



## Paper & Paperboard Testing Program

### Summary Report #4282 - February 2024

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## **The CTS Paper & Paperboard Interlaboratory Program**

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

### **About CTS**

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

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## Key for Web Summary Reports (Page 1 of 2)

<b>WebCode</b>	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.
<b>Lab Mean</b>	The average of the values obtained for each sample by the participant.
<b>Grand Mean</b>	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.
<b>Difference from Grand Mean</b>	The difference of the LAB MEAN from the GRAND MEAN.
<b>Between-Lab Standard Deviation</b>	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).
<b>Comparative Performance Value</b>	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.
<b>Inst Code</b>	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.
<b>Data Flag</b>	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	<b>CAUTION</b> - 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	<b>STOP</b> - 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	<b>PROCEED</b> - 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.

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### 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.

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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 #4282,  
February 2024

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

WebCode	Data Flag	Sample CK25			Sample CK26			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2FLC7C	*	9.340	-0.560	-2.86	9.360	-0.520	-2.77	TM
2HQWWX		9.741	-0.159	-0.81	9.743	-0.137	-0.73	XX
87XQ2F		9.832	-0.068	-0.35	9.804	-0.076	-0.41	LW
8KX7N6		10.044	0.144	0.74	10.032	0.152	0.81	EM
9DB3U8		9.900	0.000	0.00	9.855	-0.025	-0.13	OK
9GC4WP	*	9.805	-0.095	-0.49	9.686	-0.194	-1.04	TA
AGN3QY		10.079	0.179	0.92	10.035	0.154	0.82	LW
AJFYFR		10.012	0.112	0.57	9.962	0.082	0.43	LW
BU92V7		9.950	0.050	0.26	9.900	0.020	0.11	LC
CGYKLF		10.029	0.129	0.66	10.037	0.157	0.84	XX
CVJ4G6		9.920	0.020	0.10	9.900	0.020	0.11	LW
DBAMBX		10.025	0.125	0.64	10.013	0.132	0.71	LB
DBU4QZ		10.085	0.185	0.95	10.045	0.165	0.88	XX
DEPVYW		9.976	0.076	0.39	10.017	0.137	0.73	EM
EVVEAU		10.041	0.141	0.72	10.035	0.155	0.83	LW
FA8CUK		10.190	0.290	1.48	10.209	0.329	1.75	PP
KRVJQT		9.575	-0.325	-1.66	9.535	-0.345	-1.84	XX
L9YDXR		9.780	-0.120	-0.61	9.790	-0.090	-0.48	XX
M6TAMG		9.861	-0.039	-0.20	9.865	-0.015	-0.08	EM
QB26RZ		10.020	0.120	0.61	9.933	0.053	0.28	LC
RCB8FK		9.978	0.078	0.40	9.975	0.095	0.51	EM
T77PJ6	*	9.480	-0.420	-2.15	9.550	-0.330	-1.76	LW
TWG2MG		10.106	0.206	1.05	10.070	0.190	1.01	EM
U72RLE		10.117	0.217	1.11	10.064	0.184	0.98	LW
V3UWFG		9.726	-0.174	-0.89	9.698	-0.182	-0.97	TM
W7BGZB		9.924	0.024	0.12	9.941	0.061	0.32	TA
W9JV8G		9.710	-0.190	-0.97	9.715	-0.165	-0.88	XX
WG8K66		9.805	-0.095	-0.49	9.806	-0.074	-0.40	LA
XQWUR6		10.106	0.206	1.05	10.031	0.151	0.80	PP
YFCNTF		10.079	0.179	0.92	10.066	0.185	0.99	LW
YWDP8Y		9.739	-0.161	-0.82	9.710	-0.170	-0.91	XX
Z69RAB		9.823	-0.077	-0.39	9.787	-0.093	-0.50	MS

Summary Statistics	Sample CK25	Sample CK26
<b>Grand Means</b>	9.90 mils	9.88 mils
<b>Std Dev Btwn Labs</b>	0.20 mils	0.19 mils
Statistics based on 32 of 32 reporting participants.		



# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

## Analysis 3501

### Thickness (Caliper), Packaging papers

#### TAPPI Official Test Method T411

#### 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	TM	TMI
XX	Instrument make/model not specified by lab		



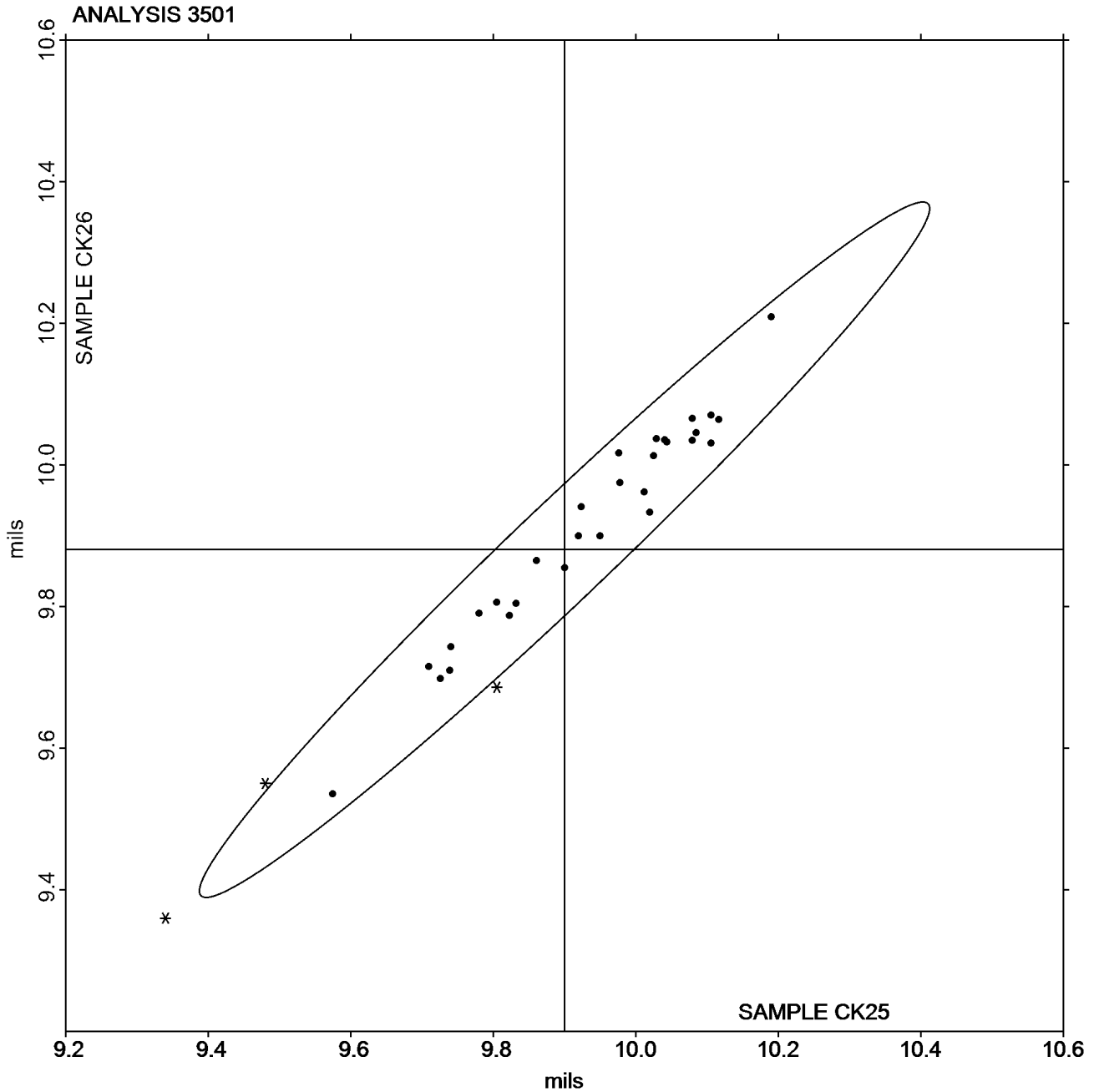
# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

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

Grand Mean Sample CK25 = 9.8999  
mils

Grand Mean Sample CK26 = 9.8803  
mils





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 3511**  
**Bursting Strength - Packaging Papers**  
**TAPPI Official Test Method T403**

**Report #4282,**  
**February 2024**

WebCode	Data Flag	<u>Sample BK25</u>			<u>Sample BK26</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
4XUDTA		64.78	-2.85	-0.30	98.8	-5.0	-0.35	ZZ
6RPWXU		70.88	3.25	0.34	118.5	14.8	1.05	ZZ
9DB3U8		70.57	2.94	0.31	106.7	3.0	0.21	ZZ
9GC4WP		69.40	1.77	0.19	109.8	6.0	0.42	ZZ
AGN3QY		60.40	-7.24	-0.77	99.7	-4.1	-0.29	ZZ
DRTGY2		82.45	14.82	1.57	117.8	14.1	1.00	ZZ
EJHEDZ		75.17	7.54	0.80	121.0	17.3	1.22	ZZ
LFUFZ4		59.00	-8.63	-0.92	103.6	-0.2	-0.01	ZZ
LVM39G		59.81	-7.82	-0.83	97.8	-6.0	-0.42	ZZ
T77PJ6	*	55.10	-12.53	-1.33	64.1	-39.7	-2.81	ZZ
U72RLE		61.07	-6.56	-0.70	94.0	-9.7	-0.69	ZZ
VWPTR4		90.60	22.97	2.44	119.3	15.5	1.10	ZZ
VYY68J		65.69	-1.95	-0.21	106.1	2.3	0.17	ZZ
YFCNTF		65.68	-1.95	-0.21	101.1	-2.7	-0.19	ZZ
YJDNVX		63.90	-3.73	-0.40	98.0	-5.8	-0.41	ZZ

<b>Summary Statistics</b>	<u>Sample BK25</u>	<u>Sample BK26</u>
<b>Grand Means</b>	67.63 psi	103.75 psi
<b>Std Dev Btwn Labs</b>	9.43 psi	14.12 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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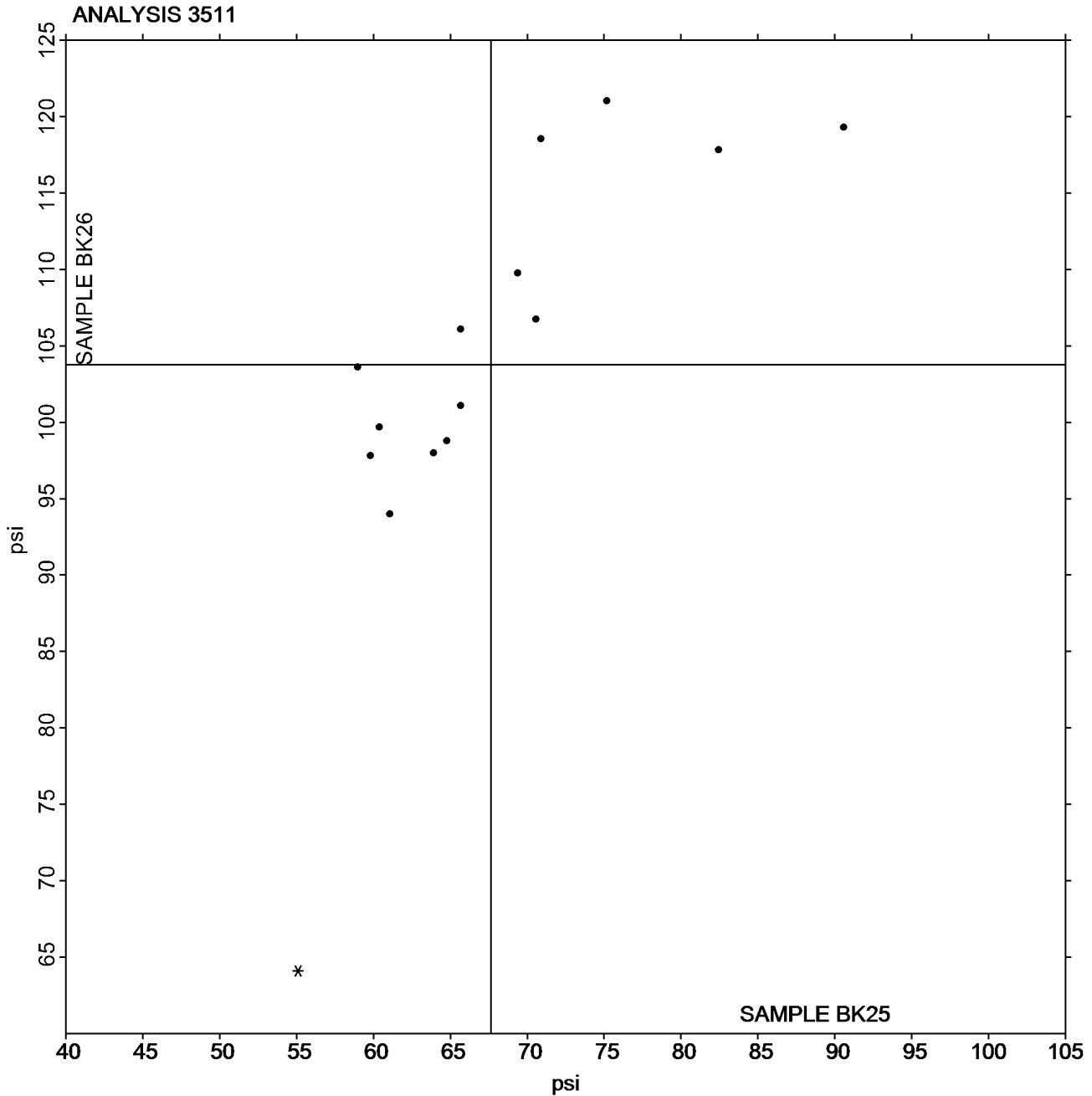
## Analysis 3511

### Bursting Strength - Packaging Papers

#### TAPPI Official Test Method T403

Grand Mean Sample BK25 = 67.634  
psi

Grand Mean Sample BK26 = 103.75  
psi



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



**Paper & Paperboard Interlaboratory Testing Program**

**Report #4282,  
February 2024**

**Analysis 3513**

**Tearing Strength - Packaging Papers**

**TAPPI Official Test Method T414**

WebCode	Data Flag	Sample RK25			Sample RK26			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
4XUDTA		148.6	-12.8	-0.79	151.6	-9.6	-0.53	ZZ
87XQ2F		142.3	-19.1	-1.18	134.8	-26.5	-1.45	ZZ
8KX7N6		186.4	25.0	1.54	194.5	33.2	1.82	ZZ
9DB3U8		160.8	-0.7	-0.04	161.4	0.1	0.01	ZZ
AGN3QY	*	191.6	30.2	1.86	205.8	44.6	2.44	ZZ
AJFYFR		152.6	-8.8	-0.54	147.0	-14.2	-0.78	ZZ
DBU4QZ		191.7	30.2	1.86	193.6	32.3	1.77	ZZ
DEPVYW		159.3	-2.1	-0.13	160.2	-1.1	-0.06	ZZ
EVVEAU		160.7	-0.7	-0.04	162.8	1.5	0.08	ZZ
FA8CUK		166.8	5.4	0.33	169.5	8.2	0.45	ZZ
H32HNNH		124.1	-37.3	-2.30	119.8	-41.5	-2.27	ZZ
HHRMR6		151.8	-9.6	-0.59	158.3	-3.0	-0.16	ZZ
L9YDXR		166.0	4.6	0.28	166.8	5.6	0.30	ZZ
LFUFZ4		149.6	-11.8	-0.73	152.7	-8.5	-0.47	ZZ
M2ACVK		174.0	12.6	0.77	170.9	9.7	0.53	ZZ
P7XEDB		178.1	16.7	1.03	176.5	15.3	0.84	ZZ
QB26RZ		165.7	4.3	0.26	164.0	2.8	0.15	ZZ
QU3RJY		163.8	2.4	0.15	163.1	1.8	0.10	ZZ
QX24EY		167.9	6.5	0.40	162.7	1.4	0.08	ZZ
RCB8FK		146.1	-15.3	-0.94	141.9	-19.4	-1.06	ZZ
T77PJ6	X	123.1	-38.3	-2.36	142.7	-18.5	-1.02	ZZ
TX9XBB		169.7	8.3	0.51	164.5	3.3	0.18	ZZ
U72RLE		146.0	-15.5	-0.95	143.9	-17.4	-0.95	ZZ
W7BGZB		157.8	-3.6	-0.22	158.1	-3.1	-0.17	ZZ
W9JV8G		135.1	-26.3	-1.62	136.9	-24.3	-1.33	ZZ
WG8K66		147.8	-13.6	-0.84	149.1	-12.1	-0.66	ZZ
Y2TXVY		187.7	26.3	1.62	184.1	22.9	1.25	ZZ
YFCNTF		161.7	0.3	0.02	161.5	0.3	0.02	ZZ
YQ72QR		162.5	1.1	0.07	159.7	-1.5	-0.08	ZZ
ZMQT3R		164.9	3.4	0.21	160.6	-0.6	-0.03	ZZ

Summary Statistics	Sample RK25	Sample RK26
<b>Grand Means</b>	161.42 Grams	161.25 Grams
<b>Std Dev Btwn Labs</b>	16.23 Grams	18.26 Grams
Statistics based on 29 of 30 reporting participants.		

**Comments on Assigned Data Flags for Test #3513**

T77PJ6 (X) - Inconsistent in testing between samples.



# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

## Analysis 3513

### Tearing Strength - Packaging Papers

#### TAPPI Official Test Method T414

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#### **Analysis Notes:**

9DB3U8 - Data appear to be off by a factor; data converted by CTS (/4). 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

Report #4282,  
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## Analysis 3513

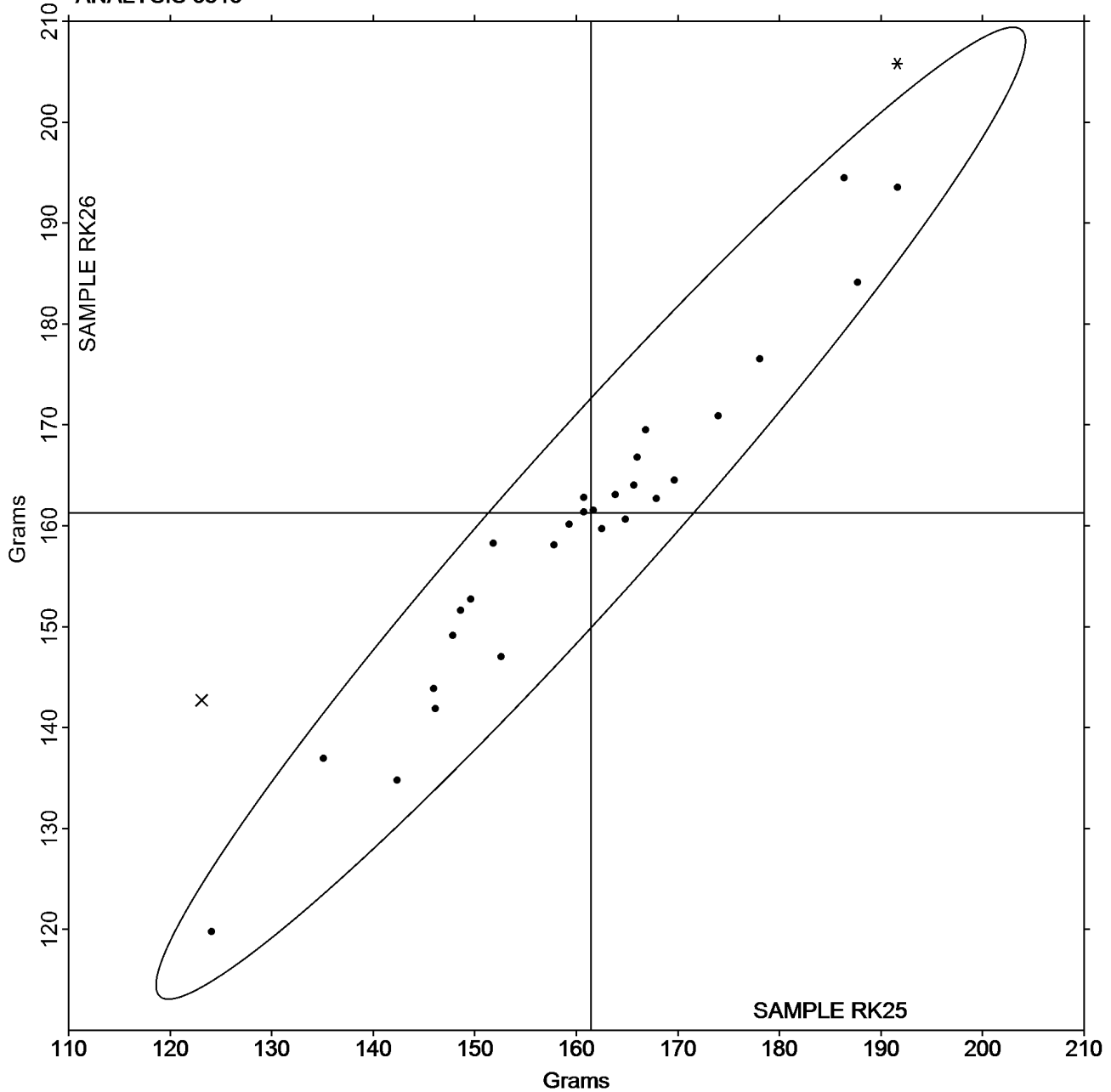
### Tearing Strength - Packaging Papers

#### TAPPI Official Test Method T414

Grand Mean Sample RK25 = 161.42  
Grams

Grand Mean Sample RK26 = 161.25  
Grams

ANALYSIS 3513





# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

## Analysis 3515

### Tensile Breaking Strength - Packaging Papers

#### TAPPI Official Test Method T494

WebCode	Data Flag	Sample NK25			Sample NK26			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
4XUDTA		10.72	-0.16	-0.20	15.74	-0.52	-0.50	TX
698XQB		12.10	1.22	1.49	17.14	0.89	0.85	LI
87XQ2F		10.76	-0.13	-0.16	17.17	0.92	0.88	LW
8KX7N6		9.90	-0.98	-1.21	15.49	-0.76	-0.73	LW
9GC4WP		11.28	0.39	0.48	17.17	0.92	0.89	TV
AGN3QY		12.23	1.34	1.64	17.93	1.68	1.61	LE
AJFYFR		11.21	0.33	0.40	16.60	0.35	0.34	LE
CDYCH6		11.83	0.95	1.16	17.57	1.32	1.27	LA
CVJ4G6		11.08	0.19	0.24	16.09	-0.16	-0.15	TH
DBAMBX	*	13.28	2.39	2.93	18.92	2.67	2.56	LC
DBU4QZ		10.62	-0.27	-0.33	15.69	-0.56	-0.53	ID
DRTGY2		11.14	0.25	0.30	16.62	0.37	0.36	PT
EVVEAU		10.68	-0.21	-0.26	15.62	-0.63	-0.61	LE
F4HYQC		10.49	-0.39	-0.48	15.47	-0.78	-0.75	IR
FA8CUK	X	9.03	-1.85	-2.27	6.15	-10.10	-9.70	TH
L9YDXR		11.75	0.87	1.06	17.48	1.23	1.18	XX
LFUFZ4		11.62	0.73	0.89	16.78	0.53	0.51	LE
LVM39G		11.37	0.49	0.60	17.13	0.88	0.85	LW
M2ACVK		10.12	-0.76	-0.93	14.95	-1.30	-1.25	LH
M337Q4		10.08	-0.81	-0.99	15.16	-1.09	-1.05	IM
MBD8C4		10.16	-0.73	-0.89	15.11	-1.14	-1.10	TS
QB26RZ		10.21	-0.68	-0.83	14.46	-1.79	-1.72	IF
QU3RJY		10.62	-0.27	-0.33	15.66	-0.59	-0.56	LE
QX24EY		10.40	-0.49	-0.59	15.32	-0.93	-0.89	LE
T77PJ6		11.02	0.13	0.16	16.77	0.52	0.50	LX
TJ9HNL		9.60	-1.29	-1.58	14.49	-1.76	-1.69	TT
TWG2MG		11.64	0.75	0.92	17.03	0.78	0.75	LE
TX9XBB	X	8.25	-2.64	-3.23	9.63	-6.62	-6.36	TH
U72RLE		9.60	-1.29	-1.58	15.29	-0.96	-0.92	IM
W7BGZB		10.09	-0.80	-0.98	15.96	-0.29	-0.28	TB
WG8K66		10.60	-0.29	-0.35	15.77	-0.48	-0.46	LA
Y2TXVY		11.83	0.94	1.16	17.81	1.56	1.50	LA
YFCNTF		10.10	-0.79	-0.97	15.85	-0.40	-0.38	LH
YQ72QR		10.71	-0.17	-0.21	16.07	-0.18	-0.17	LW
YWDP8Y		10.92	0.03	0.04	16.29	0.04	0.04	TB
ZMQT3R		10.39	-0.50	-0.61	15.91	-0.35	-0.33	XX



# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

## Analysis 3515

### Tensile Breaking Strength - Packaging Papers

#### TAPPI Official Test Method T494

Summary Statistics	Sample NK25	Sample NK26
<b>Grand Means</b>	10.89 kN/m	16.25 kN/m
<b>Std Dev Btwn Labs</b>	0.82 kN/m	1.04 kN/m
Statistics based on 34 of 36 reporting participants.		

#### Comments on Assigned Data Flags for Test #3515

FA8CUK (X) - Extreme Data for Sample NK26.

TX9XBB (X) - Extreme Data.

#### Key to Instrument Codes Reported by Participants

ID	Instron 4200 Series	IF	Instron 3340 Series
IM	Instron 5500 Series	IR	Instron 5900 Series
LA	L & W Autoline	LC	L & W Tensile - Autoline 600
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)	PT	PTA Horizontal 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		



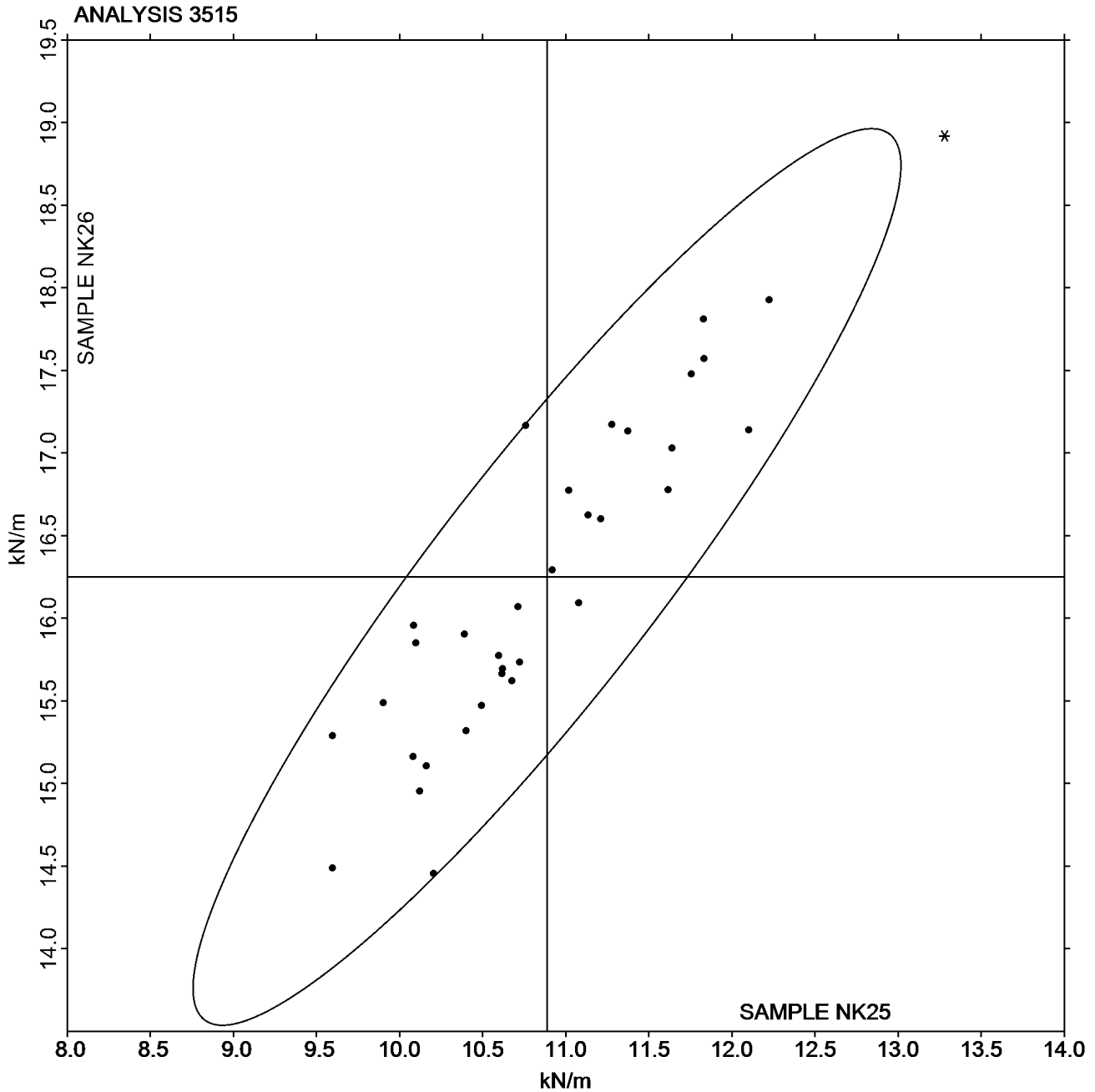
# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

## Analysis 3515 Tensile Breaking Strength - Packaging Papers TAPPI Official Test Method T494

Grand Mean Sample NK25 = 10.886  
kN/m

Grand Mean Sample NK26 = 16.251  
kN/m





# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

## Analysis 3516

### Tensile Energy Absorption - Packaging Papers

#### TAPPI Official Test Method T494

WebCode	Data Flag	Sample NK25			Sample NK26			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
4XUDTA		131.8	13.4	1.06	243.7	25.1	1.28	TX
87XQ2F		101.7	-16.7	-1.32	202.8	-15.8	-0.81	LW
8KX7N6		105.3	-13.1	-1.04	207.1	-11.5	-0.59	LW
9GC4WP		113.3	-5.1	-0.40	230.3	11.7	0.60	TV
AGN3QY		133.9	15.5	1.23	230.6	12.0	0.61	LE
AJFYFR		110.7	-7.7	-0.61	192.3	-26.3	-1.34	LE
CDYCH6		126.7	8.3	0.66	222.7	4.1	0.21	LA
CVJ4G6		123.2	4.8	0.38	246.7	28.0	1.43	TH
DBAMBX		131.9	13.5	1.08	215.6	-3.1	-0.16	LC
DRTGY2		119.3	0.9	0.07	222.9	4.3	0.22	PT
EVVEAU		111.5	-6.9	-0.55	203.1	-15.5	-0.79	LE
F4HYQC		115.7	-2.7	-0.21	202.2	-16.4	-0.84	IR
L9YDXR		109.9	-8.5	-0.67	211.3	-7.4	-0.38	XX
LFUFZ4	X	735.7	617.3	49.08	695.7	477.1	24.36	LE
LVM39G		123.4	5.0	0.40	236.8	18.1	0.93	LW
M2ACVK		107.8	-10.6	-0.84	198.3	-20.3	-1.04	LH
M337Q4		106.6	-11.8	-0.94	189.1	-29.5	-1.51	IM
MBD8C4		117.9	-0.5	-0.04	222.3	3.7	0.19	TS
QB26RZ		141.4	23.0	1.83	214.0	-4.6	-0.24	IF
QU3RJY		112.3	-6.1	-0.48	195.4	-23.2	-1.19	LE
T77PJ6		120.5	2.1	0.17	232.3	13.7	0.70	TH
TJ9HNL		88.1	-30.3	-2.41	174.3	-44.3	-2.26	TT
TWG2MG		132.8	14.4	1.15	245.5	26.9	1.37	LE
U72RLE	*	107.6	-10.8	-0.86	246.3	27.7	1.41	IM
WG8K66		144.2	25.8	2.05	233.9	15.3	0.78	LA
Y2TXVY		128.9	10.5	0.84	241.3	22.7	1.16	LC
YFCNTF		118.7	0.3	0.02	208.7	-10.0	-0.51	LH
YQ72QR		105.3	-13.1	-1.04	203.4	-15.2	-0.78	LE
YWDP8Y		118.4	0.0	0.00	232.2	13.5	0.69	TB
ZMQT3R		124.6	6.2	0.49	235.1	16.5	0.84	XX

Summary Statistics	Sample NK25	Sample NK26
<b>Grand Means</b>	118.39 Joules/sq m	218.63 Joules/sq m
<b>Std Dev Btwn Labs</b>	12.58 Joules/sq m	19.59 Joules/sq m
Statistics based on 29 of 30 reporting participants.		

#### Comments on Assigned Data Flags for Test #3516

LFUFZ4 (X) - Extreme Data.





# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

## Analysis 3516

### Tensile Energy Absorption - Packaging Papers

#### TAPPI Official Test Method T494

#### Analysis Notes:

Y2TXVY - One determination removed from the Lab Mean of Sample NK25 per Grubb's Test at 1% risk (TAPPI 1205).

#### Key to Instrument Codes Reported by Participants

IF	Instron 3340 Series	IM	Instron 5500 Series
IR	Instron 5900 Series	LA	L & W Autoline
LC	L & W Tensile - Autoline 600	LE	L & W Tensile Tester 066
LH	L & W Alwetron TH1 (Horizontal) SE 060	LW	L & W Tensile Tester SE062
PT	PTA Horizontal 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 #4282,  
February 2024

## Analysis 3516

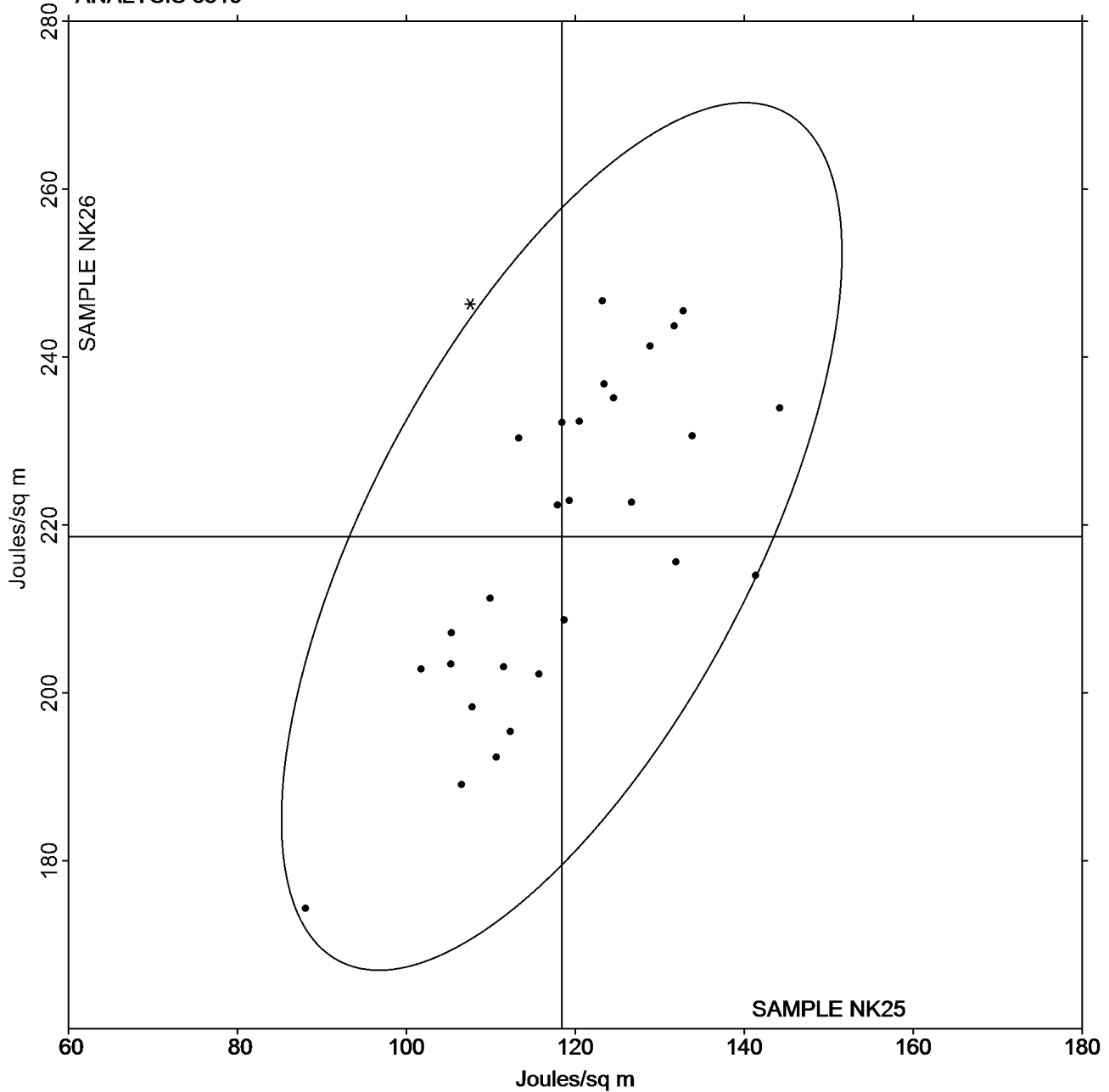
### Tensile Energy Absorption - Packaging Papers

#### TAPPI Official Test Method T494

Grand Mean Sample NK25 = 118.39  
Joules/sq m

Grand Mean Sample NK26 = 218.63  
Joules/sq m

ANALYSIS 3516





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 3517**  
**Elongation to Break - Packaging Papers**  
**TAPPI Official Test Method T494**

**Report #4282,**  
**February 2024**

WebCode	Data Flag	Sample NK25			Sample NK26			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
4XUDTA		1.926	0.203	1.39	2.414	0.272	1.24	TX
87XQ2F		1.488	-0.235	-1.61	1.890	-0.252	-1.15	LW
8KX7N6		1.672	-0.051	-0.35	2.074	-0.068	-0.31	LW
9GC4WP		1.750	0.027	0.18	2.233	0.091	0.42	TV
AGN3QY	X	0.068	-1.656	-11.34	0.079	-2.063	-9.41	LE
AJFYFR		1.586	-0.137	-0.94	1.833	-0.309	-1.41	LE
CDYCH6		1.660	-0.063	-0.43	1.937	-0.205	-0.93	XX
CVJ4G6		1.917	0.194	1.33	2.525	0.383	1.75	TH
DBAMBX		1.520	-0.203	-1.39	1.717	-0.425	-1.94	LC
DBU4QZ		1.787	0.064	0.44	2.323	0.181	0.83	XX
DRTGY2		1.764	0.041	0.28	2.157	0.015	0.07	PT
EVVEAU		1.646	-0.077	-0.53	2.013	-0.129	-0.59	LE
F4HYQC		1.712	-0.011	-0.08	2.039	-0.103	-0.47	XX
L9YDXR		1.522	-0.202	-1.38	1.872	-0.270	-1.23	XX
LVM39G		1.710	-0.013	-0.09	2.142	0.000	0.00	LW
M2ACVK		1.664	-0.059	-0.41	2.058	-0.084	-0.38	LH
M337Q4		1.728	0.005	0.03	2.045	-0.097	-0.44	IM
MBD8C4		1.881	0.158	1.08	2.351	0.209	0.95	TS
QB26RZ	X	2.202	0.479	3.28	2.342	0.200	0.91	XX
QU3RJY		1.660	-0.063	-0.43	1.943	-0.199	-0.91	LE
T77PJ6		2.003	0.280	1.92	2.447	0.305	1.39	LX
TJ9HNL		1.553	-0.170	-1.17	1.979	-0.163	-0.74	TT
TWG2MG		1.808	0.085	0.58	2.264	0.122	0.56	LE
U72RLE	*	1.799	0.076	0.52	2.533	0.391	1.78	IM
W7BGZB		1.573	-0.150	-1.03	2.152	0.010	0.05	TB
WG8K66		2.028	0.305	2.09	2.430	0.288	1.32	LX
Y2TXVY		1.632	-0.091	-0.63	2.049	-0.093	-0.42	LC
YFCNTF		1.785	0.062	0.42	2.054	-0.088	-0.40	LX
YQ72QR		1.548	-0.175	-1.20	1.960	-0.182	-0.83	LW
YWDP8Y		1.759	0.036	0.24	2.355	0.213	0.97	XX
ZMQT3R		1.897	0.174	1.19	2.322	0.180	0.82	XX

Summary Statistics	Sample NK25	Sample NK26
<b>Grand Means</b>	1.72 Percent	2.14 Percent
<b>Std Dev Btwn Labs</b>	0.15 Percent	0.22 Percent
Statistics based on 29 of 31 reporting participants.		



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 3517**  
**Elongation to Break - Packaging Papers**  
**TAPPI Official Test Method T494**

**Report #4282,**  
**February 2024**

**Comments on Assigned Data Flags for Test #3517**

QB26RZ (X) - Data for sample NK25 are high. Inconsistent within the determinations of both samples.  
 AGN3QY (X) - Extreme Data.

**Analysis Notes:**

T77PJ6 - One determination removed from the Lab Mean of Sample NK25 per Grubb's Test at 1% risk (TAPPI 1205).

**Key to Instrument Codes Reported by Participants**

IM	Instron 5500 Series	LC	L & W Tensile - Autoline 600
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)
PT	PTA Horizontal 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



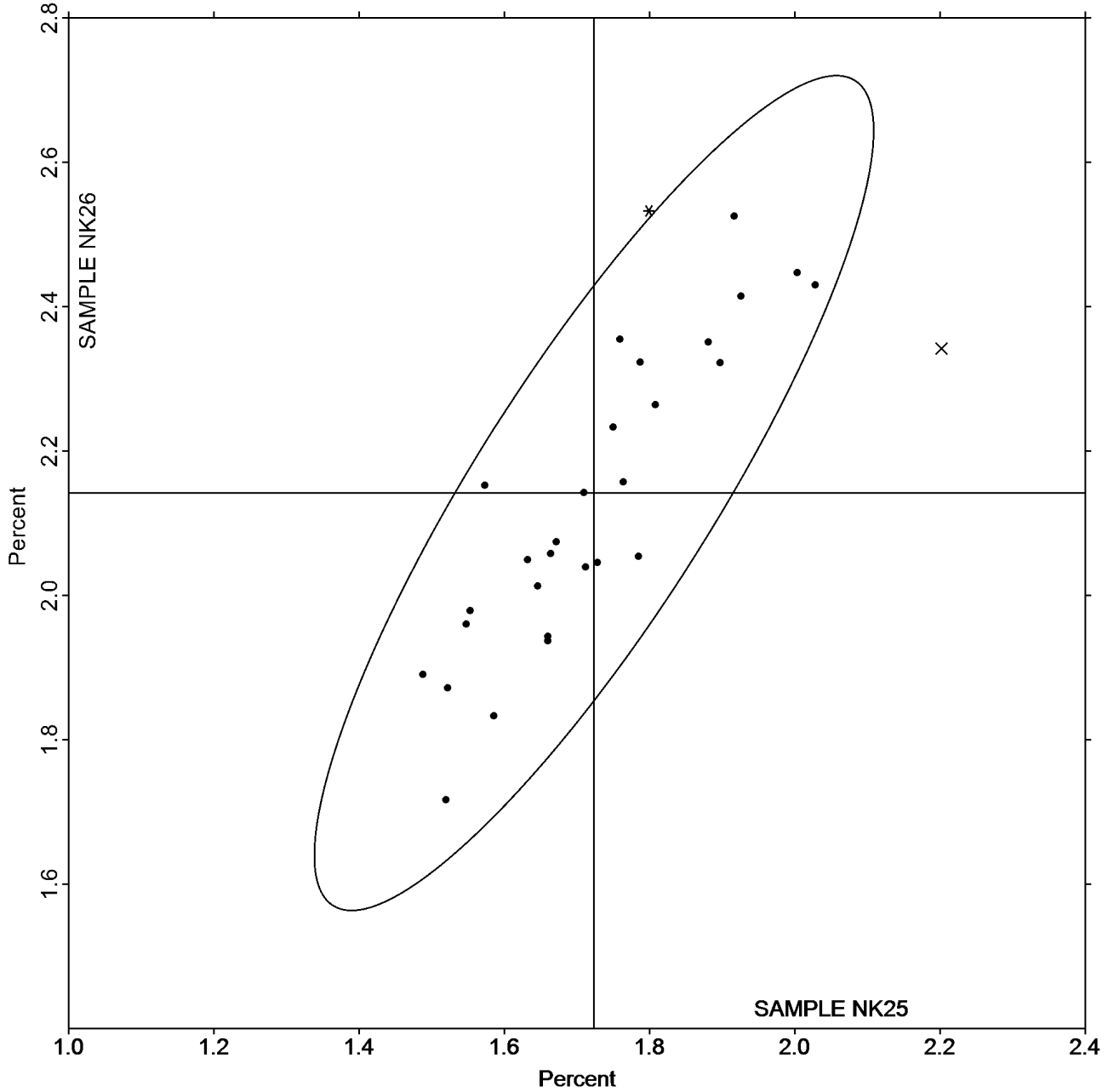
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 3517**  
**Elongation to Break - Packaging Papers**  
**TAPPI Official Test Method T494**

**Report #4282,**  
**February 2024**

**Grand Mean Sample NK25 = 1.7234**  
**Percent**

**Grand Mean Sample NK26 = 2.1417**  
**Percent**

**ANALYSIS 3517**





**Paper & Paperboard Interlaboratory Testing Program**

**Report #4282,  
February 2024**

**Analysis 3531**

**Roughness - Print Surf Method - 0.5 to 4.0 Microns**

**TAPPI Official Test Method T555**

WebCode	Data Flag	<u>Sample PS25</u>			<u>Sample PS26</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
4LFFN7		0.6780	-0.0580	-1.49	0.6850	-0.0496	-1.53	ZZ
8KX7N6		0.7310	-0.0050	-0.13	0.7180	-0.0166	-0.51	ZZ
8RXRDJ		0.7320	-0.0040	-0.10	0.7222	-0.0124	-0.38	ZZ
9DB3U8		0.7040	-0.0320	-0.82	0.7050	-0.0296	-0.91	ZZ
B4WRGX		0.7120	-0.0240	-0.62	0.7280	-0.0066	-0.20	ZZ
CVJ4G6		0.7100	-0.0260	-0.67	0.7350	0.0004	0.01	ZZ
DBAMBX		0.7220	-0.0140	-0.36	0.7240	-0.0106	-0.33	ZZ
DEPVYW		0.7750	0.0390	1.01	0.7720	0.0374	1.16	ZZ
FMCV6K		0.6950	-0.0410	-1.05	0.6940	-0.0406	-1.25	ZZ
GLVXBZ		0.7690	0.0330	0.85	0.7500	0.0154	0.48	ZZ
MBD8C4		0.7440	0.0080	0.21	0.7520	0.0174	0.54	ZZ
MUATVA		0.7220	-0.0140	-0.36	0.7230	-0.0116	-0.36	ZZ
Q473PP		0.7640	0.0280	0.72	0.7360	0.0014	0.04	ZZ
QFGCFZ		0.8260	0.0900	2.32	0.8130	0.0784	2.42	ZZ
RCB8FK		0.7460	0.0100	0.26	0.7290	-0.0056	-0.17	ZZ
TWG2MG		0.7260	-0.0100	-0.26	0.7390	0.0044	0.14	ZZ
UEVZ86		0.7460	0.0100	0.26	0.7400	0.0054	0.17	ZZ
W93CP6		0.7760	0.0400	1.03	0.7730	0.0384	1.19	ZZ
W9JV8G		0.8010	0.0650	1.68	0.7900	0.0554	1.71	ZZ
YBX6BY	X	1.4740	0.7380	19.01	1.4640	0.7294	22.54	ZZ
YFCNTF		0.6810	-0.0550	-1.42	0.7000	-0.0346	-1.07	ZZ
YWDP8Y		0.6950	-0.0410	-1.05	0.6980	-0.0366	-1.13	ZZ

<b>Summary Statistics</b>	<u>Sample PS25</u>	<u>Sample PS26</u>
<b>Grand Means</b>	0.74 Microns	0.73 Microns
<b>Std Dev Btwn Labs</b>	0.04 Microns	0.03 Microns
Statistics based on 21 of 22 reporting participants.		

**Comments on Assigned Data Flags for Test #3531**

YBX6BY (X) - Extreme Data.

**Analysis Notes:**

8RXRDJ - One determination removed from the Lab Mean of Sample PS26 per Grubb's Test at 1% risk (TAPPI 1205).

**Key to Instrument Codes Reported by Participants**

ZZ Instruments No Longer Tracked



# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

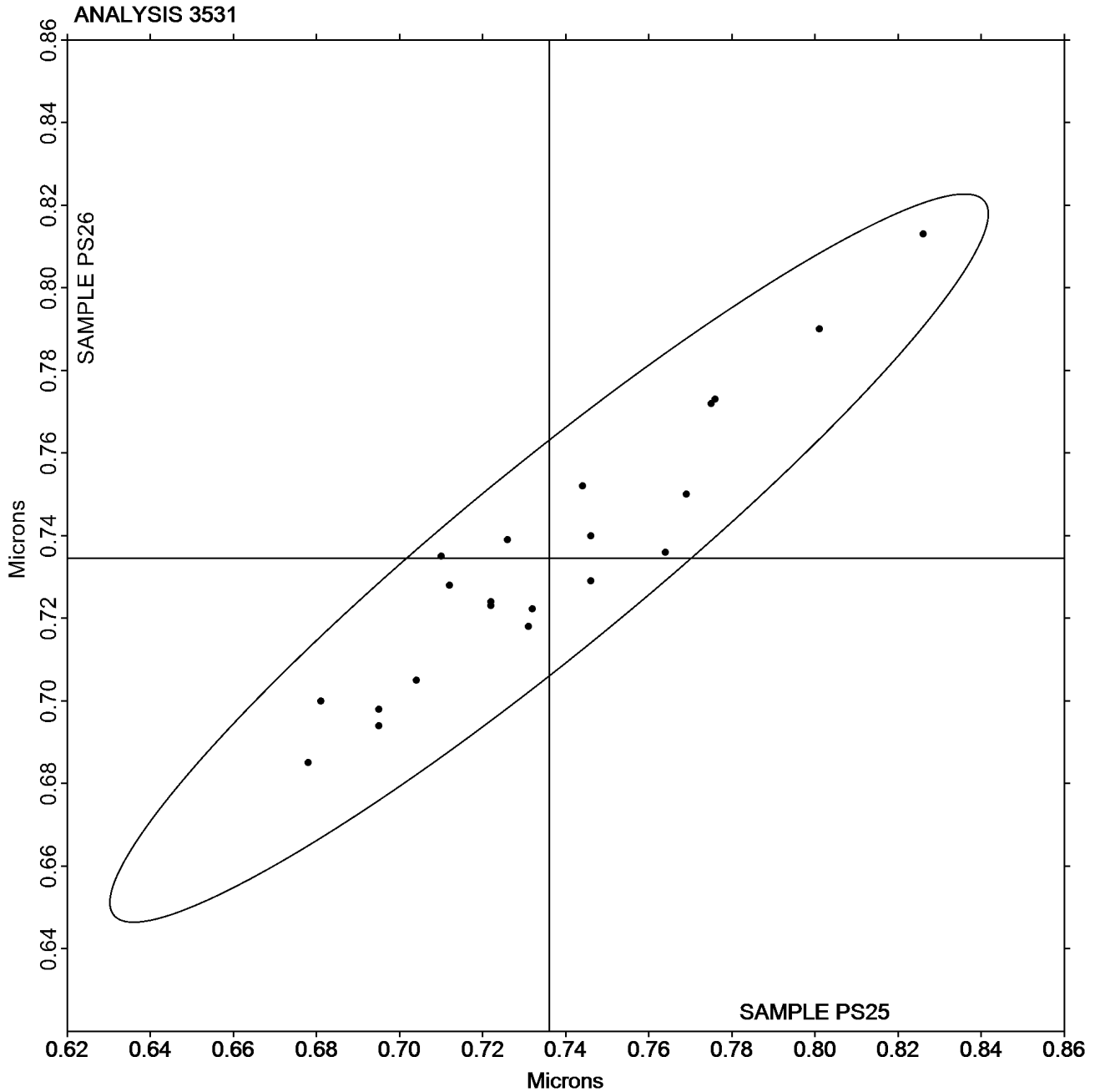
## Analysis 3531

Roughness - Print Surf Method - 0.5 to 4.0 Microns

TAPPI Official Test Method T555

Grand Mean Sample PS25 = 0.73595  
Microns

Grand Mean Sample PS26 =  
0.73458 Microns





**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 3545**  
**Directional Brightness**  
**TAPPI Official Test Method T452**

**Report #4282,**  
**February 2024**

WebCode	Data Flag	Sample BR25			Sample BR26			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
87XQ2F		76.36	-0.40	-0.14	76.58	-0.26	-0.09	TS
8KX7N6		78.99	2.24	0.78	79.02	2.19	0.78	TP
8RXRDJ		75.89	-0.86	-0.30	76.26	-0.57	-0.21	PP
9DB3U8		77.78	1.02	0.36	77.88	1.04	0.37	HG
BTG67C		76.83	0.07	0.02	76.51	-0.32	-0.12	TT
CVJ4G6		76.25	-0.50	-0.18	76.35	-0.49	-0.17	TP
DEPVYW		79.91	3.15	1.10	79.95	3.11	1.11	HG
FMCV6K		75.13	-1.63	-0.57	74.93	-1.91	-0.68	TD
GG4QTR		76.68	-0.08	-0.03	76.80	-0.04	-0.01	XX
KVUUMT		76.19	-0.57	-0.20	76.25	-0.59	-0.21	TS
L9YDXR		77.94	1.18	0.41	77.93	1.10	0.39	XX
MBD8C4		76.31	-0.44	-0.15	76.73	-0.11	-0.04	TS
MUATVA		78.98	2.23	0.78	78.87	2.04	0.73	TD
Q473PP		76.35	-0.40	-0.14	76.32	-0.52	-0.19	TP
RCB8FK		78.66	1.91	0.67	78.65	1.81	0.65	TP
TWG2MG		80.11	3.36	1.18	80.10	3.26	1.17	HG
UEVZ86		76.61	-0.14	-0.05	76.71	-0.13	-0.04	HZ
W7BGZB		76.86	0.10	0.04	77.24	0.40	0.14	XD
W9JV8G	*	66.50	-10.25	-3.59	66.81	-10.02	-3.59	XX

Summary Statistics	Sample BR25	Sample BR26
<b>Grand Means</b>	76.75 Percent	76.84 Percent
<b>Std Dev Btwn Labs</b>	2.86 Percent	2.79 Percent
Statistics based on 19 of 19 reporting participants.		

**Key to Instrument Codes Reported by Participants**

<b>HG</b> Hunter Labscan / XE	<b>HZ</b> Hunter Lab ColorFlex EZ Series
<b>PP</b> Technidyne Profile/Plus	<b>TD</b> Technidyne Color Touch 45X
<b>TP</b> Technidyne Test/Plus	<b>TS</b> Technidyne Brightimeter Micro S-5
<b>TT</b> Technidyne Brightimeter Micro S4-M	<b>XD</b> X-Rite Color Ci7600
<b>XX</b> Instrument make/model not specified by lab	





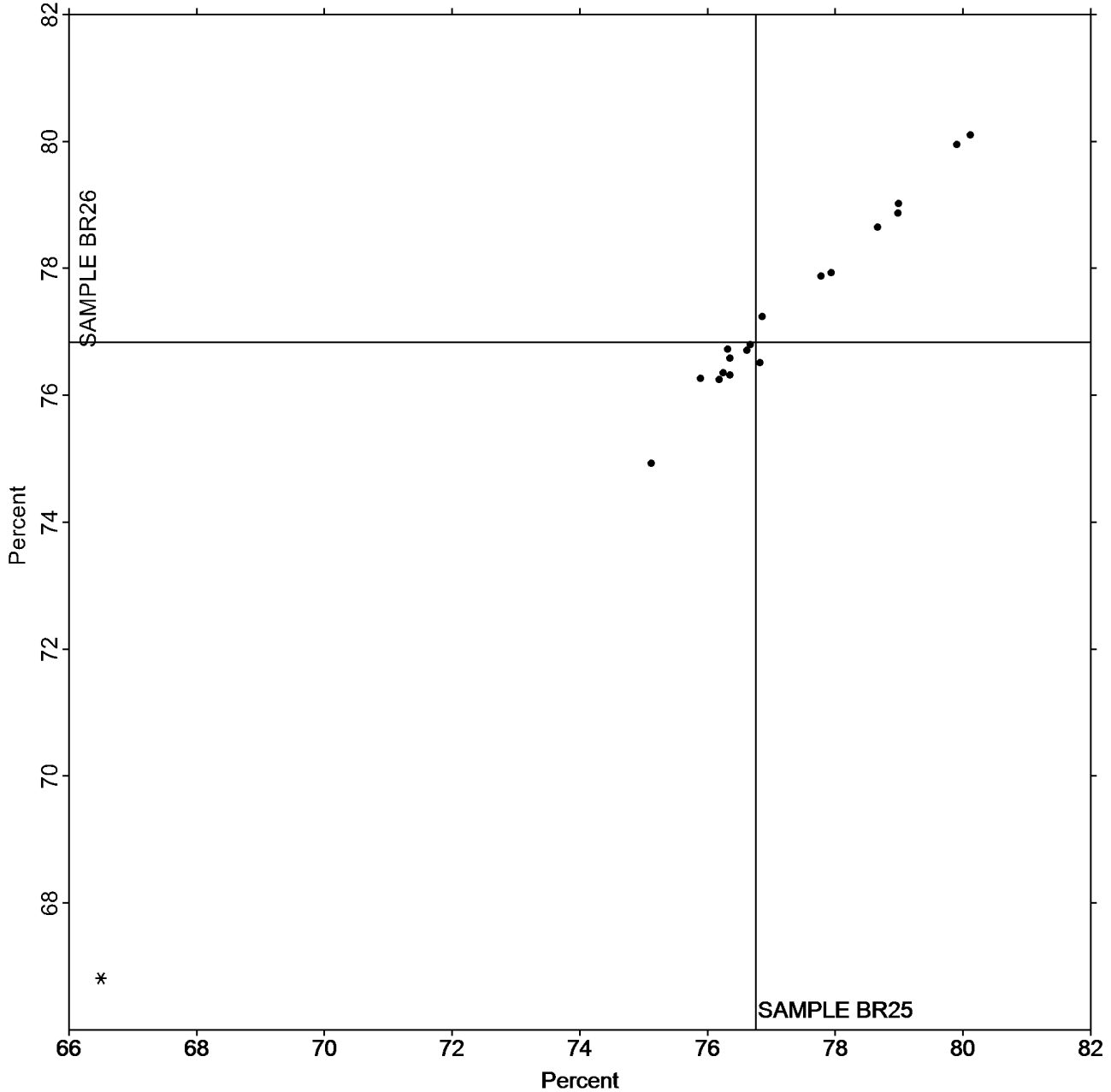
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 3545**  
**Directional Brightness**  
**TAPPI Official Test Method T452**

**Report #4282,**  
**February 2024**

**Grand Mean Sample BR25 = 76.754**  
**Percent**

**Grand Mean Sample BR26 = 76.836**  
**Percent**

**ANALYSIS 3545**



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 3547**  
**Diffuse Brightness**  
**TAPPI Official Test Method T525**

**Report #4282,**  
**February 2024**

WebCode	Data Flag	<u>Sample BR25</u>			<u>Sample BR26</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
44Z7N6		76.61	-0.27	-0.79	76.79	-0.10	-0.26	TP
8KX7N6		76.73	-0.16	-0.46	76.50	-0.38	-1.03	EA
9DB3U8		76.79	-0.09	-0.26	76.75	-0.14	-0.36	TC
CVJ4G6		76.68	-0.20	-0.59	76.62	-0.26	-0.71	LT
HKJJGY		77.05	0.17	0.49	77.02	0.14	0.37	LE
MBD8C4		77.55	0.66	1.94	77.61	0.73	1.96	LT
MUATVA		76.82	-0.07	-0.19	76.88	0.00	-0.01	TD
NVXNUN		76.45	-0.44	-1.28	76.43	-0.45	-1.21	LE
QFGCFZ		76.87	-0.01	-0.04	77.00	0.12	0.31	TC
RCB8FK		76.88	0.00	0.00	76.81	-0.07	-0.20	TC
V3UWFG		77.70	0.82	2.38	77.74	0.85	2.29	TM
WDUJ8D		77.01	0.13	0.38	77.02	0.14	0.38	XX
YFCNTF		76.89	0.01	0.02	76.87	-0.02	-0.05	LT
YQ72QR		76.65	-0.24	-0.70	76.70	-0.18	-0.48	LT
Z69RAB		76.58	-0.31	-0.89	76.51	-0.37	-1.00	LA

<b>Summary Statistics</b>	<u>Sample BR25</u>	<u>Sample BR26</u>
<b>Grand Means</b>	76.88 Percent	76.88 Percent
<b>Std Dev Btwn Labs</b>	0.34 Percent	0.37 Percent

Statistics based on 15 of 15 reporting participants.

**Key to Instrument Codes Reported by Participants**

EA	Datacolor 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
TM	Technidyne Technibrite Micro TB-1C	TP	Technidyne Test/Plus
XX	Instrument make/model not specified by lab		



Paper & Paperboard Interlaboratory Testing Program

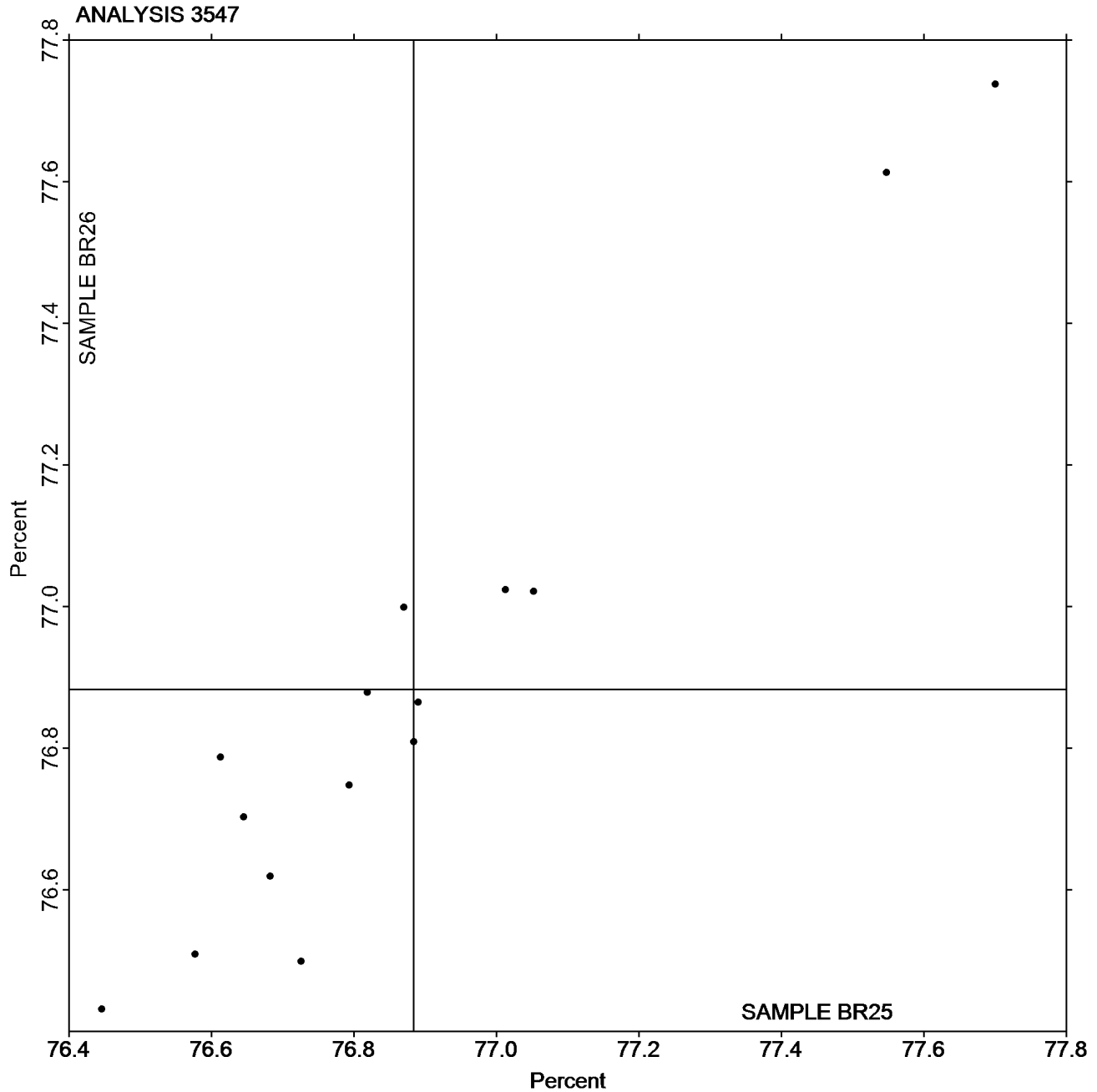
Report #4282,  
February 2024

Analysis 3547  
Diffuse Brightness

TAPPI Official Test Method T525

Grand Mean Sample BR25 = 76.884  
Percent

Grand Mean Sample BR26 = 76.883  
Percent



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



**Paper & Paperboard Interlaboratory Testing Program  
Analysis 3549**

**Report #4282,  
February 2024**

**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	$\Delta L$	$\Delta a$	$\Delta b$	$\Delta E$	
8KDP92		CA25	85.28	2.03	-1.36	-0.17	0.01	0.12	0.21	TS
		CA26	85.10	2.05	-1.25					
8RXRDJ		CA25	86.66	0.39	-0.72	0.03	-0.03	0.03	0.05	TC
		CA26	86.70	0.36	-0.69					
9DB3U8		CA25	87.35	0.82	-0.81	-0.01	-0.01	0.05	0.05	HF
		CA26	87.34	0.81	-0.77					
9RRXA4		CA25	89.50	-0.34	-0.16	0.00	-0.02	0.04	0.04	NH
		CA26	89.51	-0.37	-0.12					
DEPVYW		CA25	86.86	0.77	-0.89	0.01	-0.03	-0.01	0.03	HK
		CA26	86.86	0.74	-0.90					
FMCV6K		CA25	85.14	0.93	-1.54	-0.04	0.01	-0.08	0.09	TC
		CA26	85.10	0.94	-1.62					
GLVXBZ		CA25	89.54	0.31	-0.63	0.02	-0.01	0.00	0.02	TC
		CA26	89.56	0.30	-0.63					
L9YDXR		CA25	90.07	0.36	-0.74	0.10	-0.01	-0.02	0.10	XX
		CA26	90.17	0.35	-0.76					
M6TAMG		CA25	89.62	0.47	-0.54	0.08	0.10	0.03	0.13	TC
		CA26	89.70	0.57	-0.51					
MBD8C4		CA25	85.88	1.55	-1.64	-0.06	0.09	-0.14	0.18	TS
		CA26	85.82	1.64	-1.79					
MUATVA		CA25	86.72	0.42	-0.76	0.01	-0.03	0.00	0.03	TC
		CA26	86.73	0.39	-0.76					
NVXNUN		CA25	89.35	0.39	-0.72	0.06	-0.06	0.10	0.13	LS
		CA26	89.42	0.34	-0.62					
QLL92K		CA25	85.62	0.77	-1.63	0.20	0.04	0.08	0.22	TS
		CA26	85.82	0.81	-1.55					
RCB8FK		CA25	86.88	0.30	-0.57	-0.09	0.01	-0.04	0.10	TC
		CA26	86.79	0.31	-0.61					
TWG2MG		CA25	87.43	0.83	-1.05	0.05	-0.02	0.05	0.07	HK
		CA26	87.48	0.81	-1.00					
W9JV8G	X	CA25	80.91	-0.05	-0.96	1.66	0.37	0.01	1.70	XX
		CA26	82.57	0.32	-0.94					



**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 3549**

**Report #4282,**  
**February 2024**

**Color & Color Difference - Near White Papers - C/2deg obs**  
**Hunter L,a,b - Illuminant C - 2 Degree Observer**

WDUJ8D	<b>CA25</b>	89.64	-0.53	-0.36	0.11	0.14	-0.10	0.20	TC
	<b>CA26</b>	89.74	-0.39	-0.46					
Z69RAB	<b>CA25</b>	86.78	0.59	-0.70	-0.09	0.04	-0.16	0.19	LA
	<b>CA26</b>	86.69	0.63	-0.86					

<u>Grand Means</u>		<b>Summary Statistics</b>							
<b>CA25</b>	87.549	0.557	-0.877	0.012	0.013	-0.004	0.110		
<b>CA26</b>	87.561	0.590	-0.880						
<u>Std Dev Btwn Labs</u>									
<b>CA25</b>	1.706	0.602	0.423	0.089	0.053	0.080	0.070		
<b>CA26</b>	1.748	0.586	0.430						

Statistics based on 17 of 18 reporting participants

**Comments on Assigned Data Flags for Test #3549**

W9JV8G (X) - Low "L" values for both samples. Inconsistent within replicate readings of "L" for both samples. Large delta L, a & E.

**Key to Instrument Codes Reported by Participants**

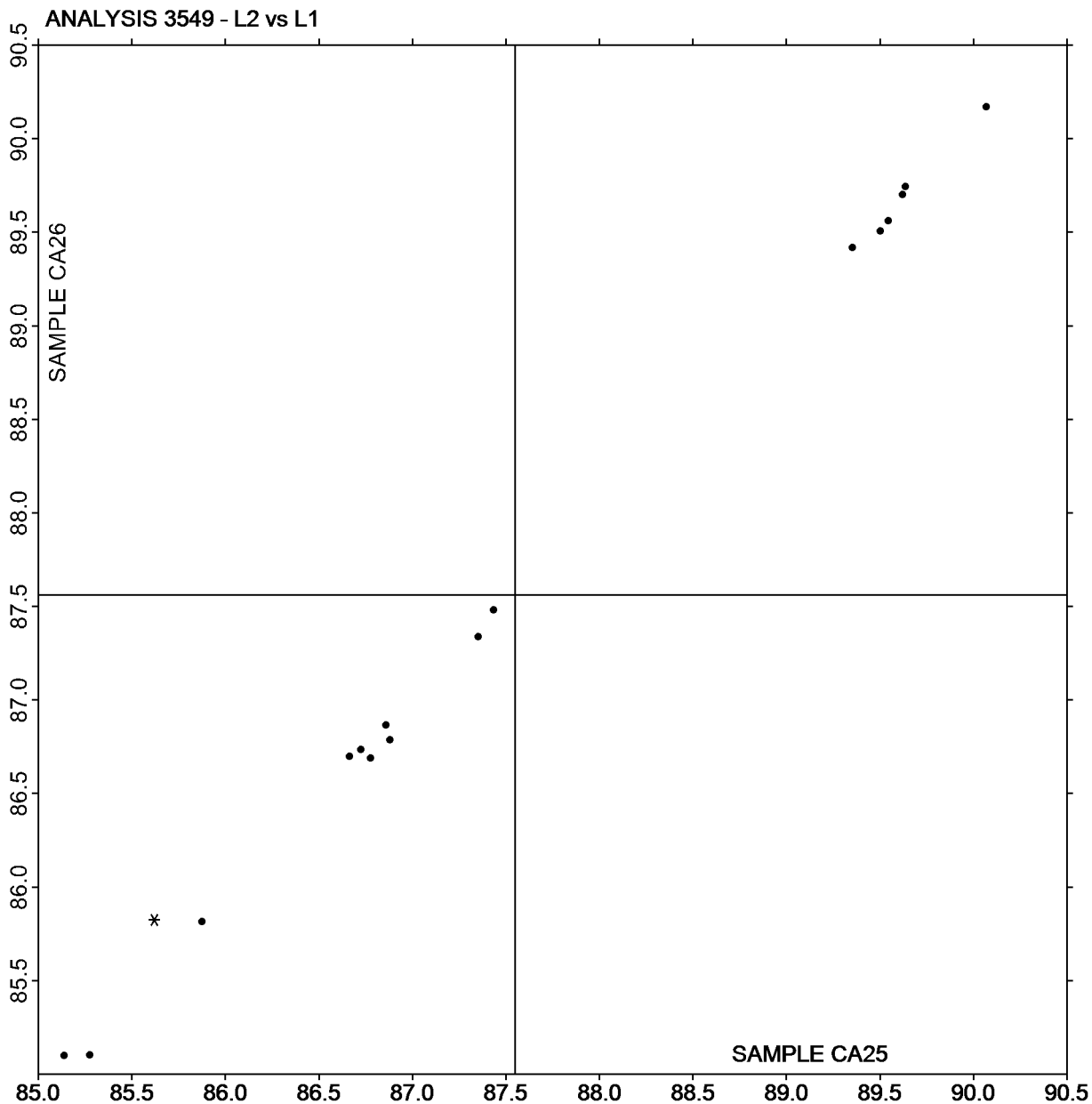
<b>HF</b>	Hunter LabScan II	<b>HK</b>	Hunter LabScan XE
<b>LA</b>	L & W Elrepho AL300	<b>LS</b>	L & W Elrepho SE 070
<b>NH</b>	Minolta CM-3700A Spectrophotometer	<b>TC</b>	Technidyne Color Touch Series
<b>TS</b>	Technidyne Brightimeter Micro S-5	<b>XX</b>	Instrument make/model not specified by lab



**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 #4282,**  
**February 2024**

Plot of L values CA26 vs L values CA25



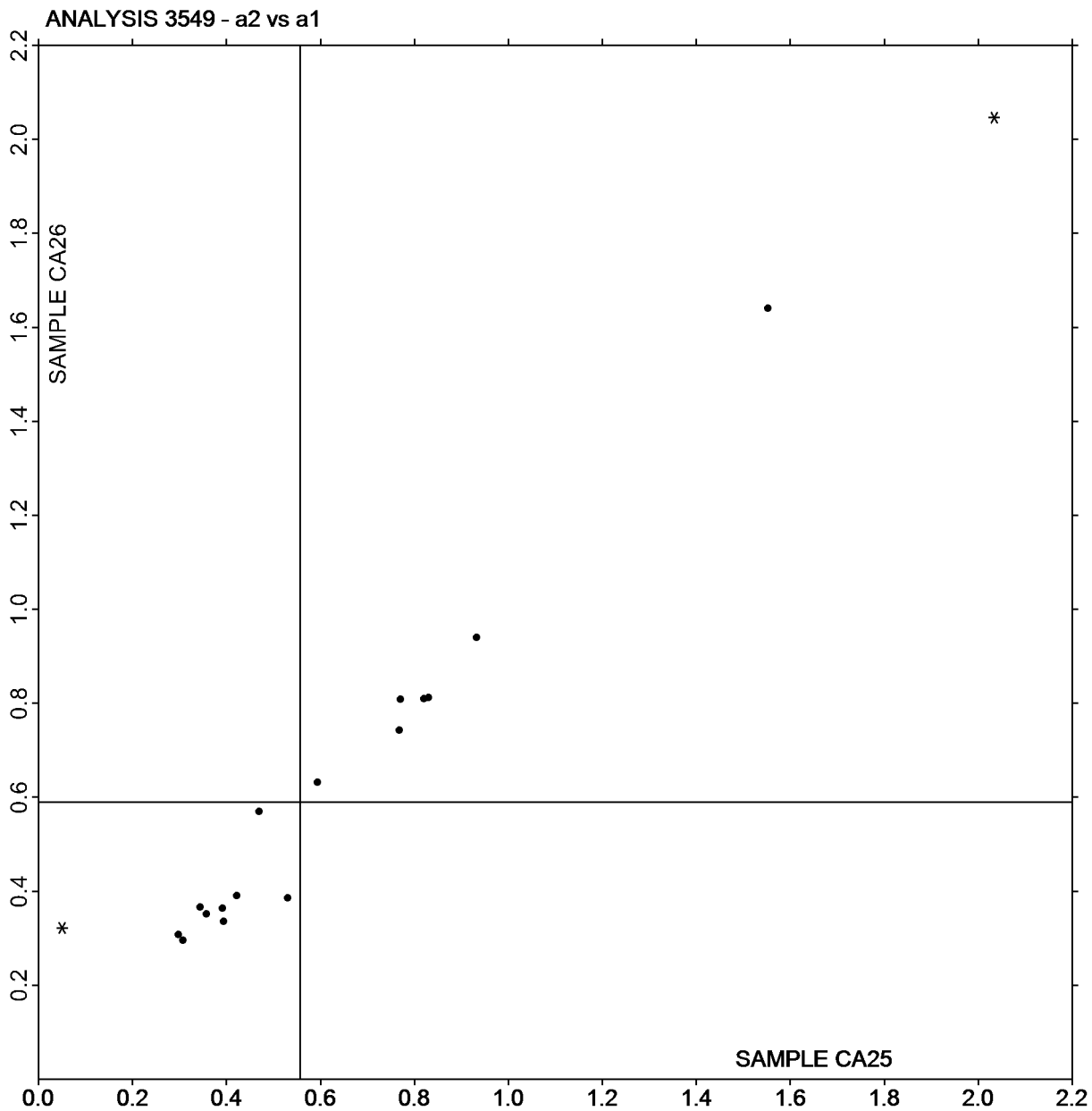
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**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 #4282,  
February 2024

Plot of a values CA26 vs a values CA25



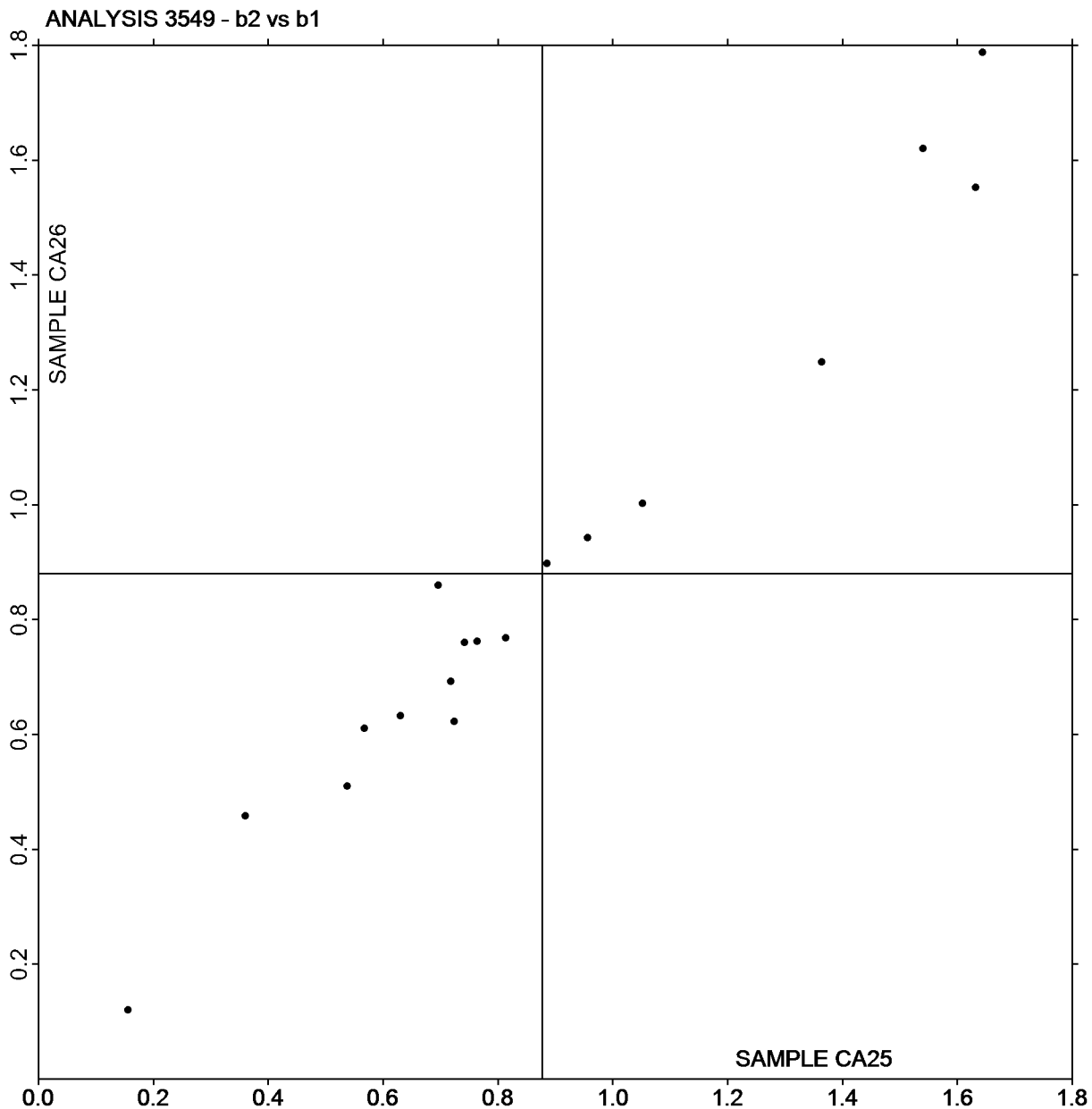
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**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 #4282,  
February 2024

Plot of b values CA26 vs b values CA25



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 #4282,  
February 2024**

**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	$\Delta L$	$\Delta a$	$\Delta b$	$\Delta E$	
8KX7N6		CA25	89.43	-0.44	-0.35	0.06	-0.05	0.11	0.14	EG
		CA26	89.49	-0.49	-0.24					
993EJQ		CA25	90.21	-0.48	-0.37	-0.30 X	-0.05	-0.22	0.37	XC
		CA26	89.92	-0.52	-0.59					
9DB3U8		CA25	86.80	-0.52	-0.32	0.15	-0.04	0.08	0.17	TC
		CA26	86.95	-0.56	-0.25					
BTG67C		CA25	87.40	-0.24	-0.47	0.11	-0.05	0.22	0.25	XB
		CA26	87.50	-0.28	-0.25					
CVJ4G6		CA25	89.52	-0.41	-0.37	-0.02	-0.02	0.12	0.13	LT
		CA26	89.50	-0.43	-0.24					
GA7YKX		CA25	89.91	-0.26	-0.72	0.04	-0.07	0.10	0.12	NF
		CA26	89.94	-0.33	-0.62					
Q473PP		CA25	87.13	-0.14	-0.55	-0.06	-0.02	-0.01	0.06	HE
		CA26	87.07	-0.15	-0.56					
R2VK4X		CA25	90.14	-0.65	-0.46	-0.04	0.02	-0.10	0.10	XC
		CA26	90.10	-0.63	-0.56					
U4AT9F		CA25	89.91	-0.53	-0.36	0.01	0.01	-0.01	0.02	XX
		CA26	89.93	-0.52	-0.37					
X7RWTH		CA25	89.69	-0.52	-0.54	0.00	-0.02	0.16	0.17	XX
		CA26	89.69	-0.55	-0.38					
XQWUR6		CA25	89.80	-0.42	0.07	-0.13	0.01	-0.18	0.22	NH
		CA26	89.66	-0.40	-0.11					
YQ72QR		CA25	89.48	-0.53	-0.55	0.01	-0.02	0.07	0.07	LS
		CA26	89.49	-0.55	-0.49					
Z987WZ		CA25	89.71	-0.51	-0.24	0.01	0.07	-0.21	0.23	TC
		CA26	89.72	-0.44	-0.45					

Grand Means			Summary Statistics						
CA25	89.163	-0.435	-0.403	-0.012	-0.017	0.011	0.158		
CA26	89.151	-0.452	-0.392						
Std Dev Btwn Labs				0.111	0.038	0.146	0.094		
CA25	1.200	0.144	0.191						
CA26	1.149	0.132	0.166						

Statistics based on 13 of 13 reporting participants



**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**

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**Report #4282,**  
**February 2024**

**Key to Instrument Codes Reported by Participants**

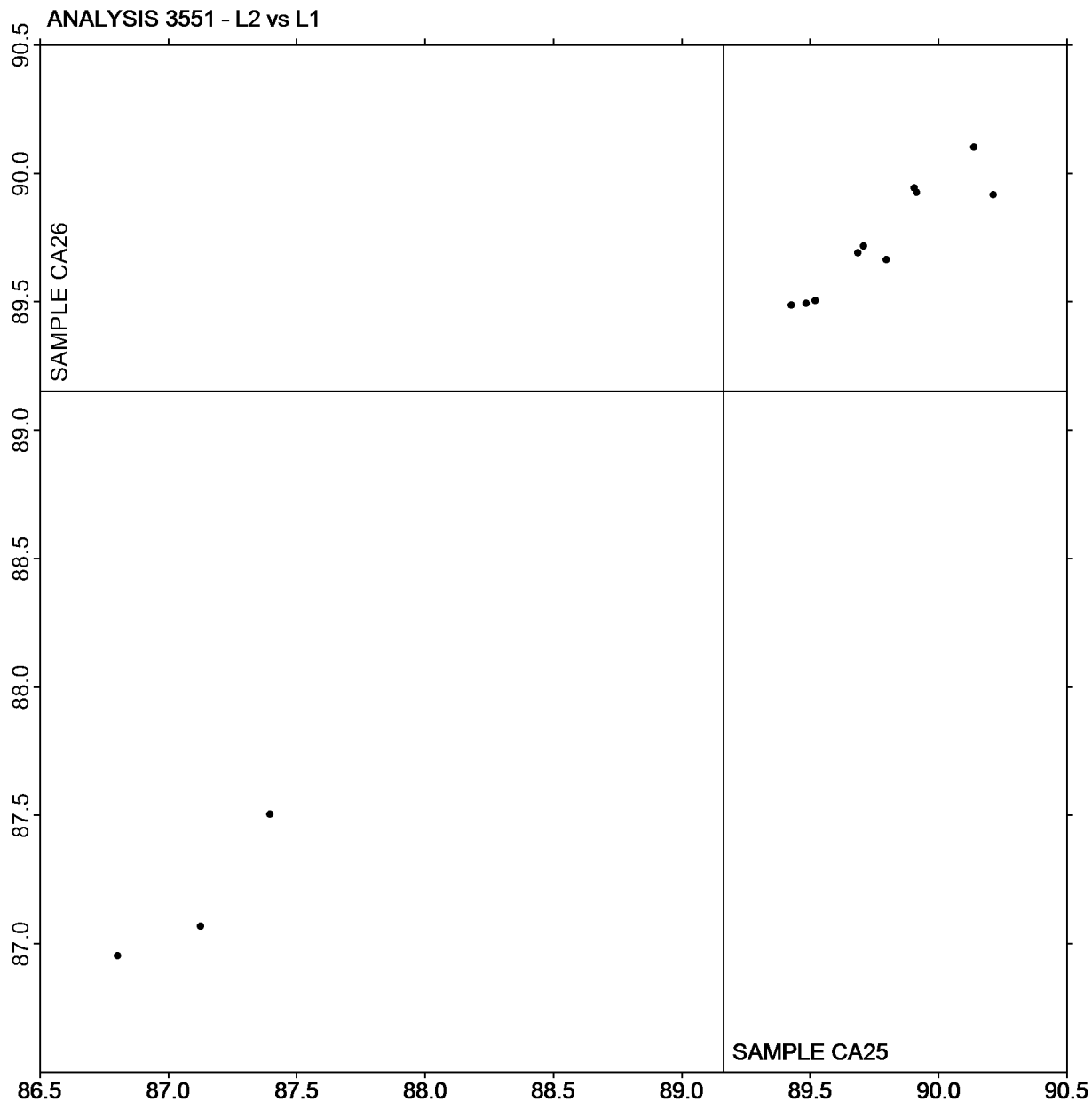
<b>EG</b>	Datacolor Elrepho	<b>HE</b>	Hunter LabScan
<b>LS</b>	L & W Elrepho SE 070	<b>LT</b>	L & W Elrepho SE 071
<b>NF</b>	Minolta CM-3600d Spectrophotometer	<b>NH</b>	Minolta CM-3700A Spectrophotometer
<b>TC</b>	Technidyne Color Touch Series	<b>XB</b>	X-Rite Ci7
<b>XC</b>	X-Rite eXact Series	<b>XX</b>	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 #4282,**  
**February 2024**

Plot of L values CA26 vs L values CA25



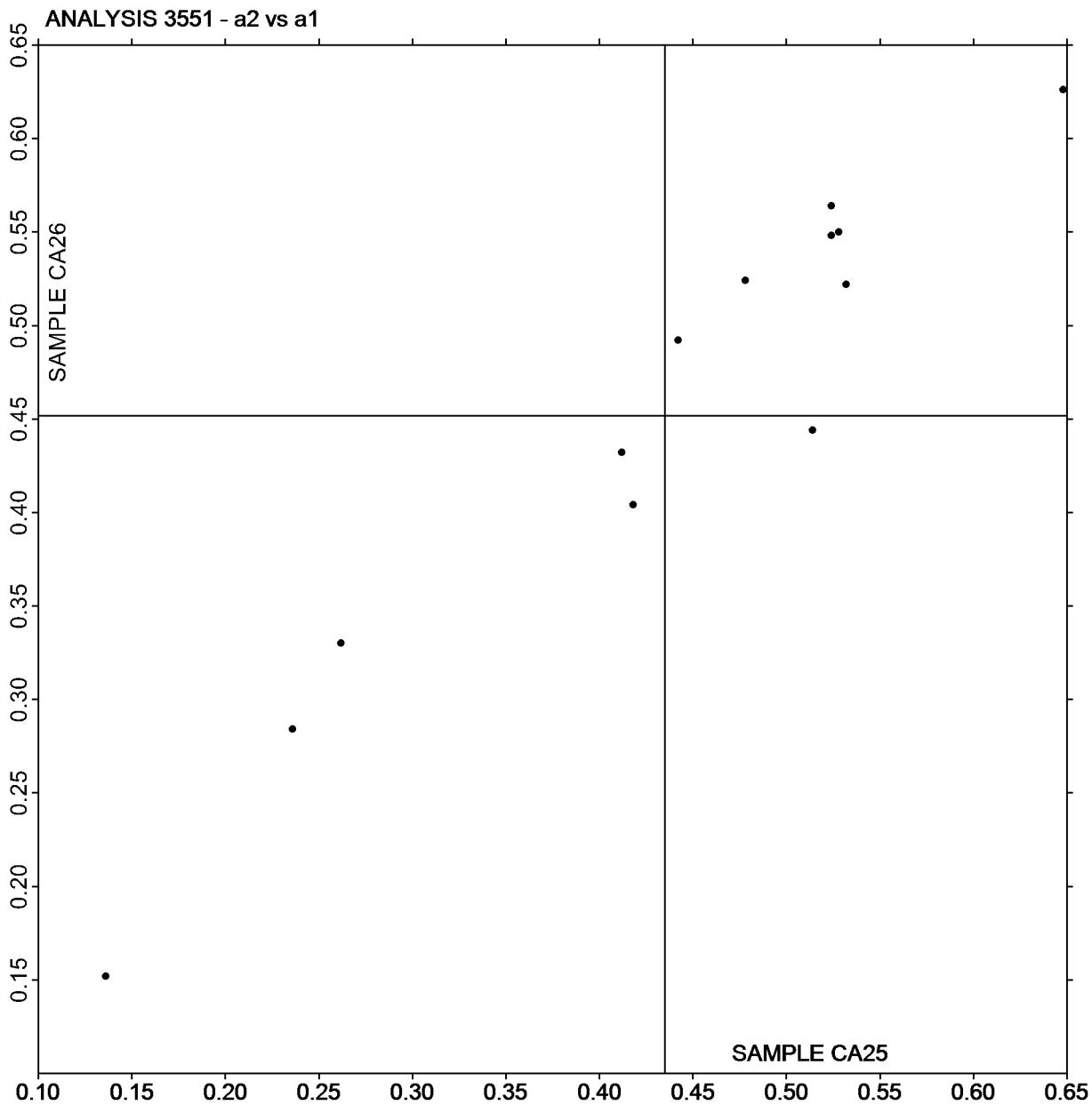
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**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 #4282,  
February 2024

Plot of a values CA26 vs a values CA25



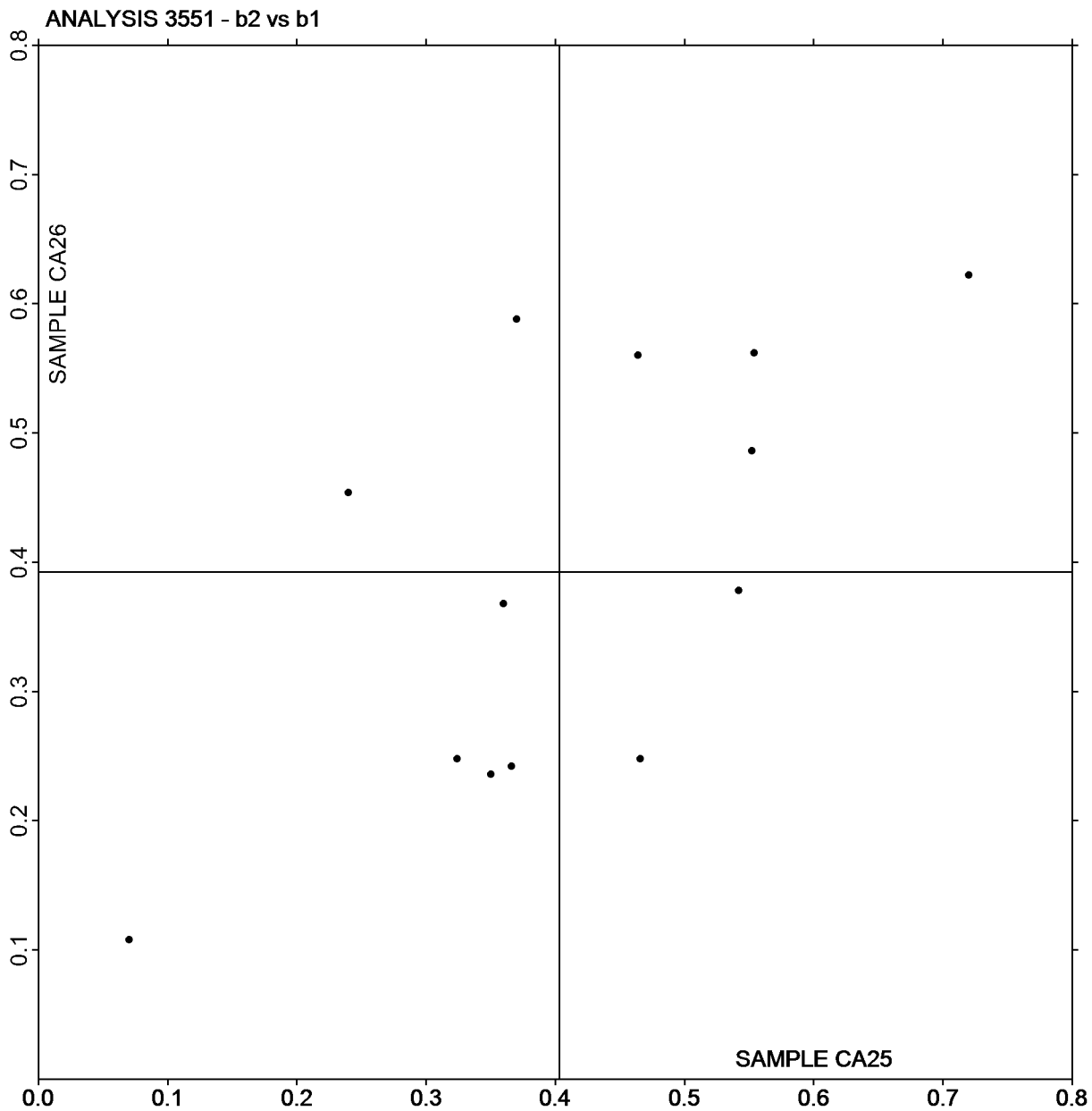
If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



**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 #4282,  
February 2024

Plot of b values CA26 vs b values CA25



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 #4282,  
February 2024

## Analysis 3553

### Specular Gloss at 75 Degrees - High Range

#### TAPPI Official Test Method T480

WebCode	Data Flag	Sample GH25			Sample GH26			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
8KX7N6		68.31	0.34	0.27	67.98	-0.05	-0.04	TH
8RXRDJ		68.44	0.46	0.37	69.36	1.32	1.00	PP
B4WRGX		69.04	1.07	0.85	68.31	0.28	0.21	VM
BU92V7		69.93	1.96	1.55	69.99	1.96	1.48	LF
CVJ4G6		65.92	-2.05	-1.63	65.17	-2.86	-2.16	GA
DBAMBX		67.91	-0.06	-0.05	67.77	-0.26	-0.20	LG
DEPVYW		67.26	-0.71	-0.57	67.44	-0.59	-0.45	TP
FJCJAK		66.59	-1.38	-1.10	66.70	-1.33	-1.00	GM
FMCV6K		66.78	-1.19	-0.95	67.80	-0.23	-0.17	LA
GLVXBZ		68.96	0.99	0.78	68.48	0.45	0.34	LF
MUATVA		65.65	-2.32	-1.85	65.88	-2.15	-1.62	TA
QLL92K		68.91	0.94	0.74	68.81	0.78	0.59	PT
RCB8FK		69.02	1.04	0.83	69.46	1.43	1.08	GM
TWG2MG		68.34	0.37	0.29	68.30	0.27	0.20	PP
YFCNTF		68.57	0.60	0.47	69.03	1.00	0.75	LW

Summary Statistics	Sample GH25	Sample GH26
<b>Grand Means</b>	67.97 Gloss Units	68.03 Gloss Units
<b>Std Dev Btwn Labs</b>	1.26 Gloss Units	1.33 Gloss Units

Statistics based on 15 of 15 reporting participants.

#### Key to Instrument Codes Reported by Participants

<b>GA</b> BYK-Gardner (model not specified)	<b>GM</b> BYK-Gardner micro-gloss
<b>LA</b> L & W Gloss - Autoline 300	<b>LF</b> L & W Autoline 400
<b>LG</b> L & W Autoline 600	<b>LW</b> L & W Gloss Tester
<b>PP</b> Technidyne Profile/Plus	<b>PT</b> PTA Line Gloss Meter
<b>TA</b> Technidyne Test Plus Gloss 75 degree	<b>TH</b> Technidyne T480A
<b>TP</b> Technidyne Profile Plus	<b>VM</b> Valmet PaperLab (was Kajaani/Robotest)



# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

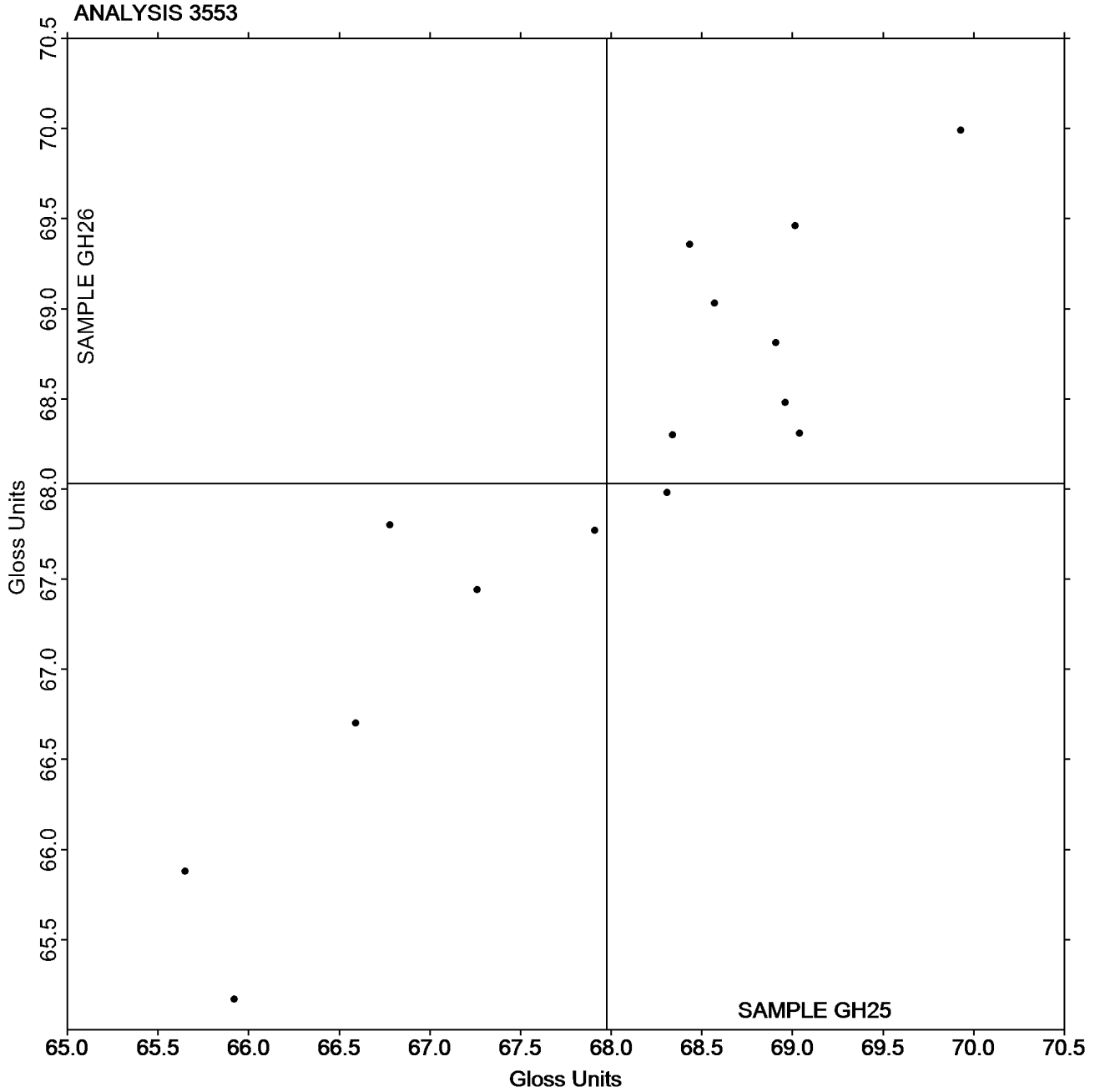
## Analysis 3553

### Specular Gloss at 75 Degrees - High Range

#### TAPPI Official Test Method T480

Grand Mean Sample GH25 = 67.975  
Gloss Units

Grand Mean Sample GH26 = 68.032  
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 3555**  
**Specular Gloss at 75 Degrees - Low Range**  
**TAPPI Official Test Method T480**

**Report #4282,**  
**February 2024**

WebCode	Data Flag	<u>Sample GL25</u>			<u>Sample GL26</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
8KDP92		36.79	2.03	0.81	35.84	0.65	0.43	TP
9DB3U8		38.91	4.15	1.65	37.77	2.58	1.69	PP
AJFYFR		31.50	-3.26	-1.29	32.80	-2.39	-1.57	GM
BTG67C		33.53	-1.23	-0.49	34.57	-0.62	-0.41	TH
LQEMYT		33.38	-1.38	-0.55	34.93	-0.26	-0.17	WJ
MUATVA		31.89	-2.87	-1.14	33.81	-1.38	-0.91	TA
UEVZ86		34.83	0.07	0.03	34.42	-0.77	-0.51	GS
W7BGZB		37.39	2.63	1.05	36.72	1.53	1.00	TH
YFCNTF		34.58	-0.18	-0.07	35.87	0.68	0.45	LW

<b>Summary Statistics</b>	<u>Sample GL25</u>	<u>Sample GL26</u>
<b>Grand Means</b>	34.76 Gloss Units	35.19 Gloss Units
<b>Stnd Dev Btwn Labs</b>	2.51 Gloss Units	1.52 Gloss Units
Statistics based on 9 of 9 reporting participants.		

**Key to Instrument Codes Reported by Participants**

<b>GM</b>	BYK-Gardner micro-gloss	<b>GS</b>	BYK-Gardner Glossgard II
<b>LW</b>	L & W Gloss Tester	<b>PP</b>	Technidyne Profile/Plus
<b>TA</b>	Technidyne Test Plus Gloss 75 degree	<b>TH</b>	Technidyne T480A
<b>TP</b>	Technidyne Profile Plus	<b>WJ</b>	Zehntner ZLR 1020





# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

Analysis 3555

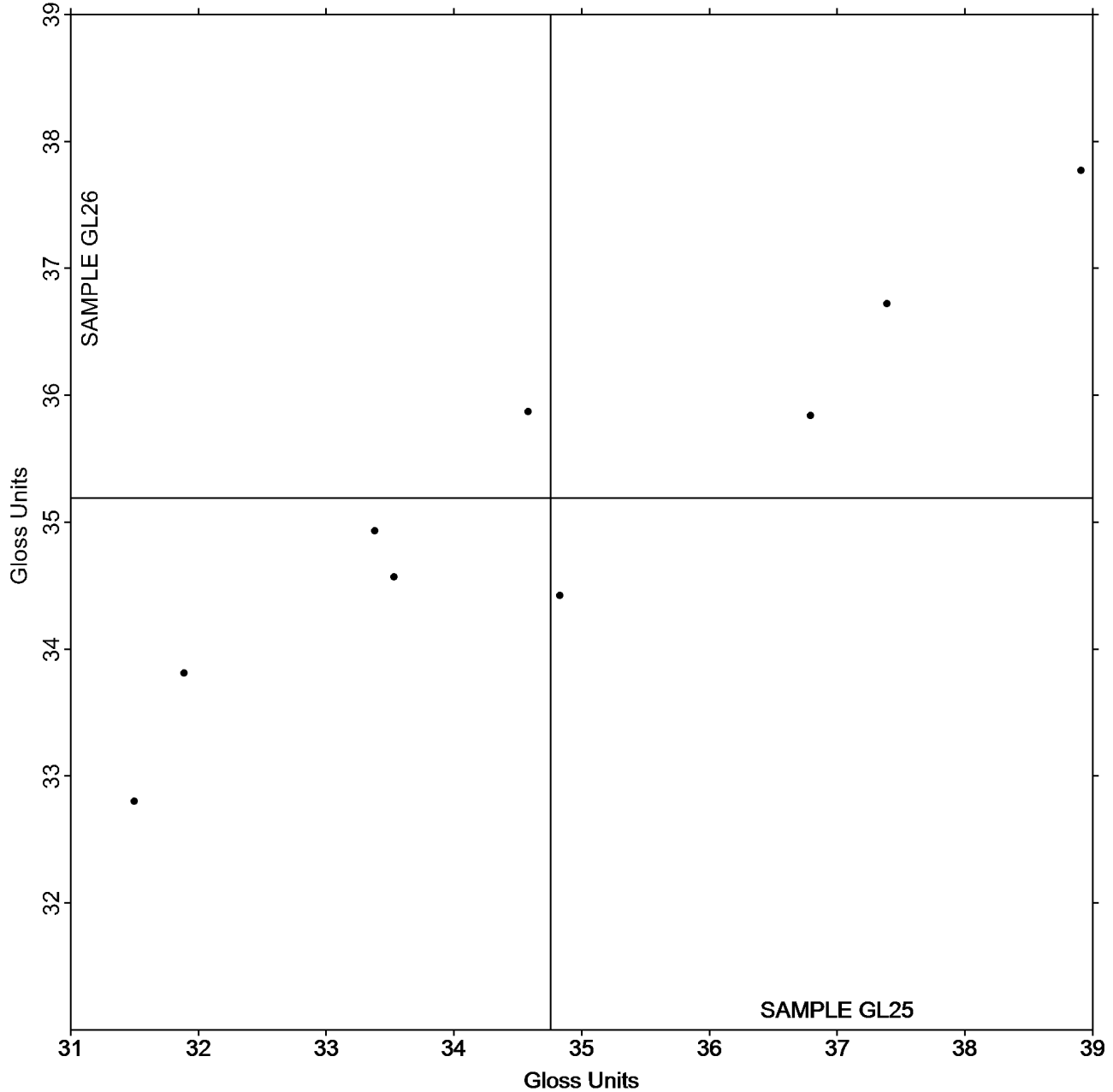
Specular Gloss at 75 Degrees - Low Range

TAPPI Official Test Method T480

Grand Mean Sample GL25 = 34.756  
Gloss Units

Grand Mean Sample GL26 = 35.192  
Gloss Units

ANALYSIS 3555



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 #4282,  
February 2024

WebCode	Data Flag	Sample MT25			Sample MT26			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2FLC7C		58.90	12.94	1.15	45.90	-0.74	-0.06	MT
4LFFN7		55.30	9.34	0.83	47.00	0.36	0.03	MT
8KX7N6		47.30	1.34	0.12	39.50	-7.14	-0.60	MT
92K9KY		52.90	6.94	0.62	67.70	21.06	1.76	MT
AD8U3Y		50.50	4.54	0.40	54.00	7.36	0.61	XX
B4WRGX		31.60	-14.36	-1.28	29.30	-17.34	-1.45	MT
BTG67C		48.40	2.44	0.22	47.50	0.86	0.07	MT
CVJ4G6		42.60	-3.36	-0.30	49.80	3.16	0.26	MT
PAYMHK		59.00	13.04	1.16	58.10	11.46	0.96	MT
U4AT9F		43.00	-2.96	-0.26	49.00	2.36	0.20	XX
U72RLE		41.40	-4.56	-0.41	49.20	2.56	0.21	MT
W7BGZB		20.60	-25.36	-2.25	22.70	-23.94	-2.00	MT

Summary Statistics	Sample MT25	Sample MT26
<b>Grand Means</b>	45.96 Double Folds	46.64 Double Folds
<b>Std Dev Btwn Labs</b>	11.25 Double Folds	11.97 Double Folds
Statistics based on 12 of 12 reporting participants.		

### Key to Instrument Codes Reported by Participants

MT MIT - Tinius Olsen

XX Instrument make/model not specified by lab



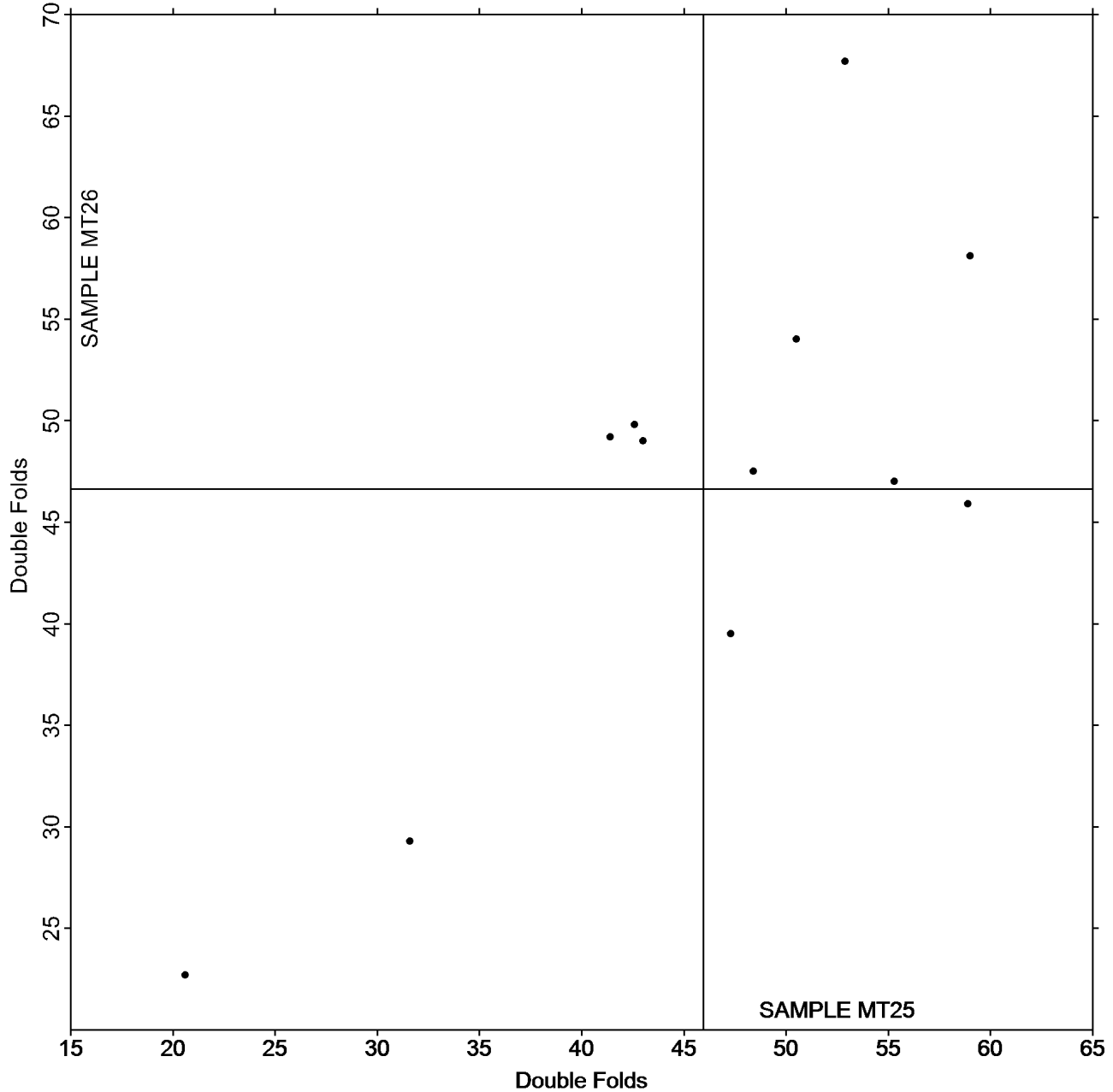
**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 3601**  
**Folding Endurance (MIT) - Double Folds**  
**TAPPI Official Test Method T511**

**Report #4282,**  
**February 2024**

**Grand Mean Sample MT25 = 45.958**  
**Double Folds**

**Grand Mean Sample MT26 = 46.642**  
**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**  
**Analysis 3603**  
**Bending Resistance, Gurley Type**  
**TAPPI Official Test Method T543**

**Report #4282,**  
**February 2024**

WebCode	Data Flag	<u>Sample BG25</u>			<u>Sample BG26</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2HQWWX		54.8	-78.2	-2.39	59.5	-73.5	-2.33	ZZ
3X269L		145.4	12.4	0.38	142.7	9.8	0.31	ZZ
4K92HZ		140.6	7.5	0.23	140.1	7.1	0.23	ZZ
4LFFN7		138.1	5.0	0.15	141.0	8.0	0.25	ZZ
92K9KY		137.9	4.8	0.15	136.8	3.8	0.12	ZZ
9RRXA4		121.3	-11.7	-0.36	132.9	-0.1	0.00	ZZ
B4WRGX		156.6	23.6	0.72	158.5	25.5	0.81	ZZ
BTG67C		143.9	10.8	0.33	148.7	15.8	0.50	ZZ
F4Z9GR		165.8	32.8	1.00	165.2	32.3	1.02	ZZ
GG4QTR		155.9	22.9	0.70	149.8	16.8	0.53	ZZ
Q473PP		129.4	-3.6	-0.11	132.5	-0.4	-0.01	ZZ
QFGCFZ		143.4	10.4	0.32	136.8	3.8	0.12	ZZ
R2VK4X		154.7	21.7	0.66	150.3	17.3	0.55	ZZ
W7BGZB		59.9	-73.1	-2.24	57.7	-75.3	-2.39	ZZ
XQWUR6		148.0	14.9	0.46	142.2	9.2	0.29	ZZ

<b>Summary Statistics</b>	<u>Sample BG25</u>	<u>Sample BG26</u>
<b>Grand Means</b>	133.05 Gurley Units	132.98 Gurley Units
<b>Std Dev Btwn Labs</b>	32.67 Gurley Units	31.52 Gurley Units
Statistics based on 15 of 15 reporting participants.		

**Key to Instrument Codes Reported by Participants**

ZZ Instruments No Longer Tracked



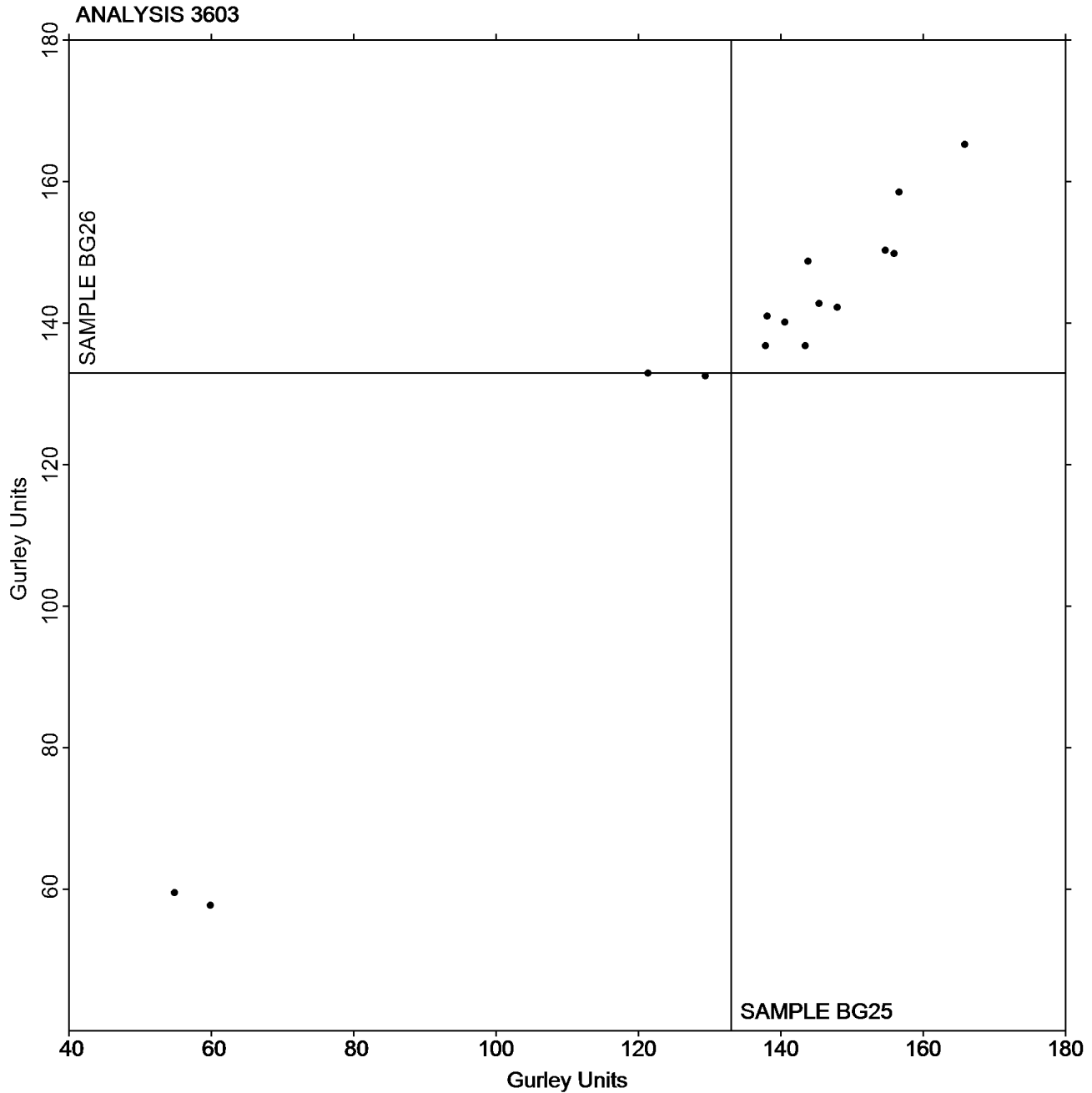
# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

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

Grand Mean Sample BG25 = 133.05  
Gurley Units

Grand Mean Sample BG26 = 132.98  
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 #4282,**  
**February 2024**

WebCode	Data Flag	<u>Sample CF25</u>			<u>Sample CF26</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3X269L		0.5920	0.0060	0.08	0.5860	-0.0128	-0.15	TA
4LFFN7		0.6422	0.0562	0.74	0.6492	0.0504	0.58	TA
4N8CDZ		0.5400	-0.0460	-0.61	0.5100	-0.0888	-1.03	TA
8KDP92		0.6514	0.0654	0.86	0.6878	0.0890	1.03	TA
9RRXA4		0.6048	0.0188	0.25	0.6426	0.0438	0.51	TX
L9YDXR		0.4958	-0.0902	-1.19	0.5036	-0.0952	-1.10	XX
MBD8C4		0.6418	0.0558	0.74	0.6704	0.0716	0.83	TA
Q473PP		0.4130	-0.1730	-2.28	0.4232	-0.1756	-2.03	TA
U72RLE		0.6090	0.0230	0.30	0.6262	0.0274	0.32	TM
XQWUR6		0.6620	0.0760	1.00	0.6900	0.0912	1.06	TP
Y2TXVY		0.5940	0.0080	0.11	0.5976	-0.0012	-0.01	TA

<b>Summary Statistics</b>	<u><b>Sample CF25</b></u>	<u><b>Sample CF26</b></u>
<b>Grand Means</b>	0.59 COF	0.60 COF
<b>Std Dev Btwn Labs</b>	0.08 COF	0.09 COF

Statistics based on 11 of 11 reporting participants.

**Key to Instrument Codes Reported by Participants**

TA	Thwing-Albert Friction Tester	TM	TMI 32-06 Monitor/Slip and Friction
TP	TMI 32-25 COF Tester (Inclined Plane)	TX	TMI (model not specified)
XX	Instrument make/model not specified by lab		

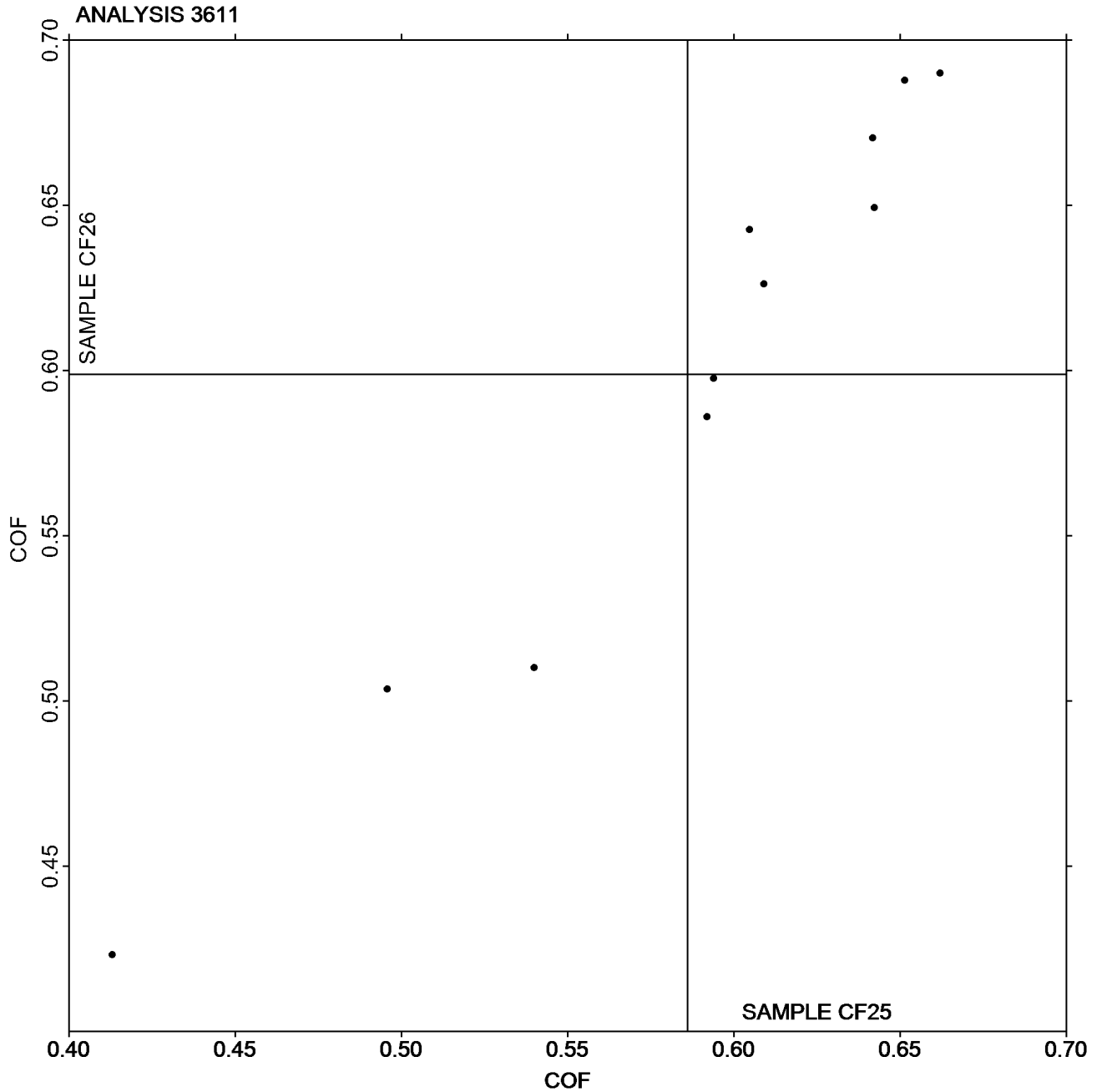


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 3611**  
**Coefficient of Static Friction - Horizontal Plane Method - Printing Papers**  
**TAPPI Official Test Method T549**

Report #4282,  
February 2024

Grand Mean Sample CF25 = 0.58600  
COF

Grand Mean Sample CF26 =  
0.59878 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 #4282,**  
**February 2024**

WebCode	Data Flag	Sample CF25			Sample CF26			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3X269L		0.5320	0.0441	0.53	0.5320	0.0197	0.24	TA
4LFFN7		0.5096	0.0217	0.26	0.5396	0.0273	0.33	TA
4N8CDZ		0.4660	-0.0219	-0.26	0.4780	-0.0343	-0.41	TA
9RRXA4		0.5496	0.0617	0.74	0.5946	0.0823	0.99	TX
L9YDXR		0.4028	-0.0851	-1.02	0.4512	-0.0611	-0.73	XX
MBD8C4		0.5642	0.0763	0.91	0.5902	0.0779	0.93	TA
Q473PP		0.3096	-0.1783	-2.13	0.3316	-0.1807	-2.17	TA
U72RLE		0.5510	0.0631	0.76	0.5760	0.0637	0.76	TM
Y2TXVY		0.5062	0.0183	0.22	0.5178	0.0055	0.07	TA

Summary Statistics	Sample CF25	Sample CF26
<b>Grand Means</b>	0.49 COF	0.51 COF
<b>Stnd Dev Btwn Labs</b>	0.08 COF	0.08 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
TX	TMI (model not specified)	XX	Instrument make/model not specified by lab



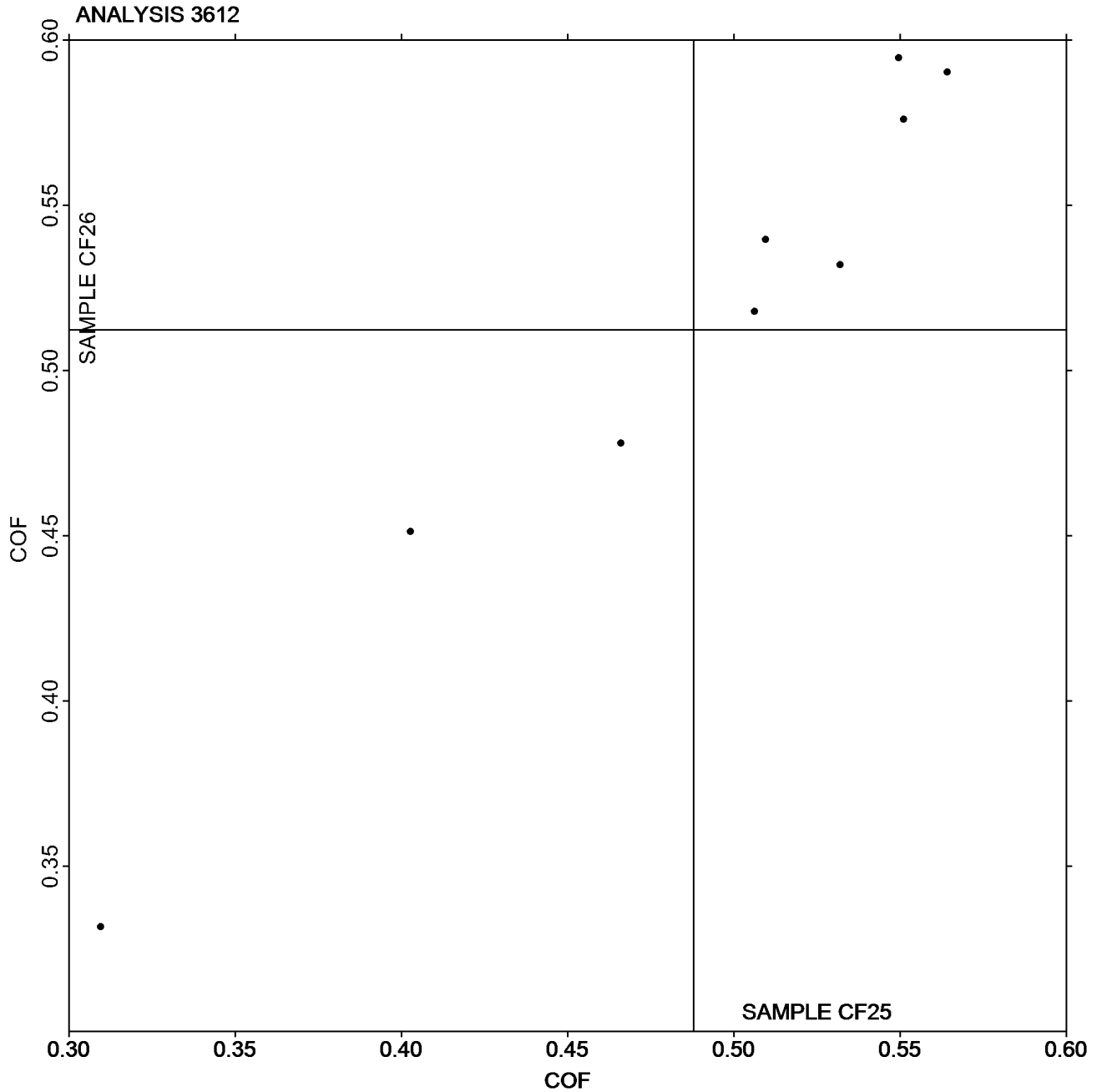


**Paper & Paperboard Interlaboratory Testing Program**  
**Analysis 3612**  
**Coefficient of Kinetic Friction - Horizontal Plane Method - Printing Papers**  
**TAPPI Official Test Method T549**

**Report #4282,**  
**February 2024**

**Grand Mean Sample CF25 = 0.48789**  
**COF**

**Grand Mean Sample CF26 =**  
**0.51233 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 #4282,**  
**February 2024**

WebCode	Data Flag	<u>Sample MC25</u>			<u>Sample MC26</u>			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3X269L		3.954	-0.122	-0.26	4.529	0.420	0.85	ZZ
4K92HZ		4.175	0.098	0.21	4.138	0.028	0.06	ZZ
92K9KY		5.065	0.988	2.10	4.965	0.855	1.74	ZZ
93C69T		4.165	0.088	0.19	4.184	0.074	0.15	ZZ
DBU4QZ		3.928	-0.149	-0.32	3.935	-0.175	-0.36	ZZ
GA7YKX		4.280	0.203	0.43	4.150	0.040	0.08	ZZ
LQEMYT		3.743	-0.334	-0.71	3.893	-0.217	-0.44	ZZ
MP2CLL		4.318	0.241	0.51	4.414	0.304	0.62	ZZ
NVXNUN		3.095	-0.982	-2.08	3.319	-0.791	-1.61	ZZ
QU3RJY		3.680	-0.397	-0.84	3.180	-0.930	-1.89	ZZ
TJ9HNL		4.352	0.275	0.58	4.342	0.233	0.47	ZZ
X2DEC2		4.167	0.090	0.19	4.267	0.157	0.32	ZZ

<b>Summary Statistics</b>	<u>Sample MC25</u>	<u>Sample MC26</u>
<b>Grand Means</b>	4.08 Percent	4.11 Percent
<b>Std Dev Btwn Labs</b>	0.47 Percent	0.49 Percent

Statistics based on 12 of 12 reporting participants.

**Key to Instrument Codes Reported by Participants**

ZZ Instruments No Longer Tracked



# Paper & Paperboard Interlaboratory Testing Program

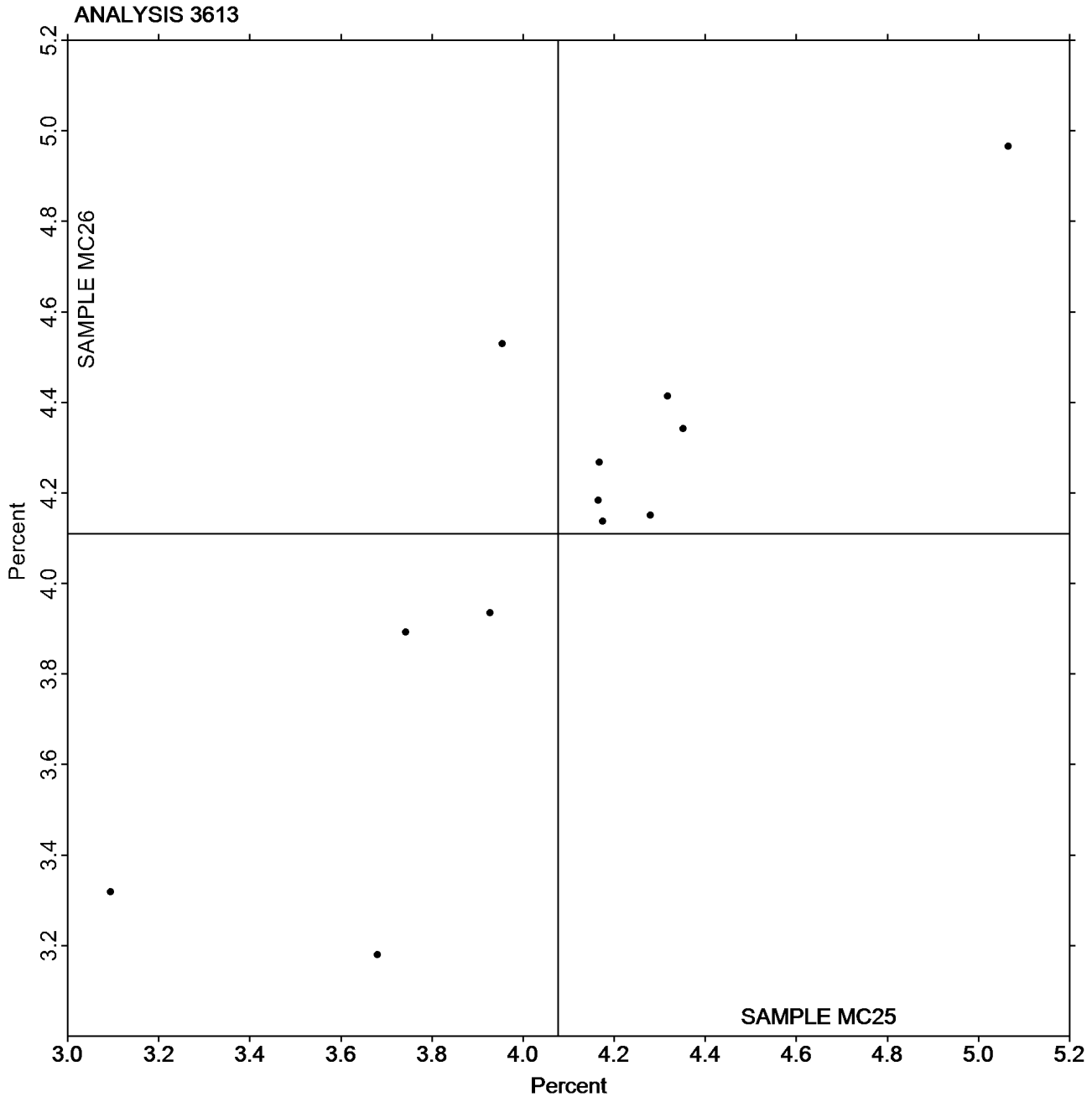
Report #4282,  
February 2024

## Analysis 3613 Moisture in Paper

### TAPPI Official Test Method T412

Grand Mean Sample MC25 = 4.0768  
Percent

Grand Mean Sample MC26 = 4.1096  
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 #4282,  
February 2024

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

WebCode	Data Flag	Sample HS25			Sample HS26			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2FLC7C	X	473.20	402.87	16.50	426.40	357.36	13.98	HE
3X269L		69.53	-0.80	-0.03	69.84	0.80	0.03	HE
4N8CDZ		85.82	15.49	0.63	89.10	20.06	0.78	HE
8KDP92		86.42	16.09	0.66	76.09	7.05	0.28	HE
993EJQ		17.95	-52.38	-2.15	17.88	-51.16	-2.00	HE
9RRXA4		81.20	10.87	0.45	84.80	15.76	0.62	HE
AJFYFR		109.70	39.37	1.61	110.70	41.66	1.63	HE
B4WRGX		63.30	-7.03	-0.29	61.60	-7.44	-0.29	HE
GG4QTR		103.76	33.43	1.37	101.56	32.52	1.27	XX
GLKYGQ		50.40	-19.93	-0.82	54.30	-14.74	-0.58	HE
GLVXBZ		99.40	29.07	1.19	102.55	33.51	1.31	HE
KVUUMT	*	56.69	-13.64	-0.56	39.76	-29.28	-1.15	HE
M6TAMG		54.87	-15.46	-0.63	53.34	-15.70	-0.61	HE
MBD8C4		19.87	-50.46	-2.07	17.87	-51.17	-2.00	HE
Q473PP		92.65	22.32	0.91	94.22	25.18	0.98	HE
QB26RZ		56.12	-14.21	-0.58	52.83	-16.21	-0.63	XX
QFGCFZ		93.71	23.38	0.96	91.03	21.99	0.86	HE
QLL92K		68.77	-1.56	-0.06	65.09	-3.95	-0.15	HE
R2VK4X		75.70	5.37	0.22	68.70	-0.34	-0.01	HE
WG8K66		75.60	5.27	0.22	82.40	13.36	0.52	HE
XQWUR6		59.41	-10.92	-0.45	54.13	-14.91	-0.58	HE
Z987WZ		56.11	-14.22	-0.58	62.00	-7.04	-0.28	HE

**Summary Statistics**

**Sample HS25**

**Sample HS26**

**Grand Means**

70.33 Seconds

69.04 Seconds

**Stnd Dev Btwn Labs**

24.41 Seconds

25.57 Seconds

Statistics based on 21 of 22 reporting participants.

**Comments on Assigned Data Flags for Test #3615**

2FLC7C (X) - Extreme Data.

**Key to Instrument Codes Reported by Participants**

HE Hercules Sizing Tester

XX Instrument make/model not specified by lab



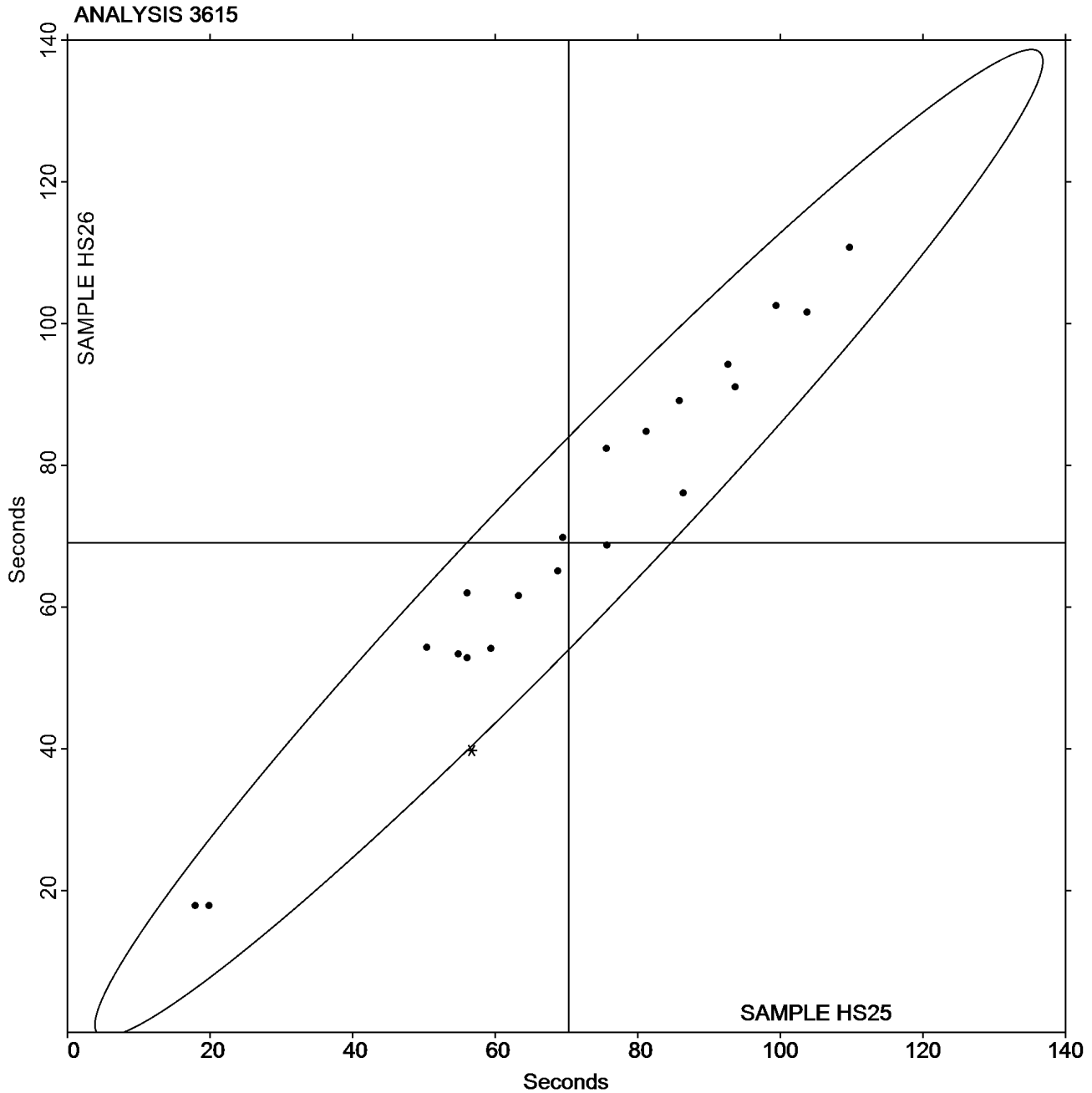
# Paper & Paperboard Interlaboratory Testing Program

Report #4282,  
February 2024

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

Grand Mean Sample HS25 = 70.332  
Seconds

Grand Mean Sample HS26 = 69.038  
Seconds



-End of Report-