

WebCode	Data Flag	Sample SM13 Lab Mean	Diff from Grand Mean	CPV	Sample SM14 Lab Mean	Diff from Grand Mean	CPV
29EGRQ		154.4	-4.0	-0.39	130.4	-2.2	-0.22
9V74CD		170.0	11.6	1.11	137.0	4.4	0.44
BABENP		160.6	2.2	0.21	154.6	22.0	2.20
BLRZGY		145.2	-13.2	-1.27	126.2	-6.4	-0.64
C4RAXA		167.4	9.0	0.86	142.0	9.4	0.94
E8XCJ9		155.8	-2.6	-0.25	127.4	-5.2	-0.52
FQ4JJM		173.0	14.6	1.40	126.6	-6.0	-0.60
HBPJFE		145.8	-12.6	-1.21	121.6	-11.0	-1.10
HNQFE8		154.2	-4.2	-0.41	132.2	-0.4	-0.04
NA89VA		164.8	6.4	0.61	139.6	7.0	0.70
P8ZB2R		160.8	2.4	0.23	119.2	-13.4	-1.33
Q4YWZ2		137.0	-21.4	-2.06	130.8	-1.8	-0.18
TEBFJ3		161.3	2.9	0.28	123.1	-9.5	-0.95
TP9CL6		167.8	9.4	0.90	145.2	12.6	1.26

Summary Statistics	Sample SM13	Sample SM14
Grand Means	158.44 1000th ft-lbs	132.56 1000th ft-lbs
Stnd Dev Btwn Labs	10.41 1000th ft-lbs	10.01 1000th ft-lbs

Statistics based on 14 of 14 reporting participants.

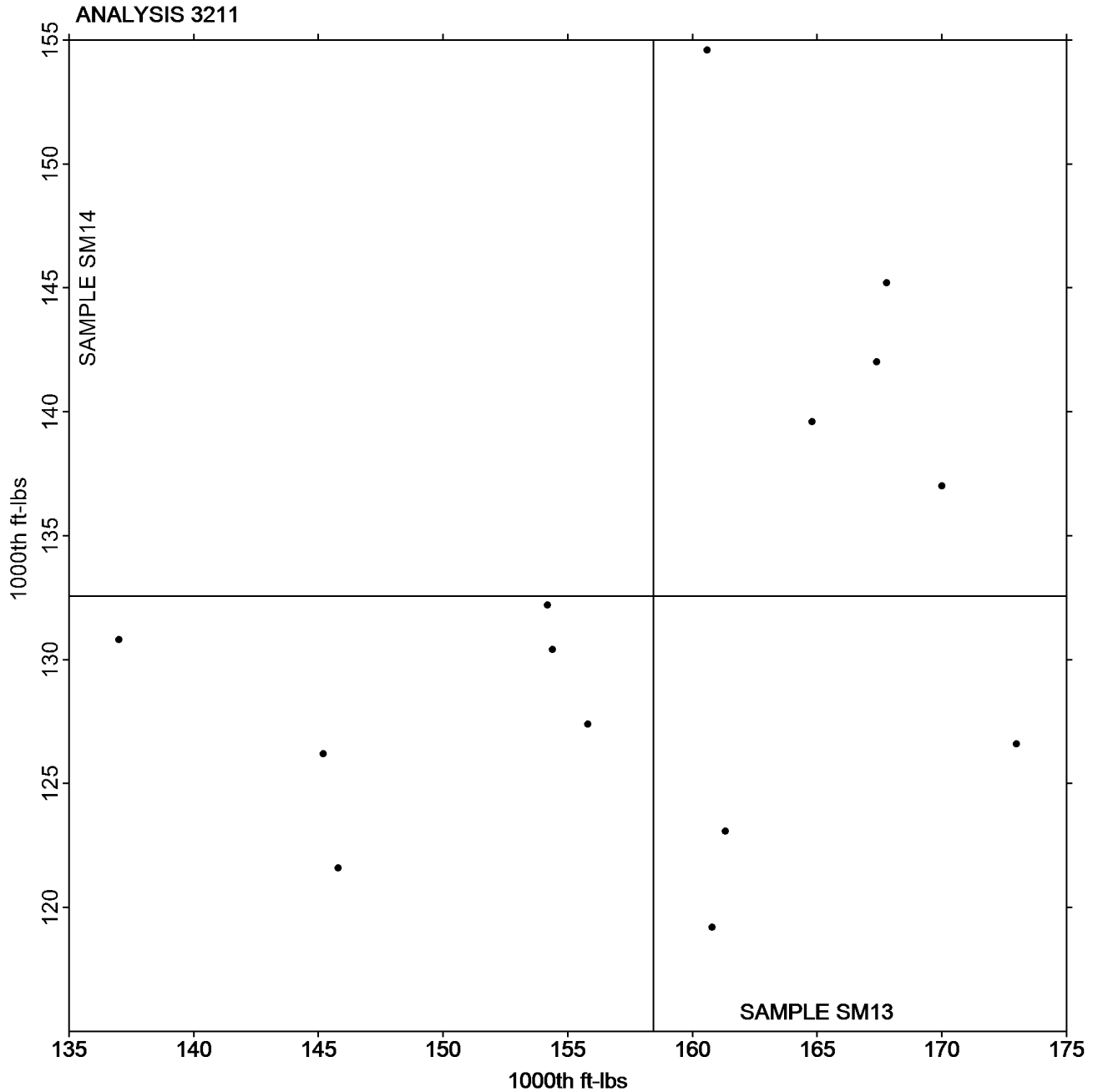**Paper & Paperboard Interlaboratory Testing Program**
Analysis 3211
Internal Bond Strength - Modified Scott Mechanics
TAPPI Provisional Test Method T569

Report #4221JA, January 2023

Grand Mean Sample SM13 = 158.44
1000th ft-lbs

Grand Mean Sample SM14 = 132.56
1000th ft-lbs

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

Report #4221JA, January 2023

		Sample SB13			Sample SB14		
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2Z2KN7		127.0	-17.0	-0.88	106.2	-15.3	-1.06
3QRKLH		146.6	2.6	0.14	111.6	-9.9	-0.68
7PJKA7		151.6	7.6	0.39	122.0	0.5	0.04
8QT9QN		181.6	37.6	1.95	151.8	30.3	2.10
A4W8VZ		104.2	-39.8	-2.06	107.0	-14.5	-1.00
CMJUJD		161.2	17.2	0.89	127.2	5.7	0.39
DQ8LT2		156.6	12.6	0.65	123.4	1.9	0.13
FMPDV7		150.4	6.4	0.33	145.8	24.3	1.68
HDAZHE		131.5	-12.5	-0.65	123.7	2.2	0.15
LHWRKR		147.8	3.8	0.20	111.0	-10.5	-0.72
MREV2Q		150.4	6.4	0.33	127.6	6.1	0.42
NFYDRJ		138.3	-5.7	-0.30	116.1	-5.4	-0.37
TBP278		124.8	-19.2	-1.00	105.9	-15.6	-1.08

Summary Statistics	Sample SB13	Sample SB14
Grand Means	143.99 1000th ft-lbs	121.48 1000th ft-lbs
Stnd Dev Btwn Labs	19.28 1000th ft-lbs	14.46 1000th ft-lbs

Statistics based on 13 of 13 reporting participants.

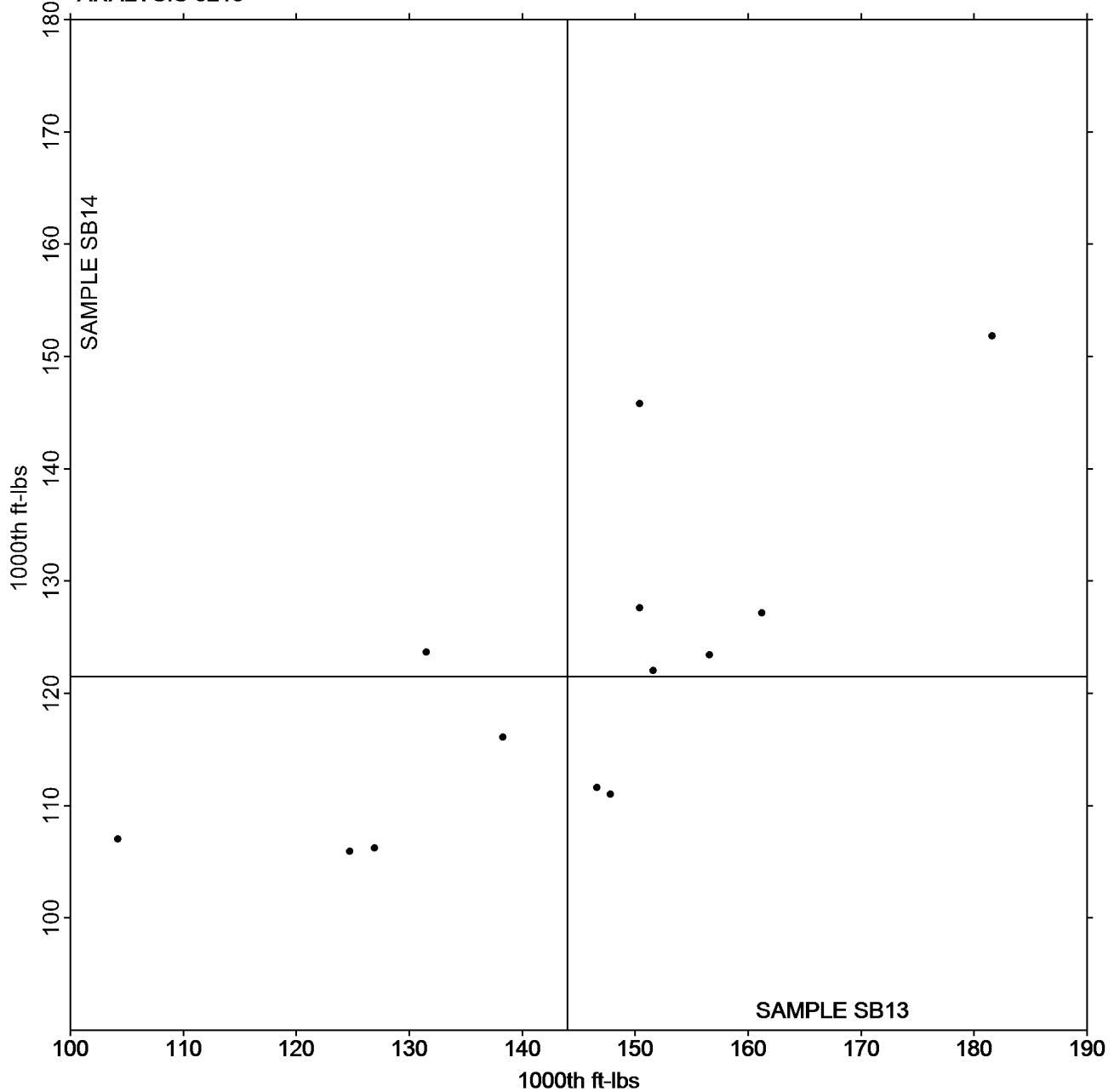**Paper & Paperboard Interlaboratory Testing Program**
Analysis 3213
Internal Bond Strength - Scott Bond Models
TAPPI Provisional Test Method T569

Report #4221JA,
January 2023

Grand Mean Sample SB13 = 143.99
1000th ft-lbs

Grand Mean Sample SB14 = 121.48
1000th ft-lbs

ANALYSIS 3213

SAMPLE SB14

1000th ft-lbs

SAMPLE SB13

1000th ft-lbs

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

Report #4221JA, January 2023

-End of Report-