

## Paper & Paperboard Interlaboratory Program

### Summary Report #238S - January 2009

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## **The CTS Paper & Paperboard 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 industrial sectors: rubber, plastics, fasteners and metals, CKPG, paper, color, 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.

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

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Sterling, Virginia 20166 USA  
+1-571-434-1925  
FAX #: +1-571-434-1937  
paper@cts-interlab.com

(Toll-free fax within the U.S.: 1-866-fax-2cts)  
Office Hours: 8:00 a.m. - 4:30 p.m. ET

## 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 web site. The WebCode for each analysis can be found in the Performance Analysis Report mailed to each participant. In addition, the WebCodes can be found on the data sheets.
<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:

DATA FLAG	STATISTICALLY INCLUDED/EXCLUDED	ACTION REQUIRED
*	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.

## Instrument Manufacturer Contacts

If your results have been flagged with an "X" and you suspect that the problem is with your instrument (and not your testing procedure), CTS urges you to contact the appropriate instrument manufacturer. CTS has asked manufacturers to supply a contact person who is familiar with the Paper, Paperboard & Corrugated Fiberboard Interlaboratory Program. The listed service contact should be able to work with you on evaluating your results and determining possible causes of the problem.

### **Technidyne Corp., Hagerty Div.**

George Hagerty  
287 Dix Ave. P.O. Box 4741  
Queensbury, NY 12804  
Phone: (518) 793-2834  
FAX #: (518) 792-1796

### **Technidyne Corporation**

Jeff Hobbs / Mike Lankins  
100 Quality Avenue  
New Albany, IN 47150-2272 USA  
Phone: (812) 948-2884  
FAX #: (812) 945-6847

### **Thwing Albert Instrument Co.**

Raymond McCart, Service Contact  
David Zarrilli, Sales Contact  
10960 Dutton Road  
Philadelphia, PA 19154  
Phone: (215) 637-0100  
FAX #: (215) 632-8370

### **Testing Machines Inc.**

Michael Foran, Technical Support Engineer  
2910 Expressway Drive South  
Islandia, NY 11722  
Phone: (631) 439-5400  
FAX #: (631) 439-5420

### **Huygen Corporation**

Richard Wade  
P.O. Box 316  
Waconda, IL 60084  
Phone: (815) 455-2200  
FAX #: (815) 455-2300

### **Gurley Precision Instruments**

Martin Gordinier, Product Manager  
P.O. Box 88  
Troy, NY 12181-0088  
Phone: (800) 759-1844  
FAX #: (518) 274-0336

### **Lorentzen & Wettre USA Inc.**

Bill Crai, Technical Manager  
1055 Windward Ridge Pkwy  
Suite 160  
Alpharetta, GA 30005  
Phone: (770) 442-8015  
FAX #: (770) 442-6792

### **Valmet Inc.**

Eeva Nettamo, Product Mgr Paper Testing  
3100 Medlock Bridge Road - Suite 260  
Norcross, GA 30071  
Phone: (404) 448-0849  
FAX #: (404) 242-8386

### **Custom Scientific Instruments**

DEK-TRON Scientific  
Segundo Vargas, Chief Design Engineer  
244 East Third Street

### **Emmerson Apparatus**

170 Anderson Street  
Portland, ME 04101  
Phone: (207) 774-5254

Plainfield, NJ 07060  
Phone: (908) 668-1777  
FAX #: (908) 668-4794

FAX#: (207) 774-5304

TAPPI-CTS Interlaboratory Testing Program

Analysis 305

**Bursting Strength - Printing Papers**

WebCode	Data Flag	Sample SA39			Sample SA40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
1B2WCH		30.66	0.29	0.18	35.51	0.83	0.46
1JCPKM		29.34	-1.03	-0.64	34.29	-0.38	-0.21
28MDGL		30.97	0.60	0.37	36.10	1.43	0.78
2HKZXX		29.23	-1.14	-0.70	33.96	-0.72	-0.39
2L4GDQ		33.24	2.87	1.77	35.85	1.18	0.65
362AMC	*	27.00	-3.37	-2.08	29.80	-4.87	-2.68
3VDZTT		27.98	-2.39	-1.48	34.71	0.03	0.02
46YHFA		27.35	-3.02	-1.87	32.80	-1.87	-1.03
4KGBTB		30.80	0.43	0.27	36.60	1.93	1.06
57S85H		28.22	-2.14	-1.32	34.11	-0.56	-0.31
5L9FZ2		29.65	-0.72	-0.44	33.60	-1.07	-0.59
94EWG4		30.59	0.22	0.14	34.64	-0.04	-0.02
A11E9X		30.80	0.43	0.27	35.30	0.63	0.34
BD9AFM		32.59	2.22	1.37	38.99	4.32	2.38
CBHKQM		30.76	0.39	0.24	36.11	1.44	0.79
CVLKFY		33.51	3.14	1.94	38.09	3.42	1.88
D5EDQV		30.41	0.04	0.03	34.45	-0.22	-0.12
DKM5CE		32.30	1.93	1.19	35.20	0.53	0.29
E7FBK3		30.90	0.53	0.33	33.90	-0.77	-0.43
JAJNCY		30.54	0.17	0.11	34.80	0.13	0.07
KR92CC		31.42	1.05	0.65	36.01	1.34	0.74
L3K9Q9		30.30	-0.07	-0.04	32.55	-2.12	-1.17
LKKRU1		28.20	-2.17	-1.34	31.95	-2.72	-1.50
M5ZTV4		30.00	-0.37	-0.23	36.40	1.73	0.95
NXEZ9T		30.73	0.36	0.22	31.92	-2.75	-1.52
PDN2YR		31.10	0.73	0.45	34.56	-0.12	-0.06
Q35ZWQ		29.20	-1.17	-0.72	35.40	0.73	0.40
T6KTUU		28.70	-1.67	-1.03	32.60	-2.07	-1.14
TU14KV		29.95	-0.41	-0.26	34.57	-0.10	-0.05
U4JKV9		31.18	0.81	0.50	35.52	0.85	0.47
U4ZPB7		29.10	-1.27	-0.78	34.65	-0.02	-0.01
U8XLYN		32.75	2.38	1.47	34.99	0.31	0.17
WH8XU3		29.30	-1.07	-0.66	32.50	-2.17	-1.20
WUR7VV		32.55	2.18	1.35	36.25	1.58	0.87
XS1JW1		32.47	2.10	1.30	36.72	2.05	1.13
YHXXRS		29.49	-0.88	-0.55	32.85	-1.82	-1.00

Sample SA39		Summary Statistics	Sample SA40	
Grand Means	30.370 psi		34.674 psi	
SD Btwn Labs	1.619 psi		1.817 psi	
Statistics based on 36 of 36 reporting participants				

**Bursting Strength - Printing Papers**

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**Notes for Analysis 305**

No Data Flags assigned for this analysis.

**Analysis Notes:**

D5EDQV - Data appear to be reported as psi, not kPa as indicated on datasheet. Units changed by CTS.

TAPPI-CTS Interlaboratory Testing Program

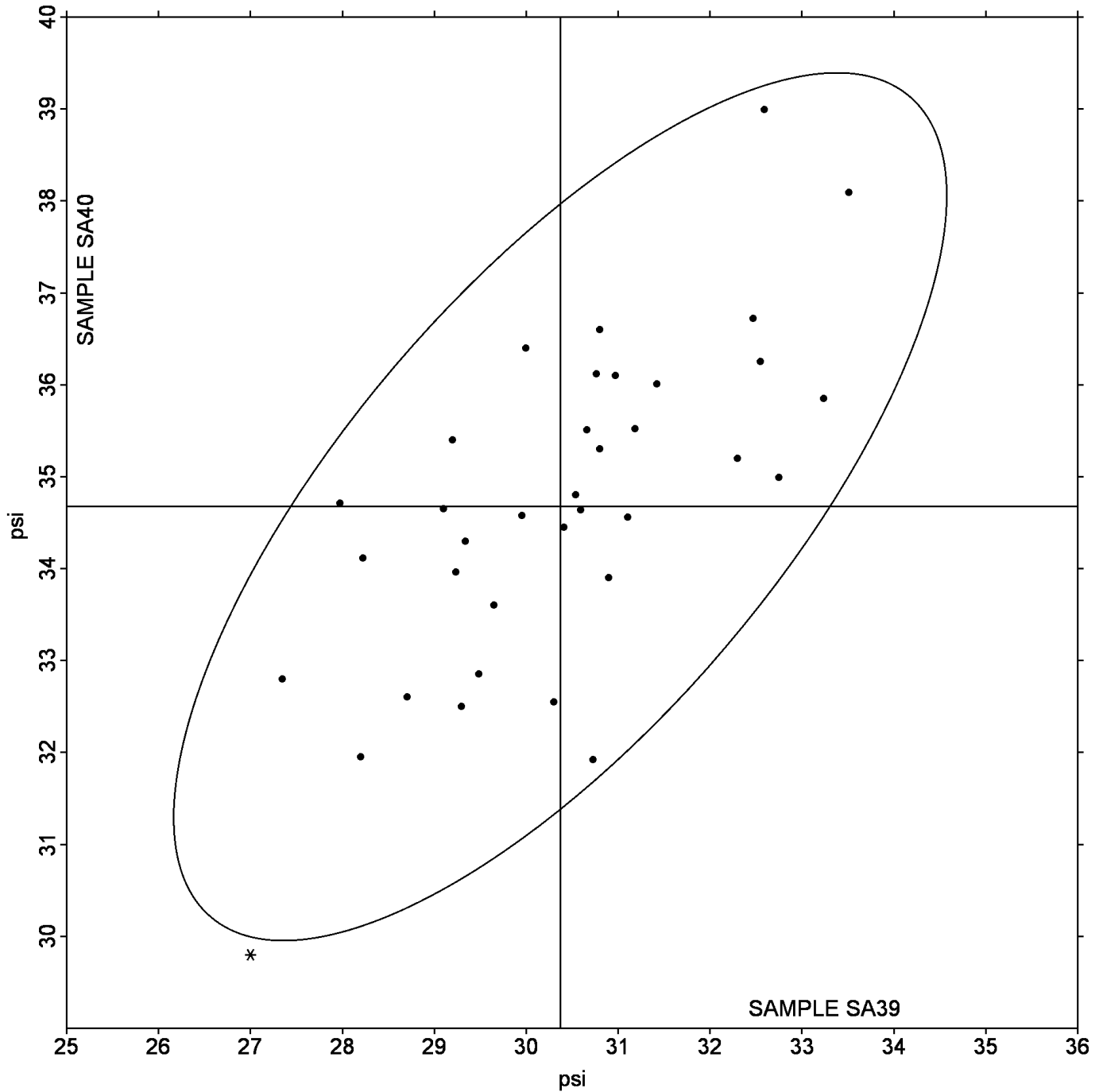
Analysis 305

Bursting Strength - Printing Papers

Grand Mean Sample SA39 = 30.370 psi

Grand Mean Sample SA40 = 34.674 psi

ANALYSIS 305



TAPPI-CTS Interlaboratory Testing Program

Analysis 310

Bursting Strength - Packaging Papers

WebCode	Data Flag	Sample SB39			Sample SB40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2Q9ZX5	*	70.13	-12.92	-2.55	40.05	-9.54	-2.59
69X1J2		76.93	-6.12	-1.21	46.28	-3.31	-0.90
6WD8GE		83.17	0.11	0.02	47.91	-1.68	-0.46
8PVG8S		82.21	-0.85	-0.17	50.20	0.61	0.17
A1NLXJ		84.40	1.35	0.27	51.47	1.88	0.51
AKAHUB		85.40	2.35	0.46	56.90	7.31	1.99
DW4PWB		72.91	-10.14	-2.00	43.53	-6.06	-1.65
GGCYNJ		88.80	5.75	1.13	50.00	0.41	0.11
H3724G		86.20	3.15	0.62	48.90	-0.69	-0.19
HFEMDU		89.11	6.05	1.20	58.28	8.69	2.36
HH64J4		80.82	-2.23	-0.44	47.71	-1.88	-0.51
HUHTRD	X	102.30	19.25	3.80	68.20	18.61	5.06
JD6UYL		82.70	-0.35	-0.07	48.70	-0.89	-0.24
JRAM9C		83.40	0.34	0.07	52.63	3.05	0.83
JSQXAR	X	102.95	19.90	3.93	60.95	11.36	3.09
KXX75Y		80.99	-2.06	-0.41	48.27	-1.31	-0.36
LNHAMC		80.80	-2.25	-0.44	49.47	-0.11	-0.03
MCHZSA		85.82	2.77	0.55	49.60	0.02	0.00
R8ZD1K		95.00	11.95	2.36	53.50	3.91	1.06
SU7EWM		78.10	-4.95	-0.98	48.00	-1.59	-0.43
TQ5SVJ		87.41	4.36	0.86	49.94	0.35	0.09
VWJ8LJ		83.87	0.81	0.16	54.06	4.47	1.22
WX2FUZ		80.64	-2.41	-0.48	48.17	-1.42	-0.39
XKQEPT		86.66	3.61	0.71	49.11	-0.48	-0.13
XMNMAJ		82.32	-0.73	-0.14	48.90	-0.69	-0.19
Y2V4J5		83.60	0.55	0.11	49.29	-0.30	-0.08
ZF7VJJ		86.80	3.75	0.74	51.10	1.51	0.41
ZNR2GN		81.20	-1.85	-0.37	47.30	-2.29	-0.62

Summary Statistics		
	Sample SB39	Sample SB40
Grand Means	83.053 psi	49.587 psi
SD Btwn Labs	5.065 psi	3.680 psi
Statistics based on 26 of 28 reporting participants		

**Comments on assigned Data Flags for Test #310**

HUHTRD (X) - Extreme data.

JSQXAR (X) - Systematic error (data for both samples are high).

**Analysis Notes:**

69X1J2 - Data appear to be reported as psi, not kPa as indicated on datasheet. Units changed by CTS.



TAPPI-CTS Interlaboratory Testing Program

Analysis 311

Tearing Strength - Newsprint

WebCode	Data Flag	Sample SK39			Sample SK40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
87MTL6		20.70	0.82	0.46	20.50	0.44	0.27
ALM5DB		22.08	2.20	1.24	21.69	1.63	1.00
C2FUZ5		20.19	0.31	0.18	20.69	0.63	0.39
EA5ZB3		20.92	1.04	0.59	21.18	1.13	0.69
EU64TP		23.40	3.52	1.99	23.10	3.04	1.86
F4T13P		17.95	-1.93	-1.09	18.41	-1.65	-1.01
FPGHAP		16.98	-2.90	-1.64	17.15	-2.91	-1.78
KN5A4B		21.09	1.21	0.69	21.05	0.99	0.61
KR14UK		16.78	-3.10	-1.75	17.02	-3.04	-1.86
M8VLN8		20.03	0.15	0.09	20.53	0.47	0.29
P9BD1F		20.00	0.12	0.07	20.20	0.14	0.09
S8ZSRR		19.89	0.01	0.01	20.17	0.11	0.07
TW8EGY		19.44	-0.44	-0.25	19.26	-0.80	-0.49
Y7MA2D		18.75	-1.13	-0.64	19.15	-0.91	-0.55
ZCE8FU		19.97	0.09	0.05	20.74	0.69	0.42

Summary Statistics		
	Sample SK39	Sample SK40
Grand Means	19.878 Grams	20.056 Grams
SD Btwn Labs	1.769 Grams	1.634 Grams
Statistics based on 15 of 15 reporting participants		

**Notes for Analysis 311**

No Data Flags assigned for this analysis.

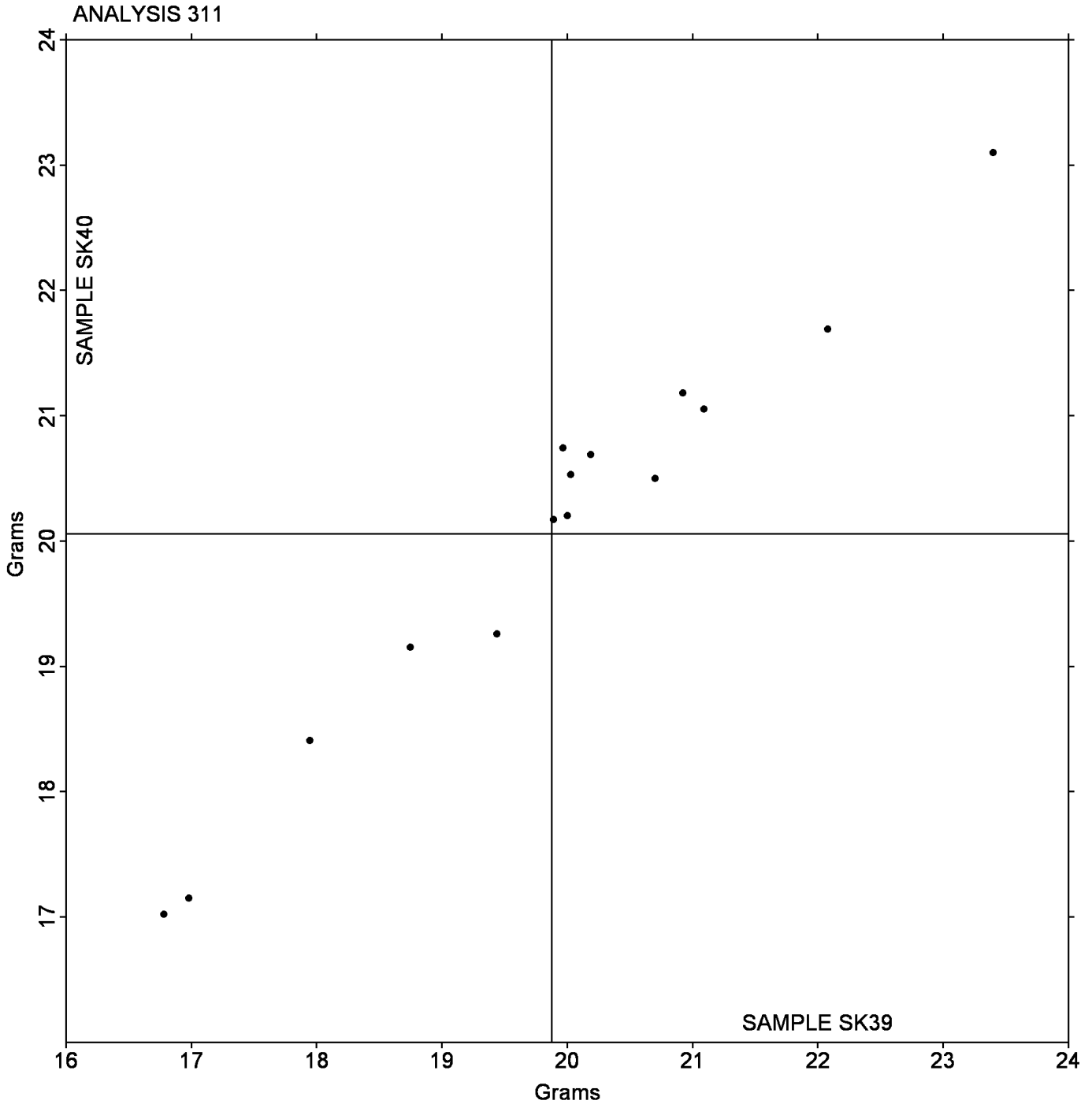
**Analysis Notes:**

87MTL6 - Data appear to be reported as gf, not mN as indicated on datasheet. Units changed by CTS.

TAPPI-CTS Interlaboratory Testing Program  
Analysis 311  
Tearing Strength - Newsprint

Grand Mean Sample **SK39** = 19.878 Grams

Grand Mean Sample **SK40** = 20.056 Grams



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

## TAPPI-CTS Interlaboratory Testing Program

## Analysis 312

## Tearing Strength - Printing Papers

WebCode	Data Flag	Sample SC39			Sample SC40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
1HR7VT		50.41	1.08	0.26	58.49	1.45	0.32
2MVJ5K		51.20	1.87	0.45	60.20	3.16	0.69
2TDLX2		49.70	0.37	0.09	55.30	-1.74	-0.38
3NKVZ5		51.96	2.63	0.64	62.11	5.07	1.11
436QUT		53.52	4.19	1.02	59.20	2.16	0.47
58HZX9		46.19	-3.14	-0.76	54.30	-2.74	-0.60
5EMVN9		55.36	6.03	1.47	63.90	6.86	1.51
656JTV		53.80	4.47	1.09	61.60	4.56	1.00
6EZSWG		55.08	5.75	1.40	60.11	3.07	0.67
7S7T4Q	X	59.93	10.60	2.58	62.85	5.81	1.28
92J34Z		57.06	7.73	1.88	66.85	9.81	2.16
945LBY		50.75	1.42	0.34	59.68	2.64	0.58
98MUTW		43.70	-5.63	-1.37	52.32	-4.72	-1.04
9DE6MM		50.16	0.83	0.20	56.70	-0.34	-0.08
9DRUT1		48.50	-0.83	-0.20	58.20	1.16	0.25
ABMF5Z		52.71	3.38	0.82	60.06	3.02	0.66
AEZGPK		50.74	1.41	0.34	58.06	1.02	0.22
AQ91X2		52.60	3.27	0.79	60.70	3.66	0.80
BCVVYD		46.88	-2.45	-0.60	53.58	-3.46	-0.76
BM12HT		42.71	-6.62	-1.61	49.50	-7.54	-1.66
C5VFSW		48.32	-1.01	-0.25	57.16	0.12	0.03
C75D1Z		43.48	-5.85	-1.42	52.74	-4.30	-0.95
CY3P5H		49.30	-0.03	-0.01	58.14	1.10	0.24
D3P6EL		46.60	-2.73	-0.66	52.64	-4.41	-0.97
DFTN68		50.46	1.12	0.27	59.30	2.25	0.50
EVRSCK	*	57.60	8.27	2.01	63.00	5.96	1.31
F57XMT		48.22	-1.11	-0.27	53.48	-3.56	-0.78
FF8G69		47.57	-1.76	-0.43	55.05	-1.99	-0.44
FNSNZZ		55.64	6.31	1.53	63.15	6.11	1.34
G2XYLD	X	52.70	3.37	0.82	61.02	3.98	0.87
GABMRM	X	56.97	7.64	1.86	59.98	2.94	0.65
GDHEYZ		46.60	-2.73	-0.66	54.00	-3.04	-0.67
GLJVKR		45.72	-3.61	-0.88	53.86	-3.18	-0.70
GN5GAT		42.58	-6.75	-1.64	49.39	-7.65	-1.68
GTSCUK		48.01	-1.32	-0.32	52.76	-4.28	-0.94
HPV464		51.88	2.55	0.62	59.85	2.80	0.62
HXMLHR	*	37.15	-12.19	-2.96	43.34	-13.70	-3.01
HXNEHK	X	50.20	0.87	0.21	57.16	0.12	0.03
JEHZK5		54.02	4.69	1.14	62.26	5.22	1.15
JHFHFB	X	77.70	28.37	6.90	88.31	31.26	6.88
KNY5P9		46.95	-2.38	-0.58	54.06	-2.98	-0.66
KP32BW		50.16	0.83	0.20	58.65	1.61	0.35
KWXV2X		47.32	-2.01	-0.49	53.78	-3.26	-0.72

TAPPI-CTS Interlaboratory Testing Program

Analysis 312

Tearing Strength - Printing Papers

WebCode	Data Flag	Sample SC39			Sample SC40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
LUE5E6	X	60.83	11.49	2.79	73.16	16.12	3.55
M3PSVX		54.99	5.66	1.38	62.63	5.59	1.23
MAHZE4		50.44	1.10	0.27	61.40	4.35	0.96
MBVUT5	*	52.80	3.47	0.84	56.60	-0.44	-0.10
MVUP58		49.80	0.47	0.11	55.11	-1.94	-0.43
MYXGAE	X	49.80	0.47	0.11	54.22	-2.82	-0.62
N4LKE3		48.00	-1.33	-0.32	54.60	-2.44	-0.54
P8Z3DQ		42.30	-7.03	-1.71	51.80	-5.24	-1.15
PNPR91		49.32	-0.01	0.00	59.98	2.94	0.65
Q3XZMA		48.00	-1.33	-0.32	56.00	-1.04	-0.23
QLZH2K		55.93	6.60	1.60	65.89	8.85	1.95
S19KNY		42.30	-7.03	-1.71	50.20	-6.84	-1.51
S215EJ		48.80	-0.53	-0.13	56.22	-0.82	-0.18
SAW2B6		50.20	0.87	0.21	58.90	1.86	0.41
SDZGMA		48.68	-0.65	-0.16	58.07	1.03	0.23
VQVQ1F		48.54	-0.79	-0.19	54.10	-2.94	-0.65
VR9R2R	X	63.40	14.07	3.42	73.10	16.06	3.53
VVPNQ6		52.08	2.75	0.67	60.50	3.46	0.76
VWZ5K6		45.78	-3.55	-0.86	53.84	-3.20	-0.70
W8LUVG		40.74	-8.59	-2.09	48.01	-9.03	-1.99
WFA911	*	52.00	2.67	0.65	63.90	6.86	1.51
X5Z9L6		48.88	-0.46	-0.11	54.98	-2.06	-0.45
XBAXPT		46.50	-2.83	-0.69	53.60	-3.44	-0.76
Y2WXDX		48.10	-1.23	-0.30	57.43	0.39	0.09
ZR1WPZ		53.46	4.13	1.00	62.24	5.20	1.14
ZVM4JZ		50.28	0.95	0.23	58.28	1.24	0.27
ZYQWP6		50.08	0.75	0.18	54.92	-2.12	-0.47

Sample SC39		Summary Statistics	Sample SC40	
Grand Means	49.332 Grams		57.043 Grams	
SD Btwn Labs	4.113 Grams		4.546 Grams	
Statistics based on 62 of 70 reporting participants				

**Tearing Strength - Printing Papers**

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**Comments on assigned Data Flags for Test #312**

7S7T4Q (X) - Inconsistent in testing between samples.

G2XYLD (X) - Data appear to be off by a factor of 2; data converted by CTS (x2).

GABMRM (X) - Inconsistent in testing between samples.

HXNEHK (X) - Data appear to be off by a factor of 2; data converted by CTS (x2).

JHFHFB (X) - Extreme data.

LUE5E6 (X) - Systematic error (data for both samples are high).

MYXGAE (X) - Data appear to be off by a factor of 2; data converted by CTS (x2).

VR9R2R (X) - Systematic error (data for both samples are high).

TAPPI-CTS Interlaboratory Testing Program

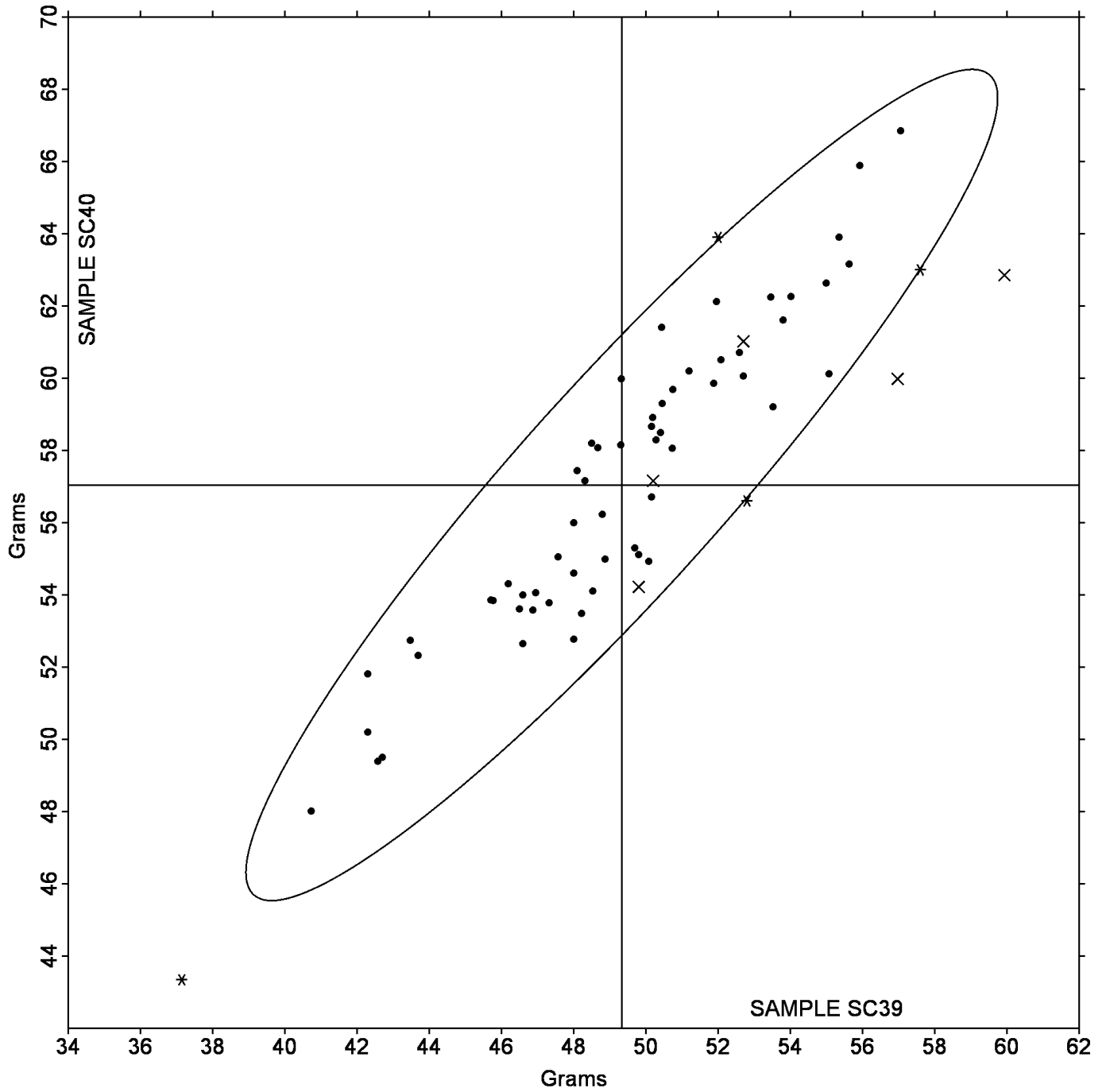
Analysis 312

Tearing Strength - Printing Papers

Grand Mean Sample **SC39** = 49.332 Grams

Grand Mean Sample **SC40** = 57.043 Grams

ANALYSIS 312



## TAPPI-CTS Interlaboratory Testing Program

## Analysis 314

## Tearing Strength - Packaging Papers

WebCode	Data Flag	Sample SD39			Sample SD40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
1E23YF		145.2	0.4	0.03	111.7	1.3	0.20
1GXQNR		146.8	2.0	0.20	110.0	-0.4	-0.07
1U2Z1E	*	145.6	0.8	0.07	119.0	8.6	1.31
2D5YWS		152.4	7.5	0.74	115.7	5.2	0.79
3CL826		140.7	-4.1	-0.40	104.8	-5.7	-0.87
3EUQ79		158.8	14.0	1.38	117.6	7.1	1.09
4C4V4T		139.0	-5.8	-0.57	104.6	-5.9	-0.89
73MQ1F		140.6	-4.2	-0.42	101.2	-9.3	-1.41
75EAPR		152.0	7.2	0.71	117.4	7.0	1.06
7CXL6R		143.9	-0.9	-0.09	110.1	-0.3	-0.05
7SME7Z	X	130.9	-13.9	-1.37	116.6	6.1	0.93
AHS5PT		143.4	-1.5	-0.14	109.0	-1.4	-0.22
CMN2RA		146.0	1.2	0.12	111.7	1.2	0.18
CRSJG5		140.9	-3.9	-0.38	112.6	2.2	0.33
D7L8F8		131.4	-13.4	-1.32	109.2	-1.3	-0.19
E8BSXZ		140.7	-4.1	-0.41	105.8	-4.7	-0.72
FUHYGN		142.4	-2.4	-0.24	109.0	-1.5	-0.23
FX986P		147.0	2.2	0.21	110.8	0.3	0.05
G8T3TV		137.4	-7.4	-0.73	102.9	-7.6	-1.15
GS4XT2		144.3	-0.5	-0.05	113.0	2.6	0.39
H8H8KN		153.2	8.4	0.83	118.8	8.3	1.27
HYVE66		161.6	16.8	1.65	119.7	9.3	1.41
J971SB		146.2	1.4	0.14	115.0	4.5	0.69
KD52YT		129.6	-15.3	-1.50	101.6	-8.9	-1.35
KEUJWS		163.2	18.4	1.81	119.5	9.0	1.38
KTHEAY	X	40.5	-104.3	-10.27	41.5	-69.0	-10.52
KZZ5FR		146.4	1.6	0.16	117.6	7.1	1.09
NP8J1R		127.9	-16.9	-1.67	96.7	-13.8	-2.10
PQRWEV	X	450.1	305.3	30.06	337.6	227.1	34.62
PYUQ6G		140.5	-4.3	-0.42	106.7	-3.8	-0.58
QE1LBU	X	178.1	33.3	3.28	142.6	32.1	4.90
R7Y5B3	*	170.9	26.1	2.57	122.9	12.5	1.90
UBNEZ3		127.8	-17.0	-1.67	102.3	-8.1	-1.24
UPR6T3		140.5	-4.3	-0.43	108.0	-2.5	-0.37
V6V8GU		137.6	-7.2	-0.71	104.5	-5.9	-0.90
V7UFPR		121.4	-23.4	-2.31	95.8	-14.7	-2.23
VEL1MZ		138.1	-6.7	-0.66	105.4	-5.1	-0.77
VTZA4U		149.7	4.8	0.48	112.5	2.0	0.31
W9SHLT		152.5	7.7	0.76	112.1	1.6	0.25
WHKTX9	X	144.4	-0.4	-0.04	116.5	6.0	0.92
XKJGRP		155.6	10.8	1.06	113.6	3.2	0.48
Y8PCFJ		148.0	3.1	0.31	114.1	3.6	0.55
ZH4WW5		154.0	9.2	0.90	114.4	3.9	0.60

**Tearing Strength - Packaging Papers**

	<b>Sample SD39</b>	<b>Summary Statistics</b>	<b>Sample SD40</b>
Grand Means	144.82 Grams		110.46 Grams
SD Btwn Labs	10.16 Grams		6.56 Grams
Statistics based on 38 of 43 reporting participants			

**Comments on assigned Data Flags for Test #314**

7SME7Z (X) - Inconsistent in testing between samples.

KTHEYA (X) - Extreme data.

PQRWEV (X) - Extreme data.

QEILBU (X) - Systematic error (data for both samples are high).

WHKTX9 (X) - Data appear to be off by a factor of 4; data converted by CTS (x4).

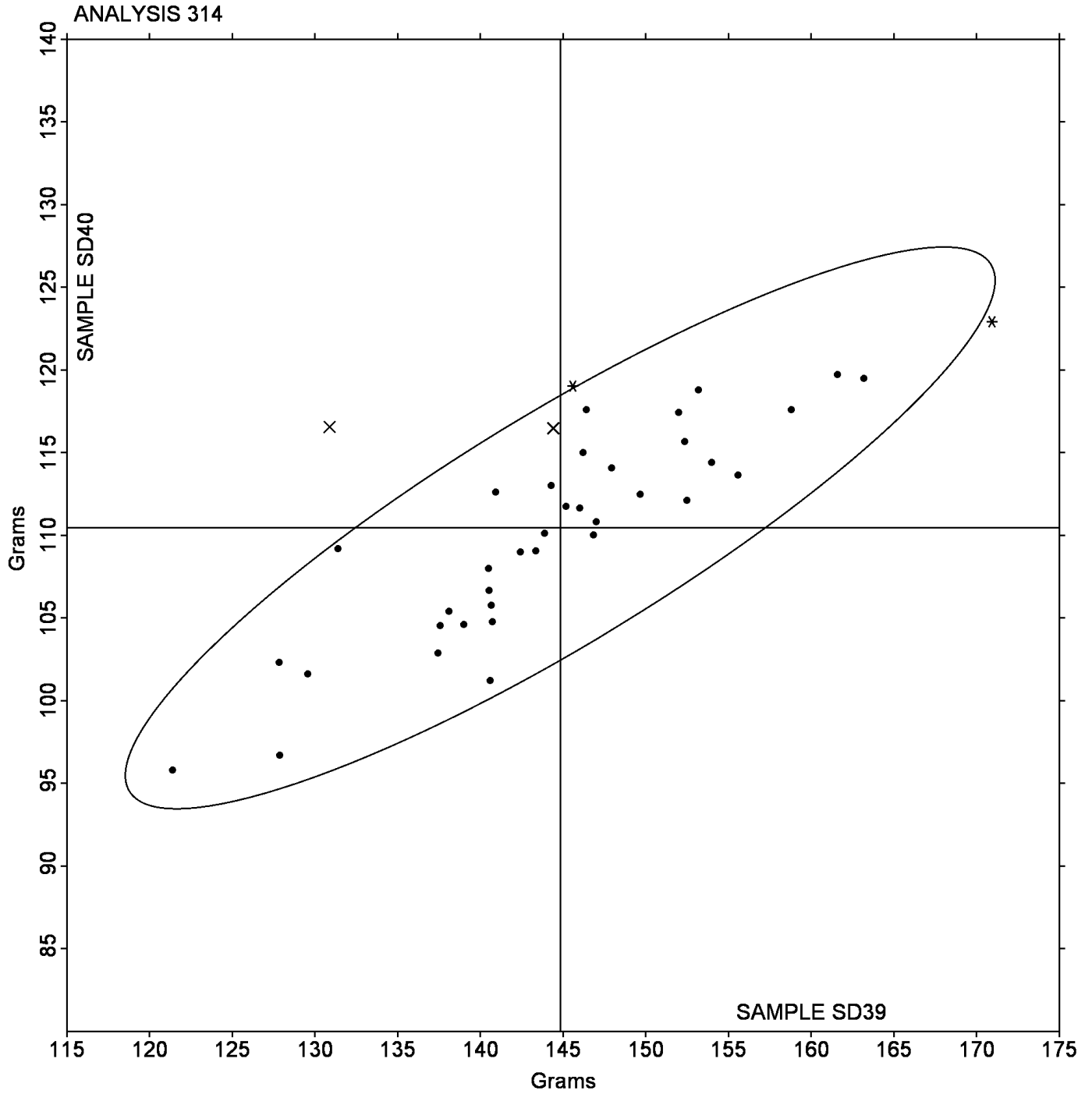
TAPPI-CTS Interlaboratory Testing Program

Analysis 314

Tearing Strength - Packaging Papers

Grand Mean Sample SD39 = 144.82 Grams

Grand Mean Sample SD40 = 110.46 Grams



## TAPPI-CTS Interlaboratory Testing Program

## Analysis 320

## Tensile Breaking Strength - Newsprint

WebCode	Data Flag	Sample SR39			Sample SR40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2VGHYJ		1.923	-0.014	-0.08	2.240	0.013	0.06
4X7LE2		2.180	0.243	1.29	2.496	0.269	1.20
8DAB69		2.119	0.182	0.97	2.330	0.104	0.46
8ZHH4U		2.086	0.148	0.79	2.291	0.065	0.29
992PMB		2.093	0.156	0.83	2.397	0.171	0.76
A2TCEJ		2.132	0.195	1.04	2.479	0.252	1.13
AGYRAU	*	1.592	-0.345	-1.83	1.690	-0.537	-2.40
DCSZJD		2.087	0.150	0.80	2.451	0.225	1.00
EP2JKD		1.892	-0.045	-0.24	2.229	0.002	0.01
GKBDUL		2.042	0.105	0.56	2.365	0.138	0.62
GMG1ES		1.894	-0.043	-0.23	2.213	-0.013	-0.06
GZM3SU		1.828	-0.109	-0.58	2.179	-0.048	-0.21
KGBHF9		1.916	-0.021	-0.11	2.344	0.117	0.52
LYZV78		1.904	-0.033	-0.18	2.177	-0.050	-0.22
MUVL6S		1.978	0.041	0.22	2.226	-0.001	0.00
RD1A3B		1.995	0.058	0.31	2.215	-0.012	-0.05
VKV9UV		1.431	-0.506	-2.69	1.669	-0.558	-2.49
X9GP85		1.946	0.009	0.05	2.269	0.042	0.19
Y4F53L		1.767	-0.170	-0.91	2.049	-0.177	-0.79

		Summary Statistics	
	Sample SR39		Sample SR40
Grand Means	1.9371 kN/m		2.2268 kN/m
SD Btwn Labs	0.1881 kN/m		0.2238 kN/m
Statistics based on 19 of 19 reporting participants			

**Notes for Analysis 320**

No Data Flags assigned for this analysis.

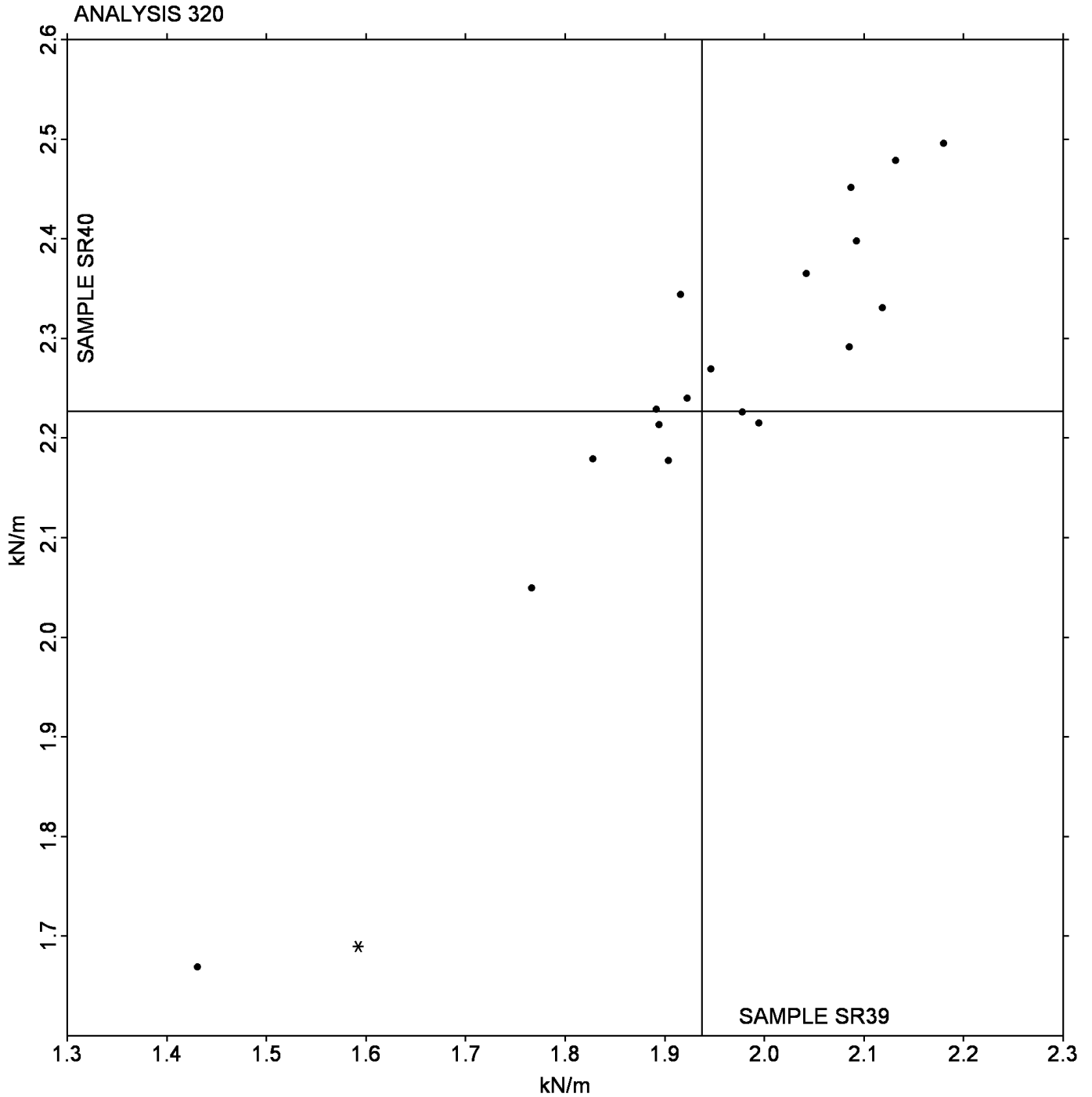
**Analysis Notes:**

8DAB69 - Data appear to be off by a factor of 10; data converted by CTS (/10).

TAPPI-CTS Interlaboratory Testing Program  
Analysis 320  
Tensile Breaking Strength - Newsprint

Grand Mean Sample **SR39** = 1.9371 kN/m

Grand Mean Sample **SR40** = 2.2268 kN/m



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

TAPPI-CTS Interlaboratory Testing Program

Analysis 321

Tensile Energy Absorption - Newsprint

WebCode	Data Flag	Sample SR39			Sample SR40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
33PG3D		11.43	0.68	0.59	12.89	-0.38	-0.25
3XQUR6		8.64	-2.11	-1.82	10.79	-2.48	-1.67
4JKWAX		10.45	-0.30	-0.26	13.10	-0.17	-0.11
9ZYBNW		9.50	-1.25	-1.08	10.74	-2.53	-1.70
BD5YGG		10.18	-0.57	-0.50	12.13	-1.14	-0.76
FTP6L5		12.32	1.56	1.35	13.14	-0.13	-0.09
FXH95X		10.30	-0.46	-0.39	14.32	1.05	0.71
JCVFJ7		11.86	1.11	0.96	15.03	1.76	1.18
KDNYEY		9.16	-1.59	-1.38	11.61	-1.66	-1.11
KN77FF		11.46	0.70	0.61	12.16	-1.10	-0.74
V6VB3H		12.40	1.64	1.42	15.19	1.92	1.29
WC26RX		12.16	1.41	1.22	15.42	2.15	1.45
Z5L4MS		9.90	-0.85	-0.74	13.33	0.06	0.04
Z996FL		9.95	-0.80	-0.70	13.21	-0.06	-0.04
ZK4MRT		11.93	1.17	1.02	15.05	1.78	1.20
ZNBSQ1		10.75	0.00	0.00	14.53	1.26	0.85
ZP8SWK		10.41	-0.34	-0.29	12.91	-0.36	-0.24

Summary Statistics		
	Sample SR39	Sample SR40
Grand Means	10.752 Joules/sq m	13.268 Joules/sq m
SD Btwn Labs	1.155 Joules/sq m	1.488 Joules/sq m
Statistics based on 17 of 17 reporting participants		

**Notes for Analysis 321**

No Data Flags assigned for this analysis.

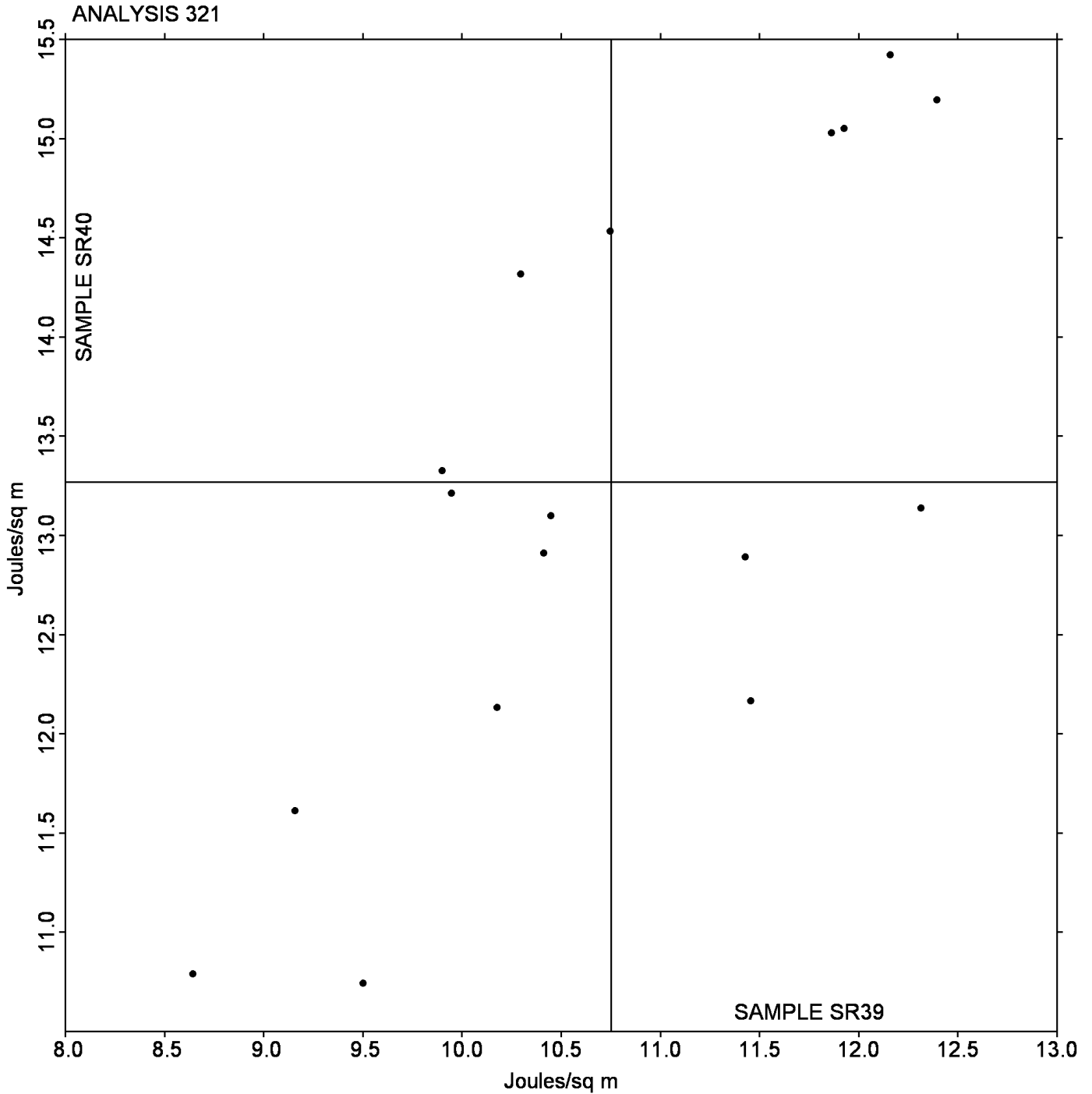
**Analysis Notes:**

3XQUR6 - Data appear to be reported as J/sq m, not ft-lb/sq ft as indicated on datasheet. Units changed by CTS.

TAPPI-CTS Interlaboratory Testing Program  
Analysis 321  
Tensile Energy Absorption - Newsprint

Grand Mean Sample **SR39** = 10.752 Joules/sq m

Grand Mean Sample **SR40** = 13.268 Joules/sq m



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

TAPPI-CTS Interlaboratory Testing Program

Analysis 322

Elongation to Break - Newsprint

WebCode	Data Flag	Sample SR39			Sample SR40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
16YR7R		0.9730	0.0215	0.30	1.085	0.068	0.84
24XZYH		1.0070	0.0555	0.76	1.103	0.086	1.06
3HYABP		0.8760	-0.0755	-1.04	0.994	-0.023	-0.29
7BSX39		0.9120	-0.0395	-0.54	0.936	-0.081	-1.00
7Y8CNK		0.9160	-0.0355	-0.49	0.939	-0.078	-0.96
9SGJ1Y		0.9620	0.0105	0.14	1.028	0.011	0.13
9W4DNJ		1.0770	0.1255	1.73	1.150	0.133	1.64
EKVFK5		0.9290	-0.0225	-0.31	1.050	0.033	0.41
FR6RH4		1.0950	0.1435	1.97	1.083	0.066	0.81
K3M1EK		1.0130	0.0615	0.85	1.095	0.078	0.96
KU2FBT		0.8860	-0.0655	-0.90	0.960	-0.057	-0.70
NMREEU		0.8855	-0.0660	-0.91	0.968	-0.049	-0.60
S77XC8		0.8760	-0.0755	-1.04	0.943	-0.074	-0.91
SX2SEM		0.9803	0.0288	0.40	1.135	0.118	1.45
TLUMFC		1.0190	0.0675	0.93	1.013	-0.004	-0.05
URWVR5		0.9240	-0.0275	-0.38	0.899	-0.118	-1.46
W9A63N		0.8449	-0.1066	-1.47	0.910	-0.108	-1.33

		Summary Statistics	
	Sample SR39		Sample SR40
Grand Means	0.95152 Percent		1.0171 Percent
SD Btwn Labs	0.07274 Percent		0.0810 Percent
Statistics based on 17 of 17 reporting participants			

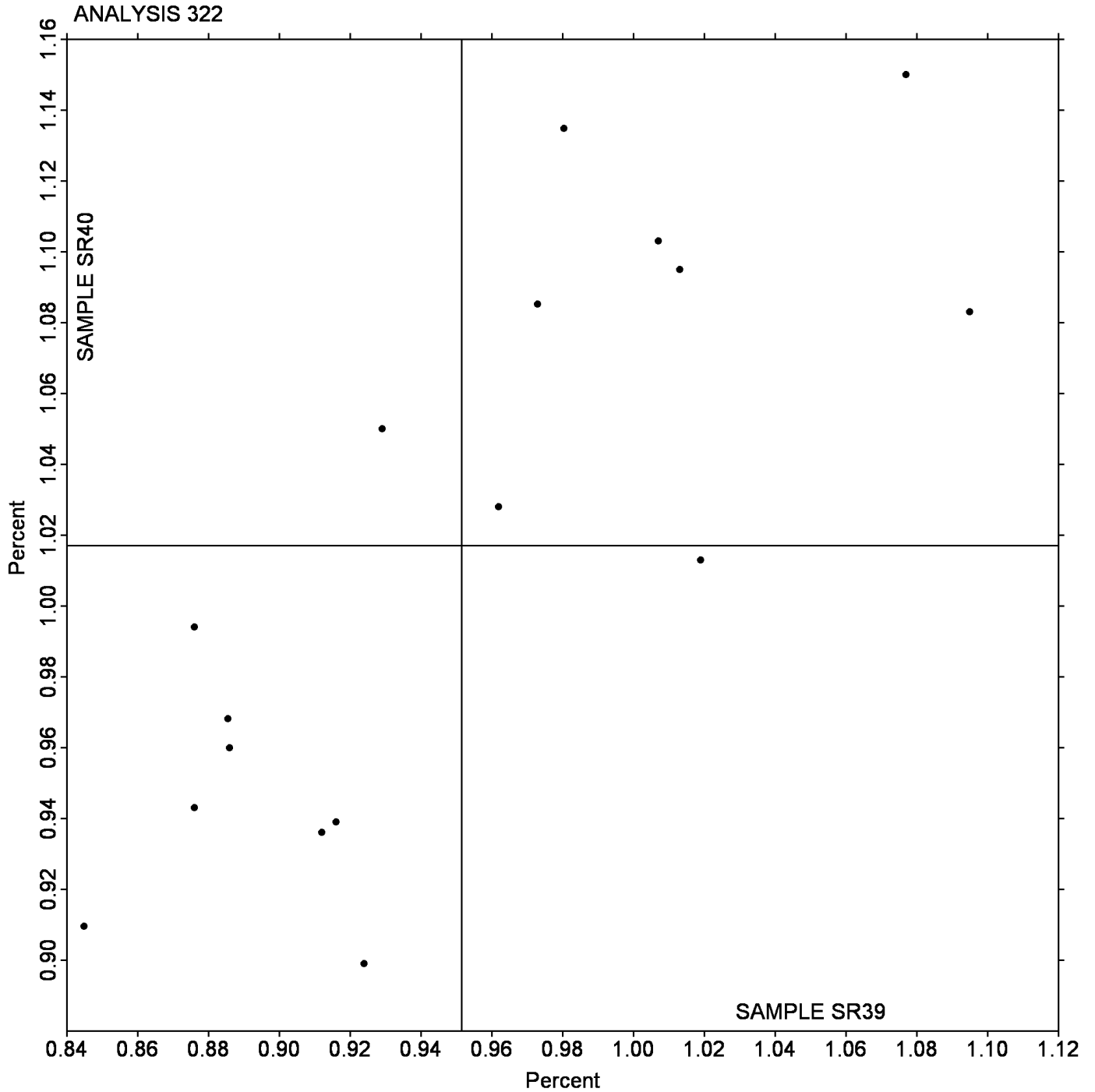
**Notes for Analysis 322**

No Data Flags assigned for this analysis.

**Elongation to Break - Newsprint**

Grand Mean Sample **SR39** = 0.95152 Percent

Grand Mean Sample **SR40** = 1.0171 Percent



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

## TAPPI-CTS Interlaboratory Testing Program

## Analysis 325

## Tensile Breaking Strength - Printing Papers

WebCode	Data Flag	Sample SF39			Sample SF40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
1Z1Z7P	*	5.264	-0.163	-0.42	6.032	0.314	0.89	TO
2EQQ7Q		5.753	0.326	0.85	6.056	0.339	0.96	LH
2HTFFR		6.042	0.615	1.60	6.119	0.401	1.13	LH
2M9NEB		5.643	0.215	0.56	6.113	0.395	1.12	LH
2X6R6Y		5.401	-0.026	-0.07	5.662	-0.056	-0.16	TP
2YQ9VC		4.849	-0.578	-1.50	5.279	-0.439	-1.24	ID
3581QY		5.243	-0.184	-0.48	5.583	-0.134	-0.38	TB
4QQTWJ		5.574	0.147	0.38	5.853	0.135	0.38	LH
5BP1V6		5.846	0.419	1.09	5.893	0.176	0.50	TB
5D88CM	*	6.435	1.008	2.62	6.425	0.707	2.00	LH
5KFU5Q		5.521	0.094	0.24	5.685	-0.032	-0.09	KA
6FXG4V		6.140	0.713	1.85	6.292	0.575	1.62	VM
6KCNAP	*	6.395	0.968	2.51	6.393	0.676	1.91	XX
751NE4		5.144	-0.283	-0.74	5.586	-0.132	-0.37	DL
8JA12U		4.810	-0.617	-1.60	5.040	-0.678	-1.91	XX
9VULE2		5.651	0.224	0.58	6.214	0.496	1.40	TJ
AJGMET		5.648	0.221	0.57	5.911	0.193	0.54	LX
BZRL7W		5.217	-0.210	-0.55	5.394	-0.324	-0.92	TC
C1Z3XE		5.021	-0.406	-1.05	5.374	-0.344	-0.97	LH
CEX9TW		5.156	-0.272	-0.71	5.293	-0.425	-1.20	LH
CM2JEP		5.080	-0.347	-0.90	5.381	-0.337	-0.95	TF
D5M9SU		5.505	0.078	0.20	6.061	0.343	0.97	LH
DWK8WU	X	5.405	-0.022	-0.06	6.260	0.542	1.53	TB
DYSN3Z	X	5.845	0.418	1.08	7.074	1.356	3.83	XX
FLD4TH		5.116	-0.311	-0.81	5.311	-0.406	-1.15	XX
GENPF3		5.250	-0.178	-0.46	5.707	-0.011	-0.03	IM
JDG4G1		5.697	0.270	0.70	5.969	0.251	0.71	LH
K4BJ5K		5.577	0.150	0.39	5.902	0.184	0.52	IX
KHD8W5		5.795	0.368	0.95	6.254	0.536	1.51	TP
KJX6SW		5.370	-0.057	-0.15	5.826	0.108	0.31	LH
L37J5H		5.061	-0.366	-0.95	5.414	-0.304	-0.86	TB
L51UAP		5.201	-0.226	-0.59	5.611	-0.107	-0.30	TX
LMPFV9		4.988	-0.439	-1.14	5.560	-0.157	-0.44	TJ
M4T489		5.716	0.289	0.75	6.244	0.526	1.49	LH
M8F6SK		5.309	-0.119	-0.31	5.511	-0.207	-0.59	IM
MGYXEX		5.145	-0.282	-0.73	5.496	-0.222	-0.63	LH
MQVN6Z		6.094	0.667	1.73	6.317	0.600	1.69	LH
MW5P22		5.639	0.212	0.55	5.762	0.044	0.12	TJ
PBHSP9		5.123	-0.304	-0.79	5.446	-0.272	-0.77	IK
Q5XB54		5.492	0.065	0.17	5.904	0.186	0.53	XX
QDEJ67		5.136	-0.291	-0.76	5.422	-0.296	-0.84	TO
QJ6RPF		5.237	-0.190	-0.49	5.832	0.114	0.32	TA
R1VU3U		5.145	-0.282	-0.73	5.469	-0.249	-0.70	LH

TAPPI-CTS Interlaboratory Testing Program

Analysis 325

Tensile Breaking Strength - Printing Papers

WebCode	Data Flag	Sample SF39			Sample SF40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
SKPT77		4.914	-0.514	-1.33	5.125	-0.593	-1.67	TO
SPWJ7S		5.263	-0.164	-0.43	5.333	-0.385	-1.09	LH
SQGVDR		5.407	-0.020	-0.05	5.663	-0.055	-0.15	LI
UYUTS7		5.458	0.031	0.08	5.575	-0.142	-0.40	TB
VB2W1N		5.160	-0.267	-0.69	5.413	-0.304	-0.86	ID
VN9E6R		5.074	-0.353	-0.92	5.396	-0.321	-0.91	IM
WLW86F		5.043	-0.384	-1.00	5.364	-0.354	-1.00	LH
X67RBB		5.499	0.071	0.19	5.581	-0.136	-0.39	TP
XCW9WS		5.188	-0.239	-0.62	5.635	-0.083	-0.23	LH
XLEZUB		5.270	-0.157	-0.41	5.598	-0.120	-0.34	MR
XPEQ26		6.281	0.853	2.22	6.346	0.628	1.78	LX
XU516P		5.274	-0.154	-0.40	5.249	-0.469	-1.32	XX
Y4L6LC		5.250	-0.178	-0.46	5.513	-0.204	-0.58	XX
Y93SXR		5.672	0.244	0.63	5.926	0.208	0.59	LX
YHJD67		5.445	0.018	0.05	5.790	0.073	0.21	LH
YY7PTA		5.560	0.133	0.34	5.911	0.193	0.54	TO
Z1GV35		6.236	0.809	2.10	6.295	0.577	1.63	TJ
ZBC69R		4.969	-0.458	-1.19	5.251	-0.467	-1.32	SP
ZJBPL7		5.242	-0.185	-0.48	5.501	-0.216	-0.61	LH

Summary Statistics		
	Sample SF39	Sample SF40
Grand Means	5.4272 kN/m	5.7177 kN/m
SD Btwn Labs	0.3851 kN/m	0.3539 kN/m
Statistics based on 60 of 62 reporting participants		

**Comments on assigned Data Flags for Test #325**

DWK8WU (X) - Inconsistent in testing between samples.

DYSN3Z (X) - Inconsistent in testing between samples, data for Sample SF40 are high.

**Analysis Notes:**

6KCNAP - Data appear to be reported as lb/inch, not kN/m as indicated on datasheet. Units changed by CTS.

TAPPI-CTS Interlaboratory Testing Program  
Analysis 325  
**Tensile Breaking Strength - Printing Papers**

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**Instrument Code List**

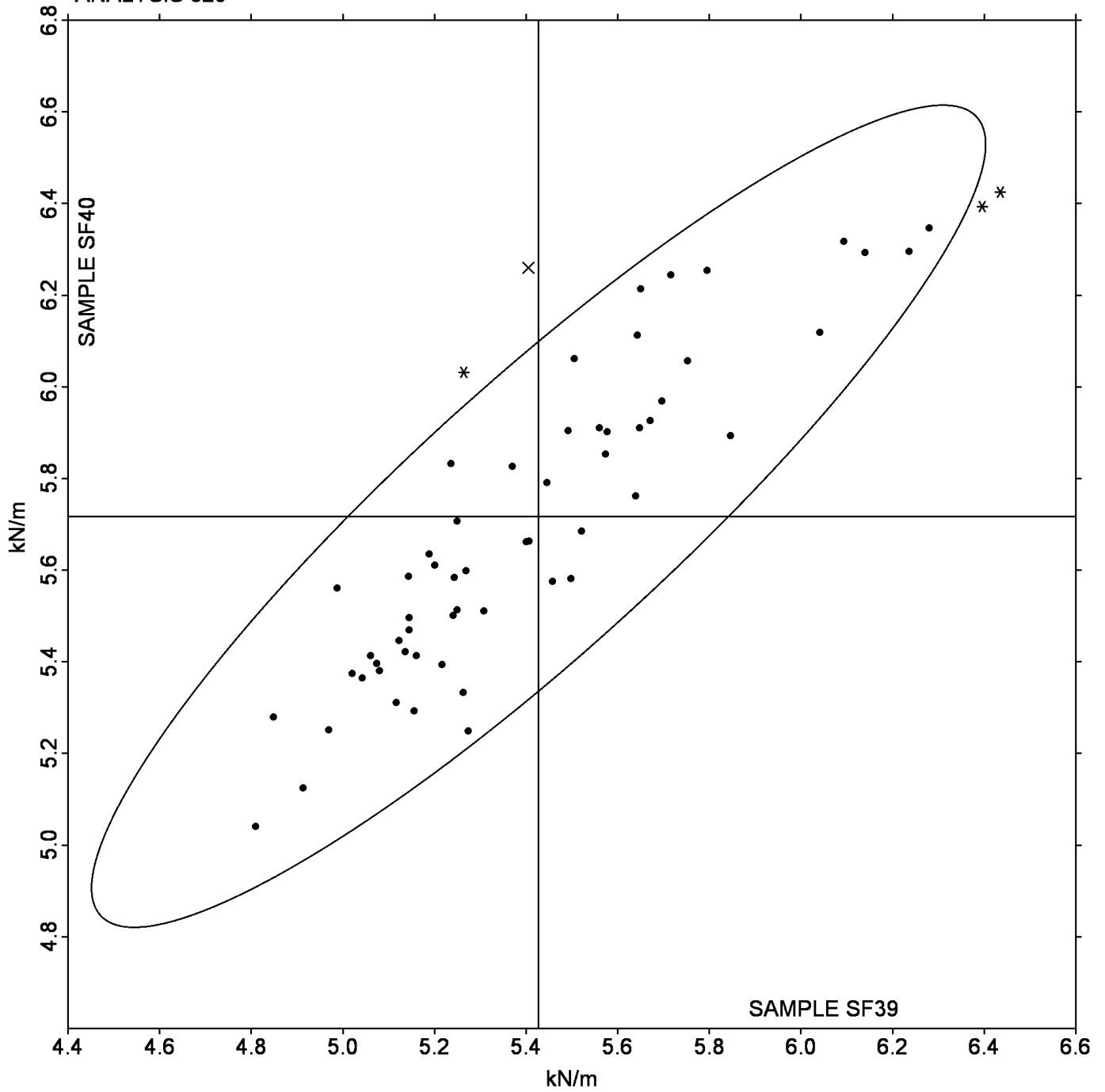
(DL) - EMIC DL500 Universal Testing Machines	(ID) - Instron 4201/4202
(IK) - Instron 4400 Series	(IM) - Instron 5500 Series
(IX) - Instron (model not specified)	(KA) - Zwick Model 1425
(LH) - L & W Alwetron TH1 (Horizontal) SE 060/065F	(LI) - L & W Tensile Tester SE 062
(LX) - L & W (model not specified)	(MR) - MTS Alliance RT series
(SP) - Schopper Type Tensile Tester (TMI)	(TA) - Testometric AX
(TB) - Thwing-Albert EJA/1000	(TC) - Thwing-Albert Electro-Hydraulic, Model 30LT
(TF) - Thwing-Albert EJA Vantage-1	(TJ) - Thwing-Albert QC II-XS
(TO) - Thwing-Albert QC-1000	(TP) - TMI Monitor/Tensile 100 (84-21-01)
(TX) - Thwing-Albert (model not specified)	(VM) - Valmet PaperLab (was Kajaani/Robotest)
(XX) - Instrument make/model not specified by lab	

**Tensile Breaking Strength - Printing Papers**

Grand Mean Sample **SF39** = 5.4272 kN/m

Grand Mean Sample **SF40** = 5.7177 kN/m

ANALYSIS 325



## TAPPI-CTS Interlaboratory Testing Program

## Analysis 327

## Tensile Energy Absorption - Printing Papers

WebCode	Data Flag	Sample SF39			Sample SF40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
1YS7J8		43.08	-1.07	-0.29	82.46	3.46	0.57	MR
2NGZMM		47.96	3.81	1.03	80.54	1.54	0.25	LX
3UQ4LX		48.16	4.00	1.08	72.39	-6.61	-1.08	VM
48P6YY		43.21	-0.95	-0.26	76.57	-2.43	-0.40	XX
5E9GUE		43.01	-1.15	-0.31	75.70	-3.30	-0.54	LI
5V7N5N		45.37	1.22	0.33	74.46	-4.54	-0.74	LH
78SSP2		45.85	1.69	0.46	80.89	1.89	0.31	XX
8ACXJK		48.28	4.13	1.12	87.01	8.01	1.31	LH
8AXXX2		46.22	2.06	0.56	86.57	7.57	1.24	TA
8XT9VD		48.00	3.84	1.04	82.30	3.30	0.54	LH
AMRL1M		48.28	4.12	1.12	87.10	8.10	1.32	IK
AVWDEA		42.89	-1.27	-0.34	78.46	-0.54	-0.09	LH
B4VRCP	X	20.42	-23.74	-6.43	31.27	-47.72	-7.80	TP
BH3FVW		44.45	0.30	0.08	79.58	0.58	0.09	LH
C18C9M		39.94	-4.21	-1.14	77.48	-1.52	-0.25	TO
CJCMSX		41.77	-2.38	-0.65	78.50	-0.50	-0.08	LH
EB7P8Y		36.08	-8.08	-2.19	66.14	-12.86	-2.10	LH
ECYTLR		50.66	6.50	1.76	92.27	13.27	2.17	IM
FFNAQX		39.33	-4.82	-1.31	79.63	0.63	0.10	ID
GD4WF1		45.30	1.14	0.31	81.00	2.00	0.33	LI
H6PMPB		45.43	1.27	0.34	77.23	-1.77	-0.29	KA
HD7V22		43.70	-0.46	-0.12	85.23	6.23	1.02	XX
JV6977		48.14	3.99	1.08	71.55	-7.45	-1.22	LH
JZ24T2	*	52.26	8.10	2.20	75.64	-3.36	-0.55	TF
JZB8YY		41.30	-2.86	-0.77	74.80	-4.20	-0.69	LH
KDZX2F		48.93	4.77	1.29	86.74	7.74	1.27	TB
MFNYKP		46.95	2.79	0.76	83.19	4.19	0.68	DL
QLKTRD		44.90	0.75	0.20	80.44	1.44	0.24	LH
QUVVCD		43.22	-0.94	-0.25	76.00	-3.00	-0.49	LH
QZV2BH		40.46	-3.69	-1.00	83.99	4.99	0.82	LH
RRNFCT		43.77	-0.39	-0.11	81.58	2.58	0.42	IM
RZTRV6		47.87	3.71	1.01	84.79	5.79	0.95	XX
T3VSAC		40.41	-3.75	-1.02	82.72	3.72	0.61	TB
TQ8A2U	X	21.35	-22.80	-6.18	34.26	-44.74	-7.31	TP
TXPGG7		38.09	-6.07	-1.64	65.02	-13.98	-2.29	IM
V3D4SA		43.18	-0.97	-0.26	74.76	-4.23	-0.69	LH
VWA2NA		45.85	1.70	0.46	81.26	2.27	0.37	LH
W13L5L		38.06	-6.10	-1.65	68.30	-10.70	-1.75	ID
WC23CE		39.16	-5.00	-1.35	79.19	0.19	0.03	LH
X56XBH		42.82	-1.34	-0.36	77.22	-1.78	-0.29	LH
YK4FQN		43.21	-0.95	-0.26	66.65	-12.35	-2.02	LH
YQFAP4		40.70	-3.45	-0.94	84.61	5.61	0.92	IM

TAPPI-CTS Interlaboratory Testing Program  
Analysis 327  
**Tensile Energy Absorption - Printing Papers**

	Sample SF39	Summary Statistics	Sample SF40
Grand Means	44.156 Joules/sq m		78.998 Joules/sq m
SD Btwn Labs	3.690 Joules/sq m		6.119 Joules/sq m
Statistics based on 40 of 42 reporting participants			

**Comments on assigned Data Flags for Test #327**

B4VRCP (X) - Extreme data.

TQ8A2U (X) - Extreme data.

**Analysis Notes:**

QZV2BH - Data appear to be off by a factor of 10; data converted by CTS (/10).

RZTRV6 - Data appear to be reported as ft-lb/sq ft, not inch-lb/sq in as indicated on datasheet. Units changed by CTS.

### Instrument Code List

(DL) - EMIC DL500 Universal Testing Machines	(ID) - Instron 4201
(IK) - Instron 4400 Series	(IM) - Instron 5500 Series
(KA) - Zwick Model 1425	(LH) - L & W Alwetron TH1 (Horizontal) SE 060
(LI) - L & W Tensile Tester SE 062	(LX) - L & W (model not specified)
(MR) - MTS Alliance RT series	(TA) - Thwing-Albert
(TB) - Thwing-Albert EJA/1000	(TF) - Thwing-Albert EJA Vantage-1
(TO) - Thwing-Albert QC-1000	(TP) - TMI Monitor/Tensile 100 (84-21-01)
(VM) - Valmet PaperLab (was Kajaani/Robotest)	(XX) - Instrument make/model not specified by lab



## TAPPI-CTS Interlaboratory Testing Program

## Analysis 328

## Elongation to Break - Printing Papers

WebCode	Data Flag	Sample SF39			Sample SF40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
1BTGSW		1.667	0.306	1.93	2.602	0.452	2.09	XX
1GZ8U2		1.547	0.186	1.17	2.241	0.091	0.42	TJ
21V51N		1.350	-0.011	-0.07	2.100	-0.050	-0.23	TF
3EBWKT	X	1.984	0.623	3.93	2.875	0.725	3.36	XX
3X8K55		1.341	-0.020	-0.13	2.229	0.079	0.37	LH
776BWE	X	2.785	1.424	8.99	4.507	2.357	10.91	TP
7GSMXU		1.413	0.052	0.33	2.278	0.128	0.59	XX
7W7HL3		1.627	0.266	1.68	2.415	0.265	1.23	DL
82F2MU		1.288	-0.074	-0.47	2.299	0.149	0.69	TB
85VXJ6		1.232	-0.129	-0.82	1.967	-0.183	-0.85	LH
95TG9D		1.345	-0.016	-0.10	2.054	-0.096	-0.44	LX
9RTEWC	X	2.512	1.151	7.27	2.127	-0.023	-0.11	LH
A8XBSU		1.338	-0.023	-0.15	2.104	-0.046	-0.21	LH
AKB4MV		1.296	-0.065	-0.41	2.025	-0.125	-0.58	LH
BFU8PX		1.230	-0.131	-0.83	2.174	0.024	0.11	LH
BNYHAQ		1.346	-0.015	-0.10	2.154	0.004	0.02	LH
C3PB5V		1.434	0.073	0.46	2.233	0.083	0.38	XX
CQEXTB		1.500	0.139	0.88	2.354	0.204	0.94	TO
DCH5SD		1.216	-0.145	-0.92	1.840	-0.310	-1.44	LH
DNKPSL	X	2.389	1.028	6.49	4.348	2.198	10.18	TP
EAG99P		1.430	0.069	0.43	1.970	-0.180	-0.83	VM
EC4MNR	X	33.684	32.323	204.13	54.452	52.302	242.15	TB
EUT21H		1.584	0.223	1.41	2.510	0.359	1.66	IK
F4V43M		1.262	-0.099	-0.63	2.078	-0.072	-0.33	LH
F69RMZ		1.270	-0.091	-0.58	2.080	-0.070	-0.32	LI
FCNEE3		1.514	0.153	0.96	2.472	0.322	1.49	TO
FX3B8J		1.488	0.126	0.80	2.377	0.227	1.05	TB
G9TZT4		1.349	-0.012	-0.08	2.082	-0.068	-0.32	LH
H1HTW2		1.390	0.029	0.18	2.210	0.060	0.28	IM
HH5CFG		1.270	-0.091	-0.58	1.860	-0.290	-1.34	IM
KTUYLN		1.296	-0.065	-0.41	2.160	0.010	0.05	LH
MIL1YJ		1.547	0.185	1.17	2.527	0.377	1.75	IM
MSVYRM		1.395	0.034	0.21	2.281	0.131	0.61	TX
PGHY5J		1.520	0.159	1.00	2.280	0.130	0.60	XX
PPQZTD		1.310	-0.051	-0.32	2.058	-0.092	-0.43	LH
Q75RBA		1.500	0.139	0.88	2.270	0.120	0.56	TF
S91J7K		1.310	-0.052	-0.33	2.254	0.104	0.48	ID
SJPCL2		1.328	-0.033	-0.21	2.042	-0.108	-0.50	KA
T3V9DW	X	1.545	0.184	1.16	1.711	-0.439	-2.03	LH
T5LSMG		1.512	0.151	0.95	2.236	0.086	0.40	TB
TBLTMR		1.132	-0.229	-1.45	1.879	-0.271	-1.26	XX
UCZS2E		1.178	-0.183	-1.16	1.905	-0.245	-1.14	ID
UZ8DKG	X	1.640	0.279	1.76	1.660	-0.490	-2.27	XX

TAPPI-CTS Interlaboratory Testing Program

Analysis 328

Elongation to Break - Printing Papers

WebCode	Data Flag	Sample SF39			Sample SF40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
WQQ6KL		1.180	-0.181	-1.14	1.880	-0.270	-1.25	LH
XFZ5NN	*	1.714	0.352	2.22	2.347	0.197	0.91	TB
YQH2TT		1.323	-0.038	-0.24	2.148	-0.002	-0.01	LH
Z2XDL8		1.333	-0.028	-0.18	2.230	0.080	0.37	MR
Z6J2H7	*	0.949	-0.412	-2.60	1.678	-0.472	-2.19	LH
ZD7NRK		1.225	-0.136	-0.86	1.917	-0.233	-1.08	LH
ZSR9AD		1.057	-0.304	-1.92	1.654	-0.496	-2.30	LH

Summary Statistics			
	Sample SF39		Sample SF40
Grand Means	1.3613	Percent	2.1501
SD Btwn Labs	0.1583	Percent	0.2160
Statistics based on 43 of 50 reporting participants			

**Comments on assigned Data Flags for Test #328**

3EBWKT (X) - Systematic error (data for both samples are high).

776BWE (X) - Extreme data.

9RTEWC (X) - Extreme data for Sample SF39.

DNKPSL (X) - Extreme data.

EC4MNR (X) - Extreme data.

T3V9DW (X) - Inconsistent in testing between samples.

UZ8DKG (X) - Inconsistent in testing between samples.

**Instrument Code List**

- (DL) - EMIC DL500 Universal Testing Machines
- (ID) - Instron 4201
- (IK) - Instron 4400 Series
- (IM) - Instron 5500
- (KA) - Zwick Model 1425
- (LH) - L & W Alwetron TH1 (Horizontal) SE 060
- (LI) - L & W Tensile Tester SE 062
- (LX) - L & W (model not specified)
- (MR) - MTS Alliance RT series
- (TB) - Thwing-Albert EJA/1000
- (TF) - Thwing-Albert EJA Vantage-1
- (TJ) - Thwing-Albert QC II-XS
- (TO) - Thwing-Albert QC-1000
- (TP) - TMI Monitor/Tensile 100 (84-21-01)
- (TX) - Thwing-Albert (model not specified)
- (VM) - Valmet PaperLab (was Kajaani/Robotest)
- (XX) - Instrument make/model not specified by lab



TAPPI-CTS Interlaboratory Testing Program  
Analysis 330

**Tensile Breaking Strength - Packaging Papers**

WebCode	Data Flag	Sample SE39			Sample SE40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
199M2A	X	13.28	0.17	0.20	7.998	0.217	0.37	TO
1XXPFL		13.04	-0.06	-0.07	7.708	-0.074	-0.13	LW
2KQQXL		12.77	-0.33	-0.38	7.415	-0.366	-0.62	XX
3BASRL		14.04	0.94	1.08	8.397	0.616	1.05	TP
3M6FQP		14.04	0.94	1.08	8.490	0.709	1.20	TA
47F6QA		14.46	1.36	1.57	8.610	0.829	1.41	IA
4S4EER		13.33	0.23	0.26	7.805	0.024	0.04	IK
56E2P2		11.88	-1.23	-1.41	7.109	-0.673	-1.14	IX
5DV7GS		11.50	-1.60	-1.85	6.498	-1.283	-2.18	SA
5PZ6NM		13.36	0.26	0.30	8.038	0.257	0.44	LH
62VJVV		12.83	-0.28	-0.32	7.606	-0.176	-0.30	TE
A6D399		11.97	-1.13	-1.31	7.381	-0.400	-0.68	ZU
DXHQRH		12.36	-0.74	-0.85	6.877	-0.904	-1.54	IF
F7AHXE	X	11.20	-1.91	-2.20	8.420	0.638	1.08	TP
FZXX4V		13.16	0.06	0.07	7.855	0.073	0.12	LH
G8P3QP	*	12.39	-0.71	-0.82	8.012	0.231	0.39	TK
GLQYMW		13.18	0.08	0.09	7.671	-0.111	-0.19	TO
GSZCX9		14.01	0.91	1.05	8.141	0.359	0.61	TB
K3Z7HT		14.45	1.35	1.55	8.446	0.665	1.13	TO
M6WMZV	X	13.96	0.86	0.99	9.984	2.203	3.74	ID
MPED67		12.27	-0.84	-0.97	6.928	-0.854	-1.45	IA
MY7RLY		12.05	-1.05	-1.21	7.001	-0.780	-1.32	XX
NK6DVE		13.67	0.56	0.65	8.187	0.405	0.69	LH
PQKQX7		12.73	-0.38	-0.43	7.537	-0.245	-0.42	SB
S3ETLP		12.90	-0.20	-0.23	7.688	-0.093	-0.16	TB
S5P6FQ		12.37	-0.74	-0.85	7.136	-0.645	-1.10	IM
UFWTF1		13.13	0.03	0.03	7.662	-0.119	-0.20	XX
UM42AP		12.40	-0.70	-0.81	7.741	-0.041	-0.07	SP
VANLRX		13.03	-0.07	-0.08	7.708	-0.073	-0.12	ID
VG4VWC		13.64	0.54	0.62	8.335	0.553	0.94	TK
WPL6WS		13.57	0.47	0.54	7.934	0.152	0.26	IM
XJEDYF		12.89	-0.22	-0.25	7.431	-0.351	-0.60	IN
YR1TB4		14.12	1.01	1.17	8.354	0.572	0.97	TO
YS12TF		13.33	0.22	0.26	7.977	0.196	0.33	LH
YS4QFZ		12.17	-0.94	-1.08	7.677	-0.104	-0.18	TB
Z9L6YL	*	15.39	2.29	2.64	9.434	1.653	2.81	TO

**Summary Statistics**

**Sample SE39**

**Sample SE40**

Grand Means

13.104 kN/m

7.7814 kN/m

SD Btwn Labs

0.867 kN/m

0.5888 kN/m

Statistics based on 33 of 36 reporting participants

TAPPI-CTS Interlaboratory Testing Program  
Analysis 330  
**Tensile Breaking Strength - Packaging Papers**

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**Comments on assigned Data Flags for Test #330**

199M2A (X) - Data appears to be transposed between Analysis 331 (TEA) and Analysis 330 (Tensile Breaking Strength). Data switched by CTS.

F7AHXE (X) - Inconsistent in testing between samples and within the determinations for Sample SE39.

M6WMZV (X) - Inconsistent in testing between samples, data for Sample SE40 are high.

**Instrument Code List**

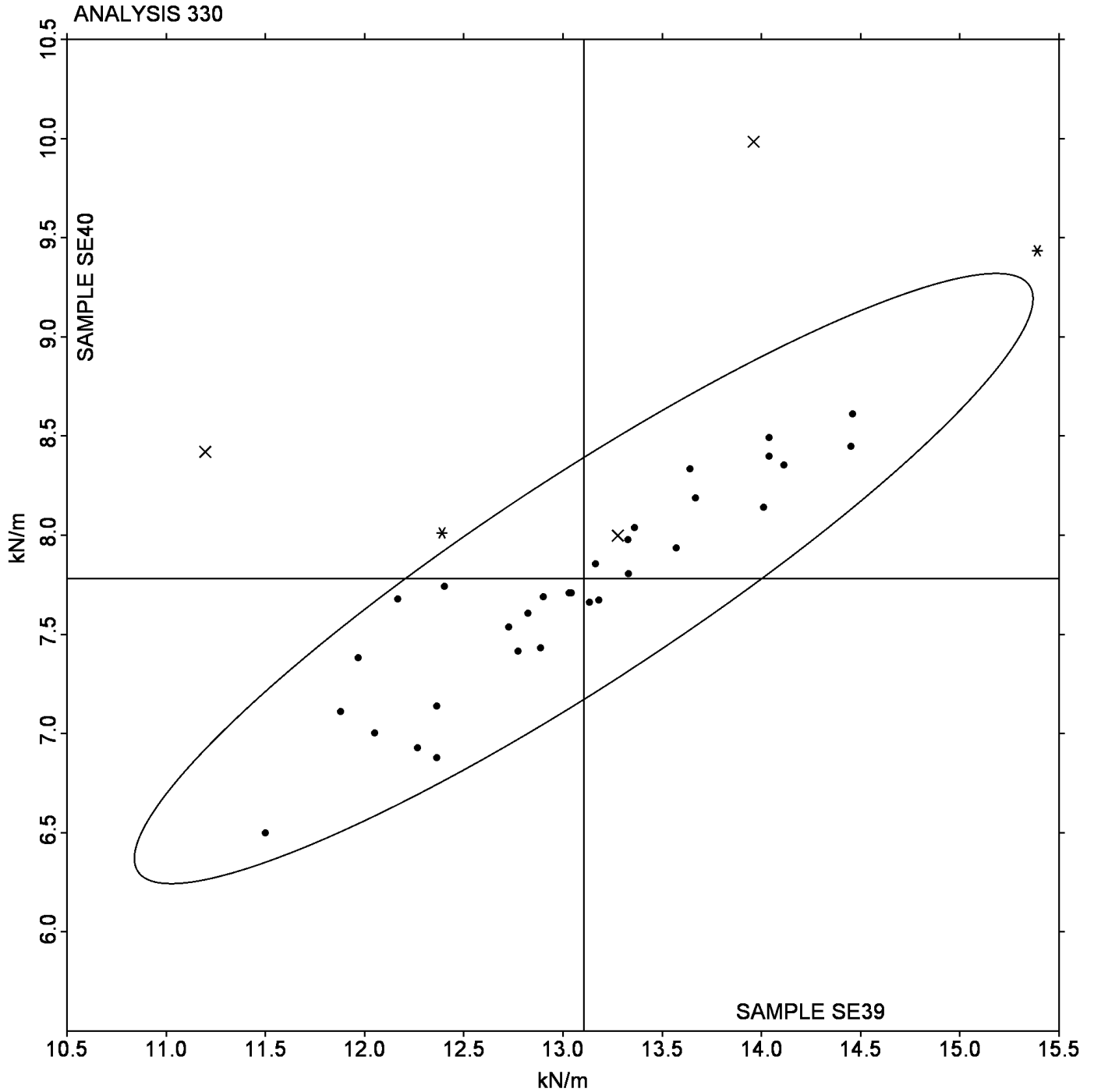
(IA) - Instron 1011	(ID) - Instron 4201
(IF) - Instron 3340 Series	(IK) - Instron 4400 Series
(IM) - Instron 5500 Series	(IN) - Instron 3360 Series
(IX) - Instron (model not specified)	(LH) - L & W Alwetron TH1 (Horizontal) SE 060
(LW) - L & W Tensile Tester SE062	(SA) - Shimadzu Autograph AG 2000 A
(SB) - Shimadzu Autograph DSS 500	(SP) - Schopper Type Tensile Tester (TMI)
(TA) - Thwing-Albert Tensile Tester	(TB) - Thwing-Albert EJA/1000
(TE) - Thwing-Albert Intelect II	(TK) - Thwing-Albert Model 37-4
(TO) - Thwing-Albert QC-1000	(TP) - TMI Monitor/Tensile 100 (84-21-01)
(XX) - Instrument make/model not specified by lab	(ZU) - Zwick Universal Tensile Tester

TAPPI-CTS Interlaboratory Testing Program  
Analysis 330

Tensile Breaking Strength - Packaging Papers

Grand Mean Sample **SE39** = 13.104 kN/m

Grand Mean Sample **SE40** = 7.7814 kN/m



TAPPI-CTS Interlaboratory Testing Program  
Analysis 331

Tensile Energy Absorption - Packaging Papers

WebCode	Data Flag	Sample SE39			Sample SE40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
1GPXCF		185.9	-20.9	-1.05	101.1	-5.2	-0.47	IM
25E11Z		210.0	3.2	0.16	109.6	3.3	0.30	XX
3ALCSB		203.4	-3.5	-0.17	110.5	4.2	0.38	IA
43ENCJ		194.7	-12.2	-0.61	101.8	-4.5	-0.41	XX
5MLSMR		194.0	-12.8	-0.64	106.3	0.0	0.00	LH
75AQ2N		187.0	-19.9	-0.99	100.8	-5.5	-0.50	XX
CJYDN4		203.6	-3.3	-0.16	106.5	0.2	0.02	TB
FF7N6F		184.1	-22.8	-1.14	82.5	-23.8	-2.17	IF
FYFC4D	X	122.5	-84.3	-4.21	88.8	-17.5	-1.59	TP
GZYYZU		204.1	-2.7	-0.13	109.0	2.7	0.24	IN
JVGGQ2		241.2	34.4	1.72	124.9	18.6	1.69	TO
LJTKQG		201.1	-5.8	-0.29	98.1	-8.2	-0.74	TE
MN2TDX		210.3	3.4	0.17	109.0	2.7	0.25	IA
N5WUNT		179.2	-27.6	-1.38	83.1	-23.2	-2.11	SA
Q41F9M	*	253.1	46.2	2.31	118.1	11.8	1.07	TO
SPFQBJ	X	221.8	15.0	0.75	117.0	10.7	0.98	TO
TW7NDC	X	438.7	231.9	11.59	239.1	132.8	12.06	IX
TXM6W3		218.2	11.3	0.57	109.8	3.5	0.32	SB
UX23NT		215.0	8.2	0.41	112.7	6.4	0.58	IM
V8XCSU		238.9	32.1	1.60	123.5	17.2	1.56	TB
XEDL7P		196.4	-10.5	-0.52	100.0	-6.3	-0.57	LW
XTE44V		193.5	-13.3	-0.67	101.8	-4.5	-0.41	LH
ZEMGMD		223.1	16.3	0.81	116.9	10.6	0.96	TO

Summary Statistics		
	Sample SE39	Sample SE40
Grand Means	206.83 Joules/sq m	106.30 Joules/sq m
SD Btwn Labs	20.01 Joules/sq m	11.01 Joules/sq m
Statistics based on 20 of 23 reporting participants		

**Comments on assigned Data Flags for Test #331**

FYFC4D (X) - Inconsistent in testing between samples, data for Sample SE39 are low. Data appear to be reported as ft-lb/sq ft, not in-lb/sq in as indicated on datasheet. Units changed by CTS.

SPFQBJ (X) - Data appears to be transposed between Analysis 330 (Tensile Breaking Strength) and Analysis 331 (TEA) and. Data switched by CTS.

TW7NDC (X) - Extreme data.

**Analysis Notes:**

Q41F9M - Data appear to be reported as ft-lb/sq ft, not in-lb/sq in as indicated on datasheet. Units changed by CTS.

TAPPI-CTS Interlaboratory Testing Program  
Analysis 331**Tensile Energy Absorption - Packaging Papers**

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**Instrument Code List**

(IA) - Instron 1011	(IF) - Instron 3340 Series
(IM) - Instron 5500 Series	(IN) - Instron 3360 Series
(IX) - Instron (model not specified)	(LH) - L & W Alwetron TH1 (Horizontal) SE 060
(LW) - L & W Tensile Tester SE062	(SA) - Shimadzu Autograph AG 2000 A
(SB) - Shimadzu Autograph DSS 500	(TB) - Thwing-Albert EJA/1000
(TE) - Thwing-Albert Intellect II	(TO) - Thwing-Albert QC-1000
(TP) - TMI Monitor/Tensile 100 (84-21-01)	(XX) - Instrument make/model not specified by lab

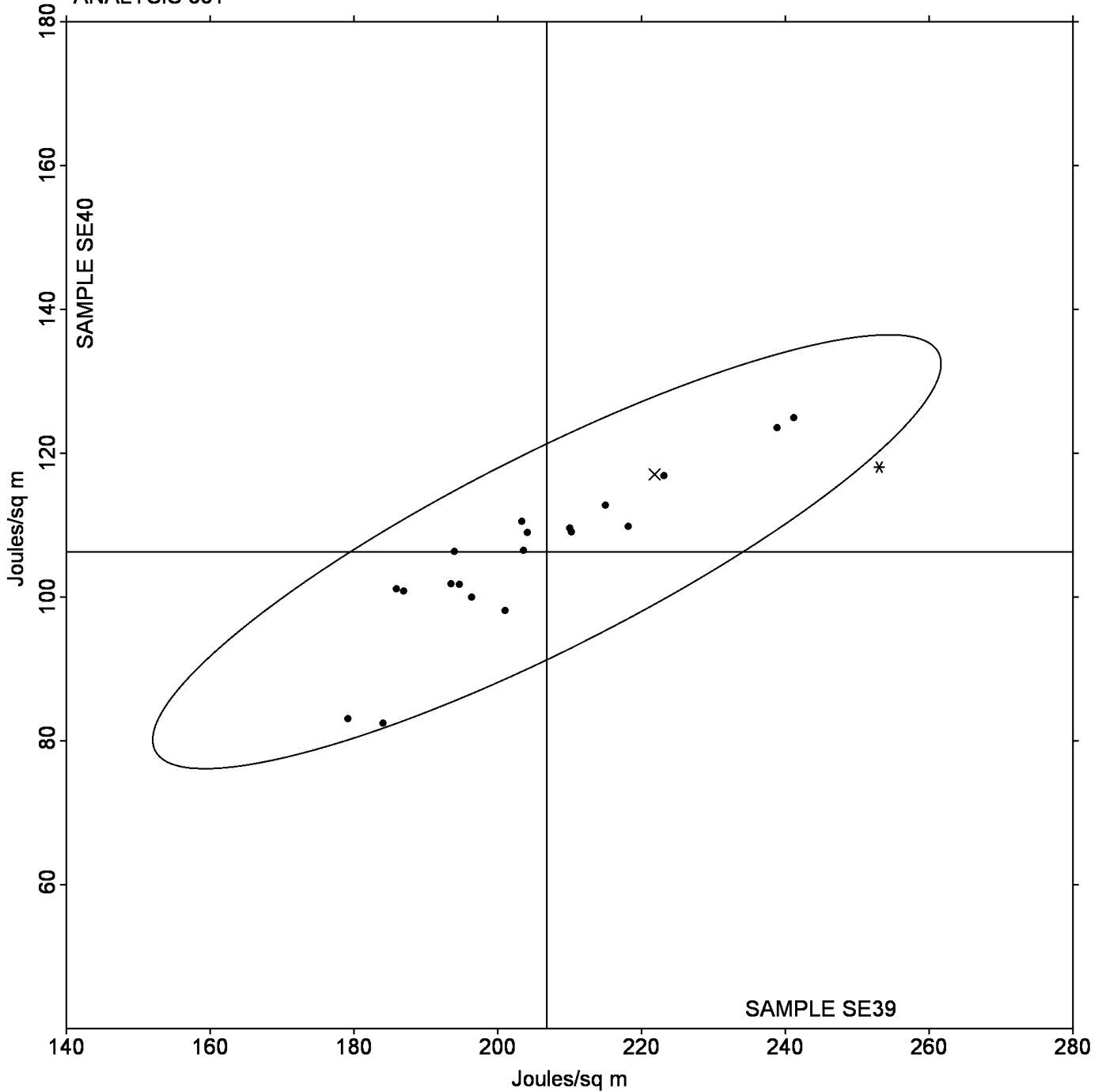
TAPPI-CTS Interlaboratory Testing Program  
Analysis 331

Tensile Energy Absorption - Packaging Papers

Grand Mean Sample **SE39** = 206.83 Joules/sq m

Grand Mean Sample **SE40** = 106.30 Joules/sq m

ANALYSIS 331



TAPPI-CTS Interlaboratory Testing Program

Analysis 332

Elongation to Break - Packaging Papers

WebCode	Data Flag	Sample SE39			Sample SE40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2AMWTT		2.583	0.103	0.47	2.044	-0.023	-0.14	SB
2BVK4K		2.374	-0.106	-0.48	2.028	-0.040	-0.24	XX
2ZN4JG		2.600	0.119	0.54	2.200	0.132	0.80	IA
4XKWV1	X	6.028	3.547	16.14	5.111	3.043	18.34	IX
5FMCYJ		2.764	0.284	1.29	2.334	0.266	1.61	TB
71FW4M		2.269	-0.211	-0.96	1.967	-0.101	-0.61	XX
7Z2JCJ		2.603	0.123	0.56	2.141	0.073	0.44	XX
9VT SMB		2.341	-0.139	-0.63	2.081	0.013	0.08	XX
AHC5XH		2.206	-0.274	-1.25	1.815	-0.253	-1.52	LH
AMQHNR		2.360	-0.120	-0.55	1.970	-0.098	-0.59	XX
B2ZBNK		2.405	-0.076	-0.35	1.806	-0.262	-1.58	IF
C3BBDC		2.396	-0.084	-0.38	1.948	-0.120	-0.72	LH
CY2X2T		2.633	0.153	0.69	2.135	0.067	0.41	TO
FJ7KHV	*	3.170	0.690	3.14	2.470	0.402	2.43	TO
FWBKCZ		2.443	-0.037	-0.17	2.034	-0.034	-0.20	TB
HVBZKX		2.636	0.156	0.71	2.134	0.066	0.40	SA
KDC5PR		2.595	0.115	0.52	2.240	0.172	1.04	IN
KYPJZ5		2.313	-0.167	-0.76	1.884	-0.184	-1.11	LW
LGPF3T		2.575	0.095	0.43	2.149	0.081	0.49	IM
MGUAZQ		2.435	-0.045	-0.21	2.069	0.001	0.01	TO
N7KYZ7		2.647	0.167	0.76	2.202	0.134	0.81	TO
R327RN		2.350	-0.130	-0.59	1.976	-0.092	-0.55	IA
SU62F1	X	0.247	-2.233	-10.16	0.160	-1.907	-11.50	TP
VD7J7L		2.597	0.117	0.53	2.305	0.237	1.43	IM
VDMLQN	X	2.889	0.409	1.86	3.333	1.266	7.63	ZU
WLWR4W		2.198	-0.282	-1.28	1.907	-0.161	-0.97	XX
XC6T74		2.415	-0.065	-0.30	1.867	-0.201	-1.21	TE
ZEXTWX		2.103	-0.377	-1.72	1.983	-0.085	-0.51	TB

Sample SE39		Summary Statistics	Sample SE40	
Grand Means	2.4804 Percent		2.0675	Percent
SD Btw Labs	0.2198 Percent		0.1659	Percent
Statistics based on 25 of 28 reporting participants				

**Comments on assigned Data Flags for Test #332**

4XKWV1 (X) - Extreme data.

SU62F1 (X) - Extreme data.

VDMLQN (X) - Extreme data for Sample SE40.

**Elongation to Break - Packaging Papers**

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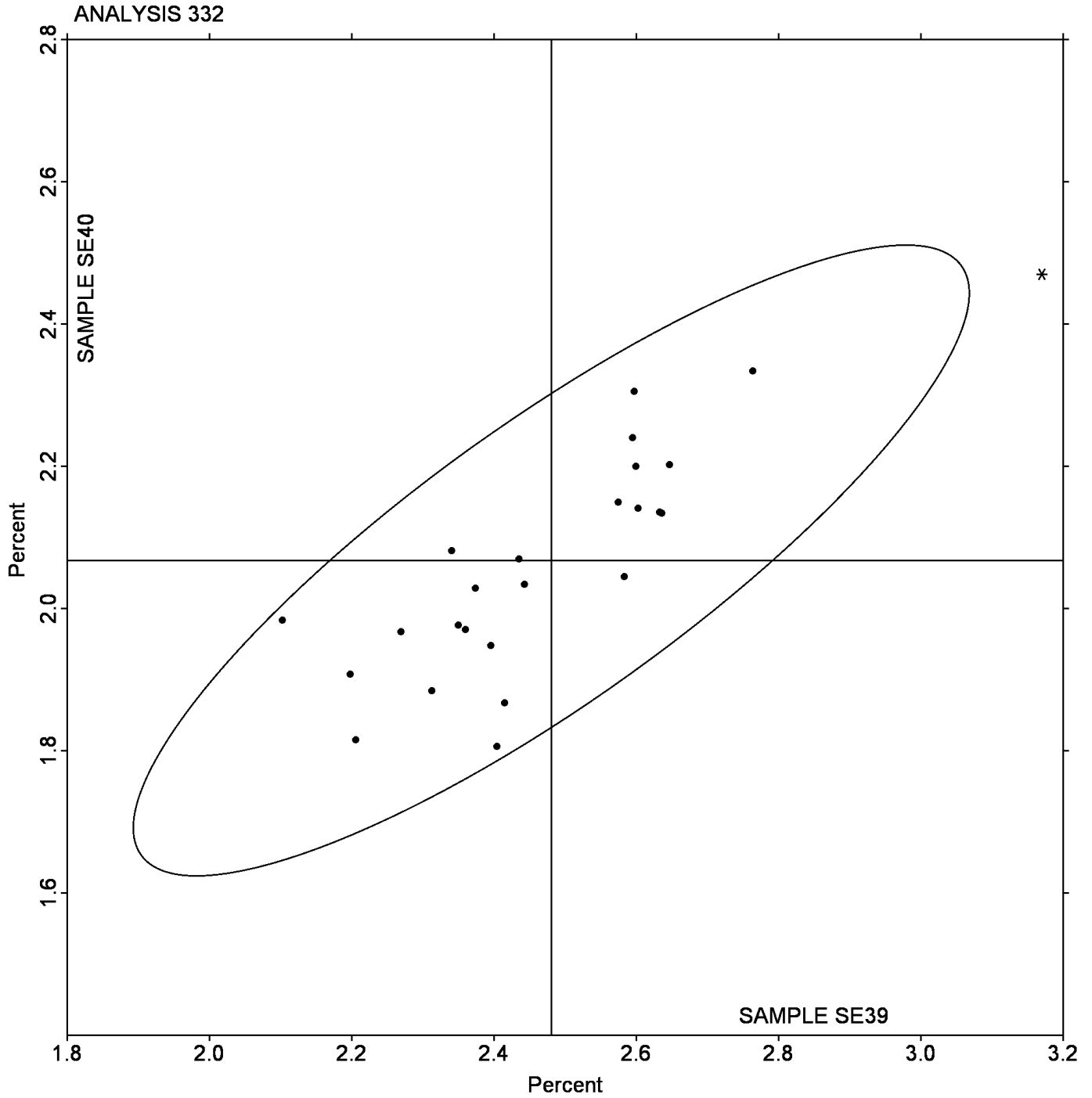
**Instrument Code List**

(IA) - Instron 1011	(IF) - Instron 3340 Series
(IM) - Instron 5500 Series	(IN) - Instron 3360 Series
(IX) - Instron (model not specified)	(LH) - L & W Alwetron TH1 (Horizontal) SE 060
(LW) - L & W Tensile Tester SE062	(SA) - Shimadzu Autograph AG 2000 A
(SB) - Shimadzu Autograph DSS 500	(TB) - Thwing-Albert EJA/1000
(TE) - Thwing-Albert Intelect II	(TO) - Thwing-Albert QC-1000
(TP) - TMI Monitor/Tensile 100 (84-21-01)	(XX) - Instrument make/model not specified by lab
(ZU) - Zwick Universal Tensile Tester	

TAPPI-CTS Interlaboratory Testing Program  
Analysis 332  
Elongation to Break - Packaging Papers

Grand Mean Sample **SE39** = 2.4804 Percent

Grand Mean Sample **SE40** = 2.0675 Percent



TAPPI-CTS Interlaboratory Testing Program

Analysis 334

Folding Endurance (MIT) - Double Folds

WebCode	Data Flag	Sample SG39			Sample SG40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2HJV78		33.20	-16.09	-1.35	36.50	-13.21	-1.11	MT
36WKC2		61.50	12.21	1.03	51.00	1.29	0.11	MT
4V21PG		47.40	-1.89	-0.16	55.60	5.89	0.49	MT
6DQ9J2		40.70	-8.59	-0.72	36.90	-12.81	-1.07	XX
6EW6UE		71.70	22.41	1.89	69.30	19.59	1.64	MT
7SJUGB		33.50	-15.79	-1.33	26.50	-23.21	-1.94	MT
7VFDD3		31.30	-17.99	-1.51	41.50	-8.21	-0.69	MT
8XM2J7		67.10	17.81	1.50	53.80	4.09	0.34	MT
9LMT4M		52.90	3.61	0.30	56.30	6.59	0.55	XX
AXC1H3		60.70	11.41	0.96	68.30	18.59	1.56	MT
B9HDBA		51.20	1.91	0.16	59.50	9.79	0.82	MT
CBG6ES		54.70	5.41	0.46	56.40	6.69	0.56	MT
H9B6Q9		44.70	-4.59	-0.39	50.60	0.89	0.07	MT
HGZ4VH		39.20	-10.09	-0.85	31.80	-17.91	-1.50	MT
LRVC43		50.70	1.41	0.12	46.60	-3.11	-0.26	MT
NNXAS1		42.50	-6.79	-0.57	48.60	-1.11	-0.09	MT
XCK9C5		54.90	5.61	0.47	55.90	6.19	0.52	MT

Summary Statistics			
	Sample SG39		Sample SG40
Grand Means	49.288	Double Folds	49.712
SD Btwn Labs	11.875	Double Folds	11.942
Statistics based on 17 of 17 reporting participants			

**Notes for Analysis 334**

No Data Flags assigned for this analysis.

**Instrument Code List**

(MT) - MIT - Tinius Olsen

(XX) - Instrument make/model not specified by lab

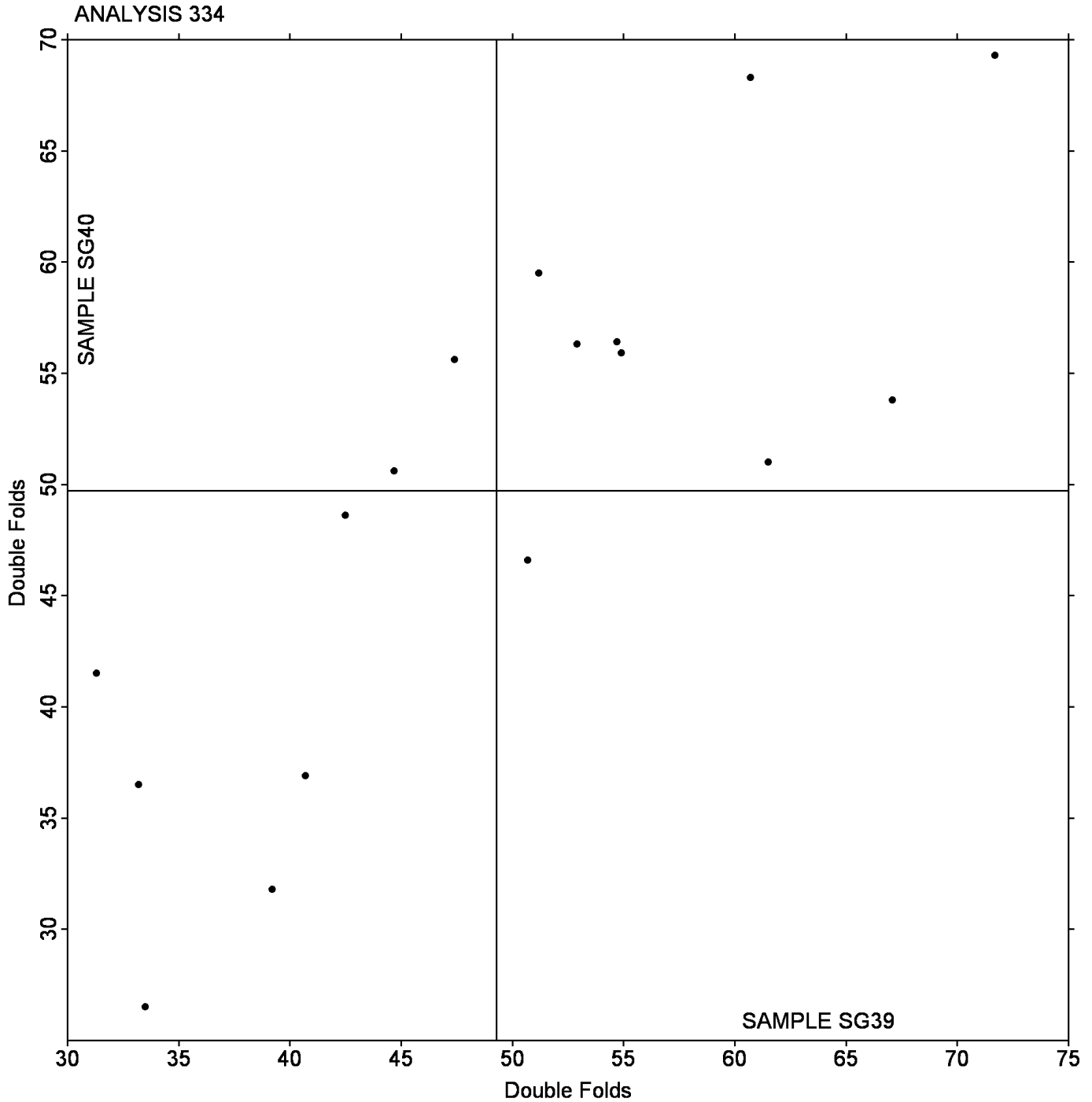
TAPPI-CTS Interlaboratory Testing Program

Analysis 334

Folding Endurance (MIT) - Double Folds

Grand Mean Sample **SG39** = 49.288 Double Folds

Grand Mean Sample **SG40** = 49.712 Double Folds



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

TAPPI-CTS Interlaboratory Testing Program

Analysis 336

Bending Resistance, Gurley Type

WebCode	Data Flag	Sample SH39			Sample SH40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3RKKHH		213.1	4.3	0.26	268.6	2.9	0.13
6E2E3S		206.5	-2.4	-0.14	280.8	15.1	0.67
B5AX2Y		218.3	9.4	0.57	268.5	2.8	0.13
EEUMYV		178.7	-30.2	-1.81	222.7	-43.0	-1.92
EPY71W		189.3	-19.6	-1.18	241.3	-24.4	-1.09
HESTXT		242.1	33.3	2.00	282.7	17.0	0.76
HFYBVP	X	104.6	-104.2	-6.26	309.0	43.3	1.93
HZ8UP1		221.4	12.5	0.75	260.0	-5.7	-0.25
JTJQ59		211.0	2.1	0.13	299.8	34.1	1.52
JXVJEN		230.0	21.1	1.27	315.7	50.0	2.23
KHXS3X		220.8	11.9	0.72	257.1	-8.6	-0.38
M73NHM		190.7	-18.2	-1.09	250.3	-15.4	-0.69
N6TSX8		218.2	9.4	0.56	278.3	12.6	0.56
NVZW2U		218.9	10.0	0.60	264.9	-0.8	-0.03
PG5DPF		185.8	-23.0	-1.39	246.6	-19.0	-0.85
QG3GVG		209.4	0.5	0.03	250.7	-15.0	-0.67
S7E5W9	X	102.7	-106.2	-6.38	136.0	-129.7	-5.78
SCR4K2		234.2	25.4	1.52	294.7	29.0	1.29
SLNVB4		192.5	-16.4	-0.98	243.3	-22.4	-1.00
UPQWQQ		197.4	-11.5	-0.69	255.8	-9.9	-0.44
VE1C34		203.6	-5.3	-0.32	284.5	18.8	0.84
YGBYC8		196.7	-12.2	-0.73	243.0	-22.6	-1.01
ZBAE62		207.6	-1.3	-0.08	270.3	4.6	0.20

		Summary Statistics	
	Sample SH39		Sample SH40
Grand Means	208.86 Gurley Units		265.69 Gurley Units
SD Btwn Labs	16.64 Gurley Units		22.43 Gurley Units
Statistics based on 21 of 23 reporting participants			

**Comments on assigned Data Flags for Test #336**

HFYBVP (X) - Extreme data for Sample SH39.

S7E5W9 (X) - Extreme data.

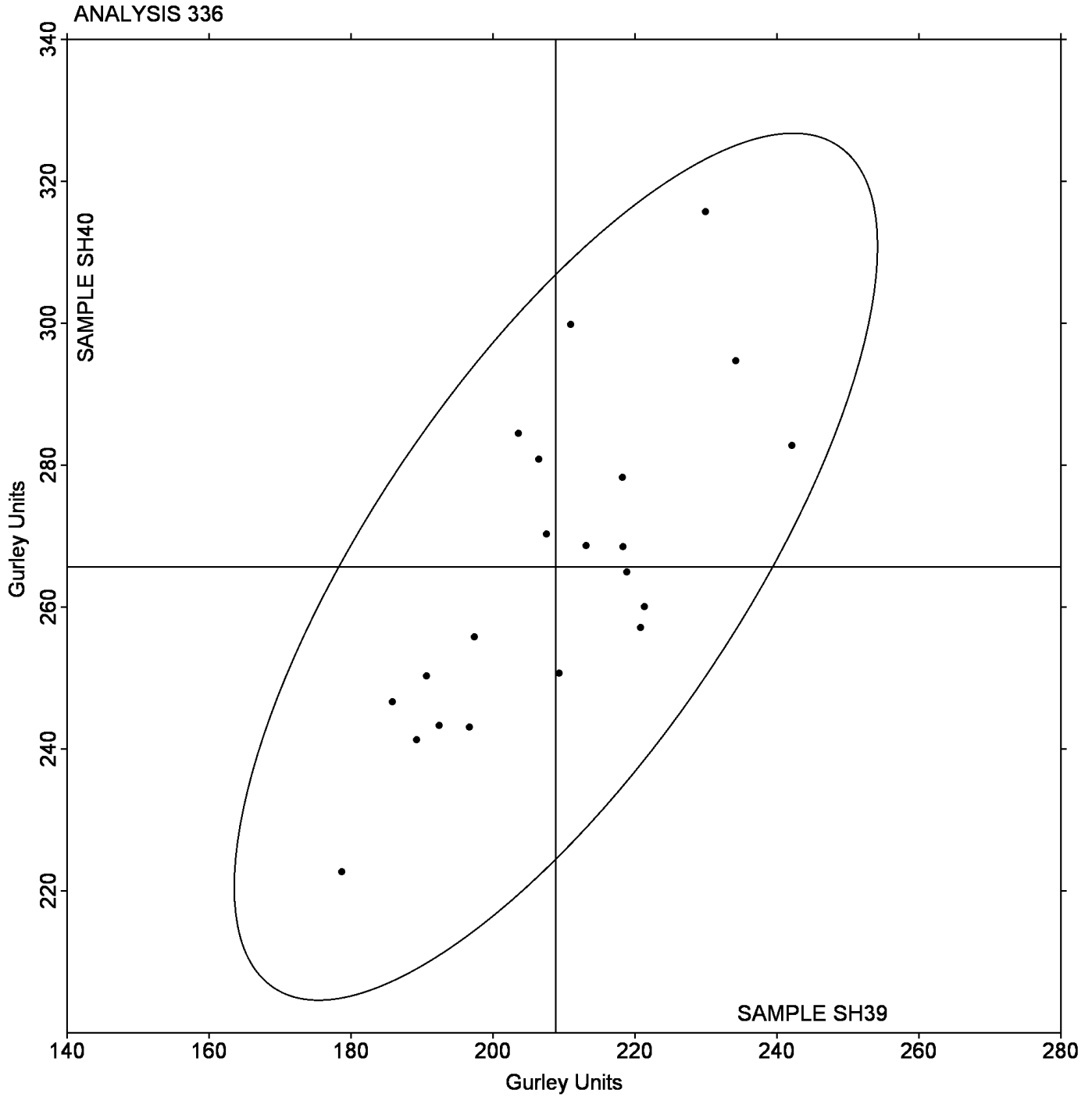
TAPPI-CTS Interlaboratory Testing Program

Analysis 336

Bending Resistance, Gurley Type

Grand Mean Sample SH39 = 208.86 Gurley Units

Grand Mean Sample SH40 = 265.69 Gurley Units



TAPPI-CTS Interlaboratory Testing Program  
Analysis 338

**Bending Resistance, Taber Type - 0 to 10 Units**

WebCode	Data Flag	Sample SJ39			Sample SJ40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2ZXTCL		3.065	-0.079	-0.21	3.537	-0.227	-0.60
5LQCAT		2.903	-0.241	-0.65	3.562	-0.202	-0.53
7BVJU9		3.656	0.512	1.39	4.656	0.892	2.35
AE7SUA		2.834	-0.310	-0.84	3.519	-0.245	-0.65
ES63T7		3.090	-0.054	-0.15	3.185	-0.579	-1.53
FBM6WQ		3.480	0.336	0.91	4.117	0.353	0.93
GRZWDP		3.490	0.346	0.94	4.040	0.276	0.73
HRDPVZ		3.188	0.044	0.12	4.089	0.325	0.86
JJNXBW		3.190	0.046	0.13	3.740	-0.024	-0.06
L16V3K		2.798	-0.346	-0.94	3.500	-0.264	-0.70
NM5LYR		2.410	-0.734	-1.99	2.995	-0.769	-2.03
P36HEU		2.851	-0.293	-0.79	3.648	-0.116	-0.30
QL71B3		3.177	0.033	0.09	3.654	-0.110	-0.29
QP81H2		3.012	-0.132	-0.36	3.474	-0.290	-0.76
TXPYGG	X	14.500	11.356	30.79	19.400	15.636	41.24
UHKH4U		3.554	0.410	1.11	4.056	0.292	0.77
UJULE7	*	4.058	0.914	2.48	4.243	0.479	1.26
VPGWU9		3.029	-0.115	-0.31	3.849	0.085	0.23
WQ33N4		2.768	-0.376	-1.02	3.686	-0.078	-0.21
X8QEE3		3.179	0.035	0.10	3.754	-0.010	-0.03
XQD32C		3.141	-0.003	-0.01	3.969	0.205	0.54

		Summary Statistics	
	Sample SJ39		Sample SJ40
Grand Means	3.1436 Taber Units		3.7636 Taber Units
SD Btwn Labs	0.3688 Taber Units		0.3791 Taber Units
Statistics based on 20 of 21 reporting participants			

**Comments on assigned Data Flags for Test #338**

TXPYGG (X) - Extreme data.

**Analysis Notes:**

2ZXTCL - Data appear to be off by a factor of 10; data converted by CTS (/10).

QP81H2 - Data appear to be off by a factor of 10; data converted by CTS (/10).

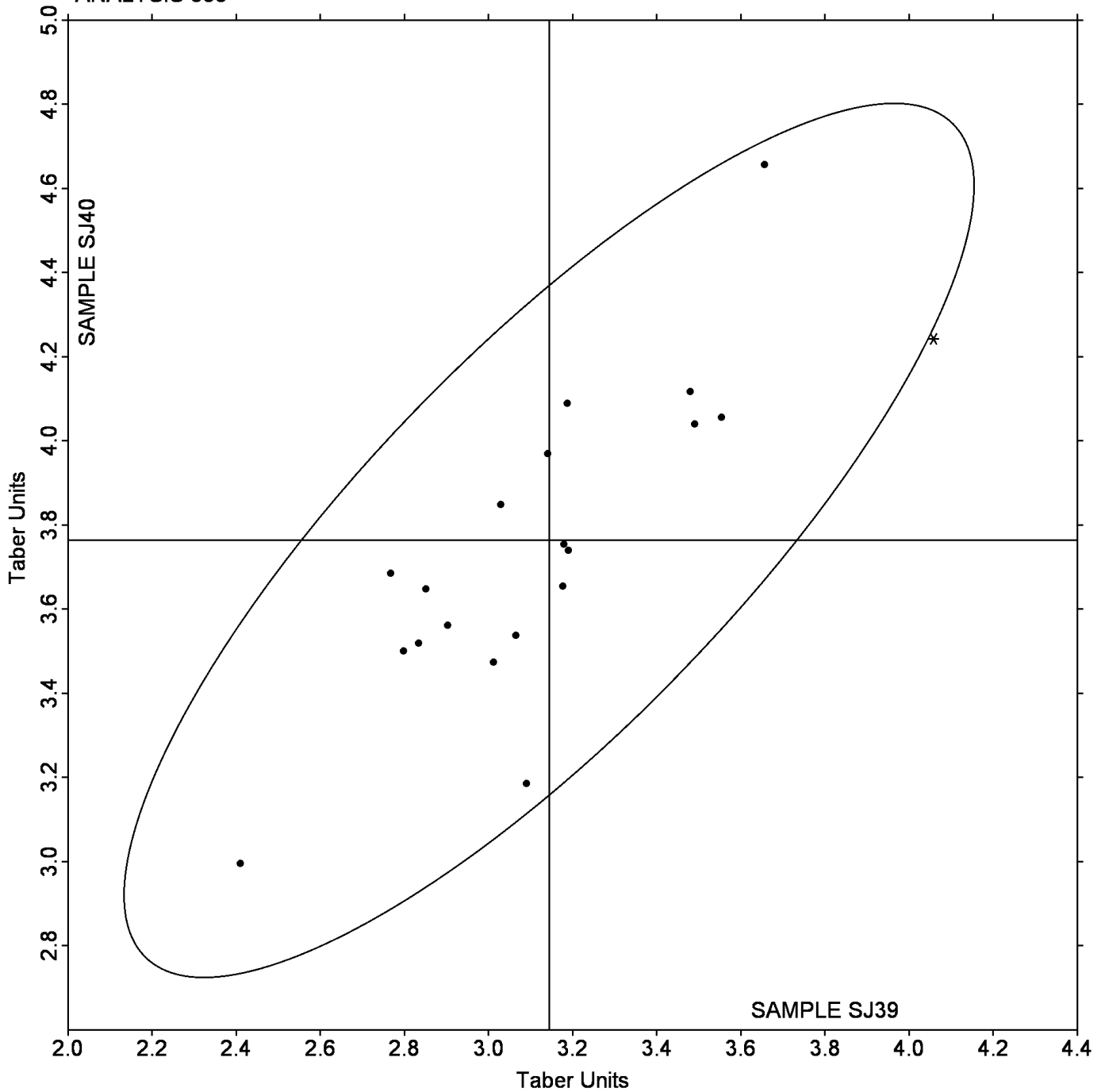
TAPPI-CTS Interlaboratory Testing Program  
Analysis 338

Bending Resistance, Taber Type - 0 to 10 Units

Grand Mean Sample **SJ39** = 3.1436 Taber Units

Grand Mean Sample **SJ40** = 3.7636 Taber Units

ANALYSIS 338



TAPPI-CTS Interlaboratory Testing Program  
Analysis 339

**Bending Resistance, Taber Type - 10 to 100 Taber Units**

WebCode	Data Flag	Sample SQ39			Sample SQ40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
24D592		23.30	0.04	0.03	21.43	-0.65	-0.32
5CCUJP		22.20	-1.06	-0.64	20.20	-1.88	-0.93
7NWF12		20.72	-2.54	-1.54	19.28	-2.80	-1.38
AGNV39		25.00	1.74	1.06	26.51	4.43	2.18
AH3ZVF		21.75	-1.51	-0.92	21.37	-0.71	-0.35
DHQVUK	X	20.00	-3.26	-1.98	30.00	7.92	3.90
EFN6GF		23.32	0.06	0.04	21.41	-0.67	-0.33
G6XN4S		26.34	3.08	1.87	22.15	0.07	0.03
PGSDNK	X	15.43	-7.83	-4.75	22.28	0.20	0.10
QEA6NQ		22.41	-0.85	-0.52	22.02	-0.06	-0.03
URWRHN		23.15	-0.11	-0.07	22.20	0.12	0.06
XUHQ29		24.40	1.14	0.69	24.25	2.17	1.07

Summary Statistics		
	Sample SQ39	Sample SQ40
Grand Means	23.259 Taber Units	22.082 Taber Units
SD Btwn Labs	1.647 Taber Units	2.031 Taber Units
Statistics based on 10 of 12 reporting participants		

**Comments on assigned Data Flags for Test #339**

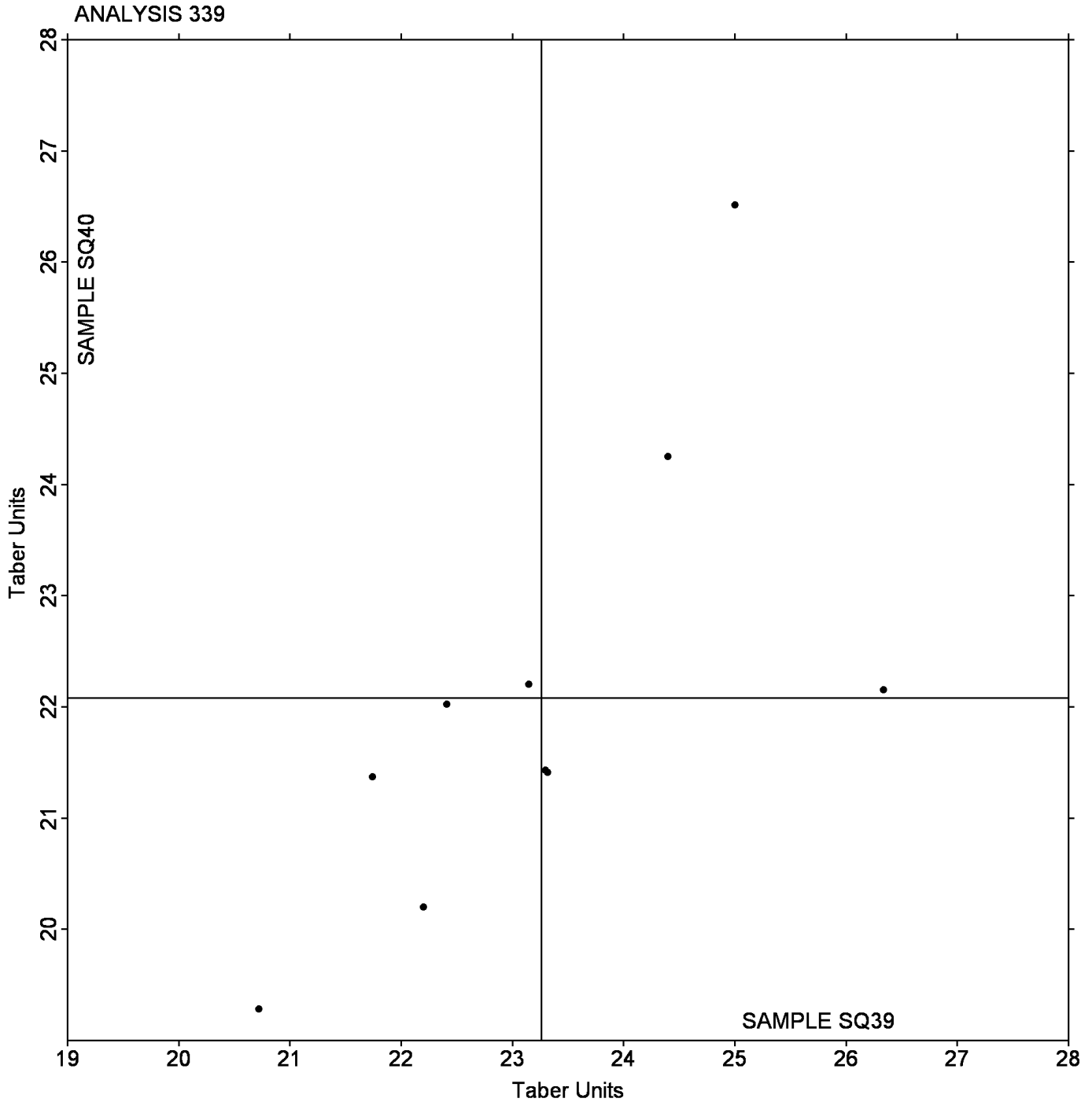
DHQVUK (X) - Inconsistent in testing between samples, data for Sample SQ40 are high.

PGSDNK (X) - Extreme data for Sample SQ39.

**Bending Resistance, Taber Type - 10 to 100 Taber Units**

Grand Mean Sample **SQ39** = 23.259 Taber Units

Grand Mean Sample **SQ40** = 22.082 Taber Units



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

TAPPI-CTS Interlaboratory Testing Program  
Analysis 340

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

WebCode	Data Flag	Sample ST39			Sample ST40		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
5P9U9Z		200.0	-10.1	-1.07	201.7	-10.1	-0.97
65K7MW		205.5	-4.6	-0.49	209.3	-2.5	-0.24
73LGU7		210.2	0.1	0.01	211.8	0.0	0.00
9LMUY7	X	1,143.1	933.0	98.66	1,137.0	925.2	89.29
C9AUH4		207.5	-2.6	-0.28	209.6	-2.2	-0.21
E4C2DY		212.2	2.1	0.22	211.0	-0.8	-0.07
GEMXCG		217.0	6.9	0.73	227.2	15.4	1.49
KJEEHC		216.5	6.3	0.67	213.5	1.7	0.17
M3DFKT		197.1	-13.0	-1.38	198.1	-13.6	-1.32
RNNEY5	X	24.4	-185.7	-19.63	23.8	-188.0	-18.14
S8AV24		227.1	16.9	1.79	233.7	21.9	2.12
SFL4EY		206.8	-3.4	-0.36	211.8	0.0	0.00
TS3XS5	X	45.6	-164.6	-17.40	43.3	-168.5	-16.26
TY1QPC		224.1	13.9	1.47	217.0	5.2	0.50
UE791A		196.7	-13.4	-1.42	197.7	-14.1	-1.36
UUHE6W		217.5	7.4	0.78	219.8	8.0	0.77
ZBLHB1		203.5	-6.6	-0.70	202.5	-9.3	-0.89

Summary Statistics		
	Sample ST39	Sample ST40
Grand Means	210.11 Taber Units	211.76 Taber Units
SD Btwn Labs	9.46 Taber Units	10.36 Taber Units
Statistics based on 14 of 17 reporting participants		

**Comments on assigned Data Flags for Test #340**

9LMUY7 (X) - Extreme data.

RNNEY5 (X) - Extreme data.

TS3XS5 (X) - Extreme data.



**TAPPI-CTS Interlaboratory Testing Program**  
**Analysis 343**  
**Z-Direction Tensile**

WebCode	Data Flag	Sample SM39			Sample SM40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
25YB3K		94.38	17.30	1.72	94.84	16.64	1.59	TA
3WRSM9		74.74	-2.35	-0.23	73.49	-4.71	-0.45	TZ
CUETYJ		62.40	-14.69	-1.46	62.60	-15.60	-1.49	CA
CV7Z2H		71.80	-5.29	-0.52	72.02	-6.18	-0.59	LW
D6LBWR		57.14	-19.95	-1.98	53.04	-25.16	-2.40	TZ
F6PWBC		89.66	12.57	1.25	82.98	4.78	0.46	TL
FHS1MS		92.64	15.55	1.54	93.16	14.96	1.43	CD
GRAZMG		79.54	2.45	0.24	76.02	-2.17	-0.21	TZ
HW5KF9		89.52	12.43	1.23	89.48	11.28	1.08	CD
JMP6DL		65.60	-11.49	-1.14	76.00	-2.20	-0.21	CA
MT7AEC		80.92	3.83	0.38	88.30	10.10	0.96	CD
Q5WJ5A		66.95	-10.14	-1.01	66.78	-11.42	-1.09	LW
SFDJAW		83.50	6.41	0.64	84.32	6.12	0.58	TA
SJ52WM		76.40	-0.69	-0.07	78.20	0.00	0.00	CA
T56M8C		73.68	-3.41	-0.34	76.08	-2.12	-0.20	XX
TZD8PX		76.02	-1.07	-0.11	74.92	-3.28	-0.31	TZ
U3H7VP		77.60	0.51	0.05	76.00	-2.20	-0.21	CA
UJJ3XE	*	72.60	-4.49	-0.45	87.20	9.00	0.86	XX
VLK7TU		85.22	8.13	0.81	87.02	8.82	0.84	XX
YE7CM3		71.45	-5.64	-0.56	71.50	-6.70	-0.64	TZ

Sample SM39		Summary Statistics	Sample SM40	
Grand Means	77.088 psi		78.197 psi	
SD Btw Labs	10.076 psi		10.490 psi	
Statistics based on 20 of 20 reporting participants				

**Notes for Analysis 343**

No Data Flags assigned for this analysis.

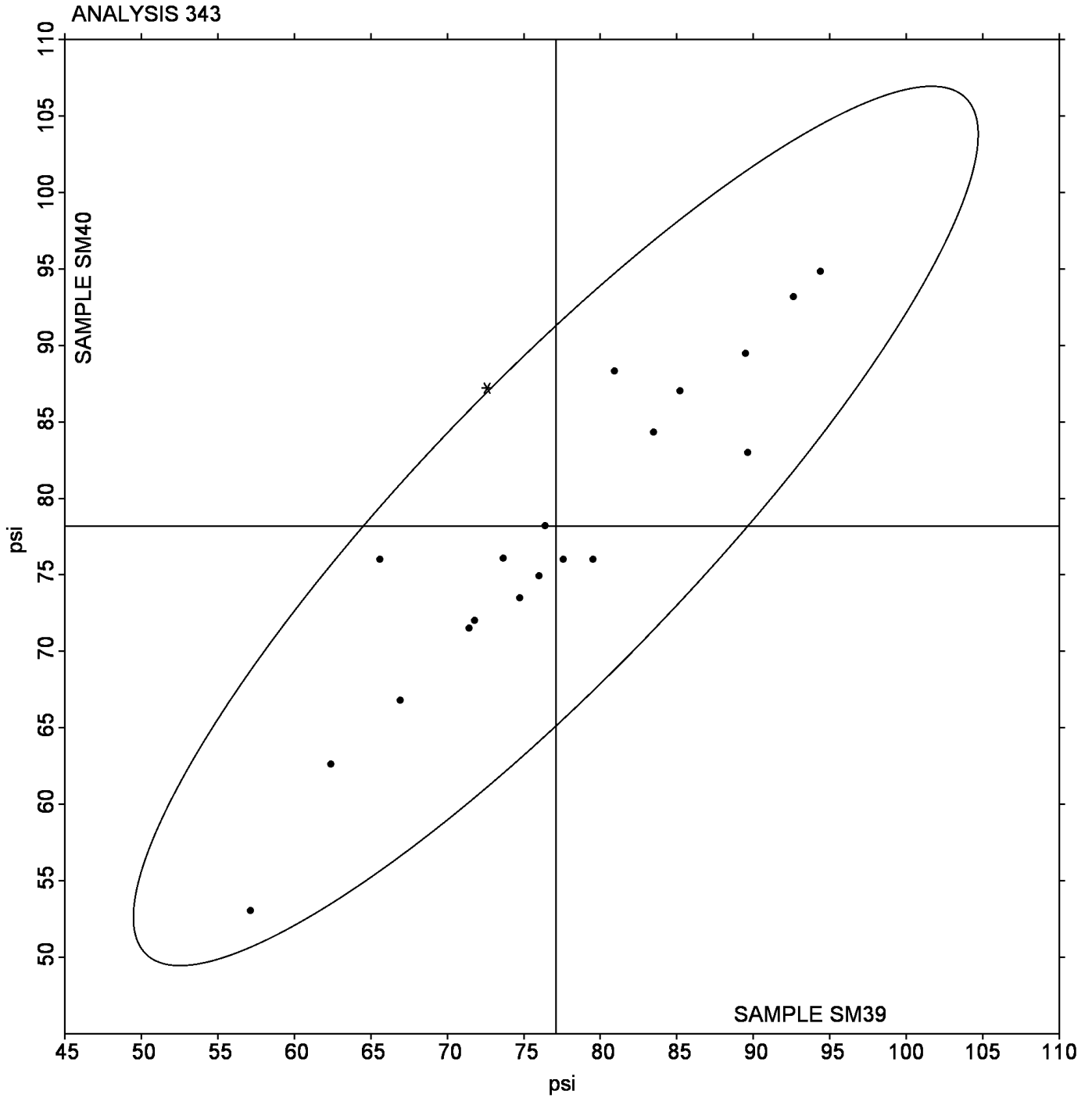
**Instrument Code List**

- |   |                                     |
|---|-------------------------------------|
| (CA) - CSI CS-163                                 | (CD) - CSI CS-163D                  |
| (LW) - L & W ZD Tensile Tester                    | (TA) - Thwing-Albert Tensile Tester |
| (TL) - TMI Lab Master                             | (TZ) - TMI Monitor/ZDT Tester       |
| (XX) - Instrument make/model not specified by lab |                                     |

TAPPI-CTS Interlaboratory Testing Program  
Analysis 343  
Z-Direction Tensile

Grand Mean Sample **SM39** = 77.088 psi

Grand Mean Sample **SM40** = 78.197 psi



**TAPPI-CTS Interlaboratory Testing Program**  
**Analysis 345**  
**Z-Direction Tensile, Recycled Paperboard**

WebCode	Data Flag	Sample SZ39			Sample SZ40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2Q6GTE		67.46	8.77	1.58	70.44	10.95	1.99	TL
4D24DY		58.60	-0.09	-0.02	59.80	0.31	0.06	CA
4LV97Z		53.60	-5.09	-0.92	52.00	-7.49	-1.36	CA
64NYBS		64.60	5.91	1.06	62.80	3.31	0.60	CD
7R4FU9		60.66	1.97	0.35	61.18	1.69	0.31	TL
NXP1Y7		46.59	-12.11	-2.18	49.56	-9.93	-1.81	TZ
RLHB9T		64.80	6.11	1.10	63.80	4.31	0.78	CA
RZE4WQ		56.62	-2.07	-0.37	57.08	-2.41	-0.44	LW
SSZ7QN		59.70	1.01	0.18	62.80	3.31	0.60	DP
TDBXK4		56.44	-2.25	-0.41	59.41	-0.08	-0.02	TZ
TLA38K		56.56	-2.13	-0.38	57.86	-1.63	-0.30	TZ
WV669J		58.70	0.01	0.00	57.14	-2.35	-0.43	CA

<b>Summary Statistics</b>			
	<b>Sample SZ39</b>		<b>Sample SZ40</b>
Grand Means	58.694 psi		59.489 psi
SD Btwn Labs	5.562 psi		5.493 psi
Statistics based on 12 of 12 reporting participants			

**Notes for Analysis 345**

No Data Flags assigned for this analysis.

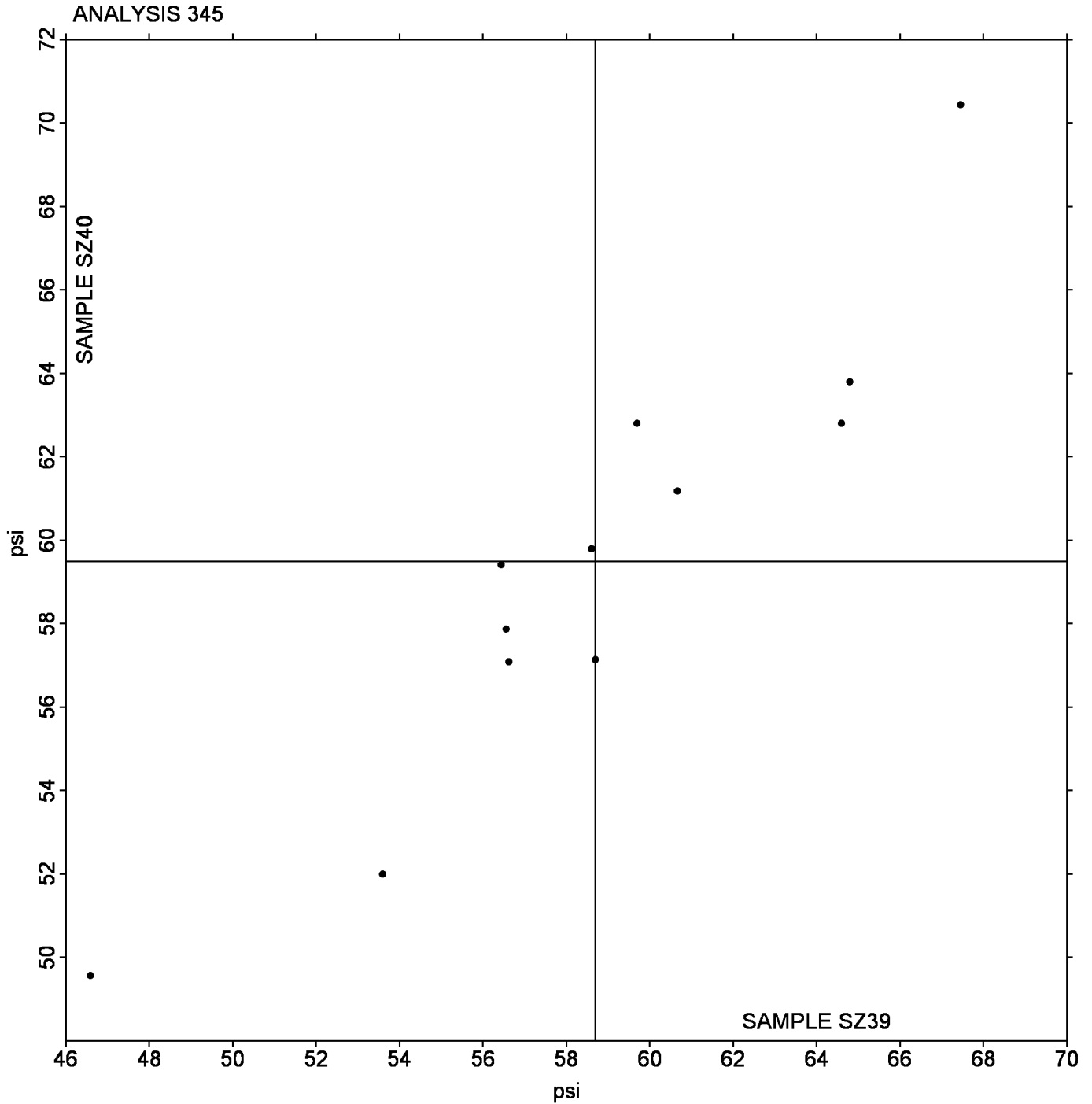
**Instrument Code List**

- |                           |                                |
|---------------------------|--------------------------------|
| (CA) - CSI CS-163         | (CD) - CSI CS-163D             |
| (DP) - Dek-Tron XP Series | (LW) - L & W ZD Tensile Tester |
| (TL) - TMI Lab Master     | (TZ) - TMI Monitor/ZDT Tester  |

TAPPI-CTS Interlaboratory Testing Program  
Analysis 345  
Z-Direction Tensile, Recycled Paperboard

Grand Mean Sample **SZ39** = 58.694 psi

Grand Mean Sample **SZ40** = 59.489 psi



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

TAPPI-CTS Interlaboratory Testing Program

Analysis 348

Internal Bond Strength - Modified Scott Mechanics

WebCode	Data Flag	Sample SN39			Sample SN40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3YNLYR		77.85	-3.97	-0.62	92.60	-5.17	-0.79	HY
4LRF6Z		90.00	8.18	1.28	100.20	2.43	0.37	HZ
7NM8K2		73.00	-8.82	-1.38	90.00	-7.77	-1.19	HY
7YBADF		82.00	0.18	0.03	97.80	0.03	0.01	HZ
8NN5UC		98.20	16.38	2.56	110.80	13.03	1.99	XX
999U2E		93.20	11.38	1.78	106.80	9.03	1.38	HY
9PF59T		75.60	-6.22	-0.97	91.40	-6.37	-0.97	XX
AT5C7M		77.40	-4.42	-0.69	89.40	-8.37	-1.28	HY
B2PCSP		74.88	-6.94	-1.08	90.60	-7.17	-1.10	HY
C4ZWPA		80.00	-1.82	-0.28	94.40	-3.37	-0.51	HY
C9RFZ1		76.60	-5.22	-0.82	94.80	-2.97	-0.45	HY
CS7P5H	X	61.12	-20.70	-3.23	71.72	-26.05	-3.98	HZ
EHFEW4		78.20	-3.62	-0.57	96.00	-1.77	-0.27	XX
FC1VY3		85.08	3.26	0.51	101.64	3.87	0.59	HY
LLR7WR		76.00	-5.82	-0.91	100.20	2.43	0.37	HY
M8J8DP		86.80	4.98	0.78	97.00	-0.77	-0.12	HY
R5RGY3		84.00	2.18	0.34	98.00	0.23	0.04	HZ
S258Z2		88.00	6.18	0.96	106.20	8.43	1.29	HY
U6L56G		79.00	-2.82	-0.44	96.00	-1.77	-0.27	HY
UCUU58		75.00	-6.82	-1.07	88.40	-9.37	-1.43	HY
UZJVZP	*	84.60	2.78	0.43	110.40	12.63	1.93	XX
VN9G19		78.92	-2.90	-0.45	92.20	-5.57	-0.85	KR
X6YGVQ		82.60	0.78	0.12	100.60	2.83	0.43	HY
YQ2QAN		85.00	3.18	0.50	103.20	5.43	0.83	HY

		Summary Statistics	
	Sample SN39		Sample SN40
Grand Means	81.823 1000th ft-lbs		97.767 1000th ft-lbs
SD Btw Labs	6.403 1000th ft-lbs		6.541 1000th ft-lbs
Statistics based on 23 of 24 reporting participants			

**Comments on assigned Data Flags for Test #348**

CS7P5H (X) - Systematic error (data for both samples are low).

**Analysis Notes:**

X6YGVQ - Data appear to be reported as 1000th of ft-lb, not J/sq m as indicated on datasheet. Units changed by CTS.

**Instrument Code List**

(HY) - Huygen Digitized Scott Internal Bond Tester

(HZ) - Huygen Internal Bond Tester with AccuPress

(KR) - Kumagai Riki Kogyo Internal Bond Tester

(XX) - Instrument make/model not specified by lab

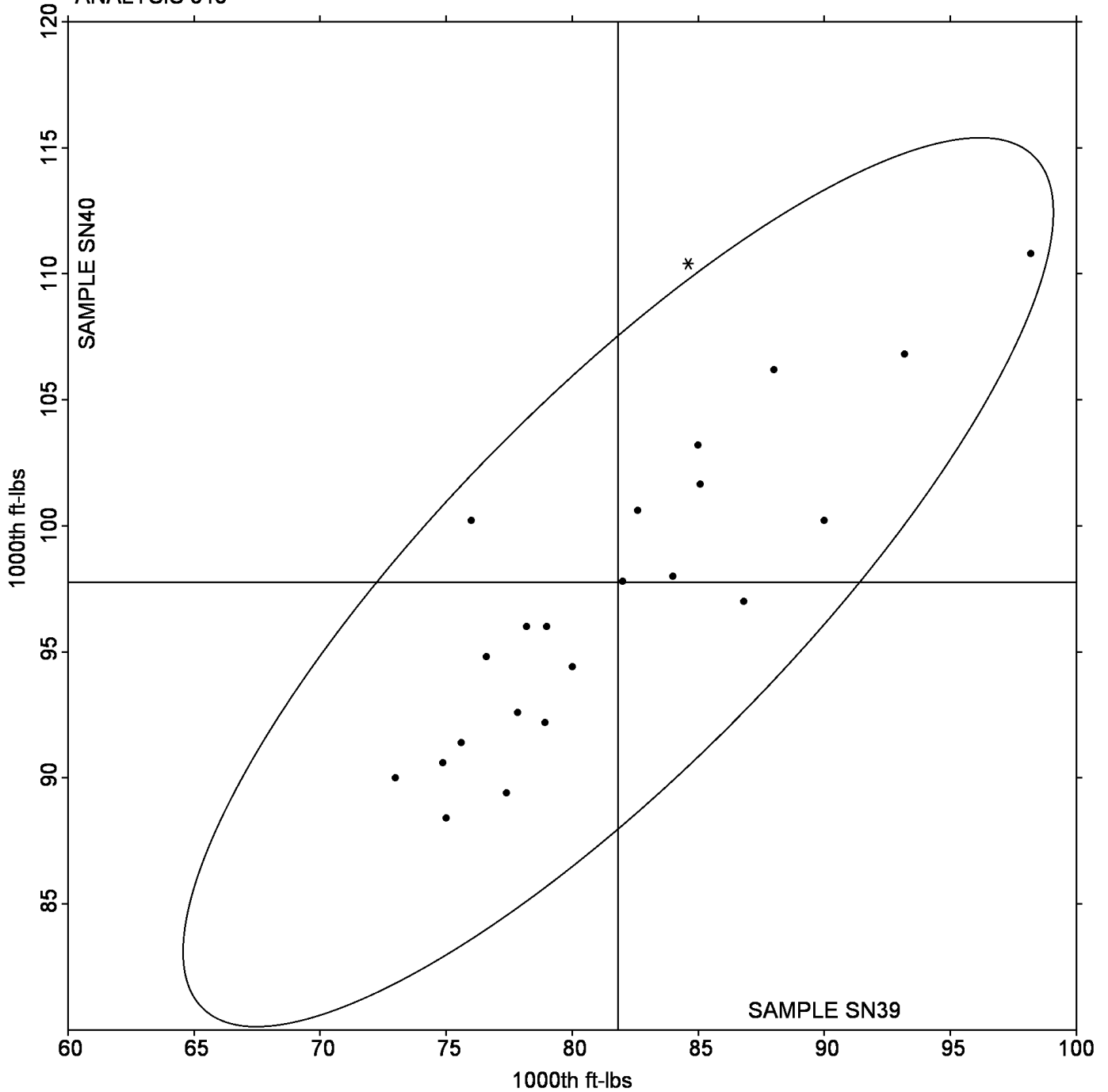
TAPPI-CTS Interlaboratory Testing Program  
Analysis 348

Internal Bond Strength - Modified Scott Mechanics

Grand Mean Sample **SN39** = 81.823 1000th ft-lbs

Grand Mean Sample **SN40** = 97.767 1000th ft-lbs

ANALYSIS 348



TAPPI-CTS Interlaboratory Testing Program

Analysis 349

Internal Bond Strength - Scott Bond Models

WebCode	Data Flag	Sample SP39			Sample SP40			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
1KYKJM		70.20	-3.12	-0.28	78.20	-9.20	-0.81	TM
365FZ9		89.20	15.88	1.44	104.80	17.40	1.53	SC
6ULEBK		63.60	-9.72	-0.88	79.60	-7.80	-0.68	SC
7MD36S		82.57	9.25	0.84	91.25	3.85	0.34	TM
9GFZMX		60.43	-12.89	-1.17	73.85	-13.55	-1.19	XX
BCXJ9B		66.80	-6.52	-0.59	83.20	-4.20	-0.37	TM
CXATND		61.40	-11.92	-1.08	75.80	-11.60	-1.02	TM
KXQMD3		79.80	6.48	0.59	96.80	9.40	0.82	SC
U8GKVL		73.00	-0.32	-0.03	84.40	-3.00	-0.26	XX
UYWQZX		67.54	-5.78	-0.52	86.12	-1.28	-0.11	TM
ZSZQT4		92.00	18.68	1.69	107.40	20.00	1.76	SC

Summary Statistics			
	Sample SP39		Sample SP40
Grand Means	73.322	1000th ft-lbs	87.402 1000th ft-lbs
SD Btwn Labs	11.032	1000th ft-lbs	11.392 1000th ft-lbs
Statistics based on 11 of 11 reporting participants			

**Notes for Analysis 349**

No Data Flags assigned for this analysis.

**Instrument Code List**

(SC) - Scott Internal Bond Tester (Manual)

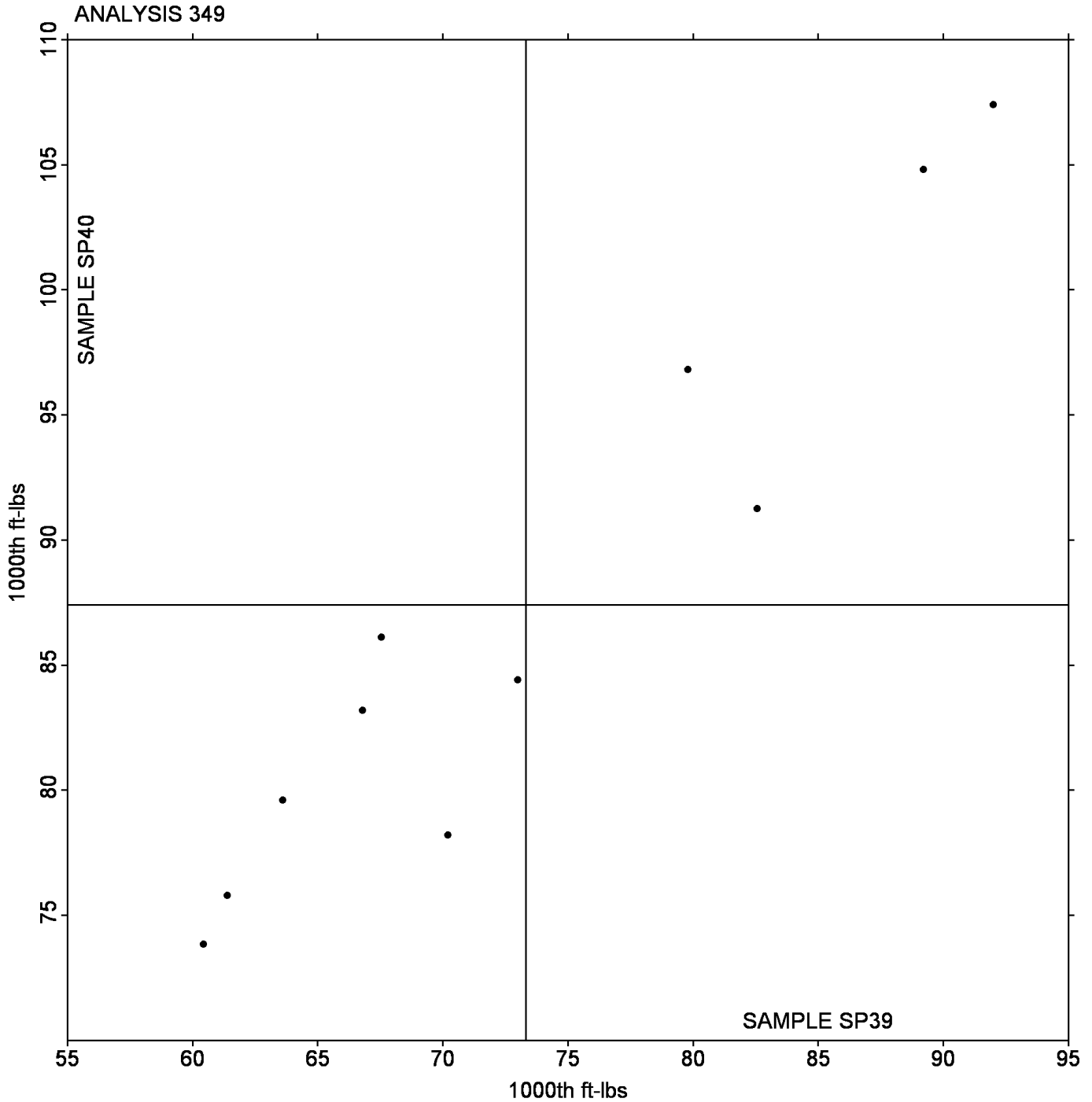
(TM) - TMI Monitor/Internal Bond Tester

(XX) - Instrument make/model not specified by lab

TAPPI-CTS Interlaboratory Testing Program  
Analysis 349  
Internal Bond Strength - Scott Bond Models

Grand Mean Sample **SP39** = 73.322 1000th ft-lbs

Grand Mean Sample **SP40** = 87.402 1000th ft-lbs



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