Collaborative Testing Services, Inc.

Paper & Paperboard Interlaboratory Testing Program

Summary Report #273S - November 2014

Introduction to the Paper & Paperboard Interlaboratory Program

Explanation of Tables and Definitions of Terms

Instrument Manufacturer Contacts

Analysis	Analysis Name
305	Bursting Strength - Printing Papers
310	Bursting Strength - Packaging Papers
311	Tearing Strength - Newsprint
312	Tearing Strength - Printing Papers
314	Tearing Strength - Packaging Papers
320	Tensile Breaking Strength - Newsprint
321	Tensile Energy Absorption - Newsprint
322	Elongation to Break - Newsprint
325	Tensile Breaking Strength - Printing Papers
327	Tensile Energy Absorption - Printing Papers
328	Elongation to Break - Printing Papers
330	Tensile Breaking Strength - Packaging Papers
331	Tensile Energy Absorption - Packaging Papers
332	Elongation to Break - Packaging Papers
334	Folding Endurance (MIT) - Double Folds
336	Bending Resistance, Gurley Type
338	Bending Resistance, Taber Type - 0 to 10 Units
339	Bending Resistance, Taber Type - 10 to 100 Taber Units
340	Bending Resistance, Taber Type - 50 to 500 Taber Units - Recycled Paperboard
343	Z-Direction Tensile
345	Z-Direction Tensile, Recycled Paperboard
348	Internal Bond Strength - Modified Scott Mechanics
349	Internal Bond Strength - Scott Bond Models

The CTS Paper & Paperboard Interlaboratory Fiberboard 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. Labs from the U.S., as well as more than 80 countries, currently participate in CTS programs.

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

Collaborative Testing Services, Inc.
21331 Gentry Drive
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

WebCode Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Paper Report published on the CTS 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.

Lab Mean The average of the values obtained for each sample by the participant.

Grand Mean The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.

Difference from Grand Mean The difference of the LAB MEAN from the GRAND MEAN.

Between-Lab Standard Deviation An indication of the precision of measurement between the laboratories. The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).

Comparative Performance Value An indication of how well a laboratory's results agree with the other participants. The CPV is a ratio indicating the number of standard deviations from the GRAND MEAN. The closer a laboratory's COMPARATIVE PERFORMANCE VALUE is to zero, the more consistent its results are with the other participants' data (and vice versa). The critical value for each CPV will vary depending on the number of labs participating in a test.

Inst Code A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section), if instruments are tracked.

Data Flag DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

DATA FLAG	STATISTICALLY INCLUDED/EXCLUDED	ACTION REQUIRED
*	INCLUDED	CAUTION -review testing procedure and monitor future results. Results fall outside 95% ellipse but within a 99% ellipse that is calculated but not drawn.
X	EXCLUDED	STOP - immediate review of data and/or testing procedure is required. Results fall outside the 99% ellipse. See specific notes following each table for more information on why the data is excluded.
M	EXCLUDED	PROCEED - lab was unable to report data for at least one sample.

Graph - For each laboratory, the LAB MEAN for the first sample (x-axis) is plotted against the LAB MEAN for the second sample (y-axis) with each point representing a laboratory. The horizontal and vertical cross-hairs are the GRAND MEANS for each sample. When 20 or more laboratories are in the statistics, an ellipse is also drawn so that 95% of the time a randomly selected laboratory will be included inside the ellipse. Plotted data flags are explained on the previous page.

Common Problems Highlighted in Footnotes

1. ***Extreme data*** - The laboratory's results for one or both samples are so inconsistent with those of the other participants that the lab mean(s) fall outside the plot. The participant is advised to immediately review his data and/or testing procedure.

2. ***Systematic bias*** - The laboratory's results are either consistently high or low for both samples when compared to the other participants (the plotted point falls near the top or bottom of the ellipse). This indicates that the participant is performing the test with a constant bias. Causes of systematic errors include improper calibration, the particular make/model of equipment or a modification to the testing procedure.

3. ***Inconsistency in testing between samples/sample sets*** - The laboratory's results indicate that there are differences in the way the two samples tested (the plotted point falls to the side of the ellipse). This type of error may be attributed to the analyst deviating from the procedure when testing one of the samples or a material interaction occurrence with the instrument or room conditions. The inconsistency is reflected in the CPVs for the two samples, such as a +1.5 CPV for sample A and a -2.2 CPV for sample B. CTS also will specify if the laboratory's data for one sample are high/low compared to the other participants. If this inconsistency is slight, the lab's plotted point will be an * that falls on the edge of the ellipse.

4. ***Inconsistency in testing within a sample*** - The laboratory's within-lab standard deviation for a specified sample is high when compared to the other participants, often causing the lab's plotted point to fall outside of the ellipse.

Labs flagged with an * are not typically included in the footnotes of a data table. These labs may locate their position in the control ellipse and use the definitions above to help identify the type of testing error. An * should serve as a caution flag, a "yellow light", to a lab. If this error is repeated in future rounds, a lab may need to stop and review its testing procedures. The initial data flag is not cause for alarm. Interlaboratory tests conducted at regular intervals permit a lab to recognize trends in testing.

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 Corporation
James Bruner/Nicholas Riggs
100 Quality Avenue
New Albany, IN 47150-2272 USA
Phone: (812) 948-2884
FAX #: (812) 945-6847

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

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

TAPPI-CTS Interlaboratory Testing Program

Analysis 305

Bursting Strength - Printing Papers

WebCode	Data Flag	Sample SA13 Lab Mean	Sample SA13 Diff from Grand Mean	Sample SA13 CPV	Sample SA14 Lab Mean	Sample SA14 Diff from Grand Mean	Sample SA14 CPV
3FAT32		27.72	-1.51	-0.58	29.88	-2.73	-0.86
3VG8YP		27.53	-1.70	-0.65	32.20	-0.41	-0.13
7G3TB3		26.75	-2.49	-0.95	27.65	-4.96	-1.56
ACMKVM		29.50	0.26	0.10	32.30	-0.31	-0.10
AGVCH6		26.31	-2.93	-1.12	29.08	-3.53	-1.11
AVT3XC		30.76	1.53	0.58	34.94	2.33	0.73
CV4VC3		30.40	1.16	0.44	35.18	2.57	0.81
D9TV46		24.38	-4.86	-1.85	27.08	-5.53	-1.74
DEZNVF		26.16	-3.08	-1.17	27.95	-4.66	-1.46
DLF327		28.94	-0.30	-0.11	32.58	-0.03	-0.01
DUPT4A		31.32	2.08	0.79	34.10	1.49	0.47
EJ6KFF		30.39	1.15	0.44	32.94	0.33	0.10
F2JHXH	*	30.10	0.86	0.33	38.70	6.09	1.91
FTTXU7		24.24	-5.00	-1.90	27.97	-4.64	-1.46
GG7FCH		28.75	-0.49	-0.19	32.25	-0.36	-0.11
H2D3F3		30.74	1.51	0.57	35.78	3.17	0.99
JC6X73		28.00	-1.24	-0.47	33.80	1.19	0.37
JNMHQY		29.80	0.56	0.21	33.90	1.29	0.40
KQ6AY7		30.33	1.09	0.42	31.27	-1.34	-0.42
LYAQ2W		27.18	-2.06	-0.78	29.56	-3.05	-0.96
NPWDYJ	X	30.85	1.61	0.61	41.75	9.14	2.87
QDKNG9		29.73	0.49	0.19	32.01	-0.60	-0.19
QGFCYZ		31.06	1.82	0.69	34.44	1.83	0.57
RX48NW		29.23	-0.01	0.00	32.81	0.20	0.06
UBKL6Z		30.95	1.71	0.65	34.20	1.59	0.50
UL387N		29.30	0.06	0.02	31.88	-0.73	-0.23
V9RPWF	*	37.18	7.94	3.02	39.51	6.90	2.17
X486YV		32.67	3.43	1.31	36.51	3.90	1.22

Summary Statistics

	Sample SA13	Sample SA14
Grand Means	29.237 psi	32.610 psi
SD Btwn Labs	2.627 psi	3.187 psi

Statistics based on 27 of 28 reporting participants

Comments on assigned Data Flags for Test #305

NPWDYJ (X) - Data for Sample SA14 are high.

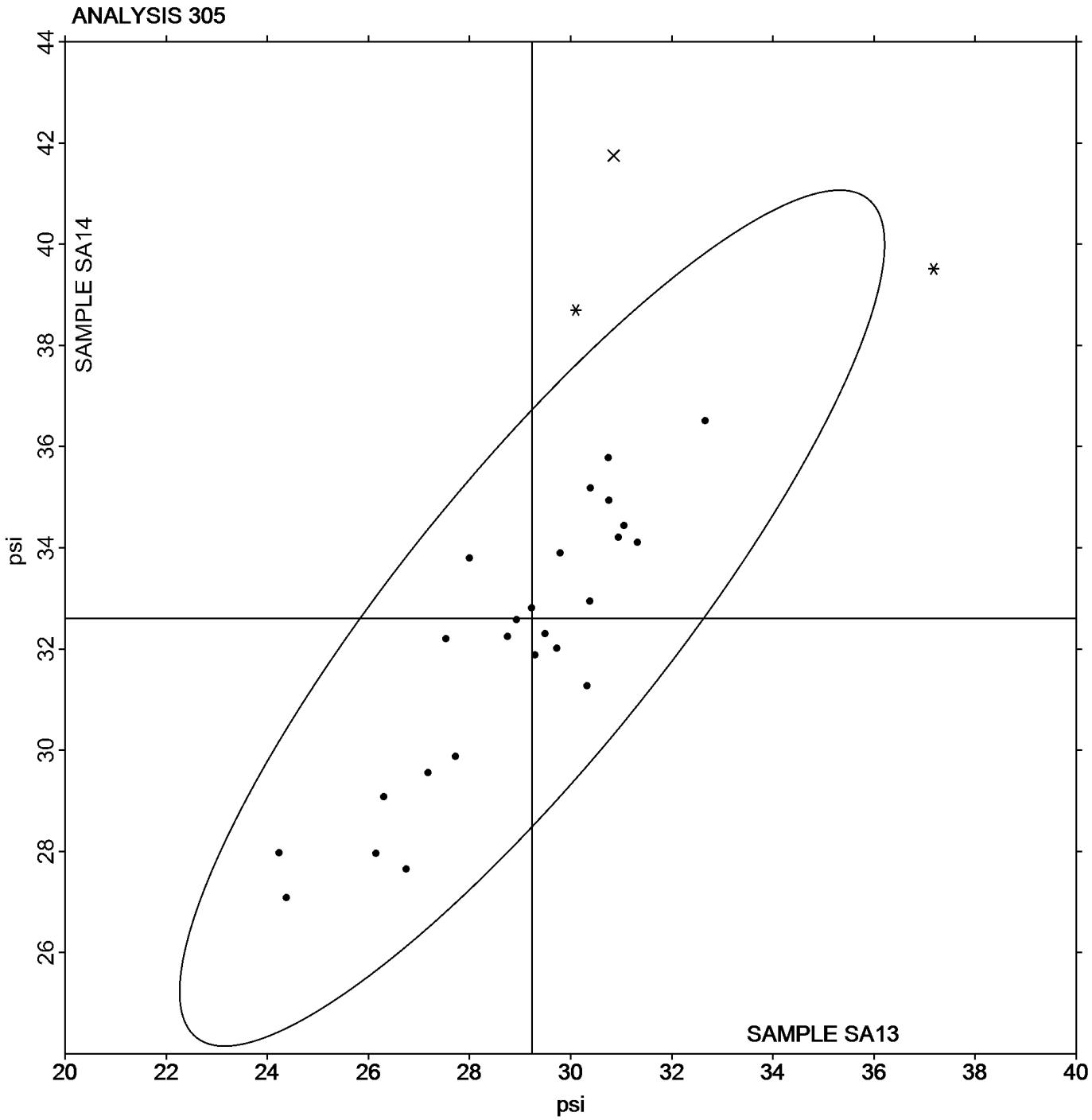
TAPPI-CTS Interlaboratory Testing Program

Analysis 305

Bursting Strength - Printing Papers

Grand Mean Sample **SA13** = 29.237 psi

Grand Mean Sample **SA14** = 32.610 psi



TAPPI-CTS Interlaboratory Testing Program

Analysis 310

Bursting Strength - Packaging Papers

WebCode	Data Flag	Sample SB13 Lab Mean	Sample SB13 Diff from Grand Mean	Sample SB13 CPV	Sample SB14 Lab Mean	Sample SB14 Diff from Grand Mean	Sample SB14 CPV
2J6HNE		75.70	-1.39	-0.26	47.70	-1.25	-0.32
43E3V3		73.16	-3.94	-0.75	48.20	-0.75	-0.19
4BPJ79		71.03	-6.07	-1.15	44.70	-4.25	-1.10
4C4XQC		75.35	-1.74	-0.33	50.69	1.74	0.45
BRVV2L		75.89	-1.21	-0.23	48.01	-0.94	-0.24
BVAT99		79.70	2.61	0.50	46.60	-2.35	-0.61
CV4VC3		80.51	3.42	0.65	51.04	2.09	0.54
DBZD32		80.30	3.21	0.61	51.30	2.35	0.61
FDBC2Y		78.58	1.49	0.28	51.23	2.28	0.59
GDU9DY		79.40	2.31	0.44	49.80	0.85	0.22
H2D3F3	*	89.75	12.65	2.41	59.34	10.39	2.68
KECQK2		71.96	-5.13	-0.98	44.70	-4.25	-1.10
KNWZ7A		73.90	-3.19	-0.61	48.90	-0.05	-0.01
KQ6AY7		73.85	-3.24	-0.62	45.30	-3.66	-0.94
LMG6XM		81.75	4.66	0.89	48.25	-0.70	-0.18
LVXHZR		70.91	-6.18	-1.18	46.54	-2.41	-0.62
M3U87H		79.36	2.27	0.43	50.29	1.34	0.35
MFYTKL		75.70	-1.39	-0.26	46.90	-2.05	-0.53
MNCZ3B		67.40	-9.69	-1.84	41.00	-7.95	-2.05
TWAJ9L		70.81	-6.28	-1.20	44.13	-4.82	-1.24
VBEPBG		74.30	-2.79	-0.53	52.70	3.75	0.97
VUVXAW		79.31	2.21	0.42	48.49	-0.47	-0.12
WECRC2		71.19	-5.90	-1.12	49.88	0.93	0.24
XYU7LG		78.95	1.86	0.35	45.78	-3.17	-0.82
YMHF37		84.44	7.35	1.40	56.73	7.78	2.01
YP2FDE		86.51	9.42	1.79	53.50	4.55	1.17
YUGMZT		81.80	4.71	0.90	50.00	1.05	0.27

Summary Statistics

	Sample SB13	Sample SB14
Grand Means	77.093 psi	48.952 psi
SD Btwn Labs	5.257 psi	3.878 psi

Statistics based on 27 of 27 reporting participants

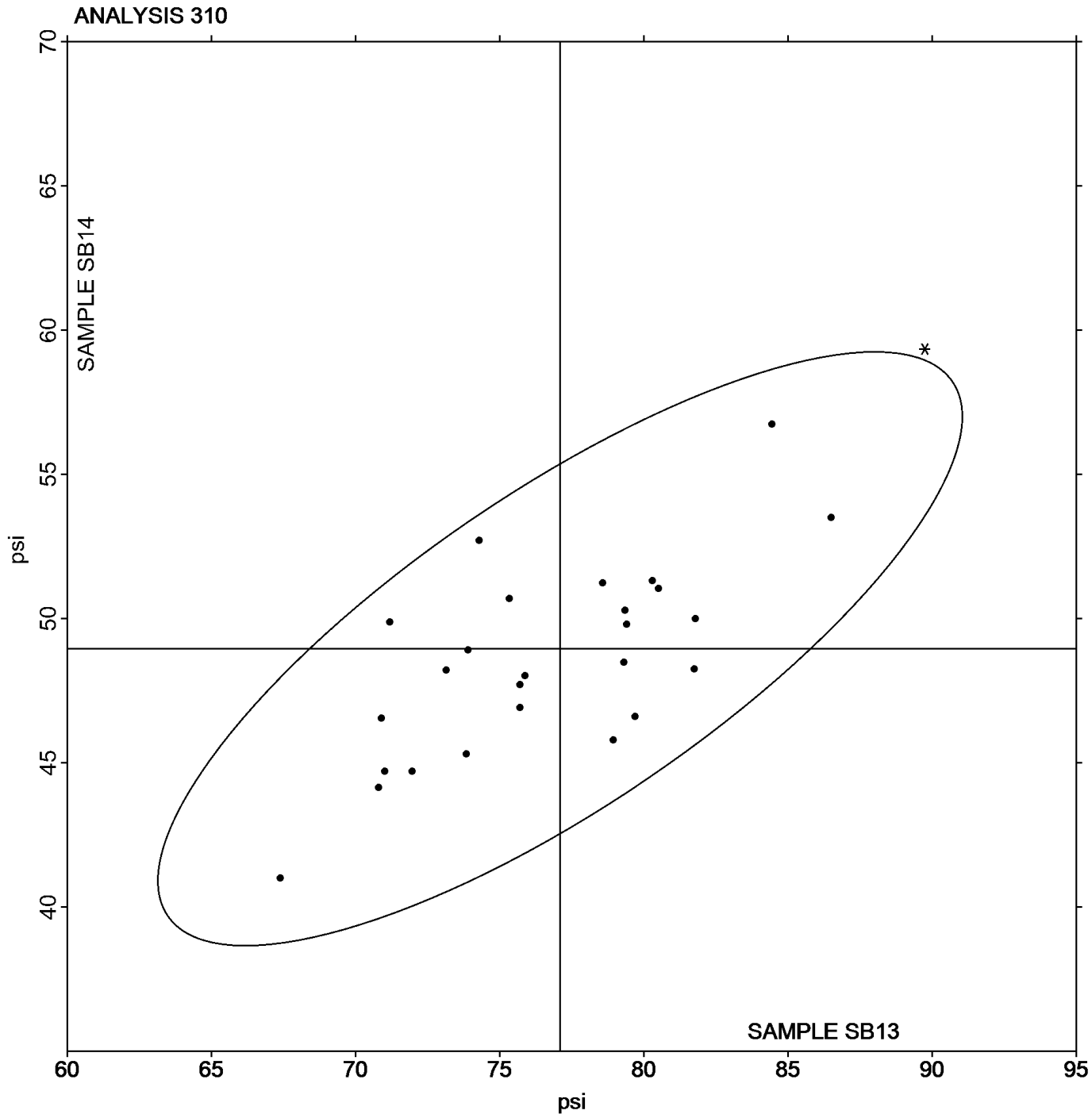
TAPPI-CTS Interlaboratory Testing Program

Analysis 310

Bursting Strength - Packaging Papers

Grand Mean Sample **SB13** = 77.093 psi

Grand Mean Sample **SB14** = 48.952 psi



TAPPI-CTS Interlaboratory Testing Program

Analysis 311

Tearing Strength - Newsprint

WebCode	Data Flag	Sample SK13 Lab Mean	Sample SK13 Diff from Grand Mean	Sample SK13 CPV	Sample SK14 Lab Mean	Sample SK14 Diff from Grand Mean	Sample SK14 CPV
6FY24F		23.19	-0.47	-0.46	24.33	-0.82	-0.51
8XAUJF		23.31	-0.34	-0.34	24.62	-0.53	-0.33
CV4VC3		22.66	-0.99	-0.99	23.56	-1.59	-0.99
M3U87H		23.83	0.18	0.18	27.82	2.67	1.66
QGFCYZ		23.37	-0.28	-0.28	24.22	-0.93	-0.58
R7URR9	X	29.52	5.87	5.83	33.29	8.14	5.06
YXYZM3	X	28.72	5.06	5.03	32.94	7.79	4.84
ZG9EG2		25.56	1.91	1.89	26.36	1.21	0.75

Summary Statistics

	Sample SK13	Sample SK14
Grand Means	23.653 Grams	25.150 Grams
SD Btwn Labs	1.007 Grams	1.610 Grams

Statistics based on 6 of 8 reporting participants

Comments on assigned Data Flags for Test #311

R7URR9 (X) - Data for both samples are high.

YXYZM3 (X) - Data for both samples are high.

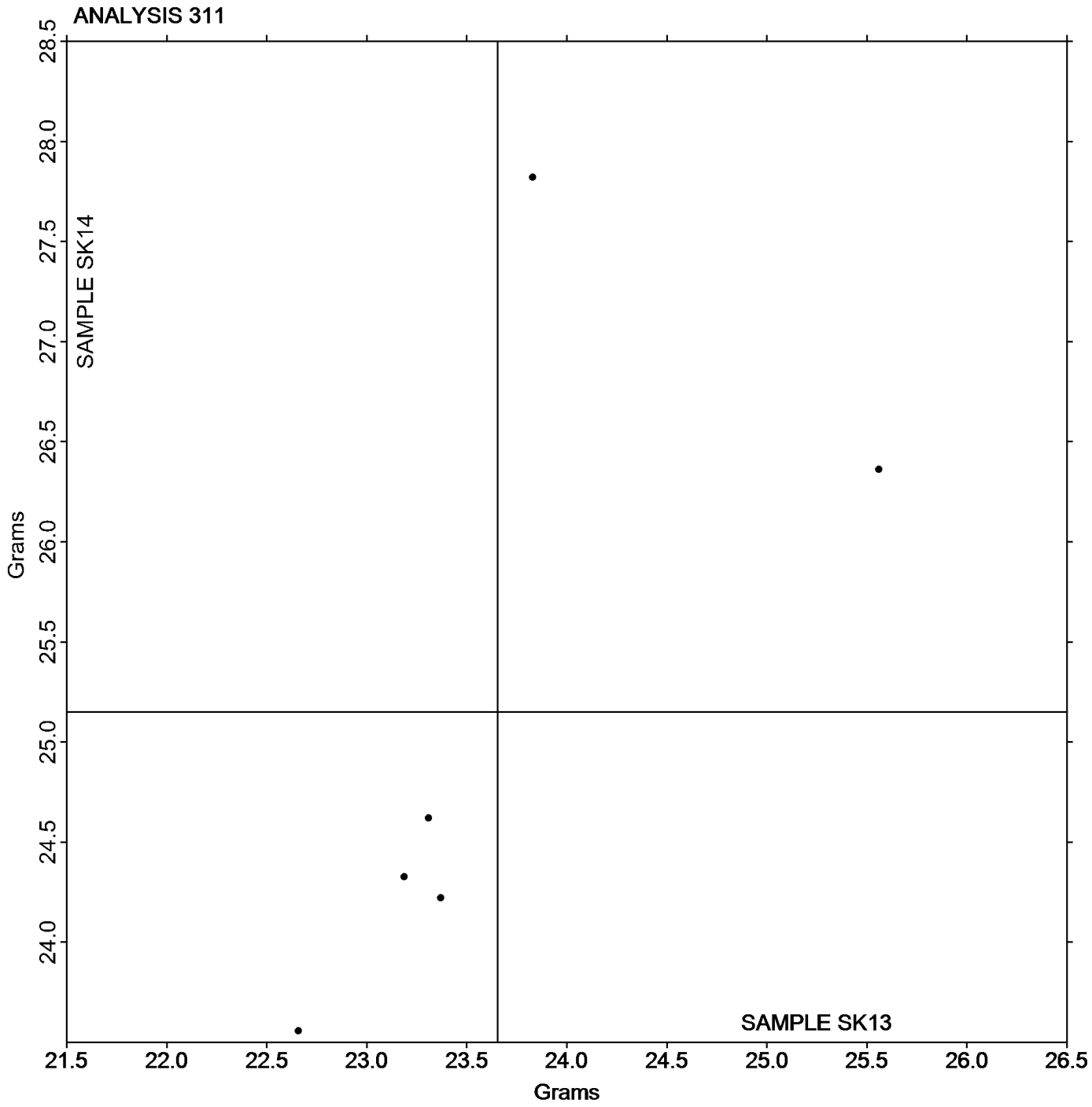
TAPPI-CTS Interlaboratory Testing Program

Analysis 311

Tearing Strength - Newsprint

Grand Mean Sample **SK13** = 23.653 Grams

Grand Mean Sample **SK14** = 25.150 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 SC13 Lab Mean	Sample SC13 Diff from Grand Mean	Sample SC13 CPV	Sample SC14 Lab Mean	Sample SC14 Diff from Grand Mean	Sample SC14 CPV
2EV8TY		51.20	2.06	0.57	67.40	2.51	0.75
2R6R9L		50.16	1.02	0.28	65.84	0.95	0.28
3FAT32		48.76	-0.38	-0.10	65.18	0.29	0.09
3KD22G		47.12	-2.02	-0.56	62.26	-2.63	-0.79
3VG8YP		51.38	2.24	0.62	68.72	3.83	1.15
4BPJ79		49.93	0.79	0.22	63.48	-1.42	-0.42
4C4XQC		51.19	2.05	0.57	65.82	0.93	0.28
4J483V		44.86	-4.28	-1.18	60.61	-4.28	-1.28
6H2GE8	*	60.58	11.45	3.15	73.14	8.25	2.47
72WRY8		53.51	4.37	1.20	66.06	1.17	0.35
77M26Y		49.20	0.06	0.02	64.54	-0.35	-0.11
7NLG6P		44.40	-4.74	-1.30	59.60	-5.29	-1.59
7XR9QD		44.50	-4.64	-1.28	61.00	-3.89	-1.17
A486K6		49.31	0.18	0.05	65.29	0.40	0.12
ACMKVM		48.64	-0.50	-0.14	65.96	1.07	0.32
AGVCH6		47.26	-1.88	-0.52	63.16	-1.73	-0.52
BRVV2L		49.91	0.77	0.21	68.76	3.87	1.16
CV4VC3		47.58	-1.56	-0.43	64.58	-0.31	-0.09
D9TV46		45.72	-3.42	-0.94	63.40	-1.50	-0.45
DEZNVF		55.80	6.66	1.83	72.69	7.80	2.34
DLF327		47.35	-1.79	-0.49	65.04	0.15	0.04
DXALDQ		47.00	-2.14	-0.59	63.20	-1.69	-0.51
EFJ87C		54.20	5.06	1.39	70.60	5.71	1.71
EJ6KFF		51.16	2.02	0.56	64.89	0.00	0.00
F2HKMM		49.32	0.18	0.05	63.18	-1.71	-0.51
FNVB33		48.81	-0.33	-0.09	67.05	2.16	0.65
FTTXU7		45.70	-3.44	-0.95	61.80	-3.09	-0.93
H2D3F3		48.42	-0.72	-0.20	64.82	-0.07	-0.02
JC6X73		45.50	-3.64	-1.00	64.40	-0.49	-0.15
JR6TN3		47.02	-2.12	-0.58	64.32	-0.57	-0.17
KECQK2		46.24	-2.90	-0.80	60.92	-3.97	-1.19
KLC8WR	X	62.40	13.26	3.65	111.00	46.11	13.82
KQ6AY7		48.66	-0.48	-0.13	63.59	-1.30	-0.39
KTUJBT		51.57	2.43	0.67	63.96	-0.93	-0.28
KZT7Z8		49.74	0.60	0.17	63.54	-1.35	-0.41
LMG6XM		44.69	-4.45	-1.22	61.32	-3.57	-1.07
LVXHZR		53.80	4.66	1.28	70.31	5.42	1.62
LYAQ2W		48.25	-0.88	-0.24	66.26	1.37	0.41
MFYTKL		42.84	-6.30	-1.73	59.58	-5.31	-1.59
MQWWL		43.04	-6.10	-1.68	57.42	-7.47	-2.24
NPWDYJ		47.34	-1.80	-0.49	62.02	-2.87	-0.86
PA6T3V	X	59.26	10.12	2.79	60.71	-4.18	-1.25
PCBGFZ	*	54.35	5.21	1.44	65.34	0.45	0.13

TAPPI-CTS Interlaboratory Testing Program
Analysis 312
Tearing Strength - Printing Papers

WebCode	Data Flag	Sample SC13 Lab Mean	Sample SC13 Diff from Grand Mean	Sample SC13 CPV	Sample SC14 Lab Mean	Sample SC14 Diff from Grand Mean	Sample SC14 CPV
QDKNG9	X	50.20	1.06	0.29	67.72	2.83	0.85
RX48NW	*	55.46	6.32	1.74	66.70	1.80	0.54
UBKL6Z		49.23	0.09	0.03	66.50	1.61	0.48
UCWGML	X	50.53	1.39	0.38	59.77	-5.12	-1.54
UL387N		48.74	-0.39	-0.11	65.45	0.55	0.17
VBEPBG	X	47.00	-2.14	-0.59	63.80	-1.09	-0.33
VUVXAW		47.29	-1.84	-0.51	61.74	-3.15	-0.94
WVFC6J	X	49.00	-0.14	-0.04	56.50	-8.39	-2.52
X486YV		52.78	3.64	1.00	67.82	2.93	0.88
XKGNXM		52.44	3.30	0.91	68.18	3.29	0.99
Y82HYQ		49.42	0.28	0.08	66.42	1.53	0.46
YMY8FW		41.90	-7.24	-1.99	59.15	-5.74	-1.72
ZBJZTV		52.60	3.46	0.95	70.20	5.31	1.59
ZH342H		50.08	0.94	0.26	66.37	1.47	0.44

Summary Statistics

	Sample SC13	Sample SC14
Grand Means	49.136 Grams	64.894 Grams
SD Btwn Labs	3.633 Grams	3.335 Grams

Statistics based on 51 of 57 reporting participants

Comments on assigned Data Flags for Test #312

KLC8WR (X) - Extreme data.

PA6T3V (X) - Inconsistent in testing between samples, data for Sample SC13 are high.

QDKNG9 (X) - Data appear to be off by a factor of .5; data converted by CTS (x2).

UCWGML (X) - Inconsistent in testing between samples and within the determinations for both samples.

VBEPBG (X) - Data appear to be off by a factor of .5; data converted by CTS (x2).

WVFC6J (X) - Inconsistent in testing between samples and within the determinations for Sample SC13.

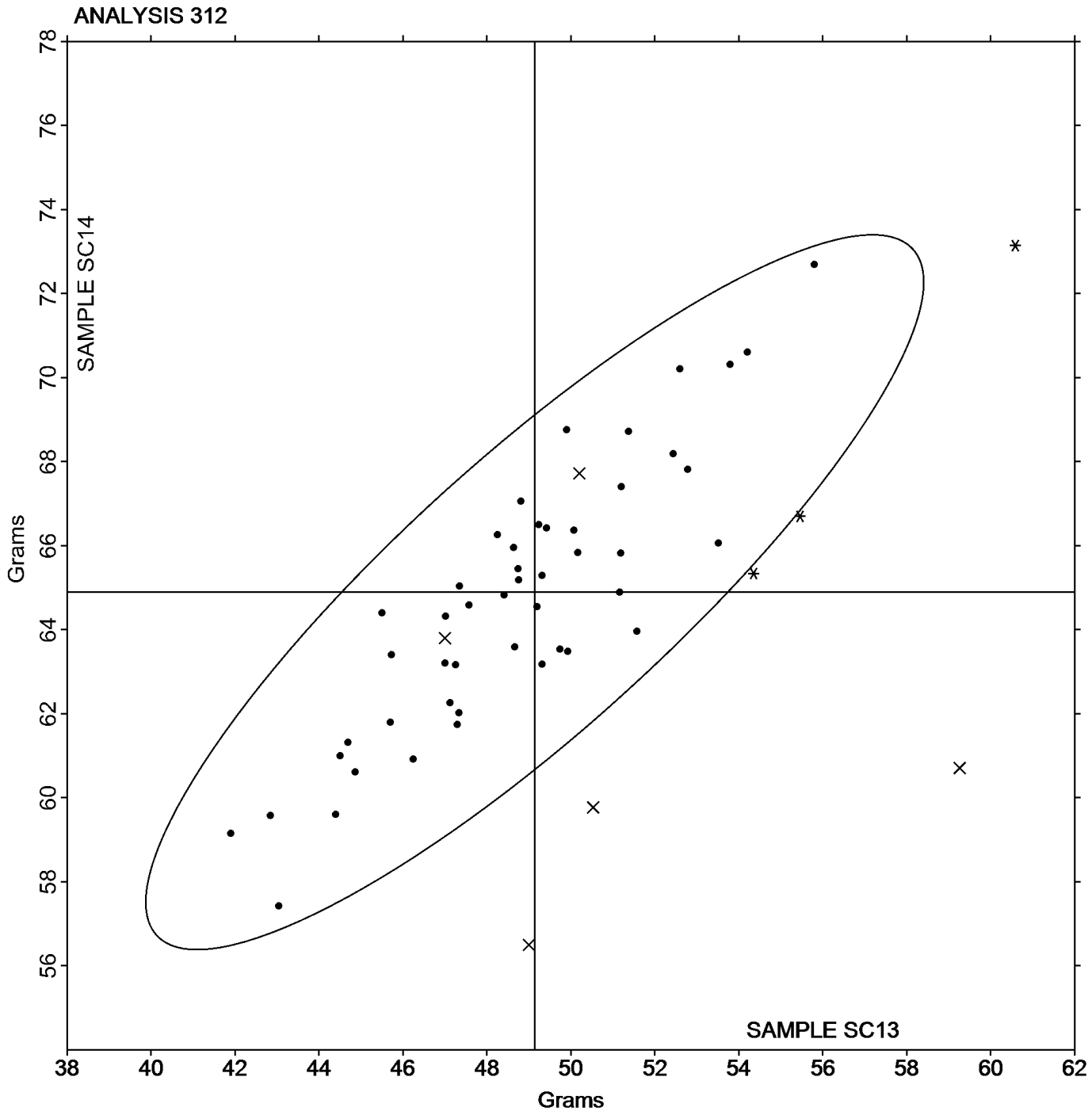
TAPPI-CTS Interlaboratory Testing Program

Analysis 312

Tearing Strength - Printing Papers

Grand Mean Sample **SC13** = 49.136 Grams

Grand Mean Sample **SC14** = 64.894 Grams



TAPPI-CTS Interlaboratory Testing Program

Analysis 314

Tearing Strength - Packaging Papers

WebCode	Data Flag	Sample SD13 Lab Mean	Sample SD13 Diff from Grand Mean	Sample SD13 CPV	Sample SD14 Lab Mean	Sample SD14 Diff from Grand Mean	Sample SD14 CPV
2J6HNE		155.5	0.9	0.07	180.2	-0.1	-0.01
43E3V3		149.0	-5.5	-0.42	178.0	-2.3	-0.16
646KEE	X	149.8	-4.7	-0.36	172.3	-8.0	-0.58
6AVULR		162.5	8.0	0.61	191.0	10.7	0.77
6E6DHZ		149.1	-5.4	-0.41	179.7	-0.6	-0.05
6FY24F		152.5	-2.0	-0.16	176.0	-4.3	-0.31
6NTAJZ		152.2	-2.3	-0.17	175.1	-5.2	-0.38
7G3TB3		139.2	-15.3	-1.17	164.4	-15.9	-1.14
A93TL6		147.2	-7.3	-0.56	162.3	-18.0	-1.30
ACMKVM		147.0	-7.5	-0.58	174.9	-5.4	-0.39
BVAT99	X	278.3	123.8	9.44	319.4	139.1	10.00
C6RU2M		144.2	-10.3	-0.79	168.0	-12.3	-0.88
CQVDEA		127.3	-27.2	-2.07	160.2	-20.1	-1.44
CV4VC3		148.2	-6.3	-0.48	181.3	1.0	0.07
DBZD32		164.8	10.3	0.78	194.8	14.5	1.04
F2JHXH	*	152.3	-2.2	-0.17	156.6	-23.7	-1.71
FAVJB7		159.7	5.2	0.40	187.3	6.9	0.50
FDBC2Y	*	193.9	39.4	3.00	209.3	29.0	2.08
FX47WV		164.0	9.5	0.72	181.6	1.3	0.09
GG7FCH		157.2	2.7	0.21	184.4	4.1	0.29
GZHCM2		174.8	20.3	1.55	206.5	26.2	1.89
HLHNDM		146.9	-7.6	-0.58	171.9	-8.4	-0.60
JUPKWK		139.2	-15.3	-1.17	168.4	-11.9	-0.86
JVZQRZ		146.0	-8.5	-0.65	175.3	-5.0	-0.36
K68LU7	X	4.0	-150.5	-11.48	4.6	-175.7	-12.63
KNWZ7A		140.4	-14.1	-1.08	172.0	-8.3	-0.60
LPNFWB		158.7	4.2	0.32	190.4	10.1	0.73
LUL2ME		154.3	-0.2	-0.02	182.1	1.8	0.13
M3U87H		173.1	18.6	1.42	192.4	12.1	0.87
MNCZ3B		157.3	2.8	0.21	188.1	7.8	0.56
PHTTAT		170.4	15.9	1.21	202.6	22.3	1.60
RCFR2U	*	168.2	13.7	1.04	174.6	-5.7	-0.41
TWAJ9L	X	139.0	-15.5	-1.18	174.0	-6.3	-0.45
U777B3		167.4	12.9	0.98	196.8	16.5	1.19
V9RPWF		139.6	-14.9	-1.14	158.2	-22.1	-1.59
VBEPBG	X	120.0	-34.5	-2.63	152.8	-27.5	-1.98
WECRC2		142.2	-12.3	-0.94	167.8	-12.5	-0.90
XEPNBE		139.2	-15.3	-1.16	165.6	-14.7	-1.06
YP2FDE		159.0	4.5	0.34	190.6	10.3	0.74
ZWXKQG		165.5	11.0	0.84	202.4	22.1	1.59

TAPPI-CTS Interlaboratory Testing Program
Analysis 314
Tearing Strength - Packaging Papers

Summary Statistics

	Sample SD13	Sample SD14
Grand Means	154.51 Grams	180.31 Grams
SD Btwn Labs	13.12 Grams	13.90 Grams

Statistics based on 35 of 40 reporting participants

Comments on assigned Data Flags for Test #314

646KEE (X) - Data appear to be off by a factor of .25; data converted by CTS (x4).

BVAT99 (X) - Extreme data.

K68LU7 (X) - Extreme data.

TWAJ9L (X) - Data appear to be off by a factor of .25; data converted by CTS (x4).

VBEPBG (X) - Data appear to be off by a factor of .25; data converted by CTS (x4).

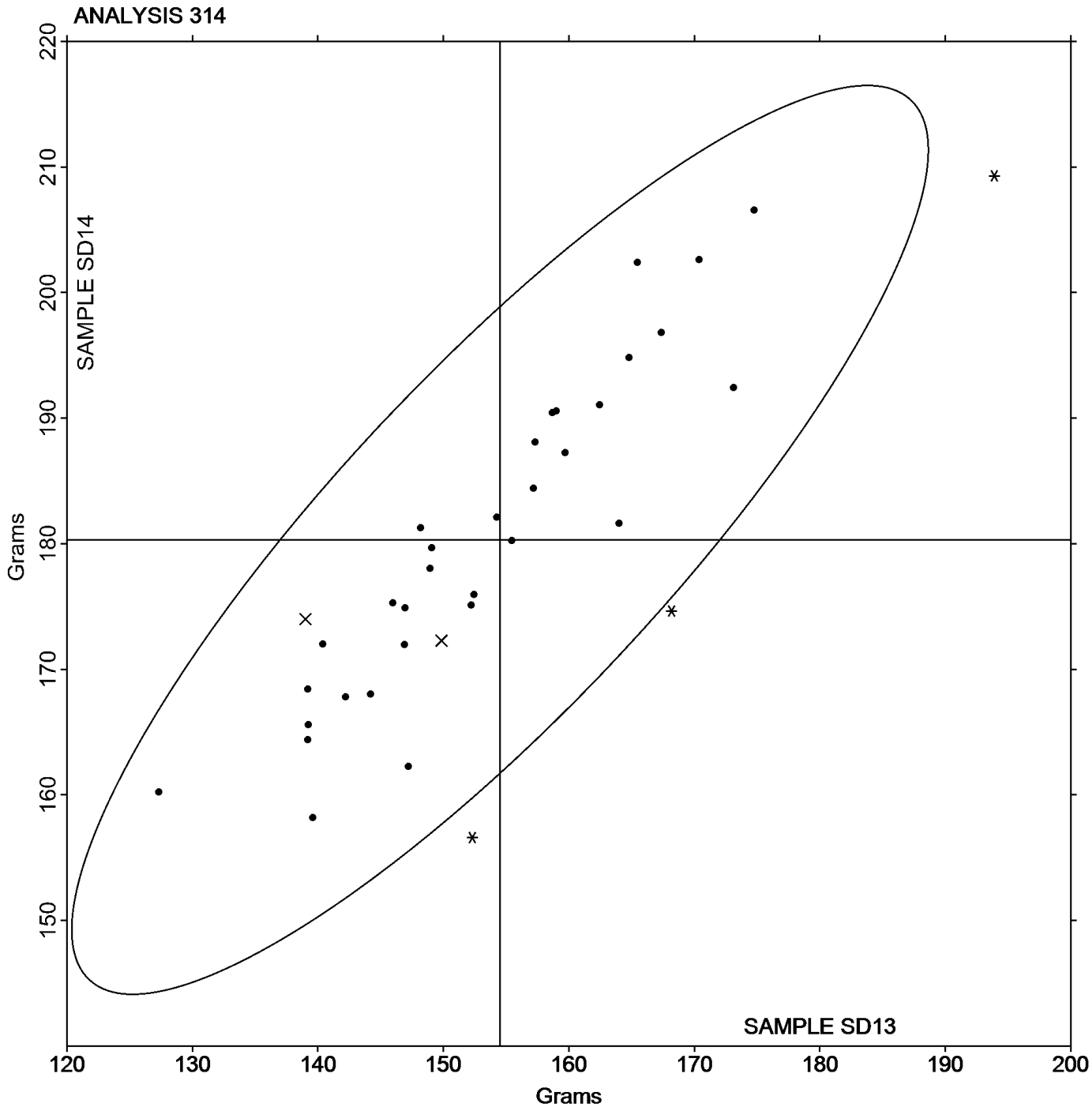
TAPPI-CTS Interlaboratory Testing Program

Analysis 314

Tearing Strength - Packaging Papers

Grand Mean Sample **SD13** = 154.51 Grams

Grand Mean Sample **SD14** = 180.31 Grams



TAPPI-CTS Interlaboratory Testing Program

Analysis 320

Tensile Breaking Strength - Newsprint

WebCode	Data Flag	Sample SR13 Lab Mean	Sample SR13 Diff from Grand Mean	Sample SR13 CPV	Sample SR14 Lab Mean	Sample SR14 Diff from Grand Mean	Sample SR14 CPV
6FY24F		2.334	0.052	0.24	3.061	0.125	0.53
8EBJQK		2.165	-0.116	-0.53	2.659	-0.277	-1.16
8XAUJF		2.222	-0.059	-0.27	2.902	-0.034	-0.14
GDU9DY		2.046	-0.235	-1.06	2.837	-0.099	-0.42
JC6X73		2.542	0.261	1.18	2.824	-0.112	-0.47
KJKTBH		2.388	0.107	0.48	3.015	0.079	0.33
KQ6AY7		2.089	-0.192	-0.87	2.764	-0.172	-0.72
M3U87H		2.431	0.149	0.68	3.187	0.252	1.06
QGFCYZ		2.379	0.098	0.44	2.968	0.033	0.14
R7URR9		2.319	0.038	0.17	2.790	-0.145	-0.61
XKGNXM		2.077	-0.204	-0.92	2.812	-0.124	-0.52
Y4LX7J		2.730	0.449	2.03	3.568	0.632	2.66
YXYZM3		1.936	-0.345	-1.56	2.776	-0.160	-0.67

Summary Statistics

	Sample SR13	Sample SR14
Grand Means	2.2814 kN/m	2.9356 kN/m
SD Btwn Labs	0.2212 kN/m	0.2376 kN/m

Statistics based on 13 of 13 reporting participants

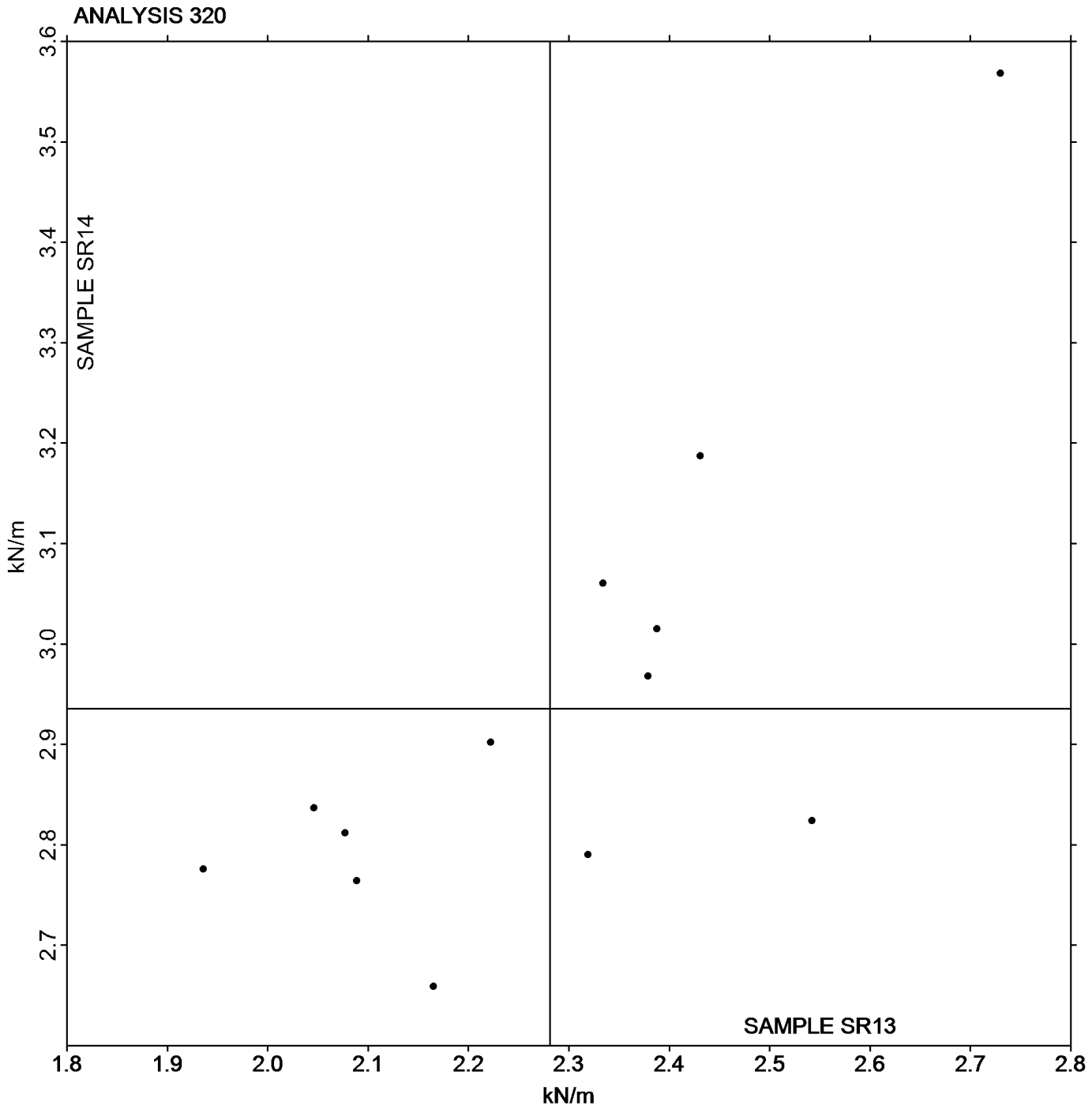
TAPPI-CTS Interlaboratory Testing Program

Analysis 320

Tensile Breaking Strength - Newsprint

Grand Mean Sample **SR13** = 2.2814 kN/m

Grand Mean Sample **SR14** = 2.9356 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 SR13 Lab Mean	Sample SR13 Diff from Grand Mean	Sample SR13 CPV	Sample SR14 Lab Mean	Sample SR14 Diff from Grand Mean	Sample SR14 CPV
6FY24F		14.46	-0.65	-0.25	22.99	1.00	0.31
8EBJQK		16.10	0.99	0.38	23.95	1.96	0.61
8XAUJF		16.24	1.13	0.43	22.01	0.02	0.01
GDU9DY		10.75	-4.36	-1.66	19.41	-2.57	-0.80
JC6X73		17.89	2.78	1.06	19.42	-2.56	-0.80
KJKTBH		15.83	0.72	0.28	21.65	-0.34	-0.11
KQ6AY7		13.01	-2.10	-0.80	21.50	-0.49	-0.15
M3U87H		19.01	3.90	1.48	26.58	4.59	1.43
QGFCYZ		16.67	1.56	0.59	22.39	0.40	0.13
R7URR9		14.55	-0.55	-0.21	18.11	-3.88	-1.21
XKGNXM		12.00	-3.10	-1.18	19.81	-2.17	-0.68
Y4LX7J		18.19	3.08	1.17	29.32	7.34	2.28
YXYZM3		11.69	-3.42	-1.30	18.68	-3.31	-1.03

Summary Statistics

	Sample SR13	Sample SR14
Grand Means	15.108 Joules/sq m	21.986 Joules/sq m
SD Btwn Labs	2.631 Joules/sq m	3.217 Joules/sq m

Statistics based on 13 of 13 reporting participants

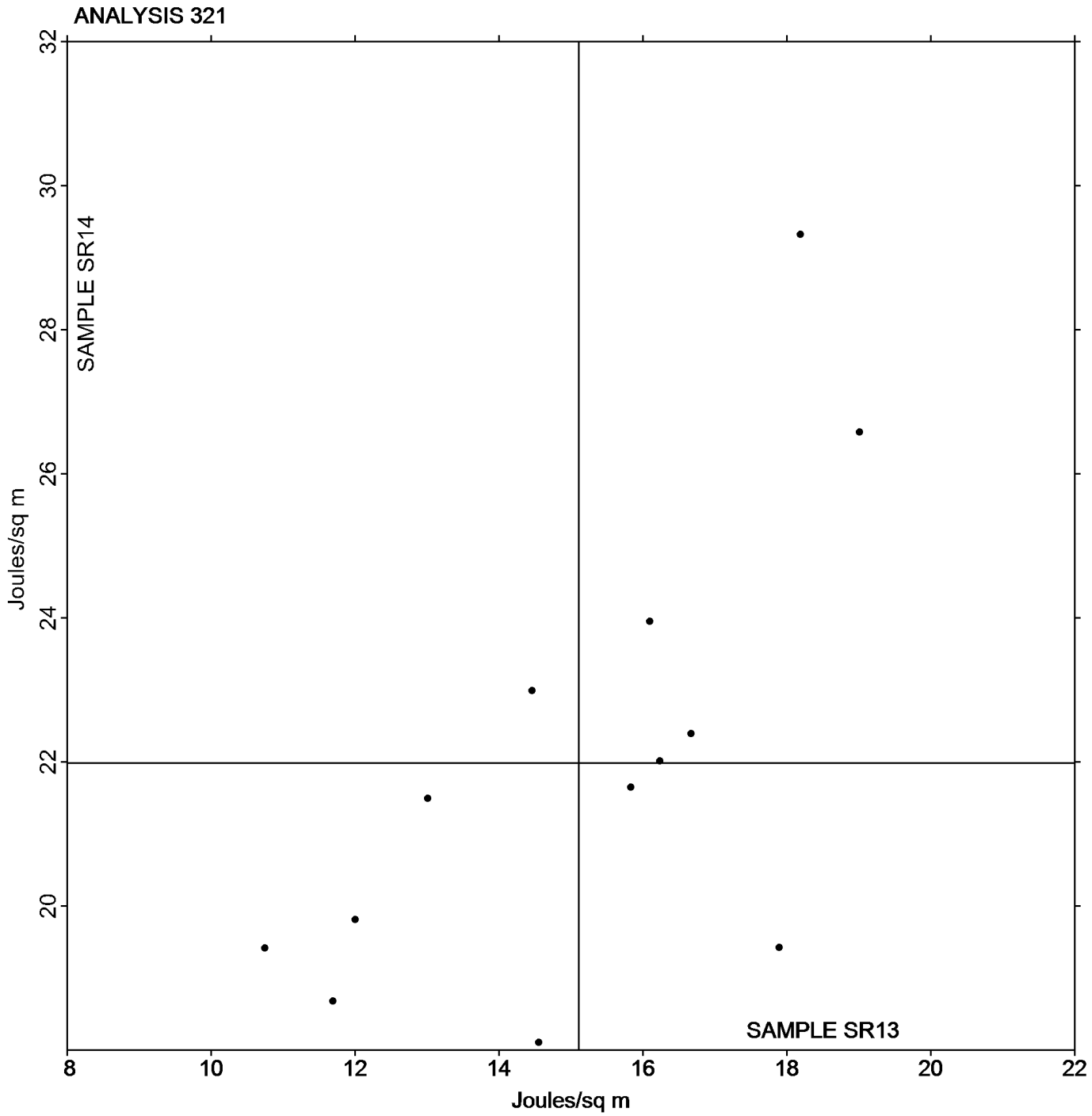
TAPPI-CTS Interlaboratory Testing Program

Analysis 321

Tensile Energy Absorption - Newsprint

Grand Mean Sample **SR13** = 15.108 Joules/sq m

Grand Mean Sample **SR14** = 21.986 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 SR13 Lab Mean	Sample SR13 Diff from Grand Mean	Sample SR13 CPV	Sample SR14 Lab Mean	Sample SR14 Diff from Grand Mean	Sample SR14 CPV
6FY24F		1.046	-0.119	-0.67	1.242	-0.058	-0.39
8EBJQK		1.437	0.272	1.52	1.606	0.306	2.07
8XAUJF		1.191	0.026	0.14	1.240	-0.060	-0.41
GDU9DY		0.892	-0.274	-1.53	1.155	-0.145	-0.98
JC6X73		1.273	0.108	0.60	1.289	-0.011	-0.07
KJKTBH		1.178	0.013	0.07	1.297	-0.003	-0.02
KQ6AY7		1.030	-0.135	-0.76	1.235	-0.065	-0.44
M3U87H		1.397	0.232	1.30	1.464	0.164	1.11
QGFCYZ		1.401	0.236	1.32	1.481	0.181	1.22
R7URR9		1.066	-0.099	-0.55	1.094	-0.206	-1.39
XKGNXM		0.989	-0.176	-0.99	1.186	-0.114	-0.77
Y4LX7J		1.082	-0.083	-0.47	1.311	0.011	0.07

Summary Statistics

	Sample SR13	Sample SR14
Grand Means	1.1651 Percent	1.3000 Percent
SD Btwn Labs	0.1786 Percent	0.1481 Percent

Statistics based on 12 of 12 reporting participants

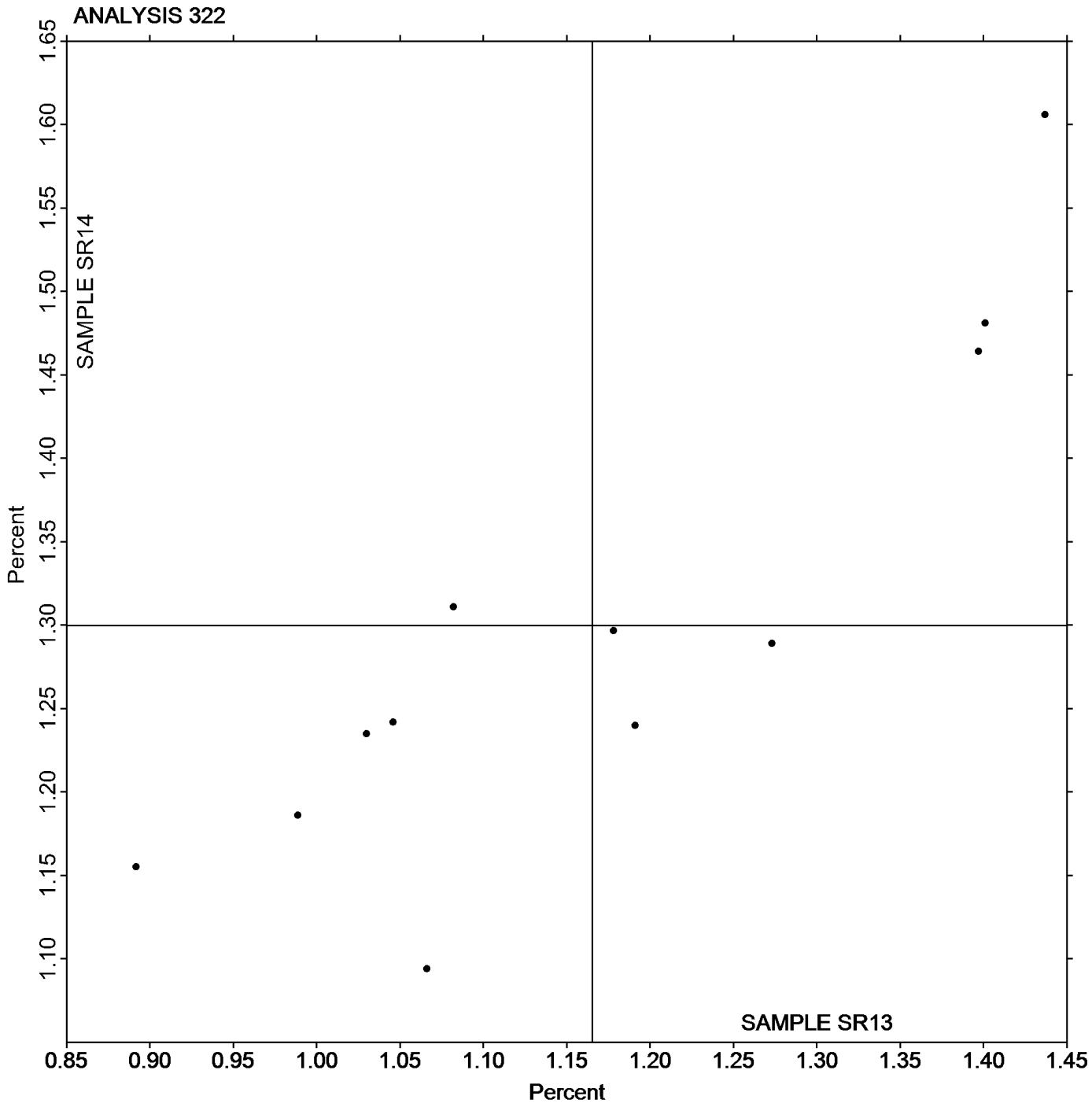
TAPPI-CTS Interlaboratory Testing Program

Analysis 322

Elongation to Break - Newsprint

Grand Mean Sample **SR13** = 1.1651 Percent

Grand Mean Sample **SR14** = 1.3000 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 SF13 Lab Mean	Sample SF13 Diff from Grand Mean	Sample SF13 CPV	Sample SF14 Lab Mean	Sample SF14 Diff from Grand Mean	Sample SF14 CPV	Instr Code
2EV8TY		4.472	-0.269	-0.85	4.093	0.102	0.36	TC
2R6R9L		4.670	-0.070	-0.22	3.918	-0.072	-0.25	LH
3FAT32		4.589	-0.152	-0.48	3.854	-0.137	-0.48	TB
3KD22G		4.941	0.200	0.63	4.225	0.235	0.82	TB
3VG8YP		3.981	-0.759	-2.40	3.333	-0.657	-2.30	ID
4BPJ79		4.938	0.197	0.62	4.219	0.229	0.80	LH
4C4XQC		4.493	-0.248	-0.78	3.819	-0.171	-0.60	LI
4EABFQ		4.931	0.190	0.60	4.097	0.107	0.37	TB
4J483V		4.878	0.137	0.43	4.078	0.087	0.31	LI
72WRY8		4.824	0.083	0.26	3.807	-0.184	-0.64	TP
77M26Y		4.721	-0.020	-0.06	3.799	-0.191	-0.67	BU
7NLG6P		5.109	0.369	1.16	4.342	0.351	1.23	TO
AGVCH6		5.129	0.389	1.23	4.165	0.174	0.61	TO
AVT3XC		4.292	-0.449	-1.42	3.561	-0.429	-1.50	LH
CV4VC3		4.847	0.106	0.33	4.147	0.157	0.55	LH
D9TV46		5.313	0.572	1.81	4.340	0.350	1.23	LX
DEZNVF		4.375	-0.365	-1.15	3.654	-0.336	-1.18	IM
DLF327		5.084	0.343	1.08	4.255	0.265	0.93	LH
DNL8GU		5.186	0.446	1.41	4.333	0.342	1.20	XX
EDJ7GV		5.070	0.329	1.04	4.462	0.472	1.65	LA
EFJ87C		4.704	-0.037	-0.12	3.783	-0.207	-0.73	LH
EJ6KFF		4.040	-0.701	-2.21	3.634	-0.356	-1.25	LH
F2HKMM		4.857	0.117	0.37	4.167	0.177	0.62	MR
FNVB33		4.700	-0.041	-0.13	3.733	-0.257	-0.90	LI
H2D3F3		4.692	-0.049	-0.15	3.955	-0.035	-0.12	DL
HTWEV9		4.728	-0.012	-0.04	3.884	-0.106	-0.37	IN
JR6TN3		5.069	0.329	1.04	4.193	0.203	0.71	LH
KECQK2	*	5.014	0.273	0.86	3.758	-0.233	-0.81	TA
KQ6AY7		4.413	-0.328	-1.03	3.702	-0.288	-1.01	LH
KTUJBT		4.315	-0.426	-1.34	3.432	-0.558	-1.95	XX
KZT7Z8		4.742	0.001	0.00	4.074	0.084	0.29	LE
LMG6XM		5.030	0.290	0.91	4.243	0.253	0.89	TP
LVXHZR		4.807	0.066	0.21	3.936	-0.054	-0.19	LI
LYAQ2W		4.527	-0.214	-0.67	3.907	-0.083	-0.29	LI
MQWWL		5.254	0.514	1.62	4.557	0.567	1.99	LH
MUEA93		5.367	0.627	1.98	4.636	0.646	2.26	TJ
NPWDYJ		4.953	0.212	0.67	4.284	0.293	1.03	TO
PA6T3V	X	2.100	-2.641	-8.34	1.756	-2.235	-7.83	TF
PCBGFZ	*	4.175	-0.566	-1.79	3.972	-0.018	-0.06	TP
PJ9TRW		4.411	-0.329	-1.04	3.703	-0.287	-1.01	RE
QDKNG9		4.595	-0.146	-0.46	3.636	-0.354	-1.24	IK
RX48NW		4.562	-0.179	-0.56	4.012	0.022	0.08	LA
UBKL6Z		4.870	0.130	0.41	4.076	0.086	0.30	LH

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

WebCode	Data Flag	Sample SF13 Lab Mean	Sample SF13 Diff from Grand Mean	Sample SF13 CPV	Sample SF14 Lab Mean	Sample SF14 Diff from Grand Mean	Sample SF14 CPV	Instr Code
UL387N		4.887	0.146	0.46	3.951	-0.039	-0.14	LH
VUVXAW		4.653	-0.088	-0.28	3.927	-0.063	-0.22	XX
WECRC2		4.721	-0.020	-0.06	3.980	-0.010	-0.04	IM
WVFC6J		4.544	-0.197	-0.62	3.903	-0.087	-0.31	TB
WXMNM		4.530	-0.211	-0.67	3.837	-0.153	-0.54	LH
X486YV		4.790	0.049	0.16	3.890	-0.101	-0.35	TJ
XYU7LG		4.705	-0.035	-0.11	4.097	0.107	0.37	TB
Y82HYQ		4.267	-0.473	-1.49	3.670	-0.321	-1.12	IM
Y8N7MA		5.038	0.298	0.94	4.345	0.355	1.24	TP
YCUK26		4.981	0.240	0.76	4.037	0.046	0.16	TI
YMY8FW		4.929	0.188	0.59	4.497	0.507	1.77	TJ
ZE3UT2	X	3.542	-1.198	-3.78	2.788	-1.202	-4.21	TB
ZH342H		4.280	-0.461	-1.46	3.562	-0.428	-1.50	SP

Summary Statistics

	Sample SF13	Sample SF14
Grand Means	4.7406 kN/m	3.9902 kN/m
SD Btwn Labs	0.3167 kN/m	0.2855 kN/m

Statistics based on 54 of 56 reporting participants

Comments on assigned Data Flags for Test #325

PA6T3V (X) - Extreme data.

ZE3UT2 (X) - Systematic error (data for both samples are low).

Instrument Code List

(BU) - Buchel
(DL) - EMIC DL500 Universal Testing Machines
(ID) - Instron 4201/4202
(IK) - Instron 4400 Series
(IM) - Instron 5500 Series
(IN) - Instron 3340 series
(LA) - L & W Tensile - Autoline 300
(LE) - L & W Tensile Tester 066
(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
(RE) - Regmed
(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)
(XX) - Instrument make/model not specified by lab

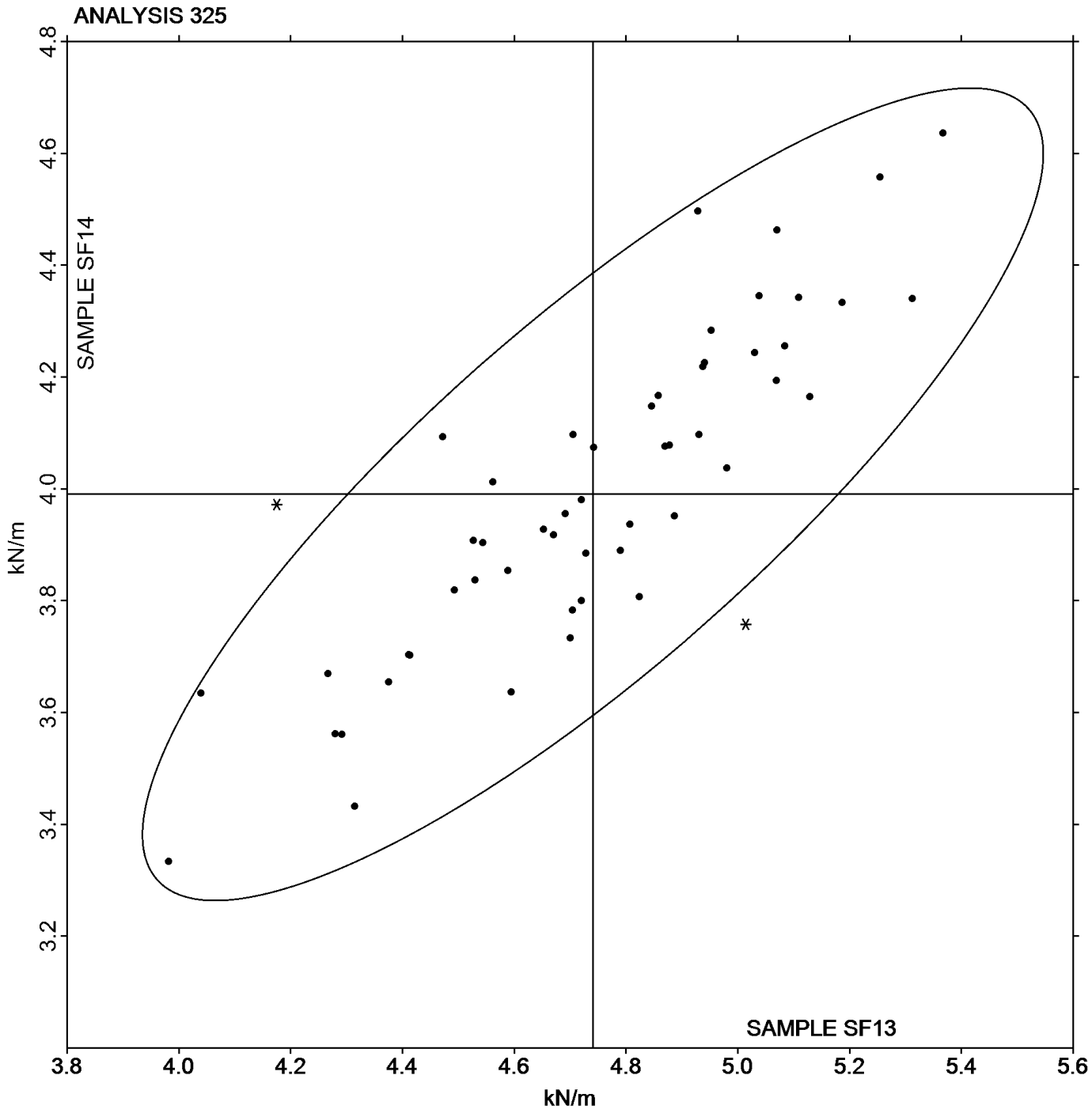
TAPPI-CTS Interlaboratory Testing Program

Analysis 325

Tensile Breaking Strength - Printing Papers

Grand Mean Sample **SF13** = 4.7406 kN/m

Grand Mean Sample **SF14** = 3.9902 kN/m



TAPPI-CTS Interlaboratory Testing Program

Analysis 327

Tensile Energy Absorption - Printing Papers

WebCode	Data Flag	Sample SF13 Lab Mean	Sample SF13 Diff from Grand Mean	Sample SF13 CPV	Sample SF14 Lab Mean	Sample SF14 Diff from Grand Mean	Sample SF14 CPV	Instr Code
2R6R9L		63.65	-1.73	-0.23	29.37	-0.67	-0.19	LH
3FAT32		70.09	4.71	0.62	31.58	1.54	0.43	TB
3KD22G	*	68.93	3.55	0.47	37.60	7.56	2.14	TB
3VG8YP		52.42	-12.97	-1.72	25.60	-4.44	-1.26	ID
4BPJ79		73.08	7.70	1.02	34.29	4.25	1.20	LH
4C4XQC		59.01	-6.37	-0.84	28.69	-1.35	-0.38	LI
4EABFQ		72.17	6.79	0.90	31.33	1.29	0.36	TB
4J483V		55.95	-9.43	-1.25	23.85	-6.19	-1.75	LW
72WRY8		59.75	-5.63	-0.75	24.05	-5.99	-1.70	TP
77M26Y		71.62	6.24	0.82	30.70	0.66	0.19	BU
7NLG6P		62.80	-2.58	-0.34	28.48	-1.56	-0.44	TO
AGVCH6		80.77	15.39	2.04	34.15	4.11	1.16	TF
AVT3XC		63.27	-2.11	-0.28	30.31	0.27	0.08	LH
CV4VC3		63.76	-1.62	-0.21	29.91	-0.13	-0.04	LH
D9TV46		74.70	9.32	1.23	29.73	-0.31	-0.09	LX
DEZNVF		73.62	8.24	1.09	32.57	2.53	0.72	IM
DLF327		71.43	6.05	0.80	32.34	2.30	0.65	LH
EJ6KFF	*	49.54	-15.84	-2.10	31.07	1.03	0.29	LH
F2HKMM		66.73	1.35	0.18	30.54	0.50	0.14	MR
FNVB33		65.17	-0.21	-0.03	27.14	-2.90	-0.82	LI
H2D3F3		66.30	0.92	0.12	31.17	1.13	0.32	DL
JR6TN3		61.25	-4.13	-0.55	27.31	-2.74	-0.77	LH
KQ6AY7		61.51	-3.87	-0.51	27.82	-2.22	-0.63	LH
LMG6XM		48.35	-17.03	-2.25	22.81	-7.23	-2.05	TP
LVXHZR		71.14	5.76	0.76	29.44	-0.60	-0.17	LI
LYAQ2W		64.10	-1.28	-0.17	30.11	0.07	0.02	LI
MQWWL	X	25.79	-39.59	-5.24	15.86	-14.18	-4.02	LH
MUEA93		56.26	-9.12	-1.21	30.01	-0.04	-0.01	TJ
NPWDYJ	*	77.49	12.11	1.60	40.43	10.38	2.94	TO
PJ9TRW		65.25	-0.13	-0.02	28.56	-1.48	-0.42	RE
QDKNG9		71.53	6.15	0.81	30.23	0.19	0.05	IK
RX48NW		52.22	-13.16	-1.74	26.33	-3.71	-1.05	LA
UBKL6Z		61.97	-3.41	-0.45	27.09	-2.95	-0.84	LH
UL387N		65.62	0.23	0.03	25.68	-4.36	-1.24	LH
VUVXAW		68.36	2.98	0.39	32.04	2.00	0.57	XX
WECRC2		75.35	9.97	1.32	35.04	5.00	1.42	IM
WXMNM		64.15	-1.24	-0.16	29.86	-0.18	-0.05	LH
XYU7LG		66.57	1.19	0.16	32.93	2.89	0.82	TB
Y82HYQ		62.63	-2.75	-0.36	30.34	0.30	0.09	IM
YCUK26		71.36	5.98	0.79	31.09	1.04	0.30	TI
ZE3UT2	X	606.10	540.72	71.54	246.24	216.20	61.26	TB

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

Summary Statistics

	Sample SF13	Sample SF14
Grand Means	65.381 Joules/sq m	30.040 Joules/sq m
SD Btwn Labs	7.558 Joules/sq m	3.529 Joules/sq m

Statistics based on 39 of 41 reporting participants

Comments on assigned Data Flags for Test #327

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

ZE3UT2 (X) - Extreme data.

Analysis Notes:

4EABFQ - Data appear to be reported as kg-m/sq m, not J/sq m as indicated on datasheet. Units corrected by CTS.

MUEA93 - Data appear to be reported as ft-lb/sq ft, not inch-lb/sq inch as indicated on datasheet. Units corrected by CTS.

XYU7LG - Data appear to be reported as kg-m/sq m, not inch-lb/sq inch as indicated on datasheet. Units corrected by CTS.

Instrument Code List

(BU) - Buchel
(DL) - EMIC DL500 Universal Testing Machines
(ID) - Instron 4201
(IK) - Instron 4400 Series
(IM) - Instron 5500 Series
(LA) - L & W Tensile - Autoline 300
(LH) - L & W Alwetron TH1 (Horizontal) SE 060
(LI) - L & W Tensile Tester SE 062
(LW) - L & W Tensile Tester SE 064
(LX) - L & W (model not specified)
(MR) - MTS Alliance RT series
(RE) - Regmed
(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)
(XX) - Instrument make/model not specified by lab

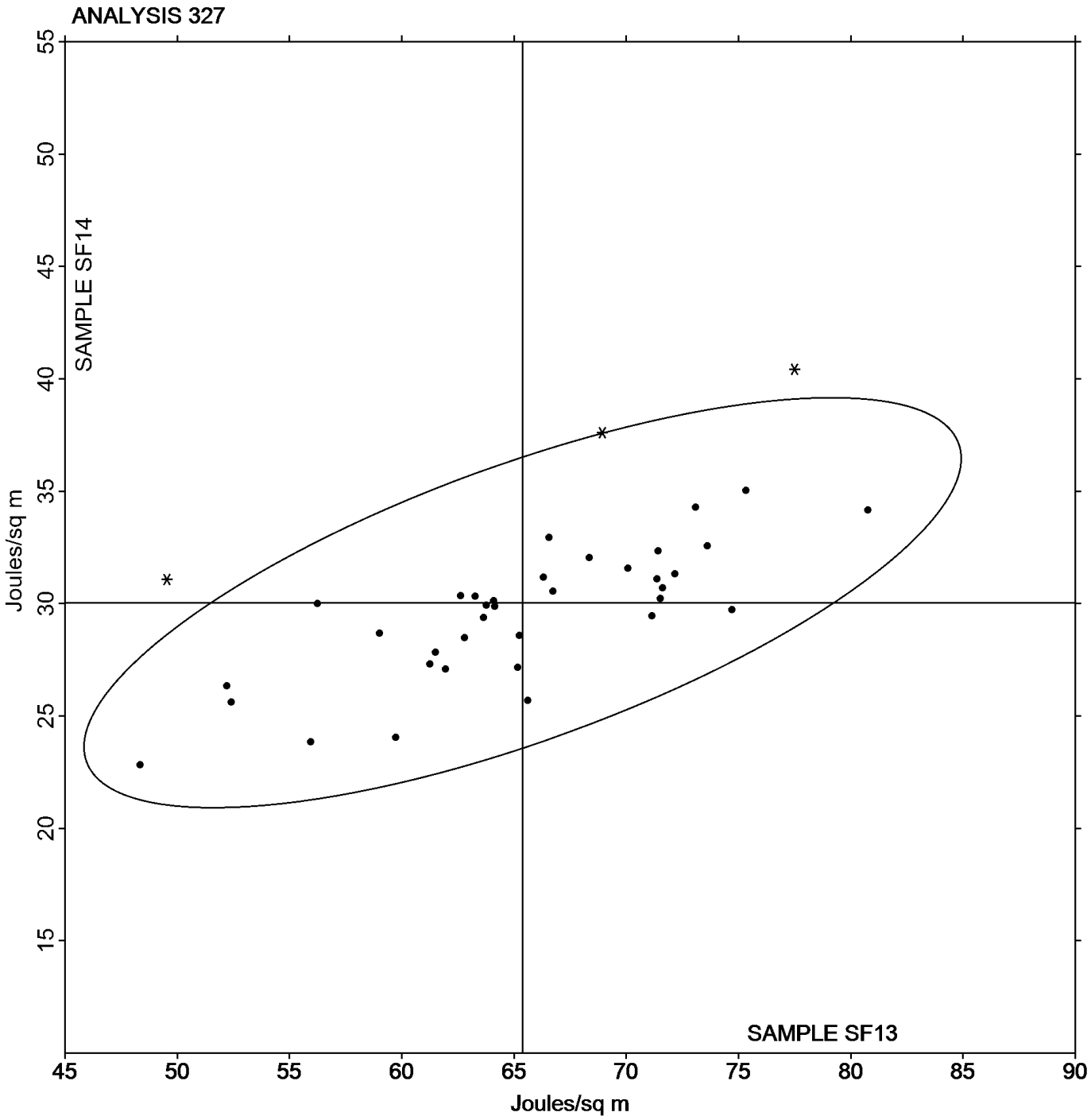
TAPPI-CTS Interlaboratory Testing Program

Analysis 327

Tensile Energy Absorption - Printing Papers

Grand Mean Sample **SF13** = 65.381 Joules/sq m

Grand Mean Sample **SF14** = 30.040 Joules/sq m



TAPPI-CTS Interlaboratory Testing Program

Analysis 328

Elongation to Break - Printing Papers

WebCode	Data Flag	Sample SF13 Lab Mean	Sample SF13 Diff from Grand Mean	Sample SF13 CPV	Sample SF14 Lab Mean	Sample SF14 Diff from Grand Mean	Sample SF14 CPV	Instr Code
2R6R9L		2.014	-0.096	-0.48	1.177	-0.060	-0.50	LH
3FAT32		2.276	0.166	0.84	1.318	0.081	0.67	TB
3KD22G		2.145	0.035	0.18	1.384	0.148	1.23	TB
3VG8YP		1.968	-0.142	-0.71	1.198	-0.039	-0.32	ID
4BPJ79		2.181	0.071	0.36	1.287	0.050	0.42	LH
4C4XQC		1.946	-0.164	-0.83	1.182	-0.055	-0.45	LI
4EABFQ		2.202	0.092	0.46	1.239	0.002	0.02	TB
4J483V		1.741	-0.369	-1.86	0.990	-0.247	-2.05	LX
72WRY8		2.230	0.120	0.61	1.198	-0.039	-0.32	TP
77M26Y		2.296	0.186	0.94	1.325	0.088	0.74	BU
7NLG6P		1.798	-0.312	-1.57	1.023	-0.214	-1.78	TG
AGVCH6		2.355	0.245	1.24	1.331	0.095	0.79	TO
AVT3XC		2.246	0.136	0.69	1.339	0.102	0.85	XX
CV4VC3		1.901	-0.209	-1.05	1.147	-0.090	-0.75	LH
D9TV46		2.097	-0.013	-0.07	1.114	-0.123	-1.02	LX
DEZNVF		2.570	0.460	2.32	1.403	0.166	1.38	IM
DLF327		2.060	-0.050	-0.25	1.180	-0.057	-0.47	LH
EJ6KFF	*	1.857	-0.253	-1.28	1.324	0.087	0.73	LH
F2HKMM		2.078	-0.032	-0.16	1.205	-0.032	-0.26	MR
FNVB33		2.065	-0.045	-0.23	1.150	-0.087	-0.72	LI
H2D3F3		2.290	0.180	0.91	1.449	0.212	1.77	DL
HTWEV9		2.201	0.091	0.46	1.281	0.044	0.37	IN
JR6TN3		1.753	-0.357	-1.80	1.004	-0.233	-1.93	LH
KQ6AY7		2.045	-0.065	-0.33	1.176	-0.061	-0.50	LH
LMG6XM		2.030	-0.080	-0.40	1.203	-0.034	-0.28	TP
LVXHZR		2.185	0.075	0.38	1.204	-0.033	-0.27	LI
LYAQ2W		2.106	-0.004	-0.02	1.216	-0.021	-0.17	LI
MQWWL	X	4.284	2.174	10.97	2.116	0.880	7.32	LH
MUEA93	*	1.665	-0.445	-2.24	1.175	-0.062	-0.51	TJ
NPWDYJ	X	2.618	0.508	2.56	1.821	0.584	4.86	TO
PA6T3V		2.250	0.140	0.71	1.340	0.103	0.86	TF
PJ9TRW		2.284	0.174	0.88	1.298	0.061	0.51	RE
QDKNG9		2.319	0.209	1.05	1.297	0.060	0.50	IK
RX48NW		2.036	-0.074	-0.37	1.260	0.023	0.19	LA
UBKL6Z		1.884	-0.226	-1.14	1.074	-0.163	-1.35	LH
UL387N		1.900	-0.210	-1.06	0.974	-0.263	-2.18	LH
VUVXAW		2.205	0.095	0.48	1.361	0.124	1.04	XX
WECRC2		2.394	0.284	1.43	1.392	0.155	1.29	IM
WVFC6J		1.970	-0.140	-0.71	1.240	0.003	0.03	TF
WXMNM		2.116	0.006	0.03	1.238	0.001	0.01	LH
XYU7LG	X	3.193	1.083	5.46	1.933	0.696	5.79	TB
Y82HYQ		2.370	0.259	1.31	1.488	0.252	2.09	XX
YCUK26		2.234	0.124	0.63	1.306	0.069	0.58	TI

TAPPI-CTS Interlaboratory Testing Program
Analysis 328
Elongation to Break - Printing Papers

WebCode	Data Flag	Sample SF13 Lab Mean	Sample SF13 Diff from Grand Mean	Sample SF13 CPV	Sample SF14 Lab Mean	Sample SF14 Diff from Grand Mean	Sample SF14 CPV	Instr Code
YMY8FW		2.250	0.140	0.71	1.210	-0.027	-0.22	LH
ZE3UT2	X	44.701	42.591	214.84	26.900	25.663	213.51	TB

Summary Statistics

	Sample SF13	Sample SF14
Grand Means	2.1100 Percent	1.2366 Percent
SD Btwn Labs	0.1982 Percent	0.1202 Percent

Statistics based on 41 of 45 reporting participants

Comments on assigned Data Flags for Test #328

MQWWLU (X) - Extreme data.

NPWDYJ (X) - Data for Sample SF14 are high.

XYU7LG (X) - Data for both samples are high.

ZE3UT2 (X) - Extreme data.

Instrument Code List

(BU) - Buchel
(DL) - EMIC DL500 Universal Testing Machines
(ID) - Instron 4201
(IK) - Instron 4400 Series
(IM) - Instron 5500
(IN) - Instron 3340 Series
(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
(RE) - Regmed
(TB) - Thwing-Albert EJA/1000
(TF) - Thwing-Albert EJA Vantage-1
(TG) - Thwing-Albert QC
(TI) - Thwing-Albert QC II
(TJ) - Thwing-Albert QC II-XS
(TO) - Thwing-Albert QC-1000
(TP) - TMI Monitor/Tensile 100 (84-21-01)
(XX) - Instrument make/model not specified by lab

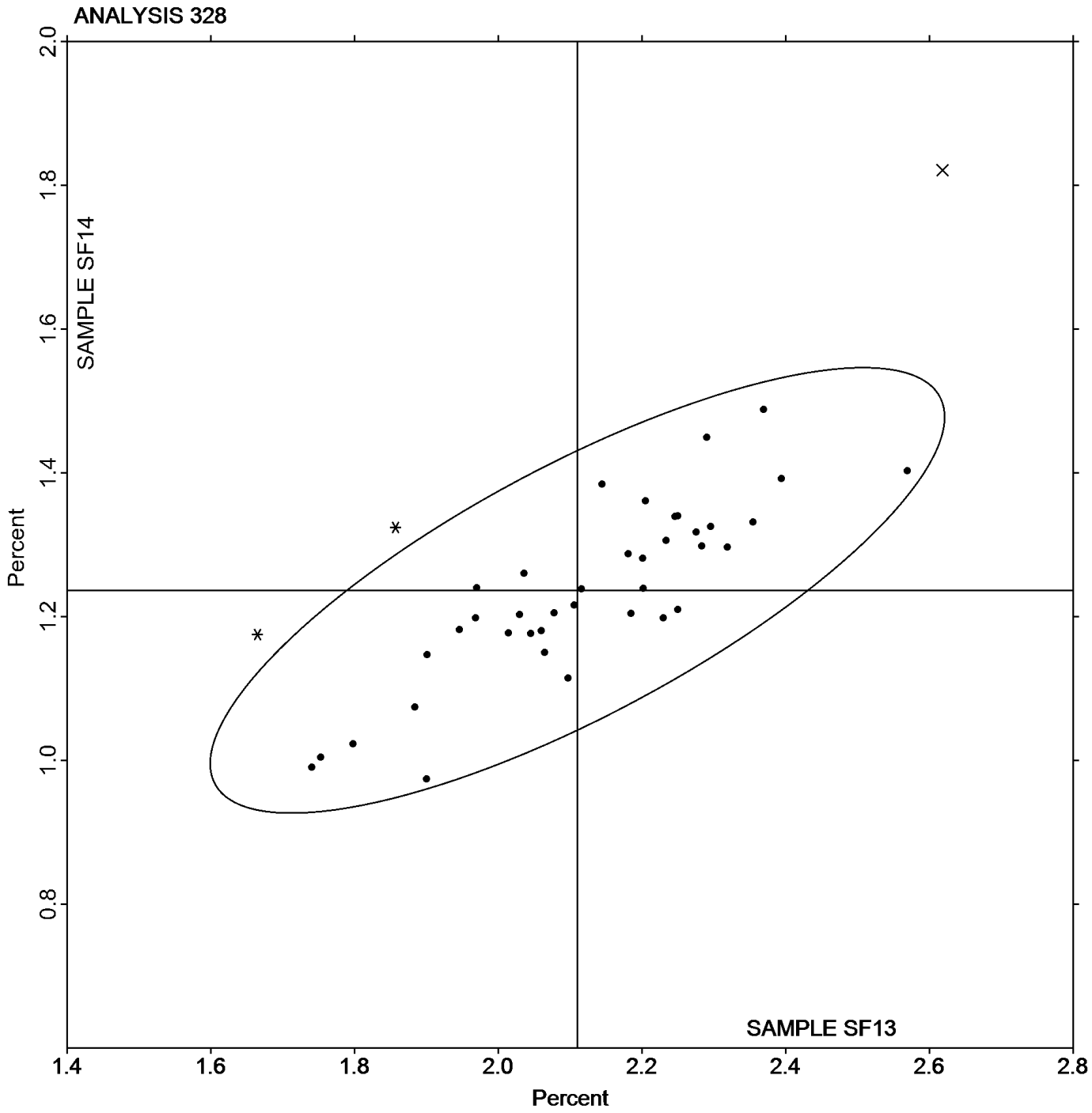
TAPPI-CTS Interlaboratory Testing Program

Analysis 328

Elongation to Break - Printing Papers

Grand Mean Sample **SF13** = 2.1100 Percent

Grand Mean Sample **SF14** = 1.2366 Percent



TAPPI-CTS Interlaboratory Testing Program

Analysis 330

Tensile Breaking Strength - Packaging Papers

WebCode	Data Flag	Sample SE13 Lab Mean	Sample SE13 Diff from Grand Mean	Sample SE13 CPV	Sample SE14 Lab Mean	Sample SE14 Diff from Grand Mean	Sample SE14 CPV	Instr Code
2J6HNE		11.06	-0.54	-0.75	8.318	-0.482	-0.94	IK
3VH6AK		11.04	-0.56	-0.77	8.273	-0.527	-1.03	LA
43E3V3		11.60	0.00	0.00	8.915	0.115	0.23	LH
6AVULR		11.12	-0.48	-0.66	8.623	-0.177	-0.35	XX
6E6DHZ		12.25	0.65	0.90	9.182	0.383	0.75	TO
6NTAJZ		11.47	-0.13	-0.18	8.793	-0.007	-0.01	IM
7G3TB3		12.72	1.12	1.53	9.313	0.514	1.01	TA
7Z42MZ		11.07	-0.53	-0.74	8.348	-0.451	-0.88	IM
A93TL6		11.21	-0.39	-0.54	8.943	0.143	0.28	IM
ACMKVM		11.67	0.07	0.09	8.750	-0.050	-0.10	TB
BRVV2L		11.58	-0.02	-0.03	8.818	0.018	0.04	LE
C6RU2M		12.60	0.99	1.36	9.459	0.659	1.29	TP
CK4CR2		12.16	0.56	0.77	9.198	0.398	0.78	TA
CQVDEA	*	11.96	0.36	0.49	9.662	0.862	1.69	LH
CV4VC3		11.98	0.38	0.52	8.907	0.107	0.21	LH
F2JHXH		11.69	0.09	0.12	8.916	0.116	0.23	TO
FAVJB7		11.92	0.31	0.43	9.081	0.281	0.55	TP
FDBC2Y		11.20	-0.40	-0.55	8.330	-0.470	-0.92	TP
FX47WV		10.95	-0.65	-0.90	8.363	-0.437	-0.86	SP
GG7FCH		12.03	0.43	0.59	9.124	0.325	0.64	TK
GZHCM2		12.01	0.41	0.56	8.969	0.170	0.33	ID
HLHNDM		10.63	-0.98	-1.34	8.229	-0.571	-1.12	SA
JUPKWK		12.06	0.45	0.62	8.785	-0.015	-0.03	LW
JVZQRZ		11.02	-0.58	-0.80	8.441	-0.358	-0.70	IF
KNWZ7A		11.34	-0.26	-0.36	8.777	-0.022	-0.04	LE
LMG6XM		11.80	0.19	0.27	8.895	0.095	0.19	TO
LPNFWB	*	10.20	-1.40	-1.93	8.347	-0.452	-0.89	TK
LUL2ME		11.59	-0.01	-0.02	9.003	0.203	0.40	LE
M3U87H	X	12.37	0.77	1.06	10.269	1.470	2.88	LA
MNCZ3B		11.14	-0.46	-0.64	8.336	-0.464	-0.91	TK
PHTTAT		11.63	0.03	0.04	8.653	-0.146	-0.29	TO
RCFR2U	*	13.46	1.86	2.55	10.165	1.366	2.67	LA
RDXGPG		10.94	-0.66	-0.91	8.285	-0.514	-1.01	TB
U777B3	*	10.28	-1.33	-1.82	7.540	-1.259	-2.46	LW
UZHL8M		11.43	-0.17	-0.24	8.775	-0.025	-0.05	LE
V9RPWF		12.85	1.24	1.71	9.636	0.836	1.64	TH
VBEPBG		10.40	-1.20	-1.65	8.163	-0.637	-1.25	IF
WU743Q		12.47	0.87	1.19	9.247	0.447	0.88	TO
XEPNBE	X	13.81	2.20	3.03	10.823	2.024	3.96	LA
ZGMNNG		12.73	1.12	1.55	9.397	0.597	1.17	TX
ZJXNTN		10.92	-0.68	-0.94	8.004	-0.796	-1.56	LW
ZLYWPL		11.95	0.34	0.47	9.021	0.222	0.43	TH

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

Summary Statistics

	Sample SE13	Sample SE14
Grand Means	11.603 kN/m	8.7996 kN/m
SD Btwn Labs	0.728 kN/m	0.5110 kN/m

Statistics based on 40 of 42 reporting participants

Comments on assigned Data Flags for Test #330

M3U87H (X) - Data for Sample SE14 are high.

XEPNBE (X) - Data for both samples are high.

Instrument Code List

(ID) - Instron 4201
(IF) - Instron 3340 Series
(IK) - Instron 4400 Series
(IM) - Instron 5500 Series
(LA) - L & W Autoline
(LE) - L & W Tensile Tester 066
(LH) - L & W Alwetron TH1 (Horizontal) SE 060
(LW) - L & W Tensile Tester SE062
(SA) - Shimadzu Autograph AG 2000 A
(SP) - Schopper Type Tensile Tester (TMI)
(TA) - Thwing-Albert Tensile Tester
(TB) - Thwing-Albert EJA/1000
(TH) - Thwing-Albert QC-3A
(TK) - Thwing-Albert Model 37-4
(TO) - Thwing-Albert QC-1000
(TP) - TMI Monitor/Tensile 100 (84-21-01)
(TX) - Thwing-Albert (model not specified)
(XX) - Instrument make/model not specified by lab

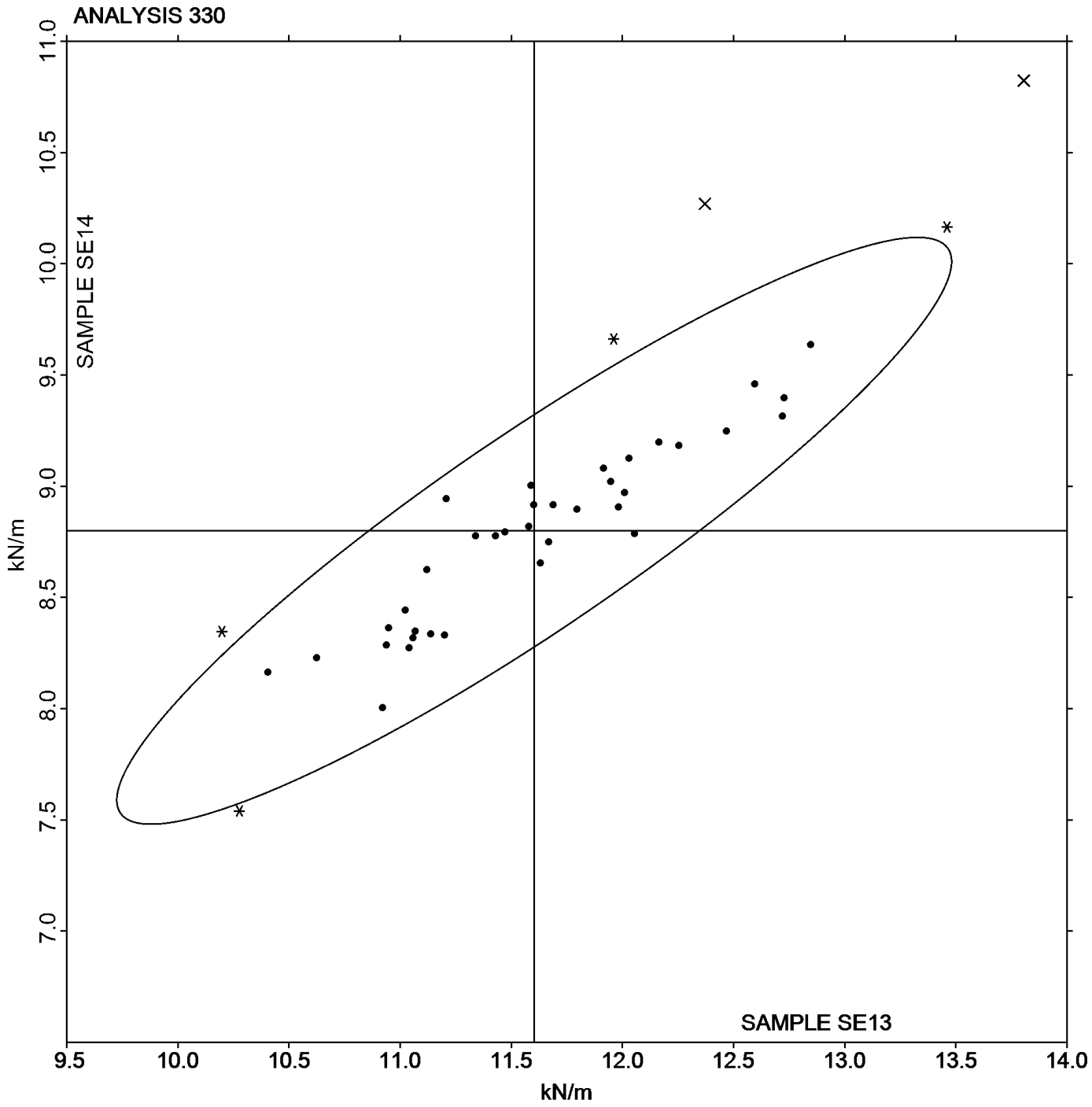
TAPPI-CTS Interlaboratory Testing Program

Analysis 330

Tensile Breaking Strength - Packaging Papers

Grand Mean Sample **SE13** = 11.603 kN/m

Grand Mean Sample **SE14** = 8.7996 kN/m



TAPPI-CTS Interlaboratory Testing Program

Analysis 331

Tensile Energy Absorption - Packaging Papers

WebCode	Data Flag	Sample SE13 Lab Mean	Sample SE13 Diff from Grand Mean	Sample SE13 CPV	Sample SE14 Lab Mean	Sample SE14 Diff from Grand Mean	Sample SE14 CPV	Instr Code
2J6HNE		230.6	34.4	1.41	96.23	15.62	1.59	IK
3VH6AK		207.0	10.7	0.44	82.25	1.64	0.17	LA
43E3V3		198.7	2.5	0.10	80.62	0.00	0.00	LH
6AVULR		185.1	-11.1	-0.45	78.68	-1.94	-0.20	XX
6E6DHZ		210.7	14.4	0.59	78.35	-2.26	-0.23	TO
6NTAJZ		202.0	5.7	0.23	82.72	2.10	0.21	IM
7Z42MZ		169.4	-26.8	-1.10	72.28	-8.33	-0.85	IM
A93TL6		167.0	-29.2	-1.19	82.66	2.05	0.21	IM
C6RU2M	*	120.7	-75.5	-3.09	53.43	-27.19	-2.78	TP
CQVDEA		179.7	-16.5	-0.68	80.92	0.31	0.03	LH
CV4VC3		195.3	-0.9	-0.04	69.76	-10.85	-1.11	LH
F2JHXH		205.6	9.4	0.38	88.44	7.82	0.80	TO
FDBC2Y		213.3	17.1	0.70	88.90	8.29	0.85	TP
HLHNDM		160.6	-35.6	-1.45	70.84	-9.77	-1.00	SA
JUPKWK		197.4	1.2	0.05	67.32	-13.30	-1.36	LW
KNWZ7A		184.9	-11.3	-0.46	74.87	-5.75	-0.59	LX
LMG6XM		207.4	11.2	0.46	80.27	-0.35	-0.04	TO
LPNFWB		171.9	-24.4	-1.00	79.68	-0.94	-0.10	TK
LUL2ME		190.6	-5.6	-0.23	76.97	-3.64	-0.37	LE
M3U87H		211.9	15.6	0.64	100.44	19.83	2.02	LA
PHTTAT		240.3	44.1	1.80	93.21	12.60	1.29	TO
RCFR2U		207.5	11.3	0.46	84.65	4.03	0.41	LA
RDXGPG	X	189.7	-6.5	-0.27	21.89	-58.72	-6.00	TB
U777B3		174.1	-22.2	-0.91	63.67	-16.94	-1.73	LW
UZHL8M		204.4	8.2	0.33	81.65	1.04	0.11	LE
V9RPWF		225.0	28.8	1.18	93.66	13.05	1.33	TH
VBEPBG		172.4	-23.9	-0.98	77.55	-3.06	-0.31	IN
WU743Q		216.9	20.7	0.84	85.37	4.76	0.49	XX
XEPNBE		206.0	9.8	0.40	85.74	5.12	0.52	LA
ZGMNNG		222.2	25.9	1.06	88.09	7.47	0.76	XX
ZLYWPL		208.2	12.0	0.49	79.23	-1.38	-0.14	TH

Summary Statistics

	Sample SE13	Sample SE14
Grand Means	196.21 Joules/sq m	80.615 Joules/sq m
SD Btwn Labs	24.46 Joules/sq m	9.795 Joules/sq m

Statistics based on 30 of 31 reporting participants

Comments on assigned Data Flags for Test #331

RDXGPG (X) - Extreme data for Sample SE14.

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

Analysis Notes:

F2JHXH - Data appear to be reported as ft-lb/sq ft, not inch-lb/sq inch as indicated on datasheet. Units corrected by CTS.

FDBC2Y - Data appear to be reported as J/sq m, not kg-m/sq m as indicated on datasheet. Units corrected by CTS.

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

Instrument Code List

(IK) - Instron 4400 Series

(IM) - Instron 5500 Series

(IN) - Instron 3360 Series

(LA) - L & W Autoline

(LE) - L & W Tensile Tester 066

(LH) - L & W Alwetron TH1 (Horizontal) SE 060

(LW) - L & W Tensile Tester SE062

(LX) - L & W (model not specified)

(SA) - Shimadzu Autograph AG 2000 A

(TB) - Thwing-Albert EJA/1000

(TH) - Thwing-Albert QC-3A

(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

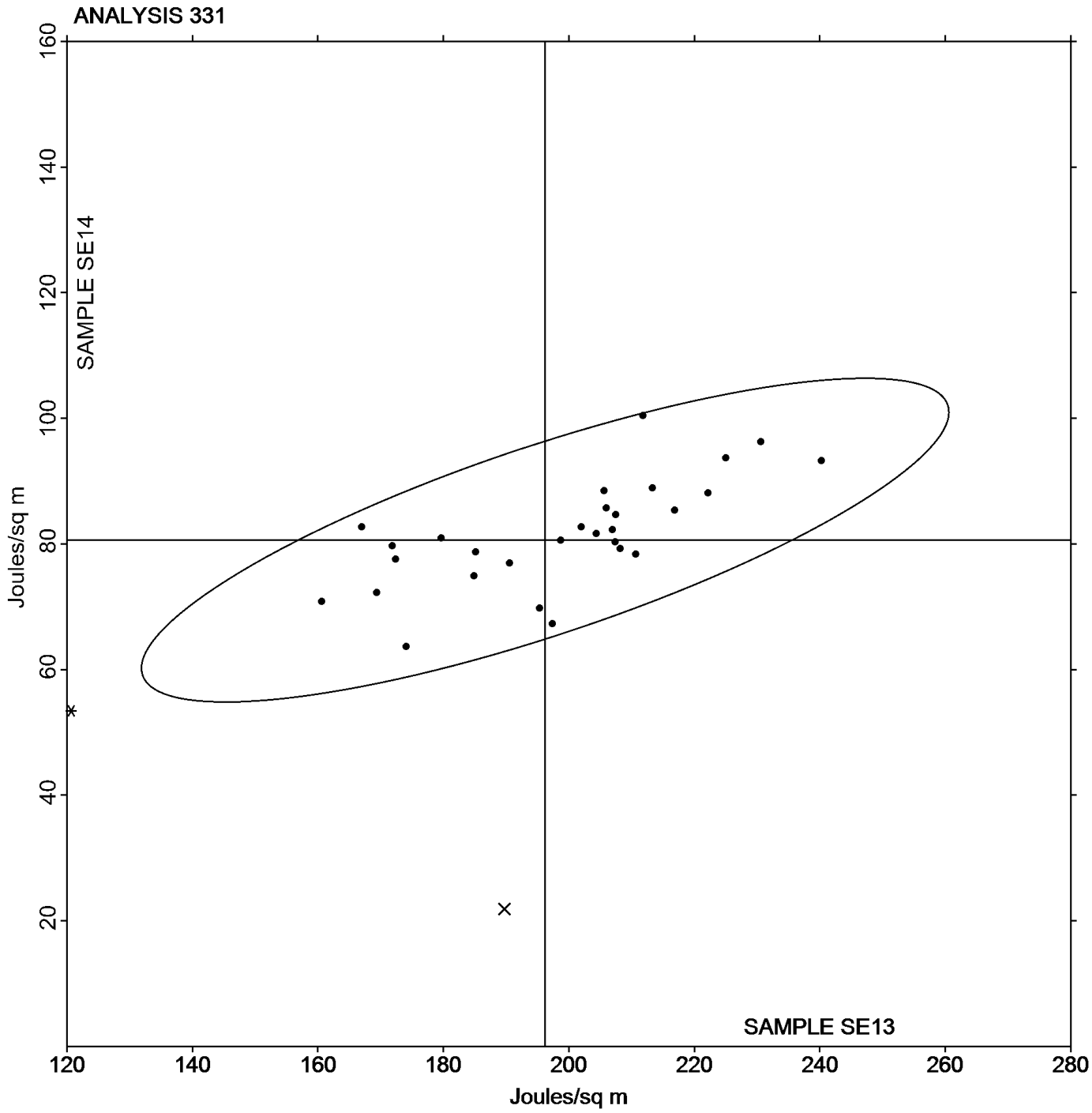
TAPPI-CTS Interlaboratory Testing Program

Analysis 331

Tensile Energy Absorption - Packaging Papers

Grand Mean Sample **SE13** = 196.21 Joules/sq m

Grand Mean Sample **SE14** = 80.615 Joules/sq m



TAPPI-CTS Interlaboratory Testing Program

Analysis 332

Elongation to Break - Packaging Papers

WebCode	Data Flag	Sample SE13 Lab Mean	Sample SE13 Diff from Grand Mean	Sample SE13 CPV	Sample SE14 Lab Mean	Sample SE14 Diff from Grand Mean	Sample SE14 CPV	Instr Code
2J6HNE		3.183	0.595	2.01	1.856	0.361	1.71	IK
3VH6AK		2.345	-0.243	-0.82	1.302	-0.193	-0.91	LA
43E3V3		2.509	-0.079	-0.27	1.400	-0.095	-0.45	XX
6AVULR		2.469	-0.119	-0.40	1.419	-0.076	-0.36	XX
6E6DHZ		2.556	-0.032	-0.11	1.390	-0.105	-0.49	TO
6NTAJZ		2.613	0.025	0.09	1.469	-0.026	-0.12	IM
7Z42MZ		2.573	-0.015	-0.05	1.661	0.166	0.79	IM
A93TL6		2.386	-0.202	-0.68	1.513	0.018	0.09	IM
ACMKVM	X	3.983	1.395	4.71	2.563	1.068	5.05	TB
C6RU2M		3.124	0.536	1.81	1.874	0.379	1.79	TP
CQVDEA		2.234	-0.354	-1.19	1.339	-0.156	-0.74	LH
CV4VC3		2.379	-0.209	-0.70	1.236	-0.259	-1.22	LH
F2JHXH	X	3.534	0.946	3.19	2.520	1.025	4.85	TO
FDBC2Y	*	3.450	0.862	2.91	2.050	0.555	2.63	TP
GZHCM2		2.589	0.001	0.00	1.346	-0.149	-0.70	ID
HLHNDM		2.303	-0.285	-0.96	1.409	-0.086	-0.40	SA
JUPKWK		2.399	-0.189	-0.64	1.228	-0.267	-1.26	LW
KNWZ7A		2.359	-0.229	-0.77	1.326	-0.169	-0.80	LX
LMG6XM		2.654	0.066	0.22	1.471	-0.024	-0.11	TO
LPNFWB		2.508	-0.080	-0.27	1.501	0.006	0.03	TK
LUL2ME		2.408	-0.180	-0.61	1.338	-0.157	-0.74	LE
M3U87H		2.467	-0.121	-0.41	1.561	0.066	0.31	LA
PHTTAT		3.110	0.522	1.76	1.784	0.289	1.37	TO
RCFR2U		2.227	-0.361	-1.22	1.283	-0.212	-1.00	LA
RDXGPG		2.682	0.094	0.32	1.617	0.122	0.58	TB
U777B3		2.508	-0.080	-0.27	1.320	-0.175	-0.83	LW
UZHL8M		2.595	0.007	0.02	1.433	-0.062	-0.29	LE
V9RPWF		2.813	0.225	0.76	1.789	0.294	1.39	TH
VBEPBG		2.421	-0.167	-0.56	1.428	-0.067	-0.32	IN
WU743Q		2.750	0.162	0.55	1.650	0.155	0.73	XX
XEPNBE		2.150	-0.438	-1.48	1.246	-0.249	-1.18	LA
ZGMNNG		2.807	0.219	0.74	1.721	0.226	1.07	XX
ZJXNTN		2.451	-0.137	-0.46	1.276	-0.219	-1.03	LW
ZLYWPL		2.783	0.195	0.66	1.593	0.098	0.46	TH

Summary Statistics

	Sample SE13	Sample SE14
Grand Means	2.5876 Percent	1.4947 Percent
SD Btwn Labs	0.2963 Percent	0.2116 Percent

Statistics based on 32 of 34 reporting participants

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

Comments on assigned Data Flags for Test #332

ACMKVM (X) - Data for both samples are high. Inconsistent in testing within the determinations for both samples.

F2JHXH (X) - Data for both samples are high. Inconsistent within the determinations for Sample SE13.

Instrument Code List

(ID) - Instron 4201

(IK) - Instron 4400 Series

(IM) - Instron 5500 Series

(IN) - Instron 3360 Series

(LA) - L & W Autoline 300

(LE) - L & W Tensile Tester 066

(LH) - L & W Alwetron TH1 (Horizontal) SE 060

(LW) - L & W Tensile Tester SE062

(LX) - L & W (model not specified)

(SA) - Shimadzu Autograph AG 2000 A

(TB) - Thwing-Albert EJA/1000

(TH) - Thwing-Albert QC-3A

(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

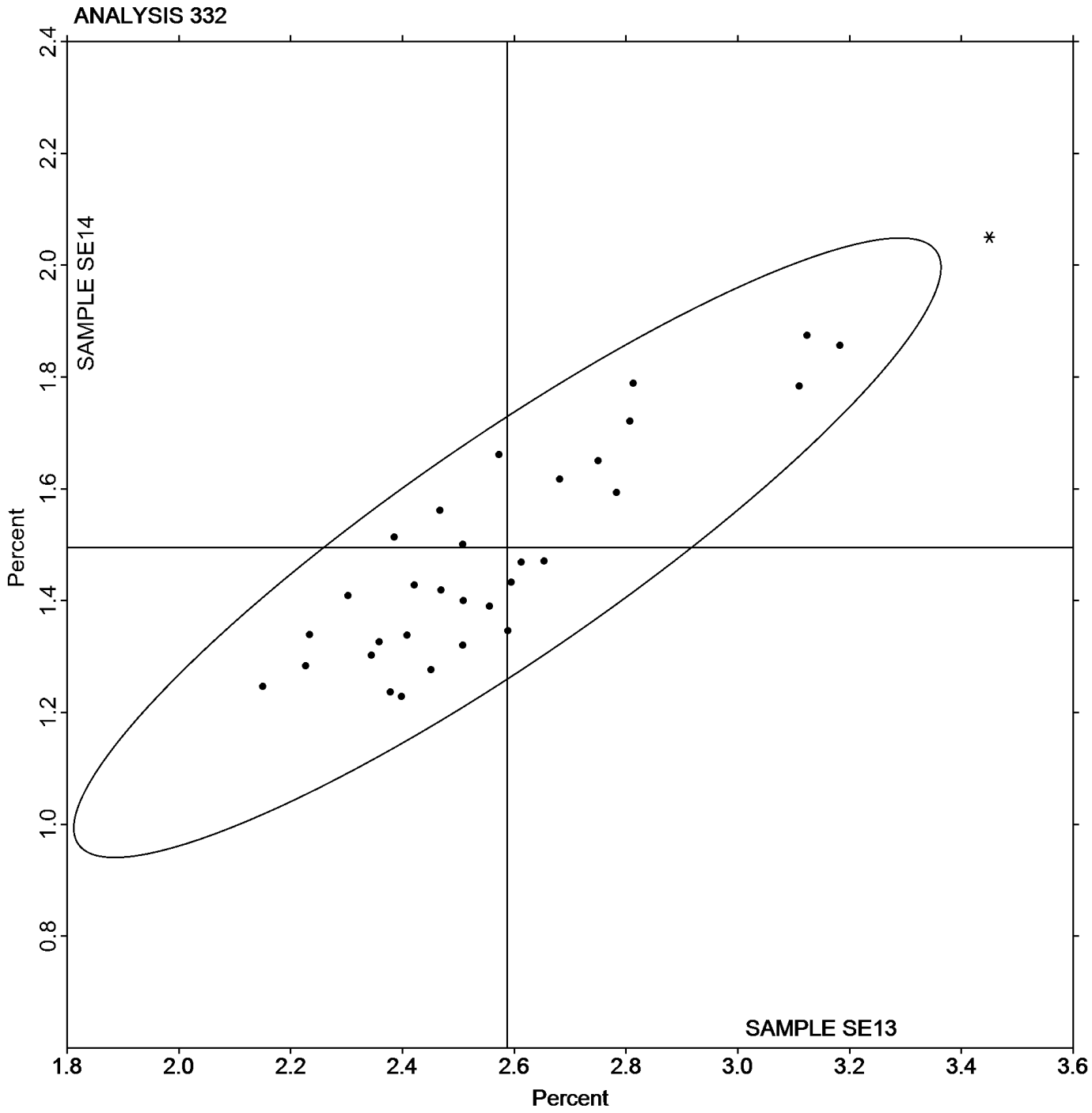
TAPPI-CTS Interlaboratory Testing Program

Analysis 332

Elongation to Break - Packaging Papers

Grand Mean Sample **SE13** = 2.5876 Percent

Grand Mean Sample **SE14** = 1.4947 Percent



TAPPI-CTS Interlaboratory Testing Program

Analysis 334

Folding Endurance (MIT) - Double Folds

WebCode	Data Flag	Sample SG13 Lab Mean	Sample SG13 Diff from Grand Mean	Sample SG13 CPV	Sample SG14 Lab Mean	Sample SG14 Diff from Grand Mean	Sample SG14 CPV	Instr Code
3VG8YP		93.50	2.46	0.10	47.90	-12.29	-0.72	MT
77M26Y		109.30	18.26	0.77	62.30	2.11	0.12	MT
ACMKVM		60.30	-30.74	-1.30	43.70	-16.49	-0.97	MT
DEZNVF		95.20	4.16	0.18	58.20	-1.99	-0.12	MT
FAVJB7		30.50	-60.54	-2.55	29.00	-31.19	-1.84	MT
FNVB33		116.00	24.96	1.05	92.20	32.01	1.89	MT
GG7FCH		78.50	-12.54	-0.53	47.20	-12.99	-0.77	MT
J3H362		68.50	-22.54	-0.95	44.50	-15.69	-0.93	XX
JNMHQY		109.70	18.66	0.79	65.30	5.11	0.30	MT
KZT7Z8		116.70	25.66	1.08	76.20	16.01	0.94	MT
PA6T3V		88.90	-2.14	-0.09	40.30	-19.89	-1.17	MT
QTABRL		122.20	31.16	1.31	66.90	6.71	0.40	MT
RCFR2U		77.10	-13.94	-0.59	59.50	-0.69	-0.04	XX
RX48NW		111.80	20.76	0.88	74.40	14.21	0.84	MT
X486YV		84.00	-7.04	-0.30	61.10	0.91	0.05	XX
Y82HYQ		86.70	-4.34	-0.18	88.40	28.21	1.66	MT
YMY8FW		98.70	7.66	0.32	66.20	6.01	0.35	MT
ZJXNTN	X	4.50	-86.54	-3.65	4.40	-55.79	-3.29	MT

Summary Statistics

	Sample SG13	Sample SG14
Grand Means	91.035 Double Folds	60.194 Double Folds
SD Btwn Labs	23.703 Double Folds	16.959 Double Folds

Statistics based on 17 of 18 reporting participants

Comments on assigned Data Flags for Test #334

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

Instrument Code List

(MT) - MIT - Tinius Olsen

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

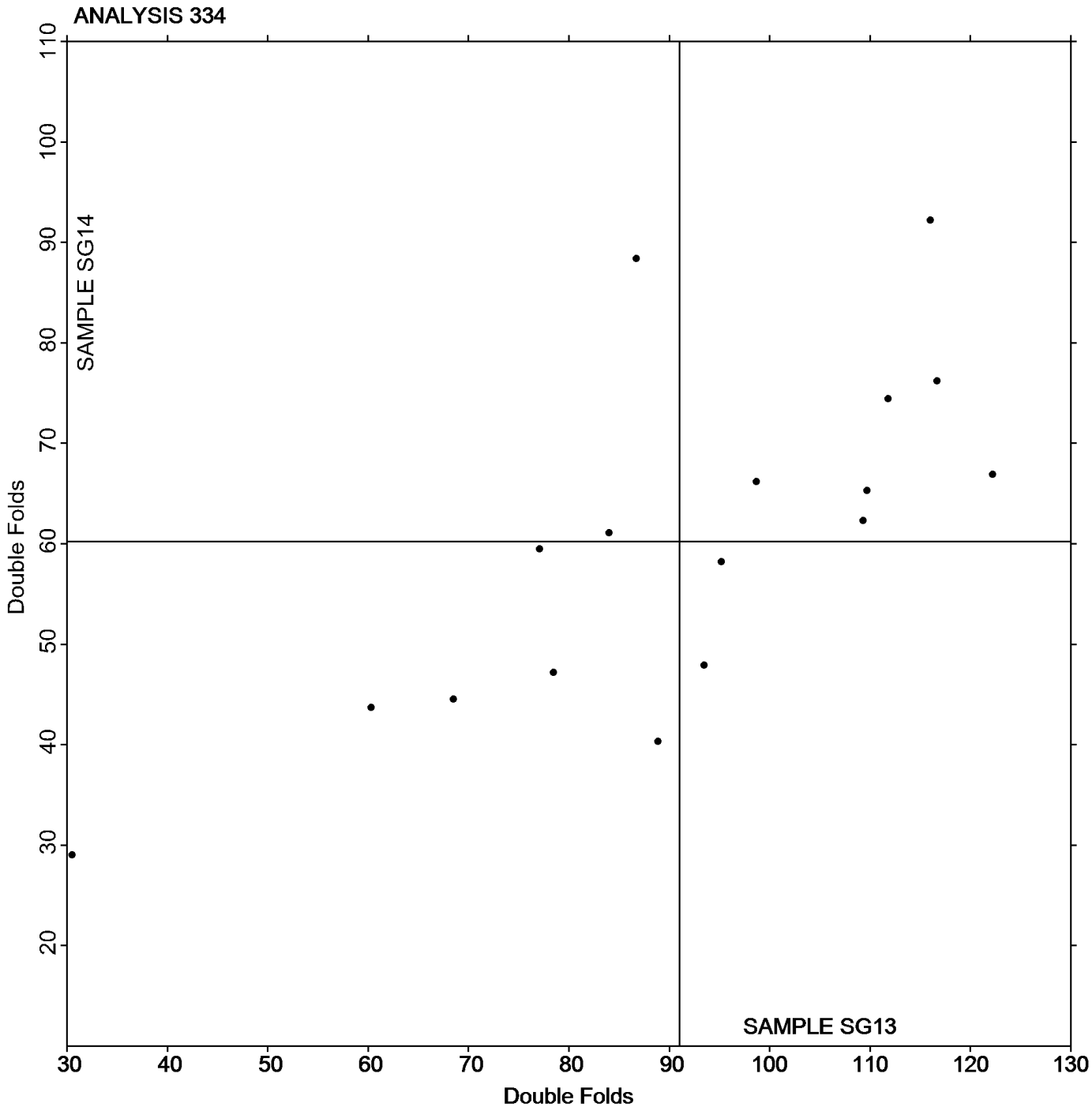
TAPPI-CTS Interlaboratory Testing Program

Analysis 334

Folding Endurance (MIT) - Double Folds

Grand Mean Sample **SG13** = 91.035 Double Folds

Grand Mean Sample **SG14** = 60.194 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 SH13 Lab Mean	Sample SH13 Diff from Grand Mean	Sample SH13 CPV	Sample SH14 Lab Mean	Sample SH14 Diff from Grand Mean	Sample SH14 CPV
2EV8TY		118.8	-8.6	-0.77	179.5	-10.9	-0.83
4EABFQ		104.7	-22.7	-2.04	175.8	-14.6	-1.12
77M26Y		139.6	12.3	1.10	209.1	18.7	1.43
A486K6		139.0	11.6	1.04	212.5	22.1	1.69
ACMKVM		142.6	15.2	1.37	206.3	15.9	1.21
DBZD32		132.8	5.4	0.48	197.1	6.7	0.51
DEZNVF		123.4	-3.9	-0.35	184.0	-6.4	-0.49
DXALDQ		122.3	-5.1	-0.45	176.8	-13.6	-1.04
EFJ87C	X	192.2	64.9	5.83	263.3	72.9	5.57
EJ6KFF		119.4	-7.9	-0.71	177.6	-12.8	-0.98
F2HKMM		137.8	10.4	0.94	181.4	-9.1	-0.69
F2JHXH	X	148.7	21.3	1.92	273.2	82.8	6.33
NPWDYJ		118.5	-8.8	-0.79	173.8	-16.6	-1.27
RX48NW		116.1	-11.3	-1.01	190.7	0.3	0.02
UCWGML		129.6	2.3	0.20	195.8	5.4	0.41
YMY8FW		125.4	-2.0	-0.18	193.4	2.9	0.22
ZG9EG2		140.5	13.1	1.18	202.5	12.1	0.92

Summary Statistics

	Sample SH13	Sample SH14
Grand Means	127.37 Gurley Units	190.42 Gurley Units
SD Btwn Labs	11.12 Gurley Units	13.08 Gurley Units

Statistics based on 15 of 17 reporting participants

Comments on assigned Data Flags for Test #336

EFJ87C (X) - Data for both samples are high. Inconsistent in testing within the determinations for both samples.

F2JHXH (X) - Extreme data for Sample SH14.

Analysis Notes:

ZG9EG2 - Data appears to be transposed between samples. Data Switched by CTS.

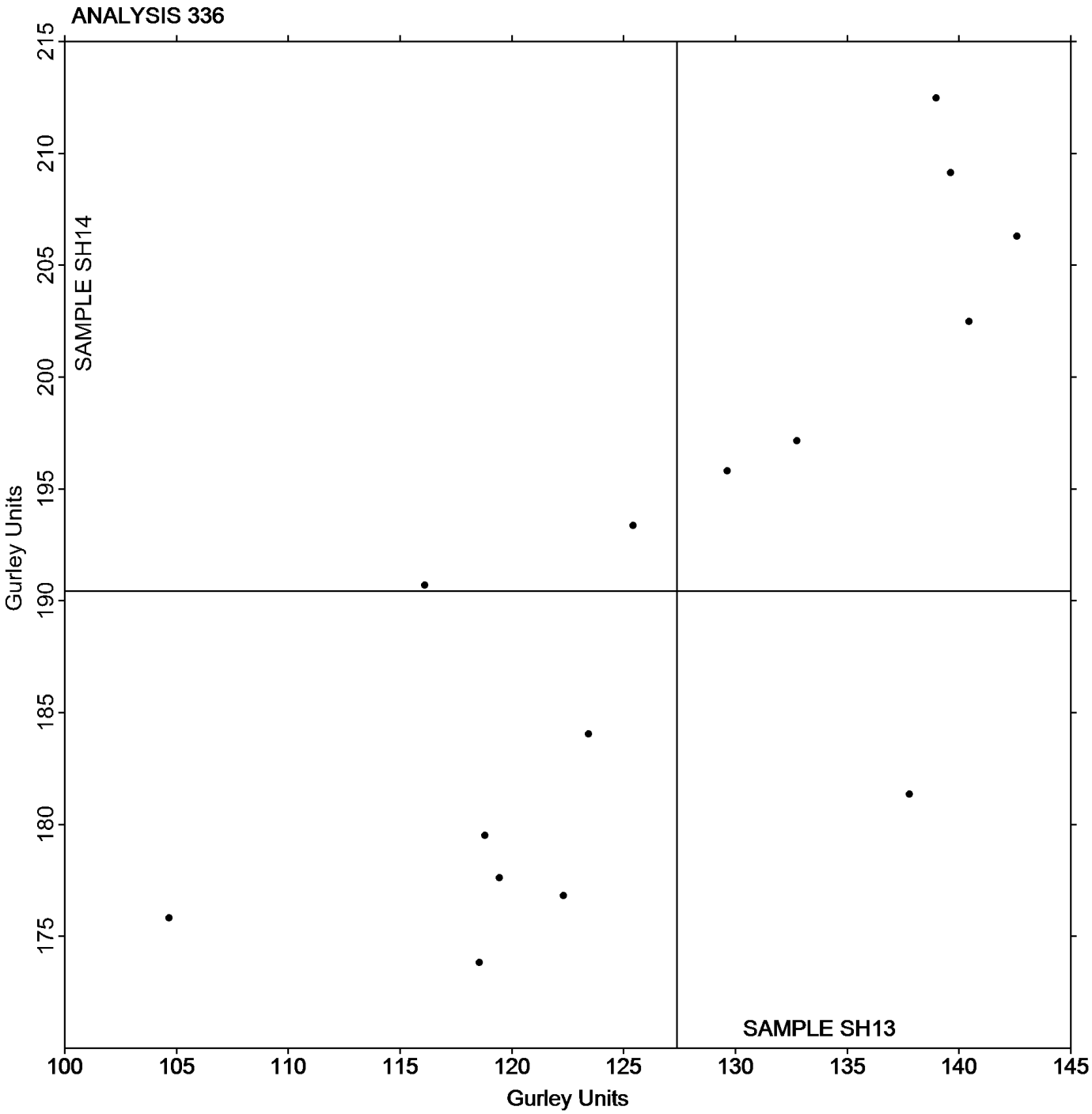
TAPPI-CTS Interlaboratory Testing Program

Analysis 336

Bending Resistance, Gurley Type

Grand Mean Sample **SH13** = 127.37 Gurley Units

Grand Mean Sample **SH14** = 190.42 Gurley 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 338

Bending Resistance, Taber Type - 0 to 10 Units

WebCode	Data Flag	Sample SJ13 Lab Mean	Sample SJ13 Diff from Grand Mean	Sample SJ13 CPV	Sample SJ14 Lab Mean	Sample SJ14 Diff from Grand Mean	Sample SJ14 CPV
3FAT32		1.863	0.041	0.17	2.788	0.178	0.46
3VG8YP		1.914	0.092	0.37	2.718	0.108	0.28
DEZNVF		1.880	0.058	0.23	2.813	0.203	0.52
DNL8GU		1.882	0.060	0.24	2.993	0.383	0.98
F2HKMM		1.648	-0.174	-0.69	2.203	-0.407	-1.04
JUPKWK		1.590	-0.232	-0.92	2.200	-0.410	-1.05
KLC8WR		1.902	0.080	0.32	2.497	-0.113	-0.29
MUEA93		2.194	0.372	1.48	2.880	0.270	0.69
QTABRL		1.899	0.077	0.31	2.835	0.225	0.58
VBEPBG		1.240	-0.582	-2.31	1.790	-0.820	-2.10
X486YV	X	1.953	0.131	0.52	2.800	0.190	0.49
Y8N7MA		2.025	0.203	0.81	2.992	0.382	0.98

Summary Statistics

	Sample SJ13	Sample SJ14
Grand Means	1.8215 Taber Units	2.6099 Taber Units
SD Btwn Labs	0.2514 Taber Units	0.3898 Taber Units

Statistics based on 11 of 12 reporting participants

Comments on assigned Data Flags for Test #338

X486YV (X) - Data for Sample SJ13 appear to be off by a factor of 10; data converted by CTS (x0.1).

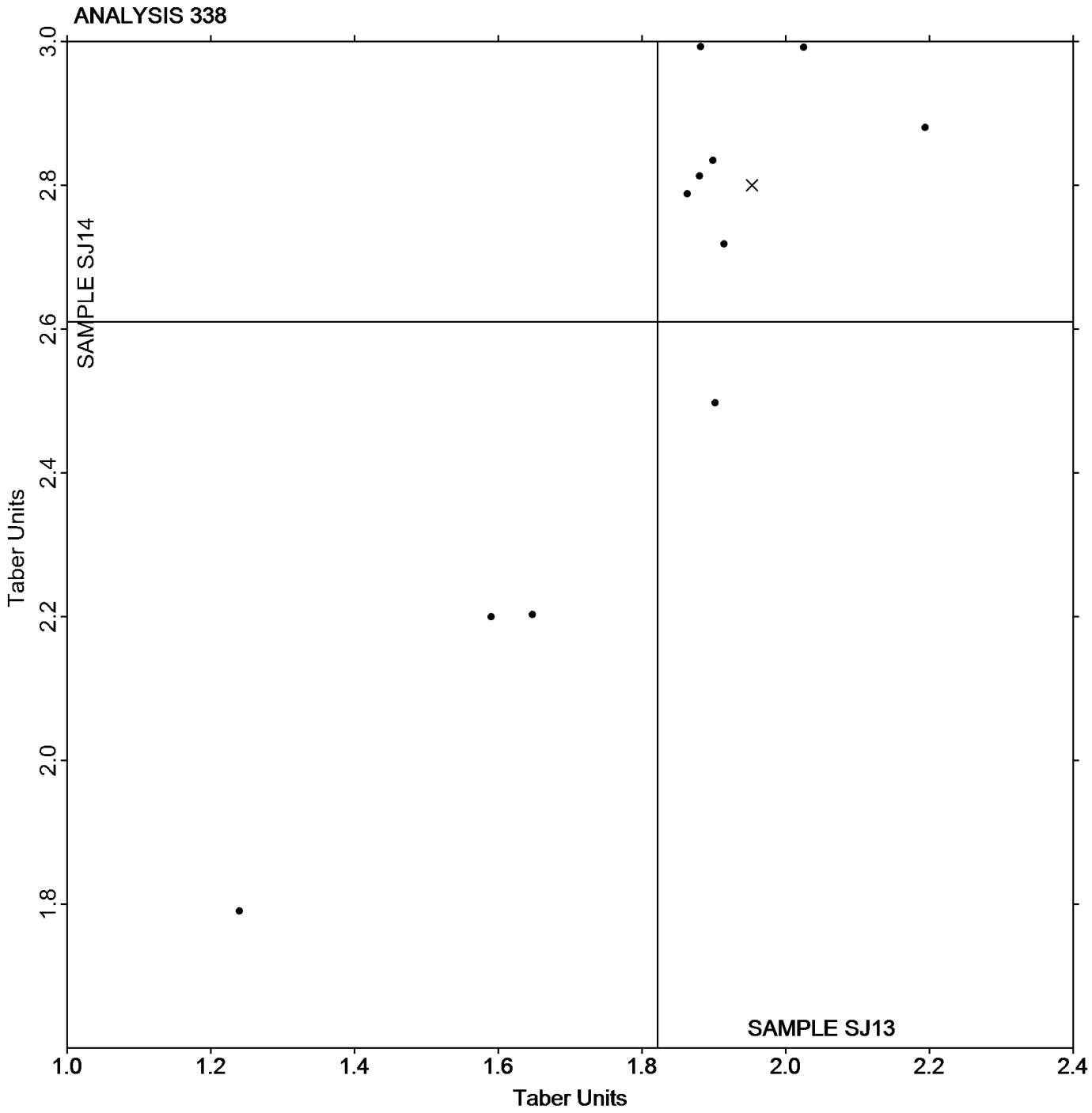
TAPPI-CTS Interlaboratory Testing Program

Analysis 338

Bending Resistance, Taber Type - 0 to 10 Units

Grand Mean Sample **SJ13** = 1.8215 Taber Units

Grand Mean Sample **SJ14** = 2.6099 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 SQ13 Lab Mean	Sample SQ13 Diff from Grand Mean	Sample SQ13 CPV	Sample SQ14 Lab Mean	Sample SQ14 Diff from Grand Mean	Sample SQ14 CPV
3VH6AK		34.00	-1.62	-0.90	22.34	0.19	0.15
72WRY8	X	48.33	12.71	7.05	29.05	6.90	5.69
77M26Y		35.26	-0.36	-0.20	21.87	-0.28	-0.23
7NLG6P		38.35	2.73	1.52	23.60	1.45	1.19
DBZD32		34.04	-1.58	-0.88	20.07	-2.08	-1.72
DEZNVF		35.53	-0.09	-0.05	21.17	-0.98	-0.81
H2D3F3		33.24	-2.37	-1.32	19.99	-2.17	-1.79
JUPKWK		35.40	-0.22	-0.12	23.60	1.45	1.19
PCBGFZ		33.40	-2.22	-1.23	22.70	0.55	0.45
RCFR2U		37.55	1.93	1.07	22.78	0.63	0.52
RDXGPG	X	36.37	0.75	0.42	9.09	-13.06	-10.77
UZHL8M		35.29	-0.33	-0.18	22.06	-0.10	-0.08
WECRC2		37.90	2.28	1.27	22.50	0.35	0.29
ZJXNTN		37.45	1.83	1.02	23.18	1.03	0.85

Summary Statistics

	Sample SQ13	Sample SQ14
Grand Means	35.617 Taber Units	22.154 Taber Units
SD Btwn Labs	1.802 Taber Units	1.213 Taber Units

Statistics based on 12 of 14 reporting participants

Comments on assigned Data Flags for Test #339

72WRY8 (X) - Extreme data.

RDXGPG (X) - Extreme data for Sample SQ14.

Analysis Notes:

H2D3F3 - Data appears to be transposed between samples. Data Switched by CTS.

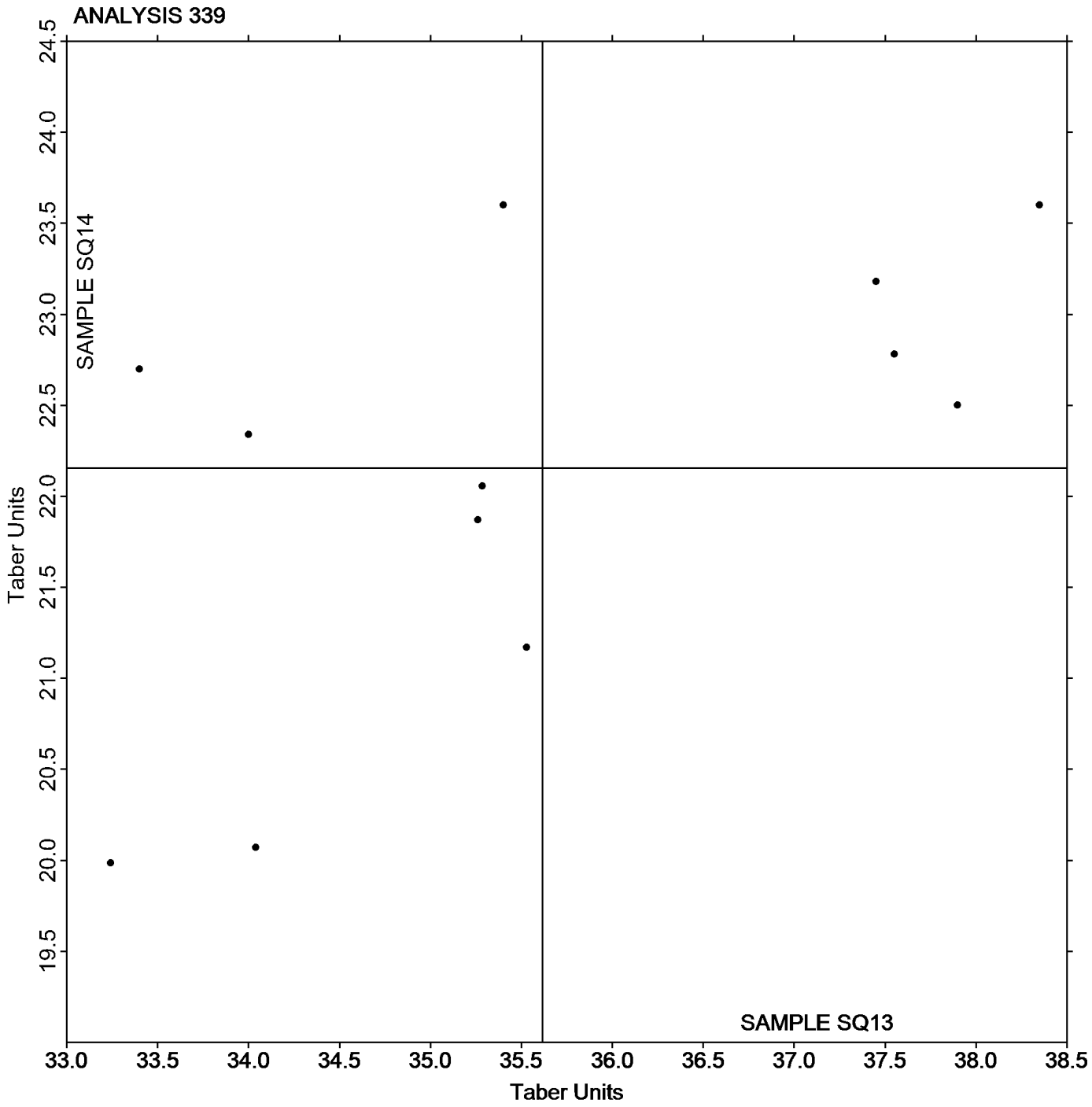
TAPPI-CTS Interlaboratory Testing Program

Analysis 339

Bending Resistance, Taber Type - 10 to 100 Taber Units

Grand Mean Sample **SQ13** = 35.617 Taber Units

Grand Mean Sample **SQ14** = 22.154 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 ST13 Lab Mean	Sample ST13 Diff from Grand Mean	Sample ST13 CPV	Sample ST14 Lab Mean	Sample ST14 Diff from Grand Mean	Sample ST14 CPV
2LHVN6	X	115.7	-136.8	-6.91	91.9	-157.3	-8.05
646KEE		265.8	13.3	0.67	260.5	11.4	0.58
6FY24F		239.5	-13.0	-0.66	232.3	-16.9	-0.86
6VEZ9G		245.9	-6.6	-0.34	238.3	-10.9	-0.56
BVAT99		271.8	19.3	0.97	265.1	15.9	0.82
CK4CR2		243.0	-9.5	-0.48	251.0	1.8	0.09
ENDC2Y		302.6	50.1	2.53	293.7	44.5	2.28
F64EH3		235.1	-17.4	-0.88	242.6	-6.6	-0.34
FDBC2Y		226.4	-26.2	-1.32	218.7	-30.4	-1.56
GZHCM2		254.0	1.5	0.07	259.5	10.3	0.53
HLHNDM		238.2	-14.3	-0.72	229.1	-20.0	-1.03
JUPKWK		244.5	-8.0	-0.41	239.5	-9.7	-0.49
JVZQRZ		241.2	-11.3	-0.57	238.4	-10.8	-0.55
K68LU7		270.6	18.1	0.91	271.5	22.3	1.14
ZLYWPL		256.8	4.3	0.22	248.0	-1.2	-0.06

Summary Statistics

	Sample ST13	Sample ST14
Grand Means	252.53 Taber Units	249.16 Taber Units
SD Btwn Labs	19.79 Taber Units	19.53 Taber Units

Statistics based on 14 of 15 reporting participants

Comments on assigned Data Flags for Test #340

2LHVN6 (X) - Extreme data.

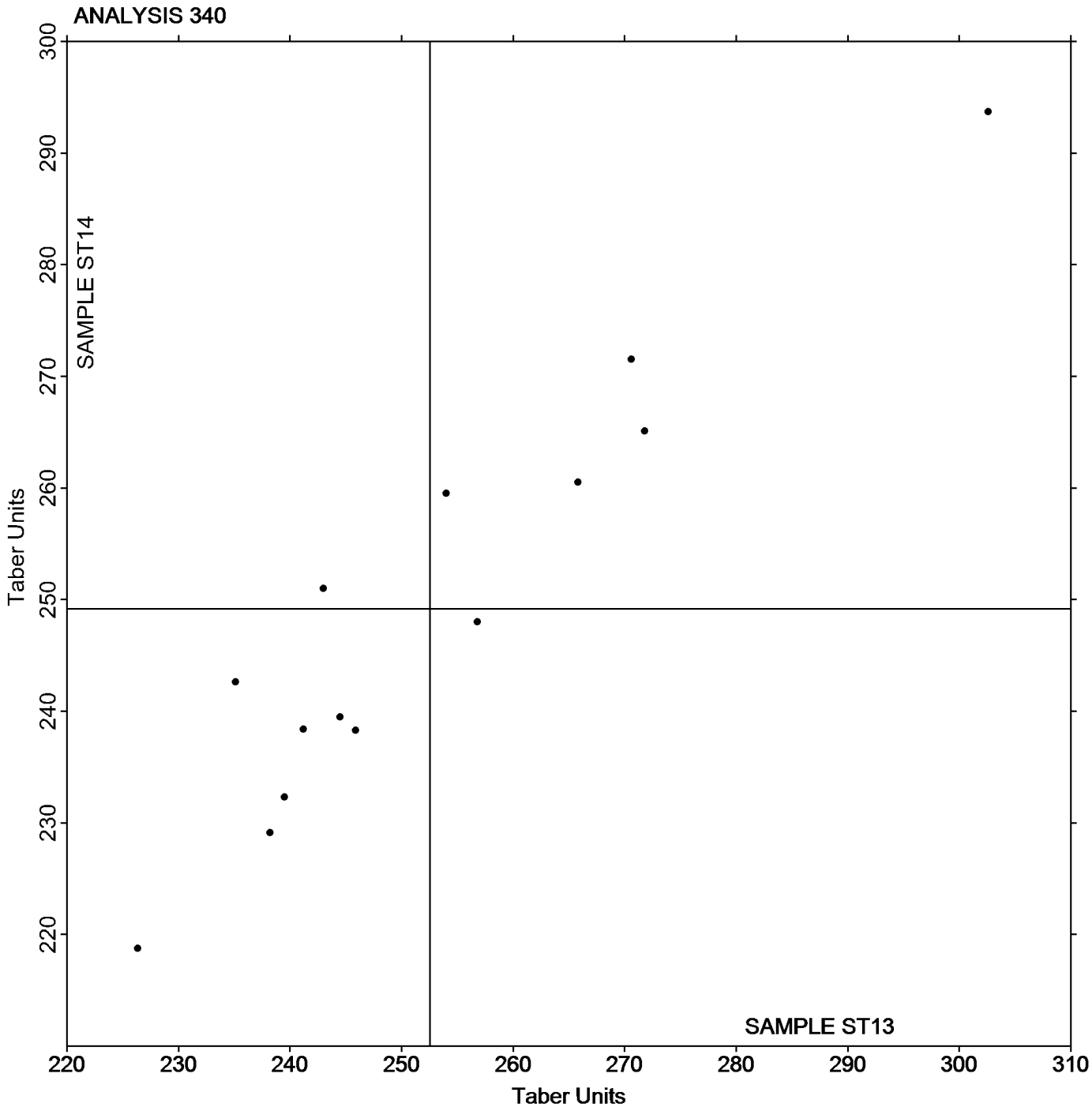
TAPPI-CTS Interlaboratory Testing Program

Analysis 340

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

Grand Mean Sample **ST13** = 252.53 Taber Units

Grand Mean Sample **ST14** = 249.16 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 SM13 Lab Mean	Sample SM13 Diff from Grand Mean	Sample SM13 CPV	Sample SM14 Lab Mean	Sample SM14 Diff from Grand Mean	Sample SM14 CPV	Instr Code
2LHVN6		83.44	11.41	1.53	100.76	14.69	1.47	CA
3VG8YP		69.78	-2.25	-0.30	87.22	1.15	0.12	CD
DEZNVF		62.75	-9.28	-1.24	75.78	-10.29	-1.03	TZ
GAUY84		71.00	-1.03	-0.14	78.80	-7.27	-0.73	XX
LYAQ2W		63.70	-8.33	-1.12	71.59	-14.48	-1.45	LW
PCBGFZ		67.28	-4.74	-0.64	86.20	0.13	0.01	LW
QDKNG9		56.40	-15.63	-2.10	63.40	-22.67	-2.27	CA
RCFR2U		79.16	7.13	0.96	93.92	7.85	0.79	LW
RDXGPG		76.70	4.67	0.63	94.32	8.25	0.83	TA
UZHL8M		73.38	1.35	0.18	89.46	3.39	0.34	TA
WU743Q		74.00	1.97	0.26	81.20	-4.87	-0.49	TA
XYU7LG		61.96	-10.07	-1.35	77.76	-8.31	-0.83	CD
ZBJZTV		75.24	3.21	0.43	90.66	4.59	0.46	XX
ZE3UT2		81.45	9.42	1.26	97.15	11.08	1.11	TA
ZJXNTN		77.54	5.51	0.74	91.52	5.45	0.55	LW
ZLYWPL		74.96	2.93	0.39	88.62	2.55	0.26	LW
ZWXKQG		75.72	3.69	0.50	94.84	8.77	0.88	TA

Summary Statistics

	Sample SM13	Sample SM14
Grand Means	72.028 psi	86.071 psi
SD Btwn Labs	7.458 psi	9.970 psi

Statistics based on 17 of 17 reporting participants

Instrument Code List

(CA) - CSI CS-163

(CD) - CSI CS-163D

(LW) - L & W ZD Tensile Tester

(TA) - Thwing-Albert Tensile Tester

(TZ) - TMI Monitor/ZDT Tester

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

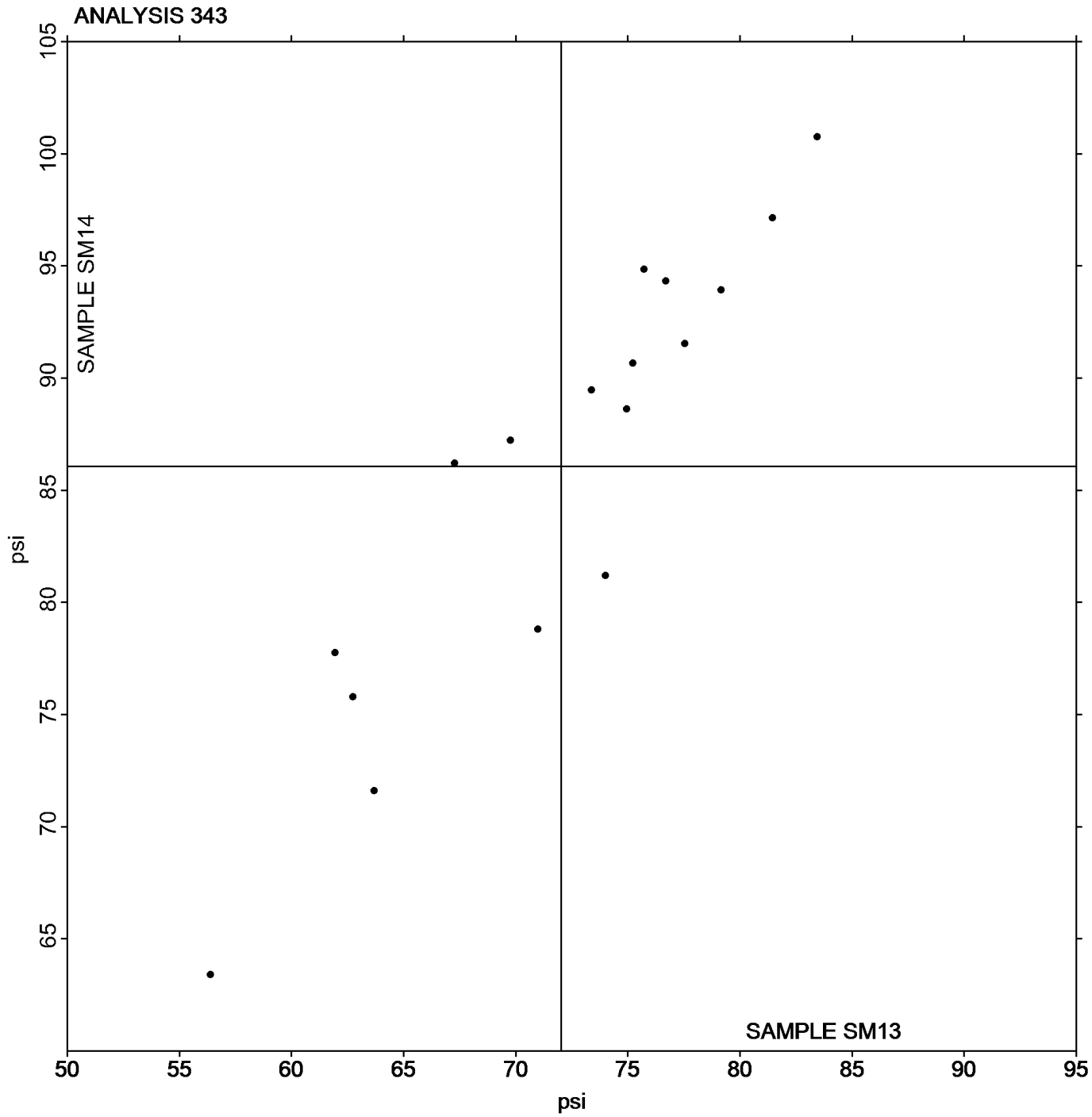
TAPPI-CTS Interlaboratory Testing Program

Analysis 343

Z-Direction Tensile

Grand Mean Sample **SM13** = 72.028 psi

Grand Mean Sample **SM14** = 86.071 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 SZ13 Lab Mean	Sample SZ13 Diff from Grand Mean	Sample SZ13 CPV	Sample SZ14 Lab Mean	Sample SZ14 Diff from Grand Mean	Sample SZ14 CPV	Instr Code
2J6HNE		40.00	1.17	0.49	43.69	3.72	1.30	PG
49KXE3		39.68	0.85	0.36	42.28	2.32	0.81	DP
6FY24F		41.20	2.37	1.00	38.12	-1.84	-0.64	CA
6VEZ9G		41.60	2.77	1.16	42.20	2.24	0.78	CA
77M26Y		38.36	-0.47	-0.20	41.24	1.28	0.45	CA
9QL8MN		39.20	0.37	0.16	36.50	-3.46	-1.21	XX
B3Q89R		37.56	-1.27	-0.53	37.16	-2.80	-0.98	LW
BVAT99		42.60	3.77	1.58	43.80	3.84	1.34	CA
ENDC2Y		35.60	-3.23	-1.36	42.60	2.64	0.92	TZ
F64EH3		36.64	-2.19	-0.92	37.34	-2.62	-0.92	TL
FDBC2Y		34.11	-4.72	-1.98	34.32	-5.65	-1.97	LW
GFCRV9		40.96	2.13	0.89	41.64	1.68	0.59	TL
HCBTC3		36.16	-2.67	-1.12	38.42	-1.54	-0.54	TL
JVZQRZ		38.86	0.03	0.01	37.34	-2.62	-0.92	TZ
K68LU7		38.32	-0.51	-0.21	42.68	2.72	0.95	TL
XEPNBE		41.68	2.85	1.20	41.07	1.11	0.39	XX
YMHF37		37.60	-1.23	-0.52	38.98	-0.98	-0.34	LW

Summary Statistics

	Sample SZ13	Sample SZ14
Grand Means	38.831 psi	39.963 psi
SD Btwn Labs	2.379 psi	2.864 psi

Statistics based on 17 of 17 reporting participants

Instrument Code List

(CA) - CSI CS-163

(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

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

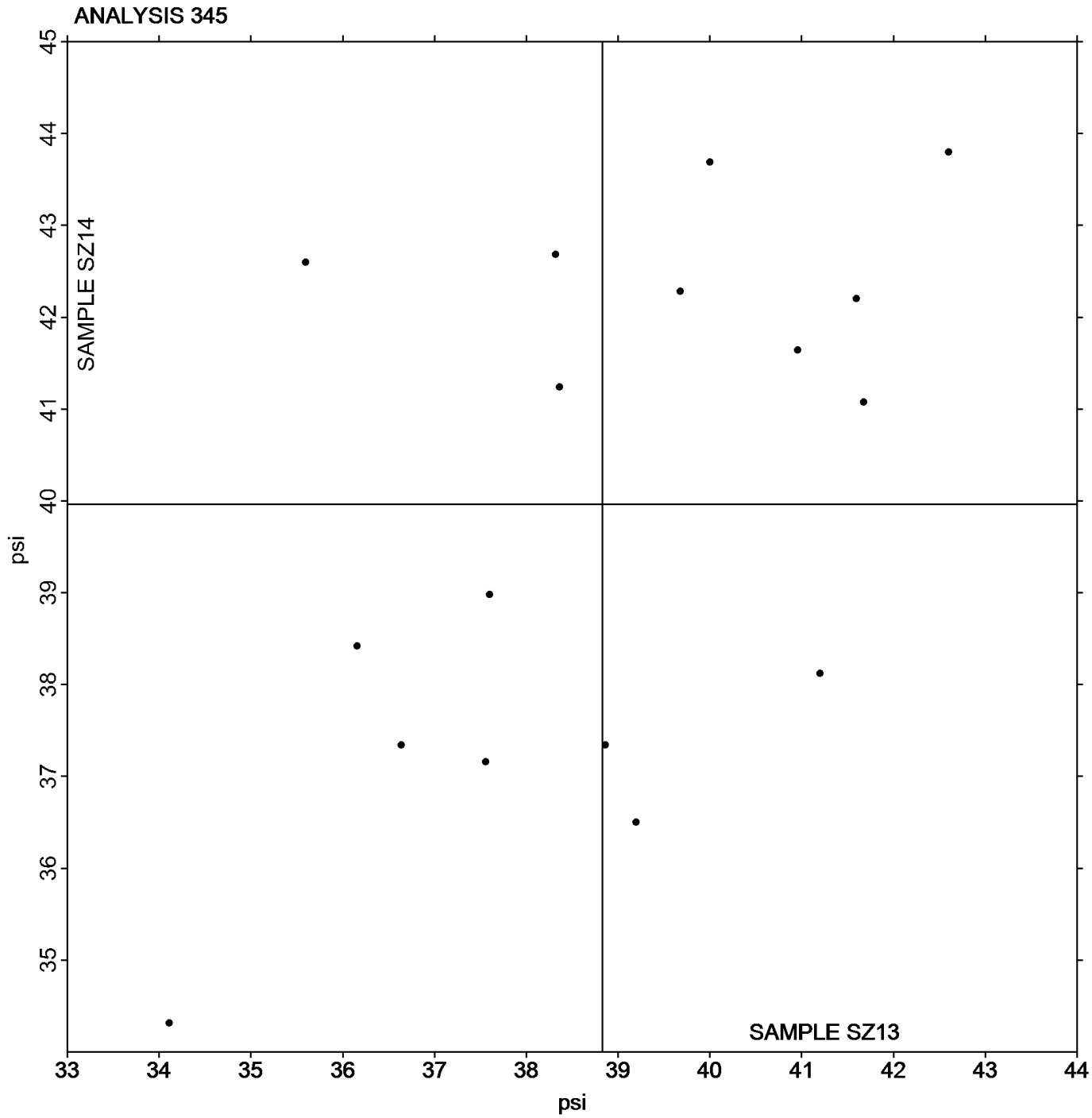
TAPPI-CTS Interlaboratory Testing Program

Analysis 345

Z-Direction Tensile, Recycled Paperboard

Grand Mean Sample **SZ13** = 38.831 psi

Grand Mean Sample **SZ14** = 39.963 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 SN13 Lab Mean	Sample SN13 Diff from Grand Mean	Sample SN13 CPV	Sample SN14 Lab Mean	Sample SN14 Diff from Grand Mean	Sample SN14 CPV	Instr Code
2R6R9L		114.3	7.4	0.71	124.4	2.3	0.20	HY
3KD22G		97.4	-9.5	-0.91	130.4	8.3	0.72	HZ
3VG8YP		106.6	-0.3	-0.03	124.2	2.1	0.18	HY
4EABFQ		103.1	-3.8	-0.36	114.8	-7.3	-0.64	HY
6E6DHZ		100.0	-6.9	-0.66	108.4	-13.7	-1.20	HY
77M26Y		112.4	5.5	0.52	121.8	-0.3	-0.03	HZ
AGVCH6		101.0	-5.9	-0.57	116.6	-5.5	-0.49	HY
DEZNVF		110.0	3.1	0.29	129.8	7.7	0.67	HY
DUPT4A		93.8	-13.1	-1.25	107.9	-14.2	-1.24	HY
MQWWL		96.4	-10.5	-1.01	110.5	-11.6	-1.02	HZ
NPWDYJ		102.6	-4.3	-0.41	115.6	-6.5	-0.57	HY
PHTTAT		108.4	1.5	0.14	117.8	-4.3	-0.38	HZ
PJ9TRW		112.8	5.9	0.56	121.4	-0.7	-0.06	HY
RCFR2U	*	140.0	33.1	3.16	148.6	26.5	2.32	XX
RDXGPG		108.6	1.7	0.16	135.4	13.3	1.16	HZ
UZHL8M		116.0	9.1	0.87	139.2	17.1	1.50	HY
YMY8FW		99.4	-7.5	-0.72	120.4	-1.7	-0.15	HY
ZJXNTN		107.0	0.1	0.01	124.0	1.9	0.16	HY
ZLYWPL		94.0	-12.9	-1.23	101.4	-20.7	-1.82	HZ
ZWXKQG		114.6	7.7	0.73	130.0	7.9	0.69	HY

Summary Statistics

	Sample SN13	Sample SN14
Grand Means	106.92 1000th ft-lbs	122.14 1000th ft-lbs
SD Btwn Labs	10.47 1000th ft-lbs	11.41 1000th ft-lbs

Statistics based on 20 of 20 reporting participants

Instrument Code List

(HY) - Huygen Digitized Scott Internal Bond Tester

(HZ) - Huygen Internal Bond Tester with AccuPress

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

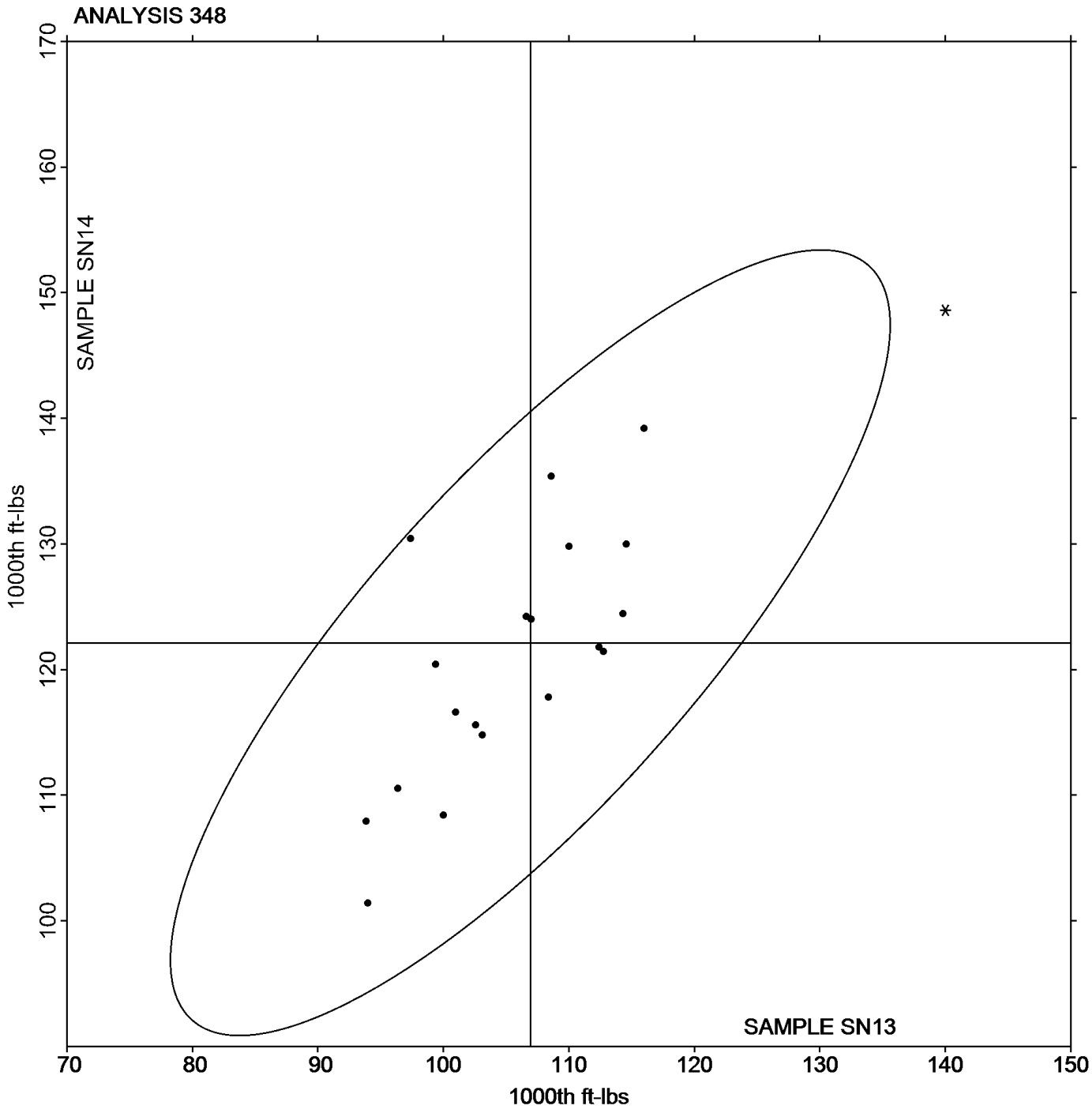
TAPPI-CTS Interlaboratory Testing Program

Analysis 348

Internal Bond Strength - Modified Scott Mechanics

Grand Mean Sample **SN13** = 106.92 1000th ft-lbs

Grand Mean Sample **SN14** = 122.14 1000th ft-lbs



TAPPI-CTS Interlaboratory Testing Program

Analysis 349

Internal Bond Strength - Scott Bond Models

WebCode	Data Flag	Sample SP13 Lab Mean	Sample SP13 Diff from Grand Mean	Sample SP13 CPV	Sample SP14 Lab Mean	Sample SP14 Diff from Grand Mean	Sample SP14 CPV	Instr Code
2J6HNE		92.40	1.37	0.12	112.8	11.1	0.65	TM
7XR9QD		94.20	3.17	0.28	100.4	-1.3	-0.08	SC
CV4VC3		84.98	-6.04	-0.54	86.8	-14.9	-0.87	TM
FDBC2Y		82.13	-8.89	-0.79	86.9	-14.8	-0.86	TM
H2D3F3		81.59	-9.44	-0.84	94.6	-7.1	-0.41	TM
HCBTC3		68.20	-22.83	-2.02	76.6	-25.1	-1.46	XX
JUPKWK		107.96	16.93	1.50	118.8	17.1	0.99	XX
KB7CR2		98.40	7.37	0.65	111.4	9.7	0.56	SC
KNWZ7A		86.68	-4.35	-0.39	109.5	7.8	0.46	SC
KQ6AY7		88.79	-2.23	-0.20	94.4	-7.3	-0.43	XX
NEXKQT		111.20	20.17	1.79	139.0	37.3	2.17	XX
X486YV		95.00	3.97	0.35	108.2	6.5	0.38	TM
YMHF37		91.80	0.77	0.07	82.8	-18.9	-1.10	XX

Summary Statistics

	Sample SP13	Sample SP14
Grand Means	91.026 1000th ft-lbs	101.71 1000th ft-lbs
SD Btwn Labs	11.277 1000th ft-lbs	17.17 1000th ft-lbs

Statistics based on 13 of 13 reporting participants

Instrument Code List

(SC) - Scott Internal Bond Tester (Manual)

(TM) - TMI Monitor/Internal Bond Tester

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

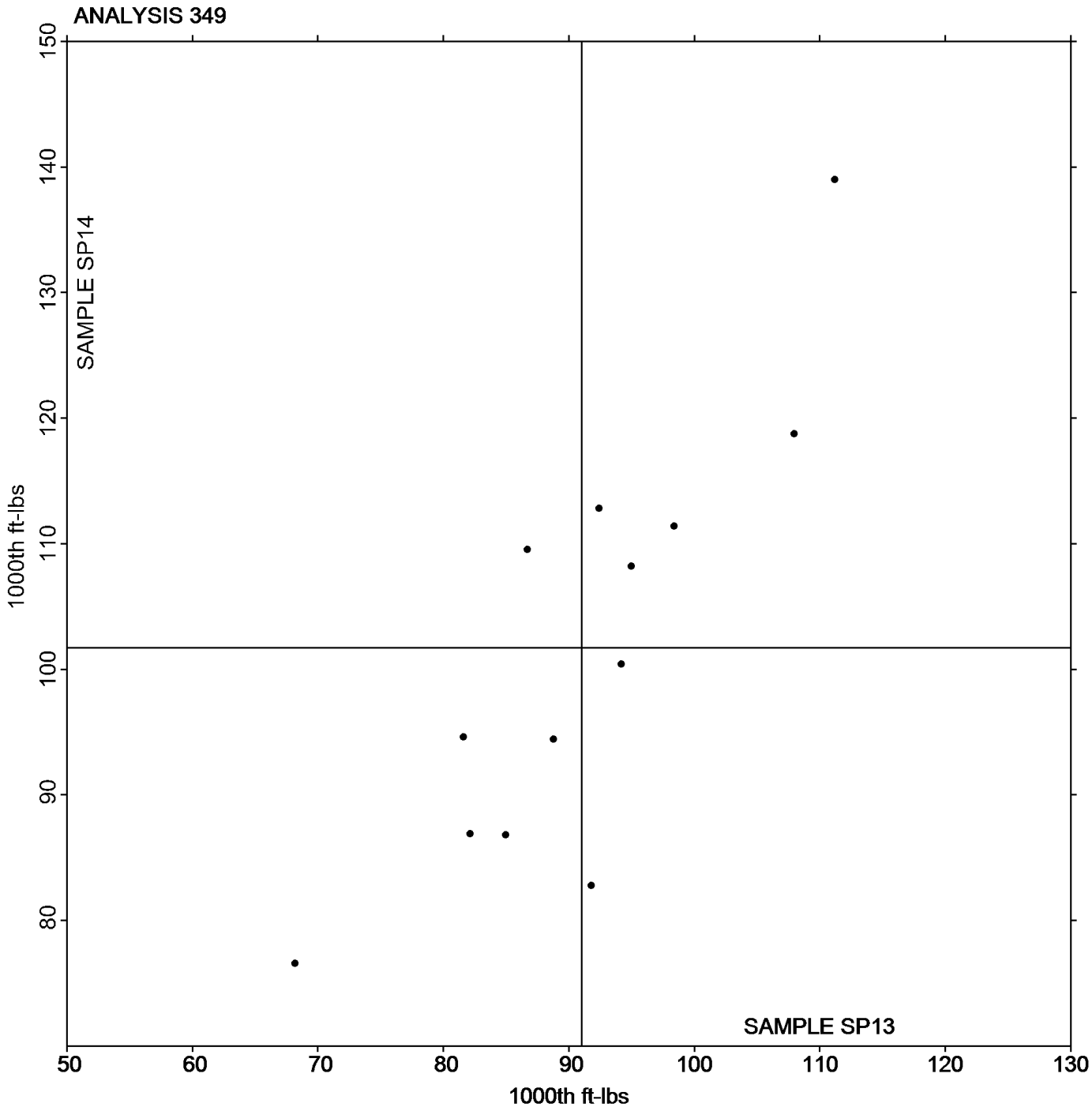
TAPPI-CTS Interlaboratory Testing Program

Analysis 349

Internal Bond Strength - Scott Bond Models

Grand Mean Sample **SP13** = 91.026 1000th ft-lbs

Grand Mean Sample **SP14** = 101.71 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.