

## Paper & Paperboard Interlaboratory Program

### Summary Report #240S - May 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  
Plainfield, NJ 07060  
Phone: (908) 668-1777  
FAX #: (908) 668-4794

### **Emmerson Apparatus**

170 Anderson Street  
Portland, ME 04101  
Phone: (207) 774-5254  
FAX#: (207) 774-5304

## TAPPI-CTS Interlaboratory Testing Program

## Analysis 305

## Bursting Strength - Printing Papers

WebCode	Data Flag	Sample SA45			Sample SA46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
1HTP2B	X	43.69	12.01	5.96	29.33	8.63	5.31
2HQL6		30.50	-1.18	-0.59	18.23	-2.48	-1.53
4LDT2S		30.31	-1.37	-0.68	20.09	-0.62	-0.38
4ZAGP6		34.86	3.18	1.58	23.11	2.41	1.48
6CB541		30.29	-1.39	-0.69	19.88	-0.82	-0.51
6UHM64		32.40	0.72	0.36	21.75	1.05	0.64
77YE45		30.57	-1.11	-0.55	22.41	1.71	1.05
78BHUV		33.70	2.02	1.00	22.70	2.00	1.23
7D7NVZ		31.97	0.29	0.14	22.46	1.75	1.08
81W12L		29.60	-2.08	-1.03	18.45	-2.25	-1.39
8MDDQ2		30.10	-1.58	-0.78	18.70	-2.00	-1.23
A6L4A3		30.50	-1.18	-0.58	19.49	-1.21	-0.75
AFYDEW		32.84	1.16	0.58	20.40	-0.30	-0.19
AV8WVF		29.90	-1.78	-0.88	18.35	-2.35	-1.45
B4KP2B		31.95	0.27	0.13	18.00	-2.70	-1.67
BNKJAU		32.62	0.94	0.47	21.83	1.12	0.69
D3LKP9		33.90	2.22	1.10	21.29	0.59	0.36
DNLAUV	*	37.68	6.00	2.97	22.53	1.83	1.12
F6EQBX		33.40	1.72	0.85	19.95	-0.75	-0.46
FNJQCR		32.75	1.07	0.53	21.00	0.30	0.18
G3QFKN		32.10	0.42	0.21	22.00	1.30	0.80
G4GJ3X		32.52	0.84	0.42	21.01	0.31	0.19
GDBT3Y		27.95	-3.73	-1.85	18.90	-1.80	-1.11
GEAGJW		30.40	-1.28	-0.63	21.42	0.72	0.44
GJHMTN		30.40	-1.28	-0.63	22.90	2.20	1.35
H5UAVD		34.40	2.72	1.35	19.50	-1.20	-0.74
JBSAVS		33.71	2.03	1.01	21.74	1.04	0.64
NENEXE		31.39	-0.29	-0.14	20.73	0.02	0.01
NPD13D		32.22	0.54	0.27	21.64	0.94	0.58
NRZ27T		29.88	-1.80	-0.89	19.87	-0.83	-0.51
P3LXGQ		31.95	0.27	0.13	21.35	0.65	0.40
SSE4WN		30.77	-0.91	-0.45	20.85	0.15	0.09
TJR85C		26.86	-4.82	-2.39	19.17	-1.53	-0.94
TTZTD1		31.88	0.20	0.10	20.75	0.05	0.03
UG7K GK		31.97	0.29	0.14	21.38	0.67	0.42
UHZVCZ		33.17	1.49	0.74	22.87	2.17	1.34
V57B91		32.40	0.72	0.36	21.10	0.40	0.24
WTVQX1		31.67	-0.01	0.00	22.48	1.77	1.09
XGG1D4	*	27.90	-3.78	-1.87	16.10	-4.60	-2.84
YS6WTM		32.10	0.42	0.21	21.10	0.40	0.24

**Bursting Strength - Printing Papers**

	<b>Sample SA45</b>	<b>Summary Statistics</b>	<b>Sample SA46</b>
Grand Means	31.678 psi		20.704 psi
SD Btwn Labs	2.017 psi		1.624 psi
Statistics based on 39 of 40 reporting participants			

**Comments on assigned Data Flags for Test #305**

1HTP2B (X) - Extreme data.

TAPPI-CTS Interlaboratory Testing Program

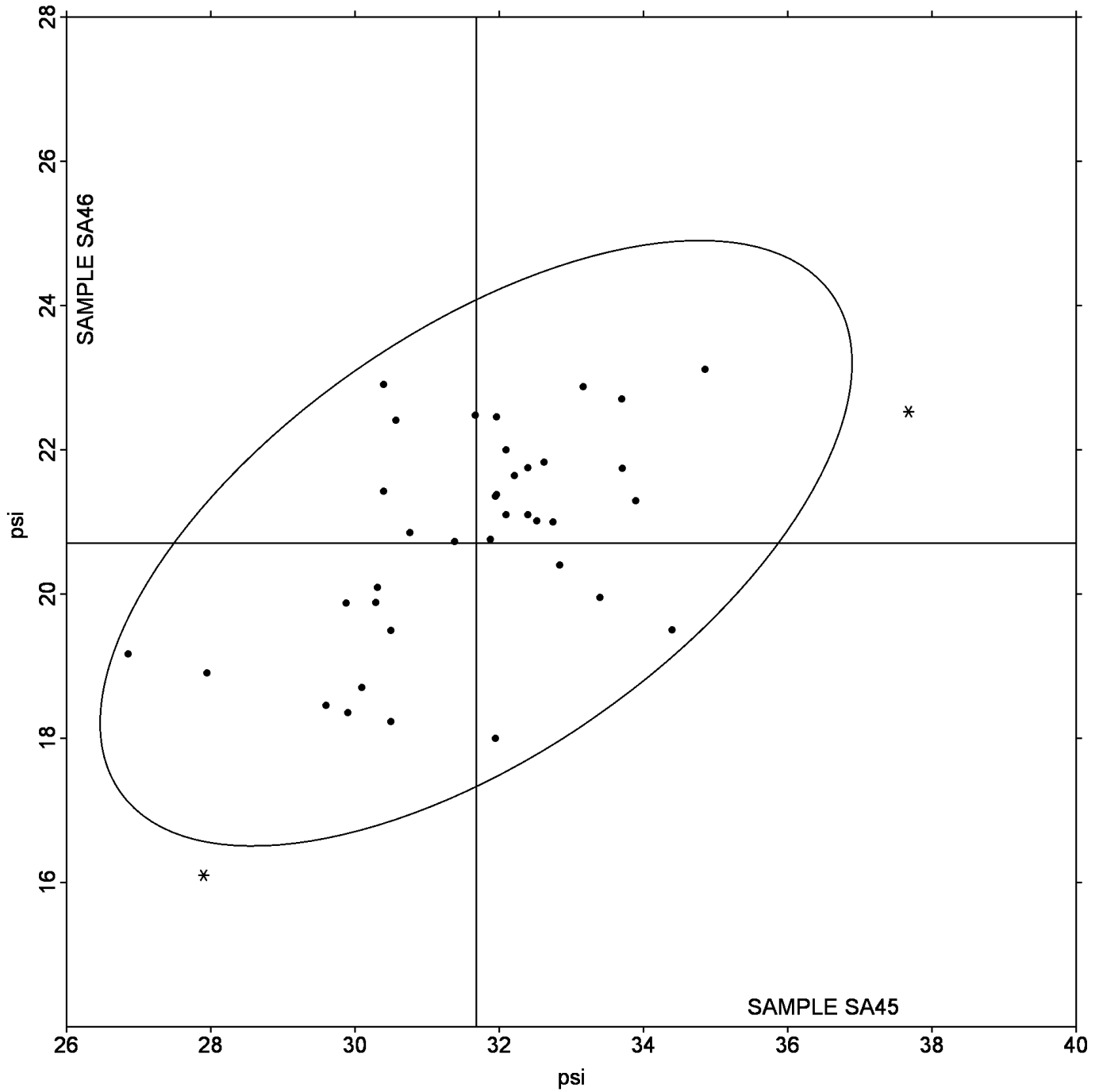
Analysis 305

Bursting Strength - Printing Papers

Grand Mean Sample SA45 = 31.678 psi

Grand Mean Sample SA46 = 20.704 psi

ANALYSIS 305



TAPPI-CTS Interlaboratory Testing Program

Analysis 310

Bursting Strength - Packaging Papers

WebCode	Data Flag	Sample SB45			Sample SB46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
1Y5ZU5		56.55	-0.16	-0.06	59.00	-0.27	-0.09
2WUKXJ		56.80	0.09	0.03	59.22	-0.06	-0.02
5U4PB7		56.30	-0.41	-0.16	58.00	-1.28	-0.41
6NTVUG	X	46.49	-10.22	-4.07	59.80	0.52	0.17
85T1GP		56.52	-0.19	-0.08	59.50	0.22	0.07
9JP2RW		53.54	-3.17	-1.26	52.36	-6.92	-2.25
9KWGMG		54.14	-2.57	-1.02	59.26	-0.01	0.00
A8ESAB		59.08	2.37	0.94	59.35	0.07	0.02
AMXEHP		55.85	-0.86	-0.34	61.18	1.90	0.62
C1RBLB		57.51	0.80	0.32	62.16	2.88	0.94
DJ77UX		54.39	-2.32	-0.92	59.09	-0.19	-0.06
FZU7Y2		54.00	-2.71	-1.08	57.59	-1.68	-0.55
HNJSNL		61.60	4.89	1.95	64.00	4.72	1.53
JGNK15		52.25	-4.46	-1.78	53.50	-5.78	-1.88
KYA236		60.40	3.69	1.47	62.30	3.02	0.98
MEJ8R8		56.57	-0.15	-0.06	56.84	-2.44	-0.79
NT9S9P		57.36	0.65	0.26	63.72	4.45	1.44
NYV6WN		59.35	2.64	1.05	58.90	-0.38	-0.12
R6Y9M7		55.20	-1.51	-0.60	59.35	0.07	0.02
RRF98L		53.37	-3.34	-1.33	54.96	-4.32	-1.40
TE1GSV		59.22	2.51	1.00	58.48	-0.80	-0.26
UZSKSU		58.16	1.45	0.58	63.66	4.38	1.42
WC7HSF		54.42	-2.29	-0.91	57.80	-1.48	-0.48
X13XN2	X	66.72	10.01	3.99	67.88	8.60	2.79
YPXJG8		60.57	3.86	1.54	63.92	4.65	1.51
Z9Y53C		57.90	1.19	0.47	58.50	-0.78	-0.25

Summary Statistics		
	Sample SB45	Sample SB46
Grand Means	56.710 psi	59.277 psi
SD Btw Labs	2.509 psi	3.078 psi
Statistics based on 24 of 26 reporting participants		

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

6NTVUG (X) - Inconsistent in testing between samples, data for Sample SB45 are low.

X13XN2 (X) - Systematic error (data for both samples are high).



## TAPPI-CTS Interlaboratory Testing Program

## Analysis 311

## Tearing Strength - Newsprint

WebCode	Data Flag	Sample SK45			Sample SK46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3V7B8M		22.13	1.00	0.63	21.33	0.46	0.29
5NZSLF		21.32	0.19	0.12	21.95	1.08	0.69
7FGLCQ		23.40	2.27	1.44	22.90	2.03	1.29
7QALAD		21.07	-0.06	-0.04	20.67	-0.20	-0.13
8AL6CE		21.13	-0.01	-0.01	20.75	-0.12	-0.08
9VL7KV		19.68	-1.45	-0.92	19.66	-1.21	-0.77
CCX9AM		20.34	-0.79	-0.50	20.40	-0.47	-0.30
D1NNPD		20.02	-1.11	-0.71	19.58	-1.29	-0.82
JZ445H		21.05	-0.09	-0.06	21.19	0.32	0.20
KZUTJW		19.98	-1.16	-0.73	19.67	-1.20	-0.76
S9U3FL		24.40	3.27	2.07	24.00	3.13	1.98
XGY34A		18.44	-2.69	-1.71	17.81	-3.06	-1.94
XNKWF9		21.80	0.67	0.42	21.40	0.53	0.34

		Summary Statistics	
	Sample SK45		Sample SK46
Grand Means	21.135 Grams		20.871 Grams
SD Btwn Labs	1.578 Grams		1.578 Grams
Statistics based on 13 of 13 reporting participants			

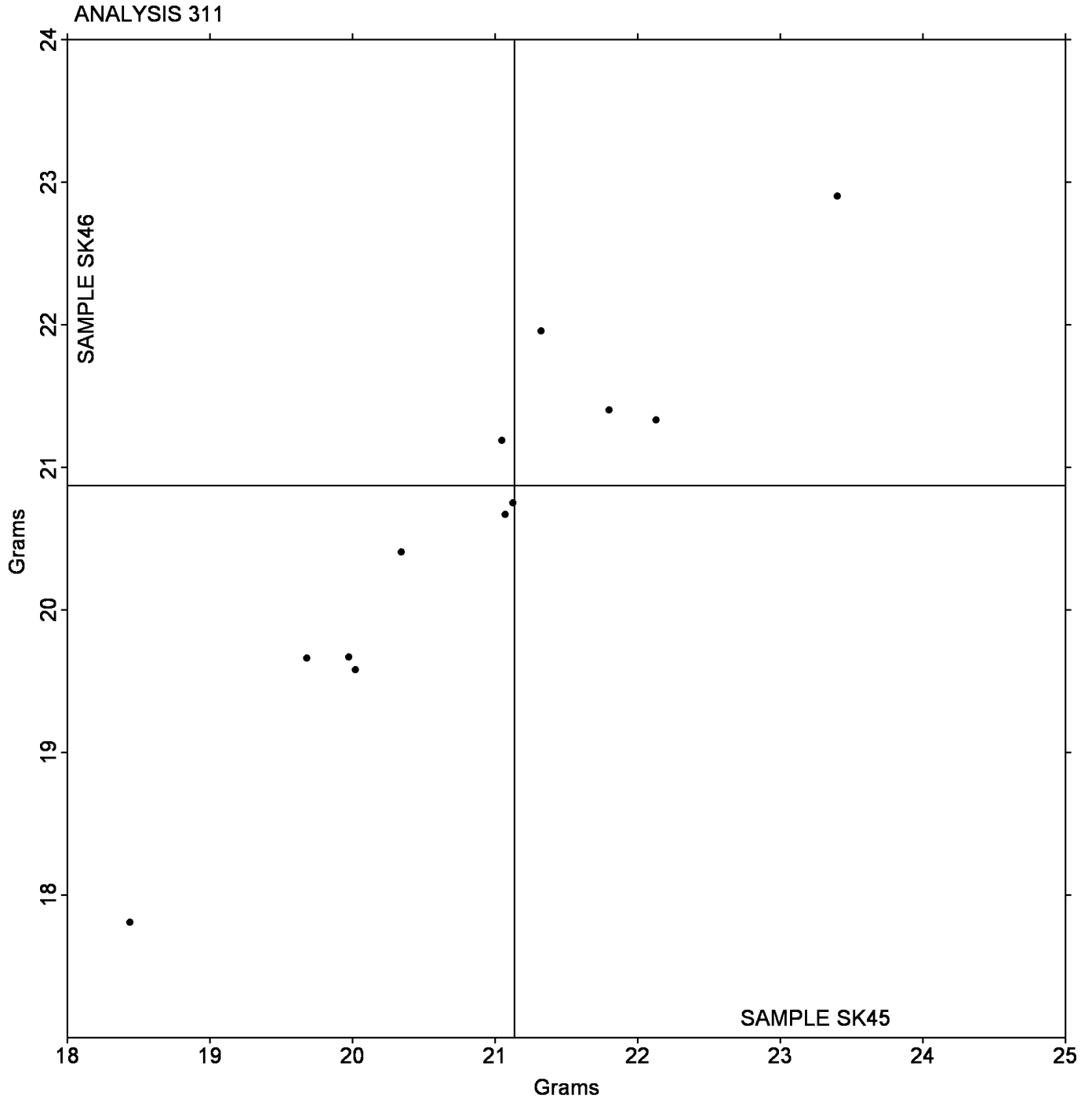
**Notes for Analysis 311**

No Data Flags assigned for this analysis.

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

Grand Mean Sample **SK45** = 21.135 Grams

Grand Mean Sample **SK46** = 20.871 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 SC45			Sample SC46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
1LAVED		69.26	1.65	0.37	57.16	-1.34	-0.33
263EAK		64.50	-3.11	-0.70	56.00	-2.50	-0.62
3FDGLH		60.80	-6.81	-1.54	56.60	-1.90	-0.47
3GEJXM		68.31	0.70	0.16	60.53	2.03	0.50
4AMWJS		68.56	0.95	0.21	57.88	-0.62	-0.15
4E4311		74.51	6.90	1.56	60.50	2.00	0.49
4UTD8A		68.00	0.39	0.09	59.20	0.70	0.17
4WM6Q1		69.31	1.70	0.38	59.54	1.04	0.26
52YU13		70.20	2.59	0.59	58.60	0.10	0.03
6A7NVV		69.80	2.19	0.50	65.00	6.50	1.61
6U8XFK		66.68	-0.93	-0.21	62.87	4.37	1.08
7NPP13		64.42	-3.19	-0.72	56.01	-2.49	-0.61
86N6UQ		65.10	-2.51	-0.57	52.20	-6.30	-1.55
8RY4LR	*	59.84	-7.77	-1.76	58.85	0.35	0.09
9B19SX		68.46	0.85	0.19	60.68	2.19	0.54
9QBCZE		62.30	-5.31	-1.20	53.90	-4.60	-1.13
9RL4P2		71.23	3.62	0.82	62.42	3.92	0.97
AA49CX	X	90.21	22.60	5.11	80.89	22.39	5.53
ADA2FR		68.56	0.95	0.21	59.02	0.52	0.13
AYUDD2		74.76	7.15	1.62	64.14	5.64	1.39
B71HX5		73.40	5.79	1.31	60.00	1.50	0.37
BH21FK		60.19	-7.42	-1.68	54.64	-3.86	-0.95
BXFU2Q		71.20	3.59	0.81	62.80	4.30	1.06
CK4X7K		63.99	-3.62	-0.82	59.37	0.87	0.22
CPH1BN		67.20	-0.41	-0.09	52.28	-6.22	-1.53
E16PFM		73.54	5.93	1.34	68.04	9.54	2.36
EHBGC4		62.64	-4.97	-1.12	52.94	-5.56	-1.37
ENKTDB		68.34	0.73	0.17	60.82	2.32	0.57
FDAV1S		66.44	-1.17	-0.26	55.82	-2.68	-0.66
FK2KTN	X	64.69	-2.92	-0.66	57.42	-1.08	-0.27
FPHQU4		74.40	6.79	1.54	61.80	3.30	0.82
FTJDGB		73.66	6.05	1.37	66.35	7.85	1.94
FWMYLB	*	55.68	-11.93	-2.70	48.15	-10.35	-2.55
GD7XF1		67.26	-0.35	-0.08	58.66	0.17	0.04
GEEE6K		70.72	3.11	0.70	65.42	6.92	1.71
GKQ8J4		71.00	3.39	0.77	63.40	4.90	1.21
GNWRM6		64.92	-2.69	-0.61	56.66	-1.84	-0.45
HCCPQW		71.42	3.81	0.86	60.63	2.14	0.53
HTKDU4		68.36	0.75	0.17	59.58	1.08	0.27
JMFM6Q		67.58	-0.03	-0.01	57.52	-0.98	-0.24
K1FQHW	X	63.03	-4.59	-1.04	56.99	-1.51	-0.37
KSPBDQ	X	83.51	15.90	3.60	65.48	6.98	1.72
L29VHM		67.12	-0.49	-0.11	56.56	-1.94	-0.48

TAPPI-CTS Interlaboratory Testing Program

Analysis 312

Tearing Strength - Printing Papers

WebCode	Data Flag	Sample SC45			Sample SC46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
LRMEGU		69.99	2.38	0.54	59.14	0.65	0.16
LTQ5N9		67.60	-0.01	0.00	54.94	-3.56	-0.88
LUBMXA		68.74	1.13	0.26	59.61	1.12	0.28
MJ88RN		60.00	-7.61	-1.72	56.00	-2.50	-0.62
MULHVG		69.92	2.31	0.52	60.61	2.12	0.52
N2HRU5		69.26	1.65	0.37	60.77	2.27	0.56
NPHB9K	X	67.16	-0.45	-0.10	77.34	18.84	4.65
NTEVD4		66.56	-1.05	-0.24	56.42	-2.08	-0.51
P5AQE8		70.73	3.12	0.71	58.83	0.33	0.08
PP8YX6		63.70	-3.91	-0.88	52.60	-5.90	-1.46
PSL6ZY		63.65	-3.96	-0.90	50.07	-8.43	-2.08
QH3WGP		69.15	1.53	0.35	55.98	-2.52	-0.62
R3CR5M		64.90	-2.71	-0.61	56.70	-1.80	-0.44
S5YCBV		64.04	-3.57	-0.81	56.29	-2.21	-0.55
S81LT5	*	80.15	12.54	2.84	69.14	10.64	2.63
SLP69E		68.31	0.70	0.16	55.54	-2.96	-0.73
UA46MQ		59.68	-7.93	-1.79	55.68	-2.82	-0.70
UE9UWS	X	55.38	-12.23	-2.77	56.98	-1.52	-0.37
URXPKY	X	63.30	-4.31	-0.97	64.25	5.75	1.42
V9NP5H		67.78	0.17	0.04	57.92	-0.58	-0.14
VSJRTR		62.14	-5.47	-1.24	57.07	-1.43	-0.35
WGBGKF		68.80	1.19	0.27	57.68	-0.82	-0.20
WM9WL1		73.36	5.75	1.30	62.58	4.08	1.01
WT2CFM		69.50	1.89	0.43	59.75	1.25	0.31
XL9RD1		67.08	-0.53	-0.12	56.00	-2.50	-0.62
XVQU46		63.18	-4.43	-1.00	51.83	-6.67	-1.65
XXUDZT		67.82	0.21	0.05	60.78	2.28	0.56
YMPS6Z		62.70	-4.91	-1.11	53.50	-5.00	-1.23
YY91L7		71.92	4.31	0.97	62.39	3.89	0.96
ZHAR59		73.40	5.79	1.31	60.30	1.80	0.45
ZNX31H		62.22	-5.39	-1.22	58.64	0.14	0.04

Sample SC45		Summary Statistics	Sample SC46	
Grand Means	67.611 Grams		58.497 Grams	
SD Btwn Labs	4.422 Grams		4.050 Grams	
Statistics based on 67 of 74 reporting participants				

**Tearing Strength - Printing Papers**

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

AA49CX (X) - Extreme data.

FK2KTN (X) - Data appears to be transposed between samples. Data switched by CTS.

K1FQHW (X) - Data appears to be transposed between samples. Data switched by CTS.

KSPBDQ (X) - Inconsistent in testing between samples, data for Sample SC45 are high.

NPHB9K (X) - Inconsistent in testing between samples, data for Sample SC46 are high and inconsistent within the replicate measurements for Sample SC45.

UE9UWS (X) - Inconsistent in testing between samples, data for Sample SC45 are low.

URXPKY (X) - Inconsistent in testing between samples.

TAPPI-CTS Interlaboratory Testing Program

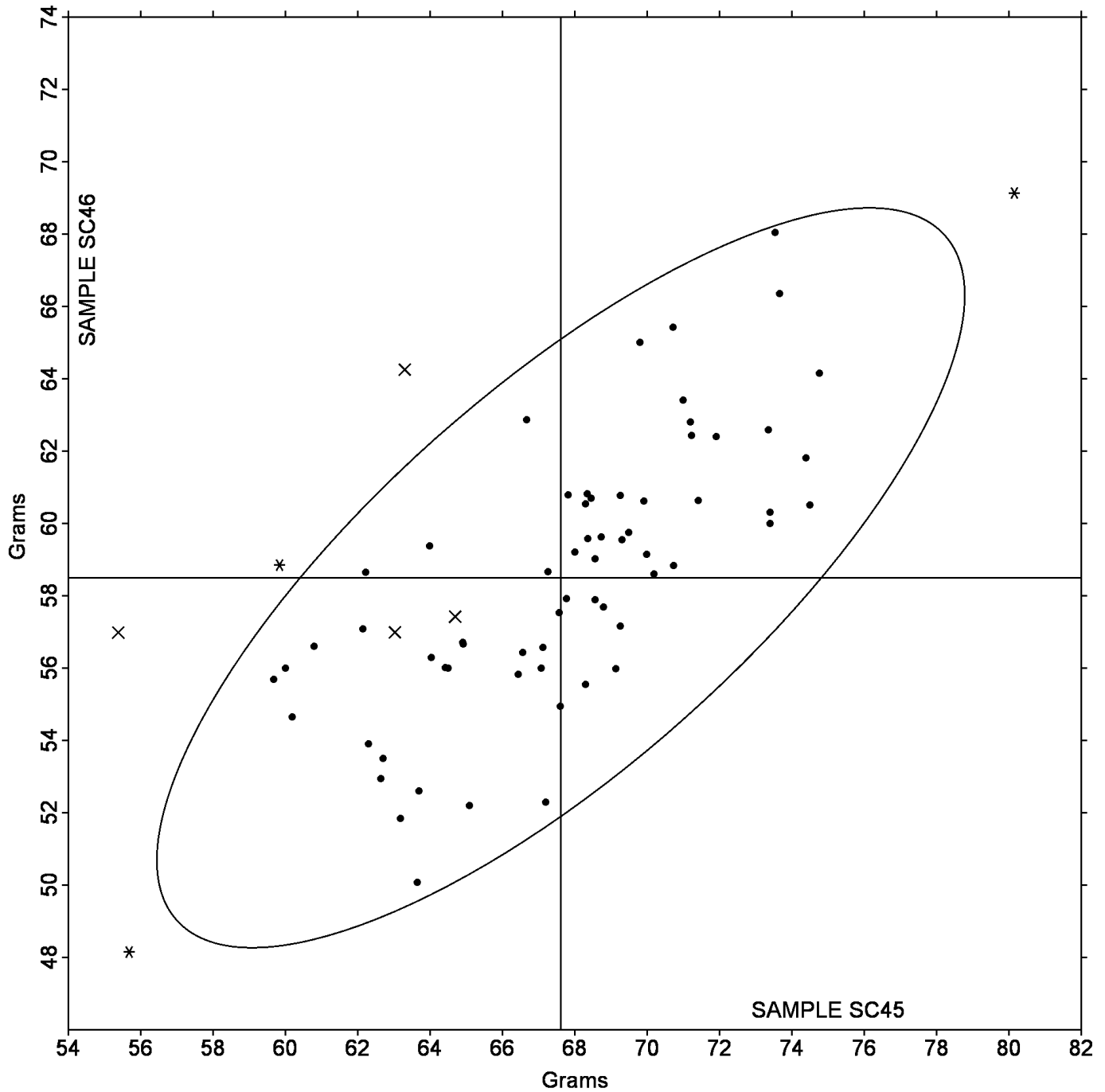
Analysis 312

Tearing Strength - Printing Papers

Grand Mean Sample **SC45** = 67.611 Grams

Grand Mean Sample **SC46** = 58.497 Grams

ANALYSIS 312



## TAPPI-CTS Interlaboratory Testing Program

## Analysis 314

## Tearing Strength - Packaging Papers

WebCode	Data Flag	Sample SD45			Sample SD46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2A1WPZ		137.6	7.7	0.89	151.6	10.4	1.19
2P47M5	X	124.0	-5.9	-0.69	131.6	-9.6	-1.10
3JURUF		121.7	-8.2	-0.95	132.9	-8.4	-0.96
3P1YVW		113.2	-16.7	-1.93	128.4	-12.8	-1.47
53DEAK		139.5	9.6	1.11	143.3	2.1	0.24
5BAQK2		113.8	-16.2	-1.87	124.2	-17.0	-1.95
5SSXEK		118.4	-11.5	-1.33	130.1	-11.1	-1.27
662BMA		133.8	3.8	0.44	141.8	0.5	0.06
71ZPYM		136.1	6.1	0.71	139.9	-1.4	-0.16
7JRJ7F		125.7	-4.2	-0.49	135.2	-6.0	-0.69
7VNDQ5		136.4	6.5	0.75	145.6	4.4	0.50
87RS2G		133.9	4.0	0.46	142.3	1.0	0.11
9AGFTU		148.2	18.2	2.10	151.9	10.6	1.22
9T9FN7		121.1	-8.9	-1.03	136.8	-4.4	-0.51
9U8KD2	X	137.2	7.3	0.84	149.6	8.4	0.96
9ZDCDY		132.9	2.9	0.34	145.2	4.0	0.46
AC2TNH		120.3	-9.6	-1.11	128.8	-12.4	-1.42
AY2CX4		132.4	2.5	0.28	138.8	-2.4	-0.28
CE7DPA		130.3	0.3	0.04	138.8	-2.5	-0.28
E7XJL5		139.3	9.4	1.08	145.7	4.5	0.51
EENH4T		132.1	2.2	0.25	149.2	7.9	0.91
GNPT5E		131.1	1.2	0.13	137.1	-4.1	-0.47
GU6H8V	X	143.5	13.6	1.57	161.2	19.9	2.28
H3RLM4	X	57.0	-72.9	-8.42	55.5	-85.7	-9.81
H82ZM8		136.5	6.6	0.76	152.0	10.8	1.23
HJEW96		125.9	-4.1	-0.47	139.5	-1.8	-0.20
HR1MCE		126.1	-3.8	-0.44	148.4	7.2	0.82
JFTERL		121.2	-8.7	-1.01	135.6	-5.6	-0.65
KA2WCE		137.2	7.3	0.84	147.6	6.3	0.72
KFCTYF		137.9	8.0	0.92	147.6	6.4	0.73
KHGR3G		125.8	-4.2	-0.48	137.4	-3.8	-0.44
LE6R22	*	150.1	20.1	2.32	166.5	25.2	2.89
LSHB59		124.5	-5.4	-0.63	140.8	-0.5	-0.06
MD3DSL		136.4	6.5	0.75	146.2	5.0	0.57
RBRECT		139.1	9.2	1.06	152.7	11.5	1.31
RS8TTD		119.6	-10.3	-1.19	125.0	-16.2	-1.85
S2YKJ5		126.8	-3.1	-0.36	139.2	-2.0	-0.23
VLCS52		126.1	-3.8	-0.44	141.0	-0.2	-0.03
WGHSNQ	X	147.2	17.3	1.99	138.4	-2.8	-0.33
X35SZZ		134.6	4.7	0.54	144.5	3.2	0.37
YLERK1		118.9	-11.0	-1.27	128.1	-13.1	-1.50
YYXH41		128.1	-1.8	-0.21	148.4	7.1	0.81
YZQFAP		125.4	-4.6	-0.53	139.4	-1.8	-0.21

**Tearing Strength - Packaging Papers**

	<b>Sample SD45</b>	<b>Summary Statistics</b>	<b>Sample SD46</b>
Grand Means	129.94 Grams		141.25 Grams
SD Btwn Labs	8.66 Grams		8.74 Grams
Statistics based on 38 of 43 reporting participants			

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

2P47M5 (X) - Data appear to be off by a factor of 4; data converted by CTS (x4).

9U8KD2 (X) - Data appear to be off by a factor of 8; data converted by CTS (x8).

GU6H8V (X) - Data appear to be off by a factor of 4; data converted by CTS (x4).

H3RLM4 (X) - Extreme data.

WGHSNQ (X) - Inconsistent in testing between samples.

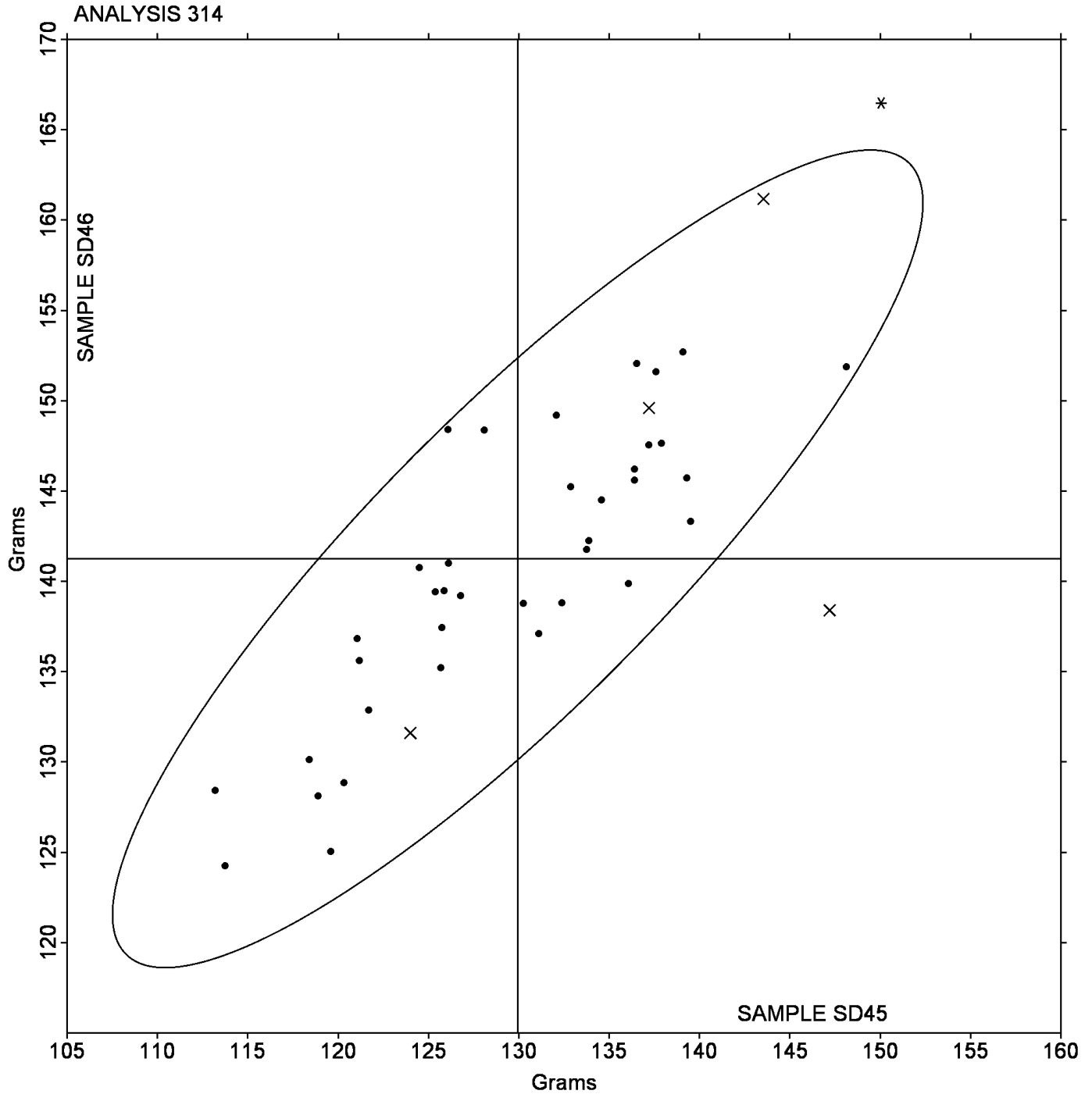
TAPPI-CTS Interlaboratory Testing Program

Analysis 314

Tearing Strength - Packaging Papers

Grand Mean Sample SD45 = 129.94 Grams

Grand Mean Sample SD46 = 141.25 Grams



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

WebCode	Data Flag	Sample SR45			Sample SR46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
171VZG		2.224	-0.009	-0.08	1.907	-0.056	-0.50
1XCJXG		2.437	0.203	1.79	2.146	0.182	1.63
7EF6TN		2.165	-0.068	-0.60	1.870	-0.093	-0.83
8LKYJK		2.156	-0.077	-0.68	1.917	-0.046	-0.41
9MECWG		2.220	-0.013	-0.11	2.006	0.043	0.39
9SK8DW		2.182	-0.051	-0.45	1.917	-0.046	-0.41
BP6JVH		2.242	0.009	0.08	1.927	-0.036	-0.32
C5NCTF		2.325	0.092	0.81	2.056	0.093	0.83
CWQG4A	X	1.609	-0.624	-5.49	1.456	-0.507	-4.53
ECYC5U		2.241	0.008	0.07	1.988	0.025	0.22
K7TXDD		2.175	-0.058	-0.51	1.875	-0.088	-0.79
LLT28Y		2.236	0.003	0.02	1.914	-0.050	-0.44
RQTZPQ		2.339	0.106	0.93	2.021	0.057	0.51
UM9714		1.934	-0.300	-2.64	1.710	-0.253	-2.26
V1DT89		2.293	0.060	0.53	2.116	0.152	1.36
Z1YEV3		2.329	0.096	0.84	2.077	0.114	1.02

		Summary Statistics	
	Sample SR45		Sample SR46
Grand Means	2.2332 kN/m		1.9631 kN/m
SD Btwn Labs	0.1135 kN/m		0.1120 kN/m
Statistics based on 15 of 16 reporting participants			

**Comments on assigned Data Flags for Test #320**

CWQG4A (X) - Extreme data.

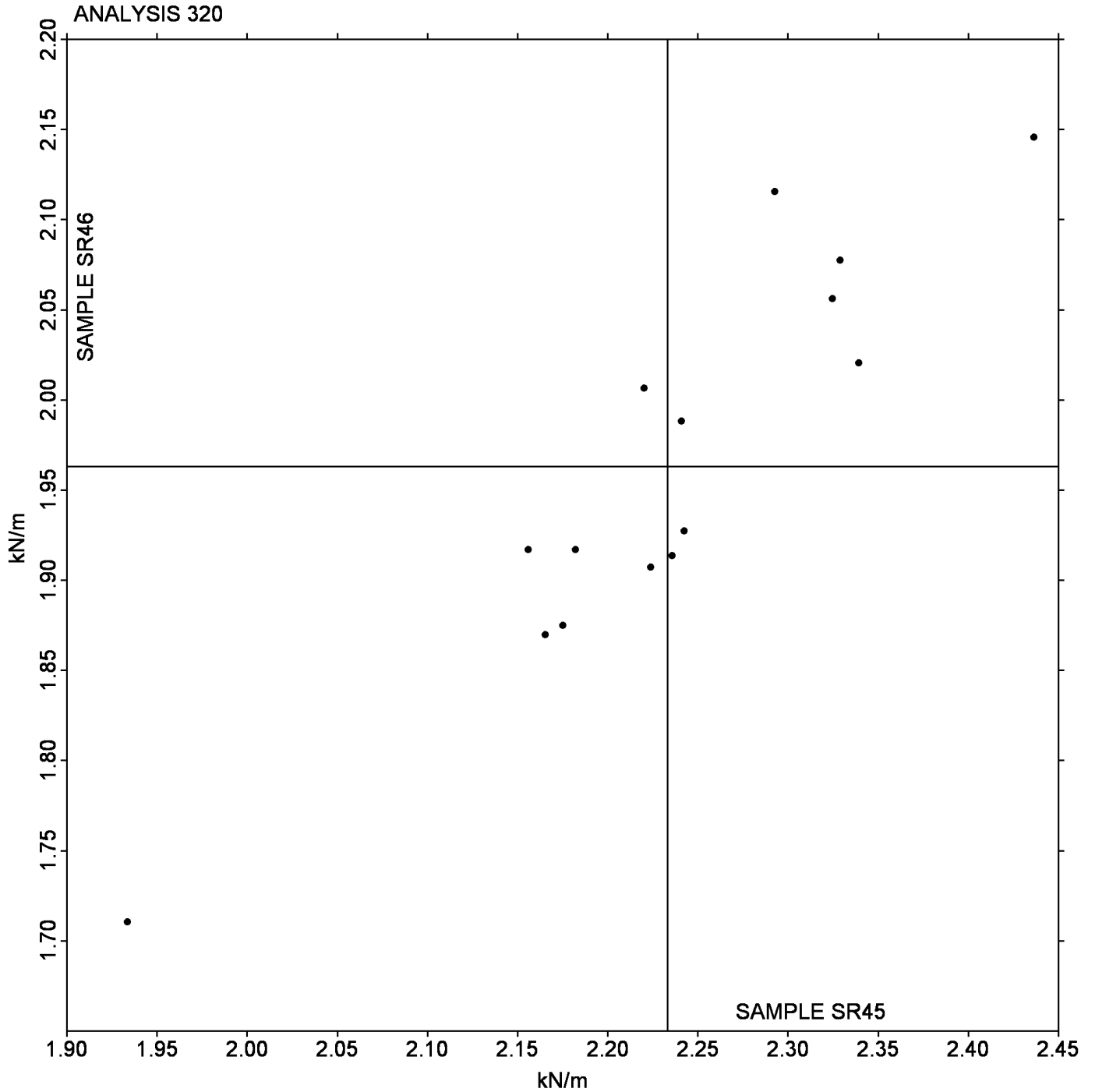
**Analysis Notes:**

C5NCTF - 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 **SR45** = 2.2332 kN/m

Grand Mean Sample **SR46** = 1.9631 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 SR45			Sample SR46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3ZUHXV		12.00	-0.67	-0.72	9.99	-0.73	-1.02
4EPAAB		13.15	0.48	0.51	10.66	-0.06	-0.09
5FGGBL		14.37	1.70	1.83	11.94	1.22	1.71
6GSJYK		14.55	1.88	2.02	11.36	0.64	0.89
6VP1JB		12.10	-0.58	-0.62	9.87	-0.85	-1.20
7ZFZ9M		12.37	-0.30	-0.32	11.15	0.43	0.60
95XAD1		11.46	-1.22	-1.31	10.27	-0.45	-0.63
D1H7FT		12.77	0.09	0.10	10.93	0.21	0.29
DQ1K8D		12.78	0.10	0.11	11.37	0.65	0.91
GBJLGV		12.19	-0.49	-0.52	9.31	-1.41	-1.98
L6GKHG		12.93	0.26	0.28	10.86	0.14	0.20
SAZ2M3		11.67	-1.01	-1.08	11.01	0.29	0.40
VXEEN5	X	15.91	3.24	3.48	15.12	4.40	6.16
ZZPD94		12.41	-0.26	-0.28	10.67	-0.06	-0.08

Summary Statistics		
	Sample SR45	Sample SR46
Grand Means	12.672 Joules/sq m	10.723 Joules/sq m
SD Btwn Labs	0.931 Joules/sq m	0.713 Joules/sq m
Statistics based on 13 of 14 reporting participants		

**Comments on assigned Data Flags for Test #321**

VXEEN5 (X) - Extreme data.

**Analysis Notes:**

4EPAAB - Data appear to be reported as ft-lb/sq ft, not in-lb/sq in as indicated on datasheet. Changed by CTS.

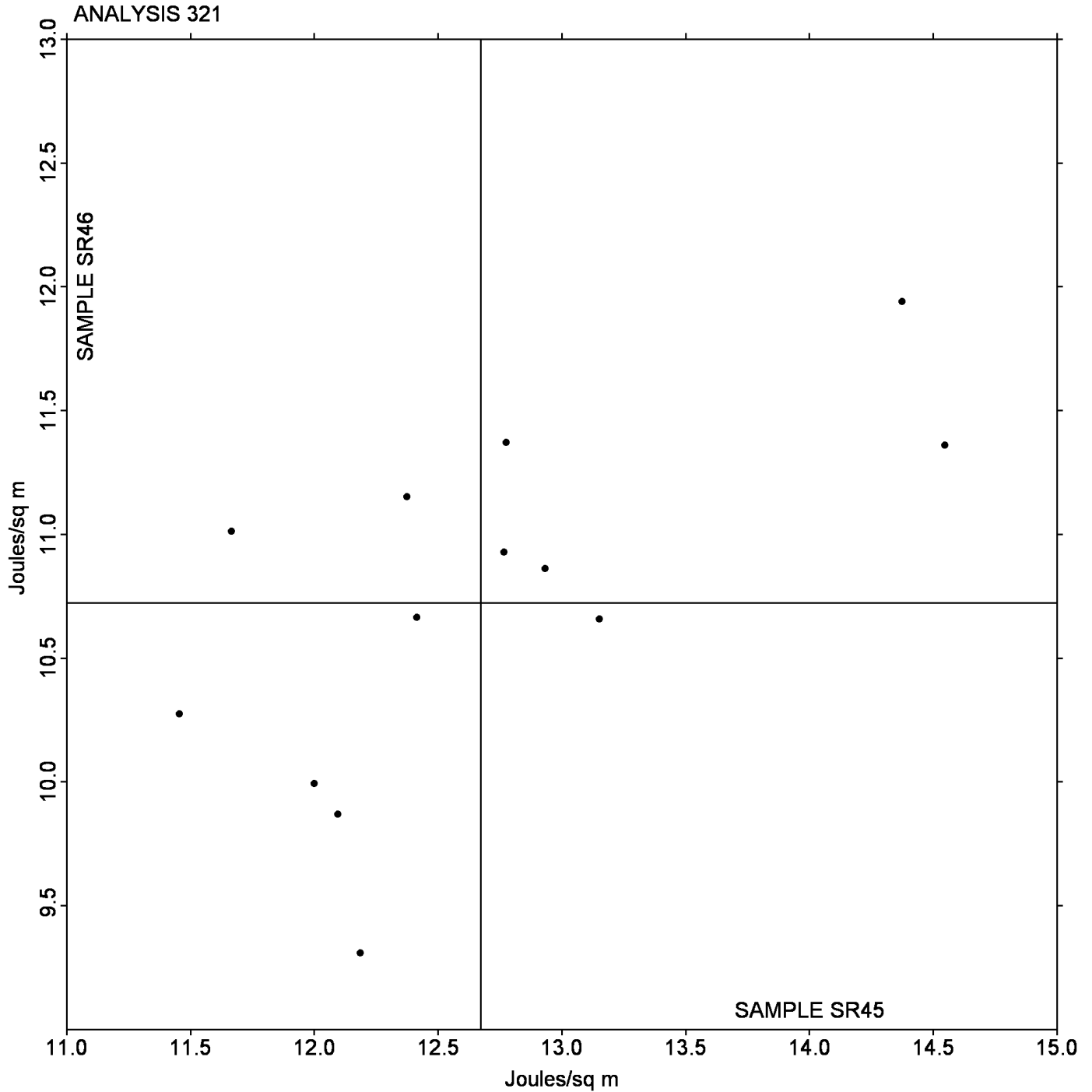
TAPPI-CTS Interlaboratory Testing Program

Analysis 321

Tensile Energy Absorption - Newsprint

Grand Mean Sample **SR45** = 12.672 Joules/sq m

Grand Mean Sample **SR46** = 10.723 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 SR45			Sample SR46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
1GNA34		0.933	-0.091	-0.71	0.8930	-0.1010	-0.77
2ABE99		1.010	-0.014	-0.11	0.9840	-0.0100	-0.08
43ALKZ		1.140	0.116	0.90	1.1200	0.1260	0.96
55YXWV		1.160	0.136	1.06	1.2293	0.2354	1.79
9J4QNH		1.125	0.101	0.78	1.0290	0.0350	0.27
B6A9X2		0.908	-0.116	-0.91	0.8150	-0.1790	-1.36
E6KYPP		0.899	-0.125	-0.98	0.8560	-0.1380	-1.05
JRZGK4		1.030	0.006	0.04	1.0020	0.0080	0.06
PQP3PC		0.927	-0.097	-0.76	0.9579	-0.0361	-0.27
Q3YSM4		0.938	-0.086	-0.67	0.9020	-0.0920	-0.70
RJN6RQ		1.022	-0.002	-0.02	0.9625	-0.0314	-0.24
T68LX1		0.906	-0.118	-0.92	0.9210	-0.0730	-0.55
XKLKMV		1.344	0.320	2.49	1.2670	0.2730	2.08
Z7AT47		0.999	-0.026	-0.20	0.9767	-0.0173	-0.13

		Summary Statistics	
	Sample SR45		Sample SR46
Grand Means	1.0244 Percent		0.99396 Percent
SD Btwn Labs	0.1282 Percent		0.13151 Percent
Statistics based on 14 of 14 reporting participants			

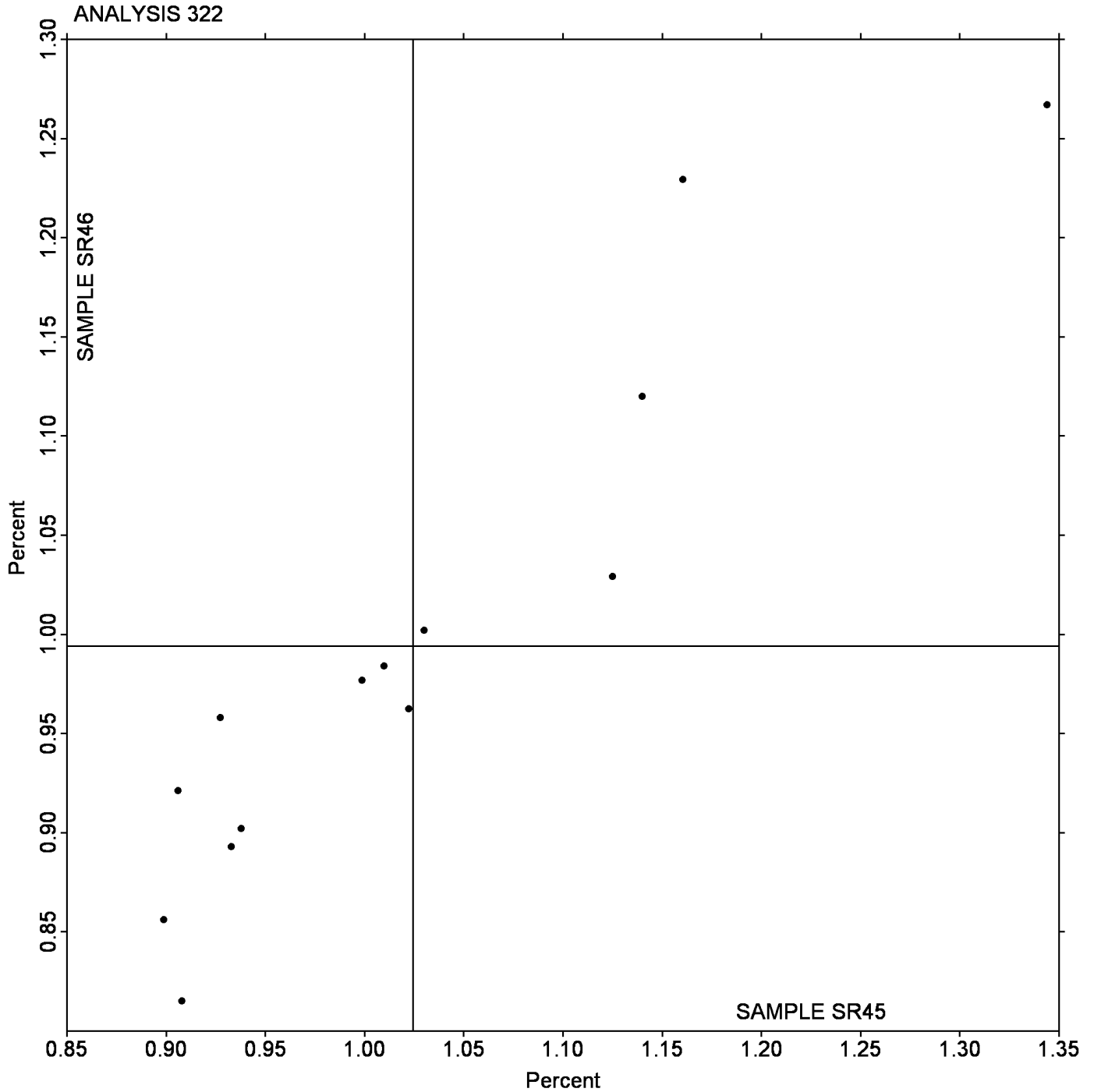
**Notes for Analysis 322**

No Data Flags assigned for this analysis.

**Elongation to Break - Newsprint**

Grand Mean Sample **SR45** = 1.0244 Percent

Grand Mean Sample **SR46** = 0.99396 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 SF45			Sample SF46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
1Y7CCE		5.517	-0.146	-0.46	5.723	-0.262	-0.77	TO
2F5C36		6.016	0.354	1.12	6.005	0.019	0.06	LH
349J99	X	11.037	5.374	16.96	11.510	5.524	16.20	IM
3D9D2D		5.501	-0.162	-0.51	5.958	-0.028	-0.08	TO
3HP6BZ		5.064	-0.598	-1.89	5.596	-0.390	-1.14	TO
42M7BH	*	5.263	-0.399	-1.26	5.243	-0.743	-2.18	TF
4A5QFW		5.697	0.034	0.11	6.204	0.218	0.64	TI
4BFR2U		6.074	0.411	1.30	6.289	0.304	0.89	TA
4F1HKC		5.486	-0.176	-0.56	6.012	0.026	0.08	LH
59USGQ		5.363	-0.300	-0.95	5.749	-0.236	-0.69	LH
5U6QJ8		5.422	-0.241	-0.76	5.804	-0.182	-0.53	TP
75EUGU		5.484	-0.178	-0.56	5.824	-0.162	-0.48	TB
7FFAB5		6.108	0.446	1.41	6.568	0.582	1.71	TB
84RTWB		6.147	0.485	1.53	6.519	0.533	1.56	LX
8HEVJB		6.008	0.346	1.09	6.459	0.473	1.39	TO
8Q1UE3		5.773	0.111	0.35	6.210	0.224	0.66	TP
8QZV8N		5.680	0.018	0.06	6.005	0.019	0.06	KA
8ZD4JV		5.841	0.179	0.56	6.144	0.158	0.46	LI
9BLSVJ		5.399	-0.264	-0.83	5.836	-0.149	-0.44	TB
9R413M		5.309	-0.353	-1.11	5.657	-0.329	-0.97	TX
ADTW6R	X	5.730	0.067	0.21	5.754	-0.232	-0.68	TI
AGD3TN		5.630	-0.032	-0.10	6.135	0.149	0.44	LH
BL1JCS		5.926	0.264	0.83	6.226	0.240	0.70	LI
BRCY6V		5.562	-0.100	-0.32	6.066	0.081	0.24	IM
BV84N1		5.523	-0.139	-0.44	5.911	-0.075	-0.22	LH
BWDMGB	X	6.668	1.005	3.17	6.163	0.177	0.52	TJ
C4FNKH		5.643	-0.019	-0.06	5.956	-0.030	-0.09	LH
CMK39G		5.955	0.293	0.92	6.242	0.256	0.75	LH
CZW3MN		5.716	0.054	0.17	5.973	-0.013	-0.04	LH
DU8BZX		6.071	0.409	1.29	6.375	0.390	1.14	LH
DWBR7H		5.594	-0.068	-0.21	5.693	-0.293	-0.86	XX
E2CANU		5.576	-0.086	-0.27	6.005	0.019	0.06	TO
ETTJUG		6.131	0.469	1.48	6.561	0.575	1.69	TB
EUKUG4		5.583	-0.079	-0.25	6.052	0.067	0.20	TJ
EV8DY3		4.941	-0.721	-2.28	5.187	-0.799	-2.34	SP
EVSJBU		5.631	-0.031	-0.10	5.866	-0.120	-0.35	DL
EZ77VT		5.688	0.026	0.08	5.824	-0.162	-0.47	LA
FB3KZF		5.477	-0.185	-0.58	5.820	-0.166	-0.49	XX
J2MZB3		5.335	-0.328	-1.03	5.930	-0.056	-0.16	TB
KKGHTN		5.911	0.248	0.78	6.170	0.184	0.54	LH
KLWAZ6		5.516	-0.146	-0.46	5.902	-0.084	-0.25	LI
LLGG49		5.644	-0.018	-0.06	5.972	-0.014	-0.04	LH
M7TKAV		6.080	0.418	1.32	6.155	0.169	0.50	LH

TAPPI-CTS Interlaboratory Testing Program

Analysis 325

Tensile Breaking Strength - Printing Papers

WebCode	Data Flag	Sample SF45			Sample SF46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
MKNZT1		5.616	-0.046	-0.15	5.727	-0.259	-0.76	XX
MS4TS5		5.644	-0.019	-0.06	6.003	0.017	0.05	MR
NHYGDR		5.820	0.157	0.50	6.359	0.373	1.09	LH
NRVVDD		5.233	-0.429	-1.35	5.695	-0.290	-0.85	IM
NSEBAS		5.818	0.156	0.49	6.251	0.265	0.78	LX
P9R3BQ		5.682	0.020	0.06	5.842	-0.144	-0.42	TJ
PGL71K		5.891	0.229	0.72	6.163	0.177	0.52	TP
PK4EEL		5.522	-0.140	-0.44	5.926	-0.060	-0.18	LH
R5KU5X		5.363	-0.299	-0.94	5.751	-0.235	-0.69	IX
RMABCD		5.347	-0.315	-1.00	5.937	-0.049	-0.14	LH
RW6GWL	*	6.490	0.828	2.61	6.874	0.888	2.60	LH
TCCFZ9		5.392	-0.270	-0.85	5.616	-0.370	-1.09	LH
U2X6MM		5.802	0.140	0.44	6.173	0.187	0.55	TI
UXCSSF	X	6.893	1.231	3.88	6.387	0.401	1.18	XX
UXE7TZ		5.267	-0.395	-1.25	5.671	-0.315	-0.92	ID
VQWTEF		5.672	0.010	0.03	5.788	-0.198	-0.58	LH
VYC49U		5.560	-0.103	-0.32	5.857	-0.128	-0.38	TO
W21AL9		6.324	0.661	2.09	6.636	0.650	1.91	VM
WEC2LG		6.330	0.668	2.11	6.788	0.802	2.35	LH
XF297K		5.575	-0.087	-0.28	5.710	-0.276	-0.81	XX
XKMTWN	*	4.968	-0.694	-2.19	5.080	-0.906	-2.66	VM
Z4BEH3		5.312	-0.350	-1.11	5.531	-0.455	-1.33	ID
ZKUHL Y		5.825	0.162	0.51	6.143	0.158	0.46	TP
ZQYWA2		5.887	0.225	0.71	6.081	0.095	0.28	TJ
ZSM897		5.589	-0.074	-0.23	5.851	-0.135	-0.40	LH
ZTMPNA		5.838	0.176	0.56	5.799	-0.187	-0.55	TC

Summary Statistics		
	Sample SF45	Sample SF46
Grand Means	5.6623 kN/m	5.9858 kN/m
SD Btwn Labs	0.3169 kN/m	0.3409 kN/m
Statistics based on 65 of 69 reporting participants		

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

349J99 (X) - Extreme data.

ADTW6R (X) - Data appear to be off by a factor of 1000; data converted by CTS (/1000).

BWDMGB (X) - Inconsistent in testing between samples, data for Sample SF45 are high.

UXCSSF (X) - Inconsistent in testing between samples, data for Sample SF45 are high.

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
(IM) - Instron 5500 Series	(IX) - Instron (model not specified)
(KA) - Zwick Model 1425	(LA) - L & W Tensile - Autoline 300
(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	(TI) - Thwing-Albert QC II
(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

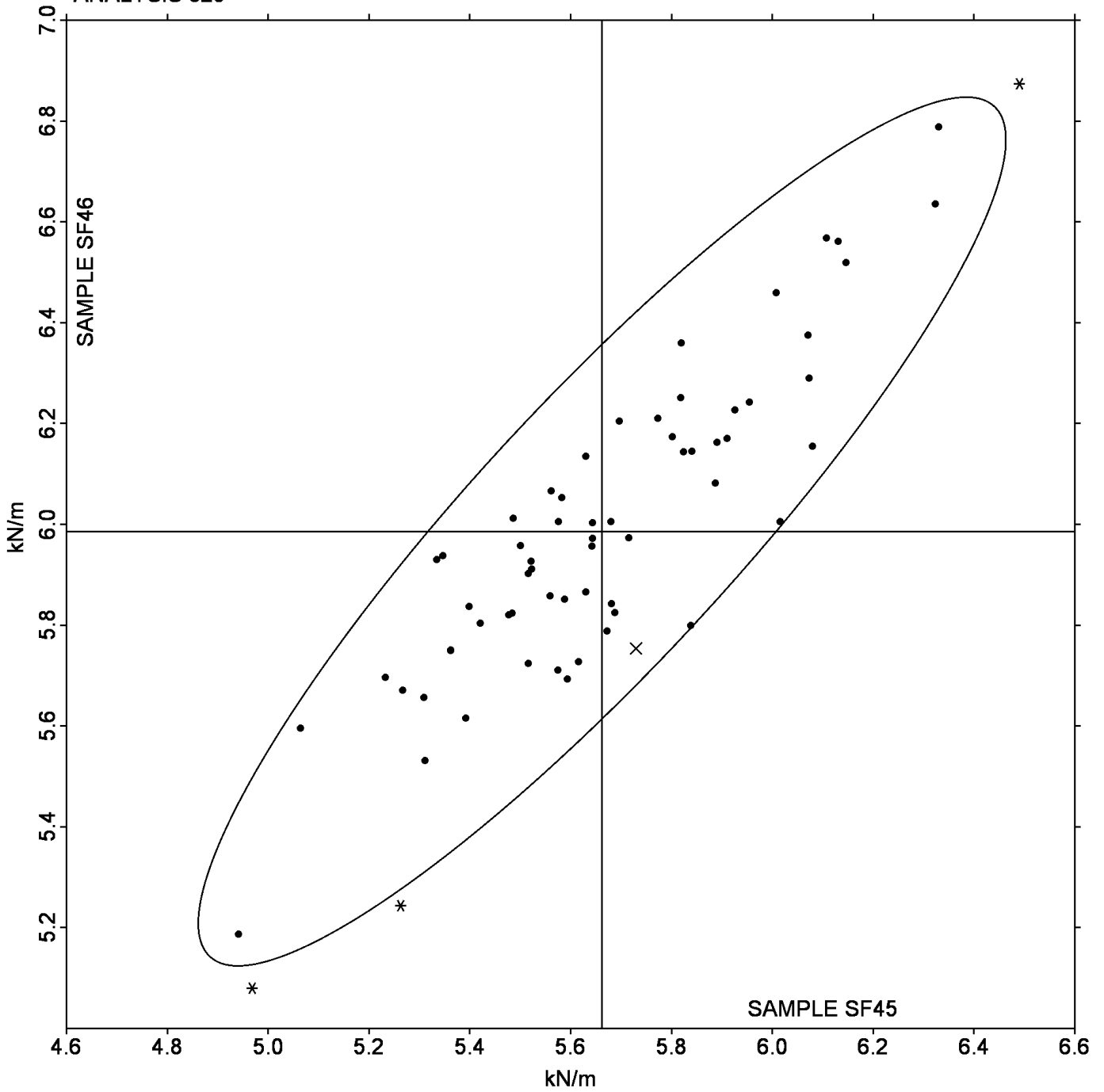
Analysis 325

Tensile Breaking Strength - Printing Papers

Grand Mean Sample SF45 = 5.6623 kN/m

Grand Mean Sample SF46 = 5.9858 kN/m

ANALYSIS 325



## TAPPI-CTS Interlaboratory Testing Program

## Analysis 327

## Tensile Energy Absorption - Printing Papers

WebCode	Data Flag	Sample SF45			Sample SF46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
1UD14V		72.98	0.99	0.16	72.46	1.84	0.31	KA
1VP7YB		77.56	5.57	0.89	73.87	3.25	0.55	LH
3U4HQA		65.13	-6.86	-1.10	63.37	-7.26	-1.24	LH
3VFDB2		75.90	3.91	0.63	74.50	3.88	0.66	LI
4AGPVC		76.62	4.63	0.74	78.52	7.89	1.34	TI
4Q5JVB		73.97	1.98	0.32	75.55	4.93	0.84	LH
6HH36B		66.35	-5.65	-0.91	68.41	-2.21	-0.38	XX
6M4D53		77.88	5.88	0.94	78.78	8.16	1.39	TB
6R8YEM		70.35	-1.64	-0.26	73.36	2.73	0.47	IM
744SVV	X	122.69	50.70	8.13	120.86	50.23	8.55	TB
9BWXSU		56.69	-15.30	-2.45	55.88	-14.74	-2.51	ID
9XTYV4	X	30.21	-41.78	-6.70	29.72	-40.90	-6.97	TP
A89F99	*	80.36	8.37	1.34	69.45	-1.17	-0.20	LI
AD7RRT		74.36	2.37	0.38	71.84	1.21	0.21	LH
AVE2GK		73.71	1.72	0.28	75.61	4.99	0.85	XX
CNQFQ5		69.38	-2.62	-0.42	69.14	-1.49	-0.25	LH
D57GYK		73.94	1.94	0.31	72.56	1.94	0.33	LH
DJQRL3		69.53	-2.47	-0.40	70.09	-0.53	-0.09	LH
DLXYVQ		59.40	-12.59	-2.02	62.47	-8.15	-1.39	TF
ETLEKU		65.32	-6.67	-1.07	59.19	-11.43	-1.95	LA
GGRCZP		75.39	3.40	0.55	71.79	1.17	0.20	LI
GJFDQQ		85.37	13.38	2.15	82.75	12.12	2.06	VM
GYVCYW		69.18	-2.81	-0.45	72.32	1.70	0.29	LI
HCYLPW		79.68	7.69	1.23	79.54	8.91	1.52	XX
HTKB2C		70.12	-1.87	-0.30	72.47	1.84	0.31	ID
HV8QT9		70.45	-1.54	-0.25	68.89	-1.74	-0.30	LI
JQH68B		69.16	-2.83	-0.45	68.15	-2.47	-0.42	LH
KQGM6U		79.17	7.18	1.15	75.01	4.39	0.75	DL
MN9BVG		74.20	2.21	0.35	70.20	-0.42	-0.07	LH
MUFU8P		61.16	-10.83	-1.74	57.85	-12.77	-2.17	LH
N7A45N		70.98	-1.02	-0.16	69.38	-1.24	-0.21	XX
NJAC1J		77.57	5.58	0.89	70.40	-0.22	-0.04	LH
NPTUS7		76.65	4.66	0.75	75.33	4.71	0.80	LH
NUX6H7	X	94.55	22.55	3.62	85.30	14.68	2.50	LH
PYFHF2		77.45	5.46	0.87	73.57	2.95	0.50	TO
QEFFSP		65.82	-6.17	-0.99	69.07	-1.55	-0.26	LH
RH1YVE		80.27	8.28	1.33	75.60	4.97	0.85	VM
RH9DK7		67.74	-4.26	-0.68	69.66	-0.96	-0.16	LH
RLKEFL	X	31.19	-40.80	-6.54	28.82	-41.81	-7.12	TP
SVR141		74.36	2.36	0.38	71.49	0.86	0.15	MR
SYJ1ME		69.03	-2.96	-0.47	70.05	-0.57	-0.10	IM
V6ZC6C	X	308.45	236.46	37.90	302.79	232.17	39.53	IM
W7V5NG		71.54	-0.45	-0.07	65.45	-5.17	-0.88	LH

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

WebCode	Data Flag	Sample SF45			Sample SF46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
WXWLR2		73.13	1.14	0.18	71.87	1.25	0.21	TA
XER7LM		71.60	-0.39	-0.06	66.43	-4.19	-0.71	XX
YS1P3M		75.96	3.97	0.64	75.81	5.19	0.88	LX
ZNTW73		58.24	-13.75	-2.20	58.04	-12.58	-2.14	IM

<b>Summary Statistics</b>			
	<b>Sample SF45</b>		<b>Sample SF46</b>
Grand Means	71.991 Joules/sq m		70.623 Joules/sq m
SD Btwn Labs	6.239 Joules/sq m		5.873 Joules/sq m
Statistics based on 42 of 47 reporting participants			

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

- 744SVV (X) - Extreme data.
- 9XTYV4 (X) - Extreme data.
- NUX6H7 (X) - Inconsistent in testing between samples, data for Sample SF45 are high.
- RLKEFL (X) - Extreme data.
- V6ZC6C (X) - Extreme data.

**Analysis Notes:**

- HCYLPW - Data appear to be reported as ft-lb/sq ft, not in-lb/sq in as indicated on datasheet. Changed by CTS.
- XER7LM - Data appears to be transposed between Analysis 328 (Elongation to Break) and Analysis 327 (TEA). Data switched by CTS.

**Instrument Code List**

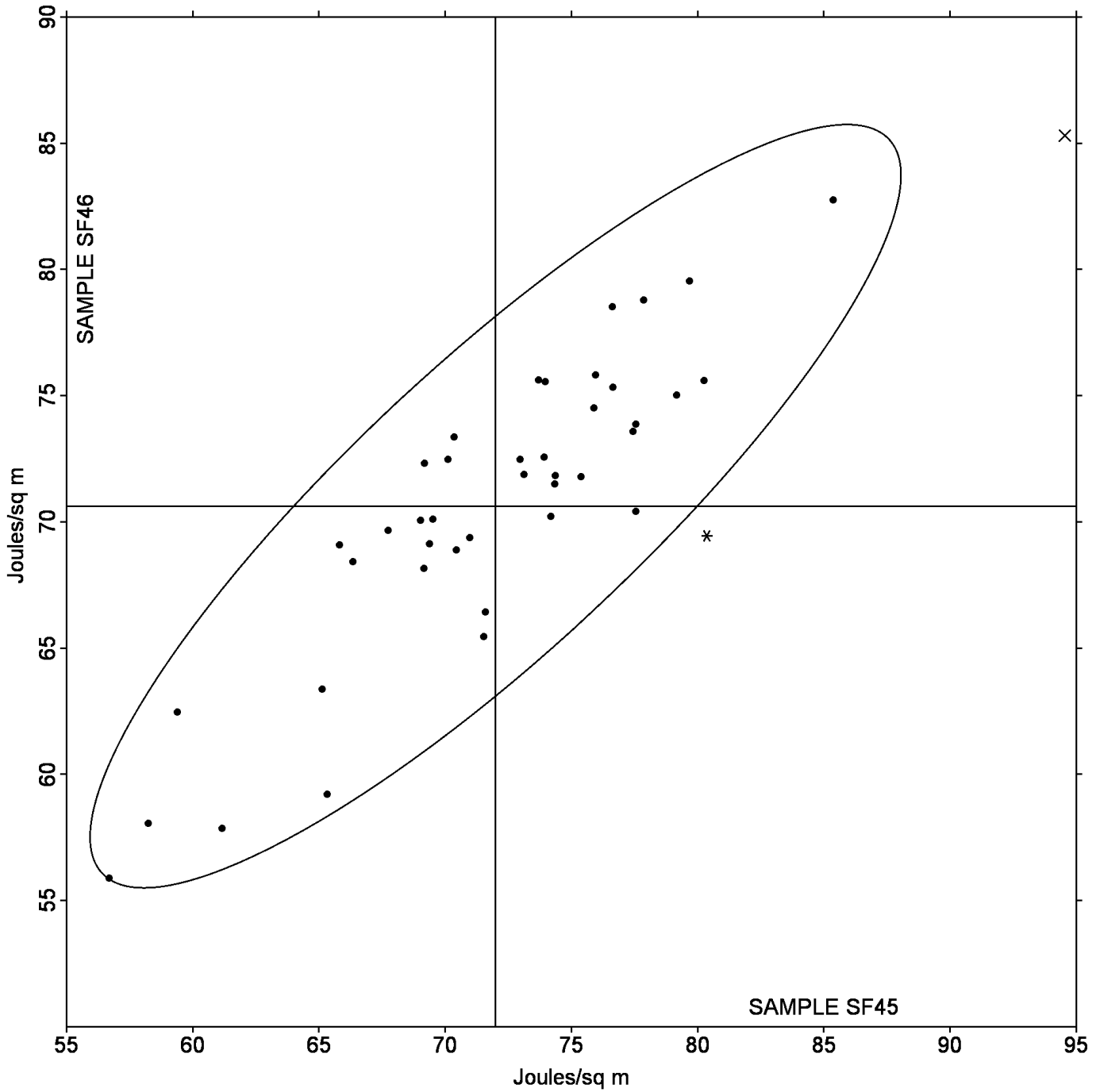
- |   |   |
|---|---|
| (DL) - EMIC DL500 Universal Testing Machines      | (ID) - Instron 4201                           |
| (IM) - Instron 5500 Series                        | (KA) - Zwick Model 1425                       |
| (LA) - L & W Tensile - Autoline 300               | (LH) - L & W Alwetron 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            |
| (TI) - Thwing-Albert QC II                        | (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 327  
Tensile Energy Absorption - Printing Papers

Grand Mean Sample SF45 = 71.991 Joules/sq m

Grand Mean Sample SF46 = 70.623 Joules/sq m

ANALYSIS 327



## TAPPI-CTS Interlaboratory Testing Program

## Analysis 328

## Elongation to Break - Printing Papers

WebCode	Data Flag	Sample SF45			Sample SF46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
12M7BD		1.560	-0.408	-1.86	1.439	-0.389	-1.96	LH
26TFFM	X	2.383	0.415	1.89	2.523	0.695	3.50	TJ
2BDGLD		1.584	-0.384	-1.75	1.563	-0.265	-1.34	LH
2HDFWH		1.925	-0.043	-0.20	1.761	-0.067	-0.34	XX
2U68YD		1.915	-0.053	-0.24	1.798	-0.030	-0.15	LH
2YGMUB		1.892	-0.076	-0.35	1.711	-0.117	-0.59	LH
2ZF2F4		1.820	-0.148	-0.67	1.760	-0.068	-0.34	LH
3AUJLF		2.260	0.292	1.33	2.045	0.217	1.09	XX
3DPK5G		1.954	-0.014	-0.06	1.701	-0.127	-0.64	LI
3SX2NY		1.823	-0.145	-0.66	1.659	-0.169	-0.85	LH
3ZT6CT		2.246	0.278	1.26	1.998	0.170	0.85	LH
3ZXWT6		1.771	-0.197	-0.90	1.692	-0.136	-0.69	LH
4R5295	X	52.360	50.392	229.10	52.375	50.547	254.40	TB
5BX6ZW		2.320	0.352	1.60	2.190	0.362	1.82	VM
6XCV3T		2.052	0.084	0.38	1.915	0.087	0.44	LH
7KVALY	*	2.614	0.646	2.94	2.427	0.599	3.01	VM
832NC5	*	2.410	0.442	2.01	2.320	0.492	2.47	IM
98T6G8		2.005	0.037	0.17	1.947	0.119	0.60	TI
9AJVUG		2.233	0.265	1.20	2.012	0.184	0.92	TO
APYQWB		1.949	-0.019	-0.09	1.827	-0.001	-0.01	LX
B72533		1.855	-0.113	-0.51	1.851	0.023	0.11	XX
B7RZ6S	X	3.419	1.451	6.60	3.181	1.352	6.80	TB
BD5ENW	X	4.268	2.300	10.46	4.009	2.181	10.98	IM
BVB4ZG		1.873	-0.095	-0.43	1.731	-0.097	-0.49	LI
BXMSNL		1.880	-0.088	-0.40	1.784	-0.044	-0.22	KA
C5K84S		1.731	-0.237	-1.08	1.692	-0.136	-0.69	LA
DURPHX		1.870	-0.098	-0.45	1.740	-0.088	-0.45	LI
E97EDP		1.616	-0.352	-1.60	1.529	-0.300	-1.51	ID
FW45P7		1.917	-0.051	-0.23	1.858	0.030	0.15	TB
G8Z2J2		1.900	-0.068	-0.31	1.870	0.042	0.21	TF
HULY3P	X	4.238	2.270	10.32	4.247	2.419	12.17	TP
JWFS5C		1.946	-0.022	-0.10	1.805	-0.023	-0.12	LH
KX4U3C		2.070	0.102	0.46	1.840	0.012	0.06	TJ
LBBS8Q		1.967	-0.001	-0.01	1.755	-0.073	-0.37	XX
LH23MV		2.063	0.095	0.43	1.887	0.059	0.29	DL
LWF1DU		1.888	-0.080	-0.36	1.782	-0.046	-0.23	LH
MLSZ7D		1.859	-0.109	-0.50	1.762	-0.066	-0.33	LH
MNPYB7		1.987	0.019	0.09	1.818	-0.010	-0.05	MR
N8MHCA		2.033	0.065	0.29	1.920	0.091	0.46	TX
P8PJZM		1.596	-0.372	-1.69	1.409	-0.419	-2.11	LH
SVUNTD		2.270	0.302	1.37	2.097	0.269	1.35	XX
T13BUJ		1.894	-0.074	-0.34	1.736	-0.092	-0.47	LH
TNAPUQ		1.854	-0.114	-0.52	1.752	-0.076	-0.38	LH

TAPPI-CTS Interlaboratory Testing Program

Analysis 328

Elongation to Break - Printing Papers

WebCode	Data Flag	Sample SF45			Sample SF46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
UEXHM8		2.039	0.071	0.32	1.786	-0.042	-0.21	LH
US41B9		2.241	0.273	1.24	1.935	0.107	0.54	TB
W3JZAV	X	1.617	-0.351	-1.60	1.756	-0.072	-0.36	XX
WKSTA5		1.813	-0.155	-0.71	1.701	-0.127	-0.64	LH
WPDNE9		1.947	-0.021	-0.10	1.883	0.054	0.27	ID
WYATTG	X	3.895	1.927	8.76	4.161	2.333	11.74	TP
Y799CT		2.001	0.032	0.15	1.843	0.015	0.07	TB
YARFQU		2.071	0.103	0.47	1.877	0.049	0.24	XX
YQ5B3P		1.730	-0.238	-1.08	1.590	-0.238	-1.20	IM
Z4G7T5		1.907	-0.061	-0.28	1.753	-0.075	-0.38	LI
ZETWEF		2.352	0.384	1.75	2.188	0.360	1.81	XX
ZJMQZH	X	2.380	0.412	1.87	1.850	0.022	0.11	TF

Sample SF45		Summary Statistics	Sample SF46	
Grand Means	1.9681 Percent		1.8285 Percent	
SD Btwn Labs	0.2200 Percent		0.1987 Percent	
Statistics based on 47 of 55 reporting participants				

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

- 26TFFM (X) - Inconsistent in testing between samples, data for Sample SF46 are high.
- 4R5295 (X) - Extreme data.
- B7RZ6S (X) - Extreme data.
- BD5ENW (X) - Extreme data.
- HULY3P (X) - Extreme data.
- W3JZAV (X) - Inconsistent in testing between samples.
- WYATTG (X) - Extreme data.
- ZJMQZH (X) - Inconsistent in testing between samples and within the replicate measurements for Sample SF45.

**Analysis Notes:**

2HDFWH - Data appears to be transposed between Analysis 327 (TEA) and Analysis 328 (Elongation to Break). Data switched by CTS.

**Elongation to Break - Printing Papers**

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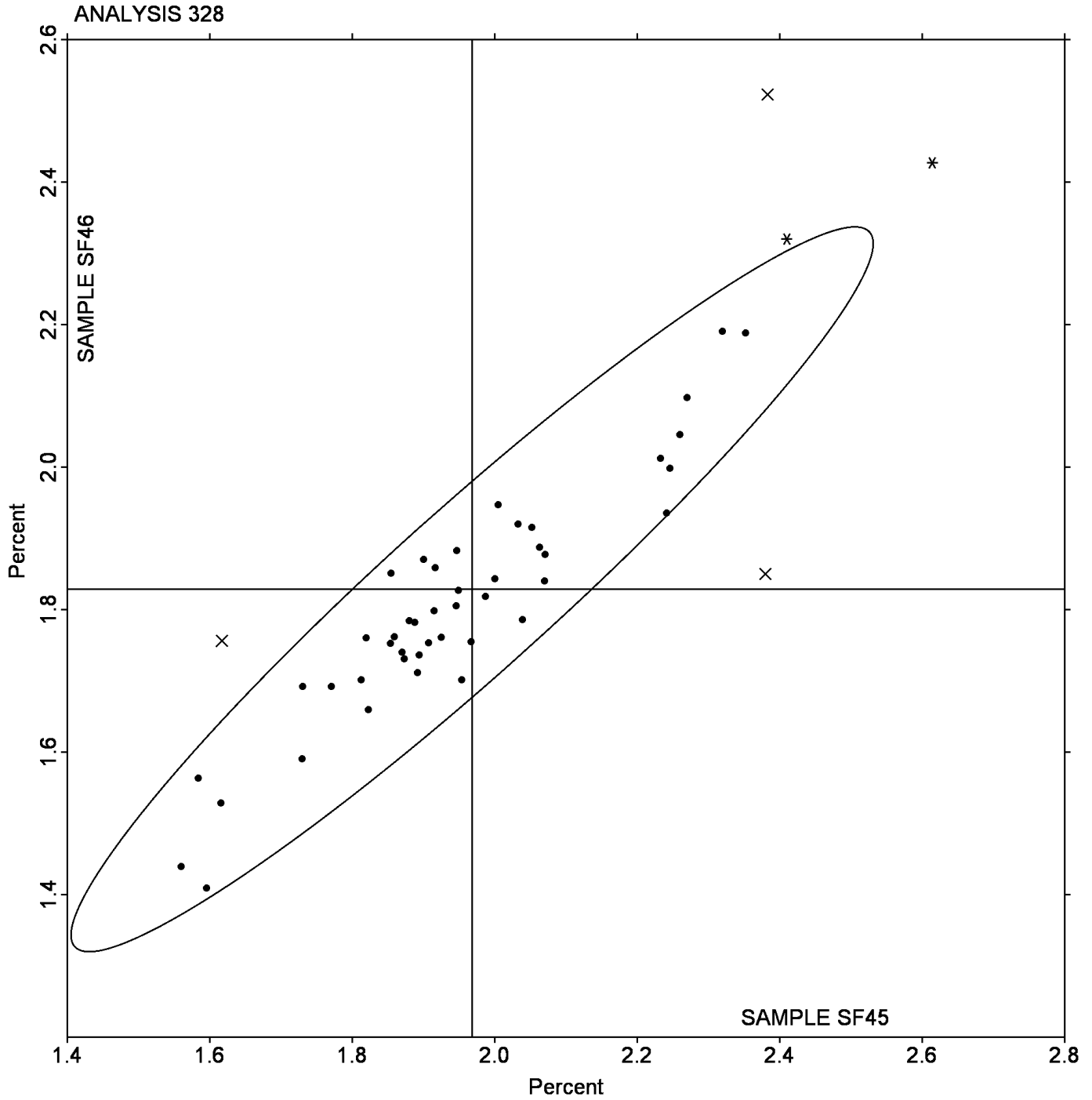
**Instrument Code List**

(DL) - EMIC DL500 Universal Testing Machines	(ID) - Instron 4201
(IM) - Instron 5500	(KA) - Zwick Model 1425
(LA) - L & W Tensile - Autoline 300	(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	(TI) - Thwing-Albert QC II
(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 328  
Elongation to Break - Printing Papers

Grand Mean Sample SF45 = 1.9681 Percent

Grand Mean Sample SF46 = 1.8285 Percent



## TAPPI-CTS Interlaboratory Testing Program

## Analysis 330

## Tensile Breaking Strength - Packaging Papers

WebCode	Data Flag	Sample SE45			Sample SE46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
1C5WYQ		7.560	-0.102	-0.18	9.455	0.055	0.08	ID
2A4YRV		7.885	0.223	0.40	9.480	0.079	0.12	SP
2CHVKL		7.875	0.214	0.39	10.360	0.960	1.46	LH
2PMAYB		7.235	-0.427	-0.77	8.940	-0.461	-0.70	LW
3UB75D		7.335	-0.327	-0.59	9.253	-0.148	-0.22	IM
423CPM		8.203	0.541	0.98	9.796	0.395	0.60	TB
4FYV3Y		8.143	0.482	0.87	10.070	0.669	1.02	TO
4H7AN6	*	6.417	-1.245	-2.26	8.912	-0.488	-0.74	TO
7NMPPL		7.363	-0.298	-0.54	9.228	-0.173	-0.26	SB
8CMVBU		7.004	-0.658	-1.19	8.829	-0.572	-0.87	TE
8LYCQF		7.735	0.073	0.13	9.294	-0.107	-0.16	TP
9EXYWX		7.245	-0.417	-0.76	9.352	-0.049	-0.07	IN
9F3K8B		7.557	-0.105	-0.19	9.137	-0.264	-0.40	LW
APT25D		7.154	-0.508	-0.92	8.319	-1.082	-1.64	IA
B718Y1		6.959	-0.703	-1.27	8.504	-0.897	-1.36	IX
BNXANJ		8.182	0.520	0.94	10.171	0.771	1.17	TP
C3Z1T9		7.043	-0.619	-1.12	8.630	-0.771	-1.17	XX
CJWMKG		8.494	0.832	1.51	9.597	0.196	0.30	TK
CWH93A		7.661	-0.001	0.00	8.861	-0.540	-0.82	ID
E4931D		8.771	1.109	2.01	11.005	1.604	2.44	LA
EVCU7M		8.084	0.422	0.76	10.108	0.708	1.07	LH
EXD19L		7.916	0.254	0.46	9.686	0.285	0.43	IK
F4W5PM		7.525	-0.137	-0.25	9.588	0.187	0.28	LH
GYU7AU		8.226	0.564	1.02	10.301	0.900	1.37	TA
HL69B3		7.716	0.054	0.10	9.486	0.086	0.13	LH
MEVZBJ		7.183	-0.479	-0.87	8.579	-0.822	-1.25	IF
NEKETL		7.639	-0.023	-0.04	9.137	-0.264	-0.40	XX
NQAL4C	X	7.602	-0.060	-0.11	9.429	0.028	0.04	LH
P1M8S4		6.941	-0.721	-1.31	8.719	-0.682	-1.04	IK
TM4AFX		8.825	1.163	2.11	10.313	0.913	1.39	TK
U2YLSE		8.082	0.420	0.76	10.275	0.874	1.33	TO
U3Q95V		7.627	-0.035	-0.06	9.140	-0.261	-0.40	TO
UJ4A5S		7.528	-0.133	-0.24	9.198	-0.203	-0.31	XX
W3X783		7.775	0.113	0.21	9.217	-0.184	-0.28	TB
WERZT2		7.434	-0.228	-0.41	8.865	-0.536	-0.81	TB
XDHPMV		8.618	0.956	1.73	10.399	0.999	1.52	TO
ZGEE1T		7.653	-0.008	-0.02	9.414	0.014	0.02	IM
ZMJVE1		6.896	-0.766	-1.39	8.208	-1.193	-1.81	SA

TAPPI-CTS Interlaboratory Testing Program  
 Analysis 330

**Tensile Breaking Strength - Packaging Papers**

	Sample SE45	Summary Statistics	Sample SE46
Grand Means	7.6618 kN/m		9.4007 kN/m
SD Btwn Labs	0.5517 kN/m		0.6584 kN/m
Statistics based on 37 of 38 reporting participants			

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

NQAL4C (X) - Data appears to be transposed between Analysis 332 (Elongation to Break) and Analysis 330 (Tensile Breaking Strength). Data switched by CTS.

**Analysis Notes:**

APT25D - Data appear to be reported as Kg/15mm, not lb/15mm as indicated on datasheet. Changed by CTS.

E4931D - Data appear to be reported as lb/inch, not kN/m as indicated on datasheet. Changed by CTS.

**Instrument Code List**

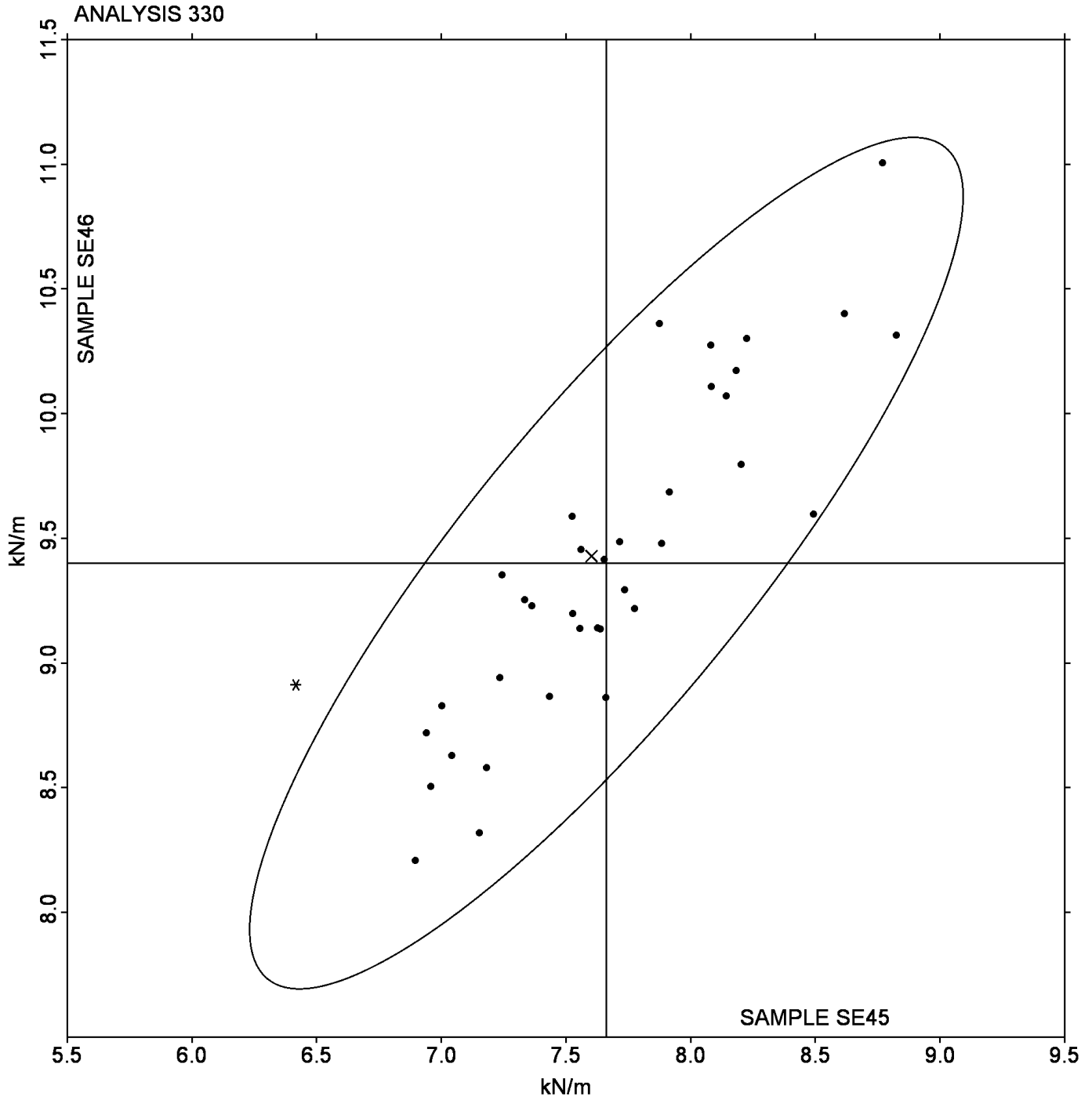
- |   |   |
|---|---|
| (IA) - Instron 1011                           | (ID) - Instron 4201                               |
| (IF) - Instron 3340 Series                    | (IK) - Instron 4400 Series                        |
| (IM) - Instron 5500 Series                    | (IN) - Instron 3360 Series                        |
| (IX) - Instron (model not specified)          | (LA) - L & W Autoline 300                         |
| (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 Intellect 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 |

TAPPI-CTS Interlaboratory Testing Program  
Analysis 330

Tensile Breaking Strength - Packaging Papers

Grand Mean Sample **SE45** = 7.6618 kN/m

Grand Mean Sample **SE46** = 9.4007 kN/m



TAPPI-CTS Interlaboratory Testing Program

Analysis 331

Tensile Energy Absorption - Packaging Papers

WebCode	Data Flag	Sample SE45			Sample SE46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
3WHCWG		101.8	-1.5	-0.13	123.6	-9.5	-0.63	XX
4B9SDM		120.3	17.0	1.51	144.6	11.5	0.76	TO
4CECU9		84.2	-19.1	-1.70	95.9	-37.2	-2.45	IX
7DL1AW		98.4	-4.9	-0.44	139.4	6.2	0.41	LH
8JEVWG		119.1	15.8	1.41	146.3	13.2	0.87	TO
8PWU4V		104.9	1.6	0.15	140.1	7.0	0.46	XX
ANYL6G		87.3	-16.0	-1.42	125.9	-7.2	-0.47	TP
CR9X1H		99.4	-3.8	-0.34	142.6	9.4	0.62	SB
DZDHBP		104.1	0.8	0.07	142.4	9.3	0.61	LH
EDE2U7		106.7	3.4	0.30	133.4	0.2	0.02	LW
EFVV8N		102.9	-0.3	-0.03	138.0	4.9	0.32	IN
HCC7MC		104.9	1.6	0.15	121.6	-11.5	-0.76	TB
JC722A		123.0	19.7	1.75	157.0	23.9	1.58	LA
LR2TP4		102.0	-1.3	-0.11	116.0	-17.1	-1.13	IA
ND9C7M		103.2	-0.1	-0.01	120.9	-12.2	-0.81	XX
QZ5BM4		111.0	7.7	0.68	139.8	6.6	0.44	IM
R66Q5K		131.2	27.9	2.48	162.6	29.5	1.94	TB
THM3XQ		103.9	0.6	0.05	131.0	-2.2	-0.14	LH
TSCP7U		95.8	-7.5	-0.67	129.4	-3.7	-0.24	TE
UU1FVK		99.6	-3.7	-0.33	126.9	-6.3	-0.41	LW
V1J49M		93.4	-9.9	-0.88	135.1	2.0	0.13	IM
WNMFKE	*	88.3	-15.0	-1.33	144.0	10.9	0.72	TO
XEFFW4		93.6	-9.7	-0.87	116.3	-16.9	-1.11	IF
Y87R1U		108.6	5.3	0.47	147.9	14.8	0.98	IK
YRJKH3		94.9	-8.4	-0.75	107.3	-25.8	-1.70	SA

Summary Statistics		
	Sample SE45	Sample SE46
Grand Means	103.29 Joules/sq m	133.12 Joules/sq m
SD Btwn Labs	11.24 Joules/sq m	15.19 Joules/sq m
Statistics based on 25 of 25 reporting participants		

**Notes for Analysis 331**

No Data Flags assigned for this analysis.

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
(IK) - Instron 4400 Series	(IM) - Instron 5500 Series
(IN) - Instron 3360 Series	(IX) - Instron (model not specified)
(LA) - L & W Autoline 300	(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

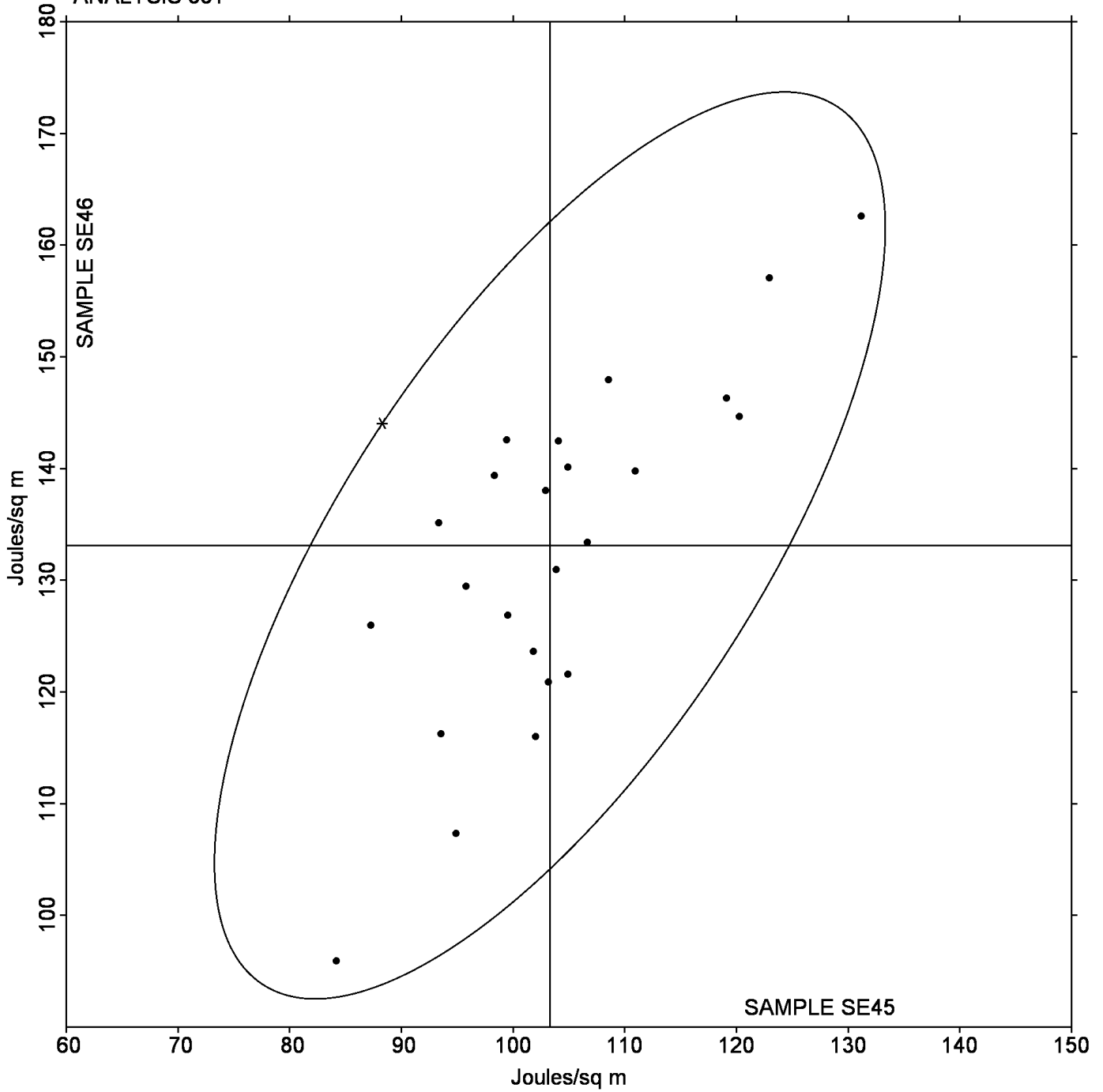
TAPPI-CTS Interlaboratory Testing Program  
Analysis 331

Tensile Energy Absorption - Packaging Papers

Grand Mean Sample SE45 = 103.29 Joules/sq m

Grand Mean Sample SE46 = 133.12 Joules/sq m

ANALYSIS 331



TAPPI-CTS Interlaboratory Testing Program

Analysis 332

Elongation to Break - Packaging Papers

WebCode	Data Flag	Sample SE45			Sample SE46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2S3PFR		2.231	0.172	0.93	2.555	0.370	1.60	TP
2Y8V5P		1.977	-0.082	-0.44	1.988	-0.197	-0.86	IA
5H5TBR		1.994	-0.065	-0.35	2.043	-0.142	-0.62	TB
5P9Q1J		1.986	-0.073	-0.40	2.169	-0.016	-0.07	TE
7LAZ4W		2.142	0.083	0.45	2.283	0.098	0.42	IN
7Z5K8C		1.955	-0.104	-0.57	2.042	-0.143	-0.62	XX
99K9ZG	*	2.577	0.518	2.81	2.625	0.440	1.91	TO
AHDMW		1.949	-0.110	-0.60	1.965	-0.220	-0.95	XX
CNQGN9		2.027	-0.032	-0.18	2.135	-0.050	-0.22	LW
D7NK4Y		2.435	0.376	2.04	2.520	0.335	1.45	TB
EEN5DY		1.792	-0.267	-1.45	1.748	-0.437	-1.90	IX
G4VJZM		1.966	-0.093	-0.50	2.104	-0.081	-0.35	IF
G8BHCL		1.880	-0.179	-0.97	2.080	-0.105	-0.46	LH
GS7W4X		1.922	-0.137	-0.74	2.222	0.037	0.16	SB
JLNME6		2.075	0.016	0.08	2.141	-0.044	-0.19	TO
KZZH6M		2.157	0.098	0.53	2.102	-0.083	-0.36	SA
L7ZA12		2.390	0.330	1.79	2.608	0.422	1.83	IK
NWR9SM		1.969	-0.090	-0.49	2.064	-0.121	-0.53	LW
PQC9GG		2.206	0.147	0.80	2.573	0.388	1.68	TO
Q8G9C9		1.877	-0.182	-0.99	2.110	-0.075	-0.33	LH
QUB9KQ		2.176	0.117	0.63	2.280	0.095	0.41	IM
R22973		1.780	-0.279	-1.51	1.822	-0.363	-1.58	TB
SMKRYZ		2.014	-0.045	-0.25	2.211	0.026	0.11	XX
T3K9YV		2.023	-0.036	-0.20	2.069	-0.116	-0.50	XX
UVPFT9		2.080	0.021	0.11	2.240	0.055	0.24	XX
UZMF6R		1.948	-0.111	-0.60	1.970	-0.215	-0.93	XX
V5TC5Y		1.991	-0.068	-0.37	2.071	-0.114	-0.49	LA
XNLWA8	X	2.091	0.032	0.17	2.171	-0.014	-0.06	LH
Z45BKH		2.143	0.084	0.45	2.443	0.258	1.12	IM
ZYZ2SB	X	0.130	-1.930	-10.46	0.148	-2.037	-8.84	TO

Sample SE45		Summary Statistics	Sample SE46	
Grand Means	2.0594 Percent		2.1851	Percent
SD Btw Labs	0.1844 Percent		0.2305	Percent
Statistics based on 28 of 30 reporting participants				

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

XNLWA8 (X) - Data appears to be transposed between Analysis 330 (Tensile Breaking Strength) and Analysis 332 (Elongation to Break). Data switched by CTS.

ZYZ2SB (X) - Extreme data.

**Elongation to Break - Packaging Papers**

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**Instrument Code List**

(IA) - Instron 1011	(IF) - Instron 3340 Series
(IK) - Instron 4400 Series	(IM) - Instron 5500 Series
(IN) - Instron 3360 Series	(IX) - Instron (model not specified)
(LA) - L & W Autoline 300	(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



TAPPI-CTS Interlaboratory Testing Program

Analysis 334

Folding Endurance (MIT) - Double Folds

WebCode	Data Flag	Sample SG45			Sample SG46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
159WJX		53.80	-1.52	-0.20	83.30	13.30	1.46	MT
5Y2JC3		53.50	-1.82	-0.24	62.90	-7.10	-0.78	MT
6LF2LQ		47.50	-7.82	-1.03	61.50	-8.50	-0.93	MT
8LVTZS		60.80	5.48	0.72	81.60	11.60	1.28	MT
9R6888		49.90	-5.42	-0.71	74.60	4.60	0.51	MT
AEWPXV		37.10	-18.22	-2.40	52.10	-17.90	-1.97	MT
AH63RY		57.10	1.78	0.24	78.00	8.00	0.88	MT
B9Q2RF		70.40	15.08	1.99	68.20	-1.80	-0.20	MT
CPZ26C		53.20	-2.12	-0.28	66.70	-3.30	-0.36	MT
DFXCP7		52.50	-2.82	-0.37	71.50	1.50	0.16	MT
F7PJN4		65.70	10.38	1.37	73.80	3.80	0.42	MT
G4KHMB		53.60	-1.72	-0.23	63.00	-7.00	-0.77	MT
GRC54K		64.90	9.58	1.26	76.80	6.80	0.75	MT
K25NCA		54.10	-1.22	-0.16	64.20	-5.80	-0.64	XX
NMWW78		52.40	-2.92	-0.38	56.00	-14.00	-1.54	MT
RMNJ99		56.70	1.38	0.18	76.50	6.50	0.71	MT
XF61L1		57.20	1.88	0.25	79.30	9.30	1.02	XX

Summary Statistics		
	Sample SG45	Sample SG46
Grand Means	55.318 Double Folds	70.000 Double Folds
SD Btwn Labs	7.579 Double Folds	9.097 Double Folds
Statistics based on 17 of 17 reporting participants		

**Notes for Analysis 334**

No Data Flags assigned for this analysis.

**Instrument Code List**

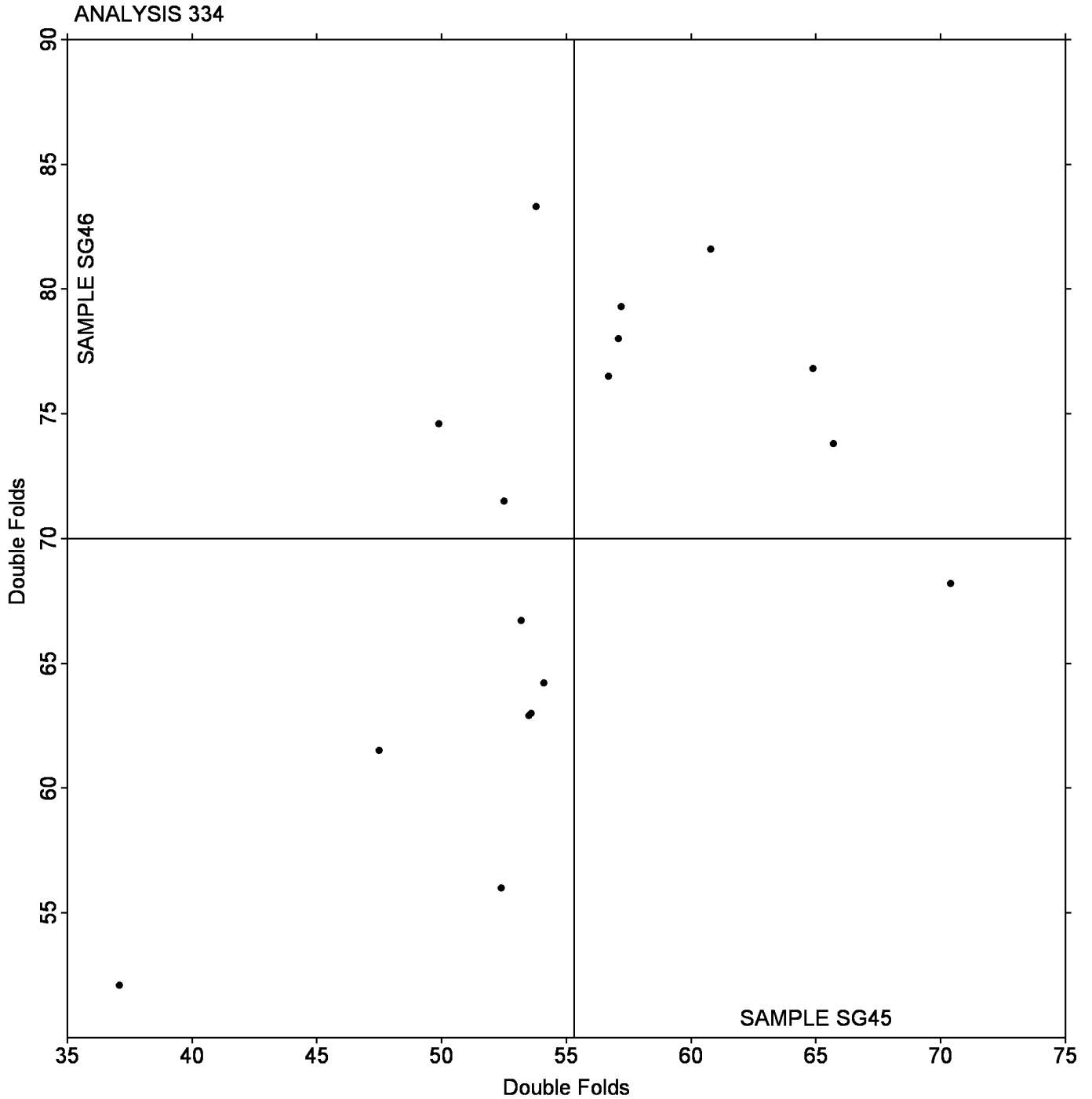
(MT) - MIT - Tinius Olsen

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

TAPPI-CTS Interlaboratory Testing Program  
Analysis 334  
Folding Endurance (MIT) - Double Folds

Grand Mean Sample **SG45** = 55.318 Double Folds

Grand Mean Sample **SG46** = 70.000 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 SH45			Sample SH46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
14PALM		271.1	-22.5	-1.17	251.9	-2.2	-0.11
3EZ343		253.8	-39.7	-2.06	206.7	-47.4	-2.39
48H24W		268.6	-24.9	-1.29	213.6	-40.5	-2.04
4CXR75		286.3	-7.3	-0.38	253.5	-0.6	-0.03
73ZL2G		270.8	-22.7	-1.18	238.4	-15.7	-0.79
7H4LAB		294.3	0.7	0.04	279.0	25.0	1.26
7JWPTK		274.2	-19.3	-1.00	244.4	-9.7	-0.49
ADQRUH		292.5	-1.1	-0.06	272.9	18.8	0.95
D36QE5		284.5	-9.1	-0.47	246.2	-7.9	-0.40
DA2A9T		303.9	10.4	0.54	255.1	1.0	0.05
DNNQVE		301.9	8.3	0.43	262.7	8.6	0.43
KDZJL9		309.5	15.9	0.82	260.4	6.3	0.32
KVNQZU		297.7	4.2	0.22	263.0	8.9	0.45
M3U3ZW		323.2	29.7	1.54	290.8	36.7	1.85
M8N6ZF		324.6	31.1	1.61	275.3	21.2	1.07
P243BZ		315.6	22.0	1.14	264.0	9.9	0.50
R4TU46		310.7	17.1	0.89	250.7	-3.4	-0.17
RBD6L1		307.1	13.6	0.70	267.6	13.5	0.68
RYDX7X		300.5	6.9	0.36	253.8	-0.3	-0.01
SRWNEU		291.6	-2.0	-0.10	251.6	-2.5	-0.13
SVLXYM		324.4	30.9	1.60	267.7	13.6	0.69
U15K3R		291.4	-2.2	-0.11	266.4	12.3	0.62
VY2P6Z		305.2	11.6	0.60	278.3	24.2	1.22
Y5Y7RU		260.5	-33.1	-1.71	218.2	-35.8	-1.81
Y78V55		301.4	7.8	0.40	250.3	-3.8	-0.19
YDHUTH		285.1	-8.5	-0.44	241.1	-13.0	-0.65
Z9ALNZ		275.6	-18.0	-0.93	236.9	-17.2	-0.87

Summary Statistics		
Sample SH45		Sample SH46
Grand Means	293.55 Gurley Units	254.09 Gurley Units
SD Btwn Labs	19.30 Gurley Units	19.85 Gurley Units
Statistics based on 27 of 27 reporting participants		

**Notes for Analysis 336**

No Data Flags assigned for this analysis.

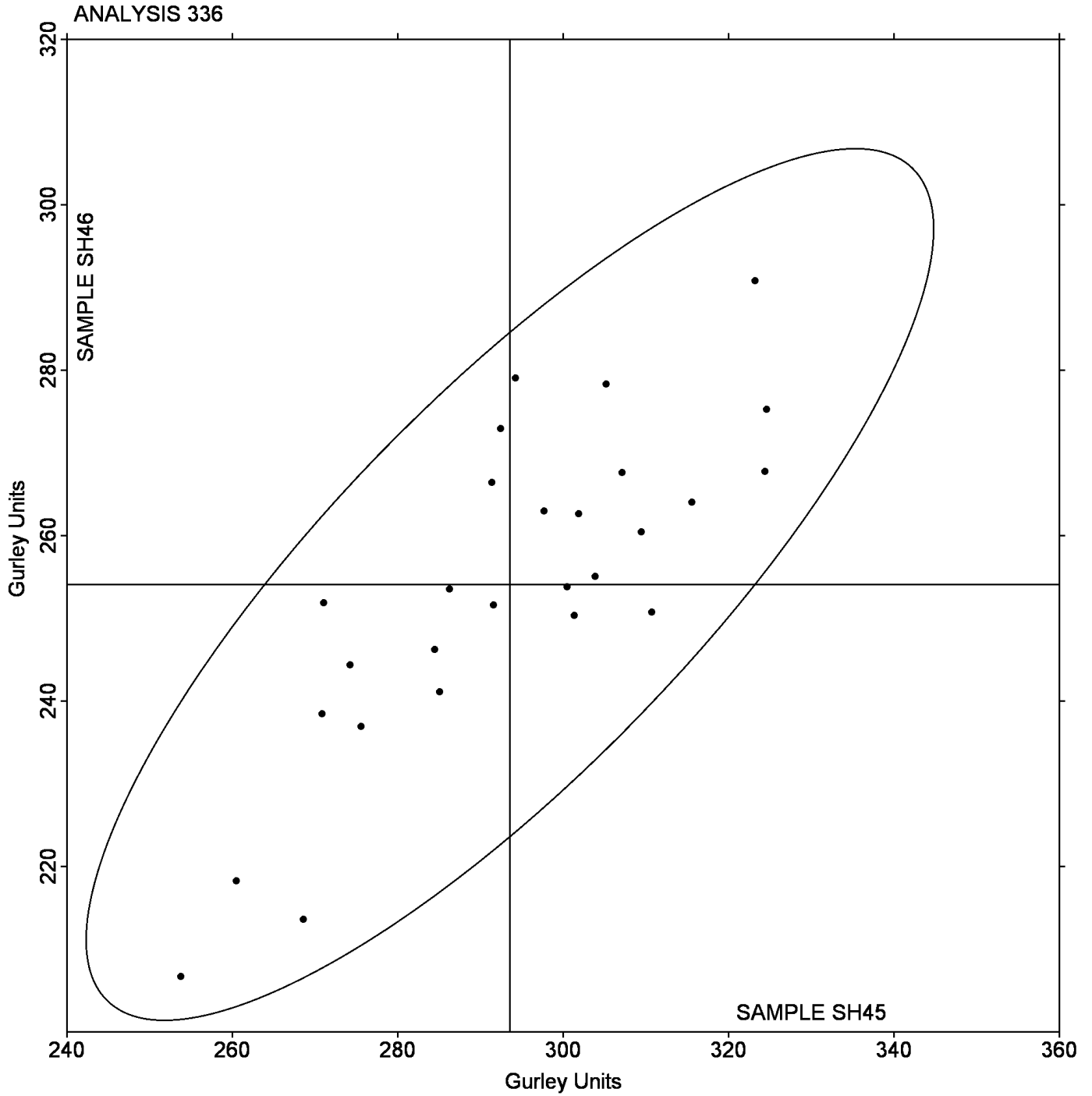
TAPPI-CTS Interlaboratory Testing Program

Analysis 336

Bending Resistance, Gurley Type

Grand Mean Sample SH45 = 293.55 Gurley Units

Grand Mean Sample SH46 = 254.09 Gurley Units



TAPPI-CTS Interlaboratory Testing Program  
Analysis 338

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

WebCode	Data Flag	Sample SJ45			Sample SJ46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
1QHV7Z		4.680	0.490	1.68	4.040	0.317	1.12
1SJQJU		4.144	-0.046	-0.16	3.682	-0.041	-0.14
34XB87	X	3.120	-1.070	-3.67	2.230	-1.493	-5.27
3915GG		4.163	-0.027	-0.09	3.935	0.212	0.75
7453US		3.690	-0.500	-1.71	3.343	-0.380	-1.34
76JZPH		3.986	-0.204	-0.70	3.836	0.113	0.40
7QHP4R		3.937	-0.253	-0.87	3.139	-0.584	-2.06
7WUW5J		3.924	-0.266	-0.91	3.487	-0.236	-0.83
9C42EQ		4.124	-0.066	-0.23	3.642	-0.081	-0.29
D7LNX9		4.535	0.345	1.18	3.862	0.139	0.49
EGQQMJ		4.172	-0.018	-0.06	3.853	0.130	0.46
HAA9QR		4.849	0.659	2.26	4.331	0.608	2.15
HNBYEB		4.234	0.044	0.15	3.616	-0.107	-0.38
HTYA6G		4.180	-0.010	-0.03	3.760	0.037	0.13
JR5TL7		4.145	-0.045	-0.15	3.788	0.065	0.23
N3M6MX		4.459	0.269	0.92	3.753	0.030	0.11
PNE3JB		3.771	-0.419	-1.44	3.309	-0.414	-1.46
SFEXZX	X	11.530	7.340	25.17	9.510	5.787	20.42
WYPP9A		4.370	0.180	0.62	4.050	0.327	1.15
ZWTEGS		4.192	0.002	0.01	3.768	0.045	0.16
ZZJA7C		4.050	-0.140	-0.48	3.540	-0.183	-0.65

		Summary Statistics	
	Sample SJ45		Sample SJ46
Grand Means	4.1897 Taber Units		3.7228 Taber Units
SD Btwn Labs	0.2916 Taber Units		0.2833 Taber Units
Statistics based on 19 of 21 reporting participants			

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

34XB87 (X) - Extreme data.

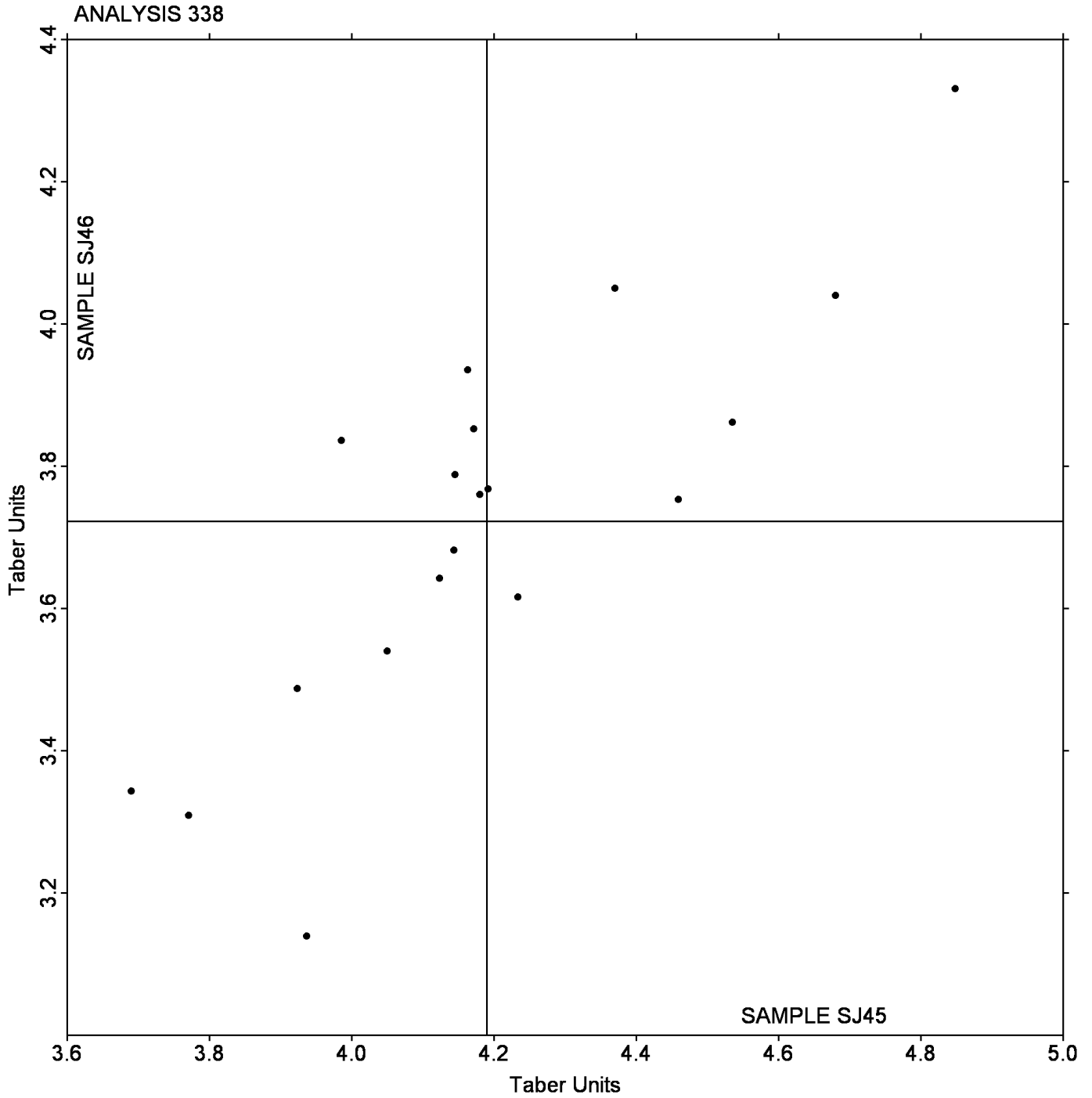
SFEXZX (X) - Extreme data.

TAPPI-CTS Interlaboratory Testing Program  
Analysis 338

Bending Resistance, Taber Type - 0 to 10 Units

Grand Mean Sample **SJ45** = 4.1897 Taber Units

Grand Mean Sample **SJ46** = 3.7228 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 339

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

WebCode	Data Flag	Sample SQ45			Sample SQ46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3XTBTB		19.70	0.19	0.11	28.20	1.16	0.73
5N8NL8		19.95	0.44	0.25	27.25	0.21	0.13
72G68Z		18.81	-0.70	-0.40	26.57	-0.47	-0.30
8H8BH7		20.20	0.69	0.40	26.73	-0.31	-0.20
CMBQ77		21.93	2.42	1.39	29.40	2.36	1.49
HMAJS8		19.50	-0.01	-0.01	27.40	0.36	0.23
NSXFPK		17.61	-1.90	-1.09	25.13	-1.91	-1.21
RA86TL		18.25	-1.26	-0.73	26.55	-0.49	-0.31
TK3F4U		22.31	2.80	1.61	28.90	1.86	1.18
XEY4FK		16.85	-2.66	-1.53	24.27	-2.77	-1.75

		Summary Statistics	
	Sample SQ45		Sample SQ46
Grand Means	19.511 Taber Units		27.040 Taber Units
SD Btwn Labs	1.737 Taber Units		1.579 Taber Units
Statistics based on 10 of 10 reporting participants			

**Notes for Analysis 339**

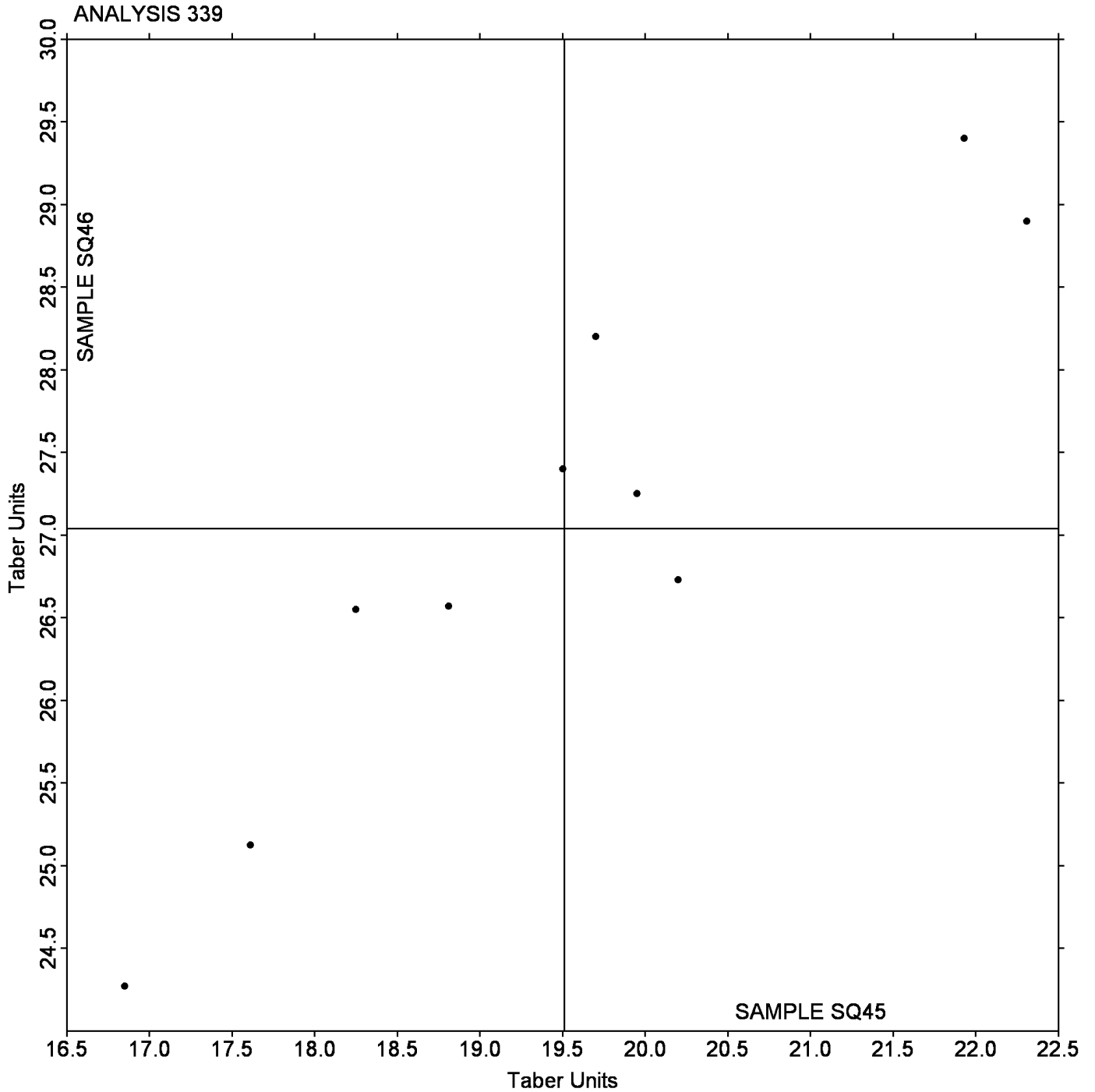
No Data Flags assigned for this analysis.

TAPPI-CTS Interlaboratory Testing Program  
Analysis 339

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

Grand Mean Sample **SQ45** = 19.511 Taber Units

Grand Mean Sample **SQ46** = 27.040 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 ST45			Sample ST46		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2VPHHL	X	90.8	-119.1	-14.94	87.7	-122.5	-16.52
59MDLV		219.3	9.4	1.18	223.0	12.8	1.72
5XHAX2		223.4	13.5	1.69	211.7	1.4	0.19
66S4U1	X	100.1	-109.8	-13.76	101.6	-108.7	-14.65
84BKYA		211.0	1.1	0.14	215.3	5.0	0.67
87WWNL		212.0	2.1	0.26	207.6	-2.6	-0.36
8R2GFE		212.3	2.3	0.29	217.3	7.0	0.94
C6MTCC		203.2	-6.8	-0.85	204.0	-6.3	-0.85
CL766X		208.8	-1.1	-0.14	207.6	-2.6	-0.36
F62B1T		191.4	-18.5	-2.32	197.8	-12.4	-1.68
PD4WCF		215.2	5.3	0.66	211.5	1.3	0.17
R8TS4Y	X	43.4	-166.5	-20.88	42.2	-168.0	-22.65
RW4V4L		212.8	2.9	0.37	212.1	1.9	0.25
VMU7UJ		200.9	-9.0	-1.13	201.7	-8.6	-1.16
W2QNTF		207.1	-2.9	-0.36	222.5	12.3	1.65
X5QUR6		217.6	7.7	0.97	214.0	3.8	0.51
ZEP9MN		209.7	-0.2	-0.03	204.0	-6.2	-0.84
ZX12AY		204.0	-5.9	-0.74	203.8	-6.4	-0.87

Summary Statistics		
	Sample ST45	Sample ST46
Grand Means	209.90 Taber Units	210.25 Taber Units
SD Btwn Labs	7.98 Taber Units	7.42 Taber Units
Statistics based on 15 of 18 reporting participants		

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

2VPHHL (X) - Extreme data.

66S4U1 (X) - Extreme data.

R8TS4Y (X) - Extreme data.

**Analysis Notes:**

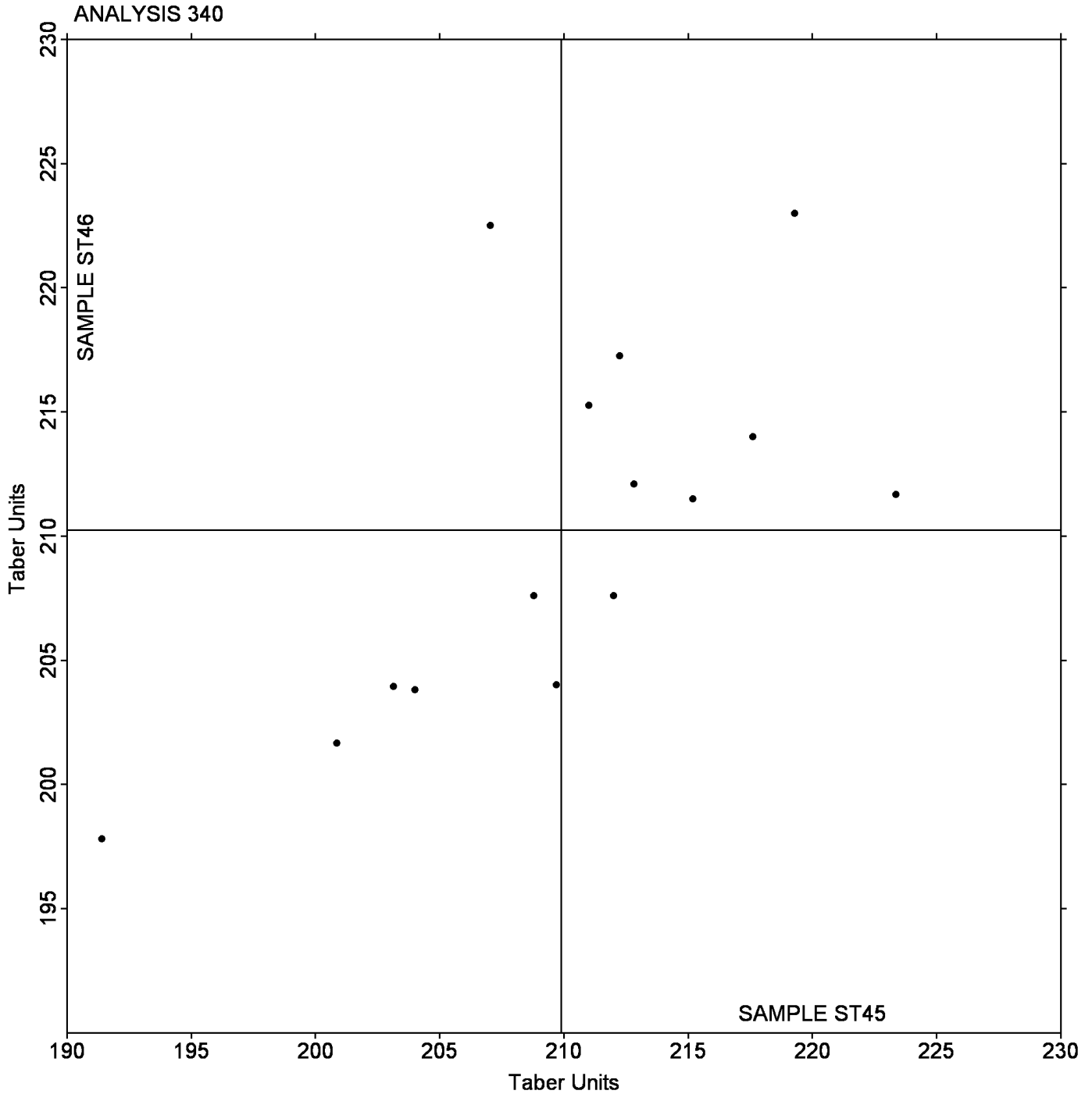
5XHAX2 - Data appear to be reported as mN-m, not g-cm as indicated on datasheet. Changed by CTS.

TAPPI-CTS Interlaboratory Testing Program  
Analysis 340

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

Grand Mean Sample **ST45** = 209.90 Taber Units

Grand Mean Sample **ST46** = 210.25 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 343**  
**Z-Direction Tensile**

WebCode	Data Flag	Sample SM45			Sample SM46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
42JZ14		63.42	-5.38	-0.74	59.90	-3.60	-0.42	LW
46WA16		67.09	-1.72	-0.23	64.51	1.01	0.12	TZ
55HMFB		71.80	3.00	0.41	68.40	4.90	0.57	CD
5RQV3F		69.80	1.00	0.14	64.60	1.10	0.13	CA
8Z32A2		61.30	-7.50	-1.03	55.90	-7.60	-0.88	TZ
B54EKW		76.21	7.41	1.01	71.30	7.79	0.91	TA
BRCUK8		57.38	-11.42	-1.56	46.00	-17.50	-2.04	TZ
CJJU7S		69.04	0.24	0.03	65.66	2.16	0.25	XX
G1HJAZ		76.08	7.28	1.00	72.60	9.10	1.06	CD
M6DR69		61.12	-7.68	-1.05	55.78	-7.72	-0.90	LW
NJ57ZM		72.36	3.56	0.49	67.68	4.18	0.49	XX
U6DD4U		73.40	4.60	0.63	67.00	3.50	0.41	CA
UT7HT5		84.74	15.94	2.18	79.88	16.38	1.90	TL
ZKWAS5		67.29	-1.51	-0.21	60.69	-2.81	-0.33	TA
ZTY74F		61.01	-7.79	-1.07	52.64	-10.86	-1.26	TZ

Summary Statistics		
	Sample SM45	Sample SM46
Grand Means	68.803 psi	63.503 psi
SD Btwn Labs	7.302 psi	8.598 psi
Statistics based on 15 of 15 reporting participants		

**Notes for Analysis 343**

No Data Flags assigned for this analysis.

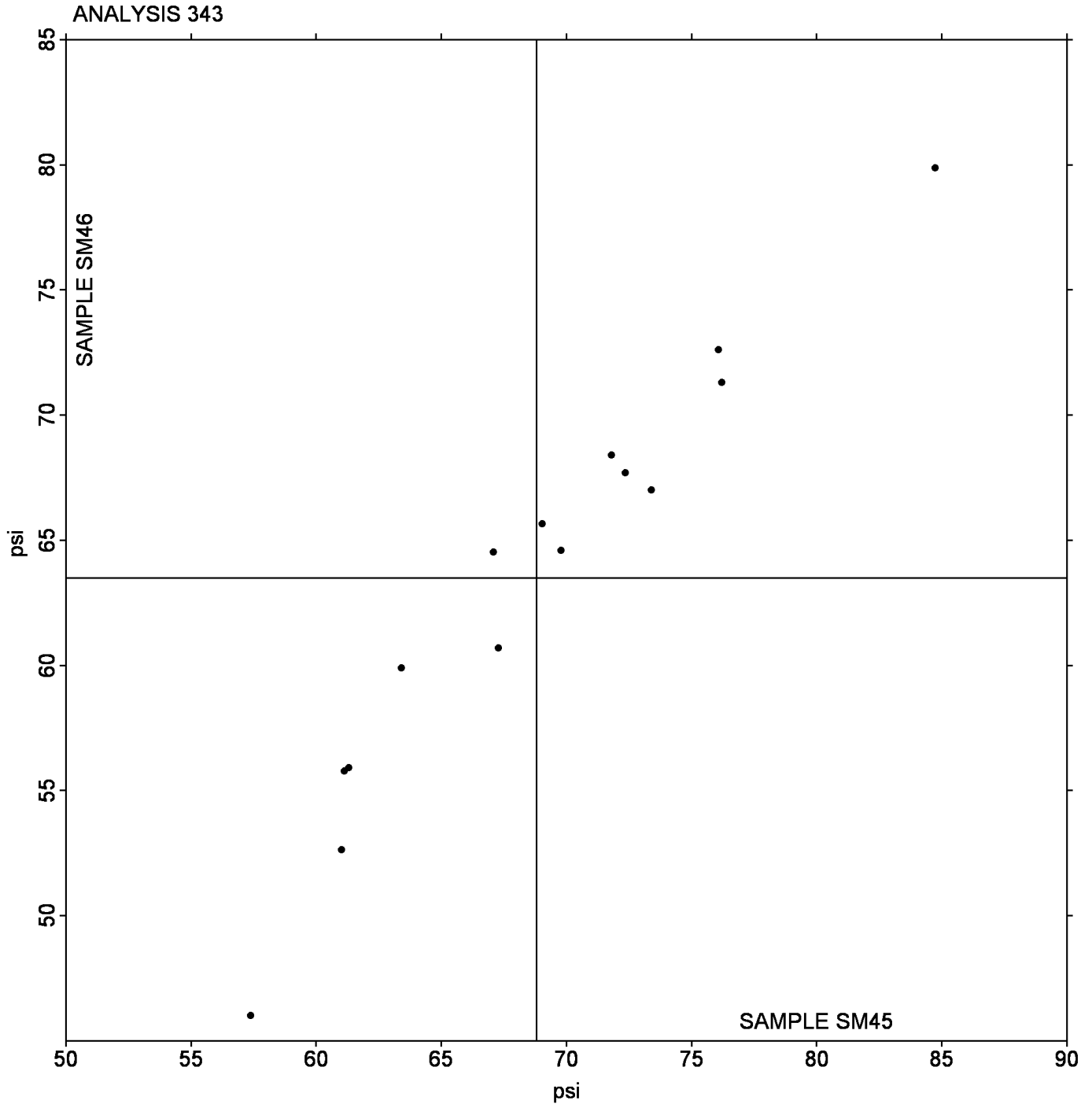
**Instrument Code List**

- |   |                                     |
|---|-------------------------------------|
| (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 **SM45** = 68.803 psi

Grand Mean Sample **SM46** = 63.503 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 345  
**Z-Direction Tensile, Recycled Paperboard**

WebCode	Data Flag	Sample SZ45			Sample SZ46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2JYEM7		54.80	-3.90	-0.82	54.00	-5.35	-1.03	CA
9M7JN8		55.74	-2.95	-0.62	54.00	-5.35	-1.03	LW
AURVQF	X	163.00	104.30	22.04	167.40	108.05	20.78	PG
AX3DFQ		58.36	-0.34	-0.07	57.36	-1.99	-0.38	LW
B3UUR9		56.20	-2.50	-0.53	55.80	-3.55	-0.68	CA
BNEDKJ		62.60	3.90	0.82	62.40	3.05	0.59	CA
CH7NYC		51.16	-7.54	-1.59	51.46	-7.89	-1.52	TZ
ELWGE6		62.88	4.18	0.88	66.68	7.33	1.41	TZ
FPWWU6		60.00	1.30	0.28	60.70	1.35	0.26	DP
NJDQU6		52.13	-6.57	-1.39	56.45	-2.90	-0.56	TZ
PSDUU8		62.70	4.00	0.85	64.26	4.91	0.94	TL
R8QXW7		66.90	8.20	1.73	66.40	7.05	1.36	CD
SK3DJW		56.76	-1.94	-0.41	56.76	-2.59	-0.50	CA
WJCA75		62.82	4.12	0.87	65.24	5.89	1.13	TL

Summary Statistics			
	Sample SZ45		Sample SZ46
Grand Means	58.696 psi		59.347 psi
SD Btwn Labs	4.732 psi		5.200 psi
Statistics based on 13 of 14 reporting participants			

**Comments on assigned Data Flags for Test #345**

AURVQF (X) - Extreme data.

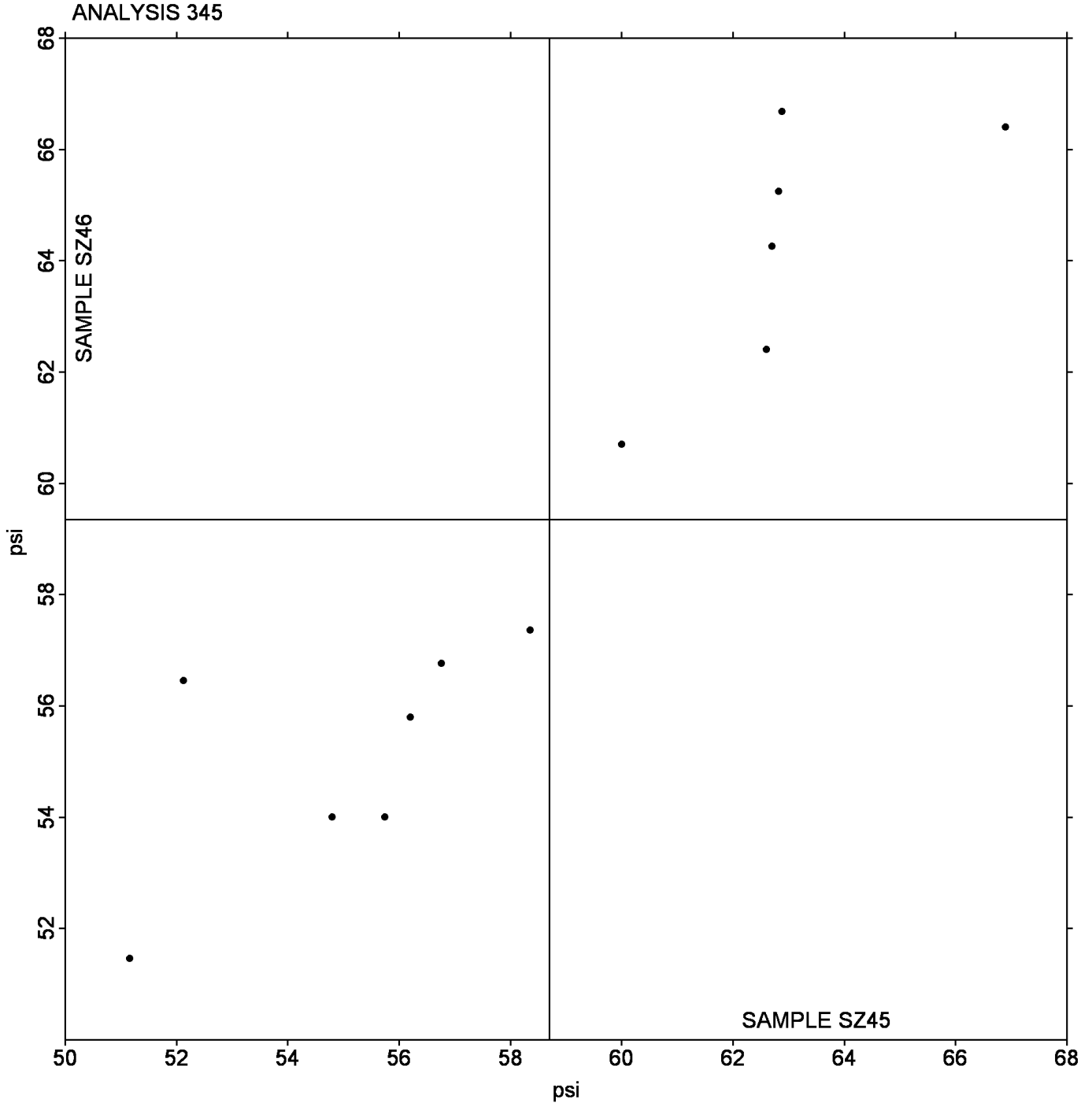
**Instrument Code List**

- |                                      |                                |
|--------------------------------------|--------------------------------|
| (CA) - CSI CS-163                    | (CD) - CSI CS-163D             |
| (DP) - Dek-Tron XP Series            | (LW) - L & W ZD Tensile Tester |
| (PG) - Perkins Model A Mullen 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 **SZ45** = 58.696 psi

Grand Mean Sample **SZ46** = 59.347 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 SN45			Sample SN46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
124DE9		107.2	2.4	0.43	96.60	-0.38	-0.05	HY
19QWS5		106.0	1.2	0.21	96.60	-0.38	-0.05	HY
1D2TKJ		99.0	-5.8	-1.07	88.44	-8.54	-1.15	KR
2PWQ4R		102.6	-2.2	-0.41	87.20	-9.78	-1.31	HY
39LE2Q		108.0	3.2	0.58	101.20	4.22	0.57	HY
3H8KPW		97.2	-7.6	-1.40	89.60	-7.38	-0.99	HY
5AKNSK		102.6	-2.2	-0.41	92.72	-4.26	-0.57	HY
7B79PL		100.0	-4.8	-0.89	96.20	-0.78	-0.10	HY
91HQC7		100.1	-4.7	-0.86	91.88	-5.10	-0.69	HY
9FKZJ2		104.8	0.0	-0.01	100.60	3.62	0.49	HY
AWNN2Z		109.6	4.8	0.87	107.40	10.42	1.40	HY
D4JSAZ		103.8	-1.0	-0.19	95.00	-1.98	-0.27	HZ
EZATL5		111.6	6.8	1.23	101.20	4.22	0.57	HZ
FUYML6		110.0	5.2	0.94	100.60	3.62	0.49	XX
GLTVA8		111.2	6.4	1.16	105.60	8.62	1.16	HZ
RDRC6M		114.3	9.5	1.73	112.16	15.18	2.04	HY
S6WS87		108.3	3.5	0.63	101.36	4.38	0.59	HY
XWBNHA		94.8	-10.0	-1.83	79.80	-17.18	-2.31	HZ
XZHQYY		102.4	-2.4	-0.45	94.80	-2.18	-0.29	XX
Y5L9J9		110.8	6.0	1.09	102.80	5.82	0.78	HY
YPWYW7		106.4	1.6	0.28	101.40	4.42	0.59	HY
YTTPWR		95.8	-9.0	-1.65	90.40	-6.58	-0.88	HY

Summary Statistics		
	Sample SN45	Sample SN46
Grand Means	104.85 1000th ft-lbs	96.980 1000th ft-lbs
SD Btwn Labs	5.47 1000th ft-lbs	7.442 1000th ft-lbs
Statistics based on 22 of 22 reporting participants		

**Notes for Analysis 348**

No Data Flags assigned for this analysis.

**Instrument Code List**

(HY) - Huygen Digitized Scott Internal Bond Tester  
(KR) - Kumagai Riki Kogyo Internal Bond Tester

(HZ) - Huygen Internal Bond Tester with AccuPress  
(XX) - Instrument make/model not specified by lab

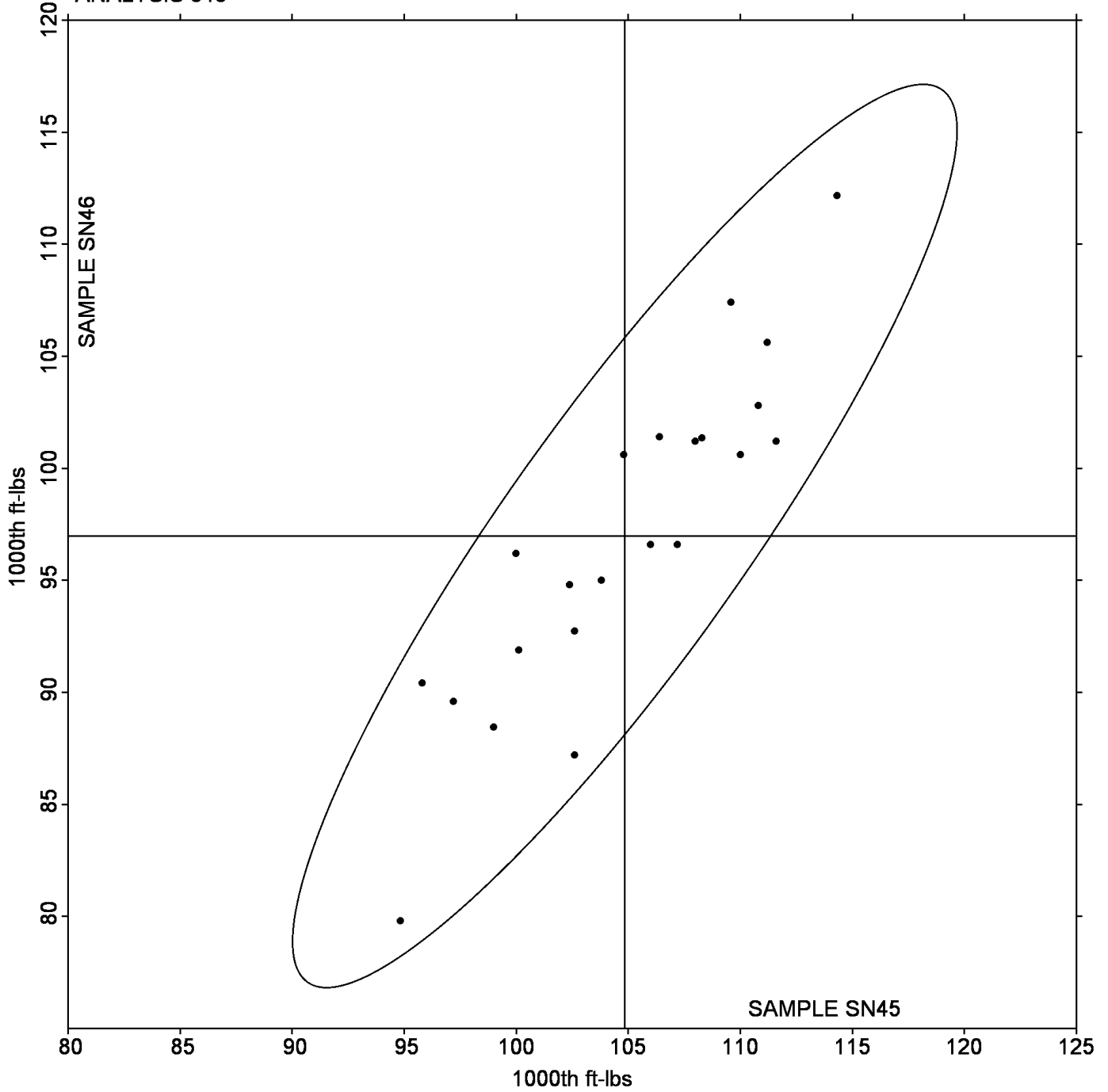
TAPPI-CTS Interlaboratory Testing Program  
Analysis 348

Internal Bond Strength - Modified Scott Mechanics

Grand Mean Sample **SN45** = 104.85 1000th ft-lbs

Grand Mean Sample **SN46** = 96.980 1000th ft-lbs

ANALYSIS 348



TAPPI-CTS Interlaboratory Testing Program  
Analysis 349

Internal Bond Strength - Scott Bond Models

WebCode	Data Flag	Sample SP45			Sample SP46			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
15ZC8L		88.20	-4.49	-0.44	78.00	-5.23	-0.50	TM
1NPDMQ		85.40	-7.29	-0.71	72.20	-11.03	-1.06	TM
37X1T8		112.85	20.16	1.96	102.91	19.68	1.89	TM
5KY3HU		92.08	-0.61	-0.06	81.22	-2.01	-0.19	TM
73K453		102.80	10.11	0.98	99.40	16.17	1.55	SC
9Z95JK		80.37	-12.32	-1.19	74.85	-8.37	-0.80	TM
DE8T78		86.20	-6.49	-0.63	79.80	-3.43	-0.33	TM
EBX4XR		82.15	-10.54	-1.02	74.72	-8.51	-0.82	SC
EHPDD1		83.46	-9.22	-0.89	79.85	-3.38	-0.32	XX
FVDV2L		104.00	11.31	1.10	95.80	12.57	1.21	XX
H48J92		87.80	-4.89	-0.47	77.00	-6.23	-0.60	SC
HHP2UV		94.80	2.11	0.21	74.80	-8.43	-0.81	TM
NKHGA8	X	63.80	-28.89	-2.80	48.80	-34.43	-3.30	TM
QW2VDT		104.80	12.11	1.18	91.40	8.17	0.78	SC

Summary Statistics			
	Sample SP45		Sample SP46
Grand Means	92.685	1000th ft-lbs	83.226 1000th ft-lbs
SD Btwn Labs	10.309	1000th ft-lbs	10.417 1000th ft-lbs
Statistics based on 13 of 14 reporting participants			

**Comments on assigned Data Flags for Test #349**

NKHGA8 (X) - Systematic error (data for both samples are low).

**Instrument Code List**

(SC) - Scott Internal Bond Tester (Manual)

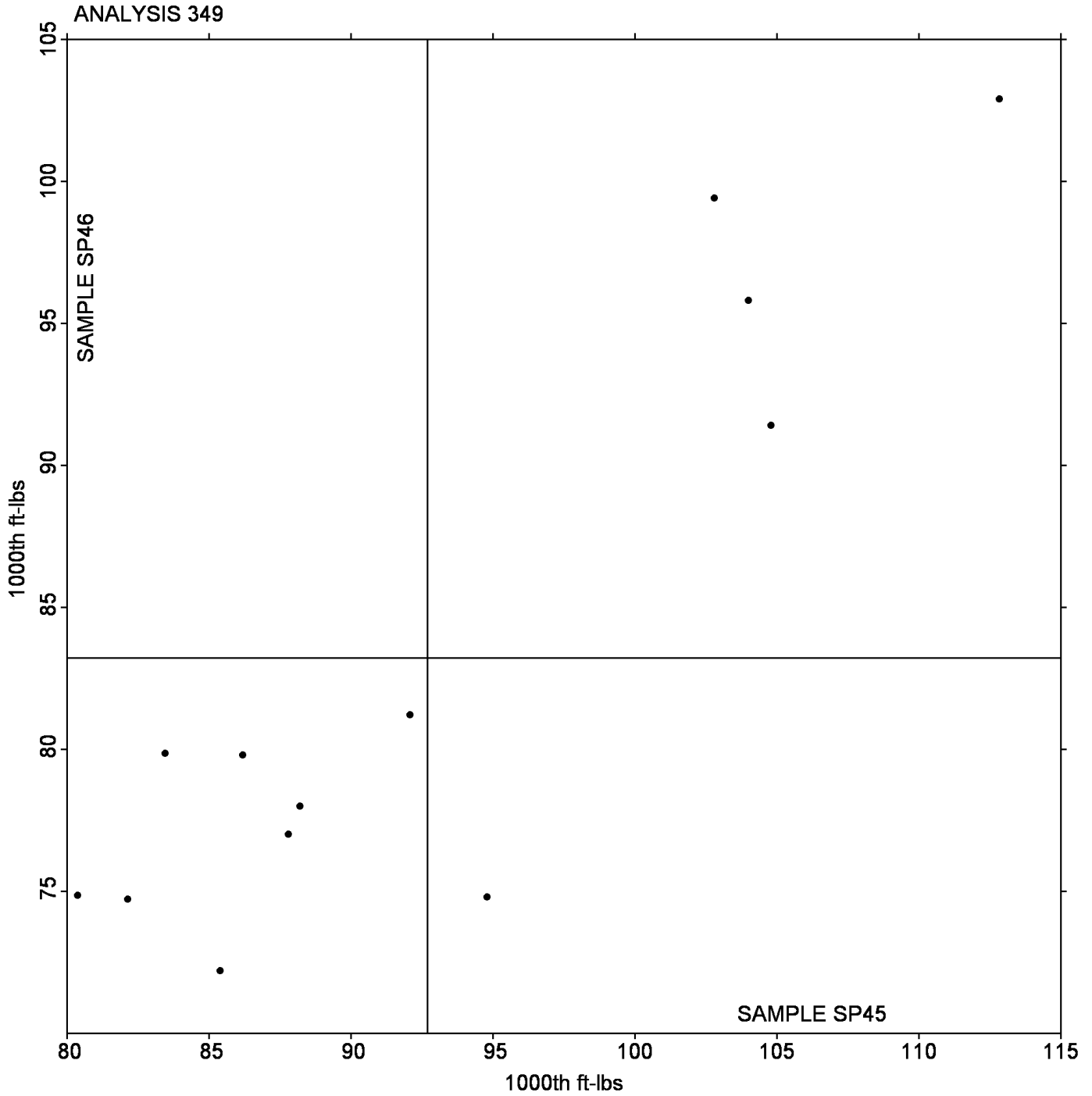
(TM) - TMI Monitor/Internal Bond Tester

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

**Internal Bond Strength - Scott Bond Models**

Grand Mean Sample **SP45** = 92.685 1000th ft-lbs

Grand Mean Sample **SP46** = 83.226 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.