



Paper & Paperboard Testing Program

Summary Report #4291 - March 2024

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The CTS Paper & Paperboard Interlaboratory Program

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

About CTS

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

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Key for Web Summary Reports (Page 1 of 2)

WebCode	Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Paper Report published on the CTS Website. The WebCode for each analysis can be found on the datasheets and in the Performance Analysis Report mailed to each participant.
Lab Mean	The average of the values obtained for each sample by the participant.
Grand Mean	The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.
Difference from Grand Mean	The difference of the LAB MEAN from the GRAND MEAN.
Between-Lab Standard Deviation	An indication of the precision of measurement between the laboratories. The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).
Comparative Performance Value	An indication of how well a laboratory's results agree with the other participants. The CPV is a ratio indicating the number of standard deviations from the GRAND MEAN. The closer a laboratory's COMPARATIVE PERFORMANCE VALUE is to zero, the more consistent its results are with the other participants' data (and vice versa). The critical value for each CPV will vary depending on the number of labs participating in a test.
Inst Code	A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section), if instruments are tracked.
Data Flag	DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

<u>DATA FLAG</u>	<u>STATISTICALLY INCLUDED/EXCLUDED</u>	<u>ACTION REQUIRED</u>
*	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

Report #4291,
March 2024

Analysis 3101 Thickness (Caliper), Printing papers TAPPI Official Test Method T411

WebCode	Data Flag	Sample CP27			Sample CP28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
24PTJD		4.399	-0.026	-0.30	4.422	-0.005	-0.06
2HB9LD		4.369	-0.056	-0.65	4.404	-0.023	-0.27
2U424T		4.520	0.095	1.11	4.515	0.088	1.02
2UZRVU		4.372	-0.053	-0.61	4.421	-0.006	-0.07
33TCQU		4.380	-0.045	-0.52	4.380	-0.047	-0.55
4L3NWP		4.520	0.095	1.11	4.570	0.143	1.67
79PXYE		4.482	0.057	0.67	4.474	0.047	0.55
7Q68ZE		4.360	-0.065	-0.75	4.374	-0.053	-0.62
8MZY9A		4.409	-0.015	-0.18	4.402	-0.025	-0.30
8W6HGP		4.576	0.151	1.76	4.539	0.112	1.30
BD7ECJ		4.493	0.068	0.80	4.510	0.083	0.97
BGLMZJ		4.380	-0.045	-0.52	4.370	-0.057	-0.66
BY7DYH	*	4.179	-0.246	-2.86	4.198	-0.229	-2.67
CF9M8G		4.519	0.094	1.10	4.519	0.092	1.07
CJ3G6H		4.401	-0.024	-0.27	4.425	-0.002	-0.02
CLCT38		4.370	-0.055	-0.63	4.303	-0.124	-1.45
CY2TUA		4.368	-0.057	-0.66	4.332	-0.095	-1.11
DFM9GJ		4.335	-0.090	-1.05	4.342	-0.085	-0.99
FPJ9TE		4.395	-0.030	-0.34	4.382	-0.045	-0.52
G9D2EC		4.456	0.031	0.37	4.421	-0.006	-0.07
GK8KTH	*	4.668	0.243	2.83	4.613	0.186	2.17
H99F93		4.447	0.022	0.26	4.450	0.023	0.27
HMNB9C		4.447	0.022	0.26	4.441	0.014	0.16
HP9QRZ		4.446	0.021	0.25	4.414	-0.013	-0.15
JMK4QG		4.417	-0.008	-0.09	4.440	0.013	0.15
K2K3DD		4.407	-0.018	-0.20	4.364	-0.063	-0.73
KJFLE	*	4.509	0.084	0.98	4.585	0.158	1.84
LWHQM7		4.300	-0.125	-1.45	4.310	-0.117	-1.36
LYQW98		4.476	0.051	0.60	4.504	0.077	0.90
MK6DXX		4.436	0.011	0.13	4.411	-0.016	-0.19
MR3HY7		4.516	0.091	1.06	4.482	0.055	0.65
NN4GHA		4.357	-0.067	-0.78	4.349	-0.078	-0.91
NX6CLU		4.436	0.011	0.13	4.433	0.006	0.07
NXKXVW		4.525	0.101	1.17	4.563	0.136	1.58
Q3D6J4		4.472	0.047	0.55	4.499	0.072	0.84
Q9ZRE9		4.383	-0.041	-0.48	4.373	-0.054	-0.63
QQYU97		4.302	-0.122	-1.42	4.312	-0.115	-1.34
T2ATLK		4.336	-0.089	-1.03	4.379	-0.048	-0.56
TTGHBP	X	4.114	-0.310	-3.61	4.106	-0.321	-3.74
UKL772		4.327	-0.098	-1.14	4.323	-0.104	-1.21



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

Report #4291,
March 2024

WebCode	Data Flag	<u>Sample CP27</u>			<u>Sample CP28</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
VDXE6K		4.296	-0.129	-1.50	4.322	-0.105	-1.22
YBZ8CJ		4.531	0.106	1.24	4.513	0.086	1.00
YGML7X		4.406	-0.019	-0.22	4.382	-0.045	-0.52
YZ3U8X		4.395	-0.029	-0.34	4.423	-0.004	-0.05
Z4E4PU		4.496	0.072	0.84	4.490	0.063	0.73
ZKF2VW		4.445	0.020	0.24	4.488	0.061	0.71
ZM8ZAU		4.470	0.045	0.53	4.477	0.050	0.58

Summary Statistics	<u>Sample CP27</u>	<u>Sample CP28</u>
Grand Means	4.42 mils	4.43 mils
Std Dev Btwn Labs	0.09 mils	0.09 mils

Statistics based on 46 of 47 reporting participants.

Comments on Assigned Data Flags for Test #3101

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

Analysis Notes:

T2ATLK - One determination removed from the Lab Mean of Sample CP28 per Grubb's Test at 1% risk (TAPPI 1205).



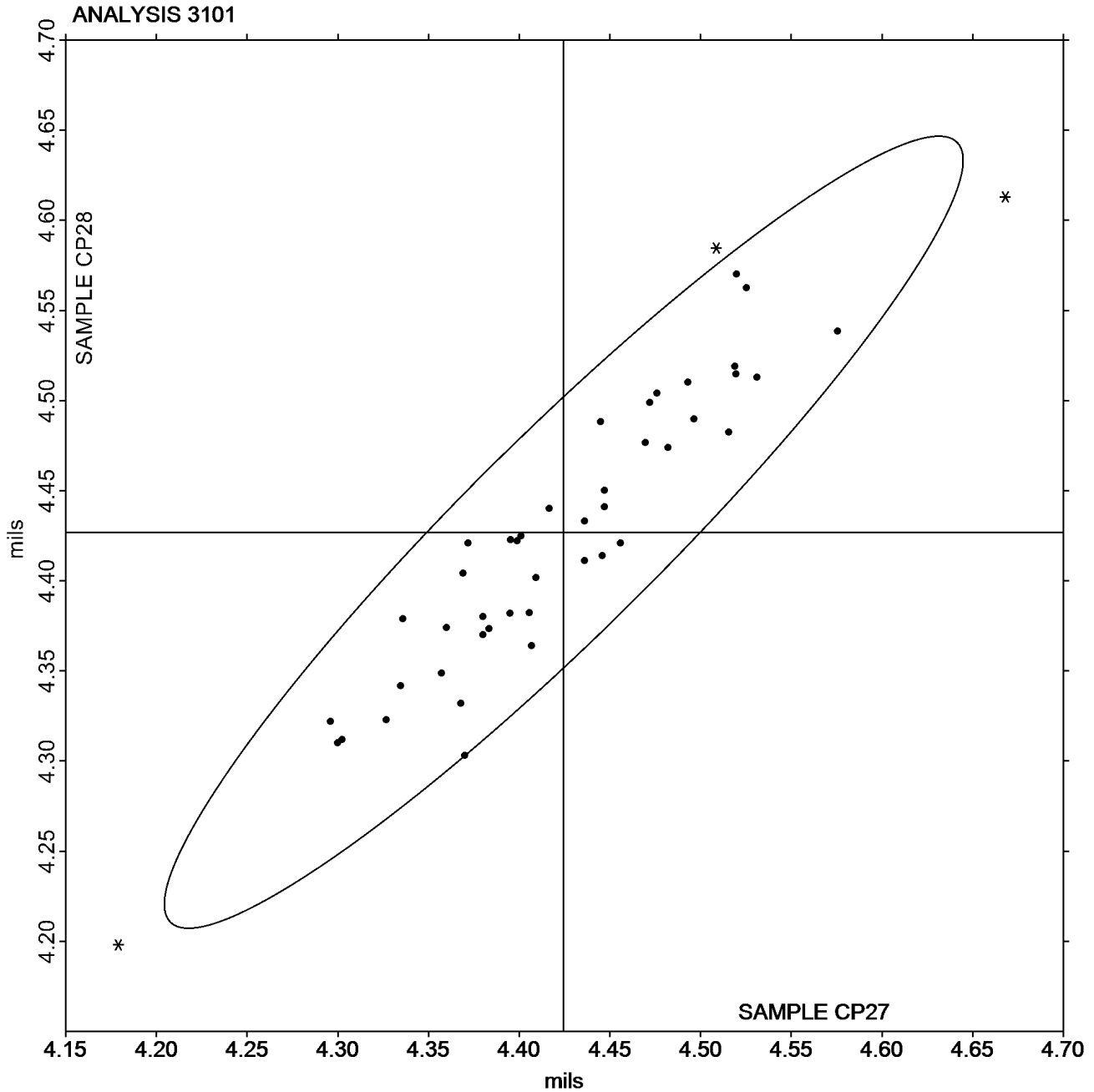
Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

Analysis 3101 Thickness (Caliper), Printing papers TAPPI Official Test Method T411

Grand Mean Sample CP27 = 4.4245
mils

Grand Mean Sample CP28 = 4.4270
mils





Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

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

WebCode	Data Flag	Sample BP27			Sample BP28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2HB9LD		21.51	-1.79	-1.02	22.21	-1.19	-0.72
2U424T		22.21	-1.10	-0.63	21.36	-2.04	-1.24
2UZRVU		26.81	3.50	1.99	26.77	3.37	2.05
7Q68ZE		23.50	0.19	0.11	24.57	1.17	0.72
CD2RG7		23.13	-0.18	-0.10	23.11	-0.29	-0.17
CJ3G6H		20.79	-2.51	-1.43	20.51	-2.89	-1.76
F4Z2GK		24.19	0.88	0.50	23.99	0.59	0.36
FPJ9TE		24.90	1.59	0.91	23.50	0.10	0.06
G9D2EC		22.00	-1.31	-0.74	22.31	-1.09	-0.66
H99F93		20.30	-3.01	-1.71	20.84	-2.56	-1.56
HX8JFE		23.18	-0.13	-0.07	24.46	1.06	0.65
JRURBT		25.50	2.19	1.25	25.10	1.70	1.04
KJJFLE		23.28	-0.03	-0.02	22.90	-0.50	-0.30
KU2WG8		23.54	0.24	0.13	22.53	-0.87	-0.53
LYQW98		23.40	0.09	0.05	24.70	1.30	0.79
MK6DXX		24.33	1.02	0.58	25.84	2.44	1.49
MR3HY7		22.26	-1.04	-0.59	23.07	-0.33	-0.20
NN4GHA		24.61	1.31	0.74	23.31	-0.09	-0.06
NXKXVW		25.51	2.20	1.25	25.07	1.67	1.02
P28ZTA		24.50	1.19	0.68	25.50	2.10	1.28
P4QQPR		20.60	-2.71	-1.54	21.41	-1.99	-1.21
Q9ZRE9		25.26	1.96	1.11	25.11	1.71	1.04
RKNQQQ		19.95	-3.36	-1.91	20.60	-2.80	-1.71
VDXE6K		25.50	2.19	1.25	23.60	0.20	0.12
YBZ8CJ		22.93	-0.38	-0.21	23.32	-0.08	-0.05
Z4E4PU		23.09	-0.22	-0.12	22.76	-0.64	-0.39
ZM8ZAU		22.50	-0.81	-0.46	23.35	-0.05	-0.03

Summary Statistics	Sample BP27	Sample BP28
Grand Means	23.31 psi	23.40 psi
Std Dev Btwn Labs	1.76 psi	1.64 psi
Statistics based on 27 of 27 reporting participants.		



Paper & Paperboard Interlaboratory Testing Program

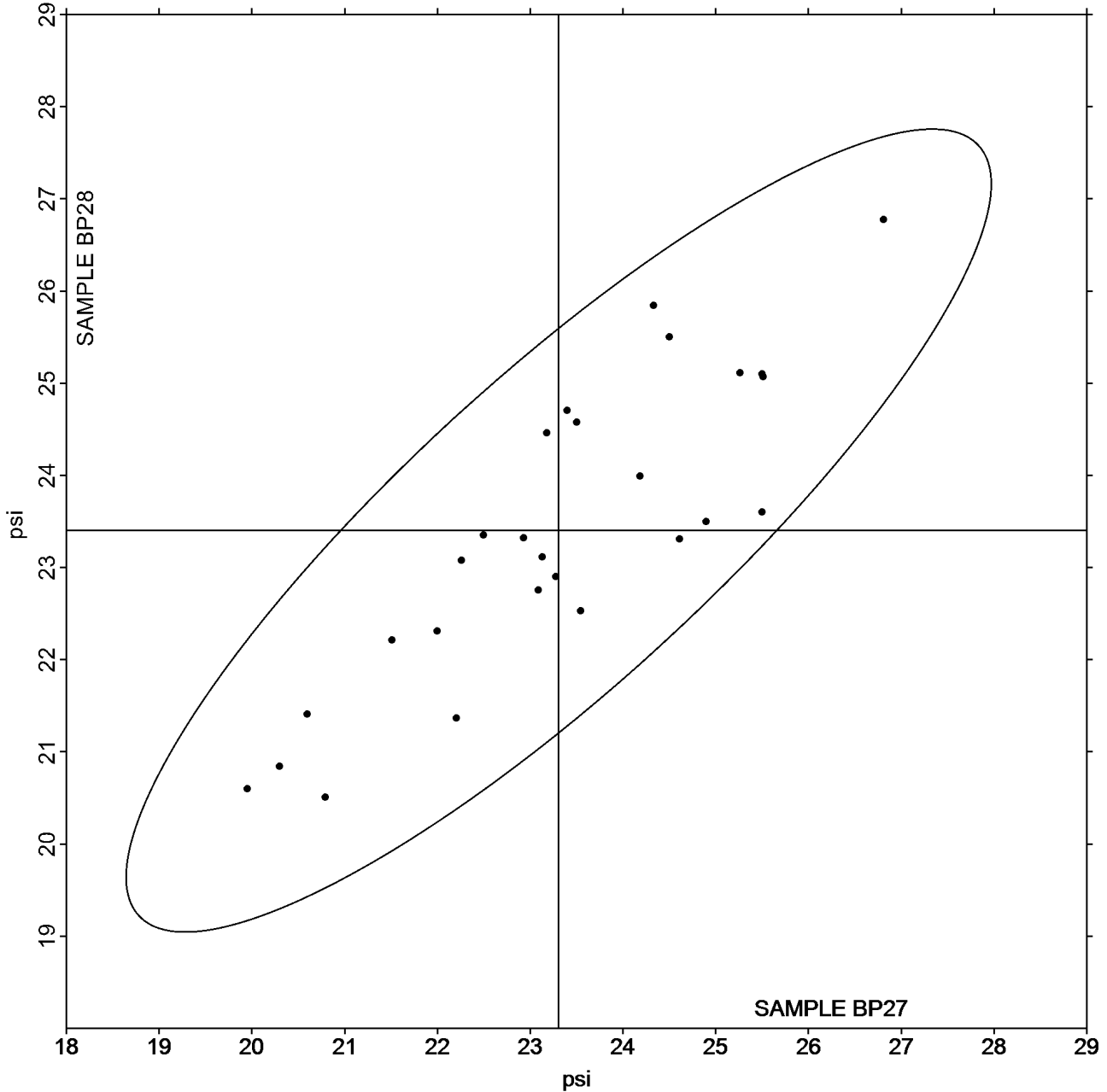
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Analysis 3111 Bursting Strength - Printing Papers TAPPI Official Test Method T403

Grand Mean Sample BP27 = 23.307
psi

Grand Mean Sample BP28 = 23.401
psi

ANALYSIS 3111





Paper & Paperboard Interlaboratory Testing Program

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Analysis 3113

Tearing Strength - Printing Papers

TAPPI Official Test Method T414

WebCode	Data Flag	Sample RP27			Sample RP28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2LAJHD		46.01	-0.45	-0.11	46.01	-0.25	-0.06
2U424T		49.39	2.92	0.73	49.60	3.34	0.79
2UZRVU	X	41.02	-5.44	-1.36	49.00	2.74	0.65
33TCQU		43.26	-3.20	-0.80	43.54	-2.72	-0.64
8MZY9A		50.76	4.30	1.08	51.13	4.88	1.15
8W6HGP		48.40	1.93	0.48	48.01	1.75	0.41
97BBUQ	X	63.27	16.81	4.21	62.51	16.26	3.85
BGLMZJ	X	66.93	20.47	5.13	66.47	20.21	4.78
BY7DYH	*	35.84	-10.62	-2.66	35.36	-10.90	-2.58
C24ECK		49.63	3.17	0.79	49.81	3.56	0.84
CF9M8G		51.20	4.74	1.19	51.80	5.54	1.31
CJ3G6H		48.82	2.36	0.59	49.46	3.20	0.76
CUQ7BJ		41.76	-4.70	-1.18	40.94	-5.32	-1.26
DW8LN3		45.07	-1.39	-0.35	44.76	-1.50	-0.36
F4Z2GK		48.36	1.90	0.48	47.40	1.14	0.27
FPJ9TE		43.20	-3.26	-0.82	42.60	-3.66	-0.87
G9D2EC		44.98	-1.48	-0.37	44.60	-1.66	-0.39
GK8KTH		43.32	-3.14	-0.79	43.16	-3.10	-0.73
H99F93		50.51	4.05	1.01	52.35	6.09	1.44
HMNB9C		41.20	-5.26	-1.32	42.14	-4.12	-0.97
HP9QRZ		39.57	-6.90	-1.73	40.01	-6.24	-1.48
HX8JFE		43.93	-2.53	-0.63	43.64	-2.62	-0.62
JMK4QG		44.29	-2.17	-0.54	42.91	-3.35	-0.79
KJJFLE		42.03	-4.43	-1.11	42.06	-4.20	-0.99
LYQW98		50.25	3.79	0.95	51.28	5.02	1.19
MK6DXX		48.20	1.74	0.44	46.40	0.14	0.03
MR3HY7		48.69	2.23	0.56	48.01	1.75	0.41
NN4GHA		54.87	8.40	2.11	55.46	9.20	2.18
NX6CLU		45.47	-0.99	-0.25	45.09	-1.17	-0.28
NXKXVW		46.05	-0.41	-0.10	46.28	0.02	0.00
P28ZTA	*	56.60	10.14	2.54	56.00	9.74	2.31
Q3D6J4		47.00	0.54	0.13	46.30	0.04	0.01
Q9ZRE9		45.36	-1.10	-0.28	45.36	-0.90	-0.21
RBMTX2		48.10	1.64	0.41	47.04	0.78	0.19
T2ATLK	X	40.04	-6.42	-1.61	43.52	-2.74	-0.65
TK4AAN		48.30	1.84	0.46	49.00	2.74	0.65
UKL772	*	47.20	0.74	0.19	44.00	-2.26	-0.53
UZEXR3		48.61	2.15	0.54	48.57	2.31	0.55
VDXE6K		42.92	-3.54	-0.89	43.32	-2.94	-0.70
WB77PV		48.54	2.08	0.52	48.42	2.16	0.51



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

Report #4291,
March 2024

WebCode	Data Flag	Sample RP27			Sample RP28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
YDMABX	X	37.17	-9.29	-2.33	53.04	6.78	1.61
YZ3U8X		44.76	-1.70	-0.43	42.28	-3.98	-0.94
ZKF2VW		43.25	-3.21	-0.81	42.42	-3.84	-0.91
ZM8ZAU		46.33	-0.13	-0.03	47.50	1.24	0.29

Summary Statistics	Sample RP27	Sample RP28
Grand Means	46.46 Grams	46.26 Grams
Std Dev Btwn Labs	3.99 Grams	4.22 Grams
Statistics based on 39 of 44 reporting participants.		

Comments on Assigned Data Flags for Test #3113

- 2UZRVU (X) - Inconsistent in testing between samples.
- BGLMZJ (X) - Data for both samples are high. Possible Systematic Error. Inconsistent within the determinations of sample RP27.
- 97BBUQ (X) - Data for both samples are high. Possible Systematic Error.
- YDMABX (X) - Inconsistent in testing between samples. Inconsistent within the determinations of sample RP28.
- T2ATLK (X) - Inconsistent in testing between samples.

Analysis Notes:

YZ3U8X - Data appear to be off by a factor; data converted by CTS (x2). CTS will not correct the data going forward.



Paper & Paperboard Interlaboratory Testing Program

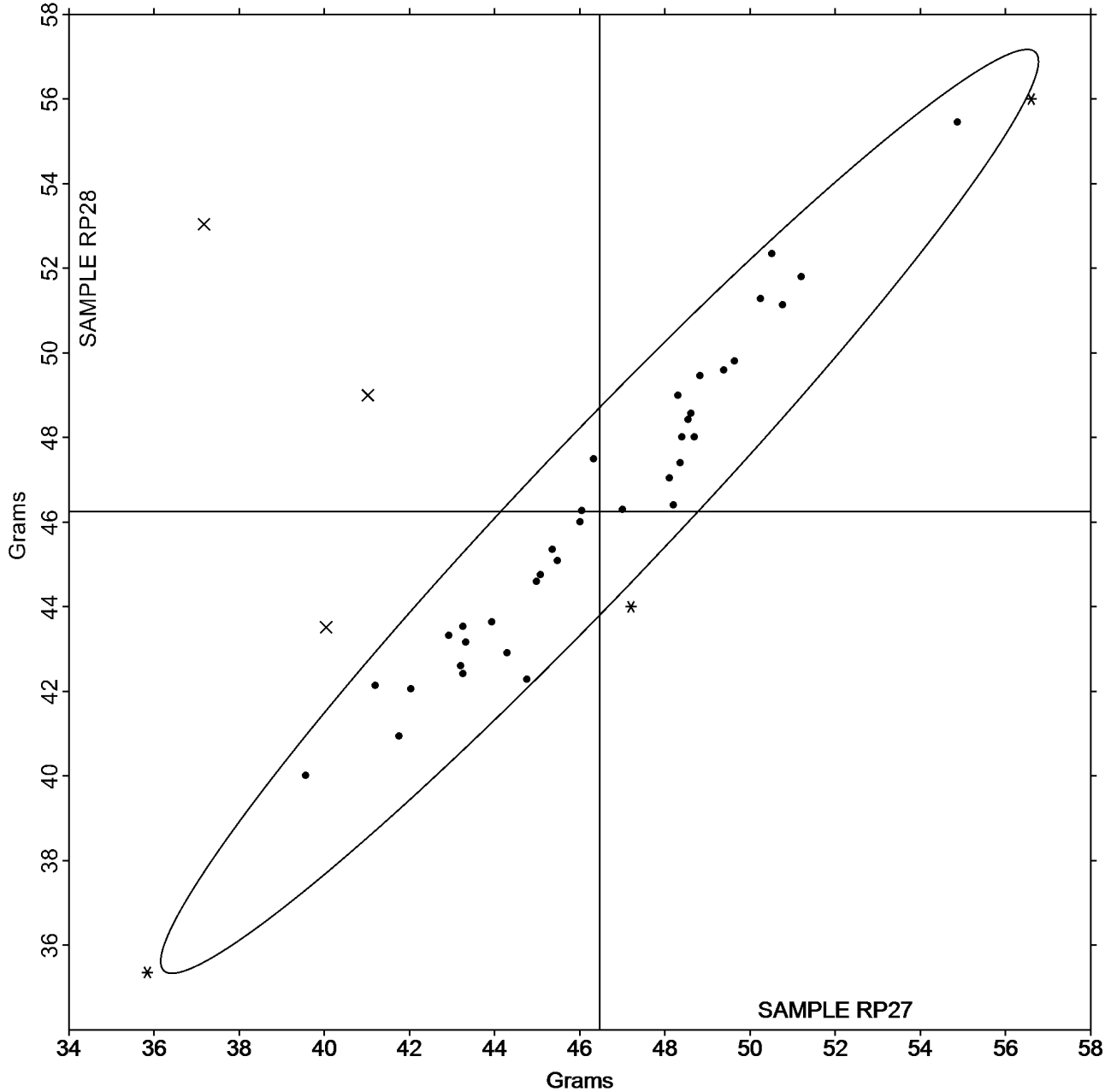
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Analysis 3113 Tearing Strength - Printing Papers TAPPI Official Test Method T414

Grand Mean Sample RP27 = 46.462
Grams

Grand Mean Sample RP28 = 46.257
Grams

ANALYSIS 3113





Paper & Paperboard Interlaboratory Testing Program

**Report #4291,
March 2024**

Analysis 3115

Tensile Breaking Strength - Printing Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NP27			Sample NP28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
24PTJD		4.954	0.619	1.82	4.867	0.486	1.48
2HB9LD	*	5.248	0.913	2.68	5.248	0.867	2.64
2U424T		4.661	0.326	0.96	4.650	0.269	0.82
2UZRVU		4.511	0.176	0.52	4.366	-0.015	-0.05
33TCQU		4.451	0.115	0.34	4.703	0.322	0.98
8MZY9A		4.263	-0.073	-0.21	4.044	-0.337	-1.03
8PQAFM		4.369	0.034	0.10	4.515	0.134	0.41
8PQWM9		3.828	-0.507	-1.49	3.992	-0.389	-1.19
8W6HGP		4.021	-0.314	-0.92	3.919	-0.462	-1.41
97BBUQ		4.528	0.193	0.57	4.521	0.140	0.43
BD7ECJ		4.025	-0.311	-0.91	4.012	-0.369	-1.13
BGLMZJ		4.016	-0.320	-0.94	4.086	-0.295	-0.90
BY7DYH		4.313	-0.022	-0.06	4.590	0.209	0.64
CF9M8G		4.112	-0.224	-0.66	4.269	-0.113	-0.34
CJ3G6H		4.031	-0.304	-0.89	4.172	-0.209	-0.64
CUQ7BJ		4.589	0.254	0.74	4.622	0.240	0.73
DW8LN3		4.180	-0.155	-0.46	4.340	-0.041	-0.13
F4Z2GK		4.146	-0.189	-0.56	4.213	-0.168	-0.51
FPJ9TE		4.084	-0.252	-0.74	4.130	-0.251	-0.77
G9D2EC		4.104	-0.232	-0.68	4.215	-0.167	-0.51
GK8KTH		3.904	-0.431	-1.27	4.038	-0.343	-1.04
H99F93		4.512	0.177	0.52	4.714	0.332	1.01
HMNB9C		3.872	-0.464	-1.36	4.023	-0.358	-1.09
HP9QRZ		4.330	-0.005	-0.02	4.390	0.009	0.03
HX8JFE		4.318	-0.018	-0.05	4.561	0.180	0.55
JMK4QG		4.421	0.086	0.25	4.583	0.202	0.62
K2K3DD		4.298	-0.037	-0.11	4.280	-0.101	-0.31
K6YDBW		4.392	0.057	0.17	4.435	0.054	0.16
KJJFLE		4.965	0.629	1.85	5.048	0.667	2.03
LRMYEA		4.283	-0.052	-0.15	4.398	0.017	0.05
LYQW98		4.146	-0.190	-0.56	4.172	-0.209	-0.64
MK6DXX		4.594	0.259	0.76	4.631	0.250	0.76
MR3HY7		4.069	-0.266	-0.78	4.189	-0.192	-0.58
NN4GHA		4.523	0.187	0.55	4.539	0.158	0.48
NX6CLU		4.632	0.297	0.87	4.511	0.130	0.40
NXXVW		4.230	-0.106	-0.31	4.206	-0.175	-0.53
QQYU97		4.227	-0.109	-0.32	4.373	-0.008	-0.02
RBMTX2		4.034	-0.301	-0.89	3.948	-0.433	-1.32
T2ATLK		4.215	-0.120	-0.35	4.198	-0.183	-0.56
TTGHBP		3.617	-0.718	-2.11	3.609	-0.772	-2.35



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

Report #4291,
March 2024

WebCode	Data Flag	<u>Sample NP27</u>			<u>Sample NP28</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
UKL772		4.746	0.411	1.21	4.694	0.313	0.95
UZEXR3		4.061	-0.275	-0.81	4.169	-0.212	-0.65
VDXE6K		4.954	0.619	1.82	4.937	0.556	1.69
YDMABX		4.671	0.336	0.99	4.651	0.270	0.82
YGML7X		4.956	0.621	1.82	4.965	0.584	1.78
YZ3U8X		4.609	0.273	0.80	4.395	0.014	0.04
Z4E4PU		4.108	-0.227	-0.67	4.070	-0.311	-0.95
ZKF2VW		3.917	-0.419	-1.23	4.065	-0.316	-0.96
ZM8ZAU		4.400	0.065	0.19	4.411	0.030	0.09

Summary Statistics	<u>Sample NP27</u>	<u>Sample NP28</u>
Grand Means	4.34 kN/m	4.38 kN/m
Std Dev Btwn Labs	0.34 kN/m	0.33 kN/m
Statistics based on 49 of 49 reporting participants.		

Analysis Notes:

- BGLMZJ - Data appear to be reported as lb/inch, not kN/m as indicated on data entry form. CTS will not correct the Units going forward.
- H99F93 - One determination removed from the Lab Mean of Sample NP27 per Grubb's Test at 1% risk (TAPPI 1205).



Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

Analysis 3115

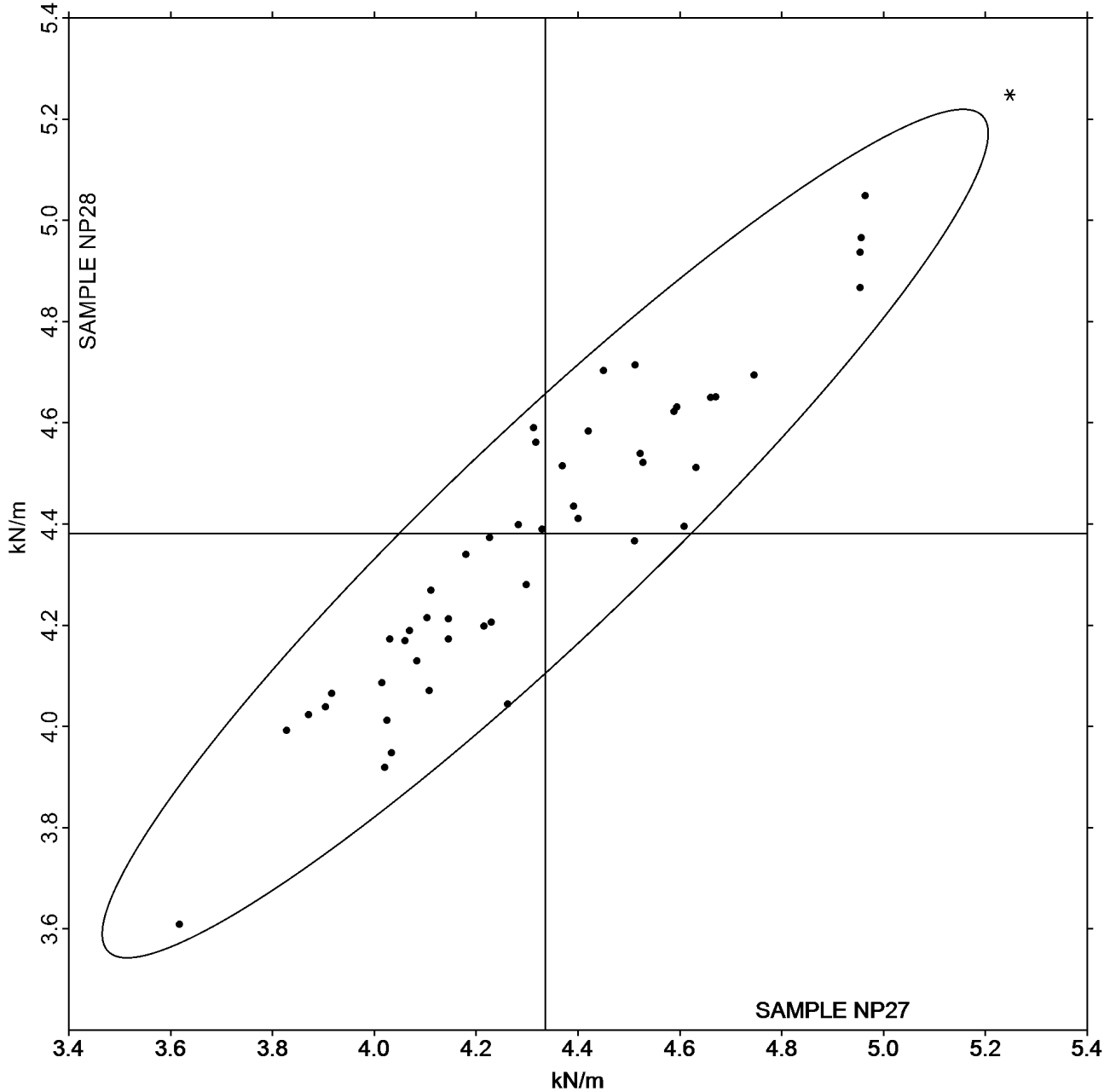
Tensile Breaking Strength - Printing Papers

TAPPI Official Test Method T494

Grand Mean Sample NP27 = 4.3355
kN/m

Grand Mean Sample NP28 = 4.3811
kN/m

ANALYSIS 3115





Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

Analysis 3116

Tensile Energy Absorption - Printing Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NP27			Sample NP28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2U424T		50.31	5.64	0.96	47.17	1.97	0.29
33TCQU	*	45.53	0.86	0.15	54.26	9.06	1.34
8MZY9A	*	47.58	2.90	0.49	40.13	-5.06	-0.75
8PQAFM		54.19	9.52	1.61	54.19	8.99	1.33
8PQWM9		39.96	-4.71	-0.80	44.46	-0.73	-0.11
8W6HGP		41.93	-2.74	-0.46	38.05	-7.14	-1.05
97BBUQ		30.41	-14.26	-2.42	30.11	-15.09	-2.23
BD7ECJ		48.86	4.19	0.71	47.42	2.23	0.33
BGLMZJ		30.22	-14.46	-2.45	29.60	-15.60	-2.30
CF9M8G		50.41	5.73	0.97	54.20	9.01	1.33
CJ3G6H		49.54	4.87	0.83	52.96	7.76	1.15
CUQ7BJ		39.01	-5.66	-0.96	38.24	-6.96	-1.03
DW8LN3		46.81	2.14	0.36	47.66	2.46	0.36
F4Z2GK		46.52	1.84	0.31	47.65	2.46	0.36
FPJ9TE		40.70	-3.98	-0.67	41.62	-3.58	-0.53
G9D2EC		47.28	2.61	0.44	51.31	6.12	0.90
H99F93		43.66	-1.02	-0.17	44.31	-0.89	-0.13
HP9QRZ		48.10	3.43	0.58	47.50	2.30	0.34
HX8JFE	*	58.87	14.19	2.41	63.69	18.49	2.73
JMK4QG		39.63	-5.05	-0.86	40.82	-4.38	-0.65
K2K3DD		42.42	-2.25	-0.38	42.76	-2.44	-0.36
K6YDBW		46.10	1.42	0.24	46.91	1.71	0.25
KJFLE		45.40	0.72	0.12	47.03	1.83	0.27
LRMYEA		49.04	4.36	0.74	51.29	6.10	0.90
LYQW98		40.76	-3.91	-0.66	41.62	-3.57	-0.53
MK6DXX		39.48	-5.19	-0.88	40.23	-4.97	-0.73
MR3HY7		44.74	0.06	0.01	45.56	0.37	0.05
NN4GHA		32.46	-12.22	-2.07	32.22	-12.97	-1.91
NX6CLU		45.21	0.54	0.09	46.63	1.43	0.21
QQYU97		44.65	-0.03	0.00	45.63	0.43	0.06
T2ATLK		48.74	4.07	0.69	48.89	3.69	0.55
TTGHBP	X	68.43	23.75	4.03	72.83	27.63	4.08
UZEXR3		40.30	-4.37	-0.74	42.21	-2.98	-0.44
VDXE6K		43.14	-1.53	-0.26	41.30	-3.89	-0.57
YDMABX		47.39	2.72	0.46	45.60	0.41	0.06
YGML7X		49.14	4.47	0.76	49.25	4.06	0.60
Z4E4PU		45.54	0.87	0.15	43.96	-1.24	-0.18
ZM8ZAU		48.91	4.24	0.72	45.79	0.59	0.09



Paper & Paperboard Interlaboratory Testing Program

**Report #4291,
March 2024**

Analysis 3116

Tensile Energy Absorption - Printing Papers

TAPPI Official Test Method T494

Summary Statistics	<u>Sample NP27</u>	<u>Sample NP28</u>
Grand Means	44.67 Joules/sq m	45.20 Joules/sq m
Stnd Dev Btwn Labs	5.90 Joules/sq m	6.78 Joules/sq m
Statistics based on 37 of 38 reporting participants.		

Comments on Assigned Data Flags for Test #3116

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

Analysis Notes:

33TCQU - Data appear to be reported as ft-lb/sq ft, not J/sq m as indicated on data entry form. CTS will not correct the Units going forward.



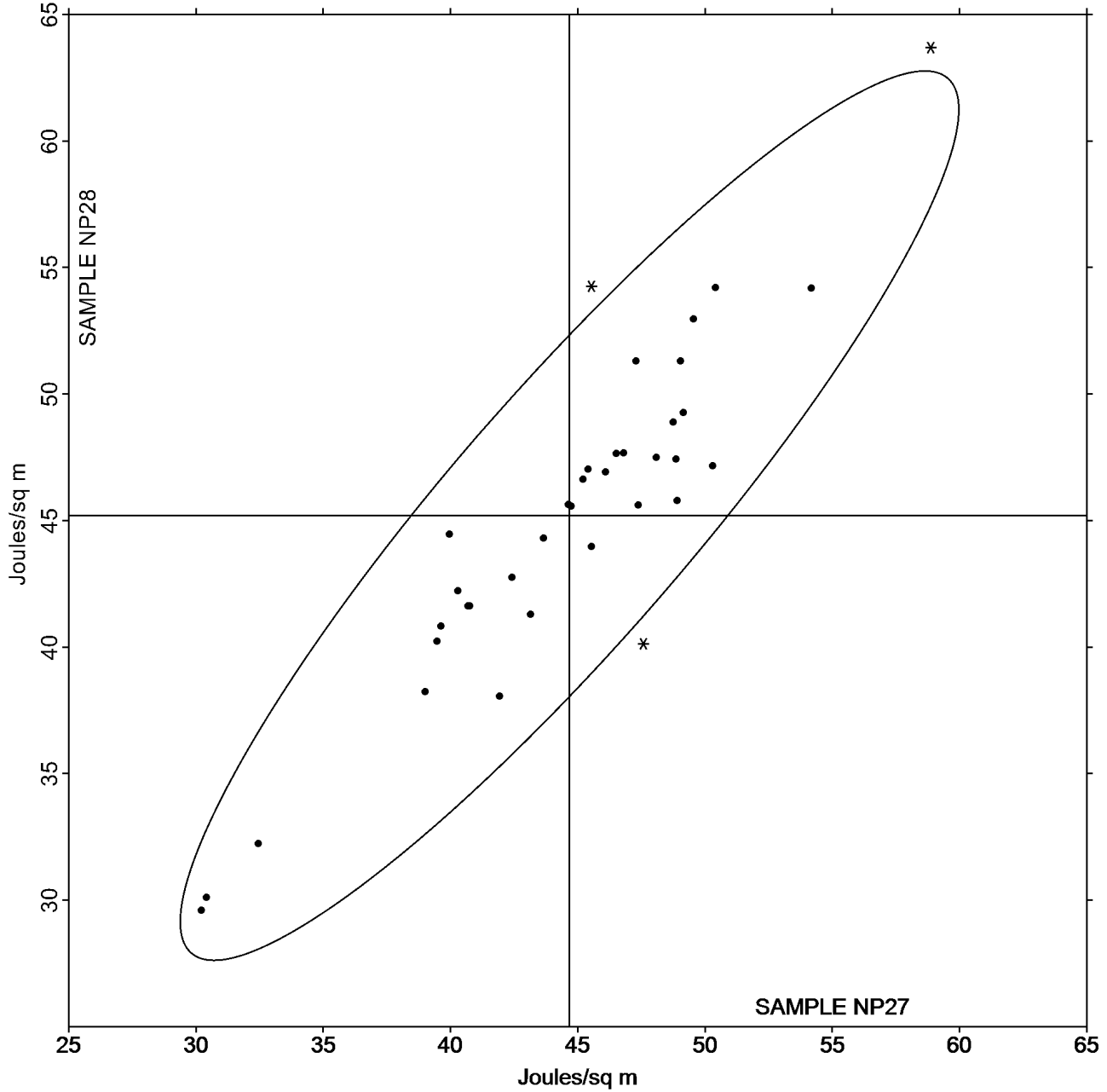
Paper & Paperboard Interlaboratory Testing Program
Analysis 3116
Tensile Energy Absorption - Printing Papers
TAPPI Official Test Method T494

Report #4291,
March 2024

Grand Mean Sample NP27 = 44.674
Joules/sq m

Grand Mean Sample NP28 = 45.196
Joules/sq m

ANALYSIS 3116





Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

Analysis 3117

Elongation to Break - Printing Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NP27			Sample NP28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2U424T		1.567	-0.070	-0.33	1.472	-0.173	-0.77
33TCQU		1.552	-0.085	-0.40	1.722	0.077	0.34
8MZY9A		1.941	0.304	1.44	1.904	0.259	1.15
8PQAFM		1.930	0.293	1.39	1.884	0.239	1.07
8PQWM9	*	1.750	0.113	0.54	1.981	0.336	1.50
8W6HGP		1.592	-0.045	-0.21	1.496	-0.149	-0.67
97BBUQ		1.345	-0.292	-1.38	1.337	-0.308	-1.38
BD7ECJ		1.851	0.215	1.02	1.807	0.162	0.72
BGLMZJ	X	2.706	1.069	5.07	2.709	1.064	4.75
BY7DYH		1.330	-0.307	-1.45	1.420	-0.225	-1.01
CF9M8G		1.926	0.289	1.37	2.016	0.371	1.65
CJ3G6H		2.042	0.405	1.92	2.085	0.440	1.96
CUQ7BJ		1.385	-0.252	-1.19	1.340	-0.305	-1.36
DW8LN3		1.710	0.073	0.35	1.730	0.085	0.38
F4Z2GK		1.723	0.086	0.41	1.739	0.094	0.42
FPJ9TE		1.586	-0.051	-0.24	1.601	-0.044	-0.20
G9D2EC		1.797	0.160	0.76	1.896	0.251	1.12
GK8KTH		1.509	-0.128	-0.60	1.518	-0.127	-0.57
H99F93		1.582	-0.055	-0.26	1.634	-0.011	-0.05
HMNB9C		1.369	-0.268	-1.27	1.483	-0.162	-0.72
HP9QRZ		1.540	-0.097	-0.46	1.530	-0.115	-0.51
HX8JFE	X	2.683	1.046	4.96	2.801	1.156	5.16
JMK4QG		1.431	-0.206	-0.97	1.419	-0.226	-1.01
K2K3DD		1.555	-0.082	-0.39	1.575	-0.070	-0.31
K6YDBW		1.663	0.026	0.13	1.701	0.056	0.25
KJJFLE		1.474	-0.163	-0.77	1.505	-0.140	-0.63
LRMYEA		1.842	0.205	0.97	1.862	0.217	0.97
LYQW98		1.521	-0.116	-0.55	1.545	-0.100	-0.45
MK6DXX		1.951	0.314	1.49	1.952	0.307	1.37
MR3HY7		1.687	0.050	0.24	1.627	-0.018	-0.08
NN4GHA		1.383	-0.254	-1.20	1.373	-0.272	-1.22
NX6CLU		1.564	-0.073	-0.34	1.602	-0.043	-0.19
QQYU97		1.657	0.020	0.09	1.643	-0.002	-0.01
T2ATLK	*	2.229	0.592	2.81	2.223	0.578	2.58
TTGHBP		1.403	-0.234	-1.11	1.308	-0.337	-1.51
UZEXR3		1.550	-0.087	-0.41	1.577	-0.068	-0.30
VDXE6K		1.390	-0.247	-1.17	1.342	-0.303	-1.35
YDMABX		1.584	-0.053	-0.25	1.552	-0.093	-0.42
YGML7X		1.500	-0.137	-0.65	1.506	-0.139	-0.62
Z4E4PU		1.702	0.065	0.31	1.655	0.010	0.04



Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

Analysis 3117

Elongation to Break - Printing Papers

TAPPI Official Test Method T494

WebCode	Data Flag	Sample NP27			Sample NP28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
ZM8ZAU		1.716	0.079	0.38	1.603	-0.042	-0.19

Summary Statistics	Sample NP27	Sample NP28
Grand Means	1.64 Percent	1.65 Percent
Std Dev Btwn Labs	0.21 Percent	0.22 Percent

Statistics based on 39 of 41 reporting participants.

Comments on Assigned Data Flags for Test #3117

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

HX8JFE (X) - Data for both samples are high. Possible Systematic Error.



Paper & Paperboard Interlaboratory Testing Program

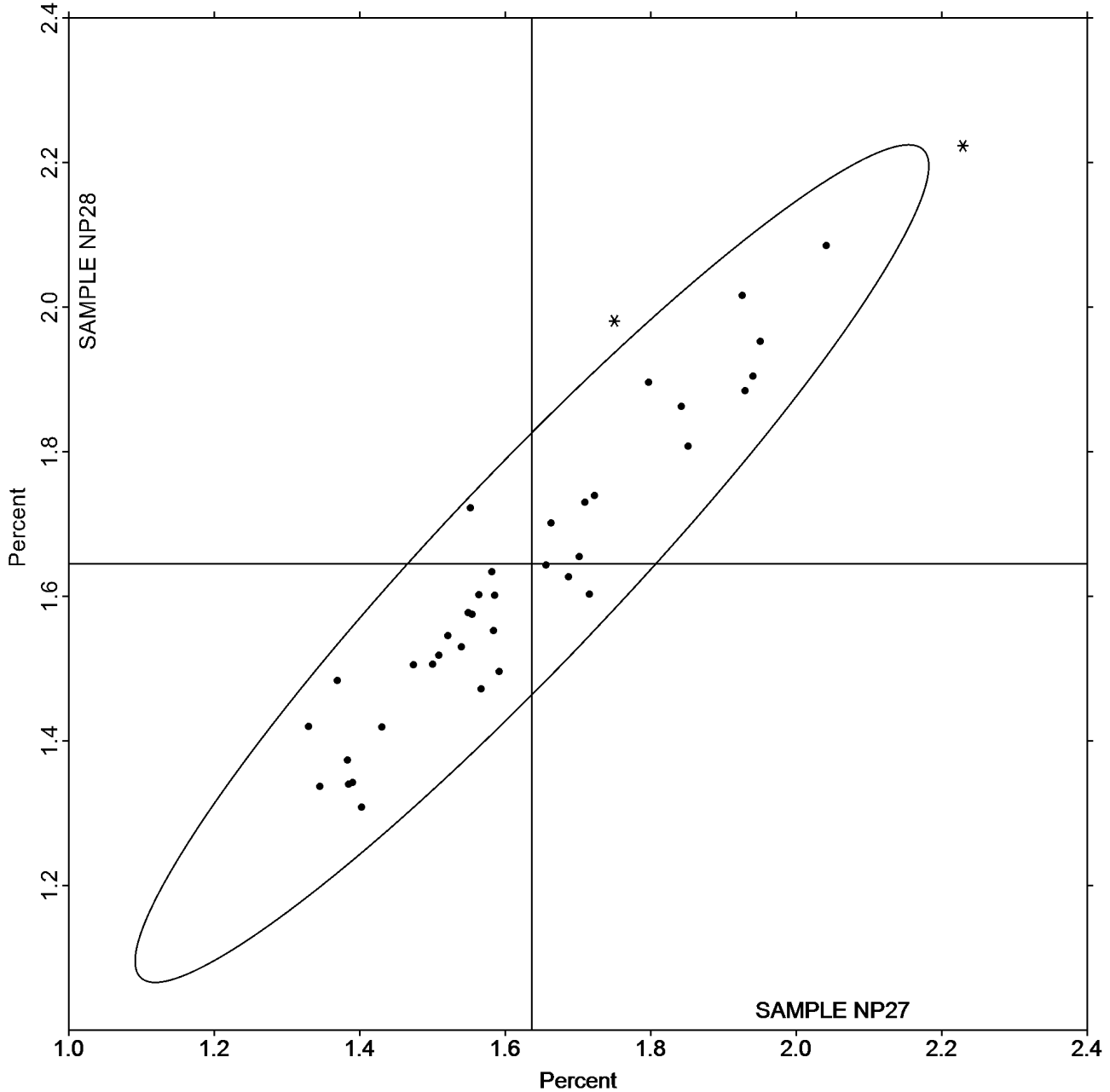
Report #4291,
March 2024

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

Grand Mean Sample NP27 = 1.6366
Percent

Grand Mean Sample NP28 = 1.6453
Percent

ANALYSIS 3117





Paper & Paperboard Interlaboratory Testing Program

**Report #4291,
March 2024**

Analysis 3121

Air Resistance - Gurley Oil Type

TAPPI Official Test Method T460

WebCode	Data Flag	Sample PP27			Sample PP28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2HBVUV		14.63	-1.02	-0.99	14.65	-1.25	-1.06
2U424T		15.65	0.00	0.00	16.05	0.15	0.13
2UZRVU		15.57	-0.09	-0.08	15.33	-0.57	-0.48
49DRUQ		15.35	-0.30	-0.29	15.16	-0.73	-0.62
4L3NWP		14.92	-0.73	-0.71	14.43	-1.47	-1.25
4W2FNN		16.11	0.46	0.44	15.94	0.04	0.04
7Y4XYP		14.19	-1.46	-1.42	14.56	-1.34	-1.14
8MZY9A		16.87	1.21	1.17	17.02	1.12	0.95
8W6HGP		15.03	-0.62	-0.60	15.30	-0.60	-0.51
BY7DYH		15.60	-0.05	-0.05	16.50	0.60	0.51
CD2RG7		15.66	0.01	0.01	15.14	-0.76	-0.64
CF9M8G	*	14.12	-1.54	-1.49	15.29	-0.60	-0.51
CJ3G6H		15.91	0.26	0.25	15.77	-0.13	-0.11
CY2TUA		14.40	-1.25	-1.21	15.60	-0.29	-0.25
DW8LN3		14.37	-1.28	-1.24	14.06	-1.84	-1.56
F4Z2GK		15.99	0.34	0.33	15.83	-0.07	-0.06
FPJ9TE		15.97	0.32	0.31	15.96	0.06	0.06
FRA88C		14.69	-0.96	-0.93	14.68	-1.22	-1.03
G9D2EC		16.02	0.37	0.36	16.58	0.68	0.58
GK8KTH		15.69	0.04	0.03	16.09	0.19	0.17
H99F93		15.66	0.00	0.00	16.85	0.95	0.81
HMNB9C		15.34	-0.31	-0.30	15.76	-0.14	-0.11
HX8JFE		13.53	-2.12	-2.06	13.54	-2.36	-2.00
KU2WG8		16.60	0.95	0.92	16.60	0.70	0.60
LRMYEA	*	18.84	3.18	3.08	19.61	3.72	3.16
M7MX27		15.67	0.02	0.02	16.89	0.99	0.85
MK6DXX		14.84	-0.82	-0.79	14.84	-1.05	-0.89
NN4GHA		17.52	1.87	1.81	17.52	1.62	1.38
NX6CLU		15.21	-0.45	-0.43	15.23	-0.66	-0.56
P28ZTA		15.50	-0.15	-0.15	16.30	0.40	0.34
P4QQPR		15.56	-0.09	-0.09	15.62	-0.28	-0.23
Q3D6J4		18.00	2.35	2.27	18.71	2.81	2.39
RKNQQQ		15.25	-0.40	-0.39	15.14	-0.76	-0.64
UDZDU2		16.31	0.66	0.63	16.40	0.50	0.43
UKL772		15.50	-0.15	-0.15	15.30	-0.60	-0.51
VDXE6K		15.20	-0.45	-0.44	15.30	-0.60	-0.51
VVYP43		16.51	0.86	0.83	16.46	0.56	0.48
W4MCJK		16.36	0.71	0.68	17.23	1.33	1.14
Z4E4PU		15.32	-0.33	-0.32	15.54	-0.36	-0.30
ZKF2VW		16.71	1.06	1.02	17.03	1.13	0.97



Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

Analysis 3121

Air Resistance - Gurley Oil Type

TAPPI Official Test Method T460

Summary Statistics	<u>Sample PP27</u>	<u>Sample PP28</u>
Grand Means	15.65 sec/100 cc	15.90 sec/100 cc
Stnd Dev Btwn Labs	1.03 sec/100 cc	1.18 sec/100 cc

Statistics based on 40 of 40 reporting participants.



Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

Analysis 3121

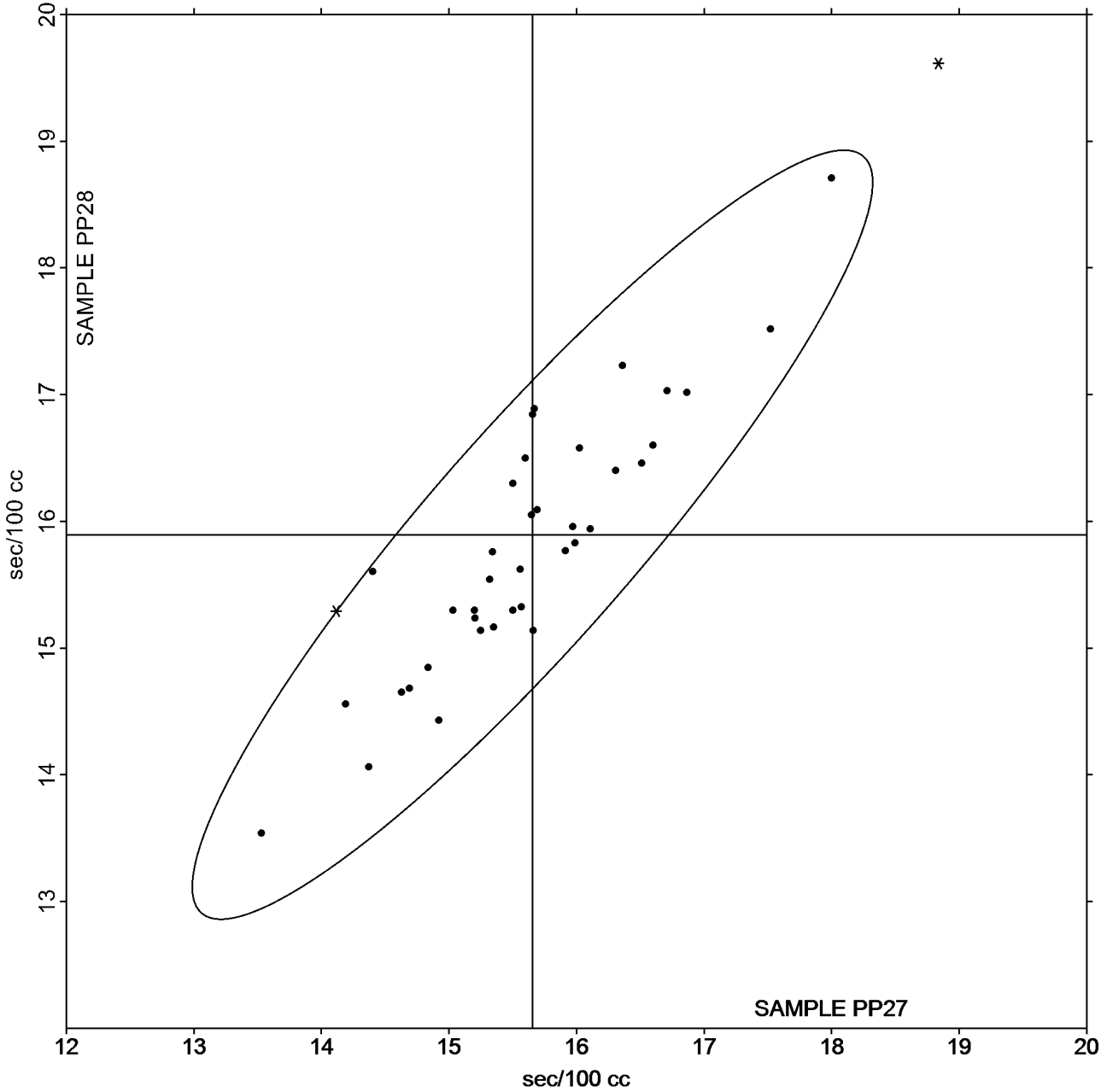
Air Resistance - Gurley Oil Type

TAPPI Official Test Method T460

Grand Mean Sample PP27 = 15.654
sec/100 cc

Grand Mean Sample PP28 = 15.895
sec/100 cc

ANALYSIS 3121





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

Report #4291,
March 2024

WebCode	Data Flag	Sample PP27			Sample PP28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2HB9LD		167.8	-2.3	-0.17	165.1	-0.5	-0.04
7Q68ZE	X	33.0	-137.1	-9.74	32.8	-132.9	-10.66
BGLMZJ		185.2	15.1	1.07	179.0	13.4	1.07
P28ZTA		151.9	-18.2	-1.29	149.1	-16.5	-1.33
Q3D6J4		175.6	5.5	0.39	169.3	3.7	0.29

Summary Statistics	Sample PP27	Sample PP28
Grand Means	170.13 Sheffield Units	165.63 Sheffield Units
Std Dev Btwn Labs	14.08 Sheffield Units	12.46 Sheffield Units
Statistics based on 4 of 5 reporting participants.		

Comments on Assigned Data Flags for Test #3123

7Q68ZE (X) - Extreme Data.

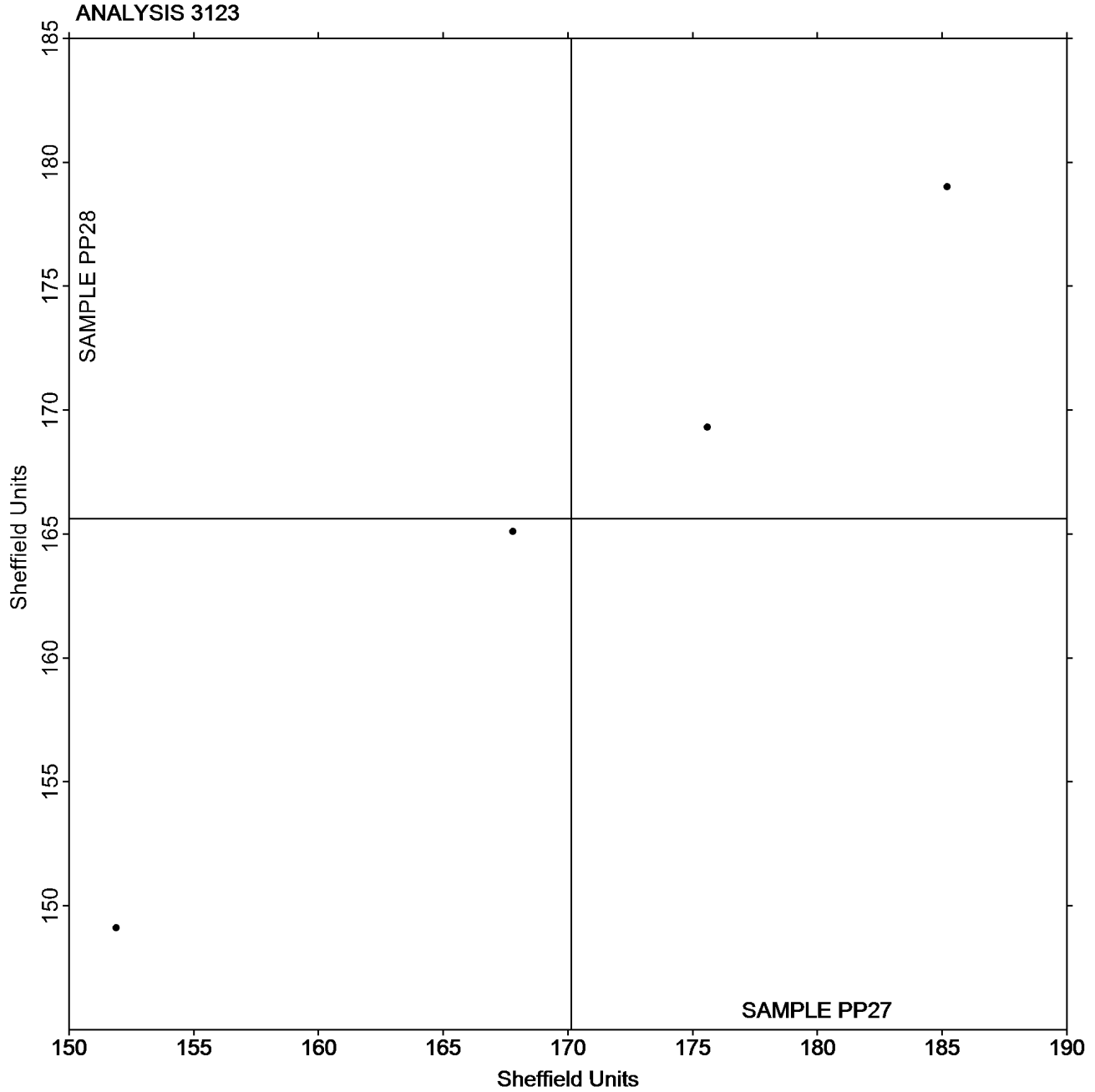


Paper & Paperboard Interlaboratory Testing Program
Analysis 3123
Porosity - Sheffield Type - Sheffield Units for 3/4 inch Diameter Orifice
TAPPI Official Test Method T547

Report #4291,
March 2024

Grand Mean Sample PP27 = 170.13
Sheffield Units

Grand Mean Sample PP28 = 165.63
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

**Report #4291,
March 2024**

Analysis 3131

Roughness - Print Surf Method - 2.5 to 6.0 Microns

TAPPI Official Test Method T555

WebCode	Data Flag	<u>Sample PH27</u>			<u>Sample PH28</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
49DRUQ		4.418	0.469	1.00	4.248	0.286	0.64
DQZJTF		4.119	0.170	0.36	4.050	0.088	0.20
F4Z2GK		3.984	0.035	0.08	4.010	0.048	0.11
FRA88C		3.990	0.041	0.09	4.184	0.222	0.50
G9D2EC		4.134	0.185	0.40	4.137	0.175	0.39
K2K3DD		3.780	-0.169	-0.36	3.823	-0.139	-0.31
LYQW98		4.112	0.163	0.35	4.256	0.294	0.66
MK6DXX	X	10.052	6.103	13.02	10.146	6.184	13.95
Q9ZRE9		4.142	0.193	0.41	4.069	0.107	0.24
W4MCJK		2.620	-1.329	-2.83	2.690	-1.272	-2.87
YGML7X		3.956	0.007	0.02	3.917	-0.045	-0.10
ZKF2VW		4.180	0.231	0.49	4.201	0.239	0.54

Summary Statistics	<u>Sample PH27</u>	<u>Sample PH28</u>
Grand Means	3.95 Microns	3.96 Microns
Stnd Dev Btwn Labs	0.47 Microns	0.44 Microns

Statistics based on 11 of 12 reporting participants.

Comments on Assigned Data Flags for Test #3131

MK6DXX (X) - Extreme Data.



Paper & Paperboard Interlaboratory Testing Program

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March 2024

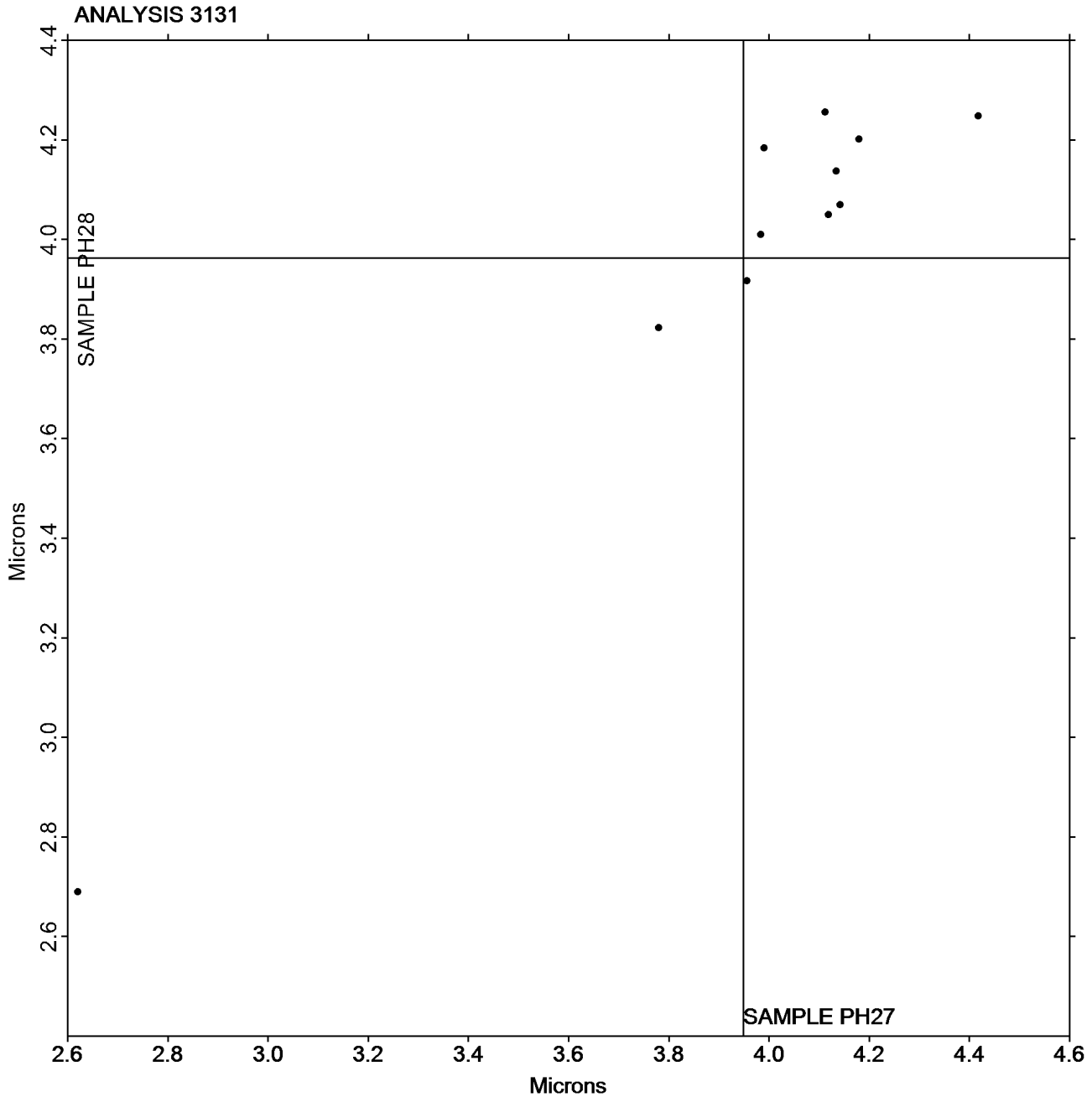
Analysis 3131

Roughness - Print Surf Method - 2.5 to 6.0 Microns

TAPPI Official Test Method T555

Grand Mean Sample PH27 = 3.9486
Microns

Grand Mean Sample PH28 = 3.9623
Microns



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

Report #4291,
March 2024

WebCode	Data Flag	Sample SR27			Sample SR28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
24PTJD		125.4	-5.8	-0.59	132.2	0.5	0.05
2UZRVU		137.7	6.5	0.66	129.4	-2.4	-0.25
3PN4VX		143.8	12.6	1.29	151.4	19.6	2.06
49DRUQ		143.4	12.2	1.25	133.4	1.6	0.17
4L3NWP		134.0	2.8	0.29	133.6	1.8	0.19
7PBQVQ		137.8	6.6	0.67	139.3	7.5	0.79
7Q68ZE		114.6	-16.6	-1.70	116.8	-15.0	-1.58
8BRJHP		119.9	-11.3	-1.16	122.2	-9.6	-1.01
8MZY9A		127.6	-3.6	-0.37	135.1	3.3	0.35
97BBUQ		126.6	-4.6	-0.47	122.7	-9.1	-0.96
BGLMZJ	X	129.2	-2.0	-0.21	91.9	-39.9	-4.20
BY7DYH		123.6	-7.6	-0.78	127.9	-3.9	-0.41
CD2RG7		140.2	9.0	0.92	139.7	7.9	0.84
CF9M8G		142.7	11.5	1.17	134.7	3.0	0.31
CJ3G6H		125.6	-5.6	-0.58	129.9	-1.8	-0.19
CY2TUA		132.1	0.9	0.09	127.8	-4.0	-0.42
D49BCF	X	85.5	-45.7	-4.68	86.8	-44.9	-4.73
E7RCNZ		118.1	-13.1	-1.34	123.9	-7.9	-0.83
F4Z2GK		144.0	12.8	1.31	147.5	15.7	1.66
FPJ9TE		128.9	-2.3	-0.23	127.2	-4.5	-0.48
FRA88C		145.0	13.7	1.41	148.1	16.3	1.72
G9D2EC		124.5	-6.7	-0.68	123.6	-8.1	-0.86
GK8KTH		137.6	6.4	0.65	134.3	2.5	0.27
H2BEZG	X	241.5	110.3	11.28	244.5	112.7	11.88
H99F93		120.1	-11.1	-1.14	119.8	-12.0	-1.26
HAJTXC		130.2	-1.0	-0.10	129.1	-2.7	-0.28
HMNB9C		133.9	2.7	0.27	124.4	-7.4	-0.78
K2K3DD	X	97.8	-33.4	-3.42	136.1	4.3	0.46
LRMYEA		124.7	-6.5	-0.67	136.3	4.6	0.48
LWHQM7		120.0	-11.2	-1.15	122.0	-9.8	-1.03
LYQW98		128.0	-3.2	-0.33	131.1	-0.7	-0.07
MK6DXX	X	12.8	-118.4	-12.12	13.0	-118.8	-12.51
NN4GHA		115.7	-15.5	-1.59	121.1	-10.6	-1.12
NX6CLU		119.2	-12.0	-1.23	126.4	-5.4	-0.56
P28ZTA		126.9	-4.3	-0.44	123.2	-8.6	-0.90
P4QQPR		126.4	-4.8	-0.49	121.4	-10.4	-1.09
PZQ42A		144.8	13.5	1.39	150.0	18.3	1.92
Q3D6J4		132.7	1.5	0.15	129.9	-1.9	-0.20
T2ATLK	X	126.1	-5.1	-0.52	89.1	-42.7	-4.49
UDZDU2		125.4	-5.8	-0.59	128.3	-3.5	-0.36



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

Report #4291,
March 2024

WebCode	Data Flag	Sample SR27			Sample SR28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
UKL772		124.8	-6.4	-0.66	130.0	-1.8	-0.19
VPR9L2		135.7	4.5	0.46	139.1	7.3	0.77
WB77PV		143.6	12.4	1.27	138.6	6.8	0.72
XDQJHX		143.9	12.6	1.29	136.1	4.4	0.46
XFFFZJ		140.4	9.2	0.94	138.2	6.4	0.68
YGML7X		123.7	-7.5	-0.77	123.5	-8.3	-0.87
YZ3U8X	X	102.6	-28.6	-2.93	130.2	-1.6	-0.17
Z4E4PU	*	155.3	24.1	2.46	159.8	28.0	2.95
ZKF2VW		122.6	-8.6	-0.88	124.9	-6.9	-0.72

Summary Statistics	Sample SR27	Sample SR28
Grand Means	131.21 Sheffield	131.76 Sheffield
Std Dev Btwn Labs	9.77 Sheffield	9.49 Sheffield

Statistics based on 42 of 49 reporting participants.

Comments on Assigned Data Flags for Test #3133

- BGLMZJ (X) - Data for sample SR28 are low.
- K2K3DD (X) - Data for sample SR27 are low.
- YZ3U8X (X) - Data for sample SR27 are low.
- H2BEZG (X) - Extreme Data.
- D49BCF (X) - Data for both samples are low. Possible Systematic Error.
- T2ATLK (X) - Data for sample SR28 are low.
- MK6DXX (X) - Extreme Data.



Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

Analysis 3133

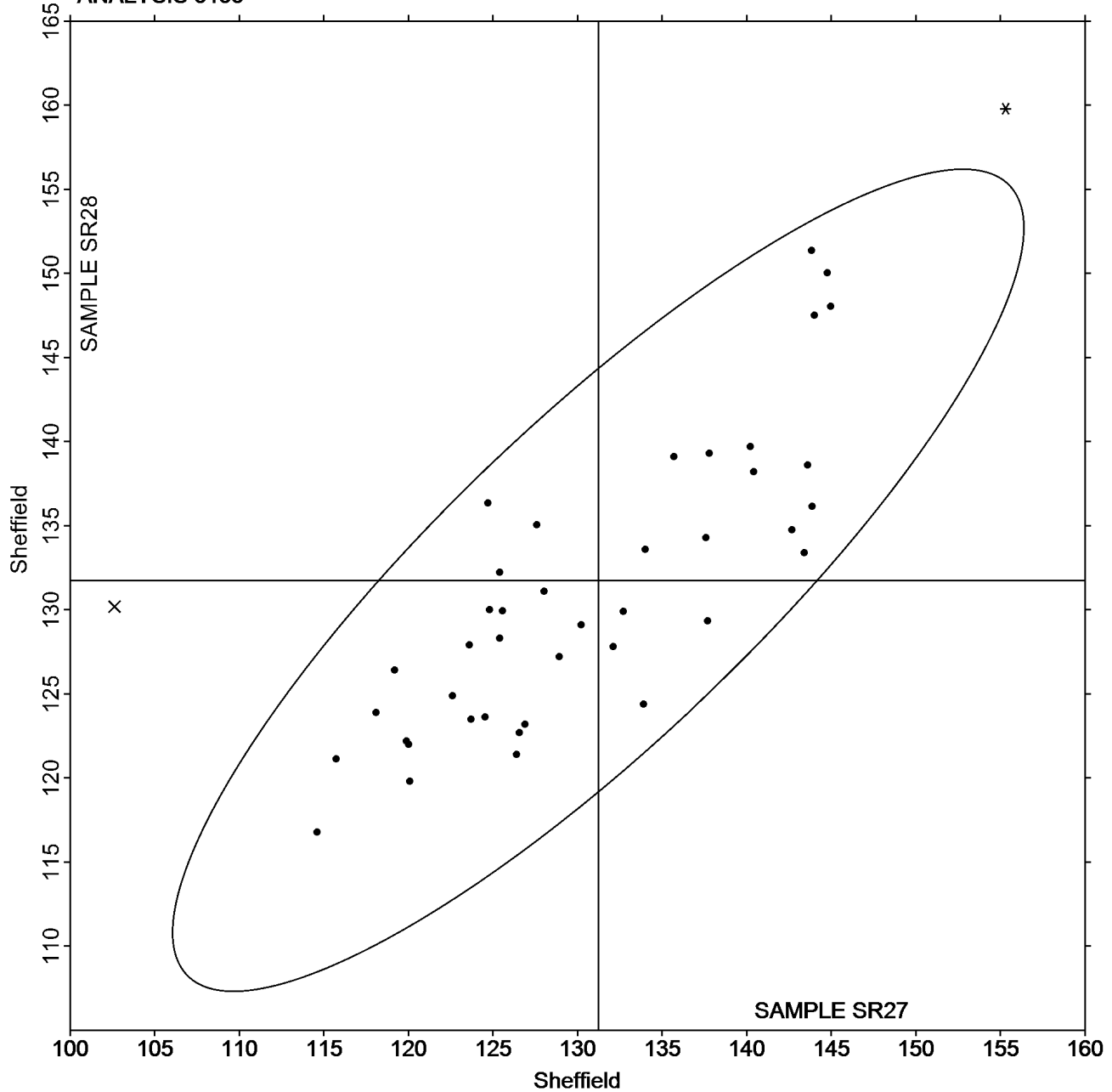
Roughness - Sheffield Type

TAPPI Official Test Method T538

Grand Mean Sample SR27 = 131.21
Sheffield

Grand Mean Sample SR28 = 131.76
Sheffield

ANALYSIS 3133





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

Report #4291,
March 2024

WebCode	Data Flag	Sample GM27			Sample GM28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
24PTJD		74.42	-0.84	-1.40	74.88	-0.53	-1.01
3GUBUD		75.04	-0.22	-0.37	75.35	-0.06	-0.11
7Q68ZE		76.76	1.50	2.50	76.51	1.10	2.10
8PQWM9	*	76.26	1.00	1.67	76.93	1.53	2.91
8X6AVK		75.54	0.28	0.47	75.58	0.17	0.33
9L2MXK		74.35	-0.91	-1.52	74.63	-0.77	-1.48
BD7ECJ		75.33	0.08	0.13	75.05	-0.36	-0.69
BGLMZJ		74.75	-0.51	-0.85	74.84	-0.57	-1.09
DW8LN3		75.25	-0.01	-0.02	75.25	-0.16	-0.30
FPJ9TE	X	4.85	-70.41	-117.67	4.85	-70.56	-134.85
GK8KTH		75.50	0.24	0.40	75.70	0.29	0.56
HMNB9C		74.96	-0.30	-0.50	75.18	-0.23	-0.44
MR3HY7		75.36	0.10	0.17	75.43	0.02	0.04
NXKXVW		75.29	0.03	0.05	75.33	-0.08	-0.16
PM7ZQR		75.21	-0.05	-0.08	75.56	0.15	0.28
Q3D6J4		75.45	0.19	0.32	75.34	-0.07	-0.13
Q9ZRE9		75.17	-0.09	-0.14	75.37	-0.04	-0.07
QQYU97		75.77	0.51	0.85	75.47	0.06	0.12
TTGHBP		75.33	0.07	0.11	75.07	-0.34	-0.64
UKL772		74.10	-1.16	-1.93	74.83	-0.58	-1.10
XQQH7U		74.73	-0.53	-0.89	75.50	0.09	0.18
XUW2D3		75.33	0.07	0.12	75.31	-0.10	-0.19
YBZ8CJ		75.04	-0.22	-0.37	75.21	-0.20	-0.38
Z4E4PU		76.02	0.76	1.27	76.06	0.65	1.25

Summary Statistics	Sample GM27	Sample GM28
Grand Means	75.26 g/sq m	75.41 g/sq m
Std Dev Btwn Labs	0.60 g/sq m	0.52 g/sq m

Statistics based on 23 of 24 reporting participants.

Comments on Assigned Data Flags for Test #3135

FPJ9TE (X) - Extreme Data.



Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

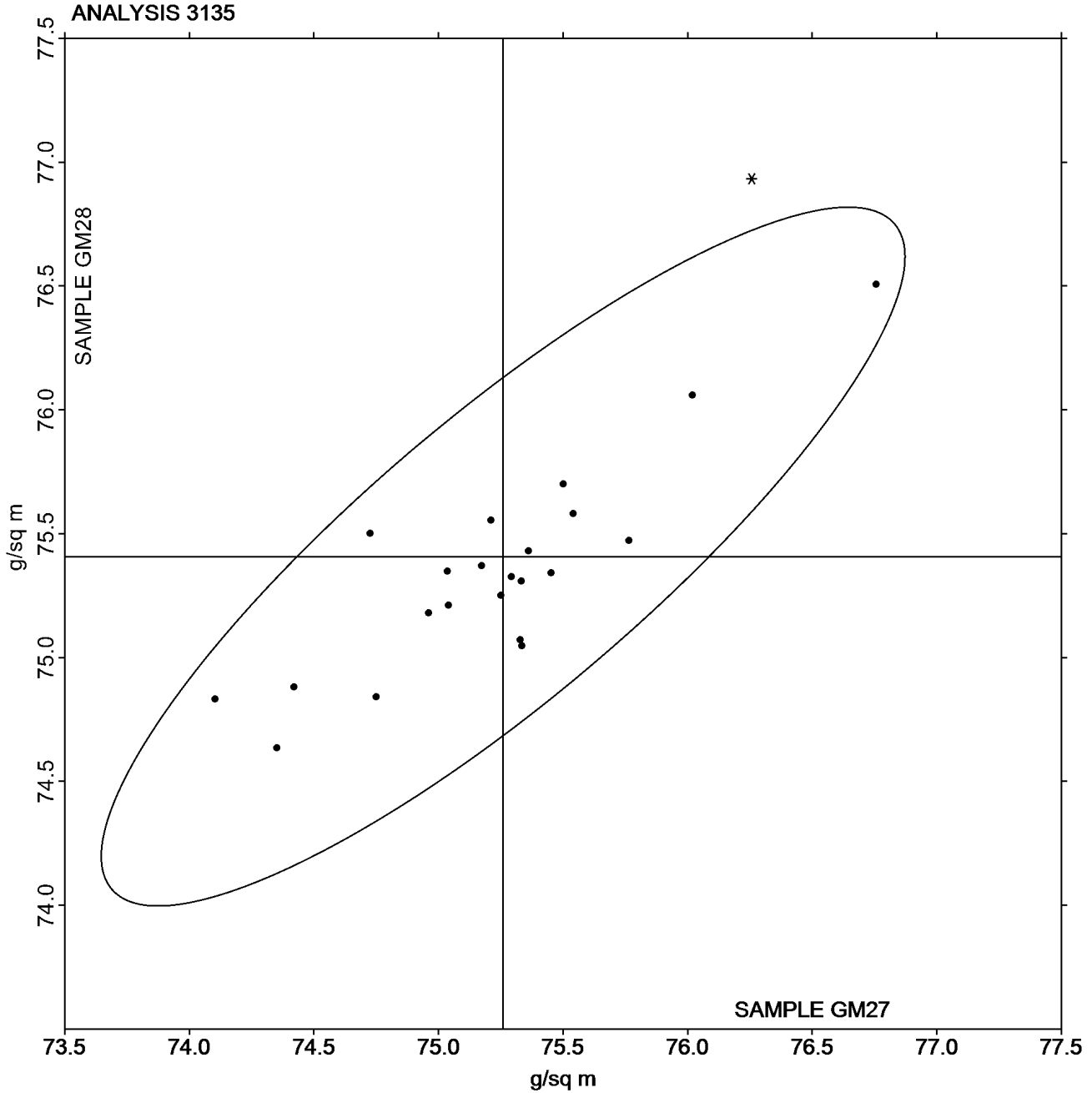
Analysis 3135

Grammage (Mass per Unit Area)

TAPPI Official Test Method T410

Grand Mean Sample GM27 = 75.259
g/sq m

Grand Mean Sample GM28 = 75.408
g/sq m





Paper & Paperboard Interlaboratory Testing Program

**Report #4291,
March 2024**

Analysis 3141

Opacity (89% Reflectance Backing) - Fine Papers

TAPPI Official Test Method T425

WebCode	Data Flag	Sample VR27			Sample VR28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
24PTJD		88.80	-0.54	-1.07	89.02	-0.39	-0.58
2HB9LD		90.15	0.81	1.62	90.65	1.24	1.85
2UZRVU		89.55	0.21	0.43	88.85	-0.55	-0.83
33TCQU		89.28	-0.06	-0.12	89.09	-0.32	-0.48
7Q68ZE		89.15	-0.18	-0.37	89.02	-0.38	-0.57
8MZY9A		88.87	-0.47	-0.93	88.85	-0.56	-0.83
BGLMZJ		89.56	0.22	0.44	89.59	0.18	0.27
CJ3G6H		88.91	-0.43	-0.86	89.04	-0.37	-0.56
CUQ7BJ		89.69	0.35	0.71	89.88	0.47	0.70
CY2TUA		88.68	-0.66	-1.31	88.77	-0.64	-0.95
FPJ9TE		89.55	0.21	0.42	89.11	-0.30	-0.44
G9D2EC		89.21	-0.13	-0.26	89.45	0.04	0.05
GK8KTH		88.56	-0.78	-1.55	88.38	-1.03	-1.53
H99F93		89.86	0.52	1.03	89.54	0.13	0.19
HMNB9C		89.13	-0.21	-0.41	89.06	-0.35	-0.52
LWHQM7		89.80	0.46	0.92	90.13	0.72	1.07
LYQW98		88.72	-0.62	-1.23	88.54	-0.87	-1.29
MK6DXX		89.04	-0.30	-0.60	89.25	-0.16	-0.24
P28ZTA		89.09	-0.25	-0.49	89.51	0.10	0.15
Q3D6J4		89.15	-0.19	-0.37	89.47	0.06	0.09
UKL772	*	90.14	0.80	1.60	91.07	1.66	2.47
WB77PV		90.37	1.03	2.06	90.48	1.07	1.59
XUW2D3		89.52	0.18	0.36	89.66	0.25	0.38

Summary Statistics	Sample VR27	Sample VR28
Grand Means	89.34 Percent	89.41 Percent
Std Dev Btwn Labs	0.50 Percent	0.67 Percent
Statistics based on 23 of 23 reporting participants.		

Analysis Notes:

GK8KTH - One determination removed from the Lab Mean of Sample VR28 per Grubb's Test at 1% risk (TAPPI 1205).



Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

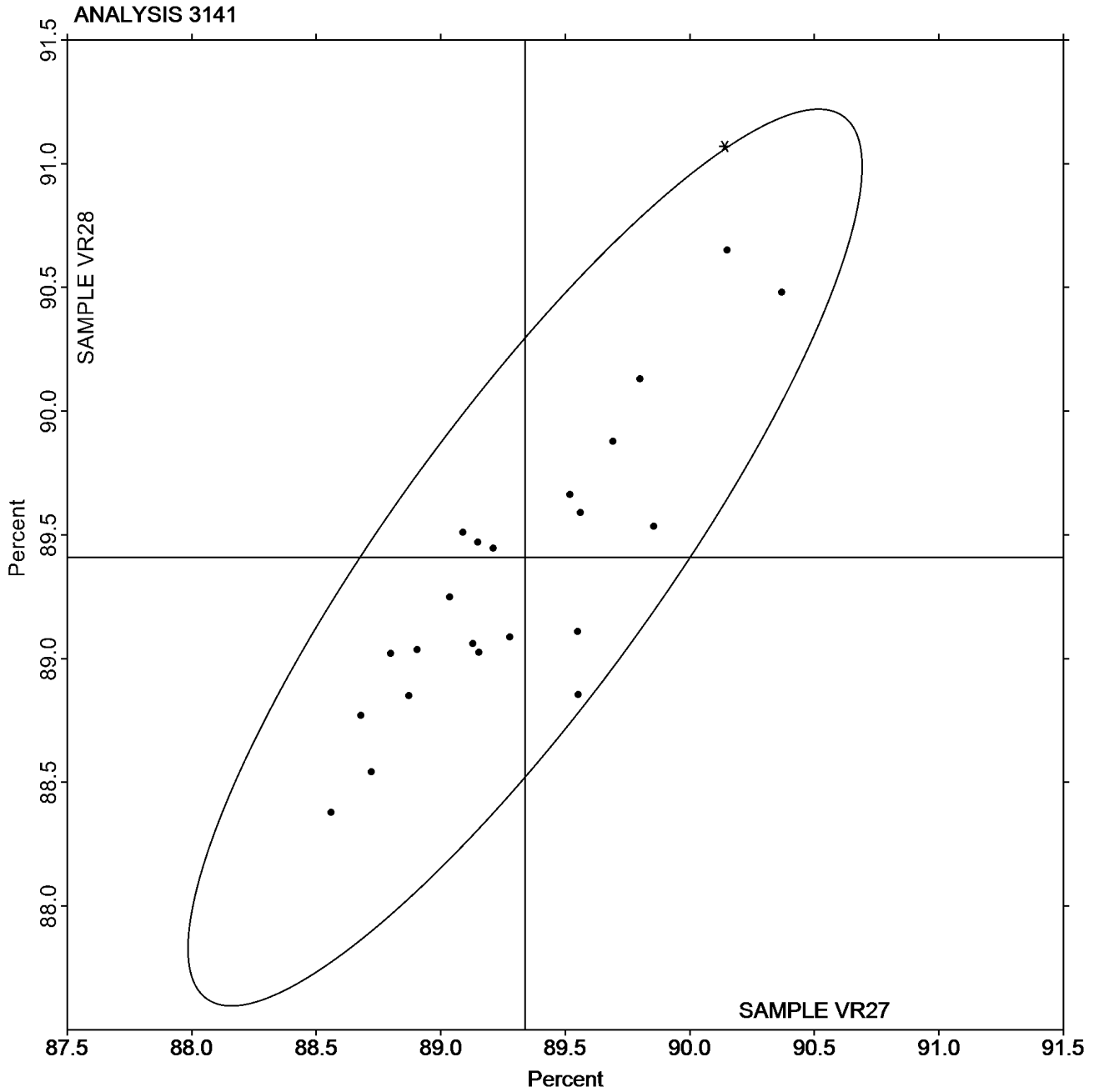
Analysis 3141

Opacity (89% Reflectance Backing) - Fine Papers

TAPPI Official Test Method T425

Grand Mean Sample VR27 = 89.338
Percent

Grand Mean Sample VR28 = 89.409
Percent





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

Report #4291,
March 2024

WebCode	Data Flag	<u>Sample VP27</u>			<u>Sample VP28</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
8W6HGP		93.41	-0.27	-0.52	94.09	-0.24	-0.73
DW8LN3		93.48	-0.20	-0.39	94.20	-0.12	-0.38
HX8JFE		94.59	0.91	1.78	94.89	0.57	1.74
MR3HY7		93.42	-0.26	-0.50	94.16	-0.17	-0.52
Z4E4PU		93.49	-0.19	-0.37	94.29	-0.04	-0.11

Summary Statistics	<u>Sample VP27</u>	<u>Sample VP28</u>
Grand Means	93.68 Percent	94.32 Percent
Std Dev Btwn Labs	0.51 Percent	0.32 Percent

Statistics based on 5 of 5 reporting participants.



Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

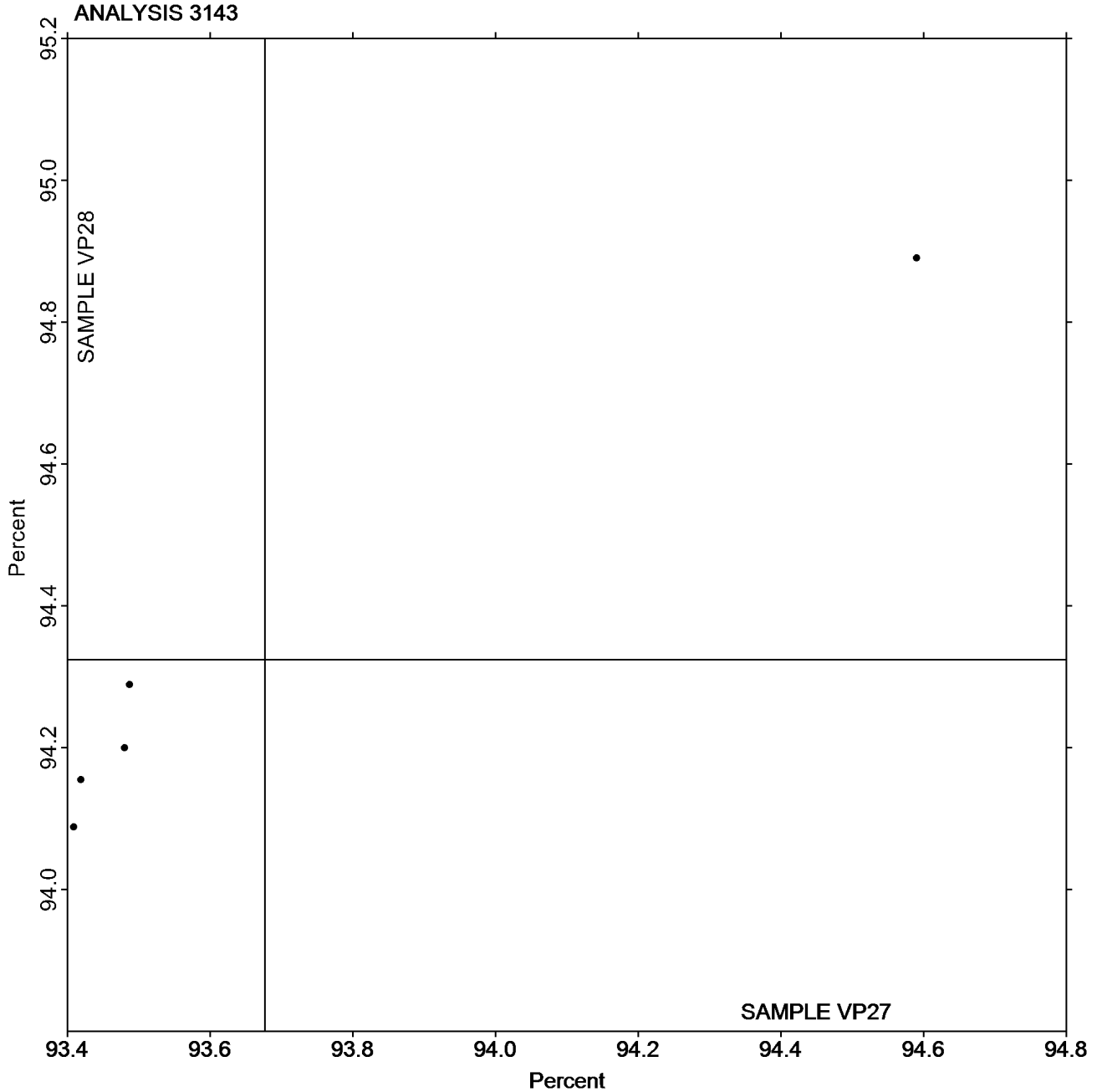
Analysis 3143

Opacity (Paper Backing) - Fine Papers and Newsprint

TAPPI Official Test Method T519

Grand Mean Sample VP27 = 93.677
Percent

Grand Mean Sample VP28 = 94.324
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

**Report #4291,
March 2024**

Analysis 3145

Directional Brightness of Fluorescent Samples

TAPPI Official Test Method T452

WebCode	Data Flag	<u>Sample BF27</u>			<u>Sample BF28</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2HB9LD		98.46	0.84	0.39	98.28	0.38	0.16
2UZRVU		98.18	0.56	0.26	99.70	1.80	0.76
33TCQU		98.04	0.42	0.20	98.95	1.05	0.44
4L3NWP		98.53	0.91	0.43	98.25	0.35	0.15
7Q68ZE		98.94	1.32	0.62	99.47	1.57	0.66
CUQ7BJ		98.05	0.43	0.20	97.80	-0.11	-0.04
FPJ9TE		102.06	4.44	2.08	103.02	5.11	2.16
G9D2EC		98.54	0.92	0.43	98.75	0.84	0.36
H99F93		94.88	-2.74	-1.29	94.80	-3.10	-1.31
MK6DXX		94.54	-3.08	-1.45	94.60	-3.30	-1.40
NN4GHA		99.31	1.69	0.79	99.10	1.19	0.51
UKL772		97.18	-0.44	-0.21	97.78	-0.12	-0.05
XUW2D3		94.35	-3.27	-1.53	94.48	-3.42	-1.45
YZ3U8X		95.64	-1.98	-0.93	95.67	-2.23	-0.94

Summary Statistics	<u>Sample BF27</u>	<u>Sample BF28</u>
Grand Means	97.62 Percent	97.90 Percent
Stnd Dev Btwn Labs	2.13 Percent	2.36 Percent
Statistics based on 14 of 14 reporting participants.		



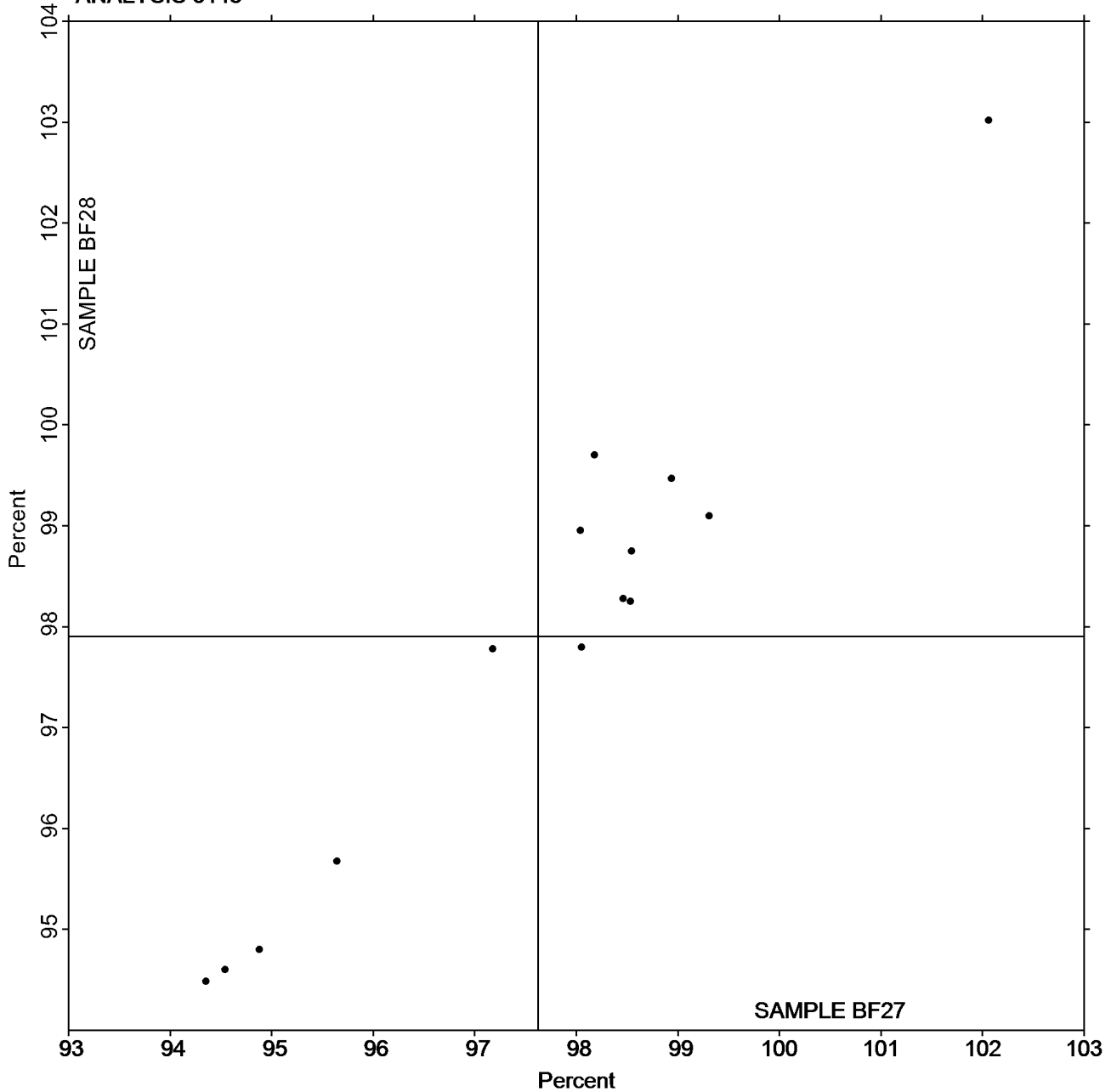
Paper & Paperboard Interlaboratory Testing Program
Analysis 3145
Directional Brightness of Fluorescent Samples
TAPPI Official Test Method T452

Report #4291,
March 2024

Grand Mean Sample BF27 = 97.623
Percent

Grand Mean Sample BF28 = 97.904
Percent

ANALYSIS 3145



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 #4291,
March 2024

WebCode	Data Flag	<u>Sample BF27</u>			<u>Sample BF28</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2UZRVU		7.904	-0.023	-0.02	7.730	-0.249	-0.23
33TCQU		7.896	-0.031	-0.03	8.114	0.135	0.13
4L3NWP		7.990	0.063	0.06	7.952	-0.027	-0.03
7Q68ZE		7.378	-0.549	-0.51	7.396	-0.583	-0.54
CUQ7BJ		7.656	-0.271	-0.25	7.618	-0.361	-0.34
FPJ9TE		10.816	2.889	2.67	10.882	2.903	2.69
G9D2EC		7.916	-0.011	-0.01	7.882	-0.097	-0.09
H99F93		7.120	-0.807	-0.75	7.020	-0.959	-0.89
MK6DXX		6.860	-1.067	-0.99	7.240	-0.739	-0.69
NN4GHA		7.732	-0.195	-0.18	7.958	-0.021	-0.02

Summary Statistics	<u>Sample BF27</u>	<u>Sample BF28</u>
Grand Means	7.93 Percent	7.98 Percent
Std Dev Btwn Labs	1.08 Percent	1.08 Percent

Statistics based on 10 of 10 reporting participants.

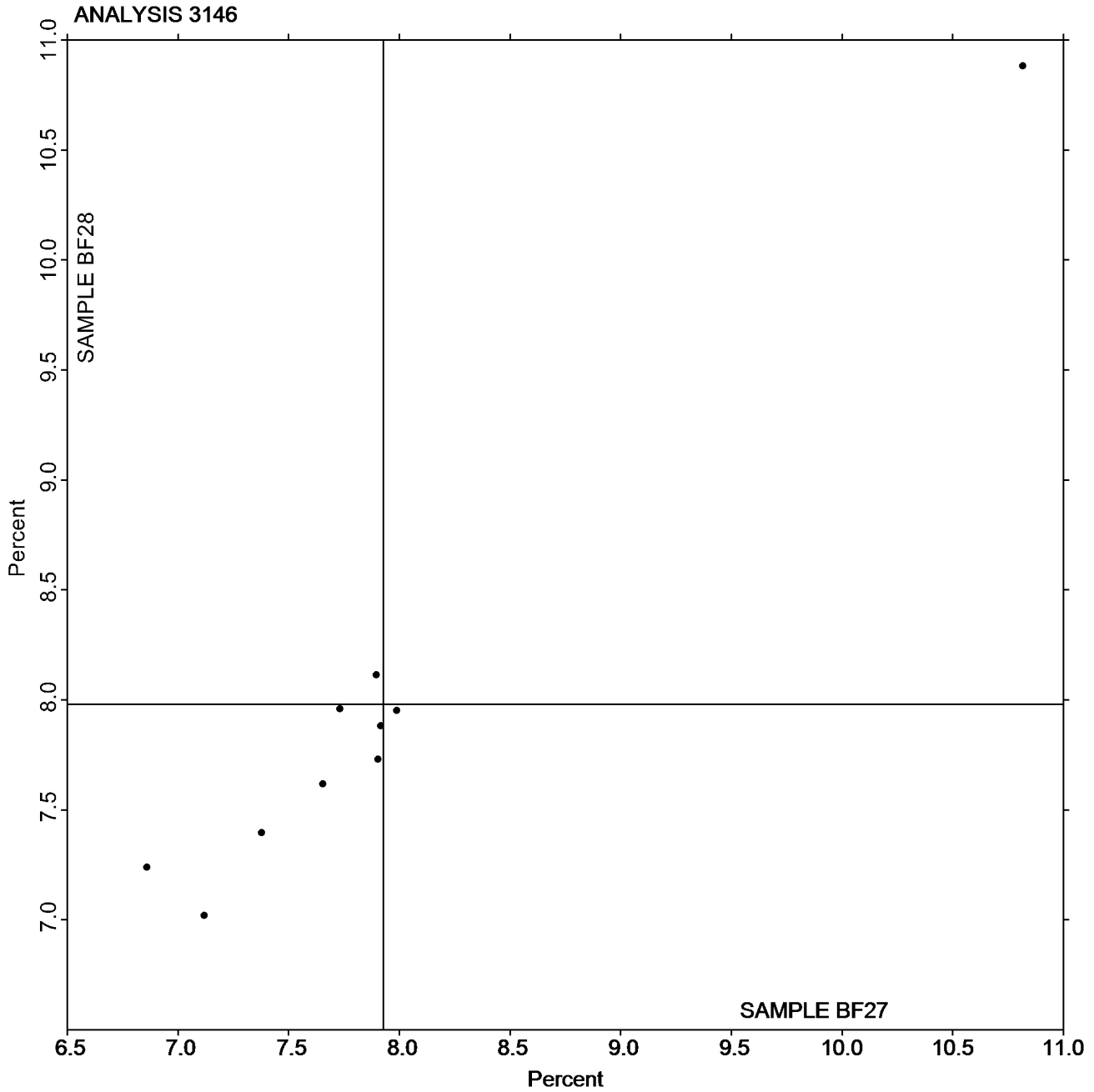


Paper & Paperboard Interlaboratory Testing Program
Analysis 3146
Fluorescent Component of Directional Brightness
TAPPI Official Test Method T452

Report #4291,
March 2024

Grand Mean Sample BF27 = 7.9268
Percent

Grand Mean Sample BF28 = 7.9792
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

**Report #4291,
March 2024**

Analysis 3201

Bending Resistance, Taber Type - 0 to 10 Units

TAPPI Official Test Method T566

WebCode	Data Flag	<u>Sample TP27</u>			<u>Sample TP28</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
24PTJD		2.339	0.138	0.89	2.362	0.151	0.66
2UZRVU		2.101	-0.100	-0.65	2.319	0.108	0.47
7Q68ZE	X	149.500	147.299	953.44	152.400	150.189	656.32
8MZY9A		2.142	-0.059	-0.38	2.101	-0.110	-0.48
BGLMZJ	X	9.850	7.649	49.51	9.250	7.039	30.76
G9D2EC		2.109	-0.092	-0.59	2.015	-0.196	-0.86
H99F93		2.178	-0.023	-0.15	2.248	0.037	0.16
MK6DXX		2.224	0.023	0.15	2.207	-0.004	-0.02
P28ZTA		2.530	0.329	2.13	2.670	0.459	2.00
UDZDU2		2.000	-0.201	-1.30	1.880	-0.331	-1.45
ZM8ZAU		2.185	-0.016	-0.10	2.100	-0.111	-0.49

Summary Statistics	<u>Sample TP27</u>	<u>Sample TP28</u>
Grand Means	2.20 Taber Units	2.21 Taber Units
Std Dev Btwn Labs	0.15 Taber Units	0.23 Taber Units

Statistics based on 9 of 11 reporting participants.

Comments on Assigned Data Flags for Test #3201

BGLMZJ (X) - Extreme Data.

7Q68ZE (X) - Extreme Data.

Analysis Notes:

8MZY9A - Data appear to be reported as g cm, not J/mN m as indicated on data entry form. CTS will not correct the Units going forward.



Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

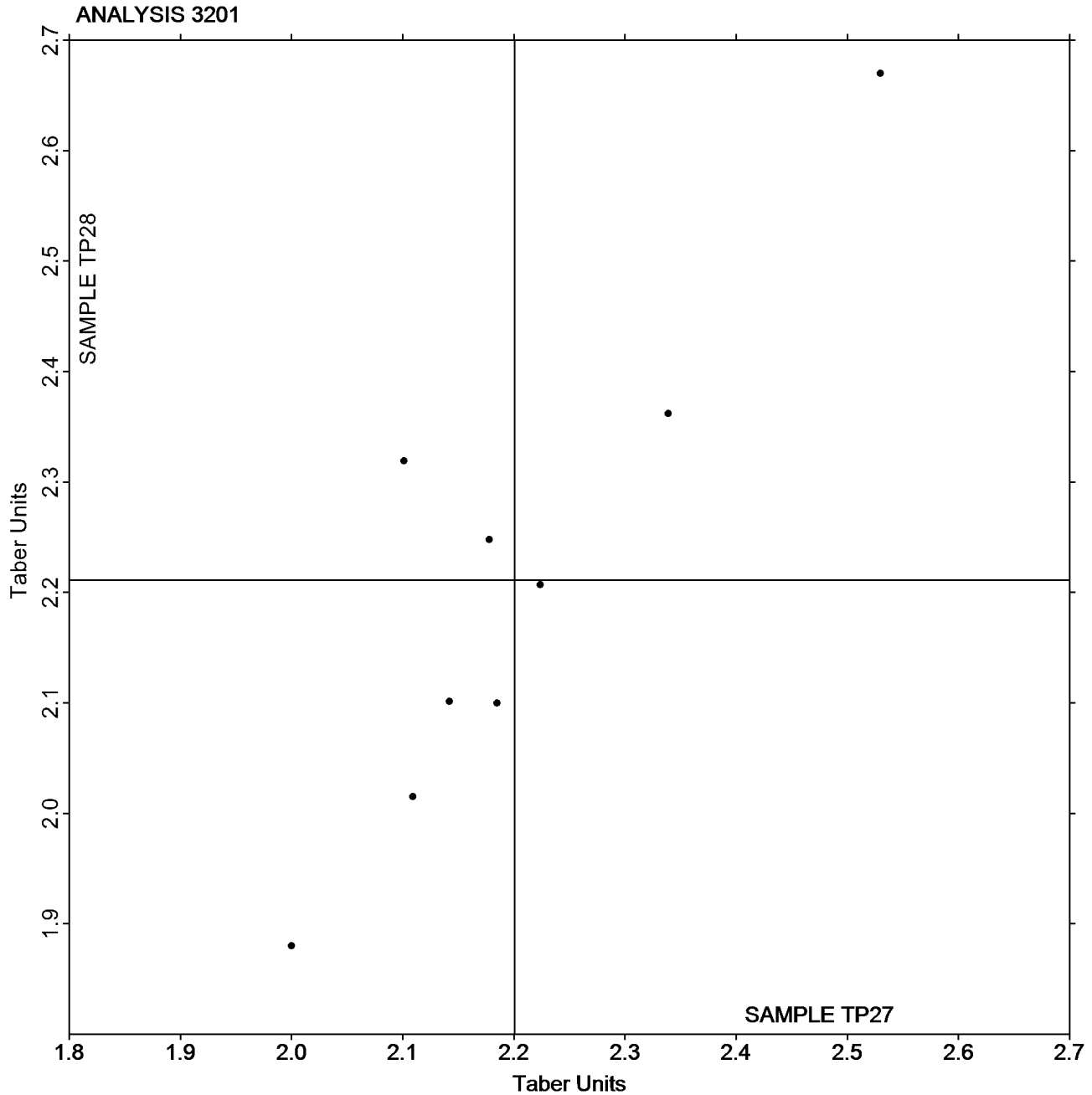
Analysis 3201

Bending Resistance, Taber Type - 0 to 10 Units

TAPPI Official Test Method T566

Grand Mean Sample TP27 = 2.2009
Taber Units

Grand Mean Sample TP28 = 2.2113
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 3203
Bending Resistance, Taber Type - 10 to 100 Taber Units
TAPPI Official Test Method T489

Report #4291,
March 2024

WebCode	Data Flag	<u>Sample TC27</u>			<u>Sample TC28</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3PN4VX		32.41	2.78	1.65	32.72	2.69	1.45
DQZJTF		28.53	-1.10	-0.65	28.37	-1.66	-0.89
F4Z2GK		30.52	0.89	0.53	30.75	0.72	0.39
FPJ9TE		27.59	-2.04	-1.21	28.18	-1.85	-0.99
FRA88C		30.25	0.62	0.37	32.15	2.12	1.14
G7223W		27.90	-1.73	-1.03	27.70	-2.33	-1.25
K2K3DD		29.19	-0.44	-0.26	29.94	-0.09	-0.05
MK6DXX		29.52	-0.11	-0.06	28.69	-1.34	-0.72
PZQ42A		32.63	3.00	1.78	32.90	2.87	1.54
YGML7X		28.52	-1.10	-0.66	29.66	-0.36	-0.19
ZKF2VW		28.83	-0.80	-0.48	29.21	-0.81	-0.44

Summary Statistics	<u>Sample TC27</u>	<u>Sample TC28</u>
Grand Means	29.63 Taber Units	30.03 Taber Units
Std Dev Btwn Labs	1.68 Taber Units	1.86 Taber Units
Statistics based on 11 of 11 reporting participants.		



Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

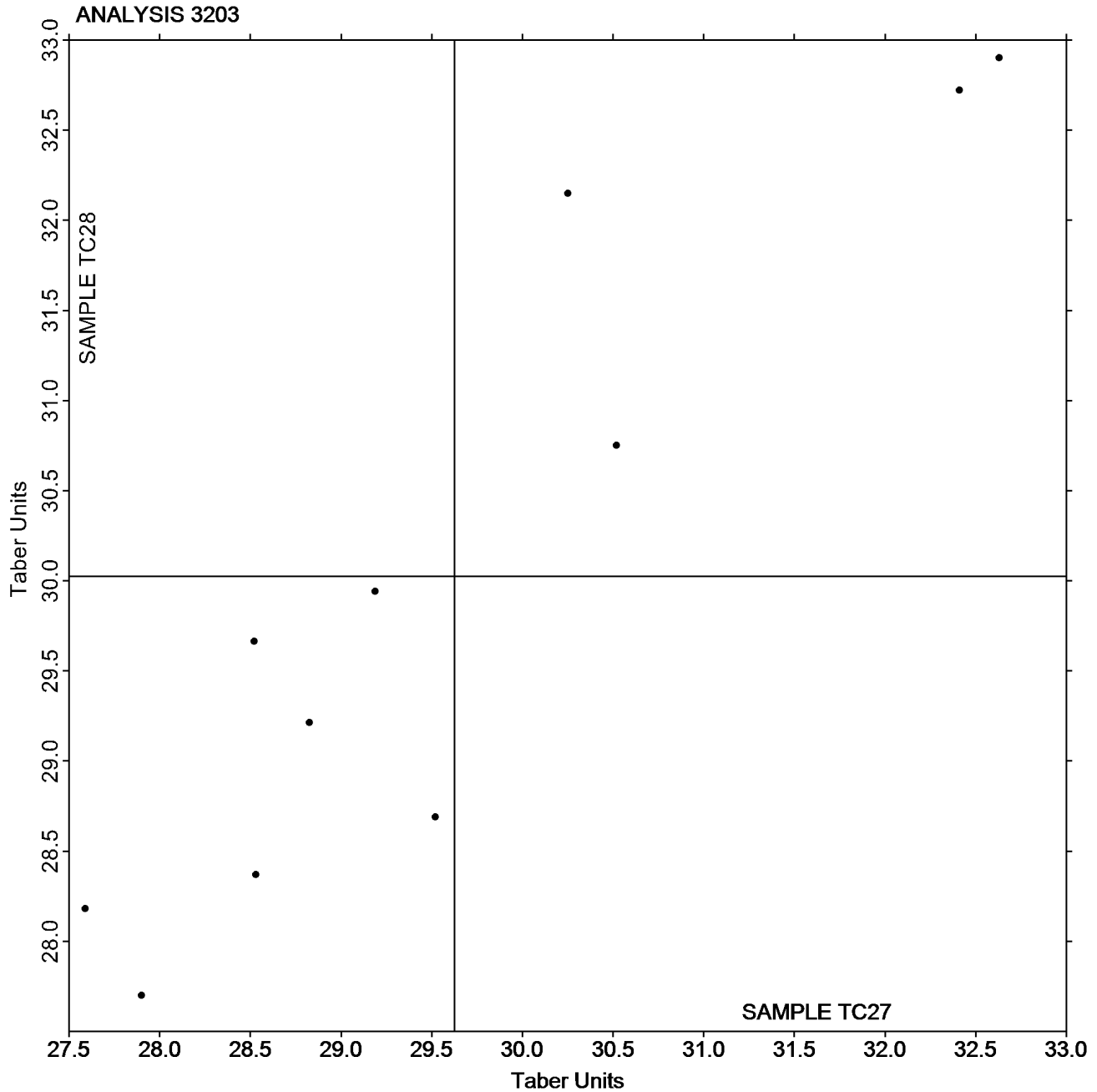
Analysis 3203

Bending Resistance, Taber Type - 10 to 100 Taber Units

TAPPI Official Test Method T489

Grand Mean Sample TC27 = 29.626
Taber Units

Grand Mean Sample TC28 = 30.025
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

**Report #4291,
March 2024**

Analysis 3205

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

TAPPI Official Test Method T489

WebCode	Data Flag	<u>Sample TR27</u>			<u>Sample TR28</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
49DRUQ		176.8	-1.4	-0.22	174.7	-3.7	-0.52
6WHWGW		177.2	-1.0	-0.16	176.0	-2.4	-0.34
8BRJHP		191.3	13.1	2.08	193.8	15.4	2.20
F4Z2GK		176.1	-2.1	-0.33	177.6	-0.8	-0.11
H2BEZG		186.0	7.8	1.24	185.5	7.1	1.02
K2K3DD		175.3	-2.8	-0.45	174.7	-3.7	-0.52
VPR9L2		181.4	3.2	0.51	172.0	-6.4	-0.91
WB77PV		174.4	-3.7	-0.59	177.2	-1.2	-0.17
XFFFZJ		172.1	-6.1	-0.96	170.3	-8.1	-1.15
YGML7X		171.2	-7.0	-1.11	182.0	3.6	0.52

Summary Statistics	<u>Sample TR27</u>	<u>Sample TR28</u>
Grand Means	178.18 Taber Units	178.38 Taber Units
Std Dev Btwn Labs	6.32 Taber Units	7.01 Taber Units
Statistics based on 10 of 10 reporting participants.		



Paper & Paperboard Interlaboratory Testing Program

Report #4291,
March 2024

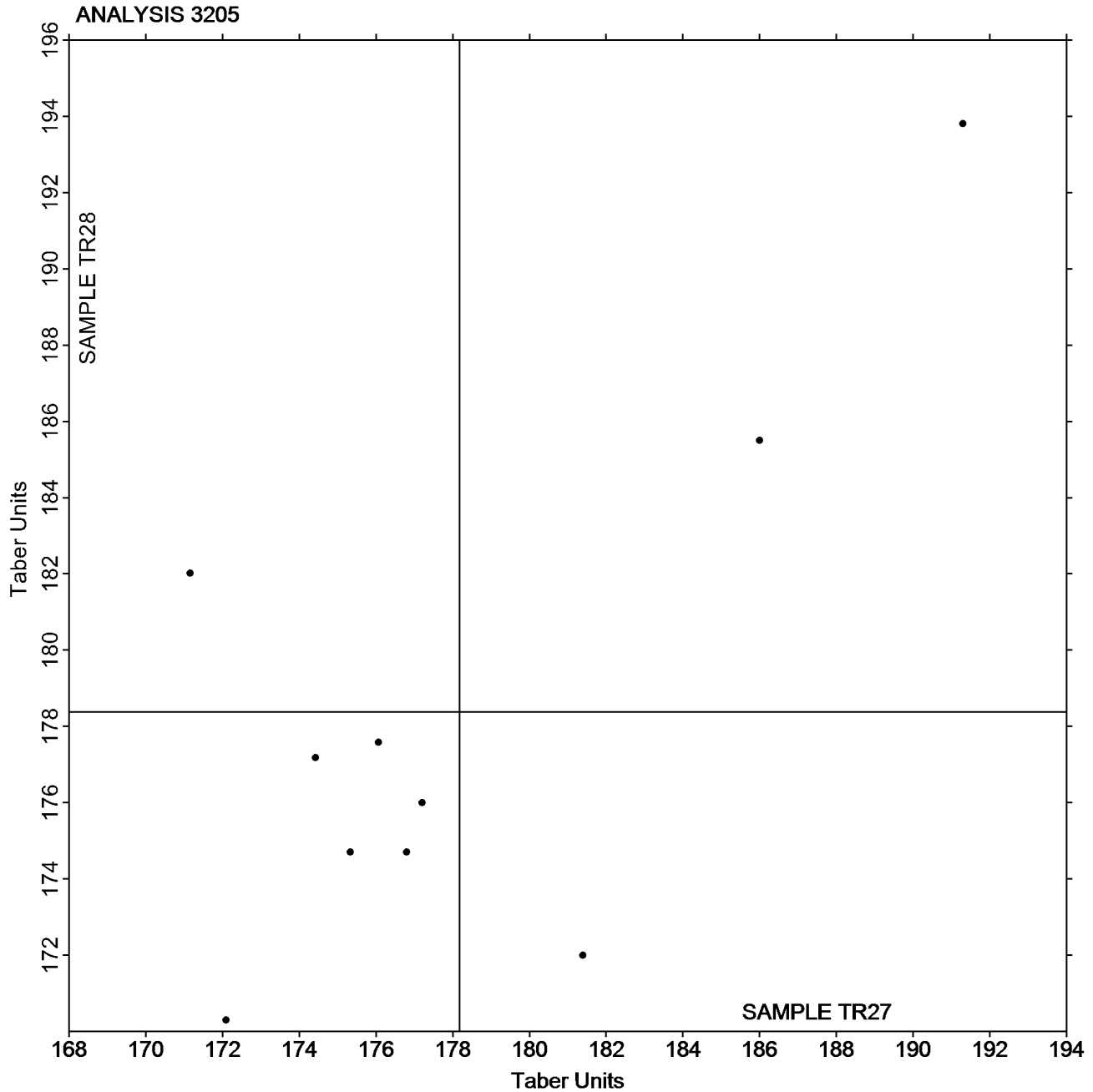
Analysis 3205

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

TAPPI Official Test Method T489

Grand Mean Sample TR27 = 178.18
Taber Units

Grand Mean Sample TR28 = 178.38
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

Report #4291,
March 2024

WebCode	Data Flag	Sample ZR27			Sample ZR28		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
32GNCN		59.40	-4.43	-0.72	56.60	-6.93	-1.00
49DRUQ		63.20	-0.63	-0.10	64.40	0.87	0.13
4W2FNN		66.68	2.85	0.47	70.70	7.17	1.04
6WHWGW		64.68	0.85	0.14	64.78	1.25	0.18
96YBHB		61.83	-2.01	-0.33	62.02	-1.51	-0.22
E7RCNZ		70.80	6.97	1.14	69.80	6.27	0.91
F4Z2GK		62.42	-1.41	-0.23	62.26	-1.27	-0.18
FCUA3B		63.92	0.09	0.01	62.98	-0.55	-0.08
GDK6AY	*	45.39	-18.45	-3.01	44.84	-18.68	-2.71
H2BEZG		58.24	-5.59	-0.91	58.24	-5.29	-0.77
K2K3DD		67.88	4.05	0.66	65.30	1.77	0.26
LLLDW8		72.22	8.39	1.37	73.34	9.81	1.42
LPLPT8		71.58	7.75	1.27	73.64	10.11	1.47
M7MX27		60.53	-3.31	-0.54	55.39	-8.14	-1.18
U88HM3		68.56	4.73	0.77	67.26	3.73	0.54
WB77PV		63.76	-0.07	-0.01	63.00	-0.53	-0.08
WKWN44		64.80	0.97	0.16	65.28	1.75	0.25
XFFFZJ		63.12	-0.71	-0.12	63.64	0.11	0.02

Summary Statistics	Sample ZR27	Sample ZR28
Grand Means	63.83 psi	63.53 psi
Std Dev Btwn Labs	6.12 psi	6.89 psi
Statistics based on 18 of 18 reporting participants.		

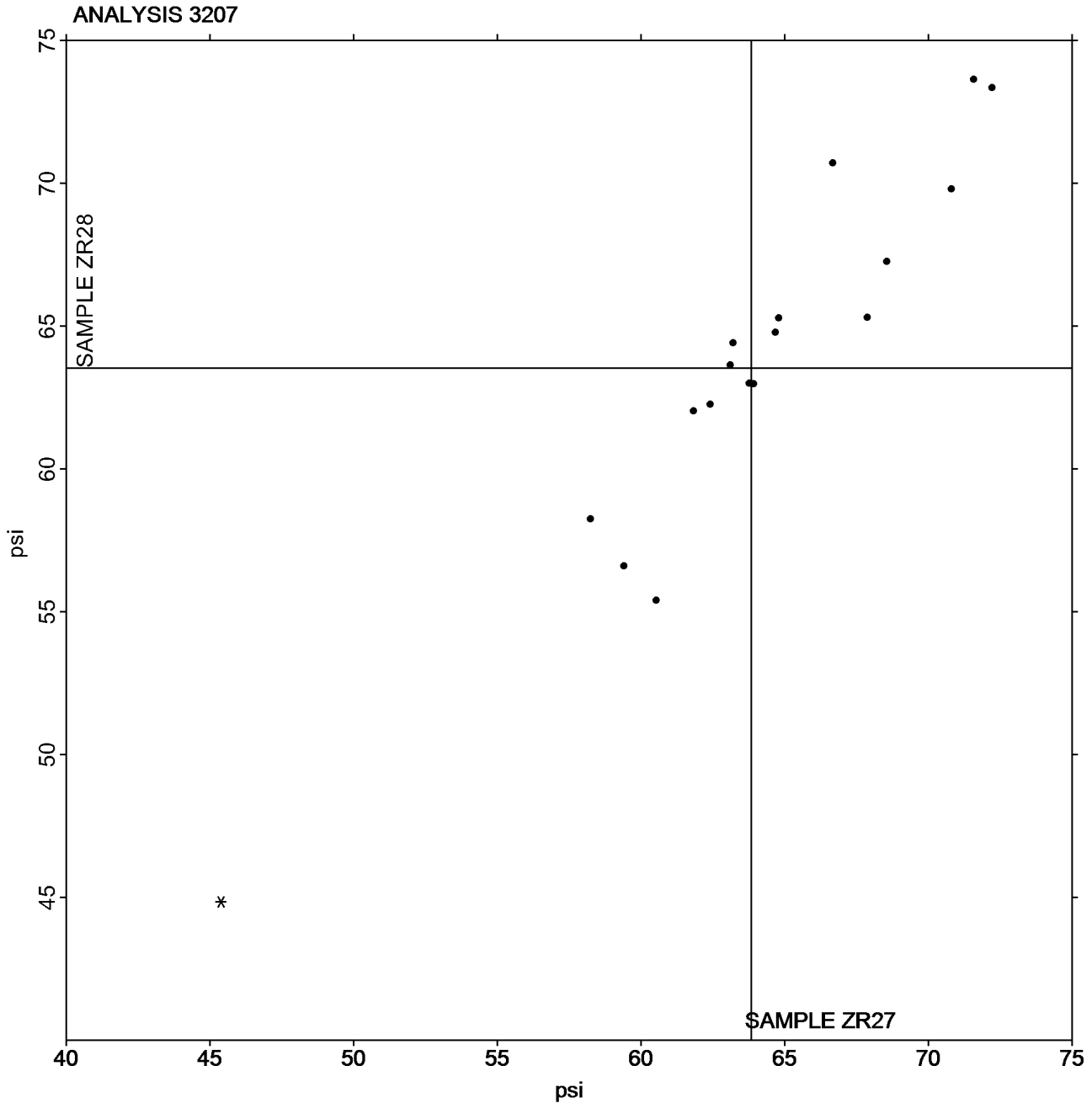


Paper & Paperboard Interlaboratory Testing Program
Analysis 3207
Z-Direction Tensile, Recycled Paperboard
TAPPI Official Test Method T541

Report #4291,
March 2024

Grand Mean Sample ZR27 = 63.833
psi

Grand Mean Sample ZR28 = 63.526
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

Report #4291,
March 2024

WebCode	Data Flag	<u>Sample ZP27</u>			<u>Sample ZP28</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3PN4VX		98.04	8.99	0.73	99.16	10.24	0.84
8BRJHP		91.40	2.35	0.19	92.00	3.08	0.25
DQZJTF		72.20	-16.85	-1.36	73.36	-15.56	-1.27
G7223W		87.80	-1.25	-0.10	86.80	-2.12	-0.17
K2K3DD		110.66	21.61	1.75	108.98	20.06	1.64
PZQ42A		91.72	2.67	0.22	93.40	4.48	0.37
V9NPU6		85.08	-3.97	-0.32	84.72	-4.20	-0.34
VPR9L2		101.56	12.51	1.01	100.72	11.80	0.97
Z4E4PU		73.07	-15.98	-1.29	71.97	-16.95	-1.39
ZKF2VW		78.96	-10.09	-0.82	78.11	-10.81	-0.88

Summary Statistics	<u>Sample ZP27</u>	<u>Sample ZP28</u>
Grand Means	89.05 psi	88.92 psi
Std Dev Btwn Labs	12.36 psi	12.22 psi

Statistics based on 10 of 10 reporting participants.



Paper & Paperboard Interlaboratory Testing Program

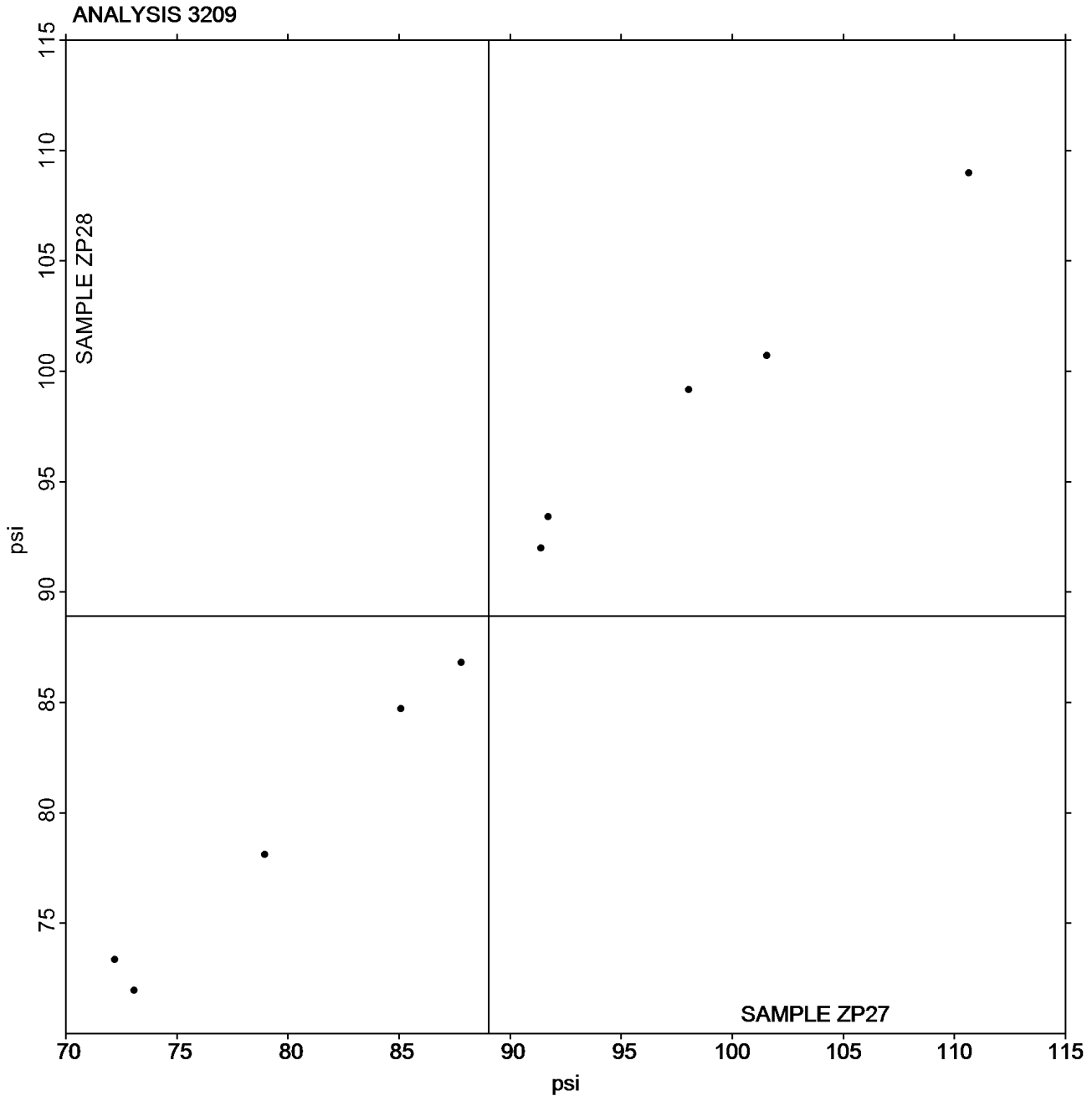
Report #4291,
March 2024

Analysis 3209 Z-Direction Tensile

TAPPI Official Test Method T541

Grand Mean Sample ZP27 = 89.049
psi

Grand Mean Sample ZP28 = 88.922
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 #4291,
March 2024

WebCode	Data Flag	<u>Sample SM27</u>			<u>Sample SM28</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3PN4VX		109.20	9.49	0.93	109.20	9.62	0.92
49DRUQ		95.00	-4.71	-0.46	92.60	-6.98	-0.67
7Q68ZE		94.40	-5.31	-0.52	96.00	-3.58	-0.34
BY7DYH		117.08	17.37	1.71	120.16	20.58	1.96
CF9M8G		96.60	-3.11	-0.31	97.40	-2.18	-0.21
CJ3G6H		94.00	-5.71	-0.56	93.60	-5.98	-0.57
G7223W		104.20	4.49	0.44	102.60	3.02	0.29
K2K3DD		109.40	9.69	0.95	105.00	5.42	0.52
PZQ42A		110.20	10.49	1.03	110.60	11.02	1.05
VDXE6K		85.80	-13.91	-1.37	83.20	-16.38	-1.56
VPR9L2		83.40	-16.31	-1.61	84.40	-15.18	-1.45
WB77PV		104.20	4.49	0.44	104.44	4.86	0.46
ZM8ZAU		92.80	-6.91	-0.68	95.40	-4.18	-0.40

Summary Statistics	<u>Sample SM27</u>	<u>Sample SM28</u>
Grand Means	99.71 1000th ft-lbs	99.58 1000th ft-lbs
Stnd Dev Btwn Labs	10.15 1000th ft-lbs	10.48 1000th ft-lbs
Statistics based on 13 of 13 reporting participants.		

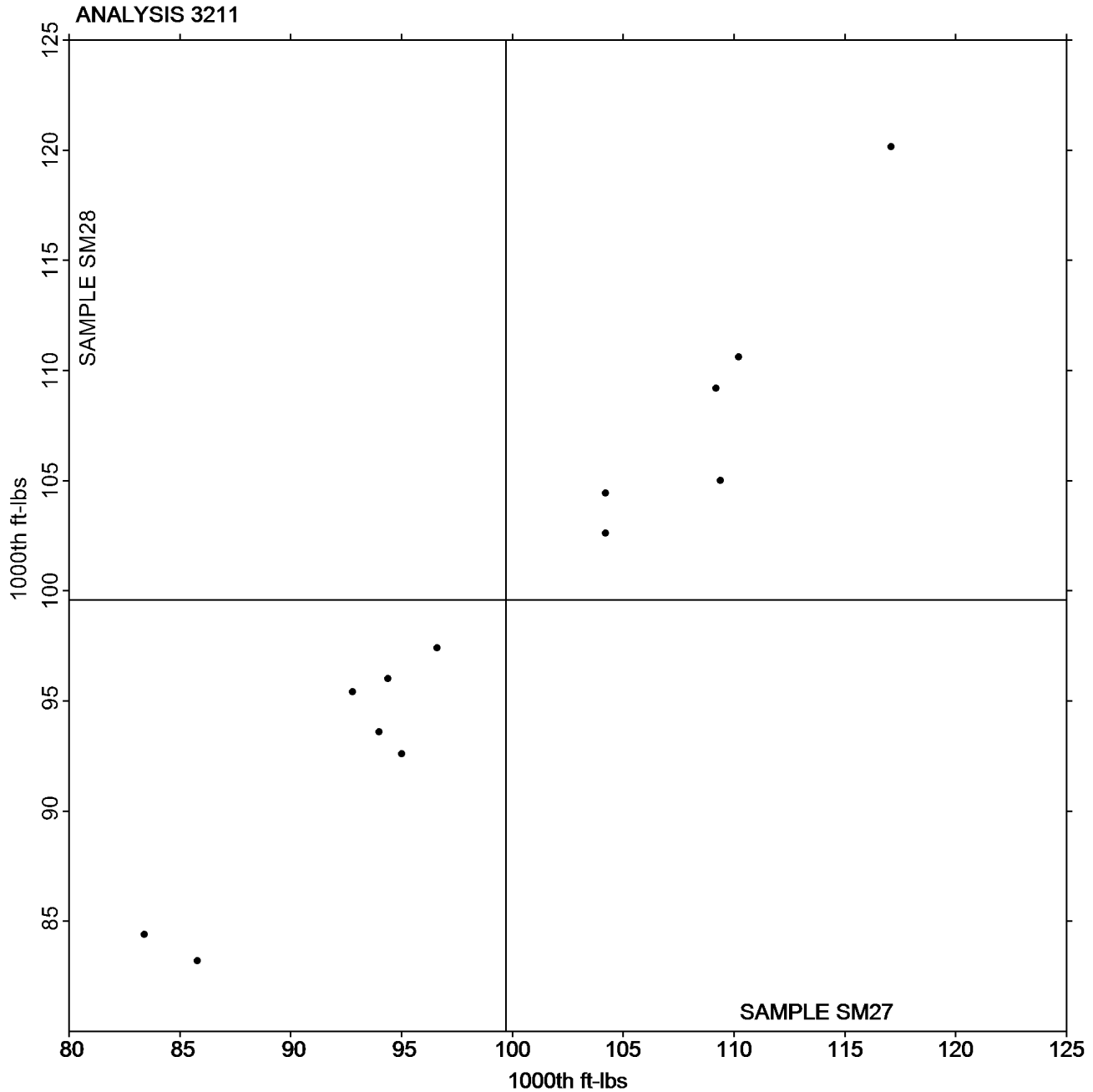


Paper & Paperboard Interlaboratory Testing Program
Analysis 3211
Internal Bond Strength - Modified Scott Mechanics
TAPPI Provisional Test Method T569

Report #4291,
March 2024

Grand Mean Sample SM27 = 99.714
1000th ft-lbs

Grand Mean Sample SM28 = 99.585
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 #4291,
March 2024

WebCode	Data Flag	<u>Sample SB27</u>			<u>Sample SB28</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
88B2EM		82.88	-12.93	-0.86	81.32	-11.13	-0.94
8MZY9A		92.00	-3.81	-0.25	88.80	-3.65	-0.31
CD2RG7		87.40	-8.41	-0.56	88.20	-4.25	-0.36
CJ3G6H		84.40	-11.41	-0.75	80.80	-11.65	-0.98
FRA88C		106.52	10.71	0.71	107.46	15.01	1.27
G9D2EC		87.40	-8.41	-0.56	84.80	-7.65	-0.64
HP9QRZ		108.60	12.79	0.85	110.60	18.15	1.53
M7MX27		126.20	30.39	2.01	109.00	16.55	1.40
MK6DXX		98.80	2.99	0.20	97.40	4.95	0.42
MR3HY7		83.67	-12.13	-0.80	90.96	-1.48	-0.12
P4QQPR		114.60	18.79	1.24	95.80	3.35	0.28
XDQJHX		77.20	-18.61	-1.23	74.20	-18.25	-1.54

Summary Statistics	<u>Sample SB27</u>	<u>Sample SB28</u>
Grand Means	95.81 1000th ft-lbs	92.45 1000th ft-lbs
Stnd Dev Btwn Labs	15.11 1000th ft-lbs	11.87 1000th ft-lbs
Statistics based on 12 of 12 reporting participants.		



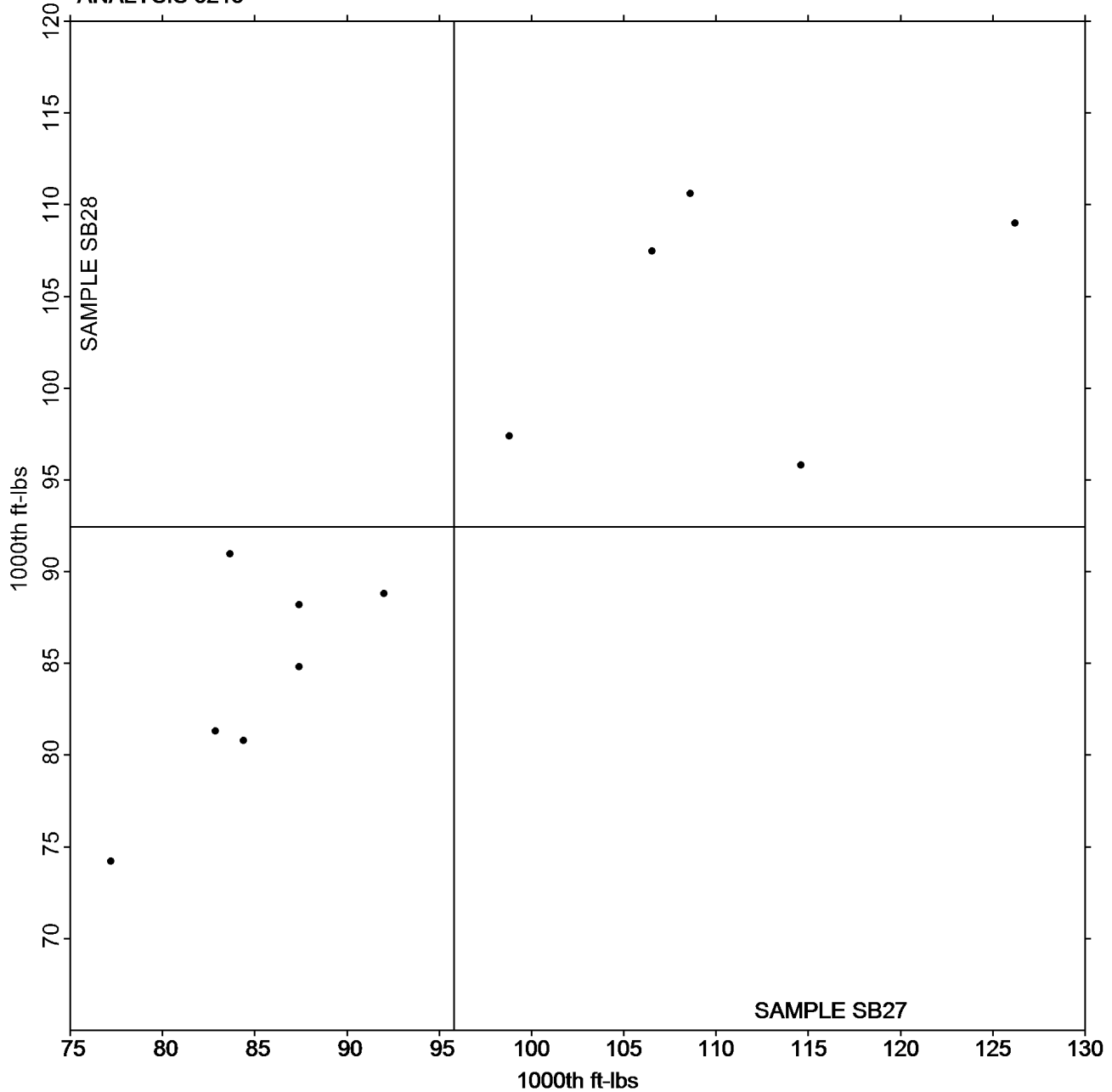
Paper & Paperboard Interlaboratory Testing Program
Analysis 3213
Internal Bond Strength - Scott Bond Models
TAPPI Provisional Test Method T569

Report #4291,
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Grand Mean Sample SB27 = 95.806
1000th ft-lbs

Grand Mean Sample SB28 = 92.445
1000th ft-lbs

ANALYSIS 3213



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-