Collaborative Testing Services, Inc.

Paper & Paperboard Testing Program

Summary Report #4251 - July 2023

Introduction to the Paper & Paperboard Interlaboratory Program

Explanation of Tables and Definitions of Terms

Analysis	Analysis Name
3101	Thickness (Caliper), Printing papers
3111	Bursting Strength - Printing Papers
3113	Tearing Strength - Printing Papers
3115	Tensile Breaking Strength - Printing Papers
3116	Tensile Energy Absorption - Printing Papers
3117	Elongation to Break - Printing Papers
3121	Air Resistance - Gurley Oil Type
3123	Porosity - Sheffield Type - Sheffield Units for 3/4 inch Diameter Orifice
3131	Roughness - Print Surf Method - 2.5 to 6.0 Microns
3133	Roughness - Sheffield Type
3135	Grammage (Mass per Unit Area)
3141	Opacity (89% Reflectance Backing) - Fine Papers
3143	Opacity (Paper Backing) - Fine Papers and Newsprint
3145	Directional Brightness of Fluorescent Samples
3146	Fluorescent Component of Directional Brightness
3201	Bending Resistance, Taber Type - 0 to 10 Units
3203	Bending Resistance, Taber Type - 10 to 100 Taber Units
3205	Bending Resistance, Taber Type - 50 to 500 Taber Units - Recycled Paperboard
3207	Z-Direction Tensile, Recycled Paperboard
3209	Z-Direction Tensile
3211	Internal Bond Strength - Modified Scott Mechanics
3213	Internal Bond Strength - Scott Bond Models

The CTS Paper & Paperboard Interlaboratory Program

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

About CTS

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

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

Collaborative Testing Services, Inc.
21331 Gentry Drive
Sterling, Virginia 20166 USA
+1-571-434-1925
FAX #: +1-571-434-1937
paper@cts-interlab.com

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 Website. The WebCode for each analysis can be found on the datasheets and in the Performance Analysis Report mailed to each participant.

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

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

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

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

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

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

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

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.

WebCode	Data Flag	Sample CP19			Sample CP20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
282MMM		3.806	-0.088	-1.34	3.779	-0.112	-1.84
3G6WUC		3.860	-0.035	-0.53	3.820	-0.071	-1.17
3HCCZH		3.761	-0.134	-2.03	3.794	-0.097	-1.60
4FM846	X	3.854	-0.041	-0.62	3.700	-0.191	-3.15
6BP97L		3.931	0.036	0.55	3.885	-0.006	-0.10
6YDXGA		3.882	-0.013	-0.19	3.892	0.001	0.02
78YLNH		3.808	-0.087	-1.32	3.835	-0.056	-0.92
7AQHDC		3.949	0.054	0.83	3.962	0.071	1.17
8QV9TL		3.931	0.036	0.55	3.951	0.060	0.99
99A8DA		3.764	-0.131	-1.99	3.748	-0.143	-2.36
9KJKTP	X	7.494	3.599	54.75	7.494	3.603	59.38
9RGD2J		3.896	0.001	0.02	3.870	-0.021	-0.34
9U99PD		3.932	0.037	0.57	3.947	0.056	0.92
A7GBNF		3.961	0.066	1.00	3.904	0.013	0.21
A9NUMC		3.769	-0.126	-1.91	3.822	-0.069	-1.14
ADUMG8		3.936	0.041	0.63	3.929	0.038	0.63
ANEYQY		3.900	0.005	0.08	3.898	0.007	0.12
ARDCDN		3.965	0.070	1.07	3.980	0.089	1.46
AZRYMR		3.799	-0.096	-1.46	3.803	-0.088	-1.45
CVRLH7		3.856	-0.039	-0.59	3.908	0.017	0.28
DW3N46		3.951	0.056	0.86	3.935	0.044	0.73
E2MBAU		3.771	-0.124	-1.88	3.820	-0.071	-1.17
EEBA3H		3.972	0.077	1.18	3.935	0.044	0.73
EM7D6T		3.916	0.021	0.32	3.879	-0.012	-0.19
FBV3EH		3.848	-0.047	-0.72	3.857	-0.034	-0.57
JGP7WC		3.882	-0.013	-0.19	3.939	0.048	0.80
JK444Y		3.941	0.046	0.70	3.969	0.078	1.28
MUYFQ4		3.930	0.035	0.53	3.941	0.050	0.82
N7TWDJ	X	3.628	-0.267	-4.06	3.603	-0.288	-4.75
NMVTB9		3.879	-0.016	-0.24	3.856	-0.035	-0.58
PR742H		3.834	-0.061	-0.92	3.826	-0.065	-1.07
RFZX3Z		3.859	-0.035	-0.54	3.852	-0.039	-0.64
RHTURU		3.917	0.023	0.34	3.919	0.028	0.46
RWD9UT		3.982	0.087	1.33	3.950	0.059	0.97
T2E6QY		4.054	0.159	2.42	4.028	0.137	2.26
T4746W		3.957	0.062	0.95	3.953	0.062	1.02
TCKPEZ		3.901	0.006	0.10	3.894	0.003	0.05
TJFRFC		3.911	0.017	0.25	3.878	-0.013	-0.22
TL8N67		3.968	0.073	1.11	3.969	0.078	1.28
TT6FDZ		3.900	0.005	0.08	3.867	-0.024	-0.39

		Sample CP19			Sample CP20		
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
UB6PVB		3.874	-0.021	-0.31	3.913	0.022	0.37
V43ZQC		3.878	-0.017	-0.25	3.833	-0.058	-0.96
V7M8QY		3.950	0.056	0.85	3.969	0.078	1.28
WD2DZB		3.858	-0.037	-0.56	3.828	-0.063	-1.04
WWB8WN		3.946	0.051	0.78	3.920	0.029	0.48
X7WV6V		3.927	0.032	0.49	3.881	-0.010	-0.16
XBN3M4		3.892	-0.003	-0.04	3.897	0.006	0.10
ZFV9FF		3.805	-0.090	-1.36	3.833	-0.058	-0.96
ZLYC4T		3.946	0.051	0.78	3.917	0.026	0.43

Summary Statistics	Sample CP19	Sample CP20
Grand Means	3.89 mils	3.89 mils
Stnd Dev Btwn Labs	0.07 mils	0.06 mils

Statistics based on 46 of 49 reporting participants.

Comments on Assigned Data Flags for Test #3101

4FM846 (X) - Data for sample CP20 are low. Inconsistent within the determinations of sample CP20.

N7TWDJ (X) - Data for both samples are low. Possible Systematic Error.
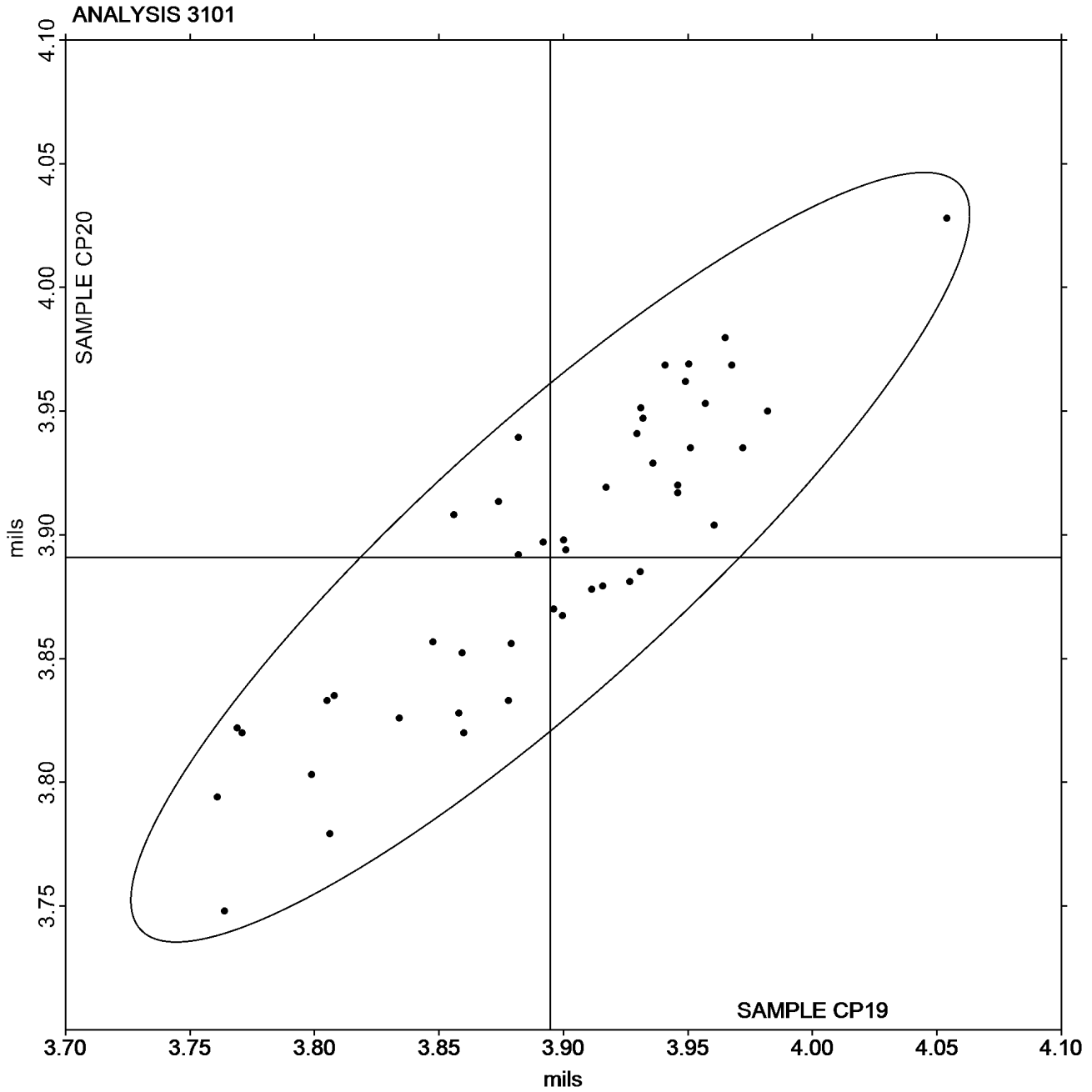
9KJKTP (X) - Extreme Data.

Analysis Notes:

282MMM - Data appear to be reported as mm, not micrometers as indicated on data entry form. CTS will not correct the Units going forward.

Grand Mean Sample CP19 = 3.8947 mils

Grand Mean Sample CP20 = 3.8910 mils

ANALYSIS 3101

SAMPLE CP20

mils

SAMPLE CP19

mils

Paper & Paperboard Interlaboratory Testing Program
Analysis 3111
Bursting Strength - Printing Papers
TAPPI Official Test Method T403

WebCode	Data Flag	Sample BP19			Sample BP20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2MAEPR		22.50	-0.69	-0.40	22.50	-1.10	-0.56
3G6WUC		20.14	-3.04	-1.78	20.64	-2.97	-1.51
7AQHDC		21.47	-1.72	-1.00	21.85	-1.75	-0.89
7H3G8M		24.19	1.00	0.58	24.19	0.58	0.30
9RGD2J		23.66	0.48	0.28	23.70	0.09	0.05
9U99PD	*	26.80	3.61	2.11	28.90	5.30	2.70
A7GBNF		21.64	-1.55	-0.90	22.09	-1.51	-0.77
ANEYQY		21.20	-1.99	-1.16	23.10	-0.50	-0.26
AVEDF7		24.37	1.18	0.69	25.21	1.61	0.82
AZRYMR		26.73	3.54	2.07	27.24	3.64	1.85
JGP7WC		22.47	-0.72	-0.42	22.79	-0.82	-0.42
N7TWDJ		23.00	-0.19	-0.11	23.80	0.20	0.10
NMVTB9		24.49	1.30	0.76	24.92	1.32	0.67
Q6Q6XE		23.59	0.40	0.24	23.11	-0.49	-0.25
QM7EXF		22.95	-0.24	-0.14	23.45	-0.16	-0.08
RFZX3Z		23.72	0.53	0.31	24.42	0.82	0.42
RHTURU		23.35	0.16	0.10	23.67	0.07	0.03
RWD9UT		23.81	0.62	0.36	22.38	-1.22	-0.62
TJFRFC		22.05	-1.14	-0.67	22.19	-1.41	-0.72
V7M8QY		20.60	-2.59	-1.52	20.36	-3.24	-1.65
W4V9C2		23.00	-0.19	-0.11	22.10	-1.50	-0.77
WD2DZB		26.04	2.85	1.67	26.56	2.95	1.50
WYHPUJ		23.86	0.67	0.39	23.78	0.18	0.09
XBN3M4		22.54	-0.65	-0.38	22.14	-1.46	-0.75
ZLYC4T	*	21.53	-1.66	-0.97	25.03	1.43	0.73

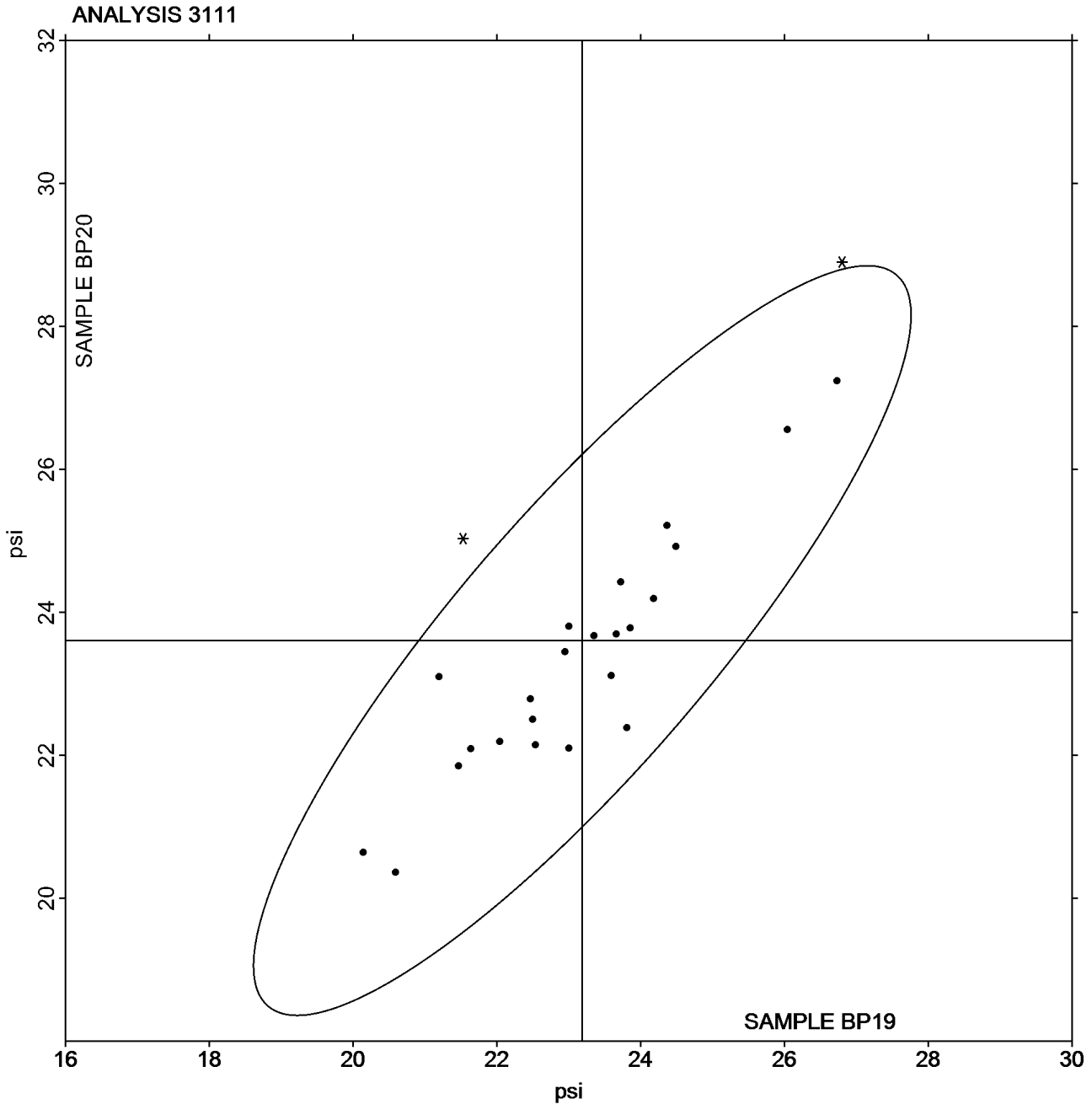| Summary Statistics	Sample BP19	Sample BP20
Grand Means	23.19 psi	23.60 psi
Stnd Dev Btwn Labs	1.71 psi	1.96 psi

Statistics based on 25 of 25 reporting participants.

Analysis Notes:

3G6WUC - One determination removed from the Lab Mean of Sample BP19 per Grubb's Test at 1% risk (TAPPI 1205).

Grand Mean Sample BP19 = 23.188 psi

Grand Mean Sample BP20 = 23.604 psi

ANALYSIS 3111

SAMPLE BP20

psi

SAMPLE BP19

psi

WebCode	Data Flag	Sample RP19			Sample RP20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
282MMM		45.84	-2.56	-0.51	45.87	-2.66	-0.52
2MAEPR		49.80	1.40	0.28	49.80	1.27	0.25
6YDXGA		41.96	-6.44	-1.30	42.52	-6.01	-1.18
7E8P2B		44.46	-3.94	-0.79	44.87	-3.66	-0.72
7H3G8M		46.26	-2.14	-0.43	47.48	-1.05	-0.21
9RGD2J		45.12	-3.28	-0.66	45.04	-3.49	-0.69
9U99PD		56.01	7.61	1.53	57.62	9.09	1.79
A7GBNF		50.47	2.07	0.42	50.22	1.69	0.33
ADUMG8		51.60	3.20	0.64	51.48	2.96	0.58
ANEYQY		49.60	1.20	0.24	49.35	0.82	0.16
ARDCDN		46.18	-2.21	-0.45	47.32	-1.21	-0.24
AZRYMR		46.05	-2.35	-0.47	45.20	-3.33	-0.66
B7F284		53.72	5.32	1.07	55.70	7.17	1.41
BQKGPU		44.78	-3.62	-0.73	44.62	-3.91	-0.77
BZPN7F		46.27	-2.13	-0.43	47.10	-1.43	-0.28
CVRLH7		40.33	-8.07	-1.62	39.40	-9.12	-1.80
DW3N46		57.62	9.22	1.86	58.06	9.53	1.88
E2MBAU		47.34	-1.06	-0.21	48.88	0.35	0.07
E6LL6U		48.40	0.00	0.00	49.30	0.77	0.15
EEBA3H		39.42	-8.98	-1.81	38.58	-9.95	-1.96
FBV3EH		48.56	0.16	0.03	48.84	0.31	0.06
LDX79R		55.78	7.38	1.49	56.12	7.59	1.50
MQX8LT		49.24	0.84	0.17	48.89	0.36	0.07
N7TWDJ		49.80	1.40	0.28	49.40	0.87	0.17
NMVTB9		50.30	1.90	0.38	50.42	1.89	0.37
PR742H		42.00	-6.40	-1.29	44.20	-4.33	-0.85
Q2QU2E		51.64	3.24	0.65	51.38	2.85	0.56
RFZX3Z		48.15	-0.25	-0.05	46.51	-2.02	-0.40
RHTURU		46.35	-2.05	-0.41	45.23	-3.30	-0.65
RWD9UT		56.40	8.00	1.61	58.00	9.47	1.87
RXKN2Y		48.52	0.12	0.02	46.38	-2.15	-0.42
T2E6QY	*	61.90	13.50	2.72	62.80	14.27	2.82
TCKPEZ		42.80	-5.60	-1.13	43.78	-4.75	-0.94
TJFRFC		50.96	2.56	0.52	49.67	1.14	0.23
TT6FDZ		44.42	-3.98	-0.80	45.22	-3.31	-0.65
UB6PVB		45.20	-3.20	-0.64	47.60	-0.93	-0.18
UVTCDD		50.56	2.16	0.43	50.25	1.73	0.34
V43ZQC		46.30	-2.10	-0.42	46.60	-1.93	-0.38
V7M8QY		51.57	3.17	0.64	50.35	1.83	0.36
VJR4BM	*	57.76	9.36	1.88	54.64	6.11	1.21

Paper & Paperboard Interlaboratory Testing Program
Analysis 3113
Tearing Strength - Printing Papers
TAPPI Official Test Method T414

Report #4251, July 2023

WebCode	Data Flag	Sample RP19			Sample RP20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
WD2DZB		43.90	-4.50	-0.91	41.72	-6.81	-1.34
XBN3M4		43.92	-4.48	-0.90	46.44	-2.09	-0.41
ZLYC4T		43.88	-4.52	-0.91	43.80	-4.73	-0.93

Summary Statistics	Sample RP19	Sample RP20
Grand Means	48.40 Grams	48.53 Grams
Stnd Dev Btwn Labs	4.97 Grams	5.07 Grams

Statistics based on 43 of 43 reporting participants.

Analysis Notes:

AZRYMR - Data appear to be off by a factor; data converted by CTS (x.5). CTS will not correct the data going forward.

BZPN7F - Data appear to be off by a factor; data converted by CTS (x.5). CTS will not correct the data going forward.

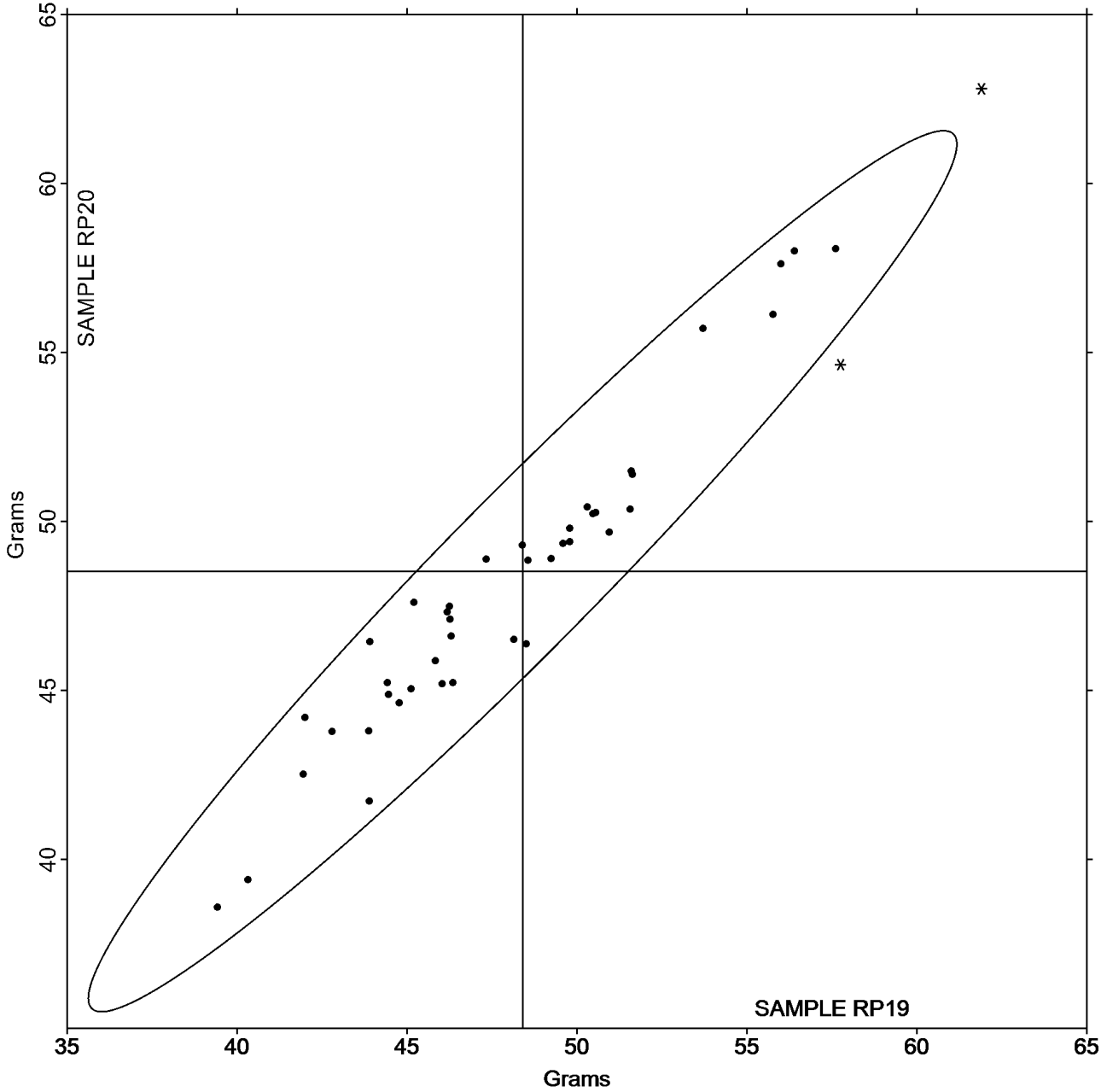VJR4BM - Data appear to be off by a factor; data converted by CTS (x2). CTS will not correct the data going forward.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3113
Tearing Strength - Printing Papers
TAPPI Official Test Method T414

Report #4251, July 2023

Grand Mean Sample RP19 = 48.398 Grams

Grand Mean Sample RP20 = 48.526 Grams

Paper & Paperboard Interlaboratory Testing Program
Analysis 3115
Tensile Breaking Strength - Printing Papers
TAPPI Official Test Method T494

Report #4251, July 2023

		Sample NP19				Sample NP20		
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV		Lab Mean	Diff from Grand Mean	CPV
282MMM		4.268	0.054	0.19		4.302	0.093	0.33
3G6WUC		4.174	-0.040	-0.14		4.040	-0.169	-0.60
4FM846		3.985	-0.229	-0.80		4.053	-0.156	-0.55
6BP97L		3.902	-0.312	-1.09		3.831	-0.378	-1.33
6V9AYY		3.888	-0.326	-1.14		4.084	-0.125	-0.44
6YDXGA		4.731	0.517	1.81		4.729	0.520	1.84
74LLRQ		3.582	-0.631	-2.21		3.714	-0.495	-1.75
7E8P2B		4.110	-0.104	-0.36		4.110	-0.099	-0.35
7H3G8M		4.089	-0.124	-0.44		4.079	-0.130	-0.46
9U99PD	*	4.845	0.631	2.21		4.599	0.390	1.38
A7GBNF		4.259	0.045	0.16		4.323	0.115	0.40
ADUMG8		3.665	-0.549	-1.92		3.699	-0.510	-1.80
ANEYQY		4.263	0.049	0.17		4.216	0.007	0.02
ARDCDN		4.096	-0.118	-0.41		3.974	-0.235	-0.83
AZRYMR		4.214	0.000	0.00		4.273	0.064	0.23
BQKGPU		4.227	0.013	0.04		4.185	-0.024	-0.08
BZPN7F		4.206	-0.008	-0.03		4.282	0.073	0.26
CVRLH7		4.490	0.276	0.97		4.480	0.271	0.96
DW3N46	*	4.067	-0.146	-0.51		3.789	-0.419	-1.48
E2MBAU		4.261	0.047	0.16		4.187	-0.022	-0.08
E6LL6U		4.193	-0.021	-0.07		4.147	-0.062	-0.22
EEBA3H		4.010	-0.204	-0.71		4.017	-0.192	-0.68
JGP7WC		4.269	0.055	0.19		4.308	0.099	0.35
JK444Y	X	2.672	-1.542	-5.40		2.646	-1.563	-5.52
LDX79R		4.299	0.085	0.30		4.424	0.215	0.76
MUYFQ4		3.955	-0.259	-0.91		3.908	-0.301	-1.06
N7TWDJ		3.800	-0.414	-1.45		3.847	-0.361	-1.28
NMVTB9		4.472	0.258	0.90		4.362	0.154	0.54
PR742H	*	4.949	0.735	2.57		4.878	0.669	2.36
RFZX3Z		4.263	0.049	0.17		4.134	-0.075	-0.27
RHTURU		4.152	-0.062	-0.22		4.134	-0.075	-0.27
RQNWT6		3.732	-0.482	-1.69		3.691	-0.518	-1.83
RWD9UT		4.392	0.178	0.62		4.515	0.306	1.08
T2E6QY		4.314	0.100	0.35		4.190	-0.018	-0.06
T4746W		4.709	0.495	1.73		4.739	0.530	1.87
TCKPEZ		3.868	-0.346	-1.21		4.064	-0.145	-0.51
TJFRFC		4.182	-0.032	-0.11		4.289	0.080	0.28
TL8N67		4.265	0.051	0.18		4.225	0.016	0.06
TT6FDZ		4.338	0.124	0.43		4.358	0.149	0.53
TYVTEN		4.323	0.109	0.38		4.361	0.152	0.54

WebCode	Data Flag	Sample NP19			Sample NP20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
UB6PVB		4.354	0.140	0.49	4.282	0.073	0.26
V7M8QY		4.406	0.192	0.67	4.395	0.186	0.66
W8VJ82		4.234	0.021	0.07	4.364	0.155	0.55
WD2DZB	*	4.602	0.388	1.36	4.793	0.584	2.06
X7WV6V		4.009	-0.205	-0.72	3.892	-0.317	-1.12
XBN3M4		4.215	0.001	0.00	4.132	-0.077	-0.27

Summary Statistics	Sample NP19	Sample NP20
Grand Means	4.21 kN/m	4.21 kN/m
Stnd Dev Btwn Labs	0.29 kN/m	0.28 kN/m

Statistics based on 45 of 46 reporting participants.

Comments on Assigned Data Flags for Test #3115

JK444Y (X) - Data for both samples are low. Possible Systematic Error.
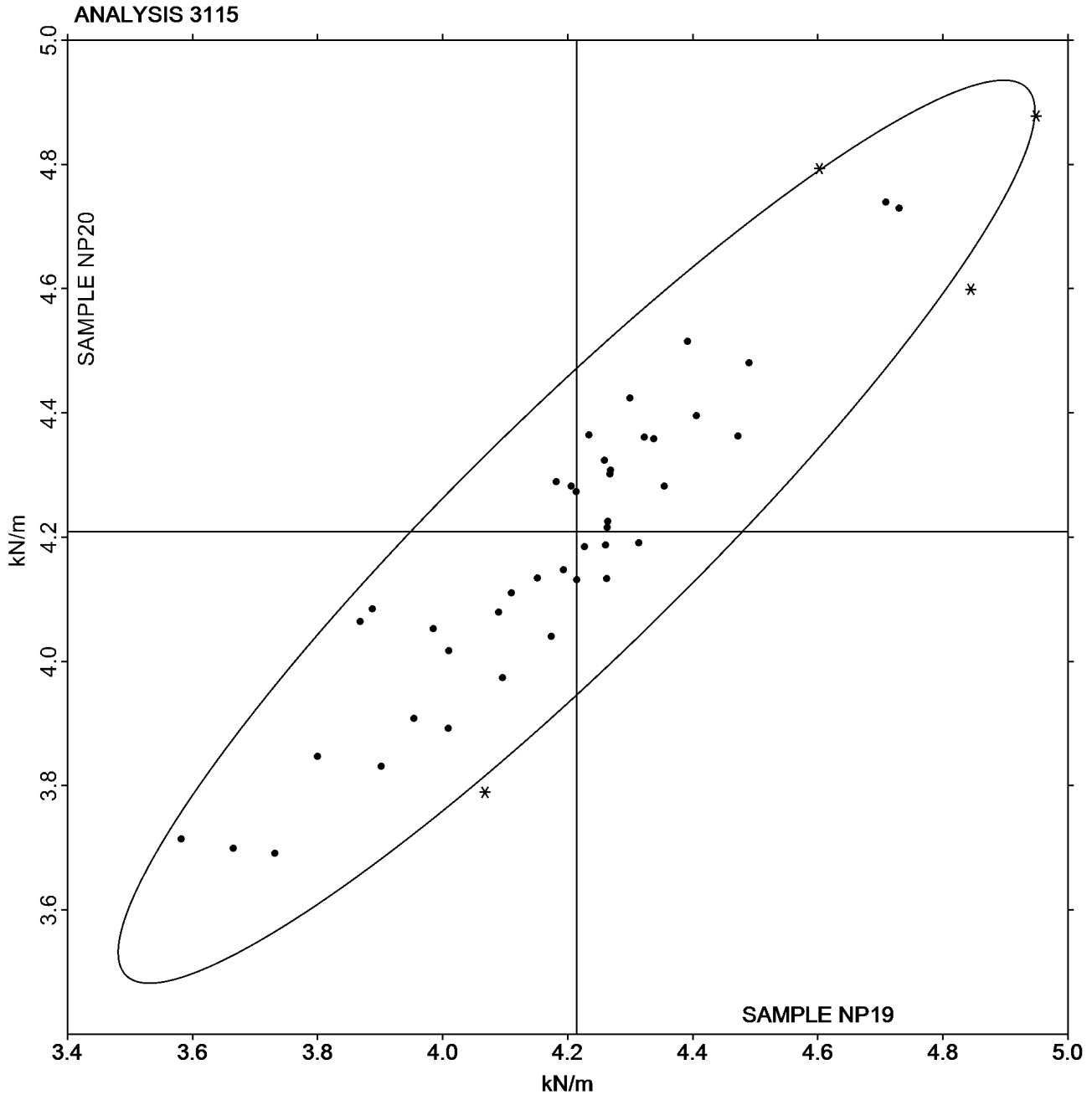
Analysis Notes:

T4746W - Data appears to be transposed between Analysis 3115 (Tensile Breaking Strength) & Analysis 3117 (Elongation to Break). CTS will not correct going forward.

Grand Mean Sample NP19 = 4.2139 kN/m

Grand Mean Sample NP20 = 4.2088 kN/m

ANALYSIS 3115

SAMPLE NP20

kN/m

SAMPLE NP19

kN/m

WebCode	Data Flag	Sample NP19			Sample NP20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
4FM846		47.49	2.93	0.60	48.76	3.62	0.75
6BP97L		41.83	-2.74	-0.56	40.40	-4.74	-0.98
6V9AYY		44.40	-0.16	-0.03	49.79	4.65	0.96
6YDXGA		46.55	1.99	0.41	48.73	3.59	0.74
74LLRQ		33.36	-11.20	-2.29	34.58	-10.56	-2.17
7E8P2B		45.62	1.06	0.22	47.69	2.55	0.53
7H3G8M		44.59	0.03	0.01	45.44	0.31	0.06
9U99PD	X	76.94	32.38	6.61	63.55	18.41	3.79
A7GBNF		46.08	1.51	0.31	48.61	3.47	0.71
ADUMG8		43.34	-1.22	-0.25	42.76	-2.38	-0.49
ANEYQY		43.10	-1.47	-0.30	42.35	-2.78	-0.57
ARDCDN		39.97	-4.59	-0.94	36.99	-8.15	-1.68
AZRYMR		40.53	-4.03	-0.82	42.84	-2.30	-0.47
BQKGPU		38.76	-5.80	-1.18	39.68	-5.45	-1.12
BZPN7F		41.79	-2.77	-0.57	40.80	-4.33	-0.89
CVRLH7		48.41	3.85	0.79	49.50	4.36	0.90
DW3N46		49.66	5.10	1.04	52.33	7.20	1.48
JGP7WC		48.91	4.35	0.89	49.73	4.59	0.95
JK444Y		48.14	3.57	0.73	47.81	2.67	0.55
LDX79R		44.37	-0.20	-0.04	48.89	3.75	0.77
MUYFQ4		42.01	-2.55	-0.52	42.51	-2.62	-0.54
N7TWDJ		39.99	-4.57	-0.93	39.58	-5.55	-1.14
NMVTB9		53.50	8.94	1.83	51.35	6.21	1.28
PR742H		52.40	7.84	1.60	48.75	3.61	0.74
RFZX3Z		44.11	-0.45	-0.09	42.02	-3.11	-0.64
RQNWT6		34.85	-9.71	-1.98	36.69	-8.45	-1.74
RWD9UT	*	36.27	-8.29	-1.69	42.86	-2.27	-0.47
T2E6QY		56.08	11.52	2.35	53.98	8.85	1.82
T4746W		48.74	4.18	0.85	49.65	4.51	0.93
TJFRFC		44.89	0.33	0.07	47.30	2.16	0.45
TL8N67		44.43	-0.13	-0.03	44.98	-0.15	-0.03
TT6FDZ		41.13	-3.44	-0.70	41.03	-4.11	-0.85
TYVTEN		45.07	0.51	0.10	45.47	0.33	0.07
V7M8QY		49.32	4.76	0.97	47.18	2.04	0.42
W8VJ82		45.73	1.16	0.24	51.08	5.95	1.22
X7WV6V		41.49	-3.07	-0.63	38.64	-6.50	-1.34
XBN3M4		47.28	2.72	0.56	44.13	-1.00	-0.21

Summary Statistics	Sample NP19	Sample NP20
Grand Means	44.56 Joules/sq m	45.14 Joules/sq m
Stnd Dev Btwn Labs	4.90 Joules/sq m	4.86 Joules/sq m
		Statistics based on 36 of 37 reporting participants.

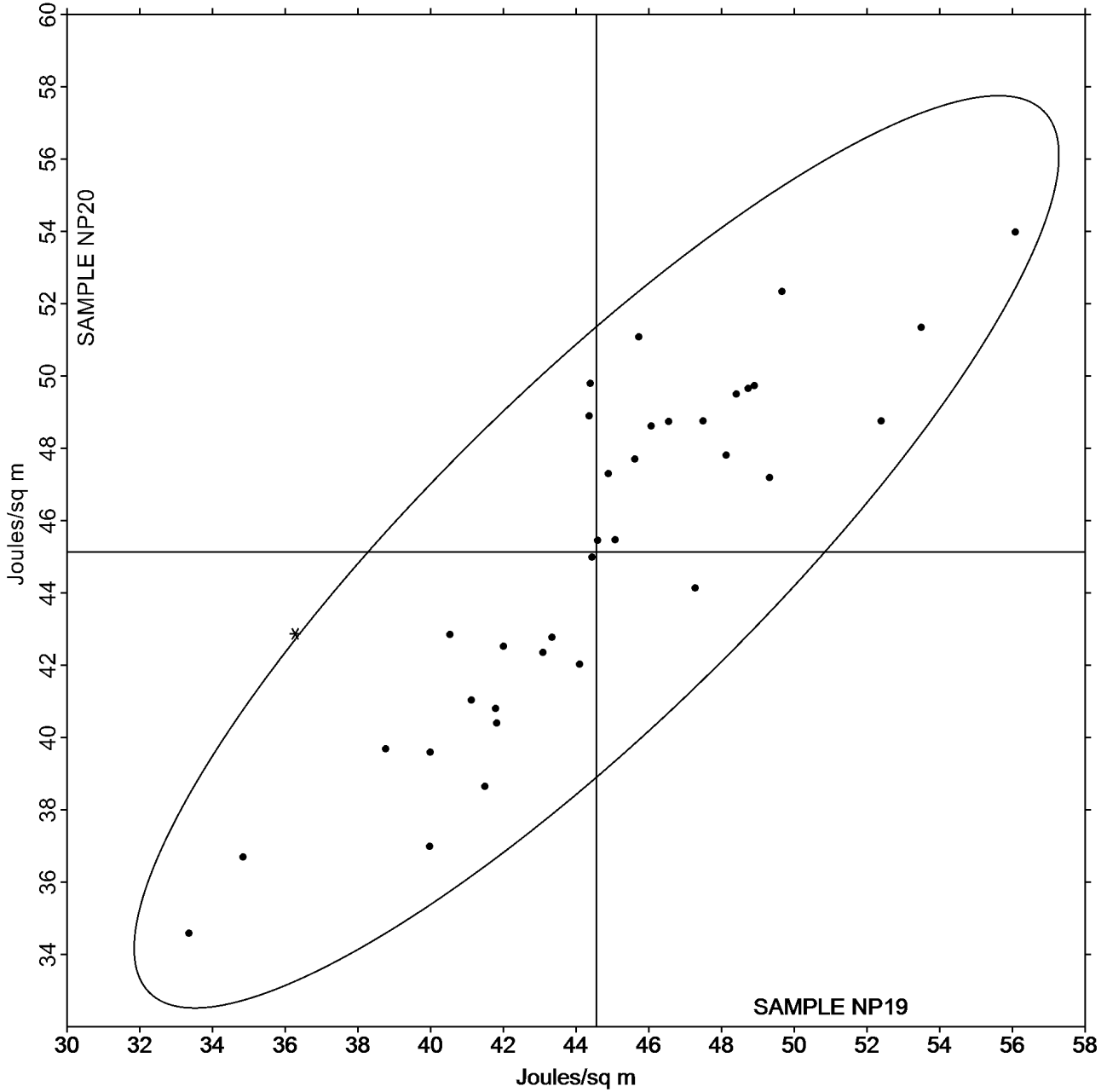### Comments on Assigned Data Flags for Test #3116

9U99PD (X) - Extreme Data.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3116
Tensile Energy Absorption - Printing Papers
TAPPI Official Test Method T494

Report #4251, July 2023

Grand Mean Sample NP19 = 44.561 Joules/sq m

Grand Mean Sample NP20 = 45.136 Joules/sq m

ANALYSIS 3116

SAMPLE NP20

Joules/sq m

SAMPLE NP19

Joules/sq m

WebCode	Data Flag	Sample NP19			Sample NP20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
4FM846		1.836	0.181	1.25	1.850	0.183	1.24
6BP97L		1.650	-0.006	-0.04	1.621	-0.046	-0.31
6V9AYY		1.790	0.134	0.93	1.910	0.243	1.65
6YDXGA		1.537	-0.119	-0.82	1.595	-0.072	-0.49
74LLRQ		1.506	-0.150	-1.04	1.542	-0.125	-0.84
7E8P2B		1.700	0.044	0.30	1.790	0.123	0.83
7H3G8M		1.679	0.023	0.16	1.712	0.045	0.31
9U99PD	X	2.118	0.462	3.19	1.936	0.269	1.82
A7GBNF		1.654	-0.002	-0.01	1.702	0.035	0.24
ADUMG8		2.017	0.361	2.49	1.991	0.324	2.19
ANEYQY		1.558	-0.098	-0.67	1.551	-0.116	-0.79
ARDCDN		1.516	-0.140	-0.96	1.451	-0.216	-1.46
AZRYMR		1.573	-0.083	-0.57	1.590	-0.077	-0.52
BQKGPU		1.472	-0.184	-1.27	1.506	-0.161	-1.09
BZPN7F		1.549	-0.107	-0.74	1.493	-0.174	-1.18
CVRLH7		1.530	-0.126	-0.87	1.550	-0.117	-0.79
DW3N46		1.888	0.232	1.60	1.855	0.188	1.27
EEBA3H		1.574	-0.082	-0.56	1.574	-0.093	-0.63
JGP7WC		1.731	0.075	0.52	1.755	0.088	0.60
JK444Y	X	1.007	-0.649	-4.47	1.109	-0.558	-3.78
LDX79R		1.591	-0.065	-0.45	1.678	0.011	0.07
MUYFQ4		1.636	-0.019	-0.13	1.671	0.004	0.03
N7TWDJ		1.642	-0.014	-0.10	1.604	-0.063	-0.43
NMVTB9		1.915	0.259	1.79	1.887	0.220	1.49
PR742H		1.672	0.016	0.11	1.599	-0.068	-0.46
RFZX3Z		1.618	-0.038	-0.26	1.620	-0.047	-0.32
RQNWT6		1.630	-0.026	-0.18	1.662	-0.005	-0.03
RWD9UT	X	2.080	0.424	2.93	2.259	0.592	4.01
T2E6QY		2.025	0.369	2.55	2.013	0.346	2.34
T4746W		1.579	-0.077	-0.53	1.583	-0.084	-0.57
TCKPEZ	*	1.386	-0.270	-1.86	1.532	-0.135	-0.91
TJFRFC		1.633	-0.023	-0.16	1.675	0.008	0.05
TL8N67		1.666	0.011	0.07	1.680	0.013	0.09
TT6FDZ		1.491	-0.165	-1.14	1.477	-0.190	-1.29
TYVTEN		1.620	-0.036	-0.25	1.622	-0.045	-0.30
V7M8QY		1.611	-0.045	-0.31	1.545	-0.122	-0.83
W8VJ82		1.787	0.131	0.90	1.912	0.245	1.66
X7WV6V		1.589	-0.067	-0.46	1.531	-0.136	-0.92
XBN3M4		1.759	0.103	0.71	1.684	0.017	0.11

Paper & Paperboard Interlaboratory Testing Program
Analysis 3117
Elongation to Break - Printing Papers
TAPPI Official Test Method T494

Report #4251, July 2023

Summary Statistics	Sample NP19	Sample NP20
Grand Means	1.66 Percent	1.67 Percent
Stnd Dev Btwn Labs	0.15 Percent	0.15 Percent
		Statistics based on 36 of 39 reporting participants.

Comments on Assigned Data Flags for Test #3117

JK444Y (X) - Data for both samples are low. Possible Systematic Error.

RWD9UT (X) - Data for both samples are high. Possible Systematic Error.

9U99PD (X) - Data for sample NP19 are high. Inconsistent within the determinations of both samples.

Analysis Notes:

T4746W - Data appears to be transposed between Analysis 3115 (Tensile Breaking Strength) & Analysis 3117 (Elongation to Break). CTS will not correct going forward.
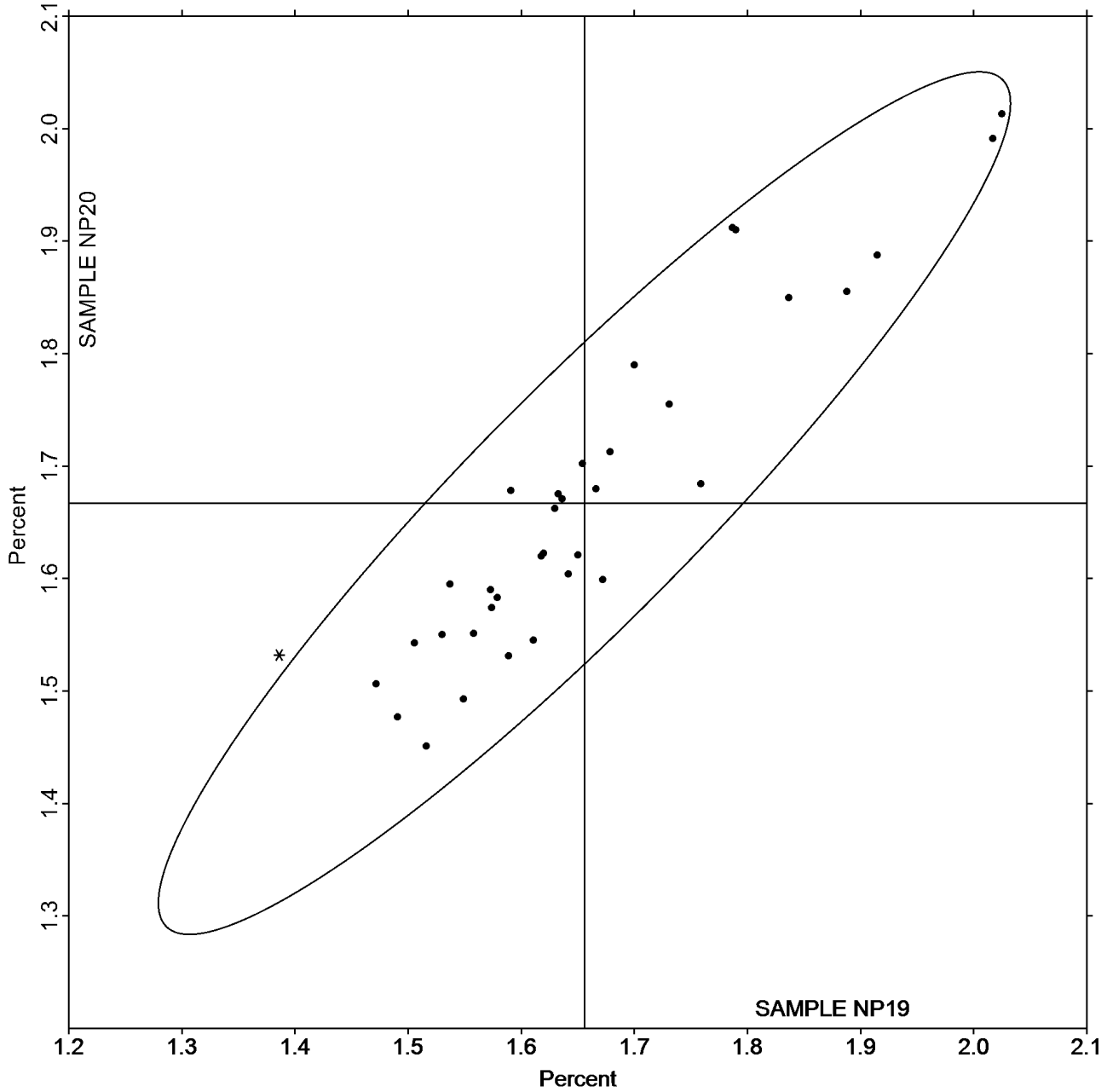
Paper & Paperboard Interlaboratory Testing Program
Analysis 3117
Elongation to Break - Printing Papers
TAPPI Official Test Method T494

Report #4251, July 2023

Grand Mean Sample NP19 = 1.6558 Percent

Grand Mean Sample NP20 = 1.6671 Percent

ANALYSIS 3117

SAMPLE NP20

Percent

SAMPLE NP19

Percent

		Sample PP19				Sample PP20		
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV		Lab Mean	Diff from Grand Mean	CPV
282MMM		25.52	-0.25	-0.21		25.83	-0.20	-0.19
2MAEPR		27.10	1.33	1.09		25.80	-0.23	-0.22
3HCCZH		25.77	0.00	0.00		25.97	-0.06	-0.06
3WV2XZ		26.19	0.42	0.34		24.76	-1.27	-1.18
74LLRQ		24.63	-1.14	-0.94		24.94	-1.09	-1.02
7E8P2B		24.81	-0.96	-0.80		24.02	-2.01	-1.87
7H3G8M		26.83	1.06	0.87		27.39	1.36	1.26
8PGMGY		25.51	-0.26	-0.22		25.26	-0.77	-0.72
9U99PD		27.21	1.44	1.19		27.67	1.64	1.52
ADUMG8	*	29.12	3.34	2.76		28.72	2.69	2.50
ARDCDN		24.82	-0.95	-0.79		25.52	-0.51	-0.48
AVEDF7		26.11	0.34	0.28		26.05	0.02	0.02
AZRYMR		25.91	0.13	0.11		25.97	-0.06	-0.06
DW3N46		25.61	-0.16	-0.13		26.67	0.64	0.60
E2MBAU		23.10	-2.67	-2.21		23.90	-2.13	-1.98
EEBA3H		26.65	0.88	0.72		26.54	0.51	0.47
EM7D6T		27.18	1.41	1.16		27.49	1.46	1.36
FVGUDE		27.18	1.41	1.16		28.07	2.04	1.89
JGP7WC		24.78	-0.99	-0.82		25.29	-0.74	-0.69
JHYFMN		24.97	-0.80	-0.66		26.25	0.22	0.20
MPPZGE		25.97	0.20	0.16		25.52	-0.51	-0.48
MUYFQ4		25.09	-0.68	-0.56		25.93	-0.10	-0.10
N7TWDJ		25.92	0.15	0.12		26.91	0.88	0.82
NMVTB9		25.69	-0.09	-0.07		25.39	-0.64	-0.60
Q6Q6XE		24.34	-1.43	-1.18		25.06	-0.97	-0.90
QM7EXF		26.48	0.71	0.58		26.60	0.56	0.53
QYYVMG		24.96	-0.81	-0.67		25.37	-0.66	-0.62
RWD9UT		23.85	-1.92	-1.59		25.48	-0.55	-0.51
T2E6QY		24.76	-1.02	-0.84		26.58	0.55	0.51
TCKPEZ		27.13	1.36	1.12		27.26	1.23	1.14
UB6PVB		24.20	-1.57	-1.30		25.60	-0.43	-0.40
UW3GQ3		26.37	0.60	0.49		26.21	0.18	0.17
V43ZQC		25.61	-0.16	-0.14		26.08	0.05	0.04
V7M8QY		25.65	-0.12	-0.10		24.98	-1.05	-0.98
W8VJ82		25.15	-0.63	-0.52		25.94	-0.09	-0.08
WD2DZB		25.62	-0.15	-0.12		25.60	-0.43	-0.40
WYHPUJ	X	104.28	78.51	64.78		105.90	79.87	74.27
X2MFV8		24.27	-1.50	-1.24		24.46	-1.57	-1.46
XBN3M4		27.22	1.44	1.19		26.46	0.43	0.40
ZLYC4T		27.92	2.15	1.77		27.72	1.69	1.57

Summary Statistics	Sample PP19	Sample PP20
Grand Means	25.77 sec/100 cc	26.03 sec/100 cc
Stnd Dev Btwn Labs	1.21 sec/100 cc	1.08 sec/100 cc

Statistics based on 39 of 40 reporting participants.

Comments on Assigned Data Flags for Test #3121

WYHPUJ (X) - Extreme Data.

Analysis Notes:
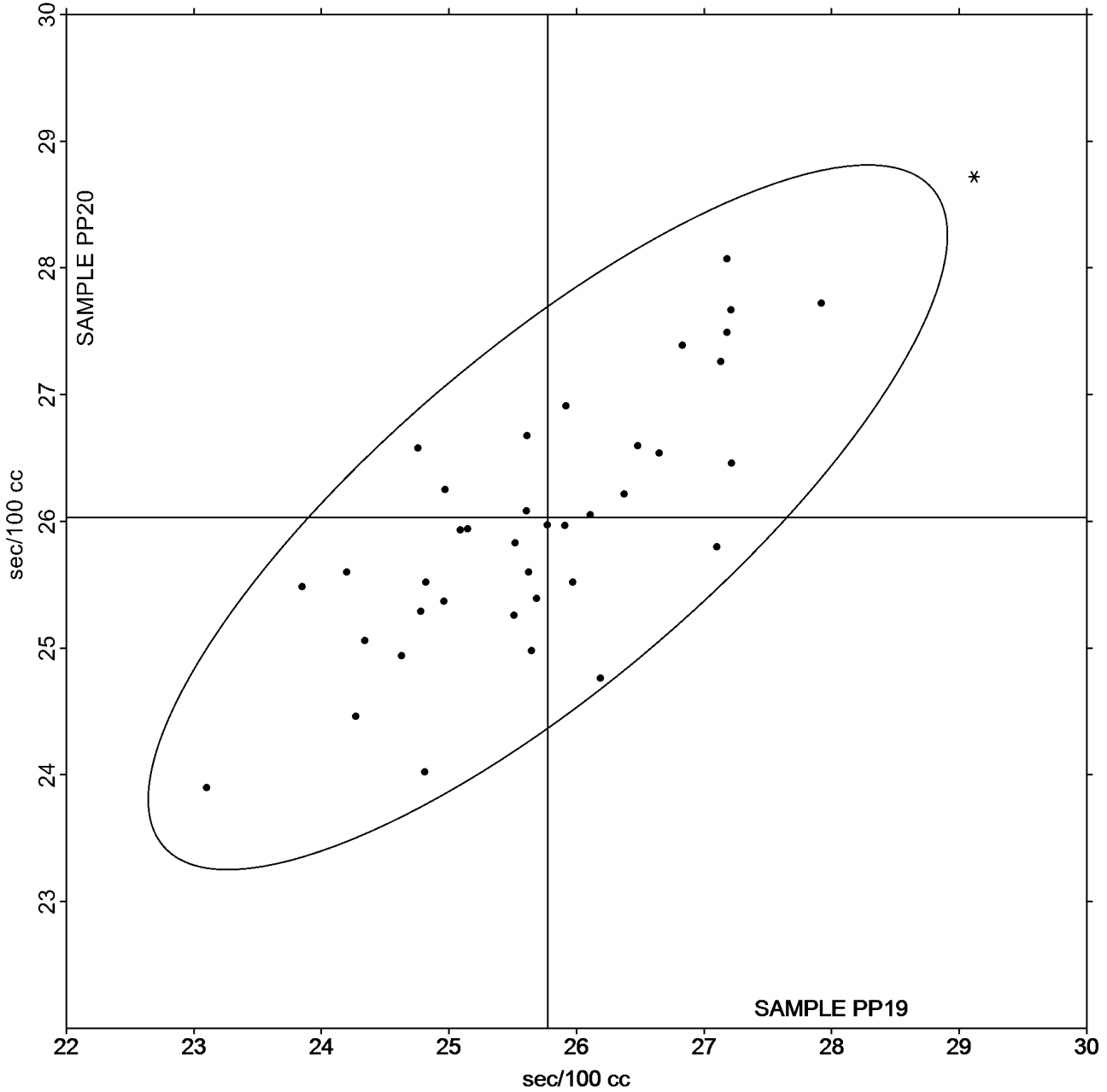
WYHPUJ - Possibly reported Sheffield units.

Grand Mean Sample PP19 = 25.774 sec/100 cc

Grand Mean Sample PP20 = 26.032 sec/100 cc

ANALYSIS 3121

SAMPLE PP20

SAMPLE PP19

sec/100 cc

WebCode	Data Flag	Sample PP19			Sample PP20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2MAEPR		107.5	0.2	0.02	108.1	-0.8	-0.19
3G6WUC		98.1	-9.2	-1.21	104.1	-4.9	-1.11
PR742H		116.7	9.4	1.23	114.7	5.8	1.32
V43ZQC		107.0	-0.3	-0.04	108.9	0.0	-0.01

| Summary Statistics	Sample PP19	Sample PP20
Grand Means	107.32 Sheffield Units	108.95 Sheffield Units
Stnd Dev Btwn Labs	7.60 Sheffield Units	4.37 Sheffield Units

Statistics based on 4 of 4 reporting participants.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3123
Porosity - Sheffield Type - Sheffield Units for 3/4 inch Diameter Orifice
TAPPI Official Test Method T547

Report #4251, July 2023

Grand Mean Sample PP19 = 107.32 Sheffield Units

Grand Mean Sample PP20 = 108.95 Sheffield Units

ANALYSIS 3123
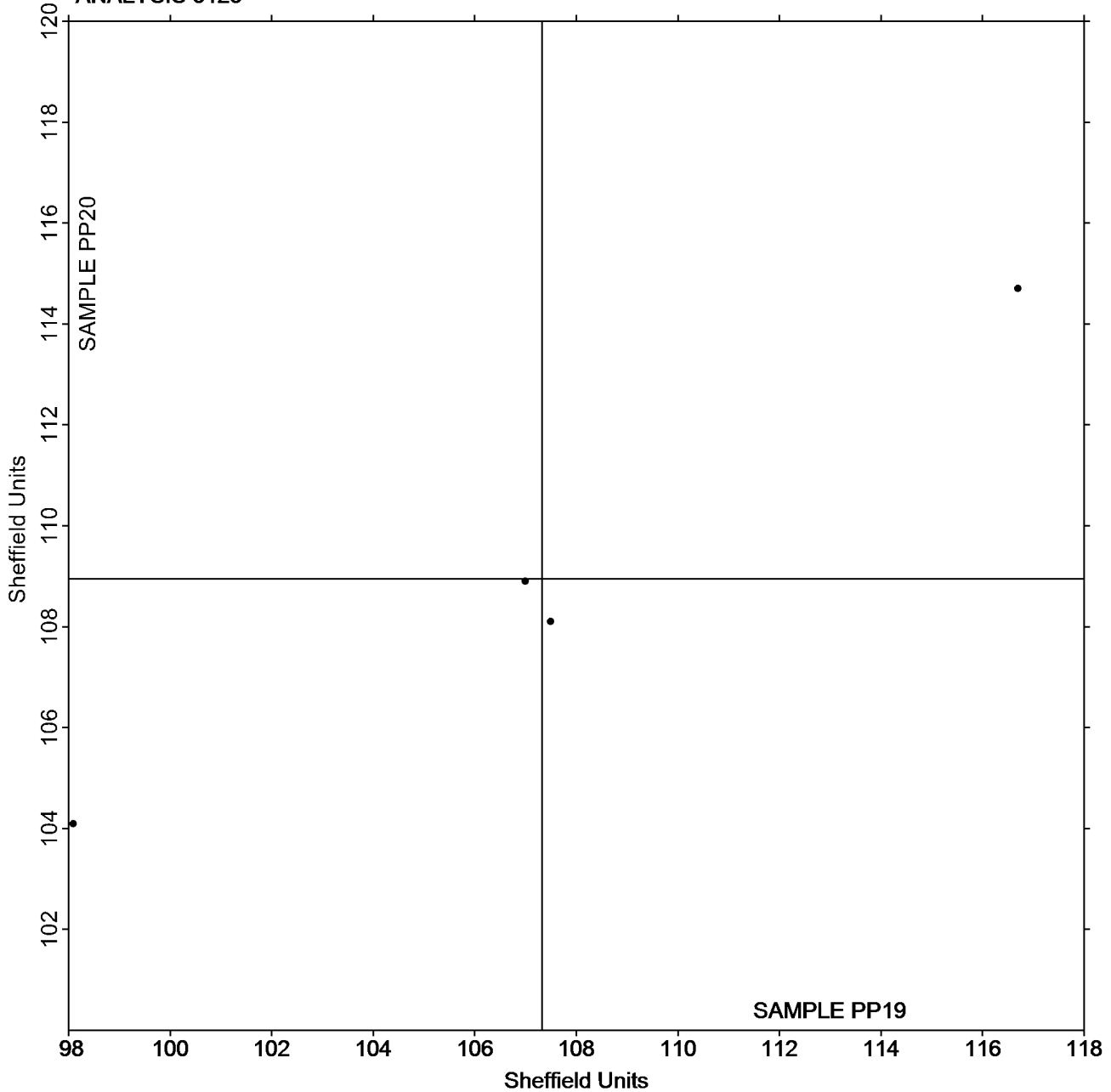
SAMPLE PP20

Sheffield Units

SAMPLE PP19

Sheffield Units

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

Analysis 3131
Roughness - Print Surf Method - 2.5 to 6.0 Microns
TAPPI Official Test Method T555

WebCode	Data Flag	Sample PH19			Sample PH20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
282MMM		6.113	-0.043	-0.18	6.103	-0.042	-0.22
3WV2XZ		5.758	-0.398	-1.67	5.913	-0.232	-1.22
6BP97L		6.115	-0.041	-0.17	6.180	0.035	0.19
7H3G8M		6.084	-0.072	-0.30	5.864	-0.281	-1.48
8KLV92		5.876	-0.280	-1.18	5.935	-0.210	-1.10
ANEYQY		6.284	0.128	0.54	6.204	0.059	0.31
RWD9UT		6.215	0.059	0.25	6.098	-0.047	-0.25
T4746W		6.299	0.143	0.60	6.500	0.355	1.87
U8J43N		6.628	0.472	1.99	6.329	0.184	0.97
UW3GQ3		6.003	-0.153	-0.64	6.237	0.092	0.49
XBN3M4		6.336	0.180	0.76	6.227	0.082	0.43

Summary Statistics	Sample PH19	Sample PH20
Grand Means	6.16 Microns	6.14 Microns
Stnd Dev Btwn Labs	0.24 Microns	0.19 Microns

Statistics based on 11 of 11 reporting participants.

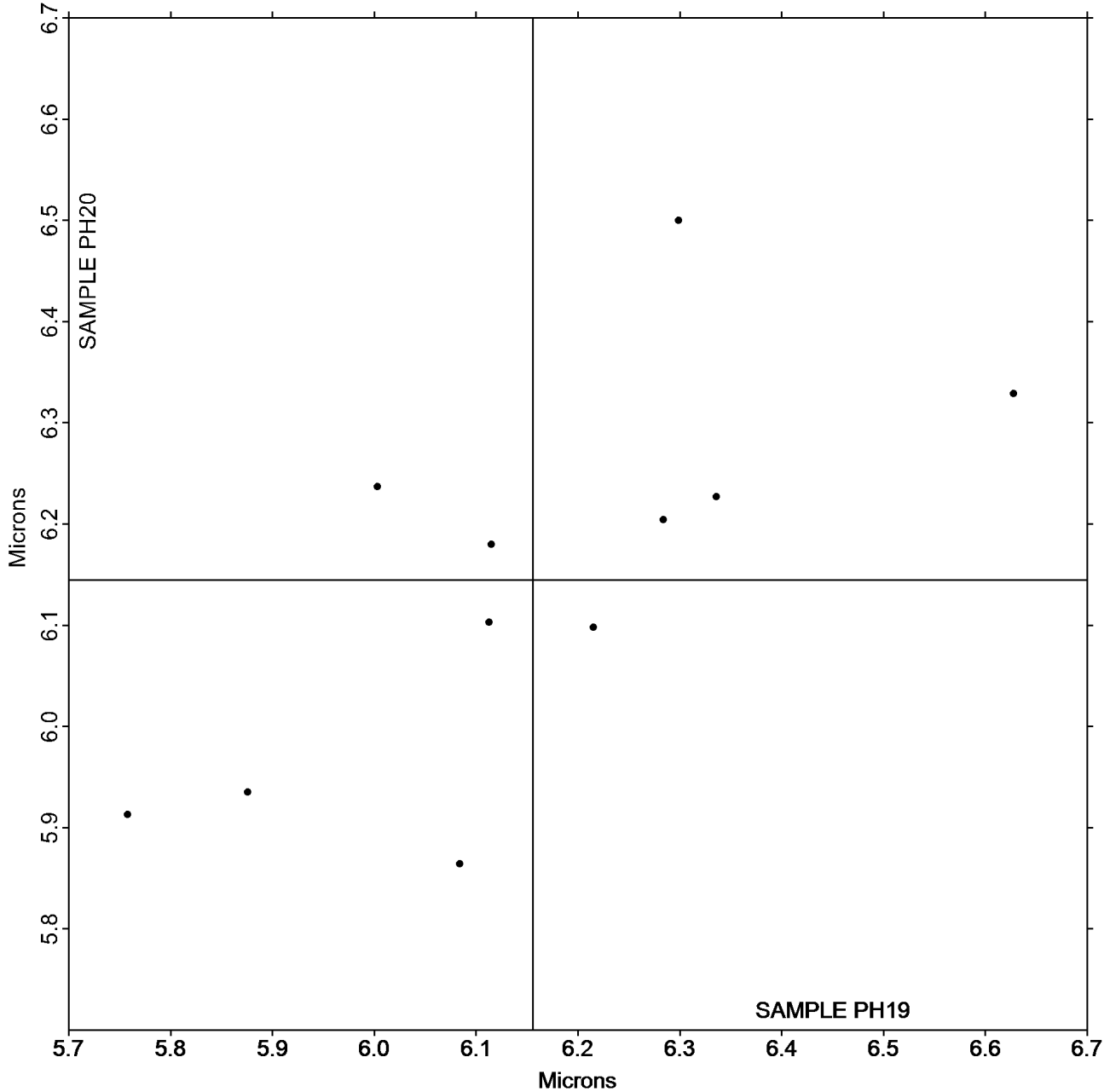**Paper & Paperboard Interlaboratory Testing Program**
Analysis 3131
Roughness - Print Surf Method - 2.5 to 6.0 Microns
TAPPI Official Test Method T555

Report #4251, July 2023

Grand Mean Sample PH19 = 6.1555 Microns

Grand Mean Sample PH20 = 6.1445 Microns

ANALYSIS 3131

SAMPLE PH20

Microns

SAMPLE PH19

Microns

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

WebCode	Data Flag	Sample SR19			Sample SR20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
282MMM		132.6	-16.4	-1.94	133.8	-15.1	-1.71
2MAEPR		137.7	-11.3	-1.34	133.1	-15.8	-1.79
3HCCZH		147.0	-2.0	-0.24	158.3	9.4	1.07
3WV2XZ	*	168.8	19.8	2.34	171.9	23.0	2.62
6YDXGA		146.1	-2.9	-0.35	150.3	1.4	0.16
76WNFB		152.2	3.2	0.37	150.5	1.6	0.18
7H3G8M		142.7	-6.3	-0.75	145.0	-3.9	-0.44
9U99PD		154.2	5.2	0.61	148.3	-0.6	-0.07
ADUMG8		144.9	-4.1	-0.49	145.1	-3.8	-0.43
ANEYQY		142.9	-6.2	-0.73	147.8	-1.1	-0.12
AVEDF7		148.8	-0.2	-0.03	145.4	-3.5	-0.40
AZRYMR		160.6	11.6	1.36	162.1	13.2	1.50
DTZPTC		164.6	15.6	1.84	159.4	10.5	1.20
DW3N46		142.0	-7.0	-0.83	141.0	-7.9	-0.89
E2MBAU	X	188.3	39.3	4.64	179.5	30.6	3.47
EEBA3H		147.5	-1.5	-0.18	151.3	2.4	0.27
EM7D6T		137.3	-11.7	-1.38	138.9	-10.0	-1.13
H4LMLC		152.3	3.3	0.39	162.6	13.7	1.56
JJC8E6		158.5	9.5	1.12	160.8	11.9	1.35
KRLWT4		139.3	-9.7	-1.15	140.5	-8.4	-0.95
M9HXKT	X	174.2	25.2	2.97	187.6	38.7	4.39
N7TWDJ		140.2	-8.9	-1.04	134.0	-14.9	-1.69
NMVTB9		163.2	14.2	1.67	153.8	4.9	0.55
NPMRP8		153.9	4.9	0.57	154.8	5.9	0.67
P2VRY6		153.8	4.7	0.56	150.4	1.5	0.18
PR742H		148.6	-0.4	-0.05	143.5	-5.4	-0.61
Q2QU2E		156.5	7.5	0.88	155.8	6.9	0.78
RWD9UT		159.2	10.2	1.20	154.3	5.4	0.61
T2E6QY	X	439.2	290.2	34.25	439.6	290.7	32.99
TCKPEZ		154.6	5.6	0.66	153.6	4.7	0.53
TCWLJ6	X	200.6	51.6	6.09	194.7	45.8	5.20
UB6PVB		148.4	-0.6	-0.07	141.1	-7.8	-0.88
UW3GQ3		155.1	6.1	0.72	154.9	6.0	0.68
V43ZQC	*	137.7	-11.3	-1.34	153.6	4.7	0.53
W8VJ82		147.2	-1.8	-0.21	141.1	-7.8	-0.88
WD2DZB		146.4	-2.6	-0.31	147.8	-1.1	-0.12
WYHPUJ		147.1	-1.9	-0.23	146.0	-2.9	-0.33
X93GUG		138.3	-10.7	-1.27	139.4	-9.5	-1.08
XBN3M4		147.9	-1.1	-0.13	145.2	-3.7	-0.42
ZLYC4T		147.0	-2.0	-0.24	144.8	-4.1	-0.46

Summary Statistics	Sample SR19	Sample SR20
Grand Means	149.03 Sheffield	148.90 Sheffield
Stnd Dev Btwn Labs	8.47 Sheffield	8.81 Sheffield

Statistics based on 36 of 40 reporting participants.

Comments on Assigned Data Flags for Test #3133

E2MBAU (X) - Data for both samples are high. Possible Systematic Error. Inconsistent within the determinations of both samples.

T2E6QY (X) - Extreme Data.

TCWLJ6 (X) - Extreme Data.

M9HXKT (X) - Data for both samples are high. Possible Systematic Error.

Grand Mean Sample SR19 = 149.03 Sheffield

Grand Mean Sample SR20 = 148.90 Sheffield
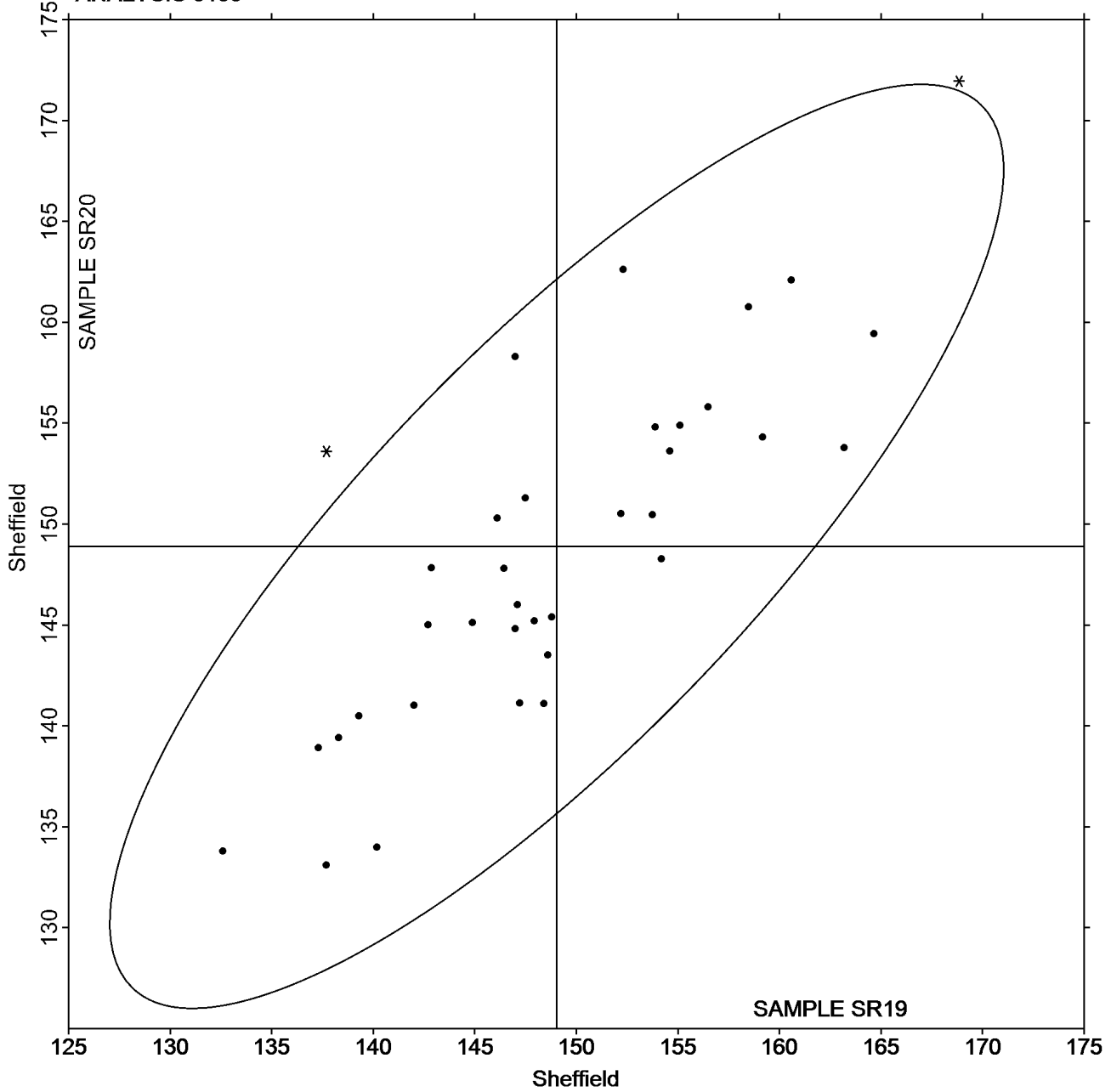
Paper & Paperboard Interlaboratory Testing Program
Analysis 3135
Grammage (Mass per Unit Area)
TAPPI Official Test Method T410

		Sample GM19			Sample GM20		
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
4FM846		74.98	-0.40	-0.94	74.99	-0.53	-1.12
6V9AYY		75.75	0.37	0.87	75.62	0.10	0.22
7AQHDC	*	75.54	0.16	0.37	76.52	1.01	2.14
7E8P2B		75.26	-0.12	-0.28	75.55	0.04	0.08
8PGMGY		75.32	-0.06	-0.14	74.99	-0.53	-1.13
9KY4CM		74.55	-0.83	-1.92	75.22	-0.29	-0.62
9RGD2J		75.16	-0.22	-0.51	75.29	-0.23	-0.49
A9NUMC		75.49	0.11	0.25	75.43	-0.09	-0.19
AZRYMR		75.20	-0.18	-0.42	75.42	-0.09	-0.20
EEBA3H		75.46	0.08	0.19	75.68	0.17	0.35
HL7EKC		76.17	0.79	1.84	75.93	0.42	0.89
JGP7WC		76.04	0.66	1.54	75.90	0.39	0.82
JK444Y		74.72	-0.66	-1.54	74.91	-0.60	-1.29
M9HXKT		74.80	-0.58	-1.35	74.50	-1.01	-2.16
MUYFQ4		75.78	0.40	0.93	75.91	0.40	0.85
N7TWDJ		75.40	0.02	0.05	75.28	-0.23	-0.50
PR742H		75.87	0.49	1.14	76.18	0.67	1.42
RFZX3Z		75.18	-0.20	-0.46	75.12	-0.40	-0.84
RHTURU		75.53	0.15	0.35	75.44	-0.07	-0.15
RQNWT6		74.77	-0.61	-1.42	75.35	-0.17	-0.35
TCKPEZ		75.20	-0.18	-0.42	75.40	-0.11	-0.24
TL8N67		76.24	0.86	2.00	76.54	1.03	2.19
UB6PVB		75.33	-0.05	-0.12	75.36	-0.15	-0.33
V43ZQC		75.41	0.03	0.08	75.71	0.20	0.42
X7WV6V		75.49	0.11	0.27	75.42	-0.10	-0.20
Y4LDJ6	X	75.68	0.30	0.70	73.65	-1.86	-3.97
Y7BHFH		75.23	-0.15	-0.35	75.72	0.21	0.44

Summary Statistics	Sample GM19	Sample GM20
Grand Means	75.38 g/sq m	75.51 g/sq m
Stnd Dev Btwn Labs	0.43 g/sq m	0.47 g/sq m

Statistics based on 26 of 27 reporting participants.
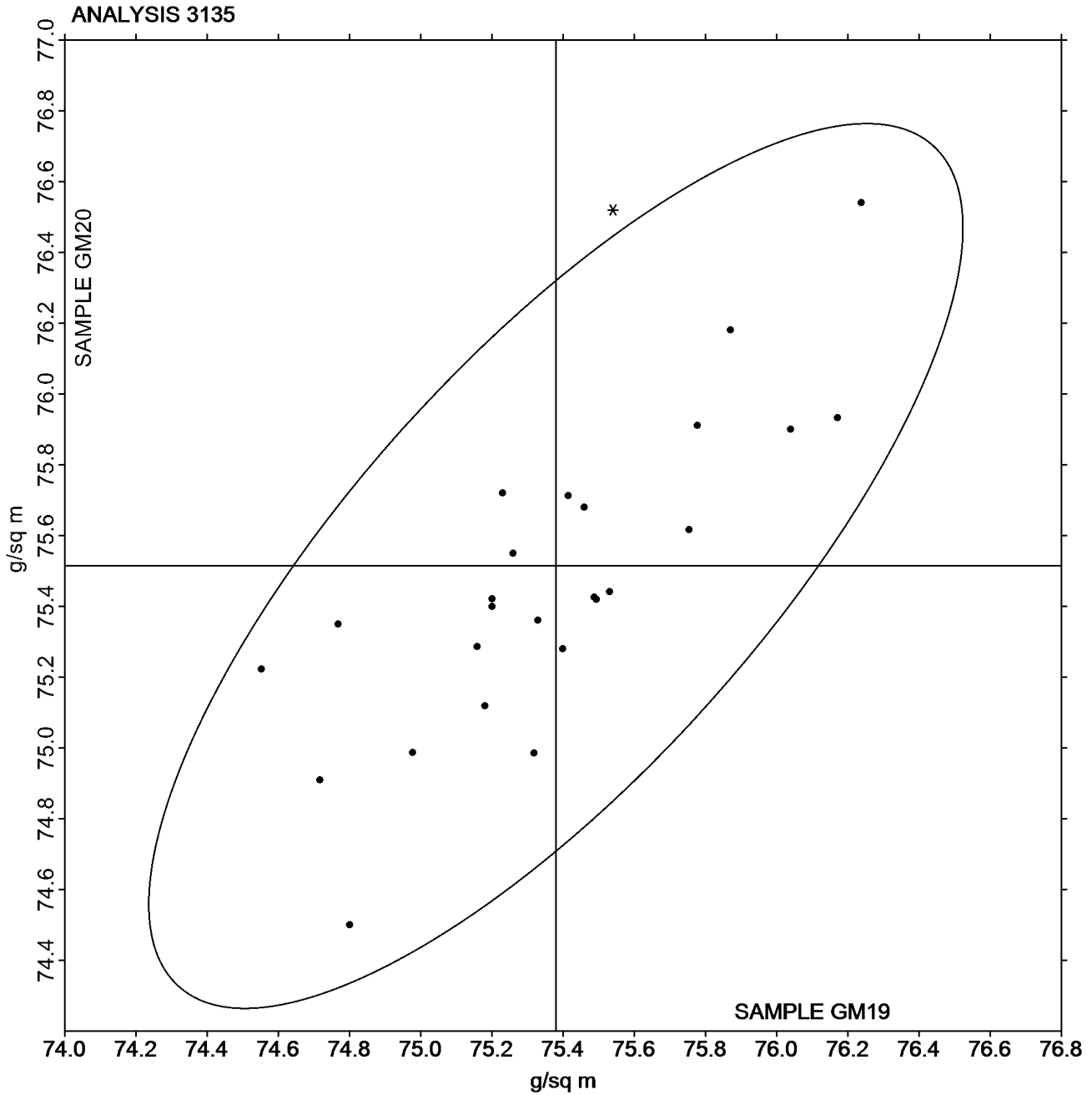
Comments on Assigned Data Flags for Test #3135

Y4LDJ6 (X) - Data for sample GM20 are low. Inconsistent within the determinations of sample GM20.

Grand Mean Sample GM19 = 75.380 g/sq m

Grand Mean Sample GM20 = 75.514 g/sq m

Paper & Paperboard Interlaboratory Testing Program
Analysis 3141
Opacity (89% Reflectance Backing) - Fine Papers
TAPPI Official Test Method T425

WebCode	Data Flag	Sample VR19			Sample VR20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2MAEPR		89.16	-0.10	-0.21	88.97	-0.11	-0.19
3G6WUC		90.21	0.95	2.09	89.58	0.50	0.82
3HCCZH		88.88	-0.38	-0.82	88.65	-0.43	-0.72
9U99PD		89.76	0.51	1.11	89.75	0.67	1.11
A9NUMC		89.10	-0.16	-0.35	89.11	0.03	0.05
ADUMG8		89.08	-0.18	-0.39	88.80	-0.28	-0.47
ANEYQY		88.91	-0.34	-0.75	89.25	0.17	0.28
AZRYMR		89.65	0.39	0.87	89.55	0.47	0.77
BQKGPU		89.68	0.42	0.93	89.00	-0.08	-0.14
CVRLH7		88.54	-0.72	-1.57	87.92	-1.16	-1.93
EEBA3H		88.72	-0.54	-1.17	88.51	-0.57	-0.95
FBV3EH		89.24	-0.02	-0.04	89.13	0.05	0.08
NMVTB9		89.41	0.15	0.33	89.62	0.54	0.89
P3MQD4		90.26	1.00	2.20	90.54	1.45	2.41
PR742H		89.25	-0.01	-0.01	88.67	-0.41	-0.69
Q2QU2E		89.91	0.65	1.44	89.41	0.33	0.54
RWD9UT		88.97	-0.29	-0.63	88.89	-0.20	-0.33
TCKPEZ		88.77	-0.49	-1.06	88.04	-1.04	-1.73
U8J43N		89.10	-0.15	-0.34	89.82	0.73	1.22
UB6PVB		89.04	-0.22	-0.47	88.35	-0.73	-1.22
V43ZQC		89.09	-0.17	-0.36	89.45	0.37	0.61
WD2DZB		89.04	-0.21	-0.47	88.89	-0.19	-0.32
XBN3M4		89.11	-0.15	-0.33	89.03	-0.06	-0.10

Summary Statistics	Sample VR19	Sample VR20
Grand Means	89.26 Percent	89.08 Percent
Stnd Dev Btwn Labs	0.46 Percent	0.60 Percent

Statistics based on 23 of 23 reporting participants.

Grand Mean Sample VR19 = 89.255 Percent

Grand Mean Sample VR20 = 89.084 Percent

ANALYSIS 3141

WebCode	Data Flag	Sample VP19			Sample VP20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
7E8P2B		90.07	-0.09	-0.54	90.04	-0.06	-0.56
8PGMGY		90.15	-0.01	-0.03	90.29	0.19	1.70
8QV9TL		90.43	0.28	1.72	90.17	0.07	0.62
ARDCDN		90.24	0.08	0.52	90.09	-0.02	-0.15
JGP7WC		90.05	-0.11	-0.66	90.04	-0.06	-0.58
RFZX3Z		89.99	-0.16	-1.02	89.99	-0.12	-1.03

Summary Statistics	Sample VP19	Sample VP20
Grand Means	90.16 Percent	90.10 Percent
Stnd Dev Btwn Labs	0.16 Percent	0.11 Percent

Statistics based on 6 of 6 reporting participants.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3143
Opacity (Paper Backing) - Fine Papers and Newsprint
TAPPI Official Test Method T519

Report #4251, July 2023

Grand Mean Sample VP19 = 90.156 Percent

Grand Mean Sample VP20 = 90.103 Percent

ANALYSIS 3143

SAMPLE VP20

SAMPLE VP19

Percent

Percent

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

		Sample BF19			Sample BF20		
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3G6WUC		89.72	-2.12	-0.92	89.51	-2.32	-1.03
9U99PD		85.98	-5.86	-2.55	86.28	-5.54	-2.45
A9NUMC		93.05	1.21	0.52	92.80	0.98	0.43
ADUMG8		93.02	1.18	0.51	93.70	1.88	0.83
BQKGPU		92.49	0.64	0.28	92.66	0.83	0.37
FBV3EH		93.05	1.21	0.52	92.86	1.03	0.46
JK444Y		89.47	-2.37	-1.03	89.42	-2.40	-1.06
RWD9UT		94.06	2.22	0.96	94.06	2.24	0.99
TYVTEN	X	104.99	13.15	5.72	104.88	13.05	5.78
UB6PVB		92.46	0.62	0.27	92.24	0.42	0.18
WD2DZB		93.03	1.19	0.52	92.87	1.04	0.46
XBN3M4		92.98	1.13	0.49	92.85	1.03	0.46
ZLYC4T		92.83	0.98	0.43	92.64	0.81	0.36

Summary Statistics	Sample BF19	Sample BF20
Grand Means	91.85 Percent	91.82 Percent
Stnd Dev Btwn Labs	2.30 Percent	2.26 Percent

Statistics based on 12 of 13 reporting participants.

Comments on Assigned Data Flags for Test #3145

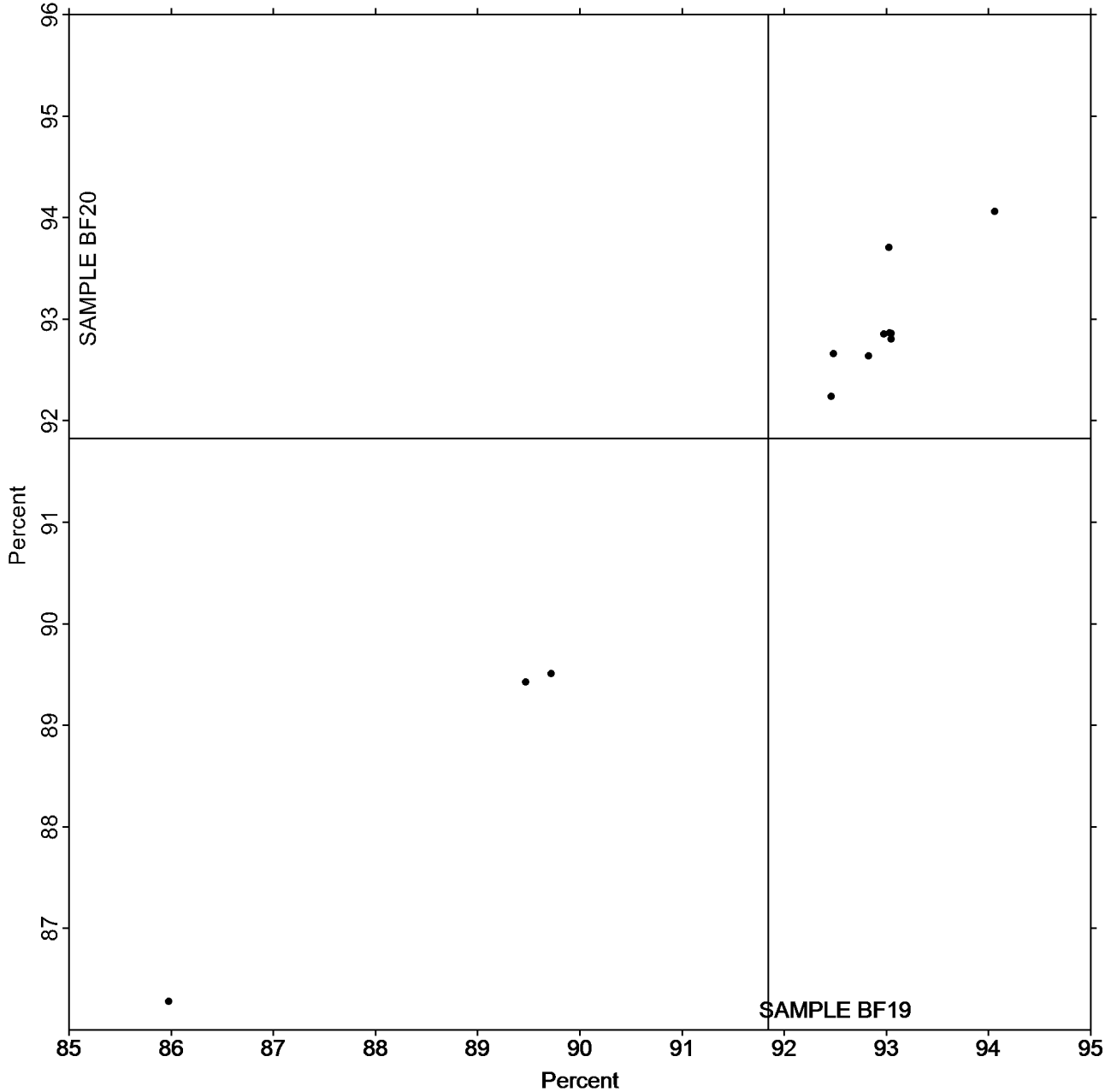TYVTEN (X) - Data for both samples are high. Possible Systematic Error.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3145
Directional Brightness of Fluorescent Samples
TAPPI Official Test Method T452

Report #4251, July 2023

Grand Mean Sample BF19 = 91.845 Percent

Grand Mean Sample BF20 = 91.824 Percent

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

		Sample BF19			Sample BF20		
WebCode	Data Flag	Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
9U99PD		5.160	-0.978	-2.08	5.200	-0.973	-2.04
A9NUMC		6.356	0.218	0.46	6.232	0.059	0.12
ADUMG8		6.514	0.376	0.80	6.678	0.505	1.06
BQKGPU		5.538	-0.600	-1.28	5.584	-0.589	-1.24
FBV3EH		6.220	0.082	0.17	6.252	0.079	0.17
JK444Y	X	0.110	-6.028	-12.82	0.062	-6.111	-12.83
RWD9UT		6.480	0.342	0.73	6.540	0.367	0.77
TYVTEN	X	18.468	12.330	26.23	18.480	12.307	25.84
WD2DZB		6.274	0.136	0.29	6.314	0.141	0.30
XBN3M4		6.232	0.094	0.20	6.280	0.107	0.23
ZLYC4T		6.472	0.334	0.71	6.474	0.301	0.63

Summary Statistics	**Sample BF19**	**Sample BF20**
Grand Means	6.14 Percent	6.17 Percent
Stnd Dev Btwn Labs	0.47 Percent	0.48 Percent

Statistics based on 9 of 11 reporting participants.

Comments on Assigned Data Flags for Test #3146

TYVTEN (X) - Extreme Data.
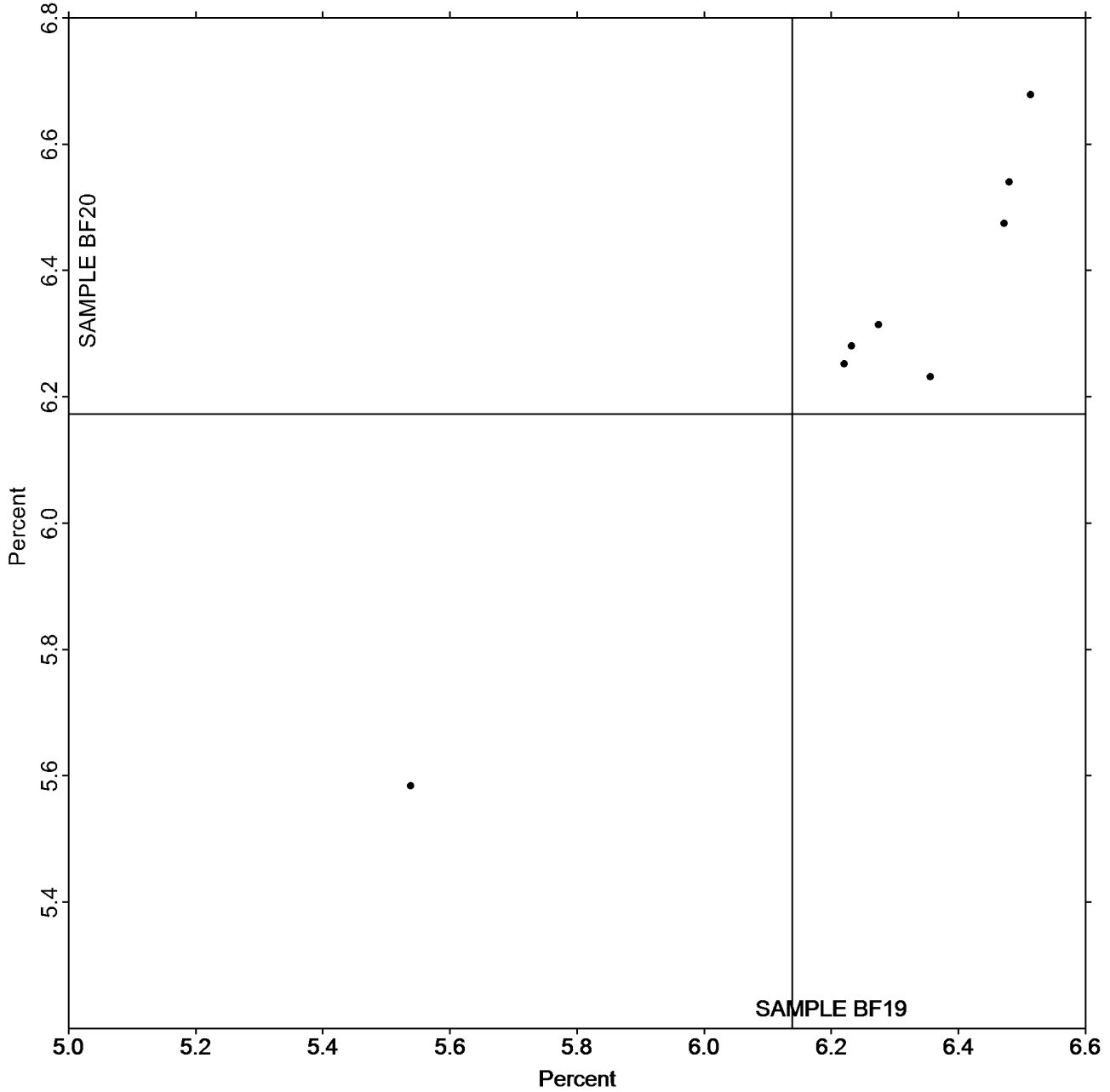
JK444Y (X) - Extreme Data.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3146
Fluorescent Component of Directional Brightness
TAPPI Official Test Method T452

Report #4251, July 2023

Grand Mean Sample BF19 = 6.1384 Percent

Grand Mean Sample BF20 = 6.1727 Percent

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

WebCode	Data Flag	Sample TP19			Sample TP20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
2MAEPR		2.510	0.310	1.61	2.510	0.297	1.12
9U99PD		2.059	-0.141	-0.73	2.032	-0.181	-0.69
ADUMG8		2.146	-0.054	-0.28	2.109	-0.104	-0.39
EM7D6T		1.980	-0.220	-1.14	2.020	-0.193	-0.73
PR742H		2.523	0.323	1.68	2.777	0.564	2.13
RWD9UT		2.122	-0.078	-0.40	2.126	-0.087	-0.33
TJFRFC		2.239	0.039	0.20	2.265	0.052	0.19
WD2DZB		2.111	-0.089	-0.46	2.001	-0.213	-0.80
XBN3M4		2.108	-0.092	-0.48	2.082	-0.132	-0.50

Summary Statistics	Sample TP19	Sample TP20
Grand Means	2.20 Taber Units	2.21 Taber Units
Stnd Dev Btwn Labs	0.19 Taber Units	0.26 Taber Units

Statistics based on 9 of 9 reporting participants.

Analysis Notes:

ADUMG8 -   Data appear to be reported as g-cm, not mN-m as indicated on data entry form. CTS will not correct the Units going forward.
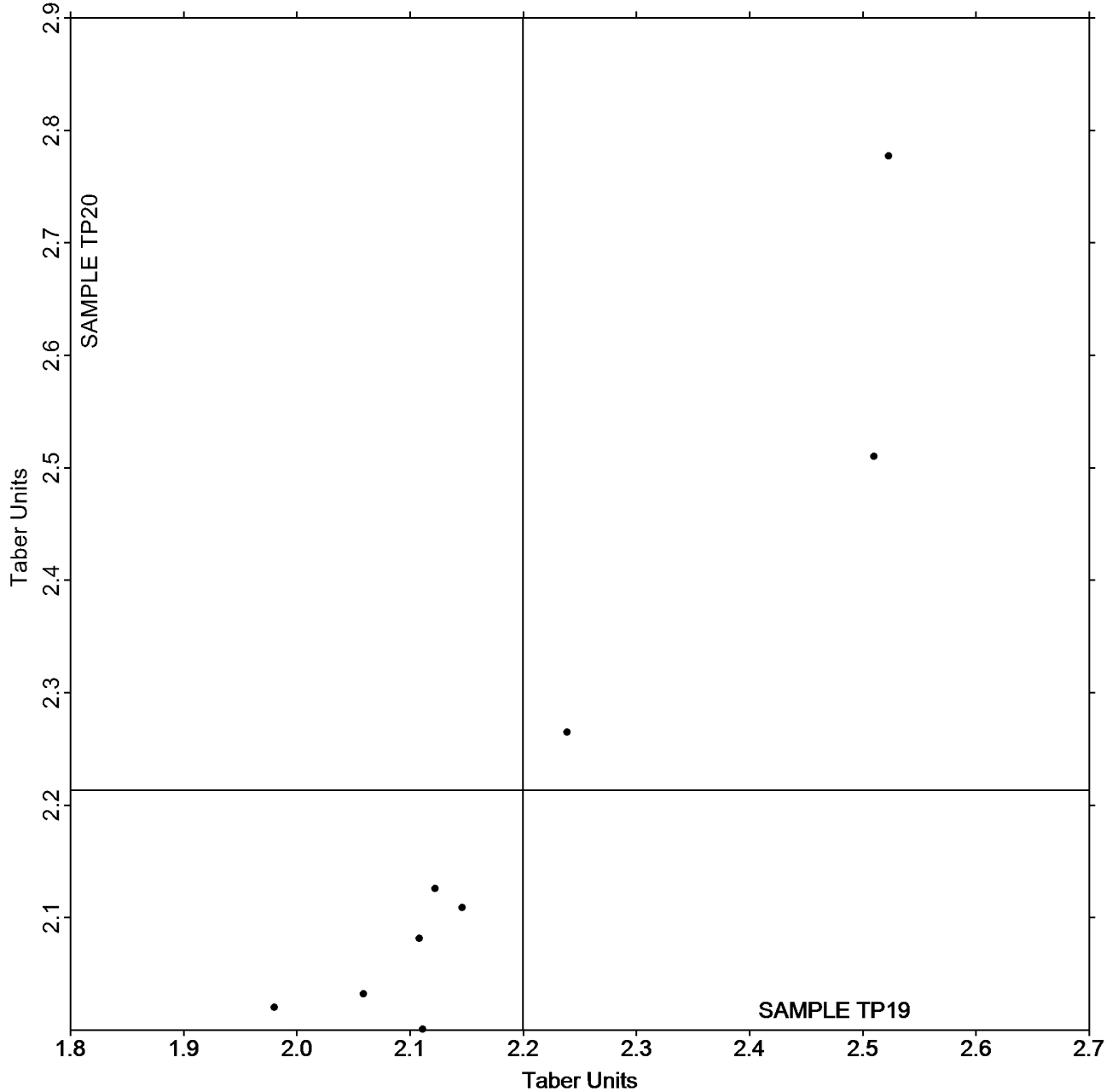
Paper & Paperboard Interlaboratory Testing Program
Analysis 3201
Bending Resistance, Taber Type - 0 to 10 Units
TAPPI Official Test Method T566

Report #4251, July 2023

Grand Mean Sample TP19 = 2.1998
Taber Units

Grand Mean Sample TP20 = 2.2134
Taber Units

ANALYSIS 3201

SAMPLE TP20

Taber Units

SAMPLE TP19

Taber Units

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

WebCode	Data Flag	Sample TC19			Sample TC20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
282MMM		25.28	-3.94	-2.27	46.95	-9.68	-2.50
3WV2XZ		28.50	-0.71	-0.41	55.55	-1.08	-0.28
6BP97L		30.27	1.06	0.61	60.18	3.55	0.92
6V9AYY		30.45	1.24	0.71	59.40	2.77	0.72
7H3G8M		30.06	0.85	0.49	57.66	1.04	0.27
8KLV92		27.75	-1.46	-0.84	55.45	-1.18	-0.30
DTZPTC		31.57	2.36	1.35	60.19	3.56	0.92
JJC8E6		30.80	1.59	0.91	60.71	4.08	1.05
N7TWDJ		29.35	0.14	0.08	55.45	-1.18	-0.30
PWH9HN		28.57	-0.64	-0.37	55.95	-0.68	-0.17
RWD9UT		28.76	-0.45	-0.26	55.39	-1.24	-0.32

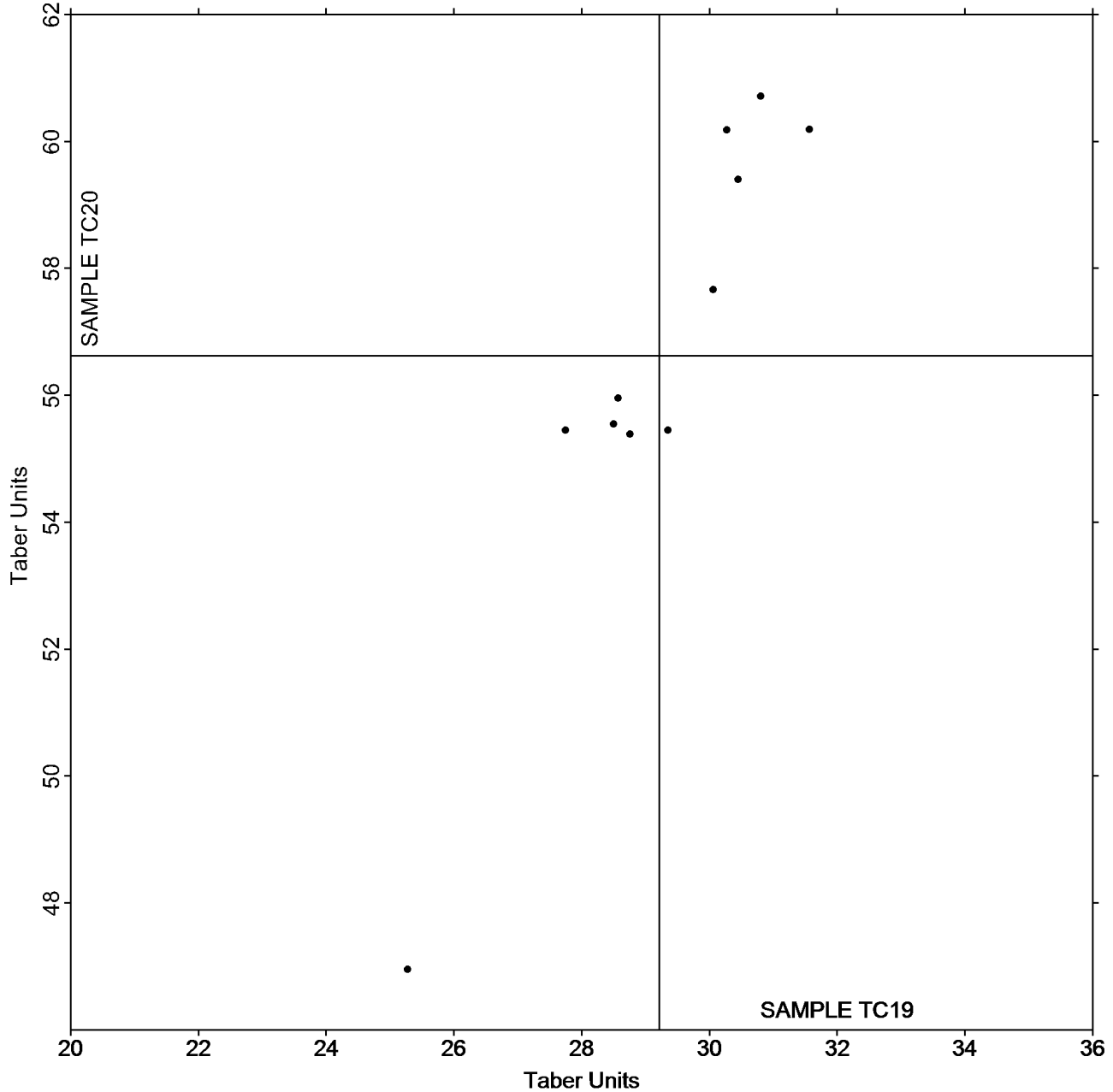| Summary Statistics	Sample TC19	Sample TC20
Grand Means	29.21 Taber Units	56.63 Taber Units
Stnd Dev Btwn Labs	1.74 Taber Units	3.88 Taber Units

Statistics based on 11 of 11 reporting participants.

Grand Mean Sample TC19 = 29.214 Taber Units

Grand Mean Sample TC20 = 56.626 Taber Units

ANALYSIS 3203

SAMPLE TC20

Taber Units

SAMPLE TC19

Taber Units

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

WebCode	Data Flag	Sample TR19			Sample TR20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
6BP97L		176.8	4.7	0.68	176.9	4.7	0.82
76WNFB		172.6	0.5	0.08	174.6	2.3	0.41
7H3G8M		176.9	4.8	0.70	176.1	3.8	0.67
8PGMGY		156.1	-16.0	-2.30	160.0	-12.3	-2.16
KRLWT4		180.6	8.5	1.23	179.2	6.9	1.22
M9HXKT	X	17.9	-154.2	-22.19	17.2	-155.1	-27.29
NCXTY6		171.1	-1.0	-0.14	170.7	-1.6	-0.27
P2VRY6		169.3	-2.8	-0.40	168.4	-3.9	-0.68
Q2QU2E		173.9	1.8	0.26	172.2	-0.1	-0.02
TCWLJ6	X	206.5	34.4	4.95	209.5	37.2	6.55
UW3GQ3		171.3	-0.8	-0.11	172.3	0.0	0.01

Summary Statistics	Sample TR19	Sample TR20
Grand Means	172.06 Taber Units	172.26 Taber Units
Stnd Dev Btwn Labs	6.95 Taber Units	5.68 Taber Units
		Statistics based on 9 of 11 reporting participants.

Comments on Assigned Data Flags for Test #3205

TCWLJ6 (X) - Extreme Data.
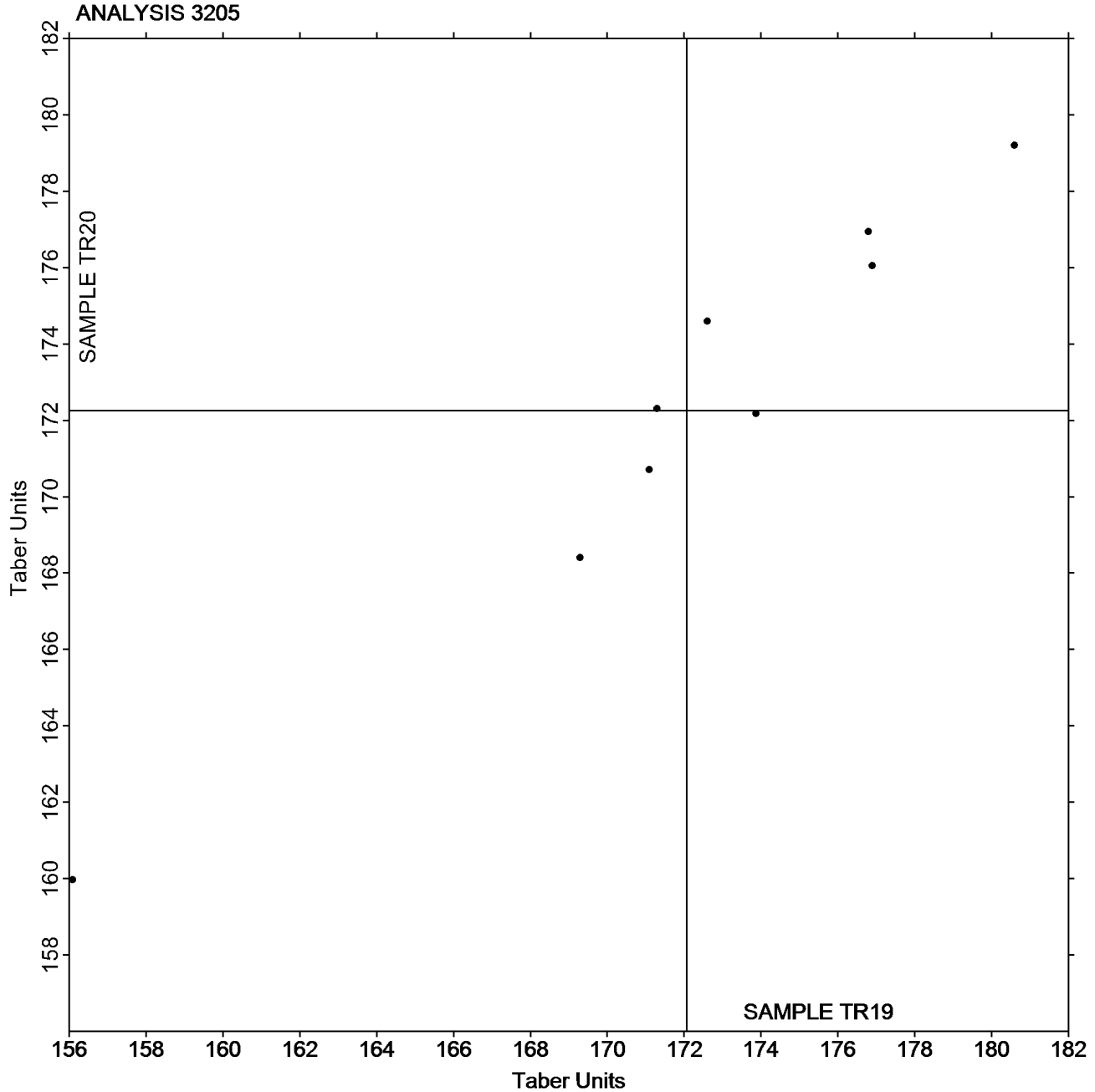
M9HXKT (X) - Extreme Data.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3205
Bending Resistance, Taber Type - 50 to 500 Taber Units - Recycled Paperboard
TAPPI Official Test Method T489

Report #4251, July 2023

Grand Mean Sample TR19 = 172.06 Taber Units

Grand Mean Sample TR20 = 172.26 Taber Units

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

| WebCode | Data Flag | Sample ZR19 | | | Sample ZR20 | | |
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
4F6GUK		60.40	-5.37	-1.02	59.60	-5.74	-1.00
4MKZCY		74.88	9.11	1.73	77.08	11.74	2.04
6BP97L		66.36	0.59	0.11	64.56	-0.78	-0.13
74LLRQ		73.42	7.65	1.45	69.08	3.74	0.65
76WNFB		59.04	-6.73	-1.28	59.28	-6.06	-1.05
7H3G8M		62.00	-3.77	-0.72	60.80	-4.54	-0.79
7UXV6X		57.50	-8.27	-1.57	54.44	-10.90	-1.89
8QV9TL		66.60	0.83	0.16	68.60	3.26	0.57
AJ89NT		72.80	7.03	1.33	74.88	9.54	1.66
D8W6T7	M	No data reported for this sample			42.22	-23.12	-4.01
FVGUDE		65.75	-0.03	0.00	71.28	5.94	1.03
KRLWT4		62.80	-2.97	-0.56	62.00	-3.34	-0.58
KZU98L		58.00	-7.77	-1.48	59.60	-5.74	-1.00
MPPZGE		70.60	4.83	0.92	67.46	2.12	0.37
NCXTY6		62.22	-3.55	-0.67	62.14	-3.20	-0.55
Q2QU2E		67.60	1.83	0.35	64.92	-0.42	-0.07
RULD7Y		67.88	2.11	0.40	67.14	1.80	0.31
UW3GQ3		67.80	2.03	0.38	67.00	1.66	0.29
X93GUG		68.28	2.51	0.48	66.20	0.86	0.15

Summary Statistics	Sample ZR19	Sample ZR20
Grand Means	65.77 psi	65.34 psi
Stnd Dev Btwn Labs	5.27 psi	5.76 psi

Statistics based on 18 of 19 reporting participants.
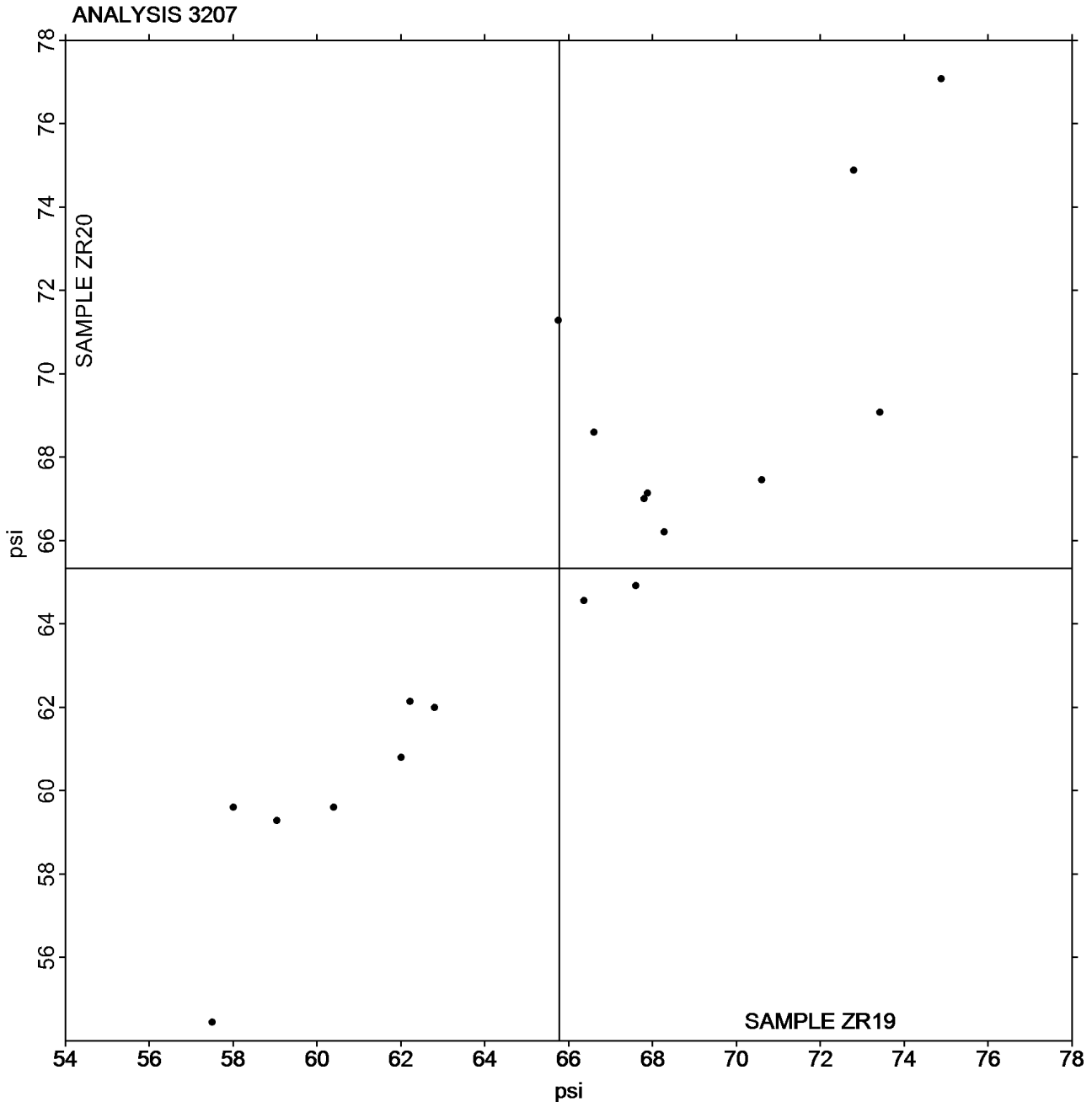
Comments on Assigned Data Flags for Test #3207

D8W6T7 (M) - Participant did not submit data for sample ZR19.

Grand Mean Sample ZR19 = 65.774 psi

Grand Mean Sample ZR20 = 65.336 psi

ANALYSIS 3207

SAMPLE ZR20

SAMPLE ZR19

psi

psi

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

Paper & Paperboard Interlaboratory Testing Program
Analysis 3209
Z-Direction Tensile
TAPPI Official Test Method T541

WebCode	Data Flag	Sample ZP19			Sample ZP20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
282MMM		79.00	4.03	0.42	69.01	-2.68	-0.30
6BP97L		83.76	8.79	0.92	84.02	12.33	1.37
8KLV92		73.84	-1.13	-0.12	71.96	0.27	0.03
8YLUWY		72.84	-2.13	-0.22	67.44	-4.25	-0.47
BGAGVJ		79.60	4.63	0.48	74.28	2.59	0.29
DTZPTC		75.00	0.03	0.00	72.72	1.03	0.11
EA2UTU		63.62	-11.35	-1.19	61.88	-9.81	-1.09
JGP7WC		66.37	-8.60	-0.90	66.37	-5.32	-0.59
JJC8E6		78.32	3.35	0.35	75.64	3.95	0.44
M9HXKT		54.71	-20.26	-2.12	52.94	-18.75	-2.08
P2VRY6		85.56	10.59	1.11	80.48	8.79	0.98
PWH9HN		87.06	12.09	1.27	83.50	11.81	1.31

Summary Statistics	Sample ZP19	Sample ZP20
Grand Means	74.97 psi	71.69 psi
Stnd Dev Btwn Labs	9.55 psi	9.01 psi

Statistics based on 12 of 12 reporting participants.
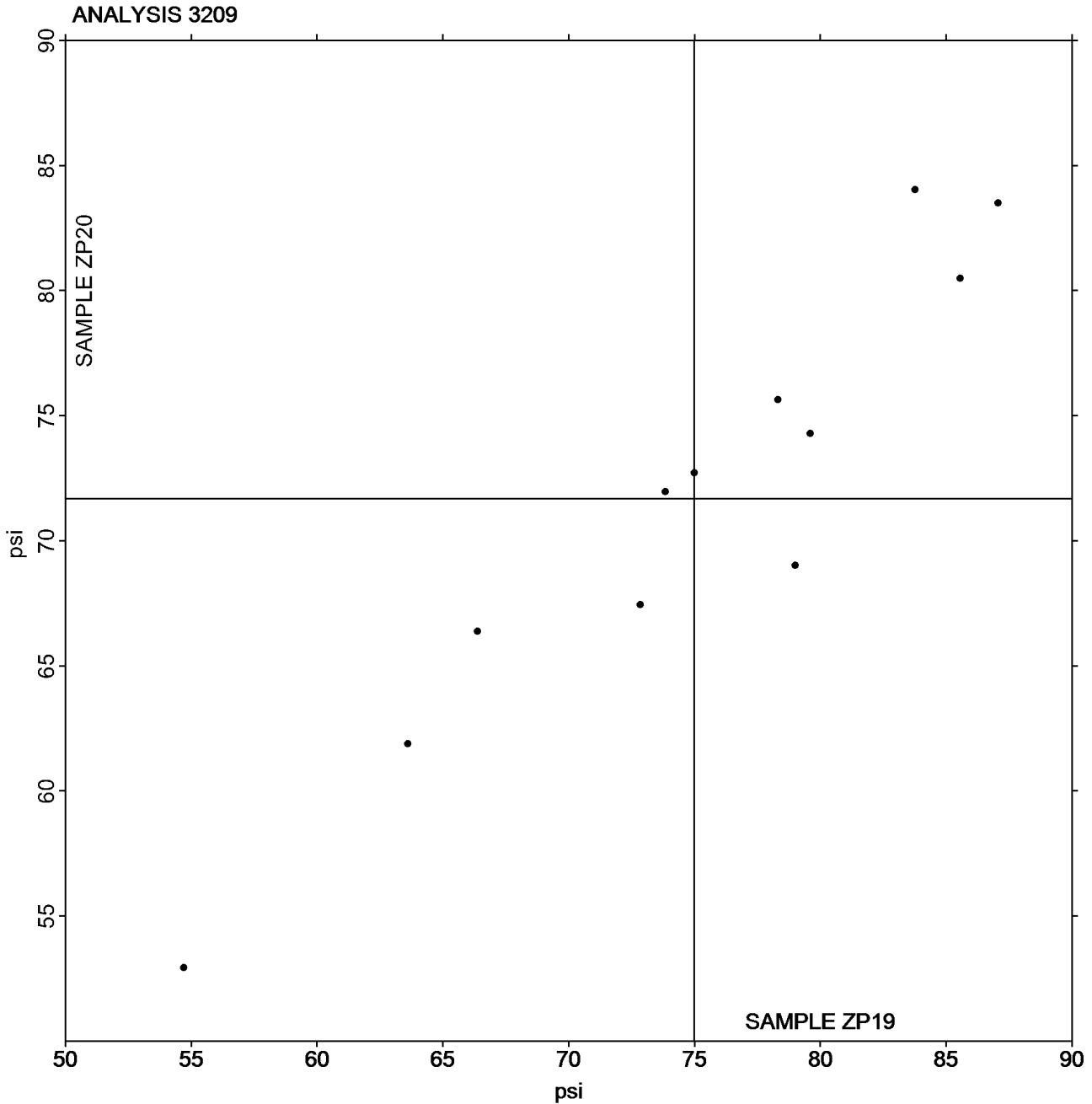
Analysis Notes:

282MMM - Data appear to be reported as kPa, not psi as indicated on data entry form. CTS will not correct the Units going forward.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3209
Z-Direction Tensile
TAPPI Official Test Method T541

Report #4251, July 2023

Grand Mean Sample ZP19 = 74.973 psi

Grand Mean Sample ZP20 = 71.687 psi

ANALYSIS 3209

SAMPLE ZP20

SAMPLE ZP19

psi

psi

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

Paper & Paperboard Interlaboratory Testing Program
Analysis 3211
Internal Bond Strength - Modified Scott Mechanics
TAPPI Provisional Test Method T569

Report #4251, July 2023

WebCode	Data Flag	Sample SM19			Sample SM20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
6BP97L		154.6	3.9	0.26	133.0	6.1	0.51
6YDXGA		156.0	5.3	0.35	128.4	1.5	0.13
DTZPTC		156.6	5.9	0.39	135.2	8.3	0.69
E2MBAU		150.6	-0.1	0.00	132.6	5.7	0.47
JJC8E6		155.2	4.5	0.30	129.4	2.5	0.21
LDX79R		150.0	-0.7	-0.04	150.4	23.5	1.95
NMVTB9		120.4	-30.3	-1.97	99.0	-27.9	-2.31
P2VRY6		143.2	-7.5	-0.48	119.8	-7.1	-0.59
PWH9HN		138.2	-12.5	-0.81	121.0	-5.9	-0.49
Q2QU2E		153.2	2.5	0.17	128.8	1.9	0.16
T2E6QY		145.4	-5.3	-0.34	123.4	-3.5	-0.29
TJFRFC		145.1	-5.5	-0.36	115.3	-11.6	-0.96
UW3GQ3		190.0	39.3	2.56	133.2	6.3	0.52

Summary Statistics	Sample SM19	Sample SM20
Grand Means	150.66 1000th ft-lbs	126.88 1000th ft-lbs
Stnd Dev Btwn Labs	15.38 1000th ft-lbs	12.09 1000th ft-lbs

Statistics based on 13 of 13 reporting participants.

Analysis Notes:

E2MBAU - Data appear to be off by a factor; data converted by CTS (x1000). CTS will not correct the data going forward.
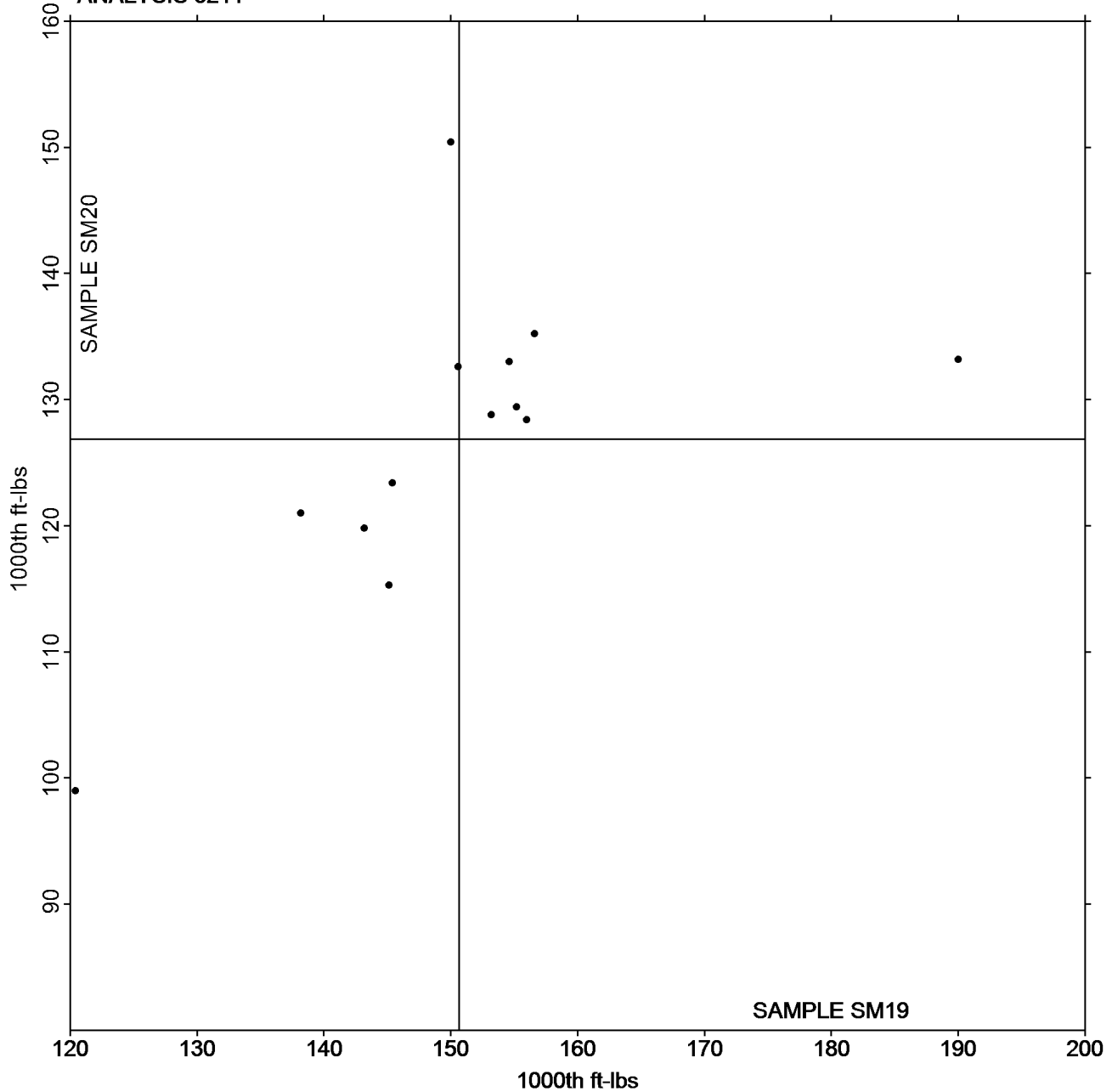
Paper & Paperboard Interlaboratory Testing Program
Analysis 3211
Internal Bond Strength - Modified Scott Mechanics
TAPPI Provisional Test Method T569

Report #4251, July 2023

Grand Mean Sample SM19 = 150.66
1000th ft-lbs

Grand Mean Sample SM20 = 126.88
1000th ft-lbs

ANALYSIS 3211

SAMPLE SM20

1000th ft-lbs

SAMPLE SM19

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.

Paper & Paperboard Interlaboratory Testing Program
Analysis 3213
Internal Bond Strength - Scott Bond Models
TAPPI Provisional Test Method T569

WebCode	Data Flag	Sample SB19			Sample SB20		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
3WV2XZ		160.3	19.6	1.74	130.6	12.6	1.03
8YLUWY		140.2	-0.5	-0.04	109.4	-8.6	-0.70
ADUMG8		141.0	0.3	0.03	104.6	-13.4	-1.09
AVEDF7		145.8	5.1	0.45	121.6	3.6	0.29
CVRLH7		154.8	14.1	1.25	129.6	11.6	0.95
FVGUDE		140.4	-0.3	-0.03	139.2	21.2	1.73
M9HXKT		134.3	-6.4	-0.57	109.3	-8.7	-0.71
RFZX3Z		139.1	-1.6	-0.14	120.2	2.2	0.18
RWD9UT		136.4	-4.3	-0.38	114.0	-4.0	-0.33
TYVTEN		132.1	-8.6	-0.76	101.9	-16.1	-1.31
WYHPUJ		154.8	14.1	1.25	134.8	16.8	1.37
XBN3M4		118.4	-22.3	-1.98	107.2	-10.8	-0.88
ZRQLDR		131.5	-9.2	-0.81	111.6	-6.4	-0.52

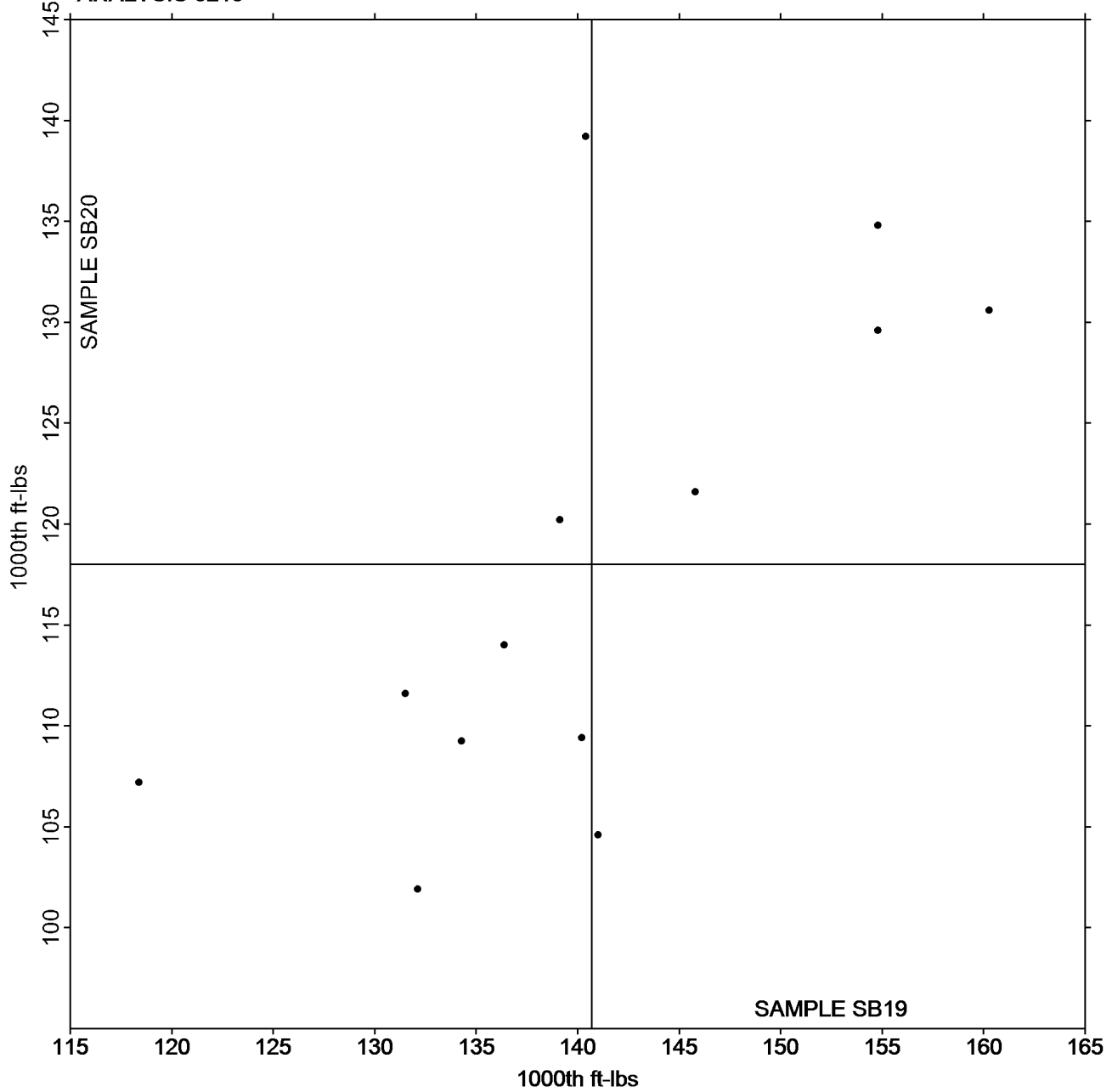| Summary Statistics	Sample SB19	Sample SB20
Grand Means	140.70 1000th ft-lbs	118.00 1000th ft-lbs
Stnd Dev Btwn Labs	11.27 1000th ft-lbs	12.26 1000th ft-lbs

Statistics based on 13 of 13 reporting participants.

Grand Mean Sample SB19 = 140.70
1000th ft-lbs

Grand Mean Sample SB20 = 118.00
1000th ft-lbs

ANALYSIS 3213

SAMPLE SB20

1000th ft-lbs

SAMPLE SB19

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.

-End of Report-