

Paper & Paperboard Testing Program

Summary Report #4382 - October 2025

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The CTS Paper & Paperboard Interlaboratory Program

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

About CTS

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

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.



Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3501 Thickness (Caliper), Packaging papers TAPPI Official Test Method T411

WebCode	Data Flag	Sample CK45			Sample CK46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
6U7C4Y		13.59	-0.18	-0.99	13.51	-0.30	-1.71	OK
893A4Z		13.63	-0.14	-0.76	13.66	-0.15	-0.85	EM
97NZQU		13.76	-0.01	-0.07	13.74	-0.06	-0.35	TB
9Y8LNN		13.80	0.03	0.15	13.75	-0.05	-0.28	PP
ACPYEN		13.54	-0.23	-1.28	13.76	-0.05	-0.26	LW
B4BC4Y		13.84	0.07	0.35	13.81	0.01	0.07	TA
BPUEYY		13.99	0.22	1.21	14.12	0.32	1.86	LW
BRXAH2	*	13.18	-0.59	-3.22	13.29	-0.51	-2.96	XX
C66F9U		13.66	-0.11	-0.59	13.75	-0.06	-0.33	LW
C93WKN		13.84	0.07	0.40	13.85	0.05	0.29	OK
D2LMWR		14.00	0.23	1.26	13.96	0.16	0.91	TA
DVUDMT		13.80	0.03	0.19	13.85	0.05	0.29	LB
E868GJ		13.88	0.11	0.63	13.83	0.03	0.17	LW
ECB4YX		13.89	0.12	0.66	13.89	0.09	0.53	LW
EMW87X		13.72	-0.05	-0.25	13.75	-0.05	-0.31	LC
FMPFRL		14.03	0.26	1.42	14.04	0.24	1.37	PP
FV42ZP		13.74	-0.03	-0.16	13.71	-0.09	-0.52	XX
JGA7RE	M	13.89	0.12	0.64	No data reported for this sample			LA
K7932Q		13.71	-0.06	-0.32	13.77	-0.04	-0.21	LW
MEWFFG		14.01	0.24	1.30	13.91	0.10	0.60	LW
MZFKZK		13.60	-0.17	-0.93	13.58	-0.22	-1.29	XX
P7V39C		13.71	-0.06	-0.33	13.80	-0.01	-0.04	XX
R9UX6K		13.71	-0.06	-0.33	13.70	-0.10	-0.59	LW
UNVJKC		13.77	0.00	0.02	13.83	0.02	0.14	EM
V7BAWF		13.76	-0.01	-0.03	13.78	-0.02	-0.13	LC
VGJVKA		13.88	0.11	0.60	14.03	0.22	1.30	XX
VNTBT4		13.87	0.10	0.52	13.80	0.00	0.01	LW
VRC467		13.81	0.04	0.22	13.85	0.05	0.27	LC
VUGVWJ		13.51	-0.26	-1.43	13.50	-0.30	-1.72	MS
XG8UDY		13.94	0.17	0.93	14.00	0.20	1.16	PP
XV2J8A		14.12	0.35	1.92	14.10	0.30	1.71	LW
YF8G7W		13.87	0.10	0.52	13.90	0.10	0.57	LW
YN2J89		13.62	-0.15	-0.80	13.76	-0.05	-0.27	EM
ZYD9L4	*	13.62	-0.15	-0.82	13.90	0.10	0.56	LW

Summary Statistics	Sample CK45	Sample CK46
Grand Means	13.77 mils	13.80 mils
Std Dev Btwn Labs	0.18 mils	0.17 mils
Statistics based on 33 of 34 reporting participants.		



Paper & Paperboard Interlaboratory Testing Program
Analysis 3501
Thickness (Caliper), Packaging papers
TAPPI Official Test Method T411

Report #4382,
October 2025

Comments on Assigned Data Flags for Test #3501

JGA7RE (M) - Participant did not submit data for sample CK46.

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
OK	Oakland	PP	Technidyne Profile/Plus
TA	Thwing-Albert	TB	Thwing-Albert 89-100
XX	Instrument make/model not specified by lab		



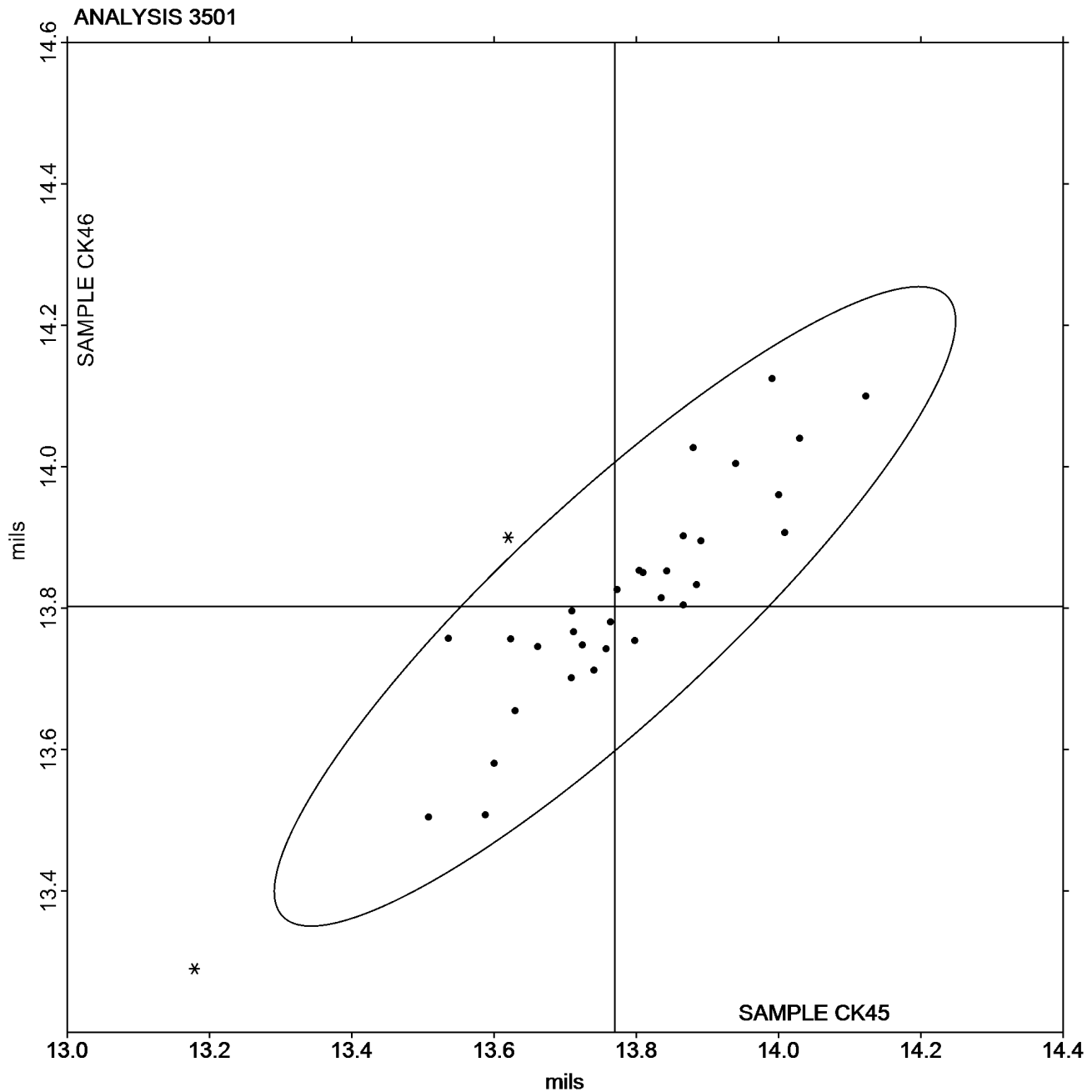
Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3501
Thickness (Caliper), Packaging papers
TAPPI Official Test Method T411

Grand Mean Sample CK45 = 13.770
mils

Grand Mean Sample CK46 = 13.802
mils





Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3511

Bursting Strength - Packaging Papers

TAPPI Official Test Method T403

WebCode	Data Flag	Sample BK45			Sample BK46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3QUPEA		87.40	-2.87	-0.46	88.40	-0.10	-0.02	ZZ
3XCVD2		98.31	8.04	1.30	95.68	7.18	1.13	ZZ
44XBGY		89.55	-0.73	-0.12	91.88	3.38	0.53	ZZ
97NZQU		87.00	-3.27	-0.53	82.65	-5.85	-0.92	ZZ
BPUEYY		94.90	4.63	0.75	93.86	5.36	0.84	ZZ
E868GJ		87.72	-2.55	-0.41	89.07	0.57	0.09	ZZ
ECB4YX		85.65	-4.63	-0.75	84.96	-3.54	-0.55	ZZ
FMPFRL		106.10	15.83	2.56	101.90	13.40	2.10	ZZ
KXYDMR		86.50	-3.77	-0.61	85.00	-3.50	-0.55	ZZ
M6LDUF	*	91.80	1.53	0.25	77.60	-10.90	-1.71	ZZ
MEWFFG		90.49	0.22	0.04	90.20	1.70	0.27	ZZ
UGCFDA		86.26	-4.01	-0.65	87.39	-1.11	-0.17	ZZ
WPHWYZ		83.64	-6.63	-1.07	83.53	-4.97	-0.78	ZZ
XV2J8A		83.32	-6.96	-1.12	80.98	-7.52	-1.18	ZZ
YF8G7W		95.45	5.18	0.84	94.41	5.90	0.93	ZZ

Summary Statistics	Sample BK45	Sample BK46
Grand Means	90.27 psi	88.50 psi
Std Dev Btwn Labs	6.19 psi	6.38 psi
Statistics based on 15 of 15 reporting participants.		

Key to Instrument Codes Reported by Participants

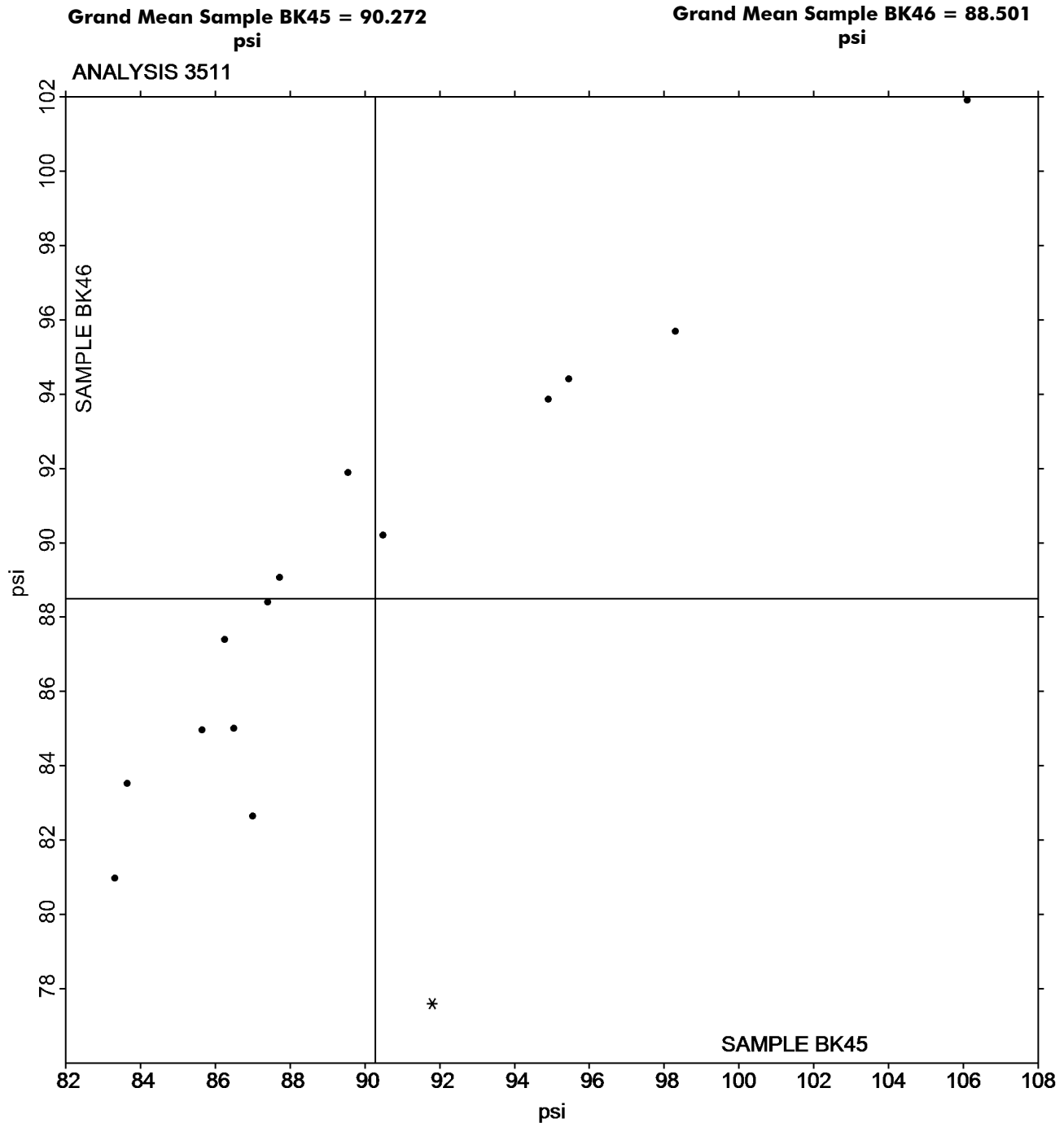
ZZ Instruments No Longer Tracked



Paper & Paperboard Interlaboratory Testing Program

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Analysis 3511 Bursting Strength - Packaging Papers TAPPI Official Test Method T403



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 #4382,
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Analysis 3513

Tearing Strength - Packaging Papers

TAPPI Official Test Method T414

Material used in Cycle 4382 for Test 3513, Pack RK45, and Tests 3515-3517, Pack NK45, exhibited higher variation than acceptable. Data flags were downgraded for participant results close to the ellipse for the affected tests. Results should be interpreted with caution.

WebCode	Data Flag	Sample RK45			Sample RK46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3QUPEA		182.4	13.1	1.14	121.8	-8.7	-0.99	ZZ
4BYKNR		180.9	11.6	1.01	139.4	8.9	1.01	ZZ
63LTV9		170.8	1.5	0.13	143.5	13.0	1.48	ZZ
6U7C4Y		176.2	6.9	0.60	124.9	-5.6	-0.64	ZZ
892DT6		162.0	-7.3	-0.63	126.4	-4.1	-0.47	ZZ
893A4Z		157.5	-11.8	-1.02	126.9	-3.6	-0.41	ZZ
9Y8LNN		157.0	-12.3	-1.07	126.4	-4.1	-0.47	ZZ
ACPYEN	*	214.4	45.1	3.92	180.8	50.3	5.71	ZZ
B4BC4Y		173.4	4.1	0.36	133.7	3.2	0.37	ZZ
BPUEYY		185.5	16.2	1.41	134.7	4.2	0.48	ZZ
C66F9U	X	247.5	78.2	6.80	148.4	17.9	2.03	ZZ
CFXYMZ		173.3	4.0	0.35	129.7	-0.9	-0.10	ZZ
CLN9YJ		144.9	-24.4	-2.12	108.0	-22.5	-2.56	ZZ
ECB4YX		163.9	-5.4	-0.47	131.3	0.8	0.09	ZZ
EMW87X		169.3	0.0	0.00	116.4	-14.1	-1.60	ZZ
FMPFRL	*	177.4	8.1	0.71	183.3	52.8	6.00	ZZ
GLD3MP		183.9	14.6	1.27	139.8	9.3	1.06	ZZ
JGA7RE		162.4	-6.9	-0.60	126.7	-3.9	-0.44	ZZ
K7932Q		152.3	-17.0	-1.47	122.6	-7.9	-0.90	ZZ
KXYDMR		175.2	5.9	0.51	136.0	5.5	0.62	ZZ
LN6MHB		168.2	-1.1	-0.10	128.3	-2.2	-0.25	ZZ
MEWFFG		160.6	-8.7	-0.75	134.4	3.9	0.45	ZZ
MZFKZK		187.2	17.9	1.56	143.2	12.7	1.44	ZZ
UGCFDA		158.6	-10.7	-0.93	122.8	-7.7	-0.88	ZZ
UNVJKC		165.6	-3.7	-0.32	137.4	6.9	0.78	ZZ
VGVIKA		186.3	17.0	1.48	145.7	15.2	1.73	ZZ
VNTBT4		158.8	-10.5	-0.91	129.5	-1.1	-0.12	ZZ
XV2J8A		176.0	6.7	0.58	133.2	2.7	0.30	ZZ

Summary Statistics	Sample RK45	Sample RK46
Grand Means	169.29 Grams	130.50 Grams
Std Dev Btwn Labs	11.50 Grams	8.80 Grams
Statistics based on 25 of 28 reporting participants.		

Comments on Assigned Data Flags for Test #3513

C66F9U (X) - Extreme Data for sample RK45.



Paper & Paperboard Interlaboratory Testing Program

Analysis 3513

Tearing Strength - Packaging Papers

TAPPI Official Test Method T414

Report #4382,
October 2025

Analysis Notes:

UNVJKC - Data appear to be off by a factor; data converted by CTS (x4). CTS will not correct the data going forward.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



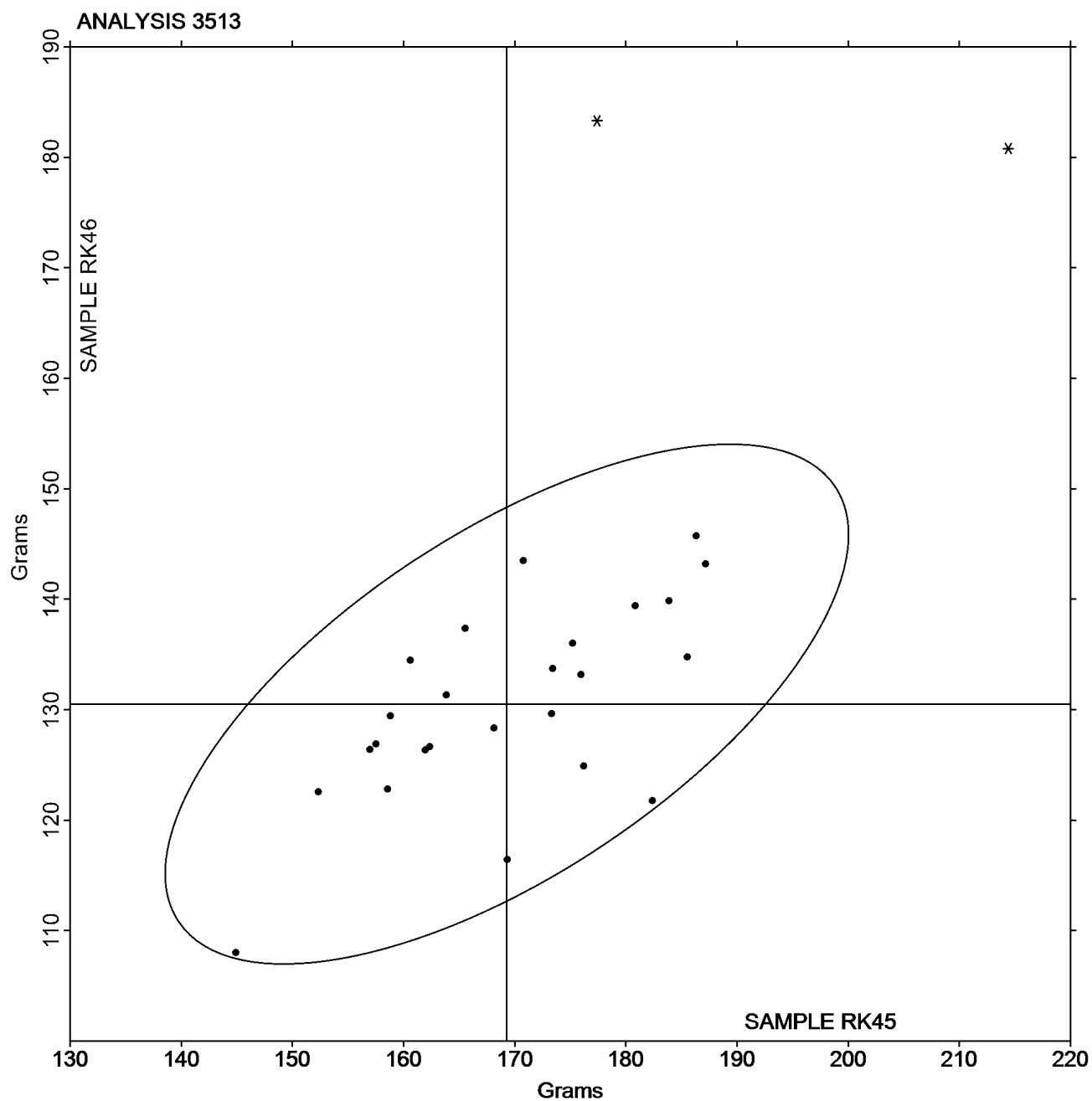
Paper & Paperboard Interlaboratory Testing Program

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October 2025

Analysis 3513 Tearing Strength - Packaging Papers TAPPI Official Test Method T414

Grand Mean Sample RK45 = 169.29
Grams

Grand Mean Sample RK46 = 130.50
Grams





Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3515

Tensile Breaking Strength - Packaging Papers

TAPPI Official Test Method T494

Material used in Cycle 4382 for Test 3513, Pack RK45, and Tests 3515-3517, Pack NK45, exhibited higher variation than acceptable. Data flags were downgraded for participant results close to the ellipse for the affected tests. Results should be interpreted with caution.

WebCode	Data Flag	Sample NK45			Sample NK46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2JGEN4		10.68	0.38	0.67	10.67	0.10	0.18	DM
3G9L8A		9.85	-0.46	-0.82	9.96	-0.61	-1.06	IR
3QUPEA		10.91	0.60	1.07	11.07	0.50	0.87	LE
63LTV9		10.02	-0.28	-0.51	10.18	-0.38	-0.66	TV
892DT6		10.16	-0.15	-0.27	10.42	-0.14	-0.25	LE
97NZQU		10.34	0.03	0.05	11.14	0.57	0.99	TV
ACPYEN		11.42	1.12	1.98	11.39	0.82	1.42	TX
B4BC4Y		10.32	0.01	0.01	10.85	0.28	0.49	TB
BPUEYY		9.90	-0.41	-0.73	10.06	-0.51	-0.89	LE
C66F9U		10.36	0.05	0.09	10.74	0.17	0.30	LW
CFXYMZ		10.00	-0.31	-0.55	9.58	-0.99	-1.70	LE
D2LMWR		10.65	0.34	0.60	11.28	0.71	1.23	TX
DDTTMK	*	13.03	2.73	4.85	13.16	2.59	4.47	XX
ECB4YX		10.04	-0.27	-0.47	10.61	0.04	0.07	LW
EMW87X		10.02	-0.28	-0.51	9.85	-0.71	-1.23	IN
FMPFRL		9.79	-0.52	-0.92	9.85	-0.72	-1.24	TA
GETZFM		10.69	0.38	0.67	11.01	0.44	0.76	LI
GLD3MP		9.17	-1.14	-2.02	9.40	-1.17	-2.02	LH
JGA7RE		10.22	-0.09	-0.15	10.50	-0.07	-0.12	LA
K7932Q		10.00	-0.31	-0.55	10.70	0.13	0.23	LW
KE2BLG		10.12	-0.18	-0.33	10.31	-0.26	-0.44	TT
MEWFFG		10.71	0.41	0.72	10.86	0.29	0.51	LH
MZFKZK		10.51	0.20	0.36	11.01	0.45	0.77	XX
P7V39C		10.25	-0.06	-0.11	11.14	0.57	0.98	TB
QN4LGK		9.21	-1.10	-1.96	10.36	-0.21	-0.36	IM
TQ8WP9		11.42	1.11	1.98	11.31	0.74	1.27	LA
TZ9JG6		11.58	1.27	2.25	11.92	1.35	2.33	LX
UGCFDA		10.18	-0.13	-0.22	10.41	-0.16	-0.27	TX
V3CYZF		9.45	-0.86	-1.53	9.65	-0.92	-1.59	TS
VGVIKA		9.82	-0.49	-0.87	10.16	-0.41	-0.71	ID
VNTBT4		10.54	0.23	0.41	10.68	0.11	0.19	LE
WPHWYZ		11.11	0.80	1.42	10.97	0.40	0.69	LW
XV2J8A		10.20	-0.11	-0.19	9.89	-0.67	-1.16	IM
YN2J89		10.44	0.13	0.24	10.78	0.21	0.37	LE
ZYD9L4		10.40	0.10	0.17	10.61	0.04	0.07	TH



Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3515

Tensile Breaking Strength - Packaging Papers

TAPPI Official Test Method T494

Summary Statistics	Sample NK45	Sample NK46
Grand Means	10.31 kN/m	10.57 kN/m
Stnd Dev Btwn Labs	0.56 kN/m	0.58 kN/m
Statistics based on 34 of 35 reporting participants.		

Analysis Notes:

3QUPEA - Data appears to be transposed between Analysis 3517 (Elongation to Break) and Analysis 3515 (Tensile Breaking Strength). CTS will not correct going forward.

TZ9JG6 - Data appear to be off by a factor; data converted by CTS (x2). CTS will not correct the data going forward.

Key to Instrument Codes Reported by Participants

DM	IDM MTC-100 Tensile Tester	ID	Instron 4200 Series
IM	Instron 5500 Series	IN	Instron 3360 Series
IR	Instron 5900 Series	LA	L & W Autoline
LE	L & W Tensile Tester 066	LH	L & W Alwetron TH1 (Horizontal) SE 060
LI	Lloyds Instruments	LW	L & W Tensile Tester SE062
LX	L & W (model not specified)	TA	Thwing-Albert Tensile Tester
TB	Thwing-Albert EJA/1000	TH	Thwing-Albert QC-3A
TS	TMI Horizontal Tensile Tester 84-58	TT	Tinius Olsen Model MHT
TV	Thwing-Albert Vantage NX	TX	Thwing-Albert (model not specified)
XX	Instrument make/model not specified by lab		



Paper & Paperboard Interlaboratory Testing Program

Analysis 3515

Tensile Breaking Strength - Packaging Papers

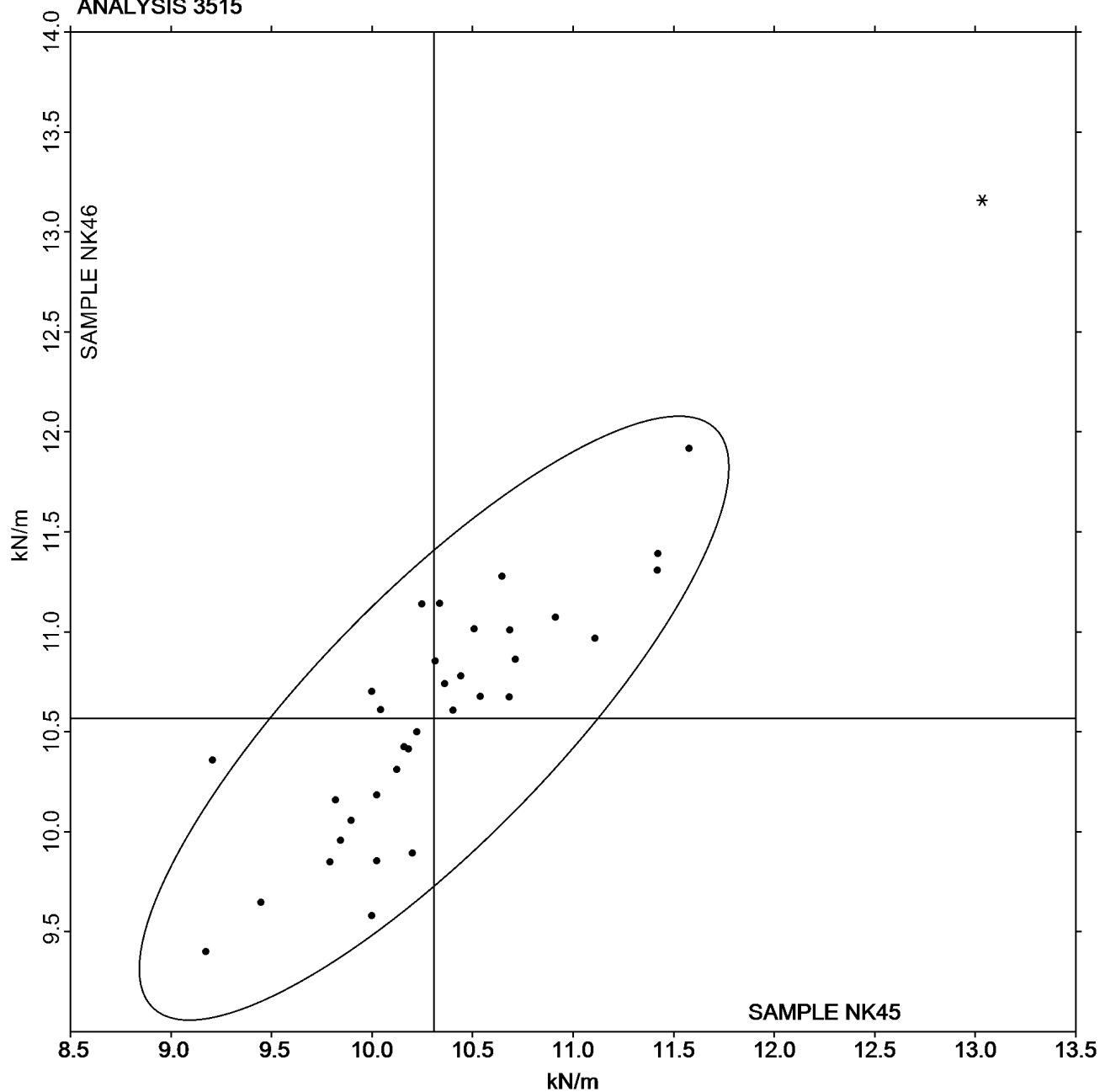
TAPPI Official Test Method T494

Report #4382,
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Grand Mean Sample NK45 = 10.308
kN/m

Grand Mean Sample NK46 = 10.568
kN/m

ANALYSIS 3515





Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3516

Tensile Energy Absorption - Packaging Papers

TAPPI Official Test Method T494

Material used in Cycle 4382 for Test 3513, Pack RK45, and Tests 3515-3517, Pack NK45, exhibited higher variation than acceptable. Data flags were downgraded for participant results close to the ellipse for the affected tests. Results should be interpreted with caution.

WebCode	Data Flag	Sample NK45			Sample NK46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2JGEN4		141.0	25.0	1.80	173.6	30.4	2.22	DM
3G9L8A		103.5	-12.6	-0.91	120.5	-22.7	-1.66	IR
3QUPEA		112.4	-3.6	-0.26	145.7	2.5	0.18	LE
63LTV9		135.9	19.8	1.43	157.5	14.3	1.05	TV
892DT6		108.8	-7.2	-0.52	138.3	-4.9	-0.36	LE
97NZQU		112.2	-3.8	-0.28	157.9	14.6	1.07	TV
ACPYEN		137.4	21.4	1.54	164.3	21.1	1.54	TH
BPUEYY		111.5	-4.6	-0.33	135.2	-8.0	-0.59	LE
C66F9U		105.4	-10.6	-0.77	128.5	-14.7	-1.08	LW
CFXYMZ		103.6	-12.5	-0.90	127.3	-15.9	-1.17	LE
D2LMWR		111.2	-4.8	-0.35	139.5	-3.7	-0.27	TX
DDTTMK		133.9	17.9	1.29	160.6	17.4	1.27	XX
ECB4YX		103.4	-12.6	-0.91	136.8	-6.4	-0.47	LE
EMW87X		109.6	-6.5	-0.47	122.5	-20.8	-1.52	IN
FMPFRL		118.1	2.0	0.15	146.2	3.0	0.22	TA
GLD3MP		103.0	-13.1	-0.94	128.0	-15.2	-1.11	LH
JGA7RE		135.3	19.2	1.39	165.3	22.1	1.62	LA
K7932Q		103.2	-12.8	-0.93	135.3	-8.0	-0.58	LW
KE2BLG		103.1	-13.0	-0.94	131.4	-11.8	-0.87	TT
MEWFFG		107.7	-8.4	-0.60	144.4	1.2	0.09	LH
MZFKZK		117.4	1.4	0.10	158.3	15.1	1.11	XX
P7V39C		116.3	0.3	0.02	157.4	14.2	1.04	TB
QN4LGK		85.2	-30.9	-2.23	126.6	-16.6	-1.21	IM
TQ8WP9		127.6	11.5	0.83	148.6	5.4	0.40	LA
TZ9JG6		146.6	30.6	2.20	151.7	8.5	0.62	LX
UGCFDA	*	215.2	99.1	7.15	267.1	123.9	9.06	TX
V3CYZF		115.5	-0.5	-0.04	142.8	-0.4	-0.03	TS
VNTBT4		109.4	-6.6	-0.48	134.0	-9.2	-0.67	LE
WPHWYZ		122.2	6.1	0.44	144.7	1.5	0.11	LW
XV2J8A		127.7	11.7	0.84	136.5	-6.7	-0.49	IM
YN2J89		118.3	2.2	0.16	145.2	2.0	0.15	LE
ZYD9L4		111.1	-4.9	-0.36	134.9	-8.4	-0.61	TH



Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3516

Tensile Energy Absorption - Packaging Papers

TAPPI Official Test Method T494

Summary Statistics	Sample NK45	Sample NK46
Grand Means	116.05 Joules/sq m	143.21 Joules/sq m
Stnd Dev Btwn Labs	13.86 Joules/sq m	13.67 Joules/sq m
Statistics based on 31 of 32 reporting participants.		

Analysis Notes:

CFXYMZ - Data appears to be transposed between samples. CTS will not correct going forward.

XV2J8A - Data appears to be transposed between samples. CTS will not correct going forward.

Key to Instrument Codes Reported by Participants

DM	IDM MTC-100 Tensile Tester	IM	Instron 5500 Series
IN	Instron 3360 Series	IR	Instron 5900 Series
LA	L & W Autoline	LE	L & W Tensile Tester 066
LH	L & W Alwetron TH1 (Horizontal) SE 060	LW	L & W Tensile Tester SE062
LX	L & W (model not specified)	TA	Thwing-Albert Tensile Tester
TB	Thwing-Albert EJA/1000	TH	Thwing-Albert QC-3A
TS	TMI Horizontal Tensile Tester 84-58	TT	Tinius Olsen Model MHT
TV	Thwing-Albert Vantage NX	TX	Thwing-Albert (model not specified)
XX	Instrument make/model not specified by lab		



Paper & Paperboard Interlaboratory Testing Program

Analysis 3516

Tensile Energy Absorption - Packaging Papers

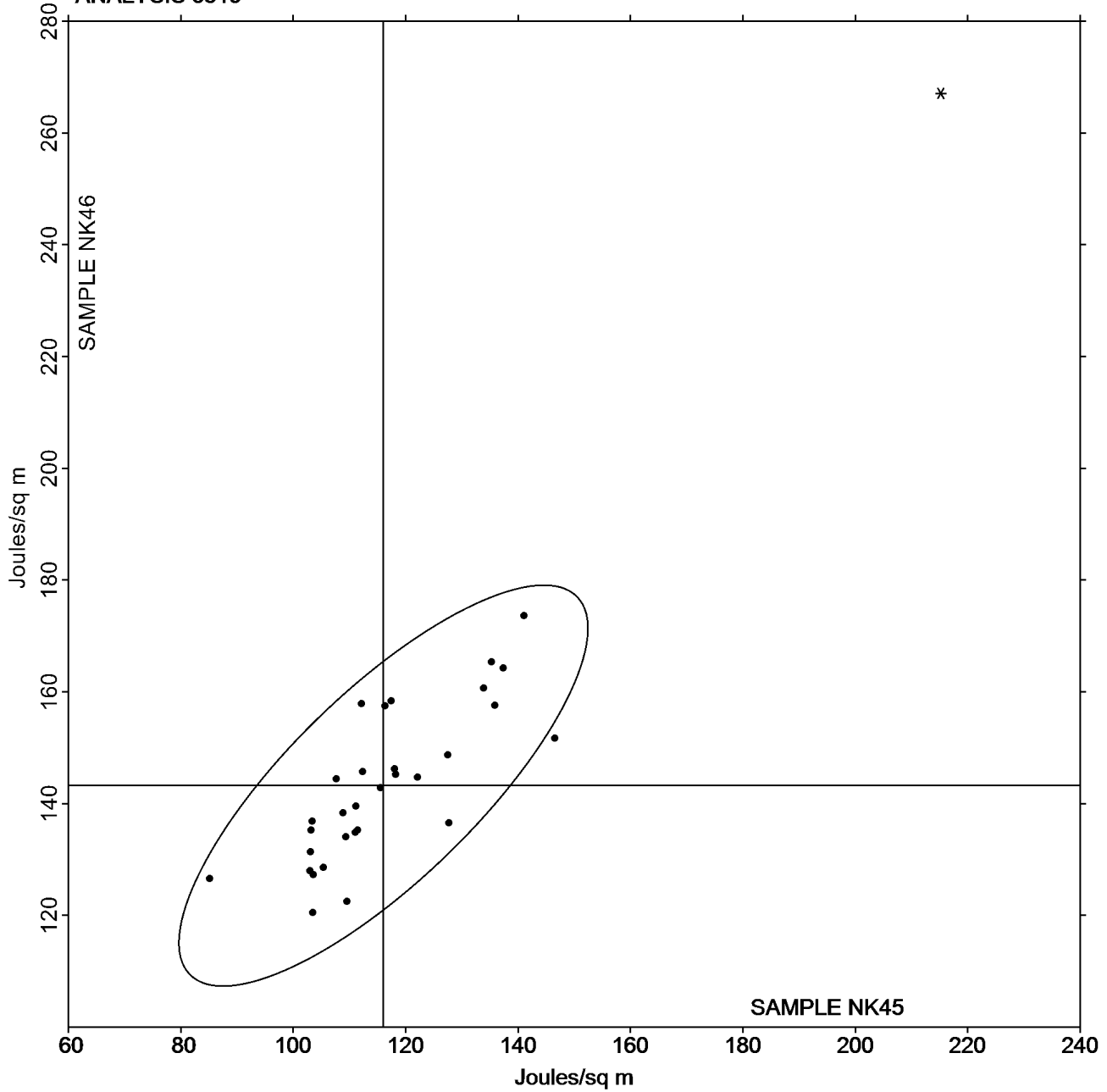
TAPPI Official Test Method T494

Report #4382,
October 2025

Grand Mean Sample NK45 = 116.05
Joules/sq m

Grand Mean Sample NK46 = 143.21
Joules/sq m

ANALYSIS 3516





Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3517

Elongation to Break - Packaging Papers

TAPPI Official Test Method T494

Material used in Cycle 4382 for Test 3513, Pack RK45, and Tests 3515-3517, Pack NK45, exhibited higher variation than acceptable. Data flags were downgraded for participant results close to the ellipse for the affected tests. Results should be interpreted with caution.

WebCode	Data Flag	Sample NK45			Sample NK46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2JGEN4		2.063	0.190	0.43	2.455	0.246	0.47	DM
3G9L8A		1.629	-0.244	-0.56	1.843	-0.366	-0.70	XX
3QUPEA		1.615	-0.258	-0.59	1.988	-0.221	-0.42	LE
63LTV9		2.097	0.224	0.51	2.356	0.147	0.28	TV
892DT6		1.648	-0.225	-0.51	1.984	-0.225	-0.43	LE
97NZQU		1.824	-0.049	-0.11	2.280	0.071	0.14	TV
ACPYEN		2.090	0.217	0.50	2.438	0.229	0.44	LX
B4BC4Y		3.134	1.261	2.88	3.642	1.433	2.75	TB
BPUEYY		1.705	-0.168	-0.38	1.996	-0.213	-0.41	LE
C66F9U		1.583	-0.290	-0.66	1.811	-0.398	-0.76	LW
CFXYMZ		1.634	-0.239	-0.54	1.893	-0.316	-0.61	LE
D2LMWR		1.767	-0.106	-0.24	2.066	-0.143	-0.27	TX
DDTTMK		1.505	-0.368	-0.84	1.695	-0.514	-0.99	XX
ECB4YX		2.908	1.035	2.36	3.547	1.338	2.57	LW
EMW87X		1.716	-0.157	-0.36	1.915	-0.294	-0.56	IN
FMPFRL		1.930	0.057	0.13	2.275	0.066	0.13	TA
GLD3MP		1.725	-0.148	-0.34	2.029	-0.180	-0.34	LH
JGA7RE		1.926	0.053	0.12	2.328	0.119	0.23	LX
K7932Q		1.503	-0.370	-0.84	1.905	-0.304	-0.58	LW
KE2BLG		1.705	-0.168	-0.38	2.026	-0.183	-0.35	TT
MEWFFG		1.619	-0.254	-0.58	1.963	-0.246	-0.47	LX
MZFKZK		1.627	-0.245	-0.56	2.011	-0.198	-0.38	XX
P7V39C		1.762	-0.111	-0.25	2.148	-0.061	-0.12	XX
QN4LGK		1.568	-0.305	-0.70	1.994	-0.215	-0.41	IM
TQ8WP9		1.684	-0.189	-0.43	1.916	-0.293	-0.56	XX
TZ9JG6	X	0.058	-1.814	-4.14	0.058	-2.151	-4.13	LX
UGCFDA		3.310	1.437	3.28	3.905	1.696	3.25	TX
V3CYZF		1.945	0.072	0.16	2.274	0.065	0.13	TS
VGVIKA		1.824	-0.049	-0.11	2.076	-0.133	-0.25	XX
VNTBT4		1.625	-0.248	-0.57	1.901	-0.308	-0.59	LE
WPHWYZ		1.778	-0.095	-0.22	1.985	-0.224	-0.43	LW
XV2J8A	*	2.080	0.208	0.47	2.011	-0.198	-0.38	IM
YN2J89		1.750	-0.123	-0.28	2.037	-0.172	-0.33	LE
ZYD9L4		1.728	-0.145	-0.33	1.999	-0.210	-0.40	TH



Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3517 Elongation to Break - Packaging Papers TAPPI Official Test Method T494

Summary Statistics	Sample NK45	Sample NK46
Grand Means	1.87 Percent	2.21 Percent
Stnd Dev Btwn Labs	0.44 Percent	0.52 Percent
Statistics based on 32 of 34 reporting participants.		

Comments on Assigned Data Flags for Test #3517

TZ9JG6 (X) - Data for both samples are low. Possible Systematic Error.

Analysis Notes:

3QUPEA - Data appears to be transposed between Analysis 3515 (Tensile Breaking Strength) and Analysis 3517 (Elongation to Break). CTS will not correct going forward.

CFXYMZ - Data appears to be transposed between samples. CTS will not correct going forward.

Key to Instrument Codes Reported by Participants

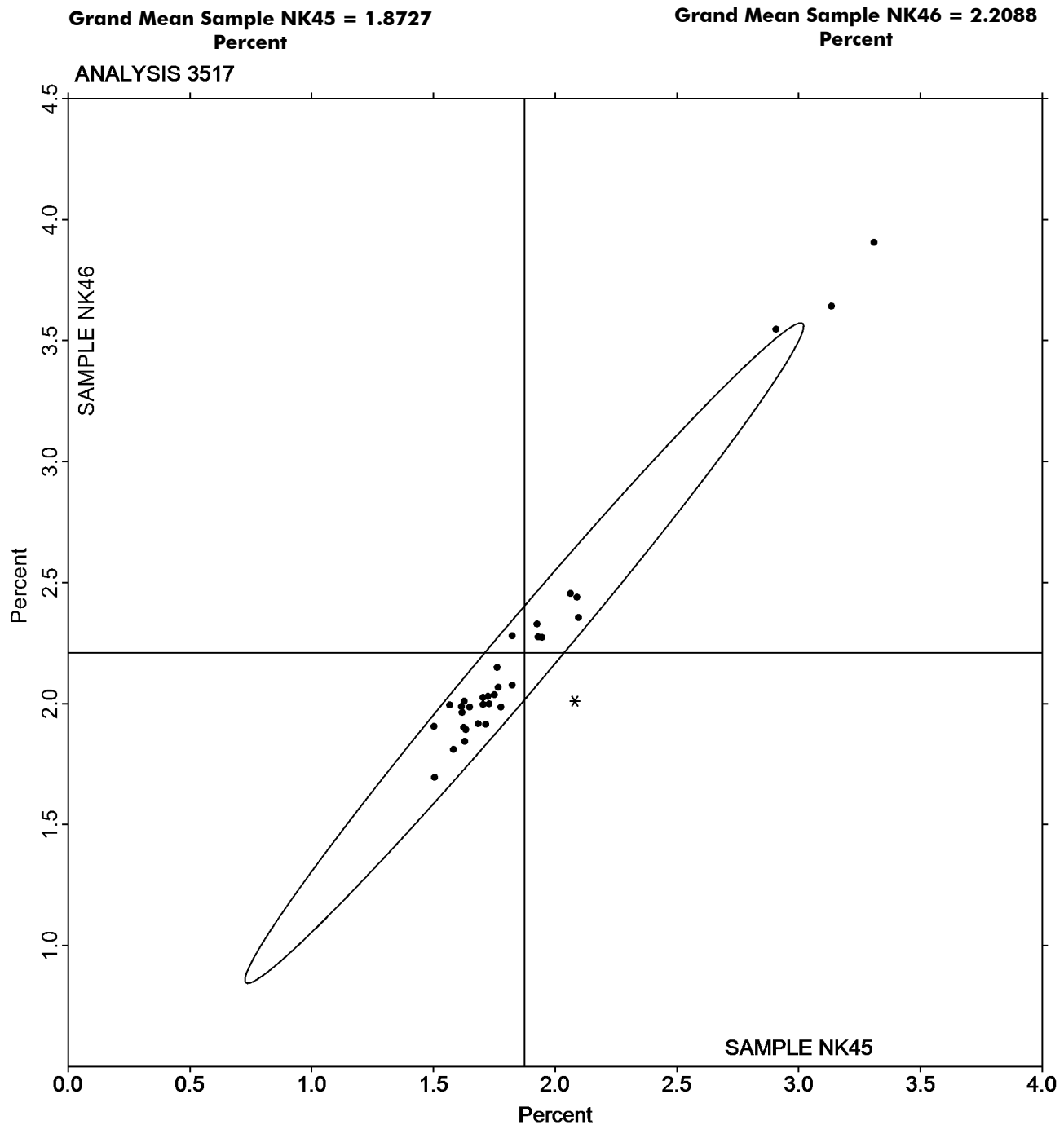
DM	IDM MTC-100 Tensile Tester	IM	Instron 5500 Series
IN	Instron 3360 Series	LE	L & W Tensile Tester 066
LH	L & W Alwetron TH1 (Horizontal) SE 060	LW	L & W Tensile Tester SE062
LX	L & W (model not specified)	TA	Thwing-Albert Tensile Tester
TB	Thwing-Albert EJA/1000	TH	Thwing-Albert QC-3A
TS	TMI Horizontal Tensile Tester 84-58	TT	Tinius Olsen Model MHT
TV	Thwing-Albert Vantage NX	TX	Thwing-Albert (model not specified)
XX	Instrument make/model not specified by lab		



Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3517 Elongation to Break - Packaging Papers TAPPI Official Test Method T494





Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3531

Roughness - Print Surf Method - 0.5 to 4.0 Microns

TAPPI Official Test Method T555

WebCode	Data Flag	Sample PS45			Sample PS46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3QUMP6		0.7430	-0.0216	-0.31	0.7270	-0.0995	-1.32	ZZ
442RFX		0.7860	0.0214	0.31	0.8880	0.0615	0.81	ZZ
4LWKZV		0.6960	-0.0686	-0.99	0.7380	-0.0885	-1.17	ZZ
4ZYWWU		0.7670	0.0024	0.04	0.8110	-0.0155	-0.21	ZZ
6U7C4Y	*	0.8270	0.0624	0.90	0.9880	0.1615	2.14	ZZ
893A4Z		0.7650	0.0004	0.01	0.8570	0.0305	0.40	ZZ
8MGBZQ		0.7470	-0.0176	-0.25	0.8130	-0.0135	-0.18	ZZ
A8J6KT		0.8410	0.0764	1.10	0.9130	0.0865	1.15	ZZ
C66F9U		0.6580	-0.1066	-1.54	0.7050	-0.1215	-1.61	ZZ
C93WKN		0.8130	0.0484	0.70	0.8810	0.0545	0.72	ZZ
DVUDMT		0.7370	-0.0276	-0.40	0.7920	-0.0345	-0.46	ZZ
EHE3AM		0.6050	-0.1596	-2.30	0.6980	-0.1285	-1.70	ZZ
FQ9ATT		0.8800	0.1154	1.67	0.8550	0.0285	0.38	ZZ
M7GU7C		0.7570	-0.0076	-0.11	0.8100	-0.0165	-0.22	ZZ
P7V39C		0.7430	-0.0216	-0.31	0.8040	-0.0225	-0.30	ZZ
QJT9ZL		0.7820	0.0174	0.25	0.8470	0.0205	0.27	ZZ
U2Y6M2		0.7490	-0.0156	-0.22	0.7820	-0.0445	-0.59	ZZ
U3DC9H		0.7430	-0.0216	-0.31	0.8460	0.0195	0.26	ZZ
UNVJKC		0.8870	0.1224	1.77	0.8960	0.0695	0.92	ZZ
V3CYZF		0.7640	-0.0006	-0.01	0.8100	-0.0165	-0.22	ZZ
VRC467		0.8790	0.1144	1.65	0.9710	0.1445	1.91	ZZ
YN2J89		0.7240	-0.0406	-0.59	0.8000	-0.0265	-0.35	ZZ
ZYD9L4		0.6920	-0.0726	-1.05	0.7770	-0.0495	-0.66	ZZ

Summary Statistics	Sample PS45	Sample PS46
Grand Means	0.76 Microns	0.83 Microns
Std Dev Btwn Labs	0.07 Microns	0.08 Microns

Statistics based on 23 of 23 reporting participants.

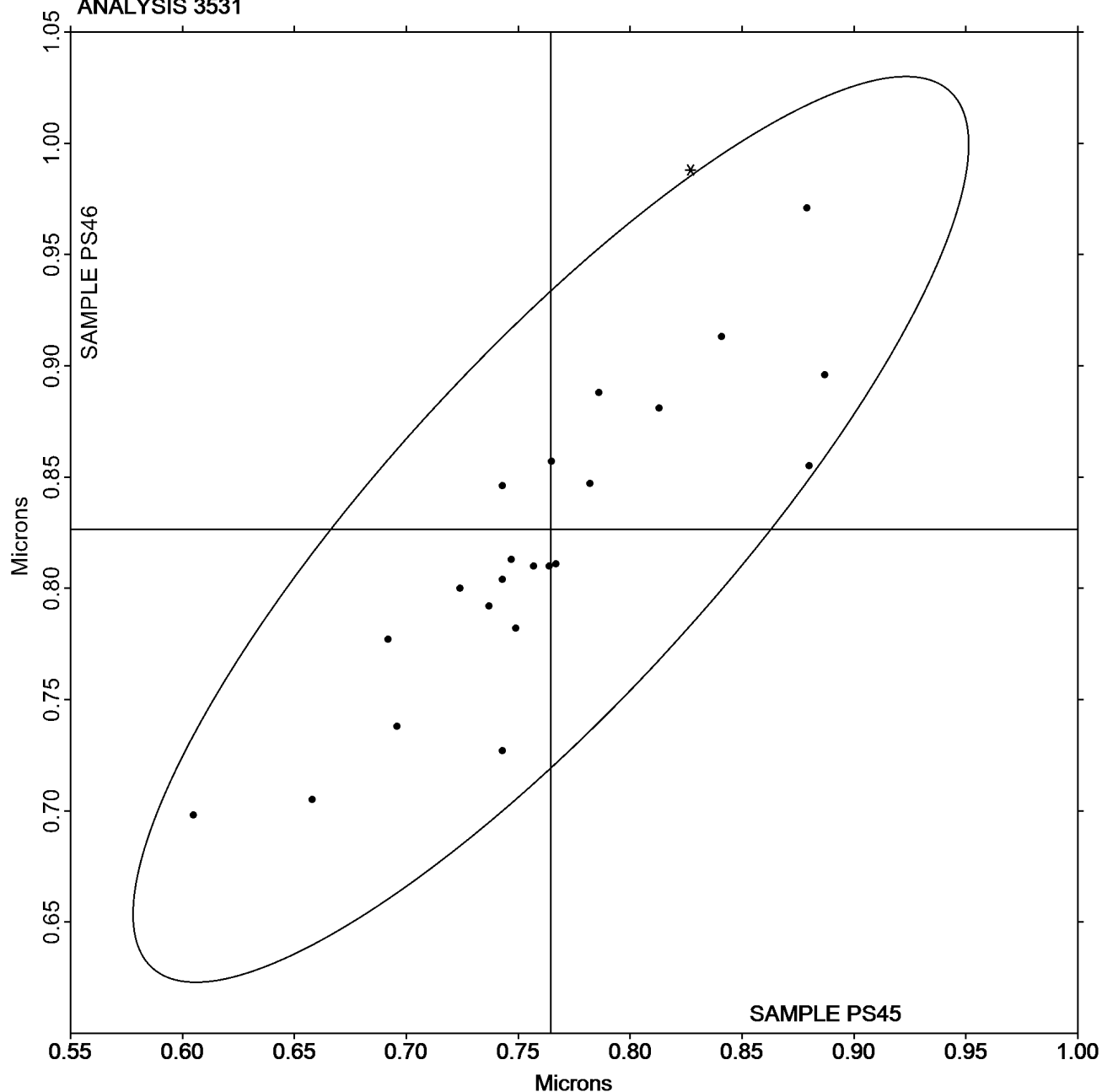
Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked

**Grand Mean Sample PS45 = 0.76457
Microns**

**Grand Mean Sample PS46 =
0.82648 Microns**

ANALYSIS 3531





Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3545

Directional Brightness

TAPPI Official Test Method T452

WebCode	Data Flag	Sample BR45			Sample BR46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2P449D		78.56	2.70	0.70	78.89	2.99	0.79	TP
6U7C4Y	*	65.40	-10.46	-2.71	65.47	-10.43	-2.77	TD
893A4Z		79.61	3.76	0.98	79.55	3.64	0.97	HG
8B4B4X		75.31	-0.54	-0.14	75.73	-0.18	-0.05	TS
8MGBZQ		78.89	3.04	0.79	78.62	2.72	0.72	TD
B4BC4Y		76.54	0.69	0.18	76.58	0.67	0.18	XD
C66F9U		76.35	0.50	0.13	76.18	0.27	0.07	TP
C93WKN		77.66	1.81	0.47	77.36	1.46	0.39	HG
EHE3AM		75.84	-0.01	0.00	75.61	-0.30	-0.08	PP
K7932Q		76.09	0.24	0.06	75.97	0.06	0.02	TS
KXYDMR		77.66	1.81	0.47	77.51	1.60	0.43	HG
MZFKZK		77.72	1.87	0.49	77.73	1.82	0.48	XX
U2Y6M2		76.43	0.58	0.15	76.11	0.21	0.06	HZ
U3DC9H		75.05	-0.80	-0.21	75.09	-0.81	-0.22	PP
UNVJKC		78.36	2.51	0.65	78.70	2.80	0.74	TP
V3CYZF		76.03	0.18	0.05	75.79	-0.12	-0.03	TS
V7BAWF		71.81	-4.04	-1.05	71.77	-4.14	-1.10	LA
VFY39D		75.54	-0.31	-0.08	76.03	0.13	0.03	XX
VGJVKA	*	65.30	-10.55	-2.73	66.08	-9.82	-2.61	TD
W77C3W		79.04	3.19	0.83	79.55	3.64	0.97	TP
YN2J89		79.89	4.04	1.05	79.90	4.00	1.06	HG
ZYD9L4		75.63	-0.23	-0.06	75.70	-0.20	-0.05	TP

Summary Statistics	Sample BR45	Sample BR46
Grand Means	75.85 Percent	75.90 Percent
Std Dev Btwn Labs	3.86 Percent	3.77 Percent
Statistics based on 22 of 22 reporting participants.		

Key to Instrument Codes Reported by Participants

HG	Hunter Labscan / XE	HZ	Hunter Lab ColorFlex EZ Series
LA	L & W Elrepho - Autoline	PP	Technidyne Profile/Plus
TD	Technidyne Color Touch 45X	TP	Technidyne Test/Plus
TS	Technidyne Brightimeter Micro S-5	XD	X-Rite Color Ci7600
XX	Instrument make/model not specified by lab		



Paper & Paperboard Interlaboratory Testing Program

Analysis 3545

Directional Brightness

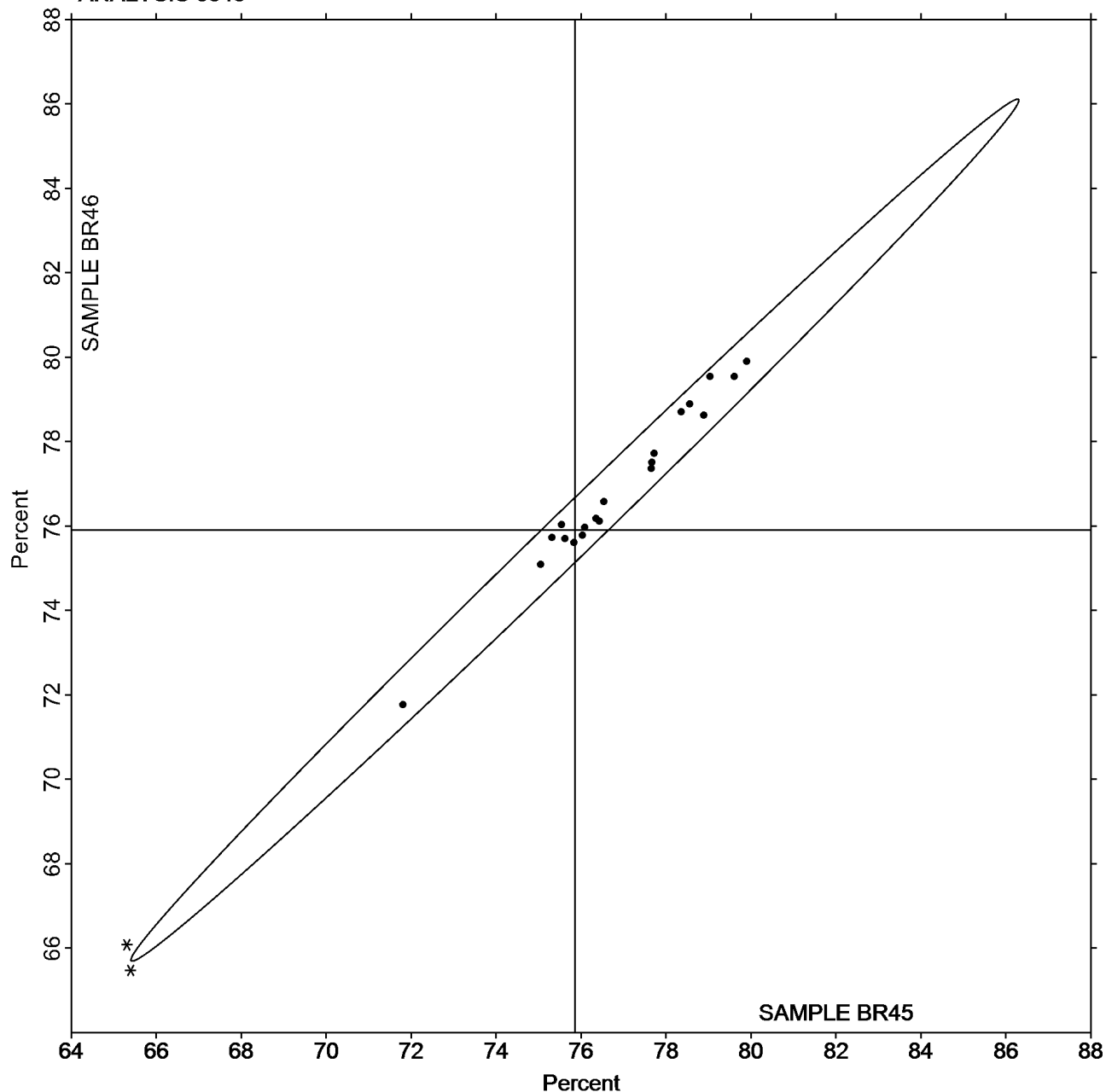
TAPPI Official Test Method T452

Report #4382,
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Grand Mean Sample BR45 = 75.850
Percent

Grand Mean Sample BR46 = 75.904
Percent

ANALYSIS 3545





Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3547 Diffuse Brightness

TAPPI Official Test Method T525

WebCode	Data Flag	Sample BR45			Sample BR46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
8MGBZQ		76.28	-0.08	-0.25	76.15	-0.13	-0.27	TD
C66F9U		75.84	-0.52	-1.65	75.33	-0.94	-2.03	EA
C93WKN		76.33	-0.03	-0.10	76.17	-0.10	-0.22	TC
CZV3QV		76.36	0.00	0.01	76.23	-0.04	-0.10	LA
ECB4YX		76.19	-0.17	-0.56	76.10	-0.18	-0.39	LT
H2KGGR		76.72	0.36	1.17	76.86	0.58	1.25	XX
MEWFFG		76.15	-0.21	-0.68	75.99	-0.28	-0.61	LT
QJT9ZL		76.11	-0.25	-0.80	76.10	-0.18	-0.39	LE
UNVJKC		76.28	-0.08	-0.27	76.28	0.00	0.00	TC
V3CYZF		77.05	0.69	2.20	77.24	0.96	2.07	LT
WDQBT6		76.57	0.21	0.68	76.45	0.17	0.37	LE
ZYD9L4		76.44	0.08	0.25	76.43	0.15	0.32	LT

Summary Statistics	Sample BR45	Sample BR46
Grand Means	76.36 Percent	76.28 Percent
Std Dev Btwn Labs	0.31 Percent	0.47 Percent
Statistics based on 12 of 12 reporting participants.		

Key to Instrument Codes Reported by Participants

EA	Datcolor Elrepho	LA	L & W Elrepho - Autoline
LE	L & W Elrepho	LT	L & W Elrepho SE 071
TC	Technidyne Color Touch Series	TD	Technidyne Color Touch X
XX	Instrument make/model not specified by lab		

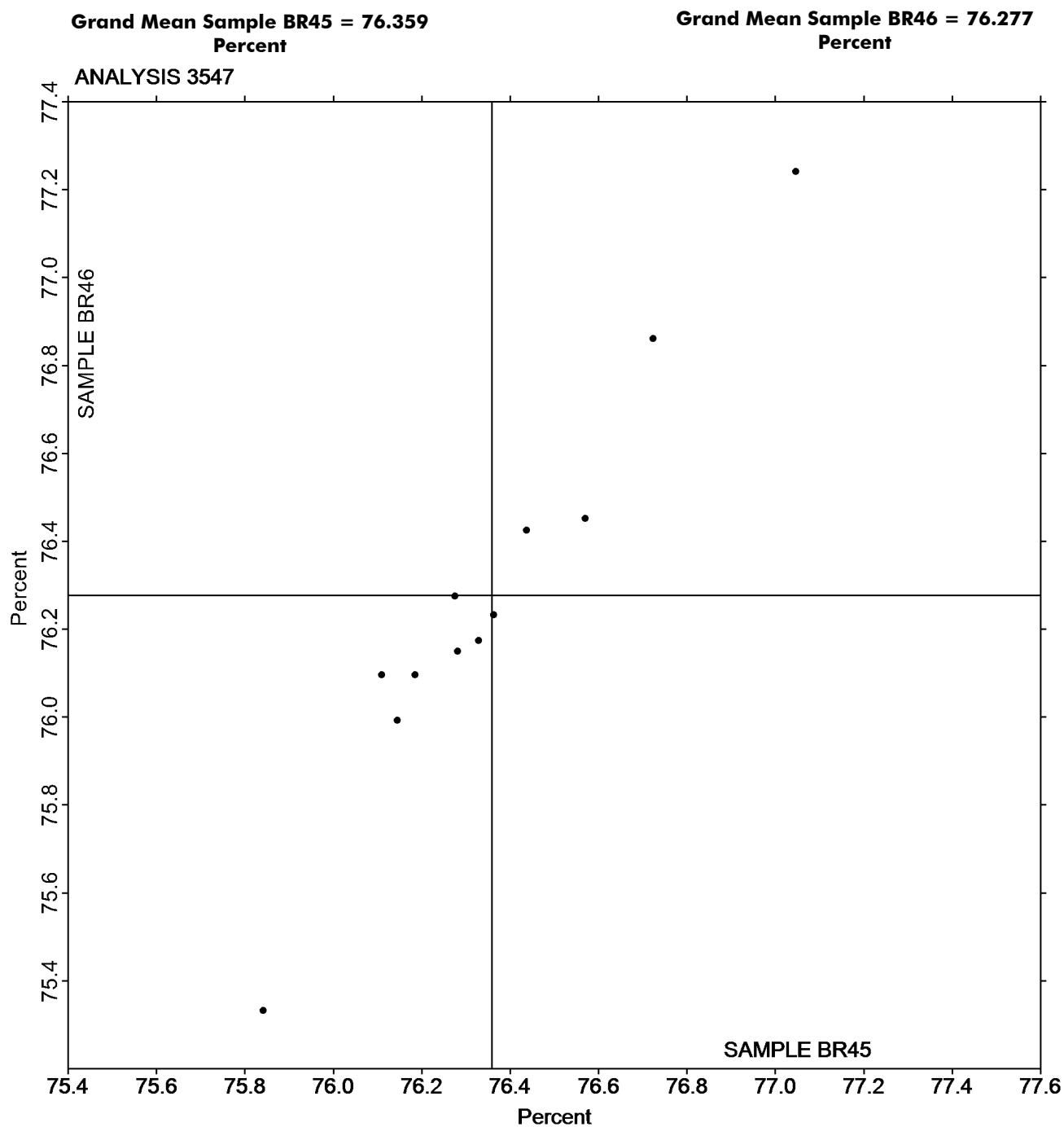


Paper & Paperboard Interlaboratory Testing Program

Analysis 3547
Diffuse Brightness

TAPPI Official Test Method T525

Report #4382,
October 2025



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 3549

Report #4382,
October 2025

Color & Color Difference - Near White Papers - C/2deg obs

Hunter L,a,b - Illuminant C - 2 Degree Observer

Web Code	Data Flag	Samples	Hunter L, a, b Color Values			Color Difference Values				Instr Code
			L	a	b	ΔL	Δa	Δb	ΔE	
442RFX		CA45	89.69	0.27	-0.28	0.03	0.00	0.04	0.05	TC
		CA46	89.72	0.27	-0.25					
4HY7D7		CA45	86.28	0.76	0.20	-0.21	0.05	-0.16	0.27	TS
		CA46	86.07	0.81	0.04					
4LWKZV		CA45	84.98	0.87	-1.42	0.02	-0.02	0.00	0.03	TC
		CA46	85.00	0.85	-1.43					
6U7C4Y		CA45	79.57	0.59	-1.20	0.33	-0.07	0.19	0.38	TC
		CA46	79.89	0.52	-1.01					
893A4Z		CA45	86.80	0.68	-0.60	0.34	-0.14	0.42	0.56	HK
		CA46	87.14	0.54	-0.18					
8MGBZQ		CA45	86.76	0.27	-0.23	0.16	-0.04	0.09	0.19	TC
		CA46	86.92	0.23	-0.15					
A7MP9V		CA45	83.07	-0.43	-0.46	0.36	-0.01	-0.03	0.36	NH
		CA46	83.43	-0.44	-0.48					
C93WKN		CA45	87.47	0.72	-0.25	0.07	0.03	-0.07	0.11	HK
		CA46	87.54	0.75	-0.32					
H2KGGR		CA45	89.71	-0.44	-0.13	-0.09	-0.08	0.05	0.13	TC
		CA46	89.62	-0.52	-0.07					
M7GU7C	X	CA45	94.72	1.04	-3.27	-0.28	0.43	-0.63	0.81	TC
		CA46	94.44	1.47	-3.90					
MZFKZK		CA45	89.94	0.31	-0.18	0.29	-0.04	-0.09	0.30	XX
		CA46	90.23	0.28	-0.27					
U3DC9H		CA45	86.77	0.27	-0.24	0.15	-0.05	0.14	0.21	TC
		CA46	86.91	0.22	-0.10					
UNVJKC		CA45	86.88	0.20	-0.23	0.13	-0.01	0.07	0.14	TC
		CA46	87.01	0.19	-0.16					
V3CYZF		CA45	85.50	2.20	-1.34	0.24	0.13	-0.14	0.31	TS
		CA46	85.74	2.34	-1.48					
V7BAWF		CA45	87.00	-0.60	0.07	0.11	0.08	0.21	0.25	XX
		CA46	87.11	-0.51	0.28					
YN2J89		CA45	87.39	0.77	-0.75	0.36	-0.09	0.27	0.46	HK
		CA46	87.75	0.68	-0.49					



Paper & Paperboard Interlaboratory Testing Program
Analysis 3549
Color & Color Difference - Near White Papers - C/2deg obs
Hunter L,a,b - Illuminant C - 2 Degree Observer

Report #4382,
October 2025

Grand Means			Summary Statistics					
CA45	87.033	0.468	-0.469					
CA46	87.157	0.480	-0.404	0.151	-0.016	0.066	0.250	
Std Dev Btwn Labs								
CA45	3.276	0.672	0.499					
CA46	3.165	0.726	0.513	0.172	0.070	0.160	0.150	
Statistics based on 15 of 16 reporting participants								

Comments on Assigned Data Flags for Test #3549

M7GU7C (X) - Very low "b" values for both samples. Small delta L & b. Large delta a & E.

Key to Instrument Codes Reported by Participants

HK	Hunter LabScan XE	NH	Minolta CM-3700A Spectrophotometer
TC	Technidyne Color Touch Series	TS	Technidyne Brightimeter Micro S-5
XX	Instrument make/model not specified by lab		



Paper & Paperboard Interlaboratory Testing Program

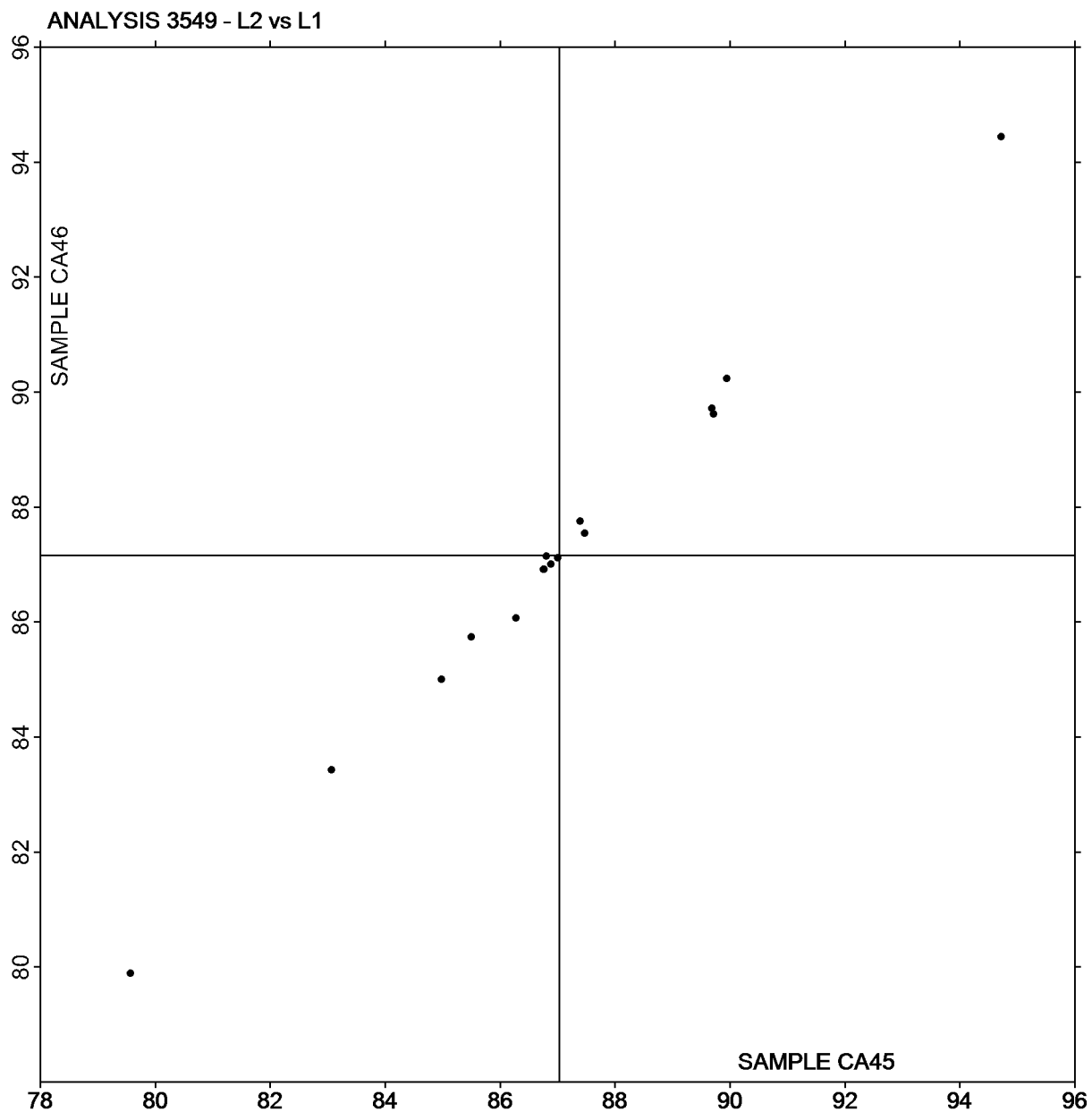
Analysis 3549

Color & Color Difference - Near White Papers - C/2deg obs

Hunter L,a,b - Illuminant C - 2 Degree Observer

Report #4382,
October 2025

Plot of L values CA46 vs L values CA45



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

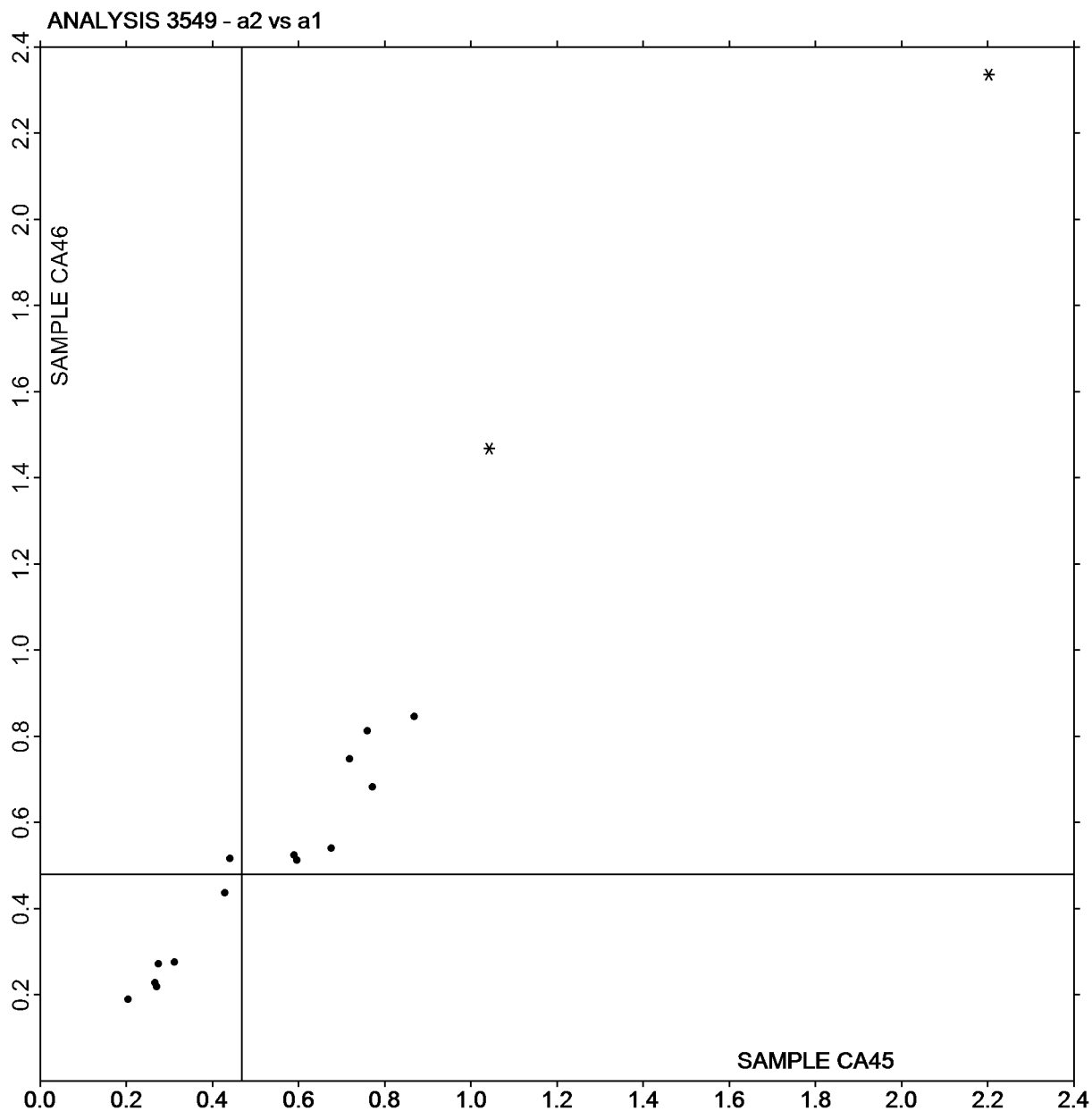
Analysis 3549

Color & Color Difference - Near White Papers - C/2deg obs

Hunter L,a,b - Illuminant C - 2 Degree Observer

Report #4382,
October 2025

Plot of a values CA46 vs a values CA45



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

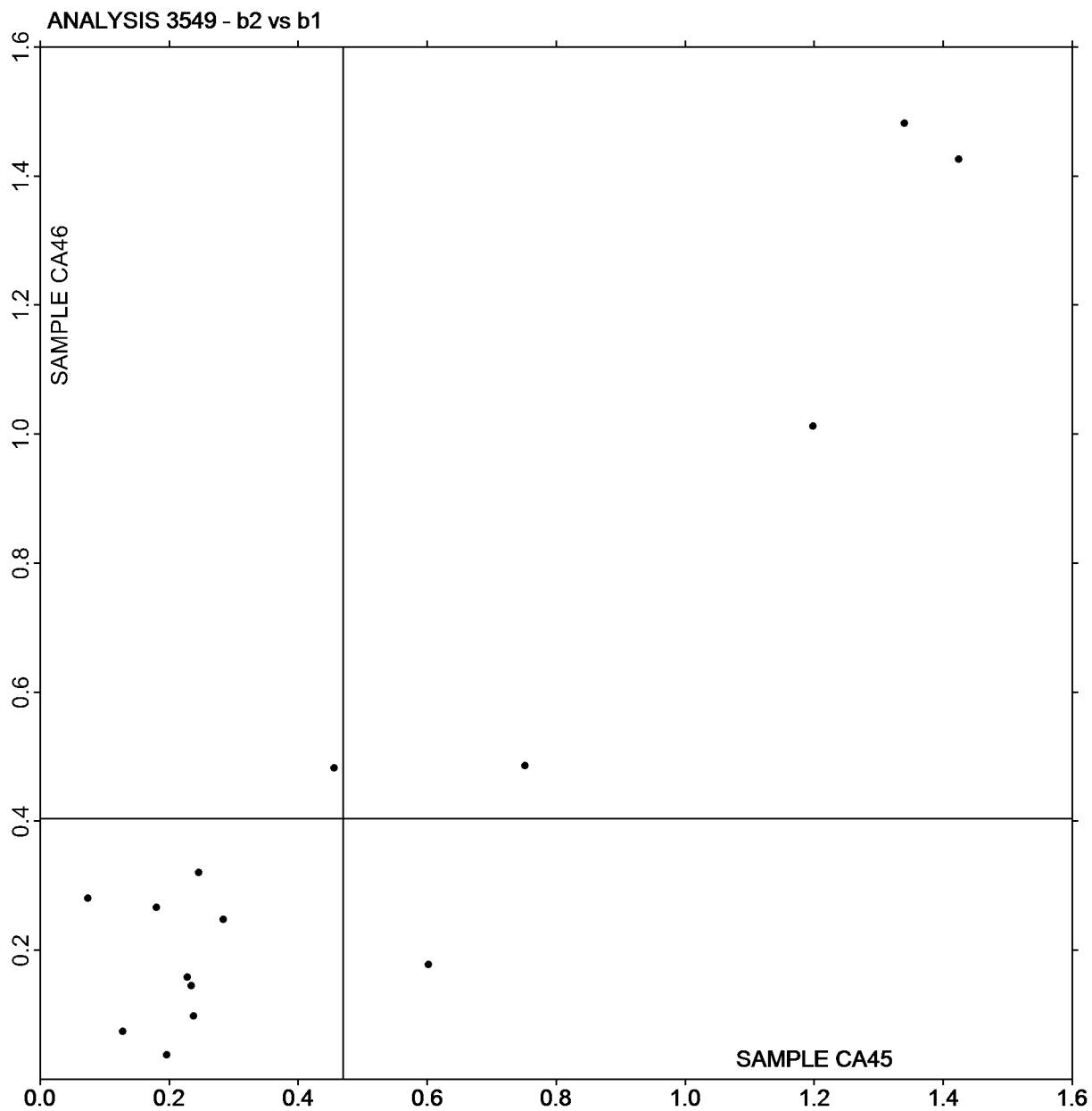
Analysis 3549

Color & Color Difference - Near White Papers - C/2deg obs

Hunter L,a,b - Illuminant C - 2 Degree Observer

Report #4382,
October 2025

Plot of b values CA46 vs b values CA45



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 3551

Report #4382,
October 2025

Color & Color Difference - Near White Papers - D65/10deg obs

Hunter L,a,b - Illuminant D65 - 10 Degree Observer

Web Code	Data Flag	Samples	Hunter L, a, b Color Values			Color Difference Values				Instr Code
			L	a	b	ΔL	Δa	Δb	ΔE	
6WDRCP		CA45	89.76	-0.48	0.12	0.27	0.22 X	-0.09	0.36	TC
		CA46	90.03	-0.26	0.03					
C66F9U		CA45	89.58	-0.58	0.12	0.08	0.01	-0.05	0.09	EG
		CA46	89.66	-0.57	0.07					
C93WKN		CA45	86.97	-0.57	0.15	0.09	-0.02	0.06	0.11	TC
		CA46	87.05	-0.58	0.21					
ECB4YX		CA45	89.54	0.27	-0.25	0.11	-0.03	0.07	0.14	LS
		CA46	89.66	0.24	-0.18					
EHE3AM		CA45	87.72	-0.53	-0.06	0.32	-0.03	0.28	0.42	HL
		CA46	88.04	-0.56	0.22					
KMRWRF		CA45	89.77	-0.57	0.17	0.17	0.03	0.10	0.20	XX
		CA46	89.94	-0.54	0.27					
M6LDUF		CA45	90.12	-0.40	-0.25	0.10	0.05	-0.10	0.15	NF
		CA46	90.21	-0.34	-0.36					
TBBGPE		CA45	89.74	-0.67	0.14	0.09	-0.01	0.11	0.14	XX
		CA46	89.83	-0.69	0.25					
ZYD9L4		CA45	89.38	-0.45	0.01	0.05	-0.02	0.01	0.06	LT
		CA46	89.43	-0.47	0.02					

Grand Means

CA45	89.176	-0.442	0.017	0.140	0.023	0.042	0.184
CA46	89.317	-0.420	0.059				

Std Dev Btwn Labs

CA45	1.076	0.281	0.170	0.092	0.079	0.119	0.125
CA46	1.058	0.280	0.213				

Statistics based on 9 of 9 reporting participants

Key to Instrument Codes Reported by Participants

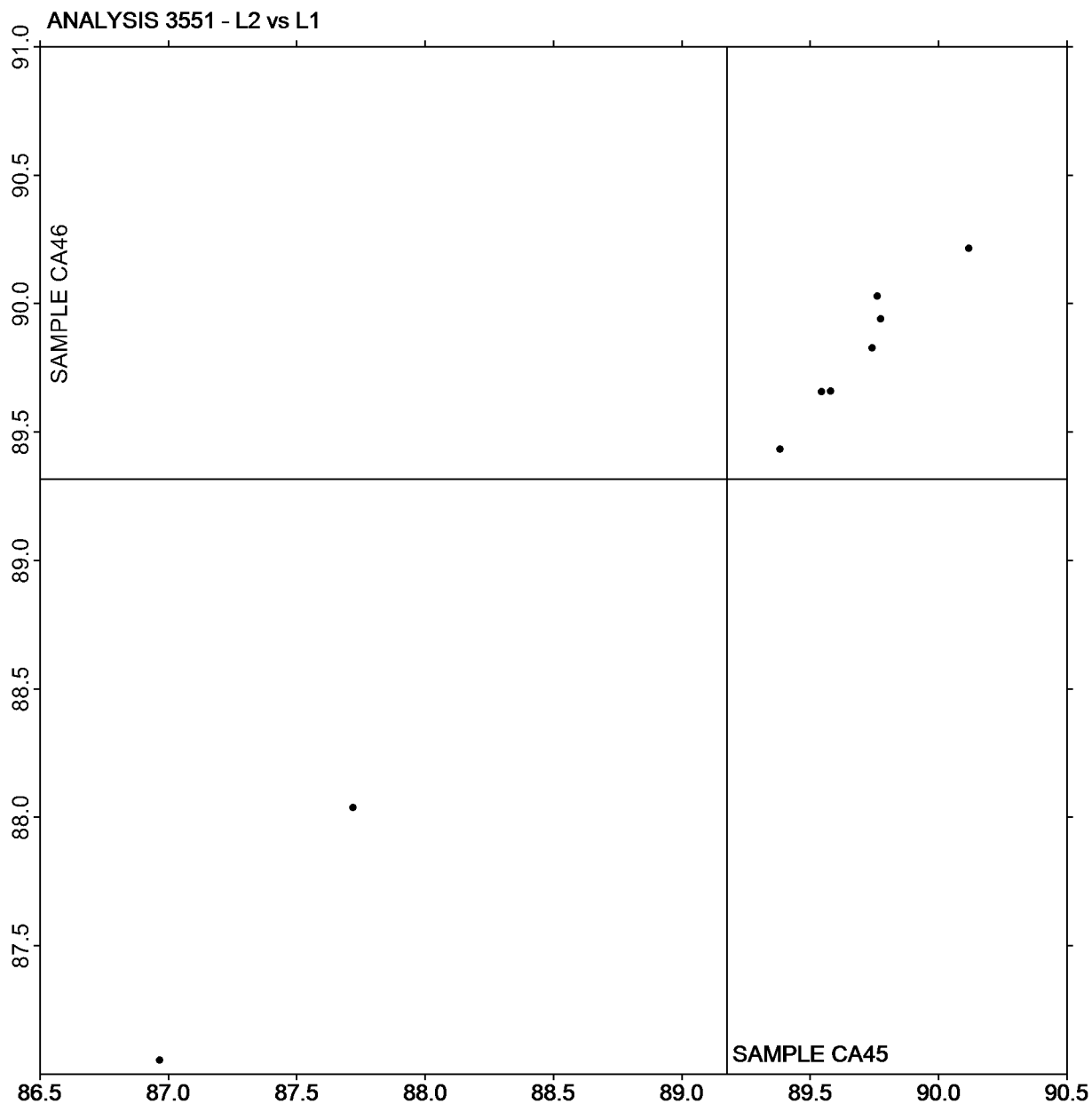
EG	Datacolor Elrepho	HL	Hunter Agera
LS	L & W Elrepho SE 070	LT	L & W Elrepho SE 071
NF	Minolta CM-3600d Spectrophotometer	TC	Technidyne Color Touch Series
XX	Instrument make/model not specified by lab		



Paper & Paperboard Interlaboratory Testing Program
Analysis 3551
Color & Color Difference - Near White Papers - D65/10deg obs
Hunter L,a,b - Illuminant D65 - 10 Degree Observer

Report #4382,
October 2025

Plot of L values CA46 vs L values CA45



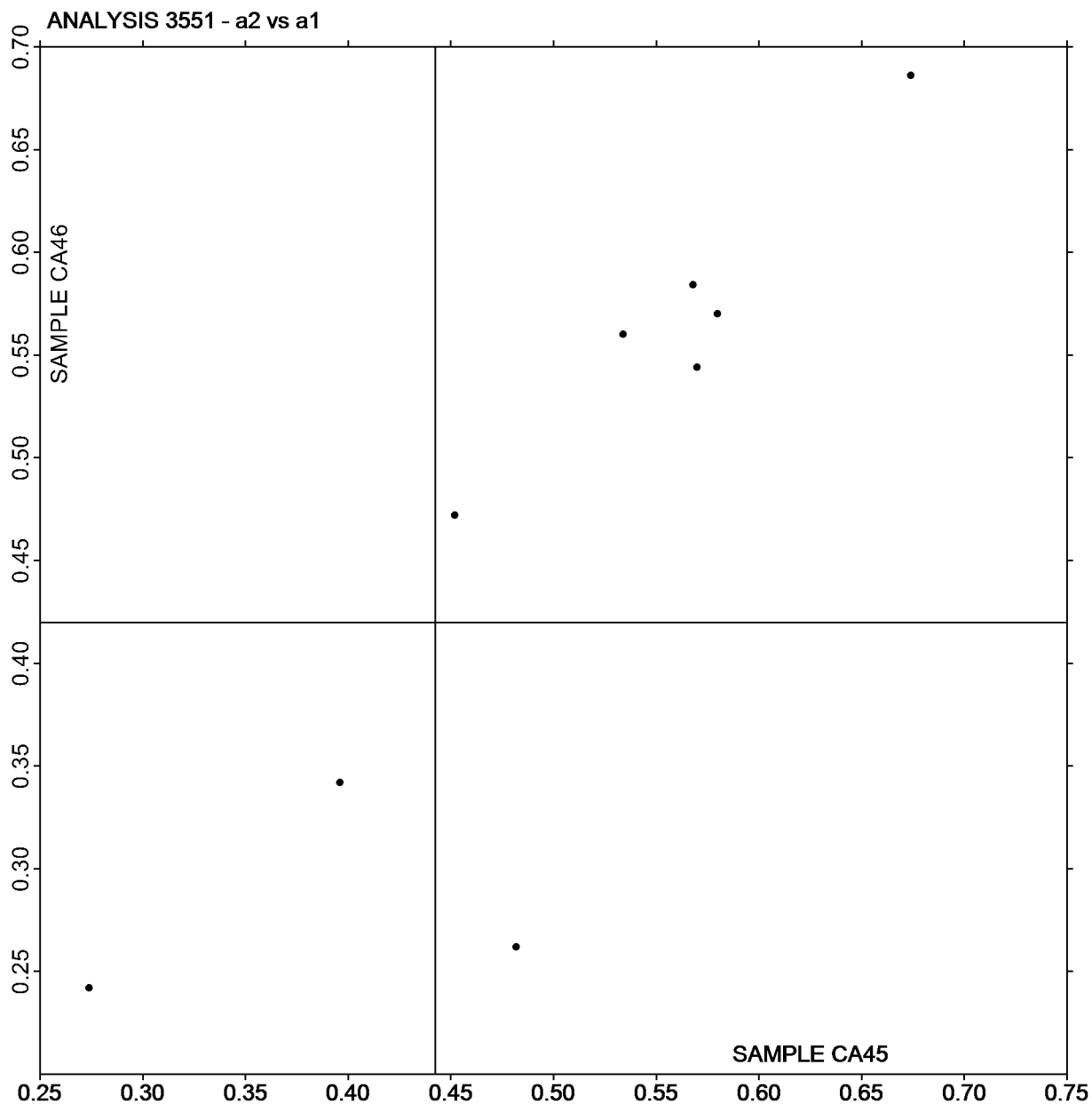
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



Paper & Paperboard Interlaboratory Testing Program
Analysis 3551
Color & Color Difference - Near White Papers - D65/10deg obs
Hunter L,a,b - Illuminant D65 - 10 Degree Observer

Report #4382,
October 2025

Plot of a values CA46 vs a values CA45



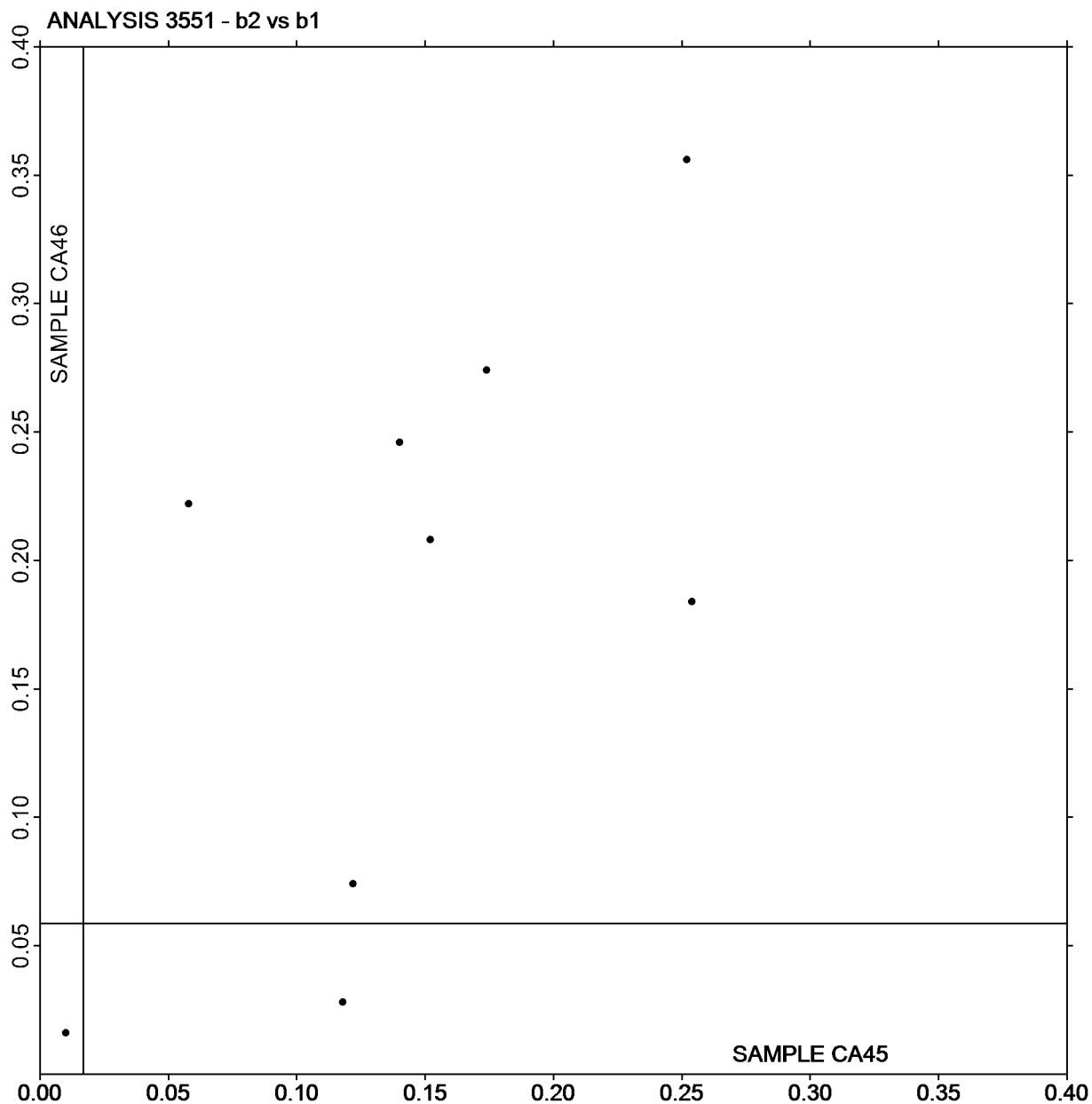
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



Paper & Paperboard Interlaboratory Testing Program
Analysis 3551
Color & Color Difference - Near White Papers - D65/10deg obs
Hunter L,a,b - Illuminant D65 - 10 Degree Observer

Report #4382,
October 2025

Plot of b values CA46 vs b values CA45



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 #4382,
October 2025

Analysis 3553

Specular Gloss at 75 Degrees - High Range

TAPPI Official Test Method T480

WebCode	Data Flag	Sample GH45			Sample GH46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
442RFX		63.60	1.50	1.63	63.71	2.65	1.17	LF
893A4Z		60.25	-1.85	-2.02	60.54	-0.52	-0.23	TP
8MGBZQ		61.40	-0.70	-0.77	58.54	-2.52	-1.12	TA
C66F9U		62.18	0.08	0.08	62.91	1.85	0.82	TH
DVUDMT		62.84	0.74	0.80	57.85	-3.21	-1.42	LG
FQ9ATT		63.14	1.04	1.13	64.63	3.57	1.58	VM
MFRVRD		62.24	0.14	0.15	60.82	-0.24	-0.11	GM
U3DC9H		62.33	0.23	0.25	63.39	2.33	1.03	PP
UNVJKC		61.95	-0.15	-0.17	60.28	-0.79	-0.35	GM
YN2J89		61.53	-0.57	-0.63	59.69	-1.38	-0.61	PP
ZYD9L4		61.68	-0.42	-0.46	59.36	-1.70	-0.76	GA

Summary Statistics

Sample GH45

Sample GH46

Grand Means

62.10 Gloss Units

61.07 Gloss Units

Std Dev Btwn Labs

0.92 Gloss Units

2.26 Gloss Units

Statistics based on 11 of 11 reporting participants.

Key to Instrument Codes Reported by Participants

GA BYK-Gardner (model not specified)

GM BYK-Gardner micro-gloss

LF L & W Autoline 400

LG L & W Autoline 600

PP Technidyne Profile/Plus

TA Technidyne Test Plus Gloss 75 degree

TH Technidyne T480A

TP Technidyne Profile Plus

VM Valmet PaperLab (was Kajaani/Robotest)



Paper & Paperboard Interlaboratory Testing Program

Analysis 3553

Specular Gloss at 75 Degrees - High Range

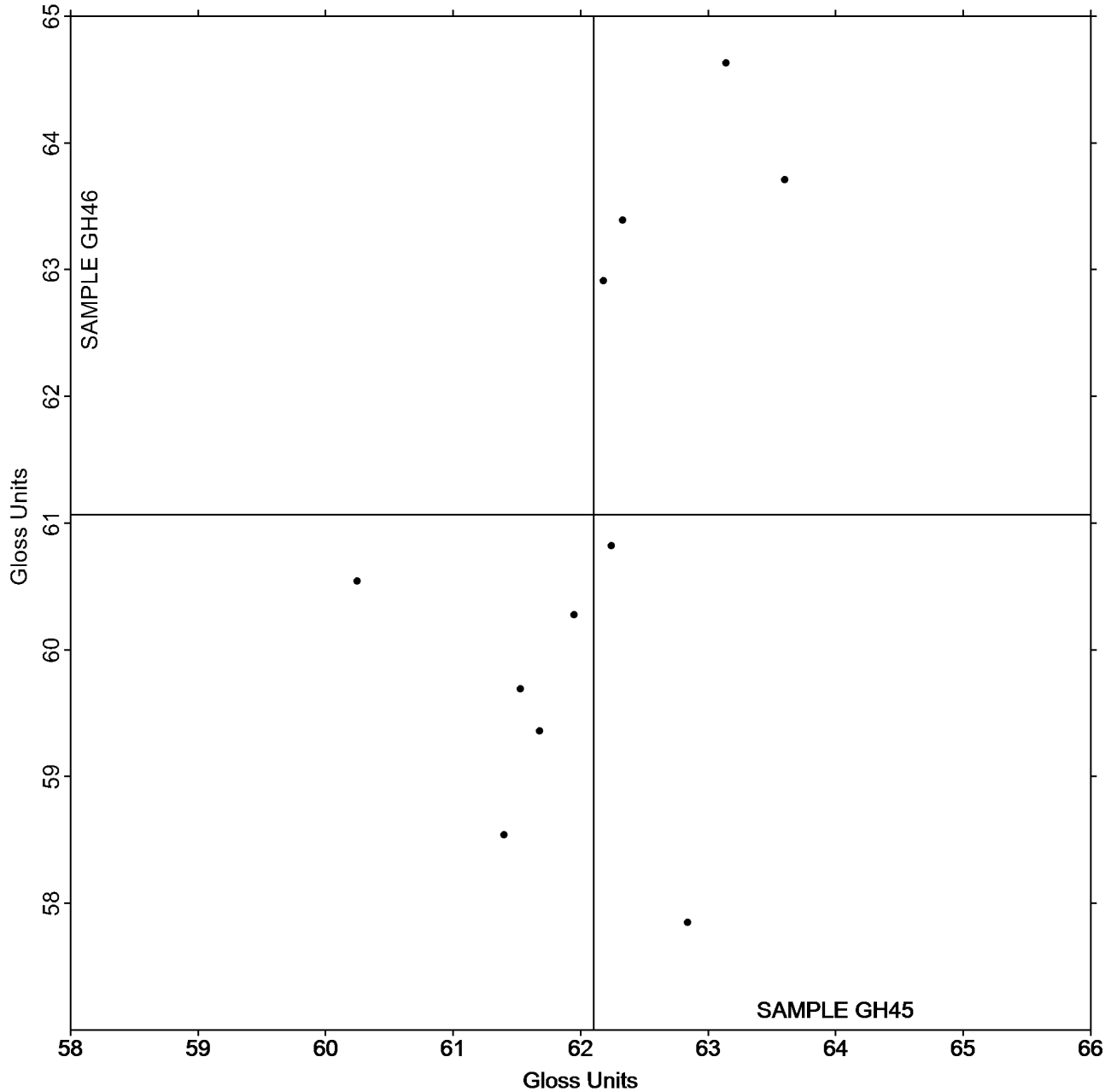
TAPPI Official Test Method T480

Report #4382,
October 2025

Grand Mean Sample GH45 = 62.104
Gloss Units

Grand Mean Sample GH46 = 61.065
Gloss Units

ANALYSIS 3553



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 3555

Specular Gloss at 75 Degrees - Low Range

TAPPI Official Test Method T480

Report #4382,
October 2025

WebCode	Data Flag	Sample GL45			Sample GL46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3XCVD2		34.98	0.32	0.17	34.82	0.18	0.13	WJ
4HY7D7		36.31	1.65	0.89	35.45	0.81	0.58	TP
8MGBZQ		32.72	-1.94	-1.04	33.41	-1.23	-0.89	TA
B4BC4Y		32.74	-1.92	-1.03	33.02	-1.62	-1.18	TH
C93WKN		33.32	-1.34	-0.72	33.60	-1.04	-0.76	PP
U2Y6M2		34.96	0.30	0.16	35.32	0.68	0.49	GS
VNTBT4		37.60	2.94	1.58	36.89	2.25	1.63	GM

Summary Statistics

Sample GL45

Sample GL46

Grand Means

34.66 Gloss Units

34.64 Gloss Units

Std Dev Btwn Labs

1.86 Gloss Units

1.38 Gloss Units

Statistics based on 7 of 7 reporting participants.

Key to Instrument Codes Reported by Participants

GM BYK-Gardner micro-gloss

GS BYK-Gardner Glossgard II

PP Technidyne Profile/Plus

TA Technidyne Test Plus Gloss 75 degree

TH Technidyne T480A

TP Technidyne Profile Plus

WJ Zehntner ZLR 1020



Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

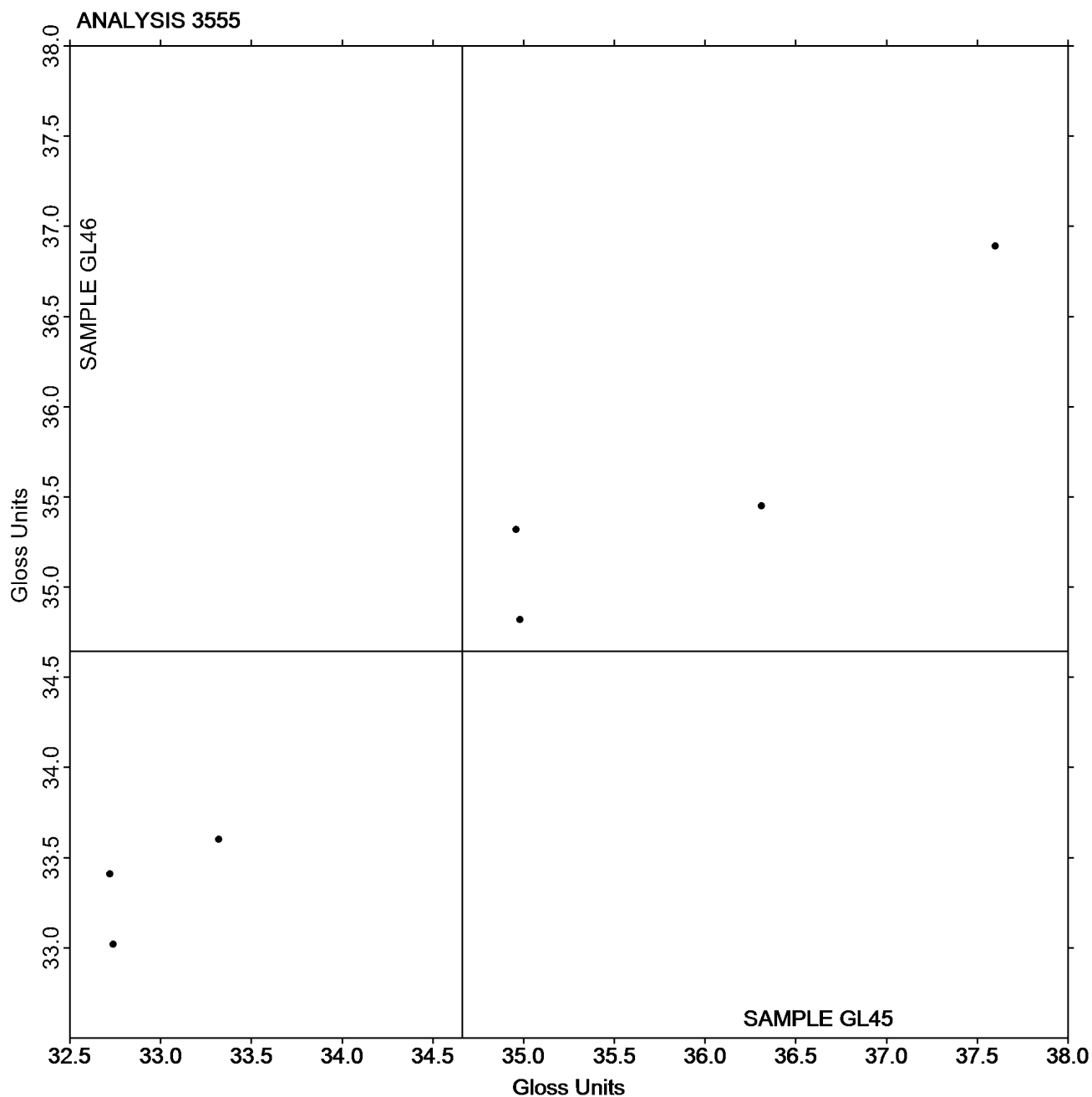
Analysis 3555

Specular Gloss at 75 Degrees - Low Range

TAPPI Official Test Method T480

Grand Mean Sample GL45 = 34.661
Gloss Units

Grand Mean Sample GL46 = 34.644
Gloss 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 3601

Folding Endurance (MIT) - Double Folds

TAPPI Official Test Method T511

Report #4382,
October 2025

WebCode	Data Flag	Sample MT45			Sample MT46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
863Y9Z		59.60	2.70	0.25	29.90	-2.18	-0.51	MT
B4BC4Y		62.40	5.50	0.51	33.80	1.72	0.41	MT
C66F9U		70.90	14.00	1.30	38.70	6.63	1.56	MT
ECDT4V		65.80	8.90	0.83	37.10	5.03	1.18	MT
FQ9ATT		41.70	-15.20	-1.41	32.40	0.32	0.08	MT
FU9LNT		58.30	1.40	0.13	26.80	-5.28	-1.24	MT
TBBGPE		40.60	-16.30	-1.51	28.00	-4.08	-0.96	XX
XV2J8A		55.90	-1.00	-0.09	29.90	-2.18	-0.51	MT

Summary Statistics

Sample MT45

Sample MT46

Grand Means

56.90 Double Folds

32.08 Double Folds

Std Dev Btwn Labs

10.77 Double Folds

4.24 Double Folds

Statistics based on 8 of 8 reporting participants.

Key to Instrument Codes Reported by Participants

MT MIT - Tinius Olsen

XX Instrument make/model not specified by lab

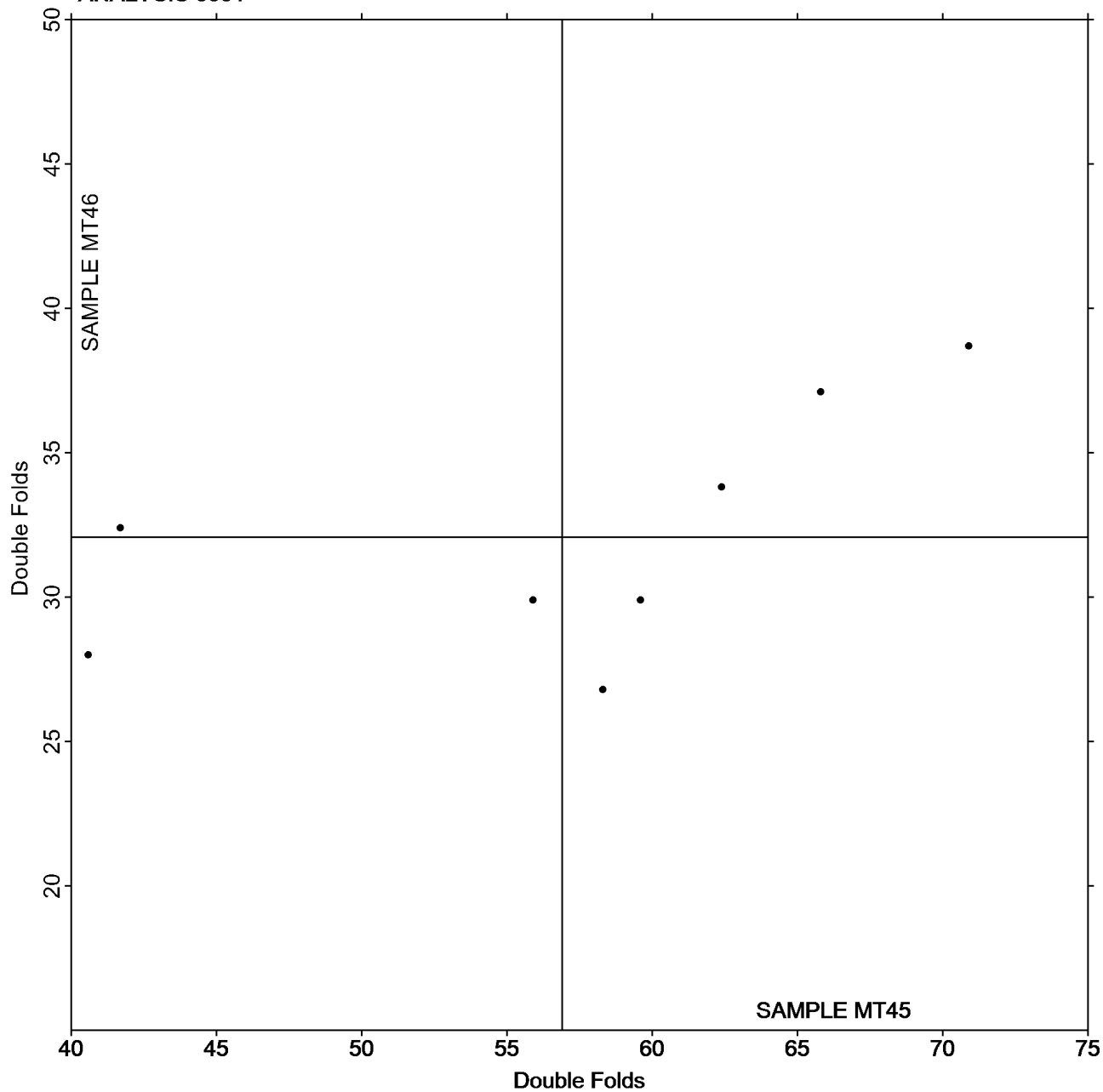
Analysis 3601

Folding Endurance (MIT) - Double Folds

TAPPI Official Test Method T511

Grand Mean Sample MT45 = 56.900
Double Folds

Grand Mean Sample MT46 = 32.075
Double Folds

ANALYSIS 3601

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 #4382,
October 2025

Analysis 3603 Bending Resistance, Gurley Type TAPPI Official Test Method T543

WebCode	Data Flag	Sample BG45			Sample BG46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3QUMP6		123.0	1.9	0.06	128.2	6.5	0.22	ZZ
A7MP9V	X	4.4	-116.8	-3.77	4.8	-116.9	-3.87	ZZ
B4BC4Y		139.1	18.0	0.58	145.4	23.6	0.78	ZZ
ECDT4V		128.4	7.3	0.24	126.0	4.3	0.14	ZZ
EHE3AM		124.1	3.0	0.10	123.4	1.7	0.06	ZZ
FQ9ATT		71.5	-49.6	-1.60	72.8	-48.9	-1.62	ZZ
HP6L4E		123.2	2.0	0.07	122.3	0.6	0.02	ZZ
QJT9ZL		143.9	22.7	0.73	134.5	12.8	0.42	ZZ
VFY39D		139.3	18.1	0.59	153.2	31.4	1.04	ZZ
XG8UDY		61.3	-59.9	-1.93	63.7	-58.0	-1.92	ZZ
XZGUKE		157.6	36.5	1.18	147.6	25.9	0.86	ZZ

Summary Statistics

Sample BG45

Sample BG46

Grand Means

121.13 Gurley Units

121.71 Gurley Units

Std Dev Btwn Labs

30.94 Gurley Units

30.19 Gurley Units

Statistics based on 10 of 11 reporting participants.

Comments on Assigned Data Flags for Test #3603

A7MP9V (X) - Data for both samples are low.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



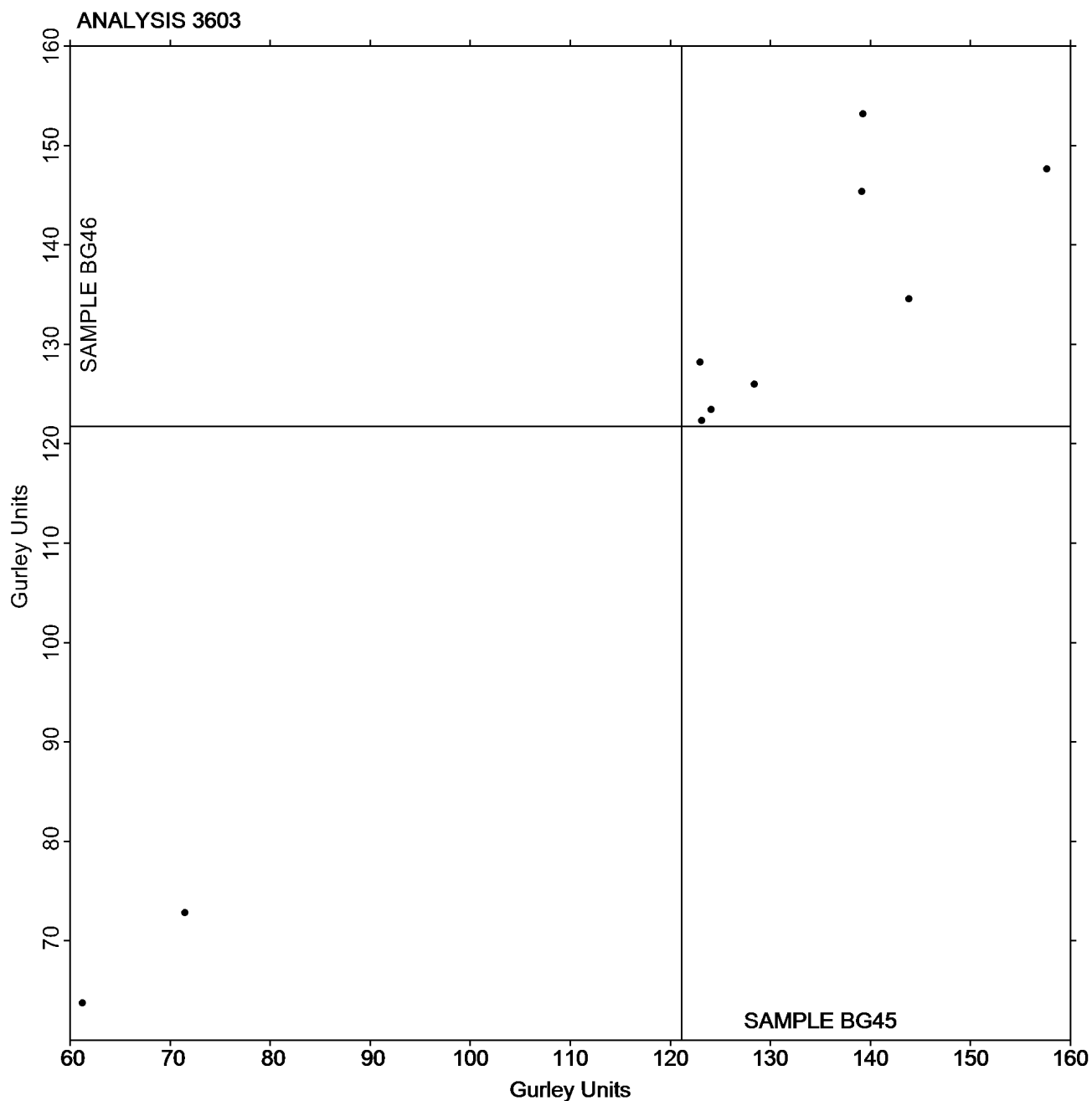
Paper & Paperboard Interlaboratory Testing Program

Report #4382,
October 2025

Analysis 3603 Bending Resistance, Gurley Type TAPPI Official Test Method T543

Grand Mean Sample BG45 = 121.13
Gurley Units

Grand Mean Sample BG46 = 121.71
Gurley 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 3611
Coefficient of Static Friction - Horizontal Plane Method - Printing Papers
TAPPI Official Test Method T549

Report #4382,
October 2025

WebCode	Data Flag	<u>Sample CF45</u>			<u>Sample CF46</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3QUMP6		0.6512	0.1534	1.13	0.6634	0.1527	1.24	TA
4HY7D7		0.6100	0.1122	0.82	0.6084	0.0977	0.80	TA
A7MP9V		0.2612	-0.2366	-1.74	0.3308	-0.1799	-1.47	TX
MZFKZK		0.4978	0.0000	0.00	0.5156	0.0049	0.04	XX
P6YJ7B		0.3102	-0.1876	-1.38	0.3303	-0.1803	-1.47	TN
TZ9JG6		0.5230	0.0252	0.18	0.5024	-0.0083	-0.07	TA
V3CYZF		0.5690	0.0712	0.52	0.5694	0.0587	0.48	TA
XV2J8A		0.6118	0.1140	0.84	0.6318	0.1211	0.99	TM
XZGUKE		0.4460	-0.0518	-0.38	0.4440	-0.0667	-0.54	TA

Summary Statistics

Sample CF45

Sample CF46

Grand Means

0.50 COF

0.51 COF

Std Dev Btwn Labs

0.14 COF

0.12 COF

Statistics based on 9 of 9 reporting participants.

Key to Instrument Codes Reported by Participants

TA	Thwing-Albert Friction Tester	TM	TMI 32-06 Monitor/Slip and Friction
TN	TMI 32-07 Monitor/Slip and Friction	TX	TMI (model not specified)
XX	Instrument make/model not specified by lab		

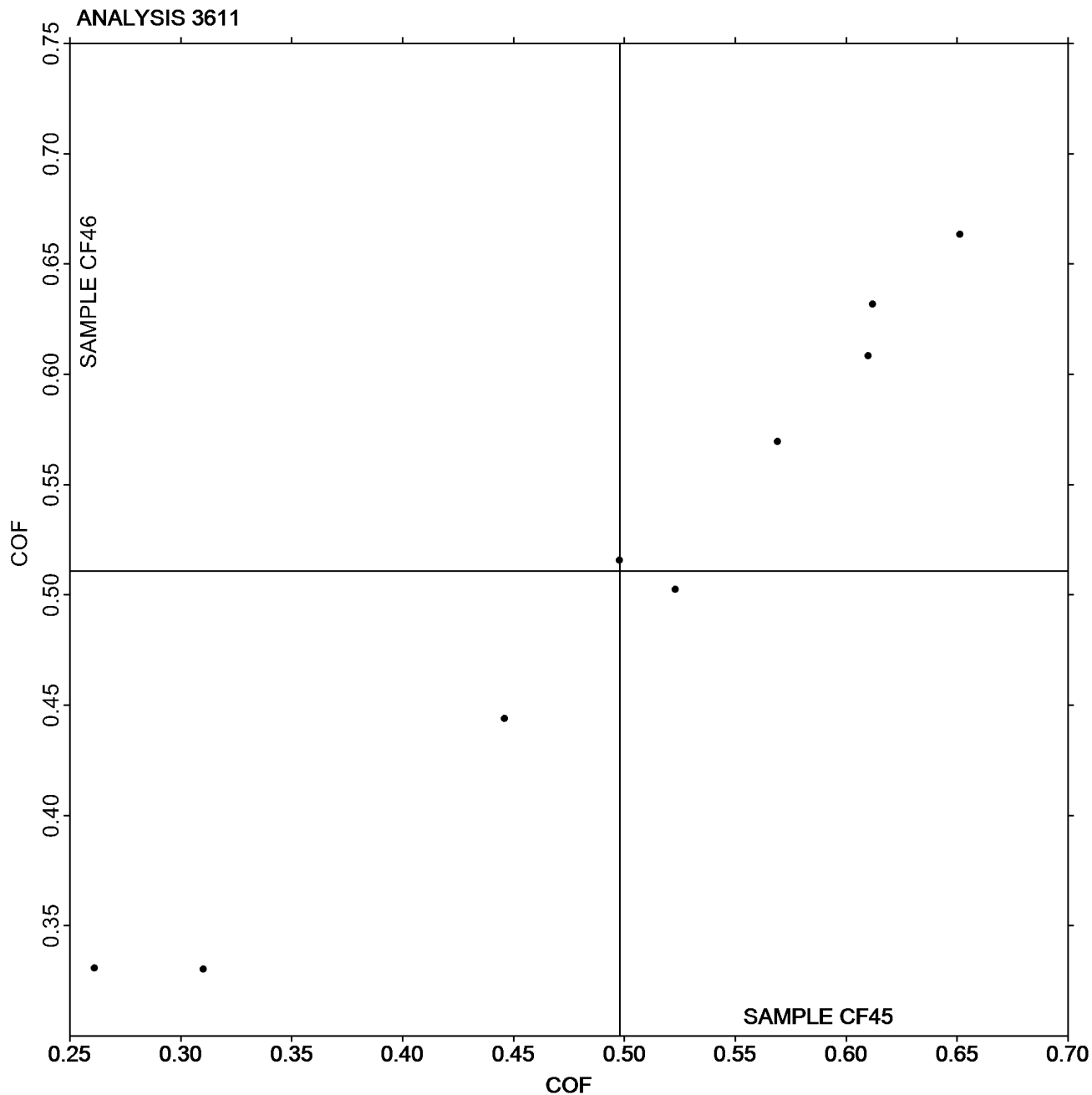


Paper & Paperboard Interlaboratory Testing Program
Analysis 3611
Coefficient of Static Friction - Horizontal Plane Method - Printing Papers
TAPPI Official Test Method T549

Report #4382,
October 2025

Grand Mean Sample CF45 = 0.49780
COF

Grand Mean Sample CF46 =
0.51068 COF



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 3612
Coefficient of Kinetic Friction - Horizontal Plane Method - Printing Papers
TAPPI Official Test Method T549

Report #4382,
October 2025

WebCode	Data Flag	<u>Sample CF45</u>			<u>Sample CF46</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3QUMP6		0.5140	0.0878	0.60	0.5326	0.1057	0.75	TA
4HY7D7		0.5044	0.0782	0.53	0.5172	0.0903	0.64	TA
A7MP9V		0.1218	-0.3044	-2.08	0.1348	-0.2921	-2.09	TX
MZFKZK		0.5186	0.0924	0.63	0.5122	0.0853	0.61	XX
P6YJ7B		0.2436	-0.1827	-1.25	0.2614	-0.1655	-1.18	TN
TZ9JG6		0.4804	0.0542	0.37	0.4316	0.0047	0.03	TA
V3CYZF		0.4396	0.0134	0.09	0.4478	0.0209	0.15	TA
XV2J8A		0.5638	0.1376	0.94	0.5562	0.1293	0.92	TM
XZGUKE		0.4500	0.0238	0.16	0.4480	0.0211	0.15	TA

Summary Statistics	<u>Sample CF45</u>	<u>Sample CF46</u>
Grand Means	0.43 COF	0.43 COF
Stnd Dev Btwn Labs	0.15 COF	0.14 COF
Statistics based on 9 of 9 reporting participants.		

Key to Instrument Codes Reported by Participants

TA	Thwing-Albert Friction Tester	TM	TMI 32-06 Monitor/Slip and Friction
TN	TMI 32-07 Monitor/Slip and Friction	TX	TMI (model not specified)
XX	Instrument make/model not specified by lab		

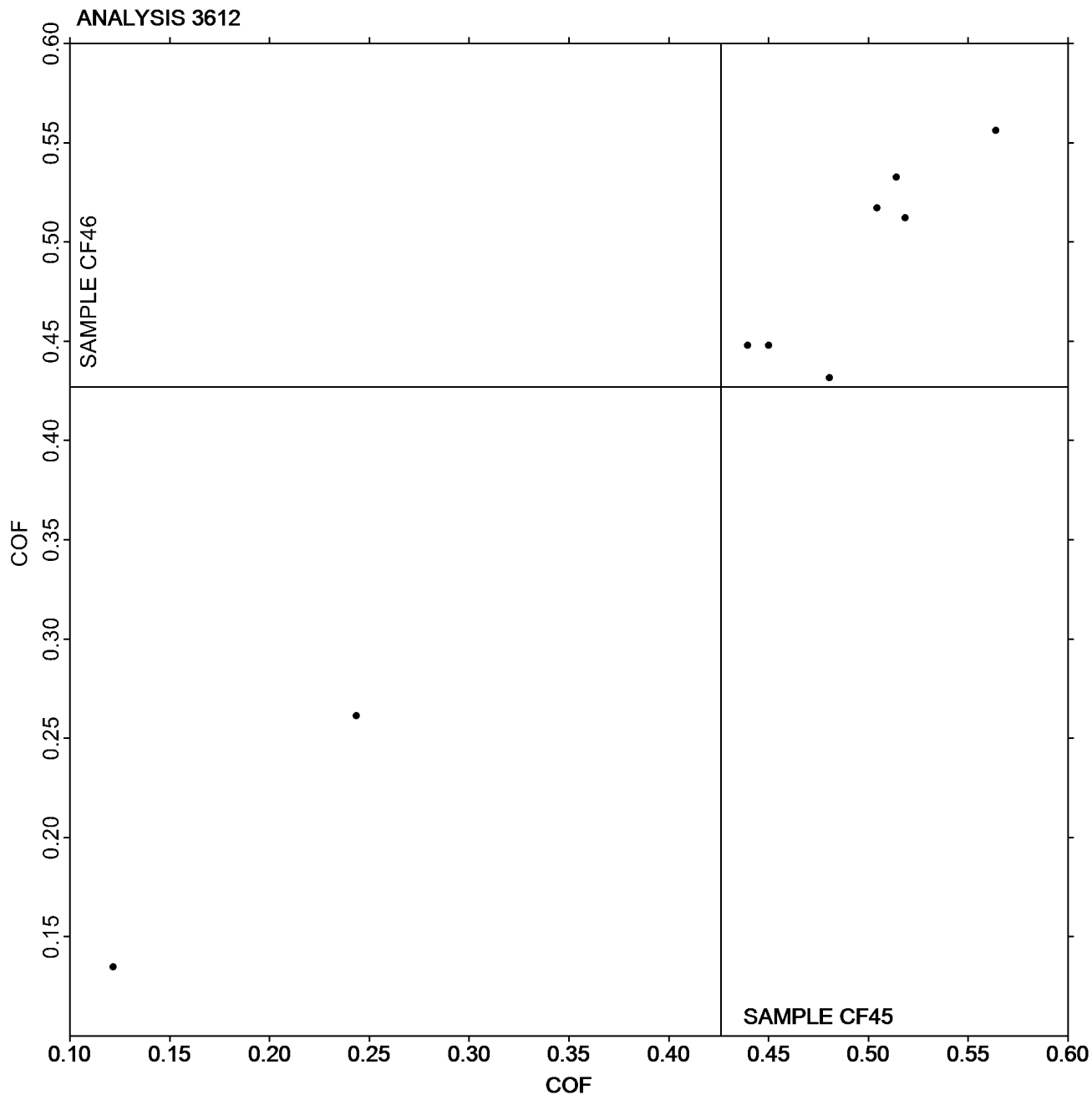


Paper & Paperboard Interlaboratory Testing Program
Analysis 3612
Coefficient of Kinetic Friction - Horizontal Plane Method - Printing Papers
TAPPI Official Test Method T549

Report #4382,
October 2025

Grand Mean Sample CF45 = 0.42624
COF

Grand Mean Sample CF46 =
0.42686 COF



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 3613 Moisture in Paper

TAPPI Official Test Method T412

Report #4382,
October 2025

WebCode	Data Flag	Sample MC45			Sample MC46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3XCVD2	M	No data reported for this sample			4.317	-0.492	-1.12	ZZ
4LWKZV		4.670	-0.057	-0.11	4.665	-0.144	-0.33	ZZ
4ZH4V		5.000	0.273	0.53	4.380	-0.429	-0.98	ZZ
892DT6		3.790	-0.937	-1.83	5.510	0.701	1.60	ZZ
ECDT4V		5.470	0.743	1.45	5.553	0.744	1.70	ZZ
HP6L4E		4.556	-0.171	-0.33	4.641	-0.168	-0.38	ZZ
KE2BLG		4.370	-0.357	-0.70	4.378	-0.431	-0.98	ZZ
M6LDUF		5.280	0.553	1.08	4.790	-0.019	-0.04	ZZ
VGJVKA		4.456	-0.271	-0.53	4.539	-0.270	-0.62	ZZ
XZGUKE		4.951	0.224	0.44	4.825	0.016	0.04	ZZ

Summary Statistics

Sample MC45

Sample MC46

Grand Means

4.73 Percent

4.81 Percent

Std Dev Btwn Labs

0.51 Percent

0.44 Percent

Statistics based on 9 of 10 reporting participants.

Comments on Assigned Data Flags for Test #3613

3XCVD2 (M) - Participant did not submit data for sample MC45.

Key to Instrument Codes Reported by Participants

ZZ Instruments No Longer Tracked



Paper & Paperboard Interlaboratory Testing Program

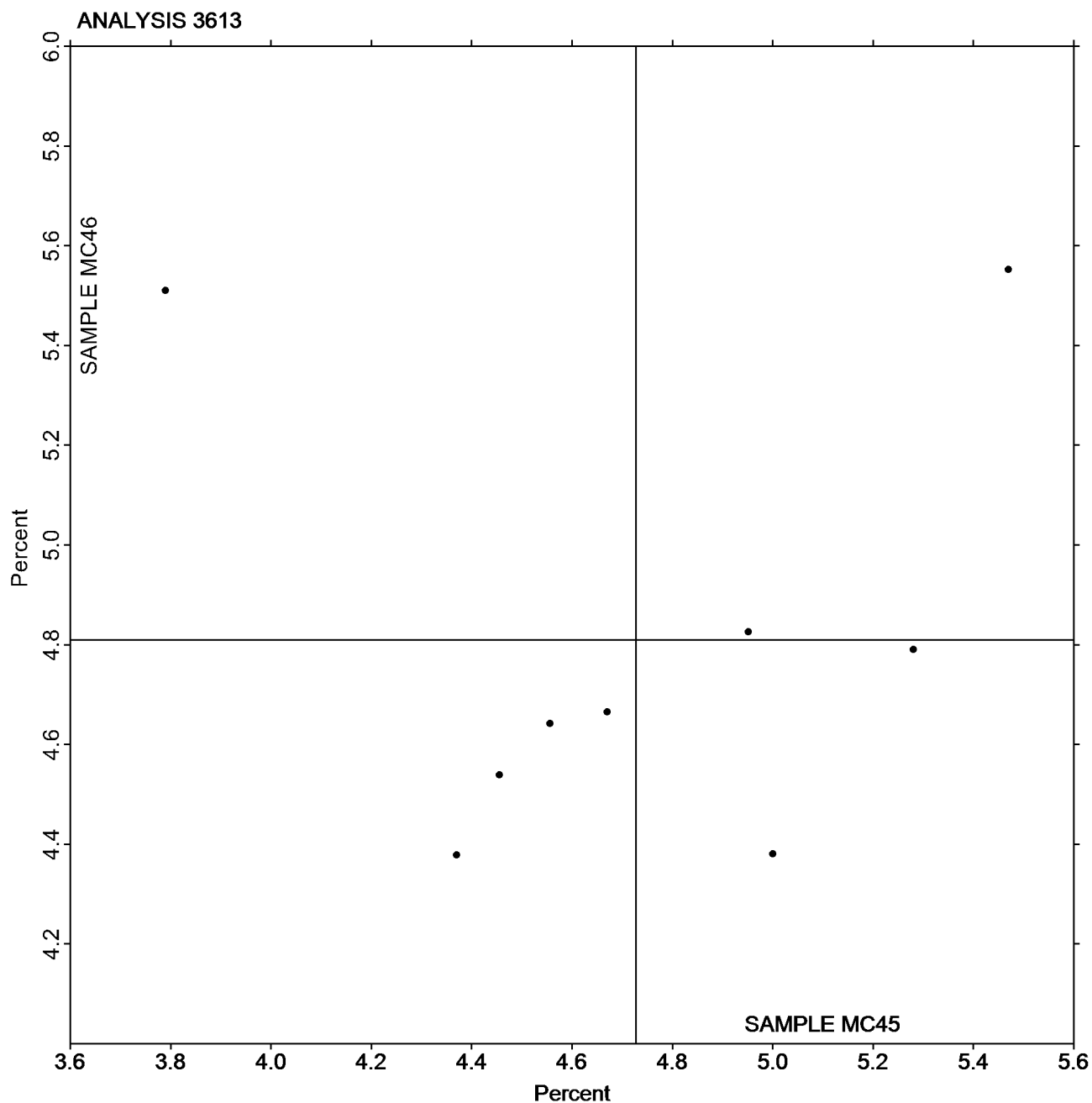
Analysis 3613
Moisture in Paper

TAPPI Official Test Method T412

Report #4382,
October 2025

Grand Mean Sample MC45 = 4.7271
Percent

Grand Mean Sample MC46 = 4.8090
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 #4382,
October 2025

Analysis 3615

Sizing Test (Hercules Type)

TAPPI Official Test Method T530

WebCode	Data Flag	Sample HS45			Sample HS46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3QUPEA		14.78	0.94	0.77	15.06	1.57	1.07	HE
442RFX		14.58	0.74	0.61	12.07	-1.42	-0.97	HE
4HY7D7		11.78	-2.06	-1.68	10.94	-2.55	-1.75	HE
6WDRCP		11.45	-2.39	-1.95	10.26	-3.23	-2.21	HE
8B4B4X		14.79	0.95	0.78	14.36	0.87	0.60	HE
A7MP9V	X	23.61	9.77	7.99	22.83	9.34	6.39	HE
EHE3AM		12.70	-1.14	-0.93	13.80	0.31	0.21	HE
EMW87X		15.09	1.25	1.03	13.09	-0.40	-0.27	HE
FQ9ATT		13.27	-0.57	-0.46	14.40	0.91	0.62	HE
JGA7RE		12.50	-1.34	-1.09	13.03	-0.46	-0.32	HE
L3NBPB		14.86	1.02	0.84	13.82	0.33	0.23	HE
MZFKZK		16.16	2.32	1.90	16.29	2.80	1.92	XX
QJT9ZL		13.62	-0.22	-0.18	13.63	0.14	0.10	HE
UXNR63		13.56	-0.28	-0.23	12.82	-0.67	-0.46	XX
V3CYZF		13.63	-0.21	-0.17	14.61	1.12	0.77	HE
VFY39D		14.54	0.70	0.58	14.52	1.03	0.70	XX
VNTBT4		14.40	0.56	0.46	13.70	0.21	0.14	HE
XG8UDY		13.07	-0.77	-0.63	12.25	-1.24	-0.85	HE
XZGUKE		14.26	0.42	0.35	14.18	0.69	0.47	HE

Summary Statistics

Sample HS45

Sample HS46

Grand Means

13.84 Seconds

13.49 Seconds

Std Dev Btwn Labs

1.22 Seconds

1.46 Seconds

Statistics based on 18 of 19 reporting participants.

Comments on Assigned Data Flags for Test #3615

A7MP9V (X) - Extreme Data.

Key to Instrument Codes Reported by Participants

HE Hercules Sizing Tester

XX Instrument make/model not specified by lab



Paper & Paperboard Interlaboratory Testing Program

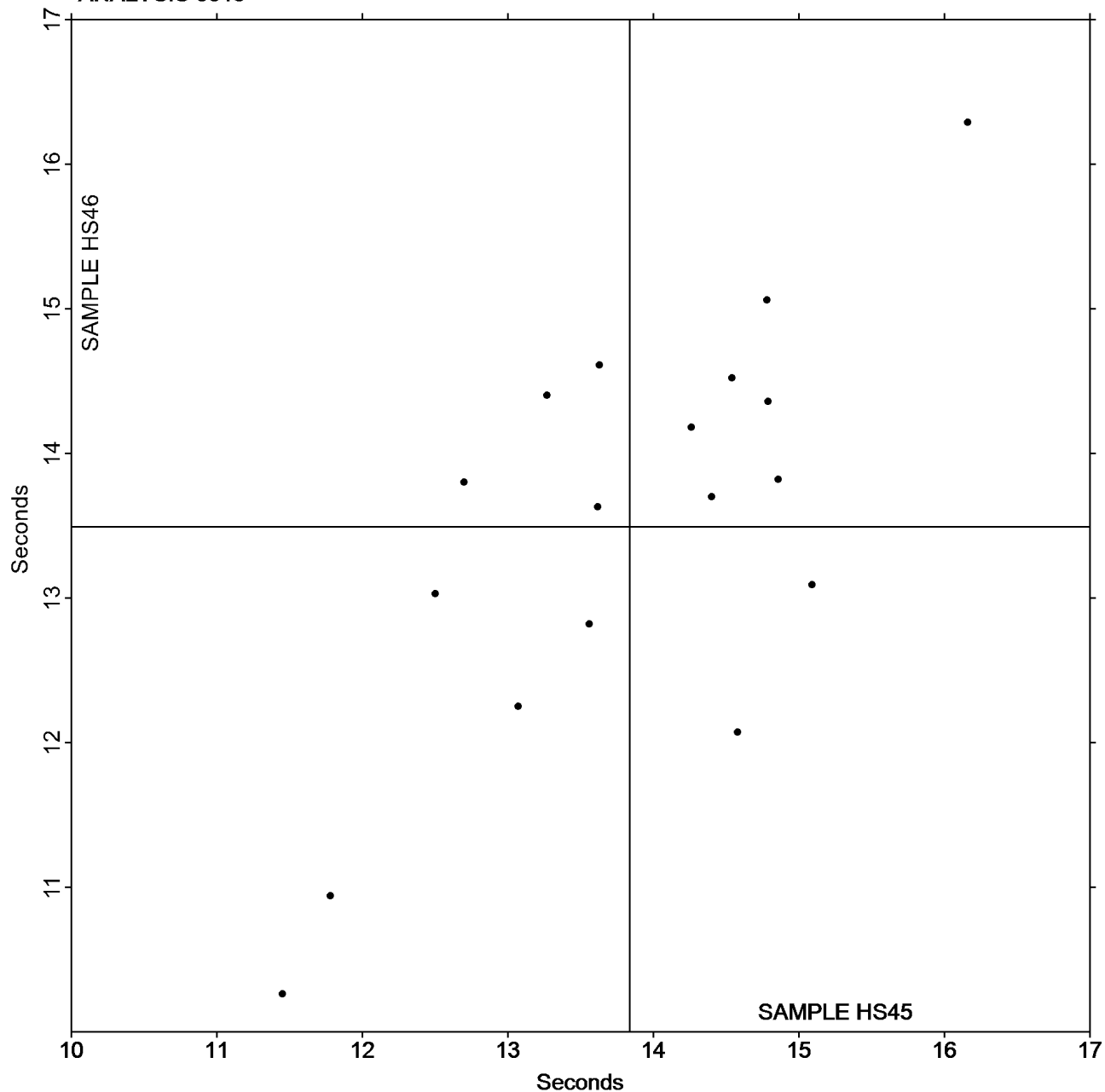
Report #4382,
October 2025

Analysis 3615 Sizing Test (Hercules Type) TAPPI Official Test Method T530

Grand Mean Sample HS45 = 13.836
Seconds

Grand Mean Sample HS46 = 13.491
Seconds

ANALYSIS 3615



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-