

Paper & Paperboard Testing Program

Summary Report #4431 - July 2026

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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.

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

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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.



Report #4431, July 2026

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

WebCode	Data Flag	Sample CP55			Sample CP56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
26YJAN		3.898	-0.105	-1.51	3.956	-0.050	-0.82
3777CU		4.067	0.064	0.92	4.040	0.034	0.56
3Y8JKV	*	4.005	0.002	0.03	4.102	0.097	1.58
4VKG2T		4.064	0.061	0.88	4.034	0.028	0.46
72KFPM		4.104	0.101	1.45	4.106	0.100	1.64
77UT8L		4.030	0.027	0.39	3.993	-0.013	-0.22
7VV66Q		4.008	0.005	0.08	4.004	-0.002	-0.03
8CF9BJ		3.986	-0.017	-0.24	3.966	-0.040	-0.65
8TNZDN		3.898	-0.105	-1.51	3.923	-0.083	-1.36
9QG68Q		3.943	-0.060	-0.86	3.968	-0.038	-0.62
9XYDVM		3.898	-0.105	-1.51	3.899	-0.107	-1.76
B8BJKL		3.991	-0.012	-0.17	4.025	0.019	0.31
CXHNXB		3.933	-0.070	-1.00	3.965	-0.041	-0.67
CYE49M		3.998	-0.005	-0.07	4.023	0.018	0.29
D4PGQL		4.052	0.049	0.71	4.032	0.026	0.43
D8NRLL		4.027	0.024	0.35	3.977	-0.029	-0.47
EE24ED		4.046	0.043	0.62	4.036	0.030	0.50
EXWT9L		3.894	-0.109	-1.57	3.917	-0.088	-1.45
F76M3E	*	3.931	-0.072	-1.03	4.045	0.039	0.64
H6MD3C		4.112	0.109	1.57	4.100	0.094	1.55
KLHPQ4		4.126	0.124	1.78	4.093	0.088	1.44
LUV2GA		4.011	0.009	0.12	4.006	0.000	0.00
LVQJHB		4.060	0.057	0.82	4.073	0.067	1.10
MKYK6B		3.929	-0.074	-1.06	3.937	-0.069	-1.13
PP4ZQ4		4.032	0.030	0.42	3.987	-0.018	-0.30
PQYJT6		4.089	0.086	1.24	4.061	0.055	0.91
Q3RMA4		3.930	-0.073	-1.05	3.977	-0.029	-0.48
QG9KE6_AL		4.046	0.043	0.62	4.074	0.068	1.12
QRP6Y2		4.089	0.087	1.24	4.038	0.032	0.53
RMUU39		4.026	0.023	0.33	4.008	0.002	0.03
TG3W66		3.985	-0.018	-0.25	3.972	-0.033	-0.55
TGWRDY		4.004	0.001	0.02	4.024	0.018	0.30
XALZCQ_AL		4.035	0.032	0.46	4.032	0.026	0.43
XXAKJZ		3.877	-0.126	-1.81	3.873	-0.133	-2.18
YYFEM4		4.057	0.054	0.78	4.052	0.046	0.76
ZY9WTW		3.918	-0.085	-1.22	3.891	-0.115	-1.88



Paper & Paperboard Interlaboratory Testing Program **Report #4431, July 2026**
Analysis 3101
Thickness (Caliper), Printing papers
TAPPI Official Test Method T411

Summary Statistics	Sample CP55	Sample CP56
Grand Means	4.00 mils	4.01 mils
Stnd Dev Btwn Labs	0.07 mils	0.06 mils
Statistics based on 36 of 36 reporting participants.		

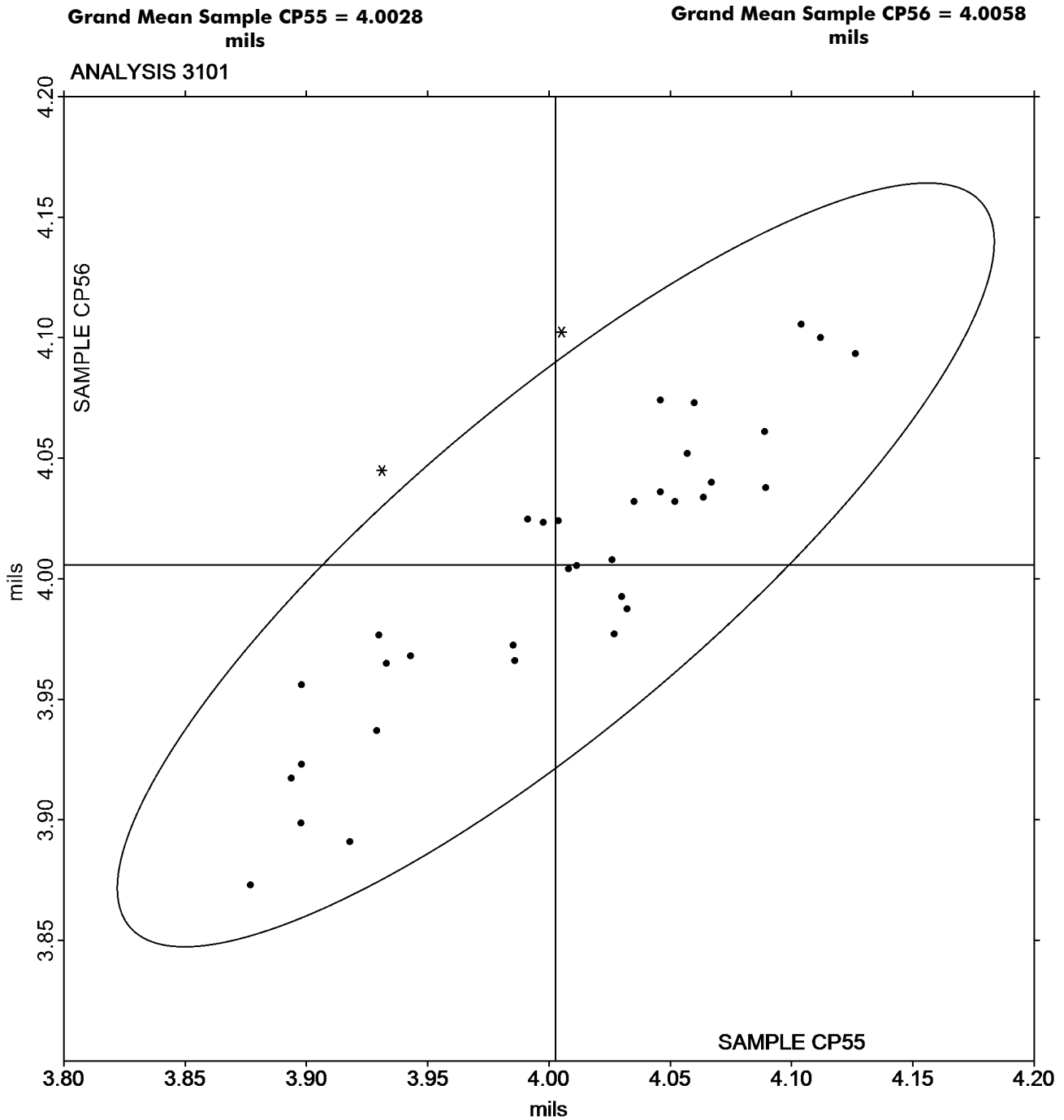
Key to Instrument Codes Reported by Participants			
EM	Emveco	LA	L & W Autoline
LB	L & W Autoline 600	LC	L & W Autoline 400
LW	L & W	MS	Messmer
PP	Technidyne Profile/Plus	TA	Thwing-Albert
TM	TMI		

Analysis Notes:

- 72KFPM - One determination removed from the Lab Mean of Sample CP56 per Grubb's Test at 1% risk (TAPPI 1205).
RMUU39 - One determination removed from the Lab Mean of Sample CP56 per Grubb's Test at 1% risk (TAPPI 1205).
TGWRDY - One determination removed from the Lab Mean of Sample CP56 per Grubb's Test at 1% risk (TAPPI 1205).



Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3101
Thickness (Caliper), Printing papers
TAPPI Official Test Method T411





Report #4431, July 2026

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

WebCode	Data Flag	Sample BP55			Sample BP56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
26YJAN	*	17.25	-4.81	-2.71	16.50	-5.56	-2.97
3777CU		23.17	1.11	0.62	22.35	0.29	0.15
4VKG2T		21.87	-0.19	-0.11	21.07	-0.99	-0.53
77UT8L		21.38	-0.68	-0.39	22.95	0.89	0.47
7LBNMH		21.03	-1.03	-0.58	22.17	0.11	0.06
7VV66Q		24.26	2.20	1.24	23.34	1.28	0.68
8CF9BJ		20.51	-1.55	-0.88	19.91	-2.15	-1.15
8TNZDN		23.55	1.49	0.84	23.65	1.59	0.85
9XYDVM		20.55	-1.51	-0.85	21.55	-0.51	-0.27
CCKW3K		22.93	0.87	0.49	24.21	2.15	1.15
CXHNXB	X	30.50	8.44	4.76	28.90	6.84	3.65
CYE49M		21.49	-0.57	-0.32	21.09	-0.97	-0.52
D4PGQL		21.30	-0.76	-0.43	20.90	-1.16	-0.62
F76M3E		21.23	-0.83	-0.47	21.70	-0.36	-0.19
HFKG77		22.43	0.37	0.21	22.73	0.67	0.36
HUK6CE		20.28	-1.78	-1.01	19.14	-2.92	-1.56
JVTRC6		23.97	1.91	1.07	22.21	0.15	0.08
KLHPQ4		23.41	1.35	0.76	23.47	1.41	0.75
MKYK6B		23.08	1.02	0.57	23.56	1.50	0.80
MZVY66		21.86	-0.20	-0.11	21.99	-0.07	-0.04
PQYJT6		21.00	-1.06	-0.60	22.48	0.42	0.22
QJE3D2		23.09	1.03	0.58	22.69	0.63	0.33
QRP6Y2		21.83	-0.24	-0.13	21.06	-1.00	-0.53
RMUU39		25.40	3.34	1.88	25.85	3.79	2.02
TG3W66		22.35	0.29	0.16	22.75	0.69	0.37
X9CVY3		25.11	3.05	1.72	25.19	3.12	1.67
YPUD7U		18.95	-3.11	-1.76	19.75	-2.31	-1.23
YYFEM4		20.23	-1.83	-1.03	21.12	-0.94	-0.50
Z3EDB2		23.12	1.06	0.60	20.82	-1.25	-0.67
ZPNJZT		23.20	1.14	0.64	23.60	1.54	0.82

Summary Statistics	Sample BP55	Sample BP56
Grand Means	22.06 psi	22.06 psi
Std Dev Btwn Labs	1.77 psi	1.88 psi
Statistics based on 29 of 30 reporting participants.		

Key to Instrument Codes Reported by Participants

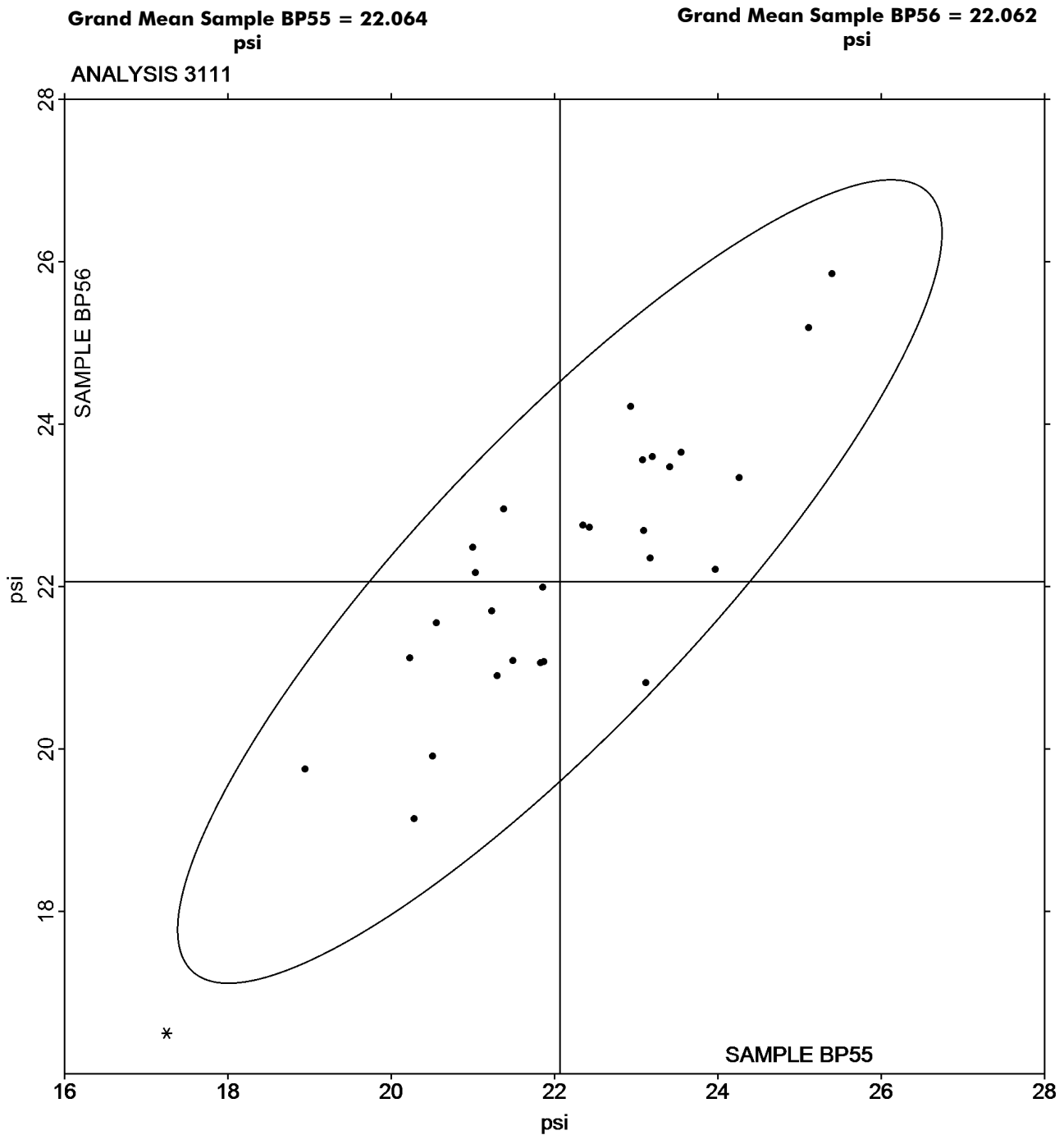
ZZ Instruments No Longer Tracked



Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3111
Bursting Strength - Printing Papers
TAPPI Official Test Method T403

Comments on Assigned Data Flags for Test #3111

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





Report #4431, July 2026

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

WebCode	Data Flag	Sample RP55			Sample RP56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
26YJAN		62.20	2.97	0.75	64.58	5.53	1.45
3777CU		64.40	5.17	1.30	62.60	3.55	0.93
3Y8JKV		63.98	4.75	1.20	64.66	5.61	1.47
4VKG2T		59.18	-0.04	-0.01	58.77	-0.28	-0.07
6MN2PU		57.80	-1.43	-0.36	56.79	-2.26	-0.59
72KFPM		54.93	-4.29	-1.08	57.82	-1.24	-0.32
77UT8L		55.67	-3.56	-0.90	55.56	-3.49	-0.91
8CF9BJ		61.46	2.23	0.56	62.66	3.61	0.94
8MWTVF		65.60	6.37	1.60	62.80	3.75	0.98
8TNZDN	X	65.60	6.37	1.60	56.20	-2.85	-0.75
8UZL4P		55.98	-3.24	-0.82	58.13	-0.92	-0.24
9QG68Q	X	59.38	0.15	0.04	64.95	5.90	1.54
9XYDVM		57.47	-1.76	-0.44	55.73	-3.32	-0.87
A9BZJE		57.70	-1.53	-0.38	58.23	-0.82	-0.22
B8BJKL		59.57	0.34	0.09	57.64	-1.41	-0.37
CCKW3K		60.98	1.75	0.44	61.84	2.79	0.73
CYE49M		57.96	-1.27	-0.32	58.35	-0.70	-0.18
D4PGQL		63.65	4.42	1.11	63.61	4.56	1.19
D8NRLL	X	3.04	-56.19	-14.14	3.08	-55.97	-14.65
EE24ED		54.88	-4.35	-1.09	54.10	-4.95	-1.30
F76M3E		58.79	-0.44	-0.11	57.11	-1.94	-0.51
F7KTFH		60.78	1.55	0.39	59.44	0.39	0.10
H4RWQF		54.38	-4.85	-1.22	54.82	-4.23	-1.11
H6MD3C		61.30	2.07	0.52	63.00	3.95	1.03
LVQJHB		57.17	-2.06	-0.52	57.51	-1.54	-0.40
MKYK6B		56.99	-2.24	-0.56	55.19	-3.86	-1.01
MZVY66		57.80	-1.43	-0.36	57.10	-1.95	-0.51
PQYJT6		58.35	-0.88	-0.22	58.71	-0.35	-0.09
QG9KE6_AL		54.38	-4.85	-1.22	54.92	-4.13	-1.08
QRP6Y2		54.85	-4.38	-1.10	55.41	-3.64	-0.95
R3LR44		62.60	3.37	0.85	60.09	1.04	0.27
RMUU39		57.80	-1.43	-0.36	56.64	-2.41	-0.63
TG3W66		59.48	0.25	0.06	58.95	-0.10	-0.03
TGWRDY		58.97	-0.25	-0.06	61.32	2.27	0.59
X9CVY3		61.63	2.40	0.61	60.34	1.29	0.34
XYLAT4	X	6.15	-53.08	-13.36	6.22	-52.83	-13.83
YPUD7U		49.40	-9.83	-2.47	49.70	-9.35	-2.45
YYFEM4		69.04	9.81	2.47	68.68	9.63	2.52
ZPNJZT		65.80	6.57	1.65	64.00	4.95	1.30



Paper & Paperboard Interlaboratory Testing Program **Report #4431, July 2026**
Analysis 3113
Tearing Strength - Printing Papers
TAPPI Official Test Method T414

Summary Statistics	Sample RP55	Sample RP56
Grand Means	59.23 Grams	59.05 Grams
Stnd Dev Btwn Labs	3.97 Grams	3.82 Grams

Statistics based on 35 of 39 reporting participants.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Comments on Assigned Data Flags for Test #3113

XYLAT4 (X) - Extreme Data.

D8NRLL (X) - Extreme Data.

9QG68Q (X) - Inconsistent in testing between samples.

8TNZDN (X) - Inconsistent in testing between samples. Inconsistent within the determinations of sample RP55.

Analysis Notes:

MZVY66 - Data appear to be reported as gf, not mN as indicated on data entry form. CTS will not correct the Units going forward.

XYLAT4 - Possible unit error.

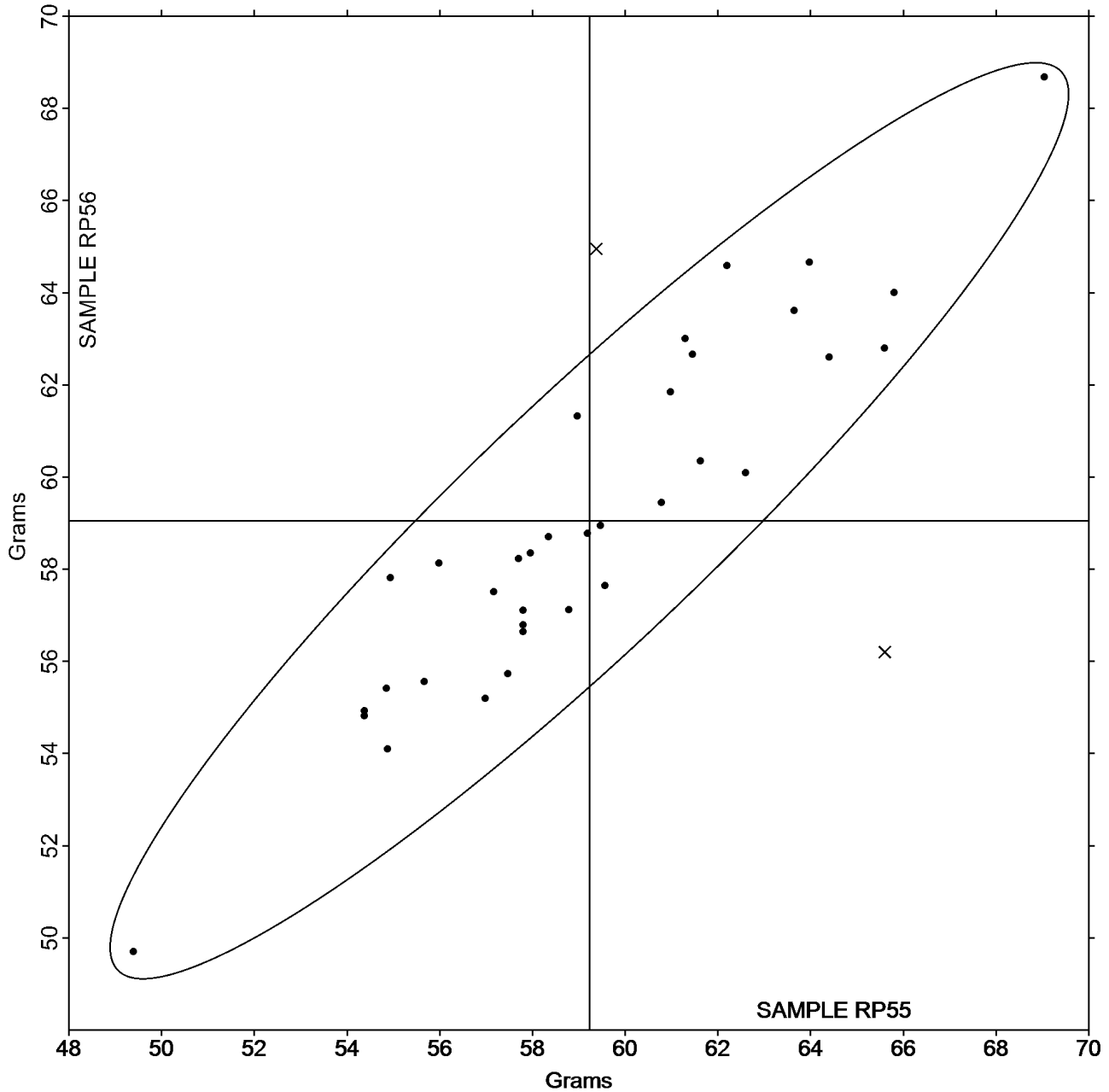


Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3113
Tearing Strength - Printing Papers
TAPPI Official Test Method T414

Grand Mean Sample RP55 = 59.226
Grams

Grand Mean Sample RP56 = 59.052
Grams

ANALYSIS 3113





Report #4431, July 2026

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

WebCode	Data Flag	Sample NP55			Sample NP56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
26YJAN		3.895	0.402	1.65	3.997	0.437	1.72
3777CU		3.863	0.370	1.52	3.868	0.308	1.21
3Y8JKV		3.145	-0.347	-1.43	3.166	-0.394	-1.55
4VKG2T		3.649	0.157	0.65	3.616	0.056	0.22
6MN2PU		3.354	-0.139	-0.57	3.329	-0.231	-0.91
72KFPM	X	1.754	-1.738	-7.15	2.806	-0.754	-2.97
77UT8L		3.661	0.168	0.69	3.716	0.156	0.61
8CF9BJ		3.482	-0.010	-0.04	3.493	-0.067	-0.26
8TNZDN		3.293	-0.200	-0.82	3.295	-0.265	-1.05
9XYDVM		3.621	0.128	0.53	3.840	0.280	1.10
B8BJKL		3.906	0.413	1.70	3.692	0.132	0.52
CCKW3K		3.465	-0.028	-0.11	3.451	-0.109	-0.43
CYE49M		3.283	-0.210	-0.86	3.674	0.114	0.45
D4PGQL		3.485	-0.007	-0.03	3.333	-0.227	-0.90
D8NRLL		3.786	0.294	1.21	3.855	0.294	1.16
EE24ED		3.095	-0.398	-1.64	3.383	-0.177	-0.70
F7KTFH		3.481	-0.012	-0.05	3.834	0.274	1.08
H4RWQF		3.738	0.245	1.01	3.580	0.020	0.08
H6MD3C		3.513	0.020	0.08	3.735	0.174	0.69
K8NZU8		3.512	0.020	0.08	3.515	-0.045	-0.18
LVQJHB		3.527	0.034	0.14	3.588	0.028	0.11
MKYK6B	*	3.199	-0.293	-1.21	2.873	-0.687	-2.71
PQYJT6		3.574	0.081	0.34	3.814	0.254	1.00
QG9KE6_AL	X	4.868	1.375	5.66	4.601	1.041	4.10
QRP6Y2		3.428	-0.065	-0.27	3.567	0.007	0.03
RMUU39	*	2.988	-0.505	-2.08	3.719	0.159	0.63
RRNQQY		3.220	-0.273	-1.12	3.151	-0.409	-1.61
TG3W66		3.526	0.033	0.14	3.509	-0.051	-0.20
X9CVY3		3.765	0.273	1.12	3.622	0.062	0.24
YYFEM4		3.337	-0.155	-0.64	3.468	-0.092	-0.36

Summary Statistics	Sample NP55	Sample NP56
Grand Means	3.49 kN/m	3.56 kN/m
Std Dev Btwn Labs	0.24 kN/m	0.25 kN/m
Statistics based on 28 of 30 reporting participants.		



Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3115
Tensile Breaking Strength - Printing Papers
TAPPI Official Test Method T494

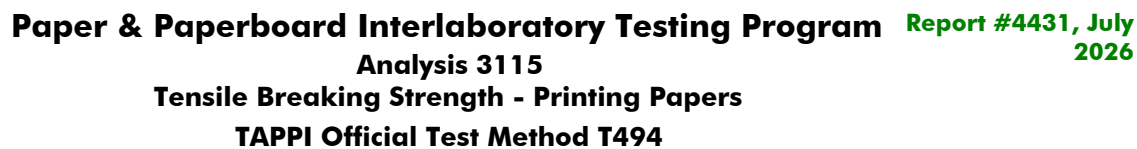
Key to Instrument Codes Reported by Participants

IO	Instron 5900 Series	LB	L & W Tensile - Autoline 400
LE	L & W Tensile Tester 066	LF	L & W Tensile/Fracture Toughness Tester SE 064
LI	L & W Tensile Tester SE 062	LJ	L & W Tensile Tester SE 063
LX	L & W (model not specified)	MA	MTS Criterion Model 43
TB	Thwing-Albert EJA/1000	TF	Thwing-Albert EJA Vantage-1
TJ	Thwing-Albert QC II-XS	TM	TMI Horizontal Tensile Tester
TO	Thwing-Albert QC-1000	TQ	Thwing-Albert QC 3A
TR	Testometric 220D	TT	Tinius Olsen H10KT
TV	Thwing-Albert Vantage NX	VM	Valmet PaperLab (was Kajaani/Robotest)

Comments on Assigned Data Flags for Test #3115

QG9KE6_AL (X) - Data for both samples are high. Possible Systematic Error.

72KFPM (X) - Data for both samples are low. Inconsistent within the determinations of sample NP55.



**Grand Mean Sample NP56 = 3.5601
kN/m**

Scatter plot showing the relationship between two variables, both measured in kN/m. The x-axis is labeled 'kN/m' and ranges from 2.8 to 4.4. The y-axis is labeled 'kN/m' and ranges from 3.0 to 4.4. The plot includes data points for SAMPLE NP56 (top) and SAMPLE NP55 (bottom). A vertical line is drawn at approximately 3.5 kN/m, and a horizontal line is drawn at approximately 3.55 kN/m. An ellipse encloses the main cluster of data points. Two points are marked with asterisks (*).



Report #4431, July 2026

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

WebCode	Data Flag	Sample NP55			Sample NP56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
26YJAN		44.37	5.02	0.84	45.64	5.43	1.00
3777CU		36.37	-2.98	-0.50	34.76	-5.44	-1.00
3Y8JKV		36.63	-2.72	-0.46	39.11	-1.10	-0.20
4VKG2T		43.28	3.93	0.66	42.79	2.58	0.48
77UT8L		39.11	-0.24	-0.04	40.09	-0.12	-0.02
8CF9BJ		49.84	10.49	1.77	49.67	9.46	1.74
8TNZDN		38.13	-1.22	-0.20	37.78	-2.43	-0.45
9XYDVM		42.24	2.89	0.49	44.21	4.01	0.74
B8BJKL		28.65	-10.70	-1.80	27.00	-13.21	-2.44
CCKW3K		36.96	-2.39	-0.40	37.03	-3.18	-0.59
CYE49M		36.19	-3.16	-0.53	43.65	3.44	0.63
D4PGQL		40.56	1.21	0.20	35.36	-4.85	-0.89
F7KTFH		40.58	1.23	0.21	43.90	3.69	0.68
H4RWQF		39.32	-0.03	-0.01	36.86	-3.34	-0.62
H6MD3C		42.95	3.60	0.61	46.25	6.04	1.11
K8NZU8		46.74	7.39	1.24	46.71	6.50	1.20
LVQJHB		36.00	-3.35	-0.56	36.89	-3.32	-0.61
MKYK6B		37.28	-2.07	-0.35	29.75	-10.46	-1.93
PQYJT6		40.35	1.00	0.17	44.92	4.71	0.87
QG9KE6_AL		52.46	13.11	2.21	43.43	3.22	0.59
QRP6Y2		37.17	-2.18	-0.37	37.19	-3.02	-0.56
RMUU39	*	25.47	-13.88	-2.34	41.72	1.52	0.28
RRNQYQY		32.61	-6.75	-1.14	37.88	-2.32	-0.43
YYFEM4		41.15	1.80	0.30	42.38	2.17	0.40

Summary Statistics	Sample NP55	Sample NP56
Grand Means	39.35 Joules/sq m	40.21 Joules/sq m
Stnd Dev Btwn Labs	5.94 Joules/sq m	5.42 Joules/sq m
Statistics based on 24 of 24 reporting participants.		

Key to Instrument Codes Reported by Participants	
IO	Instron 5900 Series
LE	L & W Tensile Tester 066
LI	L & W Tensile Tester SE 062
LX	L & W (model not specified)
TB	Thwing-Albert EJA/1000
TM	TMI Horizontal Tensile Tester
TQ	Thwing-Albert QC 3A
TV	Thwing-Albert Vantage NX
LB	L & W Tensile - Autoline 400
LF	L & W Tensile/Fracture Toughness Tester SE 064
LJ	L & W Tensile Tester SE 063
MA	MTS Criterion Model 43
TF	Thwing-Albert EJA Vantage-1
TO	Thwing-Albert QC-1000
TT	Tinius Olsen H10KT



Paper & Paperboard Interlaboratory Testing Program **Report #4431, July 2026**
Analysis 3116
Tensile Energy Absorption - Printing Papers
TAPPI Official Test Method T494

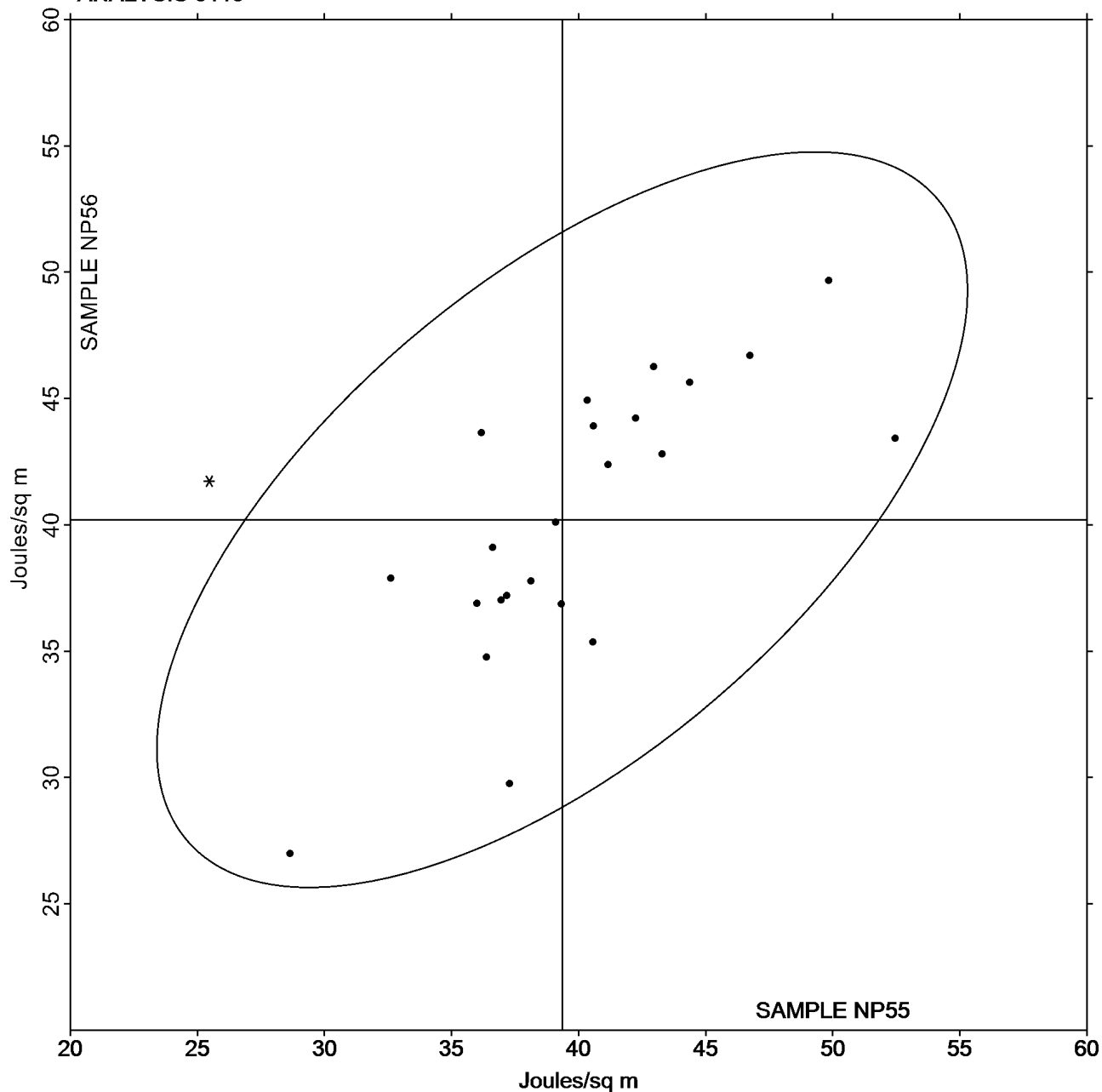


Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3116
Tensile Energy Absorption - Printing Papers
TAPPI Official Test Method T494

Grand Mean Sample NP55 = 39.350
Joules/sq m

Grand Mean Sample NP56 = 40.207
Joules/sq m

ANALYSIS 3116





Report #4431, July 2026

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

WebCode	Data Flag	Sample NP55			Sample NP56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
26YJAN		1.599	-0.089	-0.36	1.662	-0.045	-0.18
3777CU	*	2.438	0.750	3.05	2.346	0.639	2.58
3Y8JKV		1.734	0.046	0.19	1.811	0.104	0.42
4VKG2T		1.724	0.036	0.15	1.731	0.024	0.10
72KFPM	X	0.523	-1.165	-4.74	1.065	-0.642	-2.59
77UT8L		1.592	-0.096	-0.39	1.692	-0.015	-0.06
8CF9BJ		2.185	0.497	2.02	2.039	0.332	1.34
8TNZDN		1.730	0.042	0.17	1.710	0.003	0.01
9XYDVM		1.694	0.006	0.02	1.675	-0.032	-0.13
B8BJKL		1.312	-0.376	-1.53	1.273	-0.434	-1.75
CCKW3K		1.583	-0.105	-0.43	1.603	-0.104	-0.42
CYE49M		1.631	-0.057	-0.23	1.752	0.045	0.18
D4PGQL		1.699	0.011	0.04	1.567	-0.140	-0.57
D8NRLL		1.220	-0.468	-1.90	1.170	-0.537	-2.17
EE24ED		1.407	-0.281	-1.14	1.595	-0.112	-0.45
F7KTFH		1.744	0.056	0.23	1.758	0.051	0.21
H4RWQF		1.583	-0.105	-0.43	1.560	-0.147	-0.59
H6MD3C		1.761	0.073	0.30	1.828	0.121	0.49
K8NZU8		2.018	0.330	1.34	2.014	0.307	1.24
LVQJHB		1.528	-0.160	-0.65	1.534	-0.173	-0.70
MKYK6B		1.700	0.012	0.05	1.518	-0.189	-0.76
PQYJT6		1.682	-0.006	-0.02	1.759	0.052	0.21
QG9KE6_AL		1.525	-0.163	-0.66	1.433	-0.274	-1.11
QRP6Y2		1.611	-0.077	-0.31	1.554	-0.153	-0.62
RMUU39	*	1.727	0.039	0.16	2.066	0.359	1.45
RRNQYQY		1.600	-0.088	-0.36	1.886	0.179	0.72
YYFEM4		1.860	0.172	0.70	1.845	0.138	0.56

Summary Statistics	Sample NP55	Sample NP56
Grand Means	1.69 Percent	1.71 Percent
Std Dev Btwn Labs	0.25 Percent	0.25 Percent
Statistics based on 26 of 27 reporting participants.		



Paper & Paperboard Interlaboratory Testing Program **Report #4431, July 2026**
Analysis 3117
Elongation to Break - Printing Papers
TAPPI Official Test Method T494

Key to Instrument Codes Reported by Participants

IO	Instron 5900 Series	LB	L & W Tensile - Autoline 400
LE	L & W Tensile Tester 066	LF	L & W Tensile/Fracture Toughness Tester SE 064
LI	L & W Tensile Tester SE 062	LJ	L & W Tensile Tester SE 063
LX	L & W (model not specified)	MA	MTS Criterion Model 43
TB	Thwing-Albert EJA/1000	TF	Thwing-Albert EJA Vantage-1
TM	TMI Horizontal Tensile Tester	TO	Thwing-Albert QC-1000
TQ	Thwing-Albert QC 3A	TT	Tinius Olsen H10KT
TV	Thwing-Albert Vantage NX	VM	Valmet PaperLab (was Kajaani/Robotest)

Comments on Assigned Data Flags for Test #3117

72KFPM (X) - Data for sample NP55 are low.

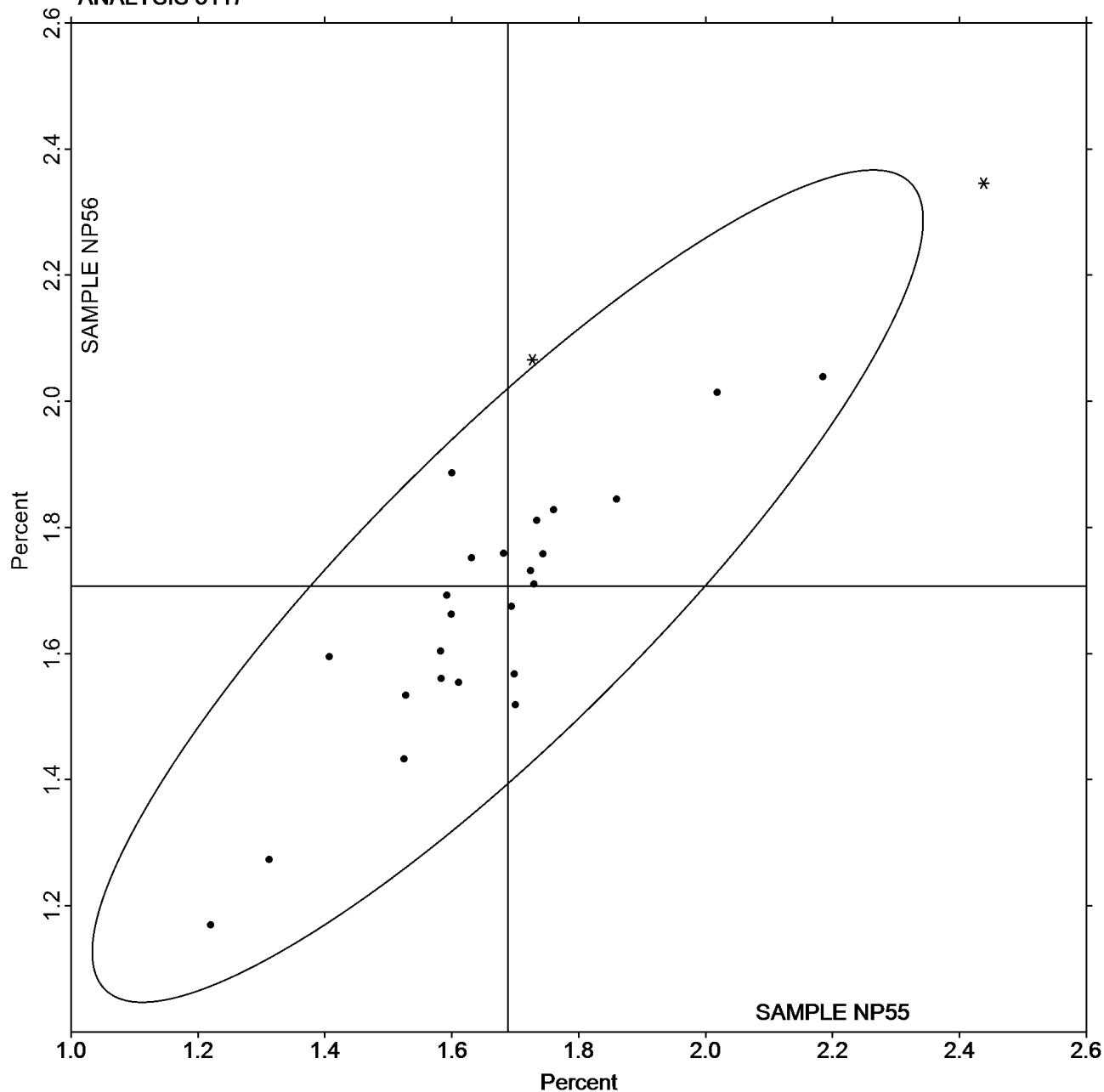


Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3117
Elongation to Break - Printing Papers
TAPPI Official Test Method T494

Grand Mean Sample NP55 = 1.6879
Percent

Grand Mean Sample NP56 = 1.7070
Percent

ANALYSIS 3117





Report #4431, July 2026

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

WebCode	Data Flag	Sample PP55			Sample PP56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3777CU		9.568	0.064	0.10	9.080	-0.430	-0.61
3Y8JKV		10.808	1.304	2.05	11.135	1.625	2.30
72KFPM		9.642	0.138	0.22	9.796	0.286	0.41
7LBNMH		9.451	-0.053	-0.08	9.353	-0.157	-0.22
7VV66Q		9.496	-0.008	-0.01	9.505	-0.005	-0.01
8CF9BJ		10.397	0.893	1.40	9.039	-0.471	-0.67
8MWTVF	X	11.280	1.776	2.79	12.750	3.240	4.59
8TNZDN		9.320	-0.184	-0.29	9.670	0.160	0.23
9FVZZQ		9.894	0.390	0.61	10.089	0.579	0.82
9QG68Q		10.365	0.861	1.35	10.293	0.783	1.11
9XYDVM		9.800	0.296	0.47	8.680	-0.830	-1.18
CCKW3K		9.690	0.186	0.29	9.430	-0.080	-0.11
D8NRLL		10.635	1.131	1.78	10.413	0.903	1.28
EE24ED		9.240	-0.264	-0.42	9.233	-0.277	-0.39
F76M3E		9.130	-0.374	-0.59	8.790	-0.720	-1.02
H6MD3C		10.277	0.773	1.22	9.386	-0.124	-0.18
HFKG77		9.660	0.156	0.25	9.840	0.330	0.47
J4LZUA		9.460	-0.044	-0.07	9.410	-0.100	-0.14
JVTRC6		9.150	-0.354	-0.56	9.590	0.080	0.11
K8NZU8		9.615	0.111	0.17	8.994	-0.516	-0.73
MKYK6B		8.262	-1.242	-1.95	8.642	-0.868	-1.23
MZVY66		9.500	-0.004	-0.01	9.100	-0.410	-0.58
PQYJT6		9.050	-0.454	-0.71	9.160	-0.350	-0.50
QG9KE6_AL		10.131	0.627	0.99	10.357	0.847	1.20
QQULXZ		8.430	-1.074	-1.69	8.320	-1.190	-1.69
QRP6Y2		9.958	0.454	0.71	11.238	1.728	2.45
RMUU39	X	14.253	4.749	7.47	14.549	5.039	7.15
X9CVY3		8.927	-0.577	-0.91	9.903	0.393	0.56
XALZCQ_AL		8.740	-0.764	-1.20	8.460	-1.050	-1.49
YYFEM4		10.052	0.548	0.86	9.083	-0.427	-0.61
Z3EDB2		8.690	-0.814	-1.28	10.180	0.670	0.95
ZAWLYX		8.620	-0.884	-1.39	9.740	0.230	0.33
ZPNJZT		9.400	-0.104	-0.16	9.700	0.190	0.27
ZY9WTW		8.774	-0.730	-1.15	8.715	-0.795	-1.13



Paper & Paperboard Interlaboratory Testing Program **Report #4431, July 2026**
Analysis 3121
Air Resistance - Gurley Oil Type
TAPPI Official Test Method T460

Summary Statistics	Sample PP55	Sample PP56
Grand Means	9.50 sec/100 cc	9.51 sec/100 cc
Stnd Dev Btwn Labs	0.64 sec/100 cc	0.71 sec/100 cc

Statistics based on 32 of 34 reporting participants.

Key to Instrument Codes Reported by Participants

GA	Gurley Precision #4340 Automatic Densometer	GG	Gurley Precision Model #4320
GL	Gurley #4110	GS	Gurley-Hill S-P-S Tester #4190
HG	Technidyne - Hagerty Model #1	LA	L & W Autoline
LP	L & W Densometer, Air Permeance	LR	L & W Air Permeance
PP	Technidyne Profile/Plus	TL	Gurley Densometer #4110, Oil Flotation
WG	W & LE Gurley Tester	XX	Instrument make/model not specified by lab

Comments on Assigned Data Flags for Test #3121

RMUU39 (X) - Extreme Data.

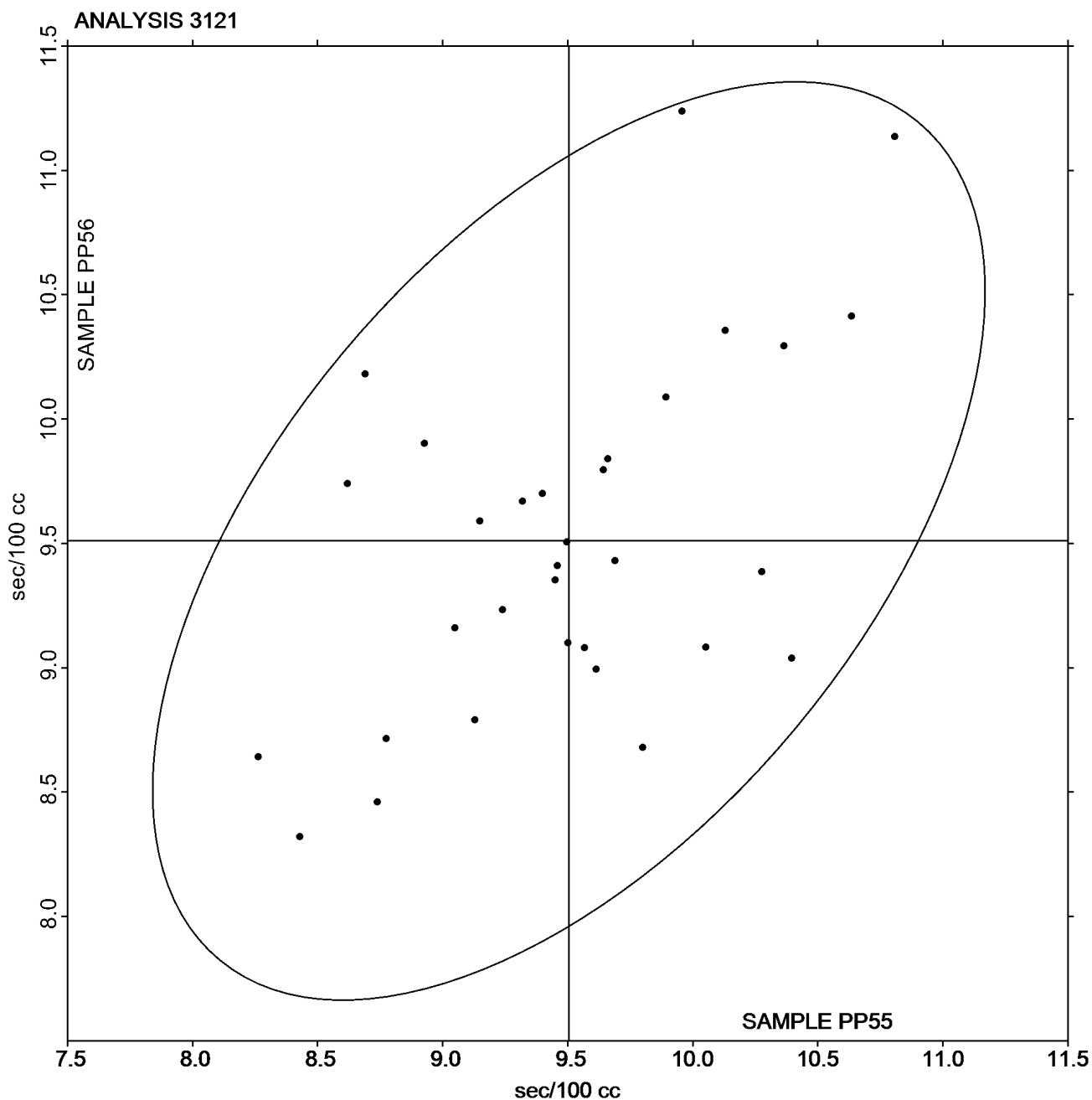
8MWTVF (X) - Data for both samples are high. Inconsistent within the determinations of both samples.



Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3121
Air Resistance - Gurley Oil Type
TAPPI Official Test Method T460

Grand Mean Sample PP55 = 9.5041
sec/100 cc

Grand Mean Sample PP56 = 9.5101
sec/100 cc





Report #4431, July 2026

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

WebCode	Data Flag	<u>Sample PH55</u>			<u>Sample PH56</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
CCKW3K		4.803	-0.119	-0.44	4.864	-0.006	-0.02
D4PGQL		5.278	0.356	1.31	5.232	0.362	1.23
JHN9YJ		4.727	-0.195	-0.72	4.518	-0.352	-1.20
LUV2GA		5.044	0.122	0.45	4.905	0.035	0.12
MZVY66		5.054	0.132	0.49	5.095	0.225	0.77
Q3RMA4		4.795	-0.127	-0.47	4.882	0.012	0.04
Q7QZV9		4.967	0.045	0.16	4.925	0.055	0.19
TGWRDY		5.011	0.089	0.33	4.954	0.084	0.29
YEWDUP		4.333	-0.589	-2.17	4.230	-0.640	-2.18
YYFEM4		5.208	0.286	1.05	5.094	0.224	0.76

Summary Statistics	<u>Sample PH55</u>	<u>Sample PH56</u>
Grand Means	4.92 Microns	4.87 Microns
Std Dev Btwn Labs	0.27 Microns	0.29 Microns
Statistics based on 10 of 10 reporting participants.		

Key to Instrument Codes Reported by Participants

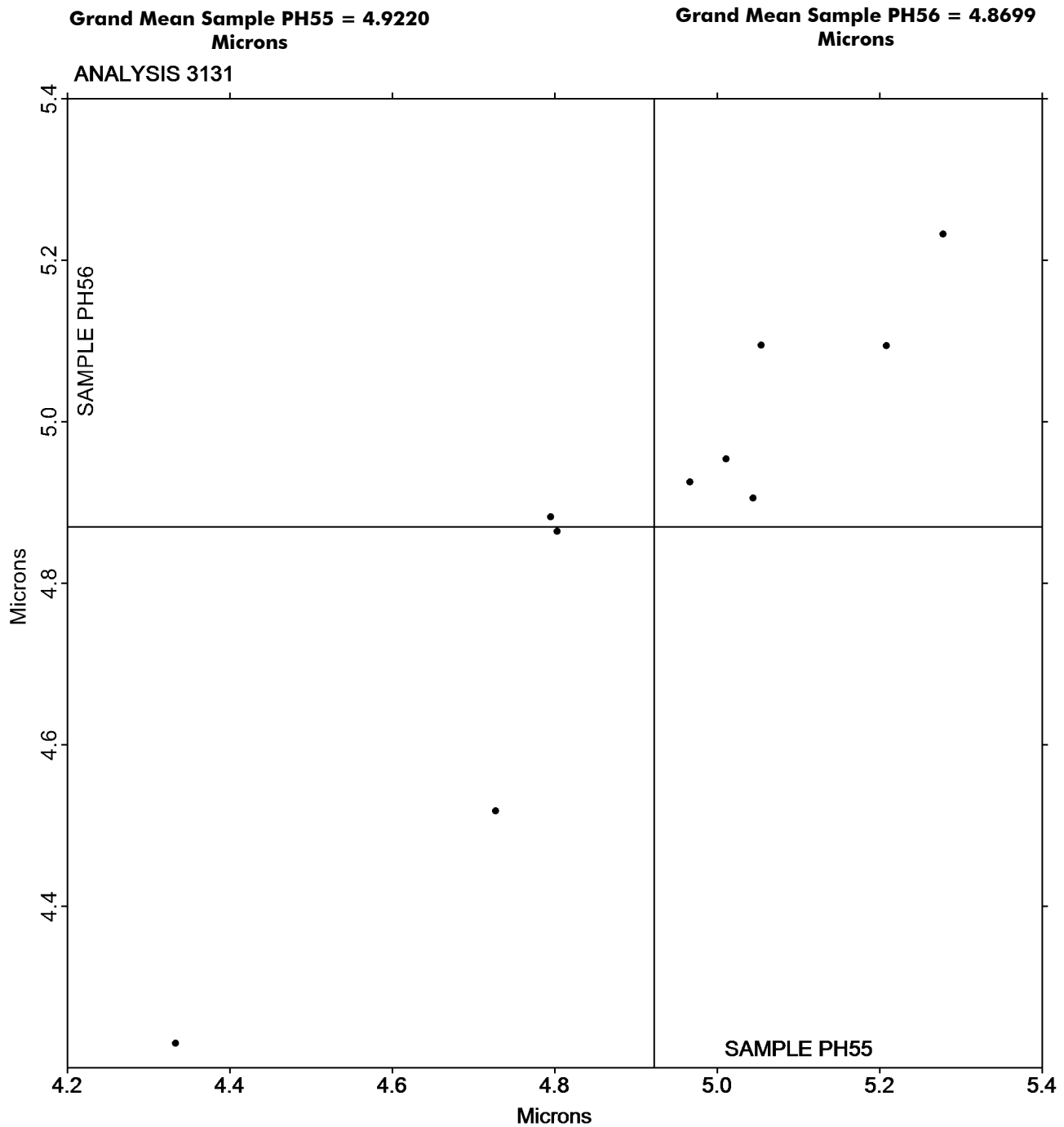
ZZ Instruments No Longer Tracked

Analysis Notes:

Q7QZV9 - One determination removed from the Lab Mean of Sample PH55 per Grubb's Test at 1% risk (TAPPI 1205).



Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3131
Roughness - Print Surf Method - 2.5 to 6.0 Microns
TAPPI Official Test Method T555



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



Report #4431, July 2026

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

WebCode	Data Flag	Sample SR55			Sample SR56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2FG23V		202.4	6.2	0.47	198.0	3.1	0.26
2L99MP		190.6	-5.6	-0.42	197.1	2.3	0.19
3777CU		220.1	23.9	1.81	206.5	11.7	0.97
3Y8JKV		170.0	-26.2	-1.98	176.1	-18.7	-1.55
6WEMVR		191.6	-4.6	-0.35	195.9	1.1	0.09
72KFPM		196.2	0.0	0.00	196.7	1.9	0.16
7LBNMH		197.8	1.6	0.12	199.4	4.6	0.38
7VV66Q		173.0	-23.1	-1.75	176.9	-17.9	-1.49
8CF9BJ		182.7	-13.4	-1.02	180.5	-14.3	-1.18
8TNZDN		190.0	-6.1	-0.46	193.4	-1.4	-0.12
9BKPAH		192.9	-3.3	-0.25	193.2	-1.6	-0.13
9FVZZQ		193.1	-3.1	-0.23	190.1	-4.7	-0.39
9QG68Q		174.2	-22.0	-1.66	173.2	-21.6	-1.79
B8BJKL	*	216.3	20.1	1.52	223.1	28.3	2.35
CCKW3K		172.0	-24.2	-1.83	165.0	-29.8	-2.47
CGD72K		185.8	-10.4	-0.78	191.0	-3.8	-0.32
CJL9XH	*	232.3	36.2	2.74	227.0	32.2	2.67
CXHNXB		205.0	8.8	0.67	204.3	9.5	0.79
D4PGQL		201.7	5.5	0.42	195.6	0.7	0.06
D8NRLL		189.6	-6.5	-0.49	203.1	8.3	0.69
EE24ED		197.3	1.1	0.09	188.4	-6.4	-0.53
G4XRWF		199.1	2.9	0.22	205.3	10.5	0.87
H6MD3C		194.3	-1.9	-0.14	189.1	-5.7	-0.47
HFKG77		181.5	-14.7	-1.11	186.5	-8.3	-0.69
J4LZUA		217.9	21.7	1.64	208.6	13.8	1.14
JHN9YJ		201.5	5.3	0.40	208.7	13.9	1.15
K8NZU8		205.3	9.1	0.69	197.4	2.6	0.21
LUV2GA		195.3	-0.9	-0.06	198.7	3.9	0.32
MKYK6B		202.8	6.6	0.50	191.5	-3.3	-0.28
MZVY66		200.5	4.3	0.33	199.6	4.8	0.40
PQYJT6	X	332.6	136.4	10.32	334.6	139.8	11.59
Q3RMA4		196.5	0.3	0.03	190.6	-4.2	-0.35
QG9KE6_AL		197.9	1.7	0.13	190.9	-3.9	-0.32
X9CVY3		199.9	3.7	0.28	192.4	-2.4	-0.20
XALZCQ_AL		193.3	-2.9	-0.22	193.9	-0.9	-0.07
XYLAT4		204.1	7.9	0.60	203.2	8.4	0.70
YEWDUP		183.1	-13.1	-0.99	178.7	-16.1	-1.33
YYFEM4		197.3	1.2	0.09	197.3	2.4	0.20
ZPNJZT		191.5	-4.7	-0.35	192.7	-2.1	-0.17
ZY9WTW		214.0	17.8	1.35	197.8	3.0	0.25



Paper & Paperboard Interlaboratory Testing Program **Report #4431, July 2026**
Analysis 3133
Roughness - Sheffield Type
TAPPI Official Test Method T538

Summary Statistics	Sample SR55	Sample SR56
Grand Means	196.16 Sheffield	194.80 Sheffield
Stnd Dev Btwn Labs	13.22 Sheffield	12.07 Sheffield

Statistics based on 39 of 40 reporting participants.

Key to Instrument Codes Reported by Participants

GA	Gurley Precision #4340 Automatic Densometer	HM	Technidyne - Hagerty Model #538
LA	L & W Roughness Sheffield - Autoline	LB	L & W - Autoline 600
LC	L & W Autoline 400	LW	L & W Roughness Tester
PG	Precision Gage Smoothcheck	PP	Technidyne Profile/Plus
SH	Sheffield (Bendix Precisionaire)	ST	Sheffield Smoothness Tester
VM	Valmet PaperLab (was Kajaani\Robotest)	XX	Instrument make/model not specified by lab

Comments on Assigned Data Flags for Test #3133

PQYJT6 (X) - Extreme Data.

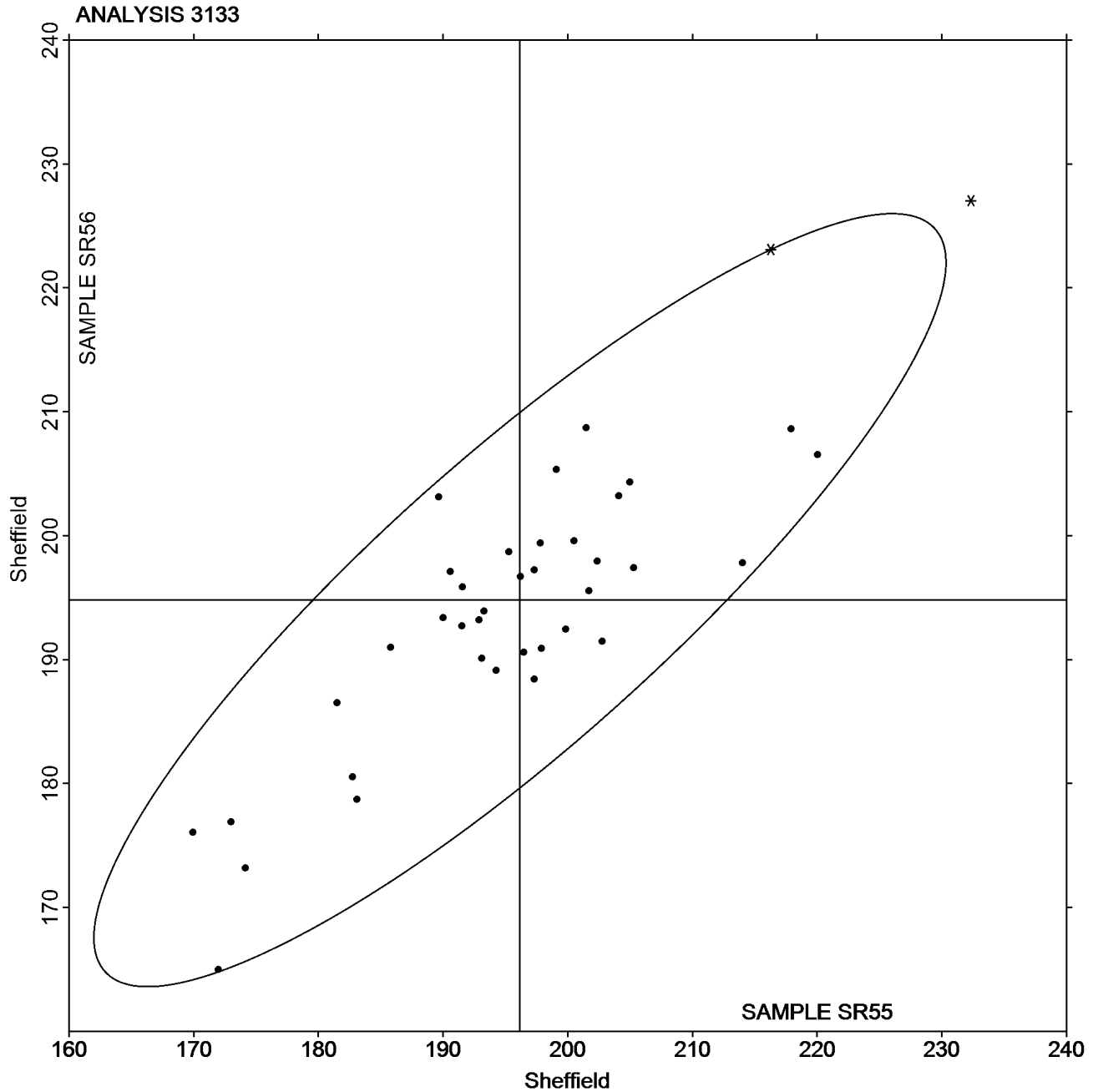
Analysis Notes:

YYFEM4 - Data appears to be transposed between Analysis 3141 (Opacity (89% Backing) 82 to 95%) and Analysis 3133 (Roughness, Sheffield Type). CTS will not correct going forward.



Grand Mean Sample SR55 = 196.16
Sheffield

Grand Mean Sample SR56 = 194.80
Sheffield





Report #4431, July 2026

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

WebCode	Data Flag	Sample GM55			Sample GM56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3R4PDK		87.02	0.06	0.11	102.0	0.1	0.24
72KFPM		86.82	-0.14	-0.27	101.3	-0.6	-1.29
77UT8L		87.44	0.48	0.89	102.3	0.4	0.84
7VV66Q		87.07	0.11	0.20	102.1	0.3	0.54
8TNZDN		86.50	-0.46	-0.86	101.7	-0.2	-0.42
9QG68Q	X	23.31	-63.65	-119.12	27.3	-74.6	-158.79
EE24ED		87.60	0.64	1.19	101.5	-0.4	-0.91
EXWT9L		87.24	0.28	0.52	102.3	0.4	0.90
F7KTFH		86.91	-0.05	-0.10	102.4	0.5	1.09
KLHPQ4		86.72	-0.24	-0.46	102.4	0.5	1.05
MKYK6B		87.44	0.48	0.89	102.5	0.6	1.26
PQYJT6		86.85	-0.11	-0.21	101.9	0.1	0.11
QG9KE6		85.55	-1.41	-2.64	101.6	-0.3	-0.67
RHX7L2		86.74	-0.22	-0.42	101.4	-0.5	-1.02
RRNQY		88.15	1.18	2.22	102.9	1.0	2.19
RTV7X6		86.76	-0.21	-0.39	101.5	-0.4	-0.92
TG3W66		86.61	-0.35	-0.66	101.6	-0.3	-0.54
TGWRDY		86.45	-0.51	-0.96	101.8	-0.1	-0.23
V63Xfv		87.33	0.37	0.68	101.8	-0.1	-0.17
Y6L9GY		87.30	0.34	0.63	101.1	-0.8	-1.72
ZPDGEU		86.76	-0.20	-0.38	101.7	-0.2	-0.34

Summary Statistics	Sample GM55	Sample GM56
Grand Means	86.96 g/sq m	101.89 g/sq m
Std Dev Btwn Labs	0.53 g/sq m	0.47 g/sq m
Statistics based on 20 of 21 reporting participants.		

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Comments on Assigned Data Flags for Test #3135

9QG68Q (X) - Extreme Data.

Analysis Notes:

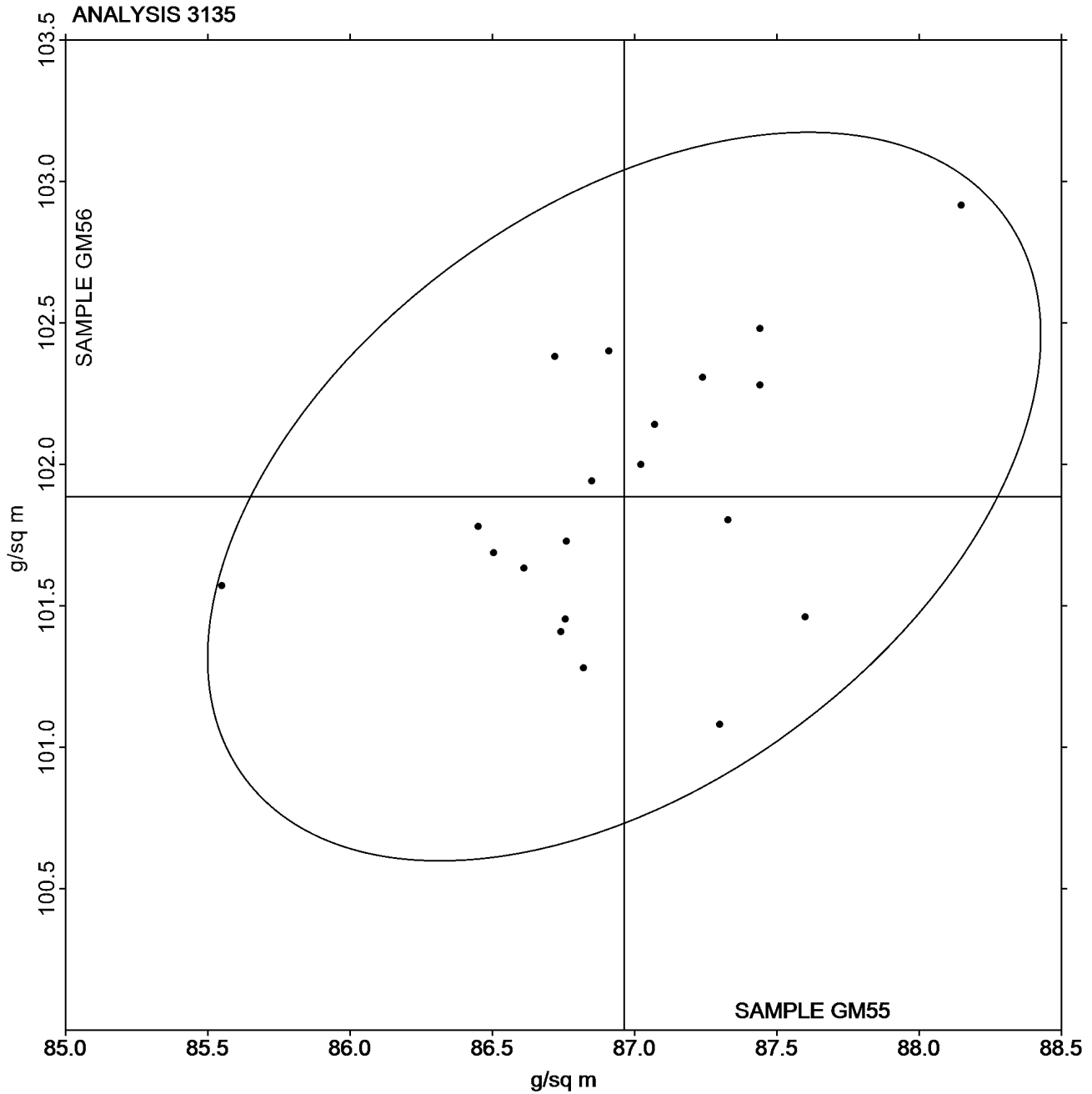
9QG68Q - Possible factor error.

MKYK6B - Data appear to be off by a factor of .10 (x10). CTS will not correct going forward.



Grand Mean Sample GM55 = 86.963
g/sq m

Grand Mean Sample GM56 = 101.89
g/sq m





Report #4431, July 2026

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

WebCode	Data Flag	Sample VR55			Sample VR56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
26YJAN		93.60	0.31	1.26	95.12	0.18	1.52
3777CU		93.27	-0.03	-0.12	94.90	-0.04	-0.32
3Y8JKV		92.82	-0.48	-1.98	94.85	-0.09	-0.78
72KFPM	X	90.56	-2.74	-11.23	88.09	-6.85	-57.08
7VV66Q		92.98	-0.32	-1.32	94.71	-0.23	-1.93
8CF9BJ		93.16	-0.14	-0.57	94.81	-0.13	-1.09
8TNZDN		93.49	0.19	0.79	94.90	-0.04	-0.34
9QG68Q		93.47	0.17	0.71	94.97	0.03	0.25
D4PGQL		93.08	-0.22	-0.88	94.84	-0.10	-0.87
EE24ED		93.23	-0.07	-0.28	94.91	-0.03	-0.25
H4RWQF		93.67	0.38	1.54	95.05	0.10	0.87
L33VB3		93.06	-0.24	-0.97	94.83	-0.11	-0.92
QG9KE6		93.38	0.08	0.34	95.15	0.21	1.75
RHX7L2		93.33	0.03	0.13	94.97	0.03	0.25
X9CVY3		93.21	-0.08	-0.34	94.90	-0.04	-0.33
XALZCQ		93.10	-0.20	-0.81	94.95	0.01	0.08
XYLAT4		93.67	0.37	1.53	95.14	0.20	1.66
YYFEM4		93.30	0.01	0.02	94.92	-0.03	-0.21
ZPNJZT	X	93.39	0.09	0.37	94.18	-0.76	-6.32
ZY9WTW		93.53	0.23	0.95	95.02	0.08	0.66

Summary Statistics	Sample VR55	Sample VR56
Grand Means	93.30 Percent	94.94 Percent
Std Dev Btwn Labs	0.24 Percent	0.12 Percent
Statistics based on 18 of 20 reporting participants.		

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Comments on Assigned Data Flags for Test #3141

72KFPM (X) - Extreme Data.

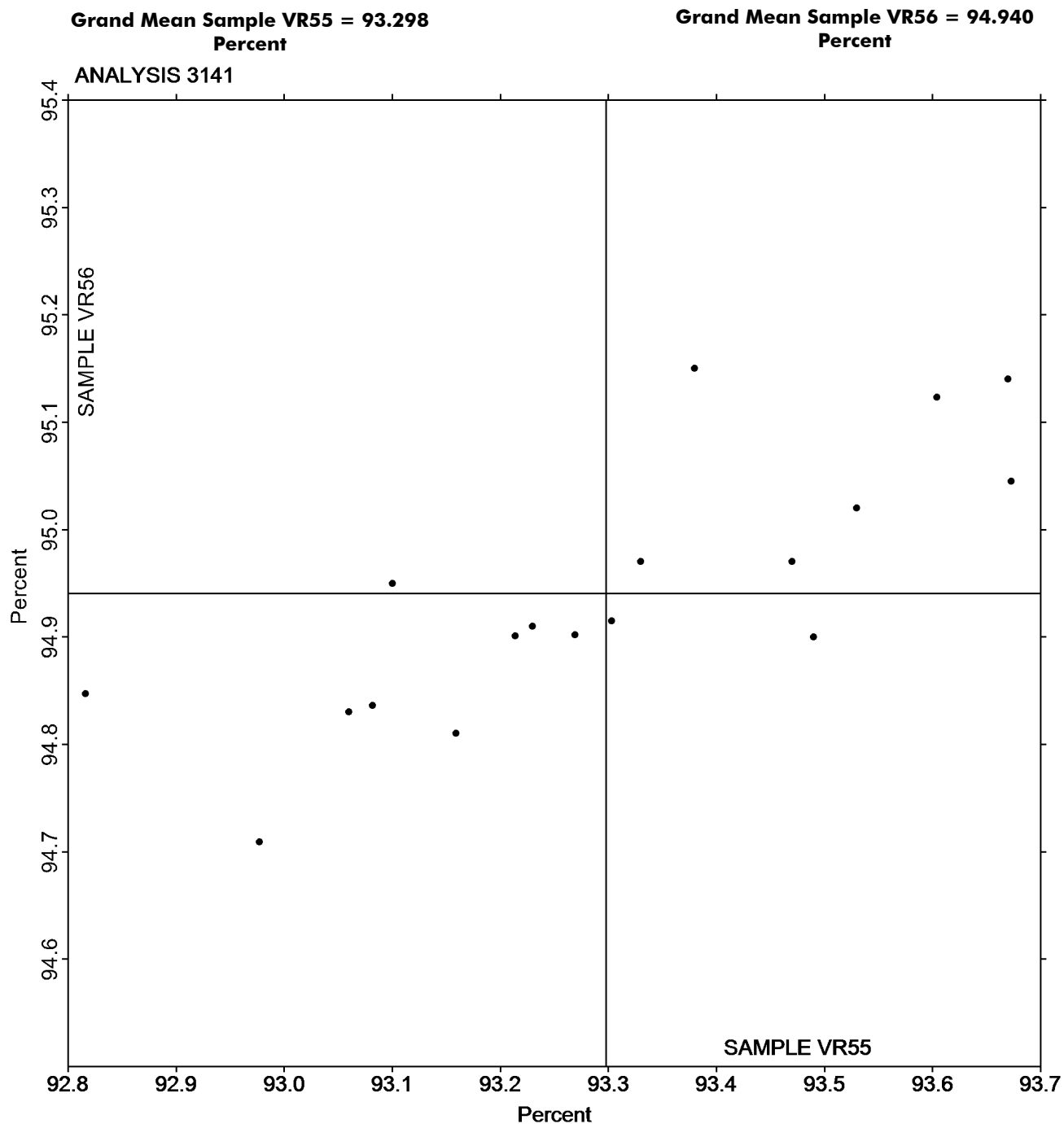
ZPNJZT (X) - Extreme Data for sample VR56.

Analysis Notes:

YYFEM4 - Data appears to be transposed between Analysis 3133 (Roughness, Sheffield Type) and Analysis 3141 (Opacity (89% Backing) 82 to 95%). CTS will not correct going forward.



Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3141
Opacity (89% Reflectance Backing) - Fine Papers
TAPPI Official Test Method T425



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



Report #4431, July 2026

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

WebCode	Data Flag	<u>Sample BF55</u>			<u>Sample BF56</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
26YJAN		86.87	-0.11	-0.19	86.87	-0.17	-0.24
3Y8JKV		87.27	0.28	0.47	87.92	0.88	1.24
7VV66Q		86.97	-0.02	-0.03	86.89	-0.15	-0.21
8Z7HMP		86.07	-0.92	-1.54	85.97	-1.07	-1.51
B8BJKL		87.54	0.55	0.93	87.36	0.32	0.46
CXHNXB		85.87	-1.12	-1.88	85.74	-1.30	-1.83
H4RWQF		87.05	0.06	0.11	87.30	0.26	0.37
MKYK6B		87.45	0.47	0.78	87.74	0.70	0.98
RHX7L2		87.99	1.00	1.69	88.06	1.02	1.44
RMUU39		86.96	-0.03	-0.04	87.00	-0.04	-0.05
X9CVY3		86.62	-0.37	-0.62	86.61	-0.43	-0.60
YYFEM4		87.19	0.20	0.34	87.01	-0.03	-0.04

Summary Statistics	<u>Sample BF55</u>	<u>Sample BF56</u>
Grand Means	86.99 Percent	87.04 Percent
Std Dev Btwn Labs	0.59 Percent	0.71 Percent
Statistics based on 12 of 12 reporting participants.		

Key to Instrument Codes Reported by Participants

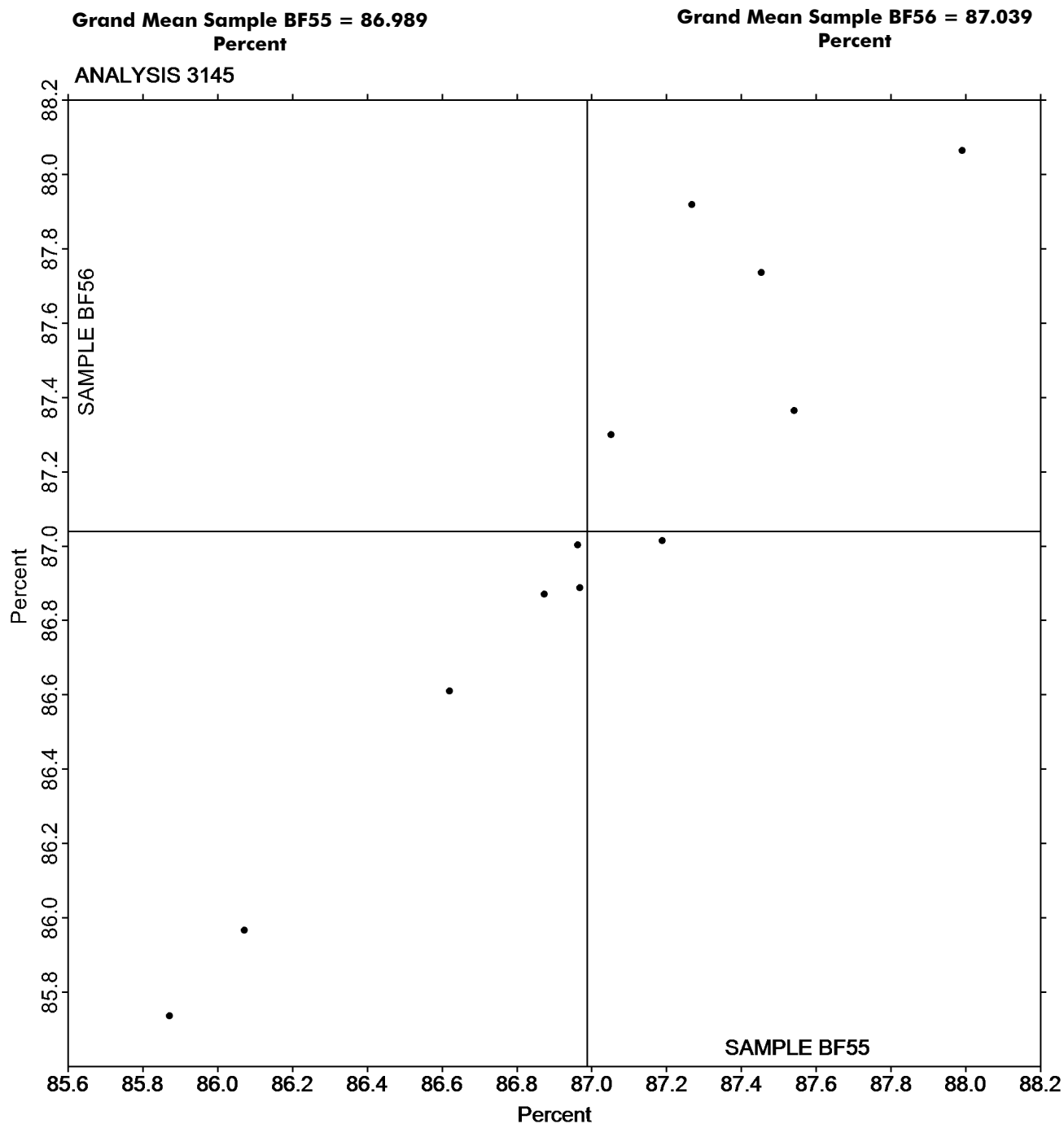
PP	Technidyne Profile/Plus	TC	Technidyne Color Touch Series
TD	Technidyne Color Touch X-45	TE	Technidyne TEST/Plus TAPPI Brightness
TS	Technidyne Brightimeter Micro S-5	TT	Technidyne Brightimeter Micro S4-M
XX	Instrument make/model not specified by lab		

Analysis Notes:

RMUU39 - One determination removed from the Lab Mean of Sample BF56 per Grubb's Test at 1% risk (TAPPI 1205).



Paper & Paperboard Interlaboratory Testing Program **Report #4431, July 2026**
Analysis 3145
Directional Brightness of Fluorescent Samples
TAPPI Official Test Method T452



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 #4431, July 2026
Analysis 3146
Fluorescent Component of Directional Brightness
TAPPI Official Test Method T452

WebCode	Data Flag	Sample BF55			Sample BF56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
26YJAN		4.606	0.068	0.35	4.644	0.083	0.35
3Y8JKV		4.756	0.218	1.12	4.894	0.333	1.42
7VV66Q		4.508	-0.030	-0.15	4.456	-0.105	-0.45
8Z7HMP		4.692	0.154	0.79	4.684	0.123	0.52
B8BJKL		4.268	-0.270	-1.38	4.234	-0.327	-1.39
CXHNXB		4.398	-0.140	-0.72	4.426	-0.135	-0.57
H4RWQF		4.580	0.042	0.22	4.626	0.065	0.28
RMUU39		4.226	-0.312	-1.60	4.174	-0.387	-1.65
X9CVY3		4.532	-0.006	-0.03	4.658	0.097	0.41
YYFEM4		4.812	0.274	1.40	4.814	0.253	1.08

Summary Statistics**Sample BF55****Sample BF56****Grand Means**

4.54 Percent

4.56 Percent

Std Dev Btwn Labs

0.20 Percent

0.23 Percent

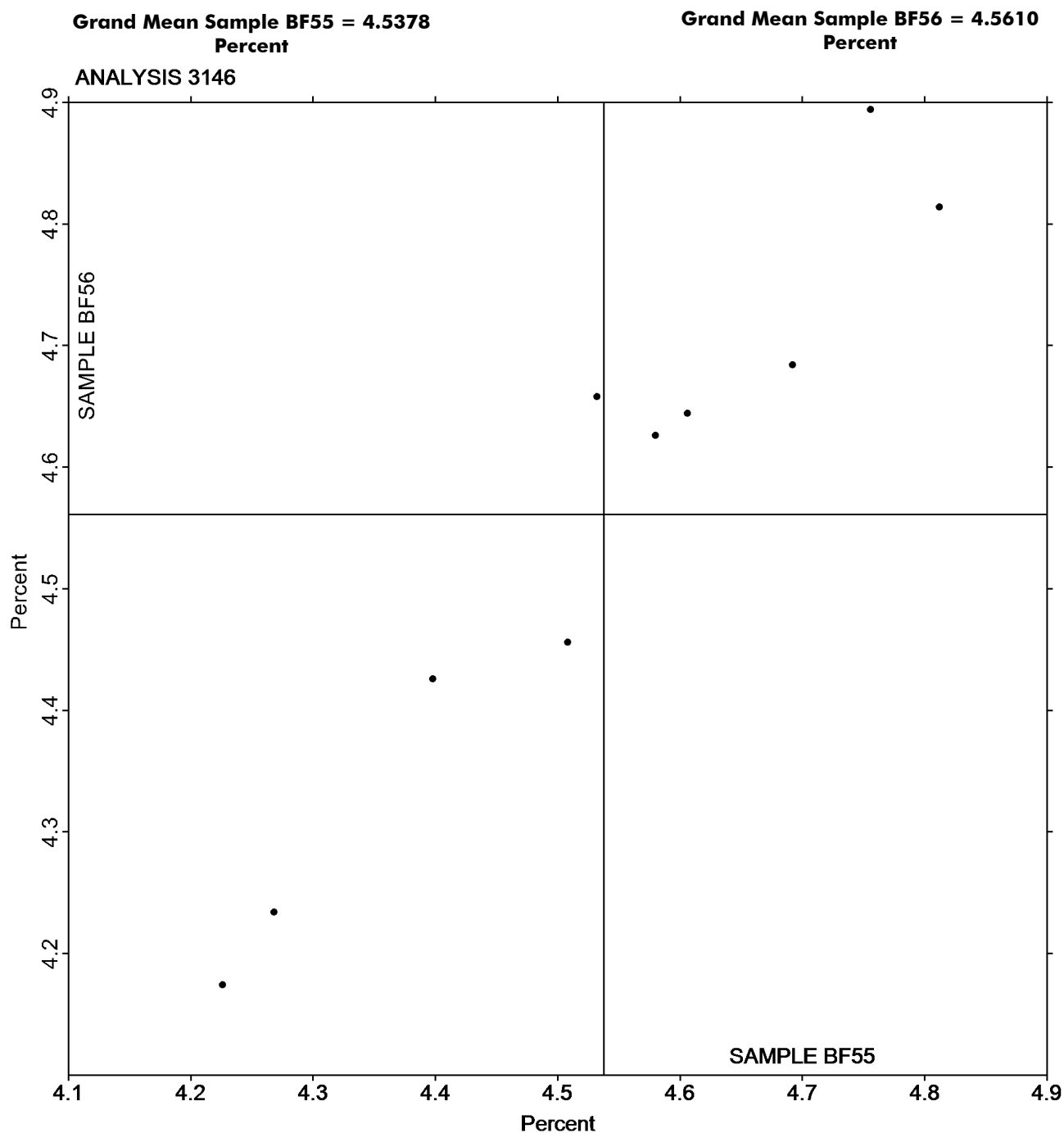
Statistics based on 10 of 10 reporting participants.

Key to Instrument Codes Reported by Participants

PP	Technidyne Profile/Plus	TD	Technidyne Color Touch X-45
TE	Technidyne TEST/Plus TAPPI Brightness	TS	Technidyne Brightimeter Micro S-5
XX	Instrument make/model not specified by lab		



Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3146
Fluorescent Component of Directional Brightness
TAPPI Official Test Method T452



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



Report #4431, July 2026

Paper & Paperboard Interlaboratory Testing Program
Analysis 3201
Bending Resistance, Taber Type - 0 to 10 Units
TAPPI Official Test Method T566

WebCode	Data Flag	<u>Sample TP55</u>			<u>Sample TP56</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3777CU		2.022	0.038	0.15	1.939	-0.004	-0.01
3Y8JKV	X	17.967	15.984	63.12	17.662	15.719	55.05
9FVZZQ		1.663	-0.321	-1.27	1.559	-0.384	-1.34
CYE49M		2.300	0.316	1.25	2.290	0.348	1.22
X9CVY3		1.847	-0.137	-0.54	1.817	-0.125	-0.44
YYFEM4		1.821	-0.163	-0.64	1.790	-0.153	-0.53
ZPNJZT		2.250	0.266	1.05	2.260	0.317	1.11

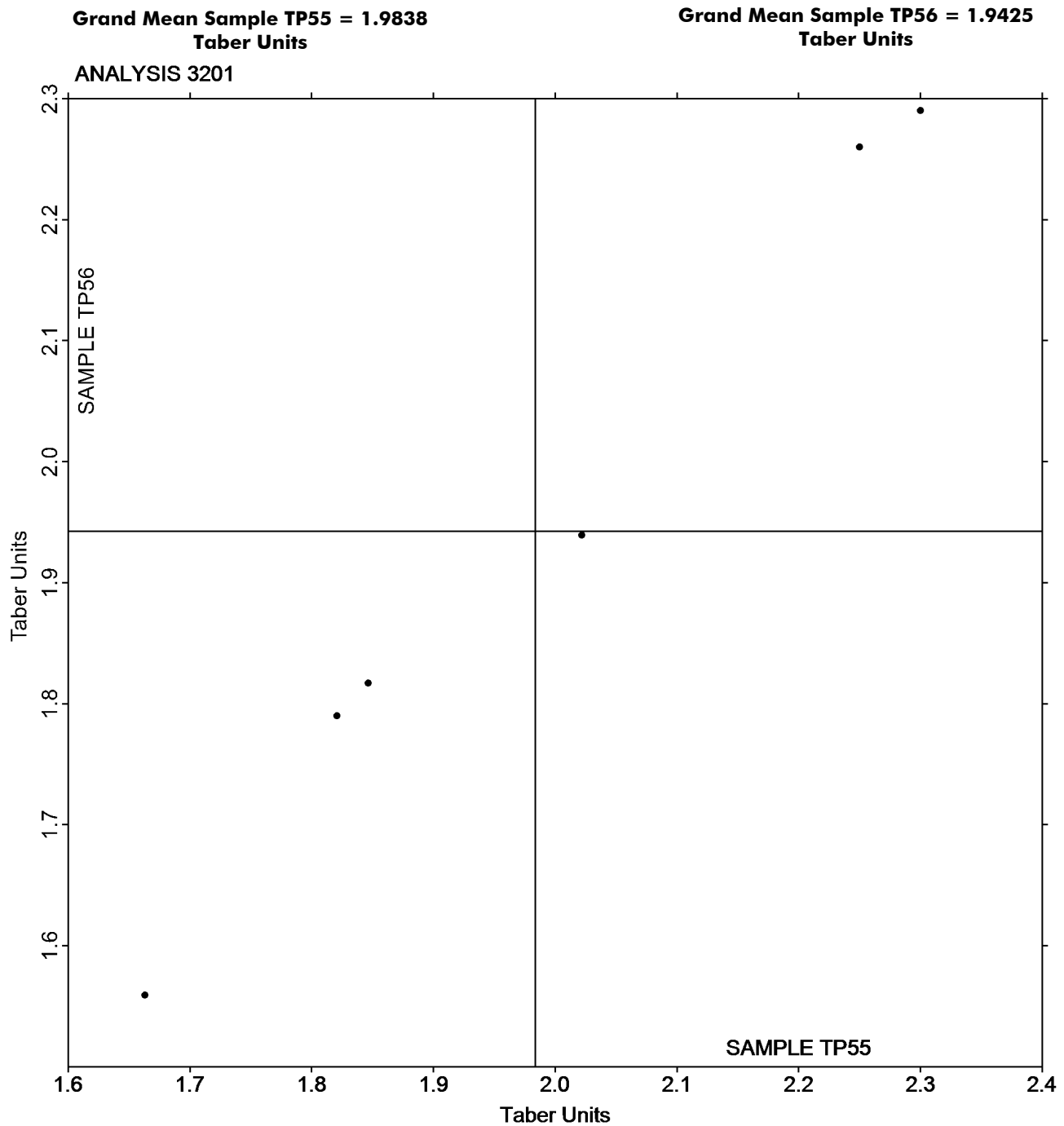
Summary Statistics	<u>Sample TP55</u>	<u>Sample TP56</u>
Grand Means	1.98 Taber Units	1.94 Taber Units
Std Dev Btwn Labs	0.25 Taber Units	0.29 Taber Units
Statistics based on 6 of 7 reporting participants.		

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Comments on Assigned Data Flags for Test #3201

3Y8JKV (X) - Extreme Data.



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



Report #4431, July 2026

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

WebCode	Data Flag	<u>Sample TC55</u>			<u>Sample TC56</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
26YJAN		17.36	-2.70	-0.45	17.55	-2.59	-0.44
2FG23V		19.35	-0.71	-0.12	19.53	-0.61	-0.10
3777CU		17.61	-2.45	-0.41	17.74	-2.40	-0.41
6WEMVR		20.73	0.67	0.11	20.58	0.44	0.08
8TNZDN		17.88	-2.18	-0.36	17.63	-2.51	-0.43
CCKW3K		17.82	-2.24	-0.37	17.97	-2.17	-0.37
FYLG78		18.39	-1.67	-0.28	19.48	-0.66	-0.11
LUV2GA	*	38.76	18.70	3.12	38.40	18.26	3.12
MKYK6B		18.50	-1.56	-0.26	18.15	-1.98	-0.34
Q3RMA4		16.95	-3.11	-0.52	17.20	-2.94	-0.50
Q7QZV9		19.79	-0.27	-0.05	19.67	-0.47	-0.08
YPUD7U		17.60	-2.46	-0.41	17.72	-2.42	-0.41

Summary Statistics	<u>Sample TC55</u>	<u>Sample TC56</u>
Grand Means	20.06 Taber Units	20.14 Taber Units
Std Dev Btwn Labs	5.99 Taber Units	5.85 Taber Units
Statistics based on 12 of 12 reporting participants.		

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

Analysis Notes:

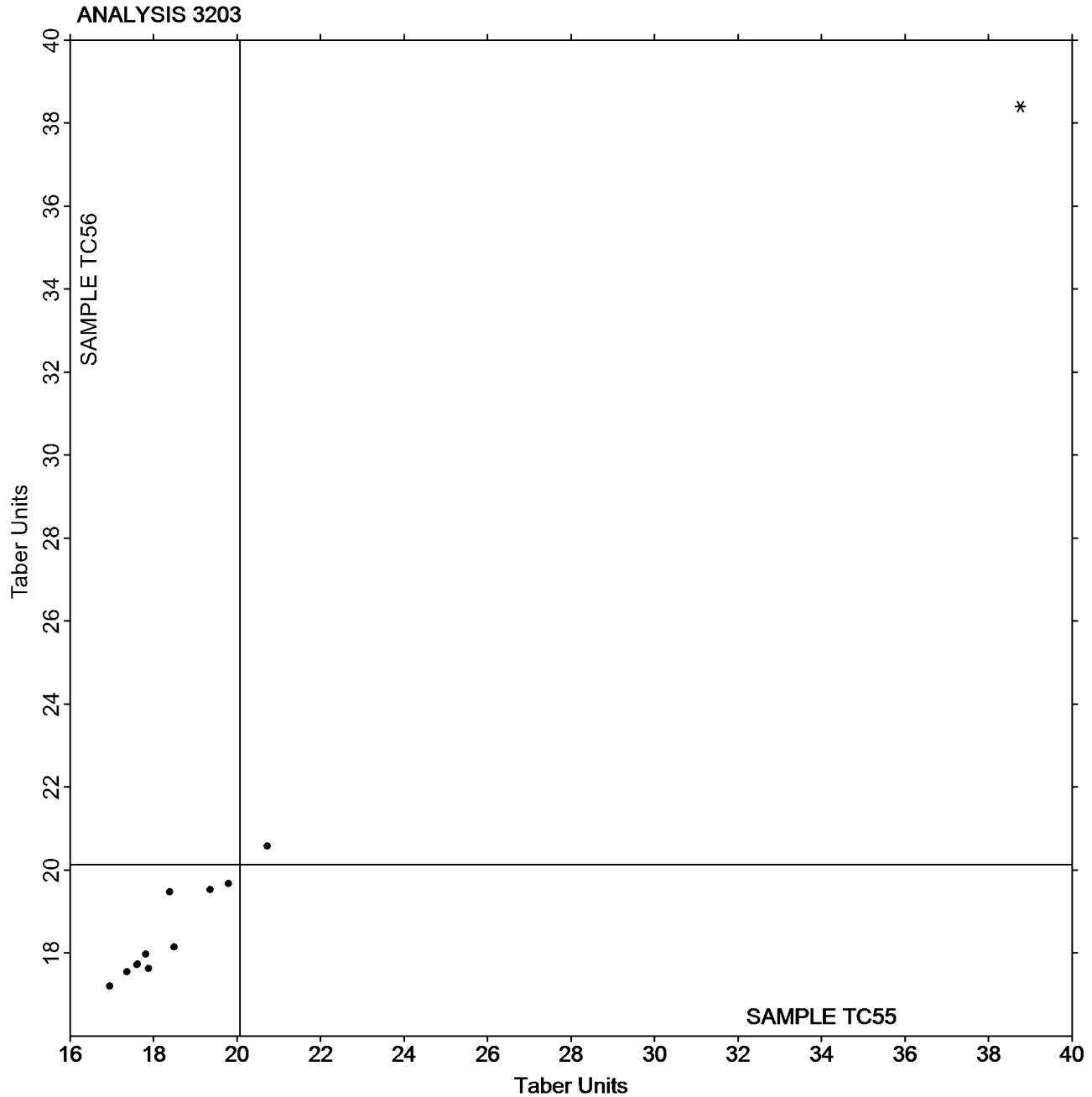
- LUV2GA - Data appear to be reported as g-cm, not mN-m as indicated on data entry form. CTS will not correct the Units going forward.
- MKYK6B - Data appear to be reported as g-cm, not mN-m as indicated on data entry form. CTS will not correct the Units going forward.
- Q3RMA4 - Data appear to be reported as g-cm, not mN-m as indicated on data entry form. CTS will not correct the Units going forward.



Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3203
Bending Resistance, Taber Type - 10 to 100 Taber Units
TAPPI Official Test Method T489

Grand Mean Sample TC55 = 20.062
Taber Units

Grand Mean Sample TC56 = 20.135
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	<u>Sample TR55</u>			<u>Sample TR56</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2L99MP		175.6	-0.5	-0.02	181.0	3.3	0.12
AFP7TQ		179.7	3.6	0.17	162.7	-15.0	-0.56
CCKW3K		171.4	-4.7	-0.22	171.9	-5.8	-0.22
CGD72K		167.3	-8.8	-0.41	167.3	-10.4	-0.39
G4XRWF		168.1	-8.0	-0.37	171.7	-6.0	-0.23
JHN9YJ		235.1	58.9	2.76	254.4	76.7	2.86
L97NJC		149.2	-26.9	-1.26	149.7	-28.0	-1.04
LUV2GA		180.2	4.0	0.19	178.3	0.6	0.02
MZVY66		165.8	-10.3	-0.48	170.0	-7.7	-0.29
Q3RMA4		177.3	1.2	0.06	177.0	-0.7	-0.02
XYLAT4		167.7	-8.4	-0.39	170.7	-7.0	-0.26

Summary Statistics	<u>Sample TR55</u>	<u>Sample TR56</u>
Grand Means	176.12 Taber Units	177.70 Taber Units
Std Dev Btwn Labs	21.38 Taber Units	26.82 Taber Units
Statistics based on 11 of 11 reporting participants.		

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

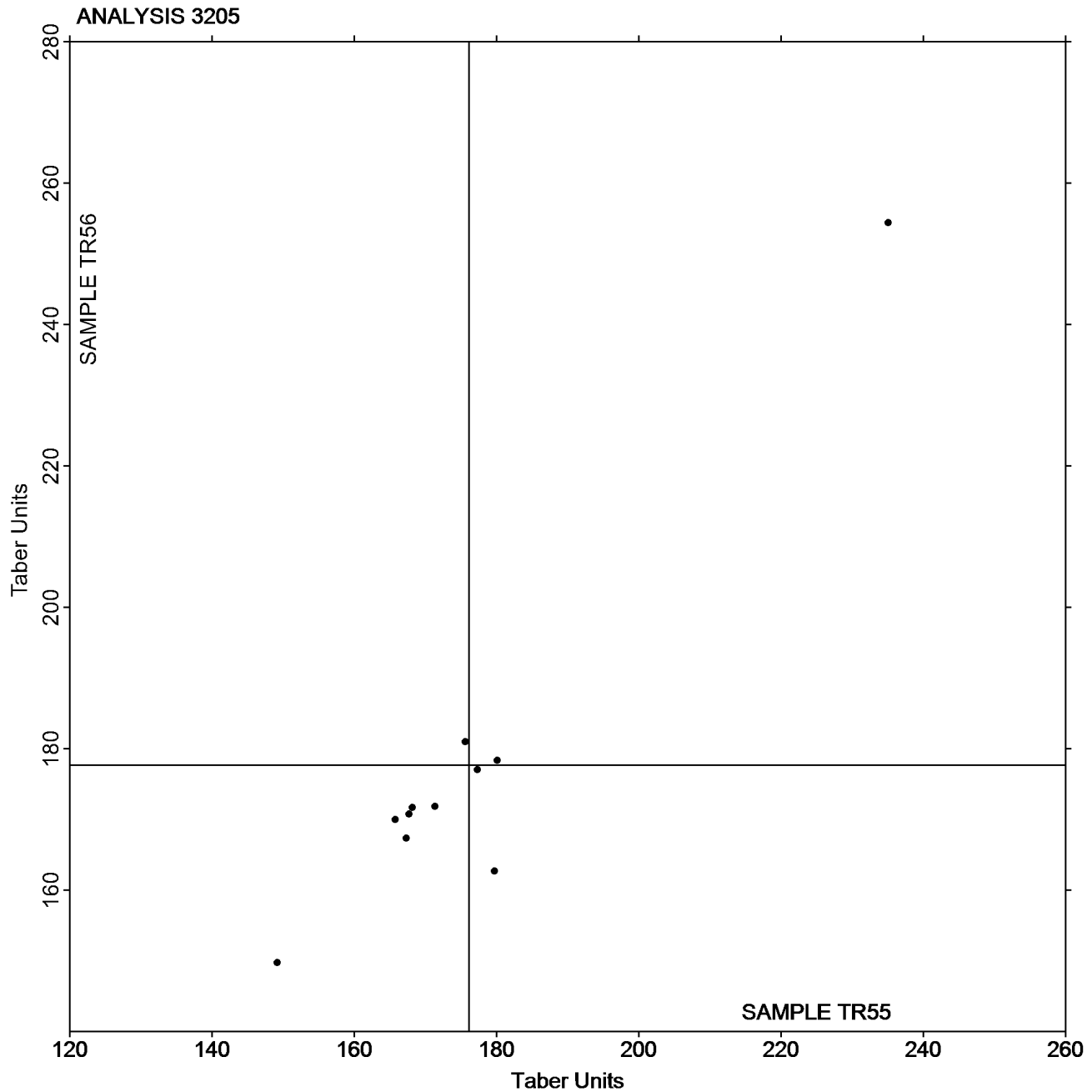
Analysis Notes:

- LUV2GA - Data appear to be reported as g-cm, not mN-m as indicated on data entry form. CTS will not correct the Units going forward.
- Q3RMA4 - Data appear to be reported as g-cm, not mN-m as indicated on data entry form. CTS will not correct the Units going forward.



Grand Mean Sample TR55 = 176.12
Taber Units

Grand Mean Sample TR56 = 177.70
Taber Units



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



Report #4431, July 2026

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

WebCode	Data Flag	Sample ZR55			Sample ZR56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
6JLZPW		47.20	-4.84	-1.04	50.80	-1.60	-0.32
8YUT8J		50.16	-1.88	-0.40	50.78	-1.62	-0.33
A3NAXJ		50.00	-2.04	-0.44	52.66	0.26	0.05
CCKW3K		51.84	-0.20	-0.04	51.44	-0.96	-0.19
CGD72K		50.84	-1.20	-0.26	51.44	-0.96	-0.19
HT7THF		47.62	-4.42	-0.95	48.38	-4.02	-0.81
JHN9YJ		50.40	-1.64	-0.35	52.00	-0.40	-0.08
MZVY66		53.40	1.36	0.29	52.00	-0.40	-0.08
PP4ZQ4		54.80	2.76	0.59	53.40	1.00	0.20
Q3RMA4		53.84	1.80	0.39	53.24	0.84	0.17
QQULXZ		53.64	1.59	0.34	50.15	-2.25	-0.45
XD7RNT	*	64.16	12.12	2.60	67.72	15.32	3.08
XYLAT4		44.84	-7.20	-1.54	45.20	-7.20	-1.45
YEWDUP		55.84	3.80	0.81	54.36	1.96	0.40

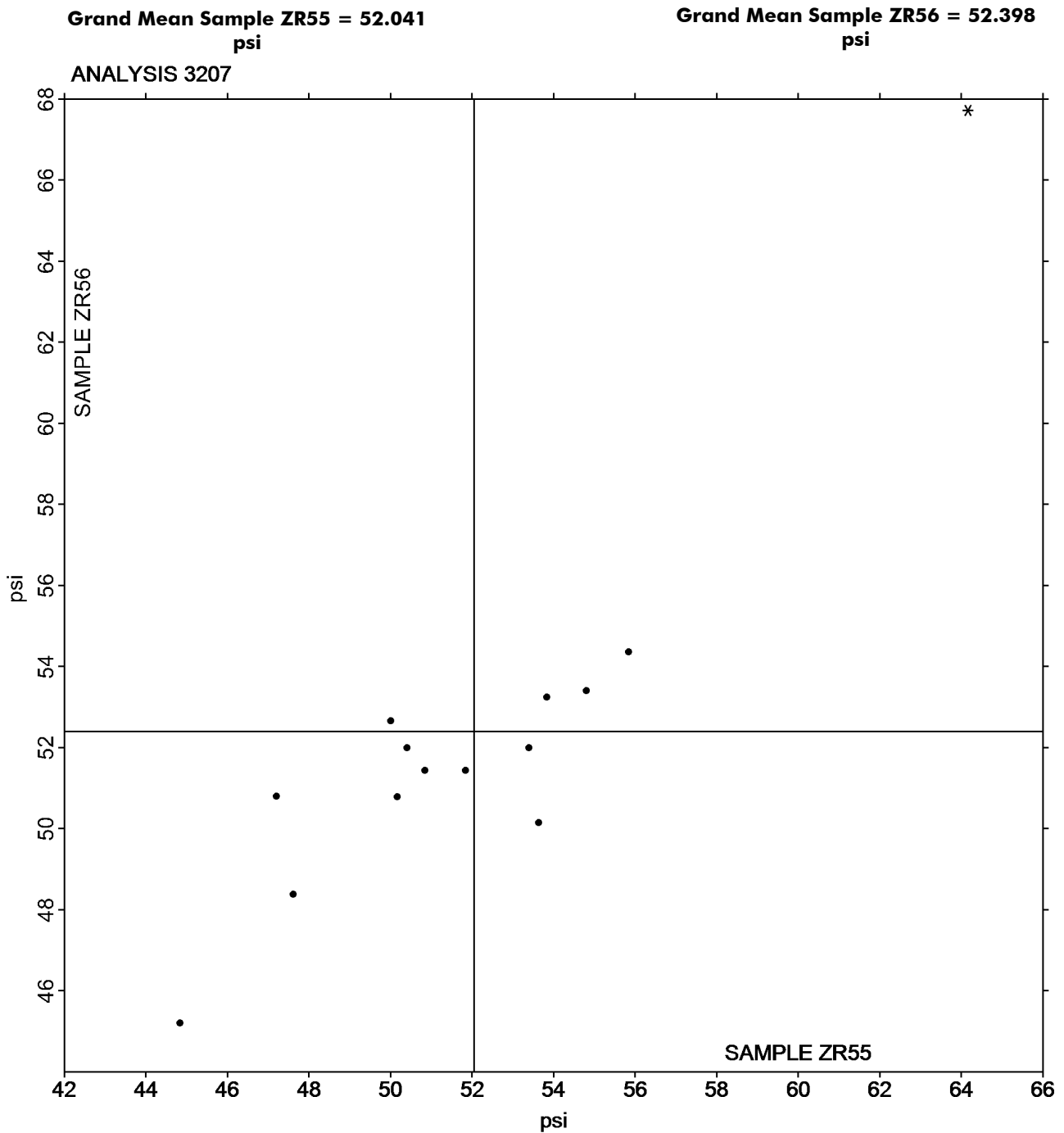
Summary Statistics	Sample ZR55	Sample ZR56
Grand Means	52.04 psi	52.40 psi
Std Dev Btwn Labs	4.67 psi	4.97 psi
Statistics based on 14 of 14 reporting participants.		

Key to Instrument Codes Reported by Participants

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



Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3207
Z-Direction Tensile, Recycled Paperboard
TAPPI Official Test Method T541



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 #4431, July 2026
Analysis 3209
Z-Direction Tensile
TAPPI Official Test Method T541

WebCode	Data Flag	Sample ZP55			Sample ZP56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2FG23V		85.12	5.46	0.77	82.44	3.11	0.45
2L99MP		84.58	4.92	0.69	82.22	2.89	0.42
6WEMVR		90.04	10.38	1.46	89.08	9.75	1.42
DPM8LC		79.00	-0.66	-0.09	78.00	-1.33	-0.19
FYLG78		77.84	-1.82	-0.26	82.32	2.99	0.44
G4XRWF		75.76	-3.90	-0.55	74.84	-4.49	-0.65
PQYJT6		69.44	-10.22	-1.44	69.27	-10.05	-1.47
Q3RMA4		85.00	5.34	0.75	85.84	6.51	0.95
Q7QZV9		70.16	-9.50	-1.34	69.92	-9.41	-1.37

Summary Statistics

Sample ZP55

Sample ZP56

Grand Means

79.66 psi

79.33 psi

Std Dev Btwn Labs

7.10 psi

6.86 psi

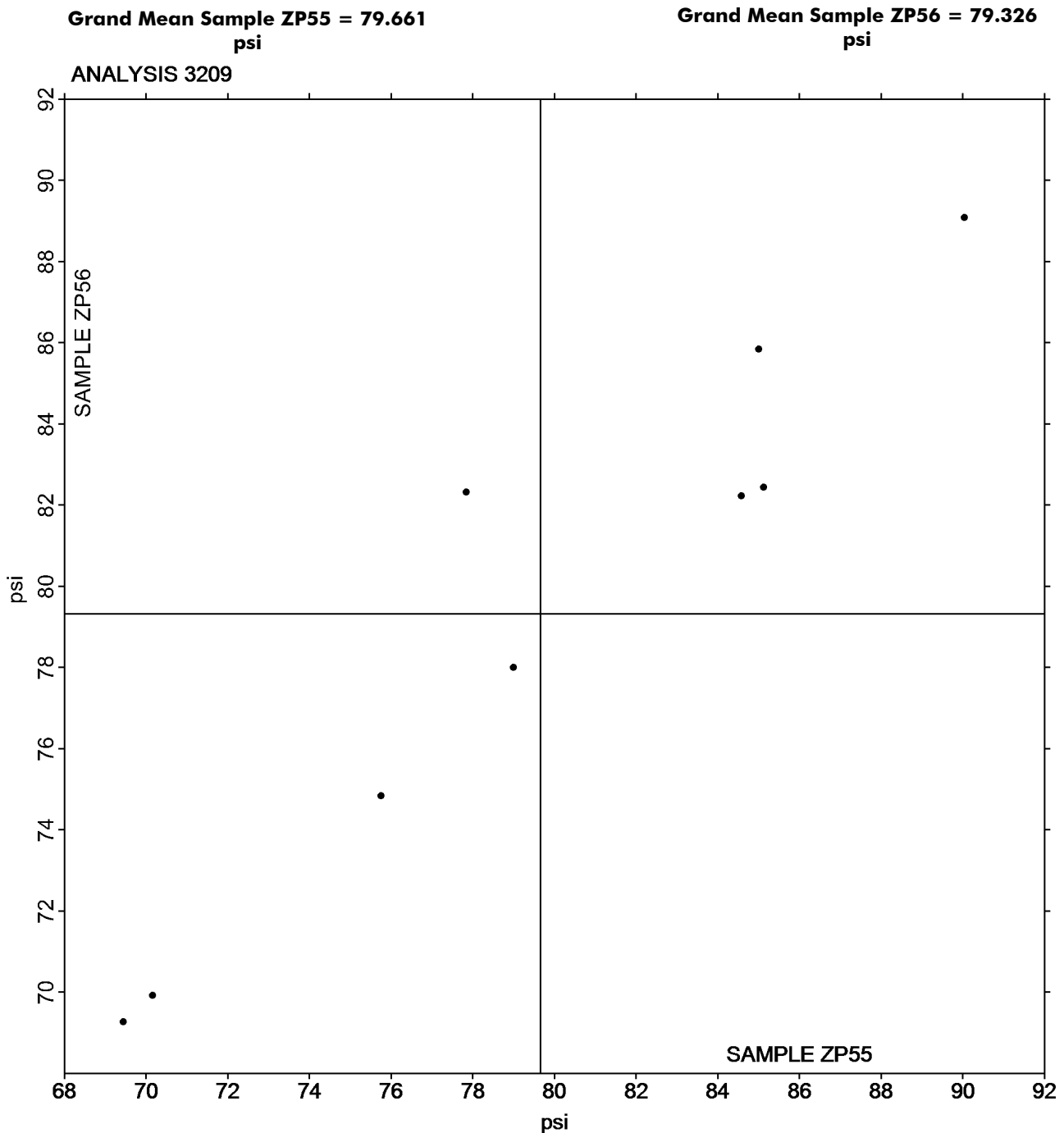
Statistics based on 9 of 9 reporting participants.

Key to Instrument Codes Reported by Participants

CD CSI CS-163D

LW L & W ZD Tensile Tester

TA Thwing-Albert Tensile Tester



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



Report #4431, July 2026

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

WebCode	Data Flag	<u>Sample SM55</u>			<u>Sample SM56</u>		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2FG23V		179.2	4.2	0.18	190.6	16.2	0.72
2L99MP		122.8	-52.2	-2.28	113.0	-61.4	-2.70
6WEMVR		190.4	15.4	0.67	195.0	20.6	0.91
7VV66Q		167.0	-8.0	-0.35	160.8	-13.6	-0.60
8CF9BJ		162.2	-12.8	-0.56	167.2	-7.2	-0.32
CXHNXB		192.4	17.4	0.76	178.6	4.2	0.19
CYE49M		156.0	-19.0	-0.83	165.4	-9.0	-0.40
D8NRLL		170.0	-5.0	-0.22	173.6	-0.8	-0.03
FYLG78		172.0	-3.0	-0.13	185.2	10.8	0.48
H6MD3C		183.6	8.6	0.37	179.8	5.4	0.24
MZVY66		214.0	39.0	1.70	199.8	25.4	1.12
Q3RMA4		190.8	15.8	0.69	183.4	9.0	0.40

Summary Statistics	<u>Sample SM55</u>	<u>Sample SM56</u>
Grand Means	175.03 1000th ft-lbs	174.37 1000th ft-lbs
Std Dev Btwn Labs	22.86 1000th ft-lbs	22.69 1000th ft-lbs
Statistics based on 12 of 12 reporting participants.		

Key to Instrument Codes Reported by Participants

HX	Huygen Internal Scott Bond Tester	HY	Huygen Digitized Internal Scott Bond Tester
HZ	Huygen Internal Bond Tester with AccuPress	KR	Kumagai Riki Kogyo Internal Bond Tester
XX	Instrument make/model not specified by lab		

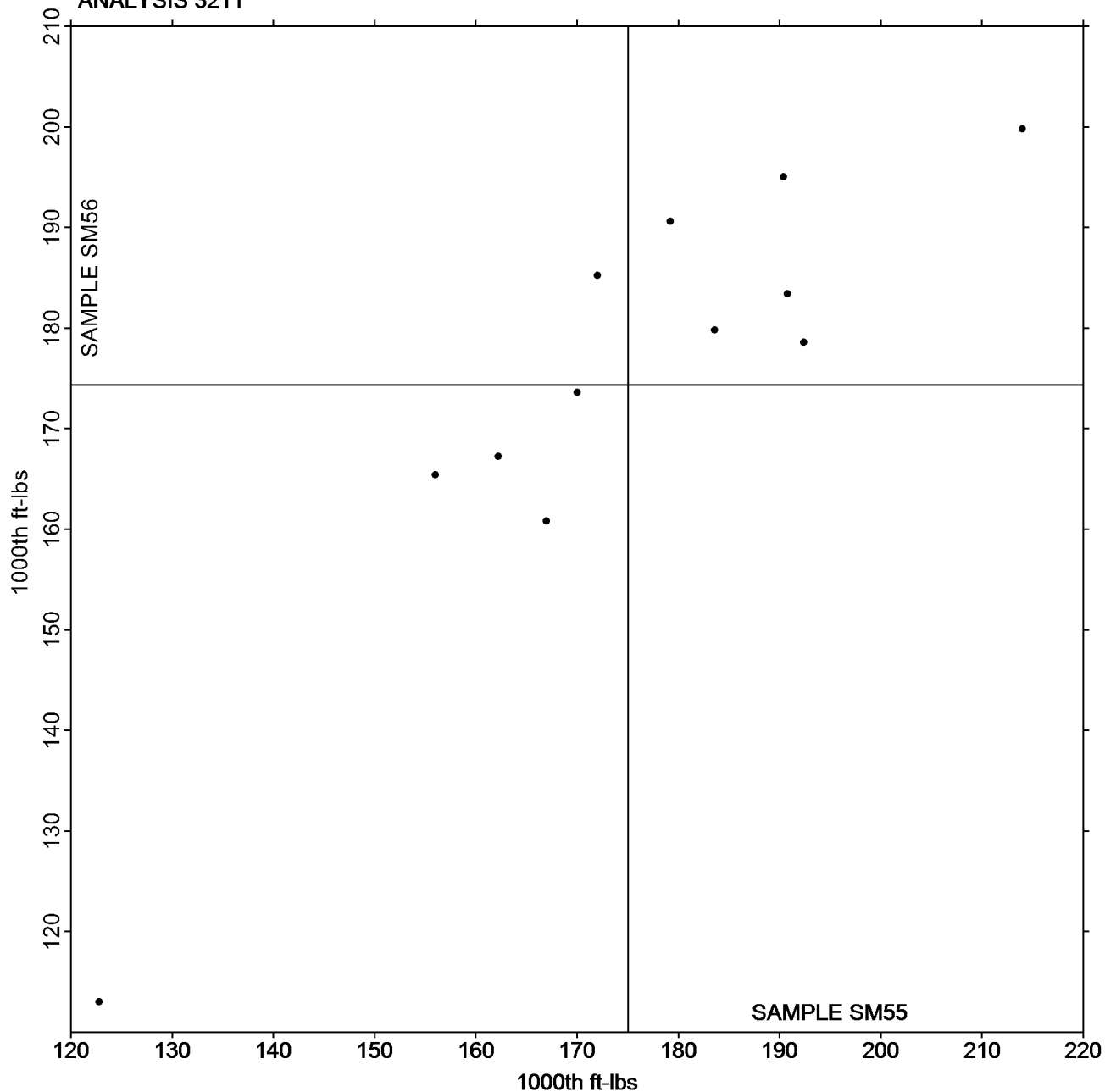


Paper & Paperboard Interlaboratory Testing Program Report #4431, July 2026
Analysis 3211
Internal Bond Strength - Modified Scott Mechanics
TAPPI Provisional Test Method T569

Grand Mean Sample SM55 = 175.03
1000th ft-lbs

Grand Mean Sample SM56 = 174.37
1000th ft-lbs

ANALYSIS 3211



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



Report #4431, July 2026

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

WebCode	Data Flag	Sample SB55			Sample SB56		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3777CU		152.4	-12.6	-0.48	160.8	-11.0	-0.42
3Y8JKV		190.6	25.6	0.97	181.0	9.2	0.35
7LBNMH		150.6	-14.4	-0.55	214.4	42.6	1.63
8CF9BJ		208.6	43.6	1.66	201.0	29.2	1.11
HFKG77		146.6	-18.4	-0.70	137.6	-34.2	-1.31
JVCBGB		147.7	-17.3	-0.66	171.1	-0.7	-0.03
L33VB3		190.4	25.4	0.97	184.8	13.0	0.50
MKYK6B		142.9	-22.2	-0.84	143.8	-28.0	-1.07
PJVL8	X	0.2	-164.9	-6.28	0.2	-171.7	-6.55
UTQBR6		133.1	-31.9	-1.21	139.7	-32.1	-1.23
XALZCQ		187.2	22.2	0.85	184.0	12.2	0.46

Summary Statistics	Sample SB55	Sample SB56
Grand Means	165.01 1000th ft-lbs	171.82 1000th ft-lbs
Std Dev Btwn Labs	26.25 1000th ft-lbs	26.19 1000th ft-lbs
Statistics based on 10 of 11 reporting participants.		

Key to Instrument Codes Reported by Participants

ID	IDM Internal Bond Tester	SC	Scott Internal Bond Tester (Manual)
TM	TMI Monitor/Internal Bond Tester	XX	Instrument make/model not specified by lab

Comments on Assigned Data Flags for Test #3213

PJVL8 (X) - Extreme Data.

Analysis Notes:

PJVL8 - Possible factor error.

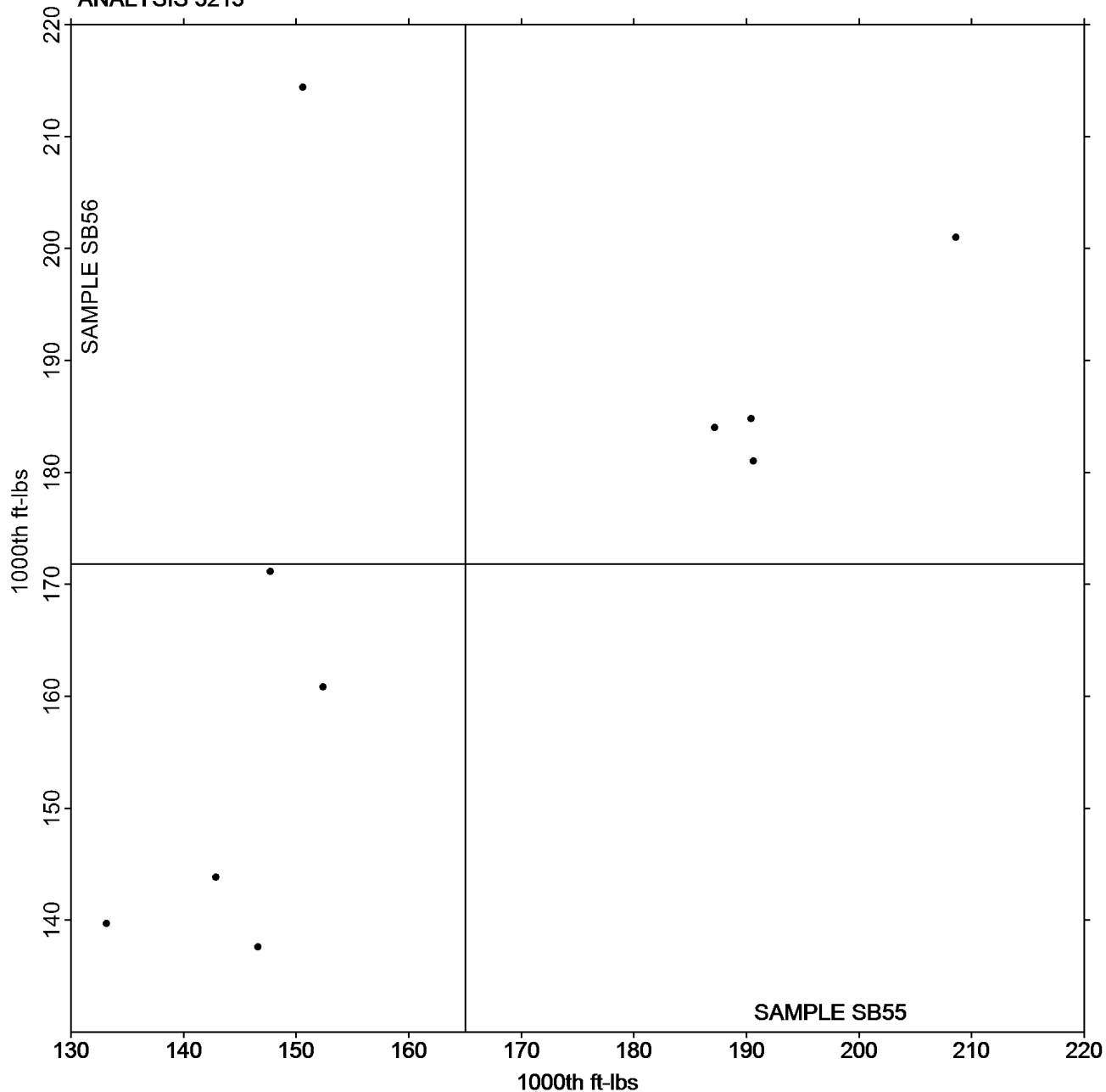


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Analysis 3213
Internal Bond Strength - Scott Bond Models
TAPPI Provisional Test Method T569

Grand Mean Sample SB55 = 165.01
1000th ft-lbs

Grand Mean Sample SB56 = 171.82
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-