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TECHNICAL ASSOCIATION OF THE  
PULP AND PAPER INDUSTRY

NBSIR 80-1824

COLLABORATIVE REFERENCE PROGRAM  
FOR PAPER

REPORT NO. 62G



U.S. DEPARTMENT OF COMMERCE  
National Bureau of Standards

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80-1824

1980

NBS COLLABORATIVE REFERENCE PROGRAMS

TAPPI Paper and Board (6 times per year)

Bursting strength	Smoothness
Tearing strength	Surface pick strength
Tensile breaking strength	K & N ink absorption
Elongation to break	Moisture content
Tensile energy absorption	Opacity
Folding endurance	Blue reflectance (brightness)
Stiffness	Specular gloss, 75°
Air resistance	Thickness
Grammage	Concora (flat crush)
	Ring crush

FKBG-API Containerboard (48 times per year)

Mullen burst of linerboard  
Concora test of medium

MCCA Color and Appearance (4 times per year)

Gloss at 60°  
Color and color difference

CTS Rubber (4 times per year)

Tensile strength, ultimate elongation and tensile stress  
Hardness  
Mooney viscosity  
Vulcanization properties

ASTM Cement (2 times per year)

Chemical (11 chemical components)  
Physical (15 characteristics)

AASHTO Bituminous

Asphalt cement (2 times per year)  
Cutbacks (once a year)

NBS Collaborative Reference Programs  
A05 Technology Building  
National Bureau of Standards  
Washington, DC 20234

SEP 19 1980

TECHNICAL ASSOCIATION OF THE  
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM  
FOR PAPER

Report No. 62G

R. G. Powell  
CTS-NBS Research Associate  
Collaborative Testing Services, Inc.

J. Horlick  
Office of Testing Laboratory Evaluation Technology  
Office of Engineering Standards  
National Engineering Laboratory

NBSIR 80-1824

U.S. DEPARTMENT OF COMMERCE  
National Bureau of Standards

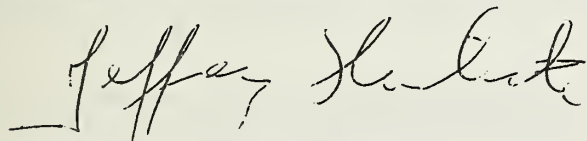


## INTRODUCTION

Reports 62S and 62G comprise the second set of reports for the 79-80 program year. Participants in tests which involve strength properties of paper will receive only the S report; those in tests which measure other properties will receive only the G report.

Notes and comments to individual laboratories and "Best Values" applicable to a particular method are given following Table 1 for each method. See page 1 of this report for an explanation of "Best Values". Please do not confuse these Best Values with provisional values included with the samples to detect serious discrepancies at the time of test.

If there are any questions on the notes, the analyses, or the reports in general, contact Robert G. Powell or Jeffrey Horlick on 301/921-2946.

A handwritten signature in cursive script, reading "Jeffrey Horlick". The signature is written in dark ink on a light background.

Jeffrey Horlick, Administrator  
NBS-TAPPI Collaborative Reference Program  
Office of Testing Laboratory Evaluation Technology

February 25, 1980



## TAPPI-NBS COLLABORATIVE REFERENCE PROGRAM

### BACKGROUND AND PURPOSE

In 1969, the National Bureau of Standards and the Technical Association of the Pulp and Paper Industry established a collaborative reference program to provide a participating laboratory with a means to check periodically the level and uniformity of its testing in comparison with that of other laboratories.

The interchange of paper and board products and of the raw materials for these products requires agreement among raw material suppliers, paper and board producers, converters, distributors, retailers, commercial testing laboratories, user organizations and the ultimate consumer as to the meaning of test results, an agreement that cannot be achieved without accurate and precise testing. This program is designed to help assure agreement.

### HOW THE PROGRAM WORKS

Participants Select the Tests in which they wish to participate. This choice is made on joining the program, but additional tests may be added at any time. Also new participants may enter the program at any time.

Test Samples are Distributed Bimonthly; i.e. every 2 months.

Provisional Values are Provided with the Samples for one or both of the test levels, depending on method. The provisional values permit serious discrepancies to be detected without delay. (It is left to the discretion of the laboratory supervisor as to whether these values should be known to the operator.)

Each Participant Tests the Samples, following instructions provided for each test method. The full check on a single instrument should normally take no more than 30 minutes. The test results are then sent to NBS for analysis. The participant is also asked to report other information relevant to an accurate analysis, such as test conditions and the instruments used.

Industry Means, Best Values and Other Statistics are developed from the data by NBS. The best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries.

A Quick Report is Prepared for each participating laboratory reporting data on time. This report shows the industry mean values, and the deviations of the laboratory's results from these values for each test method.

A Longer Summary Report, Showing the Data from all Participants, is also prepared. In the summary report, of which this report is an example, each laboratory is identified by a code number so that the information is maintained on a confidential basis. However, instruments are identified by type so participants can compare their results with those obtained on similar instruments of different manufacture. This report includes test averages, best values and standard deviations for individual participants and for the group as a whole. A participant should be able to readily determine the level and variability of his results in comparison with those of the other laboratories.

Repeatability and Reproducibility Statements such as Contained in ASTM, TAPPI and ISO Standards are included at the end of the report. Participants can check their performance level against the precision statement given in the test method or specification.

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TABLE OF CONVERSION FACTORS TO METRIC (SI) UNITS

<u>Physical Quantity</u>	<u>To Convert From</u>	<u>To</u>	<u>Multiply by</u>
Bursting strength	psi	kPa	6.895
	kg/cm <sup>2</sup>	kPa	98.07
	bar	kPa	100.00
Tearing strength	g	mN	9.807
Tensile strength	lb/in.	kN/m	.1751
	lb/0.5 in.	kN/m	.3502
	lb/15 mm	kN/m	.2965
	kg/15 mm	kN/m	.6538
	kg/25 mm	kN/m	.3923
	kg/mm	kN/m	9.807
Tensile energy absorption	ft-lb/ft <sup>2</sup>	J/m <sup>2</sup>	14.59
	in.-lb/in. <sup>2</sup>	J/m <sup>2</sup>	175.1
	kg-m/m <sup>2</sup>	J/m <sup>2</sup>	9.807
Bending stiffness	g-cm	μN-m	98.07
Flat-crush strength (Concora)	lb	N	4.448
Ring-crush (TAPPI)	lb	N	4.448
(ISO)	lb/6.00 in.	kN/m	0.0292
Thickness	mil	μm	25.40



# APPENDIX TO TABLES AND GRAPHS

MEAN -	The average of individual TEST DETERMINATIONS. The number of TEST DETERMINATIONS in the mean is given in the upper right corner of the first table (TEST D <sub>0</sub> ) and again at the bottom of this table.
GRAND MEAN - (G <sub>0</sub> MEAN)	The average of the individual laboratory MEANS, excluding laboratories flagged (see column F) with an A, W, or *. The GRAND MEAN is given in US customary units and, where applicable, in SI metric units.
SD OF MEANS - (SD MEANS)	The standard deviation of the laboratory MEANS about the GRAND MEAN; an index of the among-laboratory precision.
DEV -	The deviation or difference of the laboratory MEAN from the GRAND MEAN.
N <sub>0</sub> DEV -	The normal deviate or ratio of the DEV to the SD OF MEANS; an indication of the degree of divergence of the laboratory MEAN from the GRAND MEAN. A N <sub>0</sub> DEV of more than 2 or less than -2 may indicate that the participant is not following the procedure considered standard for this analysis.
SDP -	The standard deviation of repeated measurements; that is, of individual test determinations about their MEAN.
AVERAGE SDP -	The average of the individual laboratory SDR's; an index of the within-laboratory precision of repeated measurements.
R <sub>0</sub> SDP -	The relative standard deviation of repeated measurements; that is, the ratio of the SDP to the AVERAGE SDP; an indication of the ability of a participant to repeat his or her measurements relative to the average ability. The greater the number of TEST DETERMINATIONS the closer the R <sub>0</sub> SDP should be to unity. If R <sub>0</sub> SDP is outside the limits given below, the participant may not be following the procedure considered standard for this analysis:

No. of test determinations -----	Lower limit for R <sub>0</sub> SDR -----	Upper limit for R <sub>0</sub> SDR -----
3	0.75	2.58
4	0.12	2.25
5	0.26	2.06
8	0.40	1.77
10	0.46	1.67
15	0.56	1.53
20	0.61	1.45
25	0.65	1.39

VAR -	Code for instrument type or variation in condition, see second table.
F -	Flag, with following meaning:
Q -	Included in grand mean and inside 95% error ellipse.
* -	Included in grand means but plotted point falls outside of the 95% error ellipse. The participant should take this as a warning to reexamine his or her testing procedure.
X -	Excluded because plotted point would fall outside of the 95% error ellipse, (see page 2 for explanation of Graph).
# -	Excluded because data were not understood or because of a non-coded variation reported by the laboratory, (See the notes following Table 1 for each method).
• -	Excluded from grand means because VAR was non-standard for the analysis.
M -	Excluded because data for one sample are missing.
S -	Included in grand mean but only after omission of one or more 'wild' values; that is test determinations more than 3 times AVERAGE SDR from the laboratory's MEAN. Not more than 20% of the test determination may be excluded in this manner without rejecting the laboratory.
Best values -	Given at the end of Table 1 for each method for which sufficient information is available. These best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries. All participants using equipment that is standard for the analysis should be able to achieve results within the plus-minus (+/-) limits, when these are shown along with the best values.
COORDINATES -	Distances along major and minor axes of error ellipse. If special additive or concurrent model of the measuring process applies to this method, the distance along the minor axis represents the random error within a laboratory while that along the major axis also includes a systematic laboratory component of error.
95% ELLIPSE -	Lengths of the major and minor axes of the ellipse and the angle that the major axis makes with the horizontal axis.
AVG R <sub>0</sub> SDP -	Average of the R <sub>0</sub> SDP for the two samples; an indication of the laboratory's precision of repeated measurements.

Graph -

For each laboratory the MEAN for the second sample is plotted against the MEAN for the first sample, with each point representing a laboratory. The horizontal and vertical lines are the GRAND MEANS. The dashed line is drawn at 45 degrees. The solid sloping line, which may or may not lie close to the 45 degree line, is along the major axis of the error ellipse. The ellipse is drawn so that, on the average, it will include 90% of the points representing the laboratories.

Plotted symbols are as explained above (under F), except that an 'S' is plotted as an 'G'. A participant whose plotted point falls outside of the ellipse should carefully reexamine the testing procedure he or she is following.

The graph is plotted with an ellipse when there are 20 or more laboratories in the analysis. When there are 10 through 19 laboratories in the analysis, the graph is plotted but the ellipse is omitted. When there are fewer than 10 laboratories retained in the analysis, the graph is not plotted.

The International system of Units (SI) is used on the plots wherever possible to aid participants in familiarizing themselves with SI. Grand means in SI units are given at the top of the plot, and supplementary scales in SI units are drawn along the axes allowing the reader to compare means and variability in common units and SI units for the same data.

SUMMARY -  
(At end of report)

In addition to several quantities already defined above, the summary shows the following values for each test method:

REPL CRP -

The number of replicate test determinations used in this Collaborative Reference Program.

REPL TAPPI -

The number of replicate test determinations in a test result required by the applicable TAPPI official test method or assumed here if there is no TAPPI official test method. This quantity is needed in the computation of TAPPI repeatability and reproducibility from the SD OF MEANS and the AVERAGE SDR. See TAPPI official Test Method T1200 for definitions and computations.

REPEAT -

TAPPI repeatability, a measure of the within-laboratory precision of a test result.

REPROD -

TAPPI reproducibility, a measure of the between-laboratory precision of a test result.

ANALYSIS T40-1 TABLE 1  
AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)  
TAPPI OFFICIAL TEST METHOD T460 DS-75, AIR RESISTANCE OF PAPER

LAB CODE	SAMPLE K22 MEAN	PANNING 103 GRAMS PER SQUARE METER				SAMPLE B68 MEAN	HEAT-SET OFFSET BOOK 93 GRAMS PER SQUARE METER				TEST D <sub>0</sub> = 10		
		DEV	NO DEV	SD	R <sub>0</sub> SDR		DEV	NO DEV	SDR	R <sub>0</sub> SDR	VAR	F	LAB
L106	43.4	-1.8	-0.70	3.2	1.11	43.7	-0.6	-0.28	4.8	1.08	40D	6	L106
L107	45.6	.4	.10	1.7	.58	43.1	.8	.39	4.7	1.06	40D	6	L107
L121	44.0	-1.1	-0.30	2.1	.72	42.7	-1.6	-0.76	6.1	1.37	40D	6	L121
L122	47.5	2.3	1.00	4.2	1.40	44.8	.5	.26	4.8	1.07	40D	6	L122
L123	45.2	.1	.00	3.2	1.09	47.1	2.9	1.39	7.2	1.62	40D	6	L123
L124G	44.3	-0.9	-0.30	3.3	1.12	42.6	-1.7	-0.81	3.7	.82	40D	6	L124G
L125	43.9	.7	.30	2.7	.92	44.4	.1	.04	5.5	1.23	40D	6	L125
L128	44.8	-0.4	-0.10	3.1	1.06	44.1	3.8	1.86	5.0	1.11	40D	*	L128
L141	44.6	-0.0	-0.20	3.3	1.19	46.5	2.2	1.08	4.5	1.00	40D	6	L141
L148	44.9	-0.3	-0.12	2.7	.92	46.7	2.4	1.18	2.9	.65	40D	6	L148
L158	30.6	-8.6	-3.70	3.3	1.12	33.9	-8.4	-4.07	5.6	1.13	40D	#	L158
L159	43.6	-1.0	-0.30	1.7	.59	42.5	-1.7	-0.84	4.7	1.04	40D	6	L159
L163	44.1	-1.1	-0.40	2.4	.82	43.0	-1.3	-0.61	5.0	1.11	40D	6	L163
L166	47.3	2.2	.90	5.1	1.76	49.3	5.1	2.46	4.3	.96	40D	*	L166
L174	223.3	183.1	90.00	5.6	1.71	240.2	181.9	88.35	4.9	1.09	40D	*	L174
L176	46.5	1.4	.60	3.3	1.13	45.8	1.5	.74	5.5	1.24	40D	6	L176
L182G	43.4	-1.2	-0.70	2.0	.67	39.8	-4.5	-2.17	4.3	.96	40D	6	L182G
L183	46.2	1.0	.40	2.3	.79	46.1	1.8	.89	3.7	.82	40D	6	L183
L190C	40.2	1.0	.40	2.7	.94	43.6	-0.7	-0.33	3.0	.67	40D	6	L190C
L203	50.4	5.2	2.30	4.3	1.47	44.9	.6	.30	4.3	.96	40D	*	L203
L212	43.8	-1.4	-0.60	3.0	1.22	43.6	-0.7	-0.33	6.1	1.37	40D	6	L212
L223	46.8	3.6	1.60	3.8	1.30	44.1	-0.2	-0.08	3.4	.76	40D	6	L223
L228	40.4	-4.8	-2.10	2.0	.90	36.0	5.7	2.78	1.9	.42	40D	X	L228
L230G	44.7	-0.3	-0.20	3.6	1.04	43.9	-0.4	-0.18	6.3	1.43	40D	6	L230G
L232	31.8	-13.4	-3.30	6.0	2.24	22.9	-21.4	-10.38	4.4	.99	40D	#	L232
L238A	43.0	-2.2	-0.90	2.3	.79	44.0	-4.3	-2.07	3.2	.71	40D	6	L238A
L241	39.8	-5.4	-2.30	4.0	1.30	39.8	-4.5	-2.17	5.6	1.24	40D	6	L241
L242	43.5	-1.7	-0.70	3.1	1.05	42.8	-1.5	-0.71	5.3	1.18	40D	6	L242
L243G	44.5	-0.7	-0.30	4.0	1.60	43.4	-0.9	-0.42	5.2	1.16	40D	6	L243G
L254	47.9	2.7	1.20	2.1	.73	46.6	2.3	1.13	4.5	1.00	40D	6	L254
L259	40.1	-5.1	-2.20	2.0	.98	41.1	-3.2	-1.54	4.2	.95	40D	6	L259
L261	46.9	1.7	.70	3.2	1.09	42.7	1.5	.71	5.3	1.18	40D	6	L261
L262G	45.3	.1	.07	1.9	.65	43.3	1.0	.49	2.6	.58	40D	6	L262G
L265	44.4	-0.8	-0.30	2.6	.91	42.7	-1.6	-0.78	3.9	.86	40D	6	L265
L278	46.6	1.4	.60	3.7	1.28	44.9	.7	.32	3.9	.88	40D	6	L278
L285	46.5	1.3	.60	3.0	1.22	45.6	1.3	.65	2.7	.61	40D	6	L285
L301	46.6	1.4	.60	4.2	1.43	47.4	3.2	1.54	8.0	1.79	40D	6	L301
L308	44.9	-0.3	-0.12	3.7	1.27	45.0	1.7	.84	3.9	.87	40D	6	L308
L313	44.7	-0.3	-0.20	3.2	1.09	43.2	-1.1	-0.53	4.1	.92	40D	6	L313
L320	40.4	-4.0	-2.10	3.0	1.20	41.2	-3.1	-1.49	3.8	.85	40D	6	L320
L321	43.6	.4	.17	2.7	.92	44.8	.5	.24	6.4	1.42	40D	6	L321
L324	47.5	2.4	1.00	3.0	1.03	43.4	1.2	.57	5.6	1.25	40D	6	L324
L326	46.7	1.5	.60	3.0	1.22	44.7	.4	.21	2.7	.69	40D	6	L326
L328	46.0	.8	.30	1.7	.60	45.1	.9	.42	3.3	.75	40D	6	L328
L337	40.5	-4.6	-2.00	1.0	.51	42.4	-1.9	-0.91	4.3	.97	40D	6	L337
L339	34.6	-10.6	-4.00	2.4	.84	33.9	-8.3	-4.05	4.0	.89	40D	#	L339
L344	42.0	-3.2	-1.40	3.9	1.30	44.0	-0.3	-0.13	5.3	1.18	40D	6	L344
L348	48.4	3.2	1.40	3.2	1.11	45.1	.8	.40	3.9	.87	40D	6	L348
L376	47.0	1.9	.80	2.6	.88	46.9	2.6	1.28	4.8	1.08	40D	6	L376
L380	45.7	.0	.20	1.5	.51	44.3	.0	.01	2.1	.46	40D	6	L380
L388	47.0	1.8	.70	4.8	1.64	43.4	1.1	.53	3.8	.85	40D	6	L388
L396M	43.7	.0	.20	2.4	.81	44.7	.4	.21	3.8	.86	40D	6	L396M
L576	43.9	-1.2	-0.30	3.0	1.04	43.3	-1.0	-0.47	3.1	.69	40D	6	L576
L585	48.5	3.3	1.40	4.0	1.56	47.0	2.8	1.34	3.2	.72	40D	6	L585
L616	47.0	1.8	.60	1.2	.40	43.8	-0.5	-0.23	3.6	.80	40D	6	L616
L636	41.5	-3.0	-1.00	3.9	1.35	41.0	-3.2	-1.56	5.9	1.32	40D	6	L636
L651	34.6	-10.6	-4.00	2.1	.73	34.8	-9.5	-4.60	3.4	.77	40D	#	L651
L676	49.0	3.8	1.60	2.1	.73	46.6	.8	.36	2.8	.63	40D	6	L676
L697	44.3	-0.9	-0.30	2.5	.86	44.2	-0.1	-0.03	6.0	1.34	40D	6	L697
L702	43.3	-1.9	-0.84	2.0	.70	43.4	-0.8	-0.40	5.0	1.11	40D	6	L702
L715	46.2	1.0	.40	1.9	.60	43.6	-0.7	-0.35	4.1	.92	40D	6	L715
L737	43.5	-1.7	-0.70	2.4	.81	46.9	-3.4	-1.64	5.2	1.15	40D	6	L737

GR. MEAN = 45.2 GURLEY UNITS

SD MEANS = 2.3 GURLEY UNITS

AVERAGE SDR = 2.5 GURLEY UNITS

GRAND MEAN = 44.3 GURLEY UNITS

SD OF MEANS = 2.1 GURLEY UNITS

AVERAGE SDR = 4.5 GURLEY UNITS

TEST DETERMINATIONS = 10

56 LABS IN GRAND MEANS

AVERAGE SDR = 4.5 GURLEY UNITS

L115 43.4 -1.8 -0.70 4.1 1.41 45.8 1.5 .74 3.3 .74 40U \* L115  
 L291 43.9 -1.3 -0.30 3.0 1.21 46.5 2.2 1.08 6.4 1.42 40U \* L291

TOTAL NUMBER OF LABORATORIES PARTICIPATING = 64

Best values: K22 45.0 ± 3.8 Gurley units

B68 44.3 ± 3.5 Gurley units

The following laboratories were omitted from the grand means because of extreme test results: 158, 232, 339, 651.

Data from the following laboratories appear to be off by a multiplicative factor: 174.

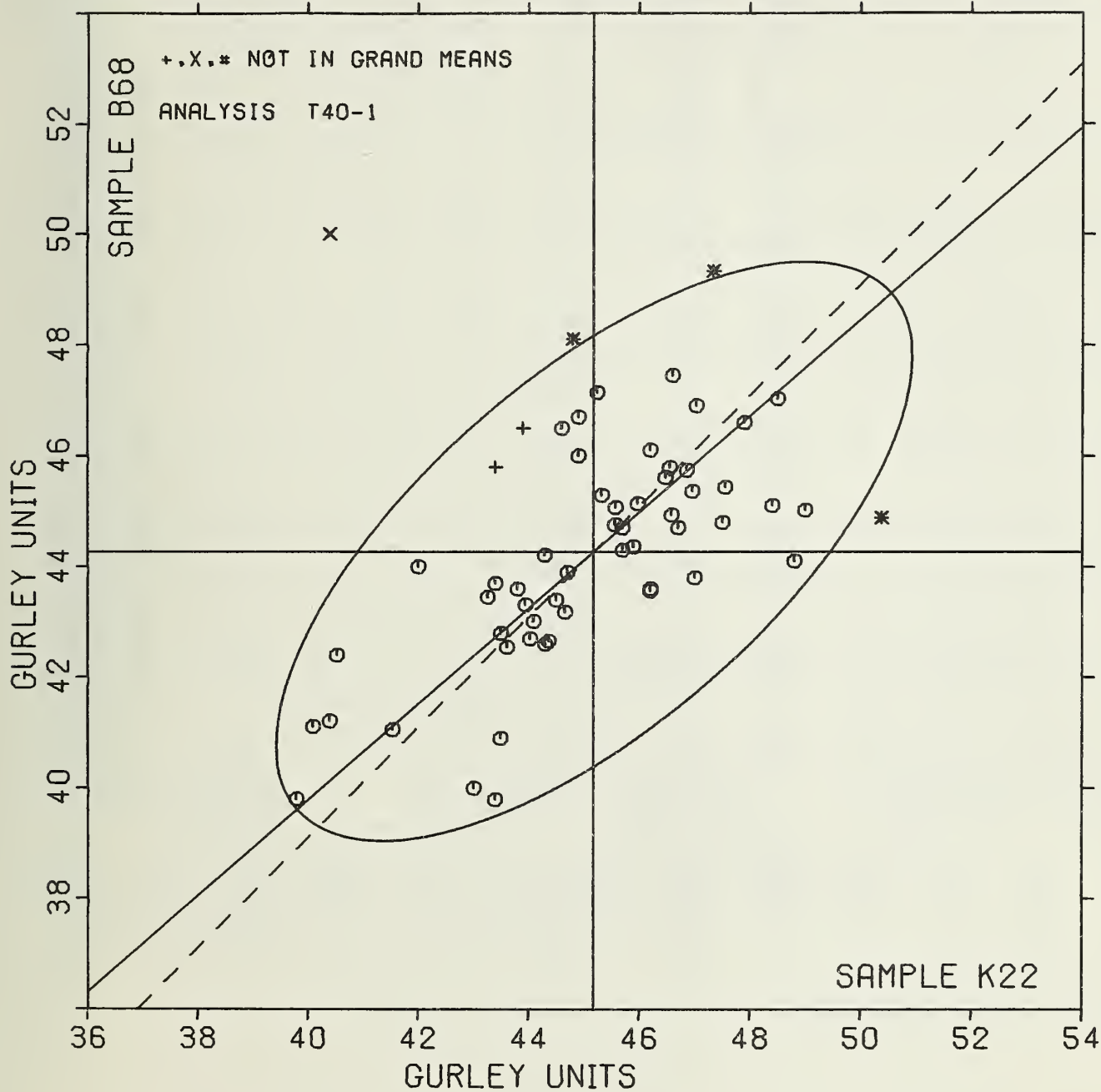


ANALYSIS T40-1 TABLE 2  
AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)  
TAPPI OFFICIAL TEST METHOD T400 OS-75, AIR RESISTANCE OF PAPER

LAB CODE	F	MEANS		COORDINATES		AVG R <sub>0</sub> SUM	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS			
		K22	B68	MAJOR	MINOR						
L232	#	31.8	22.9	-24.1	-7.4	1.01	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L651	#	34.0	34.8	-14.2	-0.2	0.75	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L339	#	34.0	35.9	-13.4	0.6	0.66	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L158	#	36.6	35.9	-12.0	-0.7	1.13	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L241	@	39.8	39.8	-7.0	0.1	1.06	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L259	@	40.1	41.1	-5.9	0.9	0.96	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L320	@	40.4	41.2	-5.0	0.8	1.03	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L228	X	40.4	50.0	0.2	7.5	0.66	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L337	@	40.5	42.4	-4.7	1.6	0.74	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L636	@	41.5	41.0	-4.9	-0.1	1.03	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L344	@	42.0	44.0	-2.0	1.9	1.07	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L238A	@	43.0	40.0	-4.4	-1.8	0.75	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L702	@	43.3	43.4	-2.0	0.6	0.90	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L115	*	43.4	45.8	-0.3	2.3	1.08	400	AIR RESISTANCE,	SHEFFIELD IN GURLEY UNITS		
L106	@	43.4	43.7	-1.7	0.7	1.09	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L182G	@	43.4	39.8	-4.3	-2.2	0.62	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L737	@	43.5	40.9	-3.5	-1.5	0.58	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L242	@	43.5	42.8	-2.2	-0.9	1.12	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L159	@	43.6	42.5	-2.3	-0.3	0.62	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L212	@	43.8	43.6	-1.5	0.4	1.09	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L291	*	43.9	46.5	0.5	2.5	1.01	400	AIR RESISTANCE,	SHEFFIELD IN GURLEY UNITS		
L576	@	43.9	43.3	-1.6	0.1	0.88	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L121	@	44.0	42.7	-1.9	-0.4	1.05	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L163	@	44.1	43.0	-1.8	-0.2	0.97	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L697	@	44.3	44.2	-0.7	0.5	1.10	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L124G	@	44.3	42.6	-1.8	-0.7	0.97	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L265	@	44.4	42.7	-1.7	-0.7	0.89	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L243G	@	44.5	43.4	-1.1	-0.2	1.08	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L141	@	44.6	46.5	1.0	2.1	1.09	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L313	@	44.7	43.2	-1.4	-0.5	1.01	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L230G	@	44.7	43.9	-0.8	0.0	1.02	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L128	*	44.8	48.1	2.2	3.1	1.08	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L148	@	44.9	46.7	1.4	2.0	0.79	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L308	@	44.9	46.0	0.9	1.5	1.07	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L123	@	45.2	47.1	1.9	2.1	1.05	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L262G	@	45.3	45.3	0.0	0.7	0.62	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L321	@	45.6	44.8	0.0	0.1	1.17	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L107	@	45.6	45.1	0.0	0.3	0.62	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L396M	@	45.7	44.7	0.7	-0.0	0.93	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L380	@	45.7	44.3	0.4	-0.3	0.49	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L125	@	45.9	44.4	0.0	-0.4	1.08	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L328	@	46.0	45.1	1.2	0.1	0.67	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L715	@	46.2	43.6	0.3	-1.2	0.79	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L190C	@	46.2	43.6	0.3	-1.2	0.61	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L183	@	46.2	46.1	2.0	0.7	0.60	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L285	@	46.3	45.6	1.9	0.2	0.91	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L176	@	46.3	45.8	2.0	0.2	1.19	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L278	@	46.6	44.9	1.5	-0.4	1.08	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L301	@	46.6	47.4	3.2	1.5	1.01	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L326	@	46.7	44.7	1.4	-0.7	0.91	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L261	@	46.9	45.7	2.2	0.0	1.13	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L388	@	47.0	45.4	2.1	-0.4	1.24	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L616	@	47.0	43.8	1.1	-1.8	0.60	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L376	@	47.0	46.9	3.1	0.8	0.96	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L166	*	47.3	49.3	5.0	2.4	1.00	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L122	@	47.5	44.8	2.1	-1.1	1.26	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L324	@	47.5	45.4	2.0	-0.7	1.14	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L254	@	47.9	46.6	3.0	-0.0	0.97	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L348	@	48.4	45.1	3.6	-1.5	0.99	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L585	@	48.5	47.0	4.3	-0.1	1.14	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L223	@	48.8	44.1	2.0	-2.5	1.03	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L676	@	49.0	45.0	3.4	-1.9	0.68	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L203	*	50.4	44.9	4.3	-2.9	1.21	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
L174	#	228.3	226.2	257.0	17.4	1.40	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- GIL FLOTATION
GMEANS:		45.2	44.3			1.00					
55% ELLIPSE:				7.1	3.1	W44H		GAMMA = 40 DEGREES			

# AIR RESISTANCE, GURLEY

SAMPLE K22 = 45.2 GURLEY UNITS    SAMPLE B68 = 44.3 GURLEY UNITS





ANALYSIS T40-2 TABLE 1  
AIR RESISTANCE, SHEFFIELD UNITS (CC/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) ORIFICE  
TAPPI Useful TEST METHOD UM 524, POROSITY BY RESISTANCE TO AIRFLOW

LAB CODE	SAMPLE K22 MEAN	PAINTING 103 GRAMS PER SQUARE METER				SAMPLE K68 MEAN	HEAT-SET OFFSET BOOK 93 GRAMS PER SQUARE METER				TEST D. = 10		
		DEV	N <sub>0.005</sub>	SDR	R <sub>0</sub> SDR		DEV	N <sub>0.005</sub>	SDR	R <sub>0</sub> SDR	VAR	F	LAB
L114	82.3	5.3	0.03	6.1	1.28	86.9	9.8	1.45	9.6	1.40	40S	Ø	L114
L121	84.5	7.5	1.17	7.6	1.60	83.5	6.4	0.95	5.8	0.84	40S	Ø	L121
L124S	77.6	0.6	0.10	3.1	0.66	76.0	-1.1	-0.16	7.6	1.10	40S	Ø	L124S
L132	70.3	-0.7	-0.10	3.1	0.66	76.7	-0.4	-0.05	3.3	0.48	40S	Ø	L132
L148	79.8	2.0	0.44	4.0	0.85	85.4	8.3	1.23	7.0	1.02	40S	Ø	L148
L150	77.4	0.4	0.07	7.2	1.50	80.6	3.5	0.52	3.7	0.55	40S	Ø	L150
L155	58.8	-18.2	-2.02	5.4	1.13	60.9	-16.2	-2.39	6.7	0.98	40S	*	L155
L157	78.4	1.4	0.22	5.7	1.20	83.7	6.6	0.98	4.7	0.68	40S	Ø	L157
L158	80.5	3.5	0.55	3.7	0.77	81.0	3.9	0.58	9.1	1.32	40S	Ø	L158
L190C	77.0	0.0	0.00	3.0	0.63	77.5	0.4	0.07	10.1	1.47	40S	Ø	L190C
L213	78.1	1.1	0.17	4.3	0.90	77.0	-0.1	-0.01	9.4	1.36	40S	Ø	L213
L223	68.2	-8.8	-1.00	4.3	0.91	66.5	-8.6	-1.26	6.5	0.94	40S	Ø	L223
L230S	77.5	0.5	0.04	4.4	0.92	77.6	0.5	0.08	4.0	0.59	40S	Ø	L230S
L233	74.3	-2.7	-0.42	3.1	0.64	72.5	-4.6	-0.67	7.1	1.04	40S	Ø	L233
L241	90.3	13.3	2.07	6.8	1.42	91.2	14.1	2.09	7.8	1.14	40S	Ø	L241
L249	74.3	-2.7	-0.42	4.1	0.86	76.2	-0.9	-0.13	5.3	0.77	40S	Ø	L249
L255	77.8	0.8	0.13	5.3	1.12	73.9	-3.2	-0.47	5.0	0.73	40S	Ø	L255
L260	78.7	1.7	0.27	4.8	1.01	81.5	4.4	0.66	8.4	1.22	40S	Ø	L260
L262S	76.8	-0.2	-0.03	3.8	0.80	74.6	-2.5	-0.36	5.0	0.73	40S	Ø	L262S
L288	87.5	10.5	1.03	4.8	1.00	82.8	5.7	0.85	15.1	2.20	40S	Ø	L288
L301	70.5	-6.5	-1.00	3.3	0.69	70.9	-6.2	-0.91	4.6	0.67	40S	Ø	L301
L315	60.5	-16.5	-2.00	5.5	1.15	62.0	-15.1	-2.22	7.5	1.10	40S	Ø	L315
L318	74.4	-2.0	-0.40	6.7	1.40	76.0	-1.1	-0.16	5.2	0.76	40S	Ø	L318
L352	79.0	2.0	0.31	4.6	0.96	75.0	1.9	0.29	5.2	0.75	40S	Ø	L352
L354	79.2	2.2	0.35	6.0	1.26	80.7	3.6	0.54	9.1	1.32	40S	Ø	L354
L360	82.0	5.0	0.70	7.5	1.57	75.7	2.6	0.39	5.4	0.78	40S	Ø	L360
L390	78.0	1.0	0.10	4.2	0.88	72.5	-4.6	-0.67	4.9	0.71	40S	Ø	L390
L562	87.7	10.7	1.00	6.7	1.41	85.0	7.9	1.17	7.3	1.06	40S	Ø	L562
L575	78.7	1.7	0.27	3.5	0.74	80.4	3.3	0.49	4.6	0.67	40S	Ø	L575
L585	73.7	-3.3	-0.51	5.2	1.09	76.0	-1.1	-0.16	5.2	0.75	40S	Ø	L585
L600	78.4	1.4	0.22	3.9	0.82	74.6	-2.5	-0.36	9.6	1.40	40S	Ø	L600
L626	69.9	-7.1	-1.10	3.1	0.65	66.6	-10.5	-1.54	6.7	0.97	40S	Ø	L626
L684	79.8	2.8	0.44	3.5	0.74	74.3	-2.8	-0.41	5.4	0.79	40S	Ø	L684
L687	82.0	5.0	0.73	3.4	0.71	75.7	2.6	0.39	9.9	1.44	40S	Ø	L687
L698	73.9	-3.1	-0.40	4.7	1.00	74.8	-2.3	-0.33	7.3	1.06	40S	Ø	L698
L704	75.5	-1.5	-0.23	2.8	0.60	NO DATA REPORTED FOR SAMPLE B68					40S	M	L704
L729	67.0	-10.0	-1.00	3.9	0.82	62.8	-14.3	-2.11	9.1	1.33	40S	Ø	L729
L738	73.0	-4.0	-0.62	5.4	1.13	81.0	3.9	0.58	4.6	0.67	40S	Ø	L738
L740	81.2	4.2	0.60	6.0	1.25	84.1	7.0	1.04	8.1	1.18	40S	Ø	L740
GR. MEAN = 77.0 SHEFF. UNITS      GRAND MEAN = 77.1 SHEFF. UNITS      TEST DETERMINATIONS = 10													
SD MEANS = 6.4 SHEFF. UNITS      SD OF MEANS = 6.8 SHEFF. UNITS      38 LABS IN GRAND MEANS													
AVERAGE SDR = 4.8 SHEFF. UNITS      AVERAGE SDR = 6.9 SHEFF. UNITS													
L182B	281.0	204.0	31.07	13.3	2.79	296.0	220.9	32.64	24.7	3.60	40B	+	L182B
L243B	228.8	151.8	23.57	13.6	2.89	234.6	157.5	23.27	23.5	3.42	40B	+	L243B
L280	133.0	56.0	8.70	9.8	2.06	143.5	66.4	9.81	22.0	3.20	40B	+	L280
L312	83.0	6.0	0.94	3.9	0.82	80.1	3.0	0.45	6.0	0.87	40T	+	L312
L333	254.0	177.0	27.45	17.0	3.56	282.5	205.4	30.35	27.7	4.03	40B	+	L333
L587	81.0	4.0	0.62	4.4	0.93	75.5	-1.6	-0.23	6.4	0.94	40T	+	L587
TOTAL NUMBER OF LABORATORIES REPORTING = 45													
Best values: K22 78 + 10 Sheffield units													
K68 77 + 11 Sheffield units													

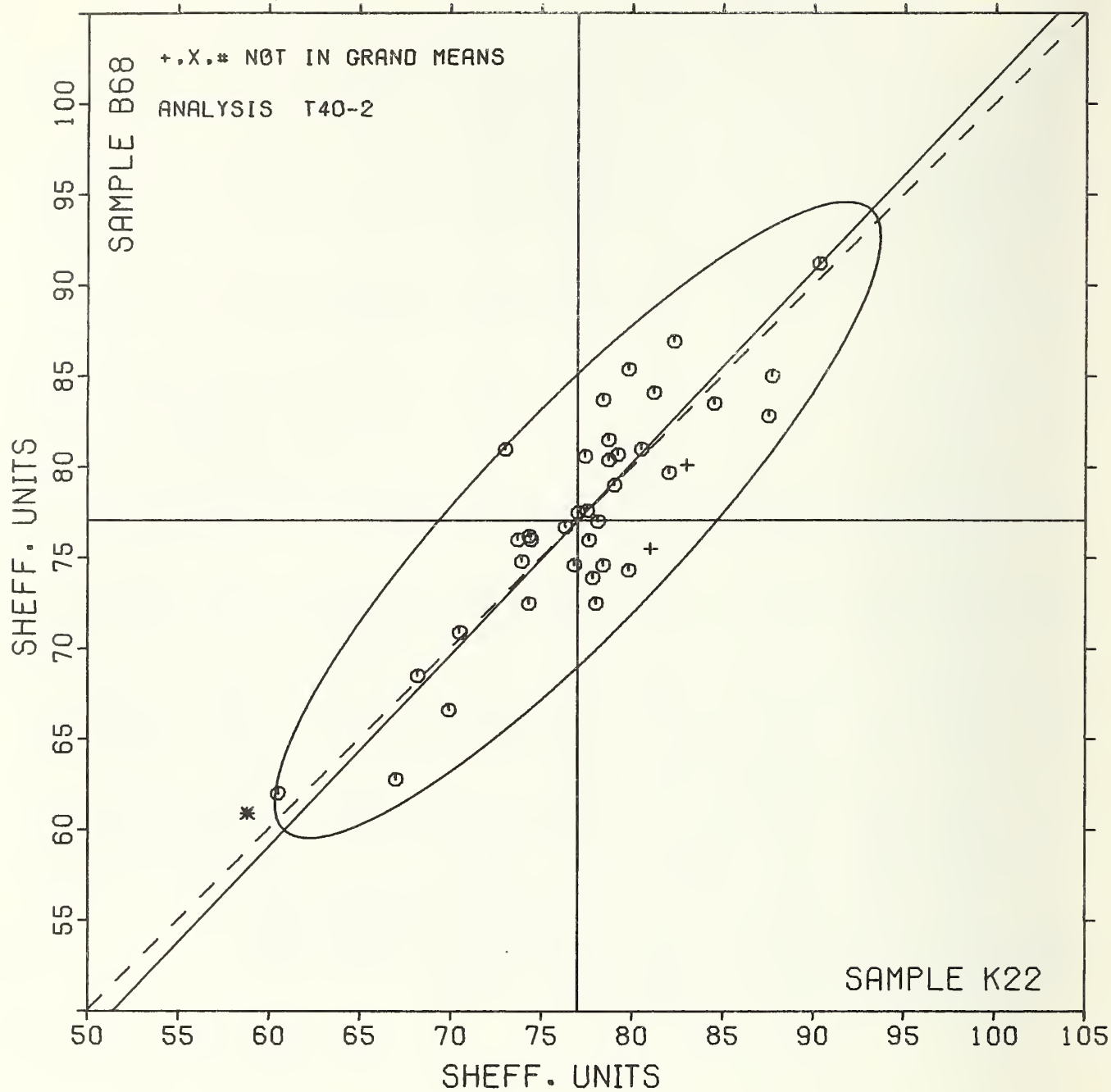
## ANALYSIS T40-2 TABLE 2

AIR RESISTANCE, SHEFFIELD UNITS (CC/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) ORIFICE  
TAPPI USFUL TEST METHOD UM 524, POROSITY BY RESISTANCE TO AIRFLOW

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		R22	B68	MAJOR	MINOR	R <sub>2</sub> SQ	VAR			
L155	*	58.8	60.9	-24.2	2.1	1.05	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L315	Ø	60.5	62.0	-22.3	1.6	1.13	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L729	Ø	67.0	62.8	-17.2	-2.5	1.07	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L223	Ø	68.2	68.5	-12.2	.5	.92	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L626	Ø	65.9	66.6	-12.5	-2.0	.81	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L301	Ø	70.5	70.9	-8.9	.5	.98	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L738	Ø	73.0	81.0	.1	5.6	.90	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L585	Ø	73.7	76.0	-3.0	1.7	.92	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L698	Ø	73.9	74.8	-3.3	.7	1.03	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L249	Ø	74.3	76.2	-2.5	1.4	.62	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L233	Ø	74.3	72.5	-5.1	-1.2	.84	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L318	Ø	74.4	76.0	-2.5	1.1	1.08	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L704	M	75.5				.60	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L132	Ø	76.3	76.7	-.7	.2	.97	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L262S	Ø	76.8	74.6	-1.9	-1.6	.76	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L190C	Ø	77.0	77.5	.3	.3	1.05	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L150	Ø	77.4	80.6	2.9	2.1	1.02	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L230S	Ø	77.5	77.6	.4	-.0	.75	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L124S	Ø	77.6	76.0	-.3	-1.2	.88	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L255	Ø	77.8	73.9	-1.7	-2.8	.93	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L390	Ø	78.0	72.5	-2.6	-3.9	.69	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L213	Ø	78.1	77.0	.7	-.9	1.13	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L600	Ø	78.4	74.6	-.8	-2.7	1.11	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L157	Ø	78.4	83.7	5.3	3.5	.94	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L260	Ø	78.7	81.5	4.4	1.8	1.12	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L575	Ø	78.7	80.4	3.0	1.0	.70	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L352	Ø	79.0	79.0	2.8	-.1	.66	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L354	Ø	79.2	80.7	4.2	.9	1.29	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L684	Ø	79.8	74.3	-.1	-3.9	.76	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L148	Ø	79.8	85.4	8.0	3.7	.93	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L158	Ø	80.5	81.0	5.3	.1	1.05	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L587	*	81.0	75.5	1.0	-4.0	.93	40T	AIR RESISTANCE,	SHEFFIELD (3	INCH DIAMETER ORIFICE)
L740	Ø	81.2	84.1	8.0	1.8	1.22	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L360	Ø	82.0	79.7	5.4	-1.8	1.17	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L687	Ø	82.0	79.7	5.4	-1.8	1.07	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L114	Ø	82.3	86.9	10.8	2.9	1.34	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L312	*	83.0	80.1	6.4	-2.3	.85	40T	AIR RESISTANCE,	SHEFFIELD (3	INCH DIAMETER ORIFICE)
L121	Ø	84.5	83.5	9.9	-1.0	1.22	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L288	Ø	87.5	82.8	11.4	-3.7	1.60	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L562	Ø	67.7	85.0	13.1	-2.3	1.24	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L241	Ø	90.3	91.2	19.4	.0	1.28	40S	AIR RESISTANCE,	SHEFFIELD (3/4	INCH DIAMETER ORIFICE)
L280	*	133.0	143.5	86.8	4.9	2.03	40S	AIR RESISTANCE,	BENDTSEN, WG	150
L243B	*	228.8	234.6	218.8	-2.1	3.15	40S	AIR RESISTANCE,	BENDTSEN, WG	150
L333	*	254.0	282.5	270.9	12.5	3.80	40S	AIR RESISTANCE,	BENDTSEN, WG	150
L182B	*	281.0	298.0	300.7	3.6	3.19	40S	AIR RESISTANCE,	BENDTSEN, WG	150
GMEANS:		77.0	77.1			1.00				
55% ELLIPSE:				23.5	5.7			WITH GAMMA = 46 DEGREES		

# AIR RESISTANCE, SHEFFIELD

SAMPLE K22 = 77.    SHEFF. UNITS    SAMPLE B68 = 77.    SHEFF. UNITS





ANALYSIS T41-1 TABLE 1  
AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION  
DIRECT READING, SEC/10 CC, MERCURY DENSITY

LAB CODE	SAMPLE G12 MEAN	MoFo MOWASE PAPER 70 GRAMS PER SQUARE METER					SAMPLE E37 MEAN	BLEACHED BACKING 69 GRAMS PER SQUARE METER				TEST D <sub>0</sub> = 10		
		DEV	N <sub>0</sub> DEV	SDR	N <sub>0</sub> SDR			DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	VAR	F	LAB
L122	234.	-14.	0.40	89.	1.37		733.	-49.	-0.95	102.	1.18	41G	0	L122
L128	284.	15.	0.00	51.	0.78		718.	-64.	-1.24	66.	0.76	41G	0	L128
L134	287.	19.	0.00	38.	0.58		743.	-39.	-0.76	61.	0.70	41G	0	L134
L166M	335.	67.	2.00	61.	0.94		838.	57.	1.09	80.	0.93	41G	0	L166M
L195	255.	-13.	-0.44	50.	0.76		771.	-11.	-0.22	70.	0.81	41G	0	L195
L224	276.	8.	0.29	51.	0.78		820.	38.	0.73	94.	1.08	41G	0	L224
L230	260.	-8.	-0.27	50.	1.31		749.	-33.	-0.63	90.	1.04	41G	0	L230
L259	212.	-56.	-1.00	39.	0.60		709.	-73.	-1.42	61.	0.71	41G	0	L259
L312	273.	5.	0.10	73.	1.12		873.	91.	1.75	70.	0.80	41G	0	L312
L358	280.	11.	0.40	90.	1.38		848.	66.	1.29	130.	1.50	41G	0	L358
L558	259.	-9.	-0.33	60.	1.00		751.	-31.	-0.60	75.	0.86	41G	0	L558
L574	230.	-38.	-1.00	109.	1.07		775.	-7.	-0.13	111.	1.28	41G	0	L574
L576	259.	-9.	-0.30	38.	0.59		799.	17.	0.34	78.	0.90	41G	0	L576
L618	2815.	2547.	88.20	1038.	15.90		7940.	7158.	138.47	755.	8.73	41G	#	L618
L697	289.	21.	0.70	73.	1.12		821.	39.	0.76	125.	1.44	41G	0	L697
L732	118.	-150.	-0.21	15.	0.23		587.	-395.	-7.65	70.	0.81	41G	#	L732

GR. MEAN = 268. SEC/10 CC

GRAND MEAN = 782. SEC/10 CC

TEST DETERMINATIONS = 10

SD MEANS = 29. SEC/10 CC

SD OF MEANS = 52. SEC/10 CC

14 LABS IN GRAND MEANS

AVERAGE SDR = 60. SEC/10 CC

AVERAGE SDR = 87. SEC/10 CC

TOTAL NUMBER OF LABORATORIES REPORTING = 16

Best values: G12 270 ± 50 seconds per 10cc,

E37 780 ± 70 mercury density

(direct reading)

Data from the following laboratories appear to be  
off by a multiplicative factor: 618, 732.

The values reported here are the time in  
seconds required for the displacement of  
10 ml of air through an area of 1.0 sq.  
in. of the specimen. The values are not  
converted to 100ml of air nor to oil density.

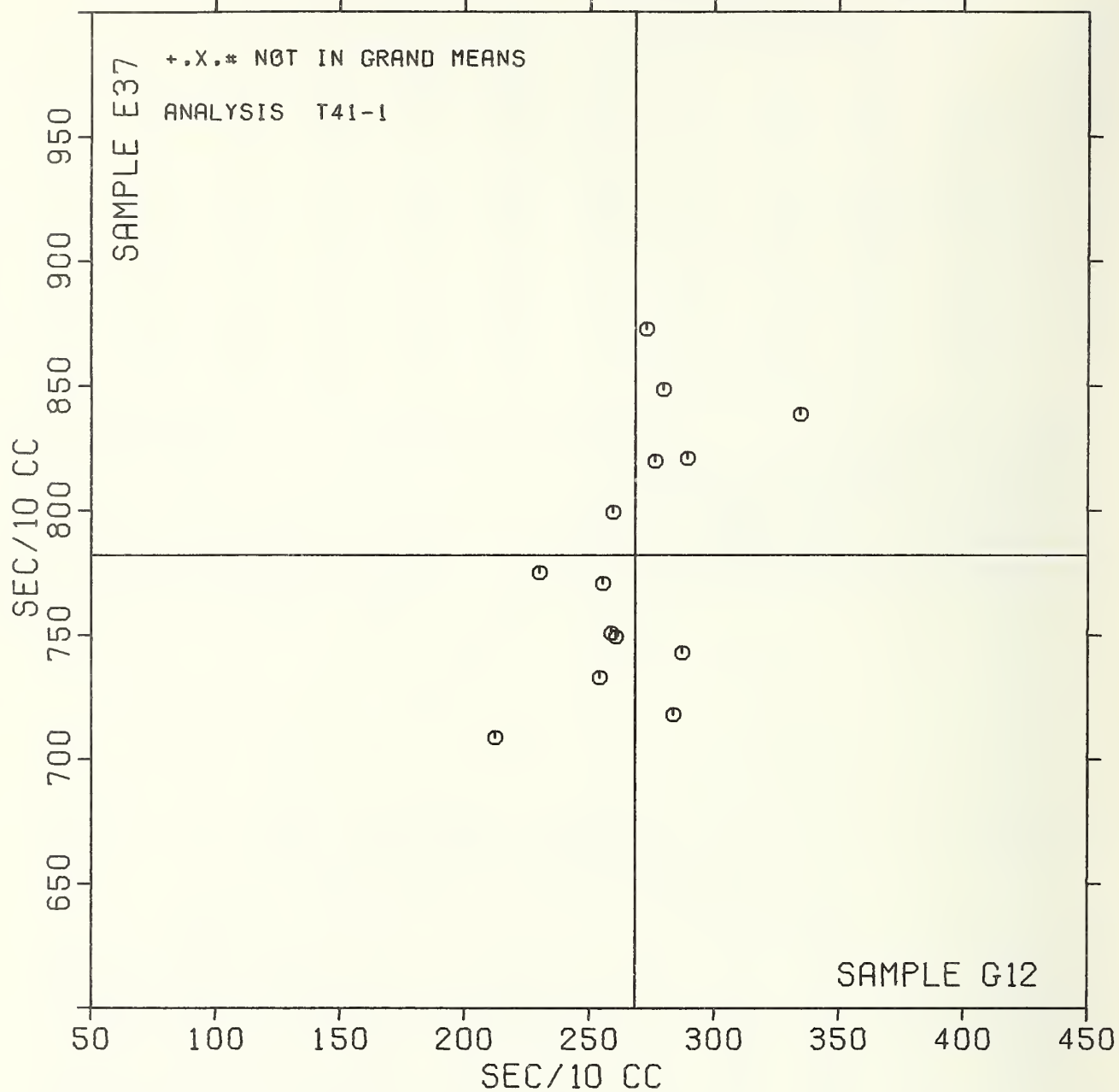
ANALYSIS T41-1 TABLE 2  
AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION  
DIRECT READING, SEC/10 CC, MERCURY DENSITY

LAB CODE	F	MEANS		COORDINATES		AVG R <sub>0</sub> SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS						
		G12	E37	MAJOR	MINOR									
L732	#	118.	387.	-423.	7.	0.02	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L259	0	212.	709.	-60.	28.	0.00	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L574	0	230.	775.	-20.	34.	1.47	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L122	0	254.	733.	-51.	-4.	1.26	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L195	0	255.	771.	-15.	8.	0.78	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L558	0	259.	751.	-33.	-2.	0.53	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L576	0	259.	799.	13.	14.	0.75	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L230	0	260.	749.	-33.	-4.	1.17	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L312	0	273.	873.	57.	20.	0.90	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L224	0	276.	820.	30.	5.	0.53	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L358	0	280.	848.	60.	12.	1.44	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L128	0	284.	718.	-50.	-30.	0.77	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L134	0	287.	743.	-30.	-31.	0.04	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L697	0	289.	821.	44.	-7.	1.26	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L166M	0	335.	838.	70.	-43.	0.53	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
L618	#	2815.	7940.	7550.	51.	120.34	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION						
GMEANS:		268.	782.			1.00								
		95% ELLIPSE:		150.	69.			WITH GAMMA = 70 DEGREES						

# AIR RESISTANCE, GURLEY HG FLOTATION

SAMPLE G12 = 268. SEC/10 CC

SAMPLE E37 = 782. SEC/10 CC





TAPPI COLLABORATIVE REFERENCE PROGRAM  
ANALYSIS T44-1 TABLE 1  
SMOOTHNESS, PARKER PRINTSURF

NOVEMBER 1979

LAB CODE	SAMPLE		PRINTING				SAMPLE		VELLUM ENVELOPE				TEST D <sub>0</sub> = 10		
	K46	MEAN	60 GRAMS PER SQUARE METER	DEV	N <sub>0</sub> DEV	SDR	A84	MEAN	91 GRAMS PER SQUARE METER	DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	VAR	F LAB
L122	5.30	-.09	-.27	.07	.05		5.52	-.16	-.54	.12	1.12		44P	0	L122
L182	5.63	.25	.77	.08	.75		5.78	.10	.33	.03	.34		44P	0	L182
L288	5.13	-.25	-.70	.09	.67		5.50	-.18	-.60	.09	.92		44P	0	L288
L317	5.67	.29	.07	.12	1.00		5.15	.47	1.57	.13	1.24		44P	0	L317
L588	4.90	-.48	-1.40	.17	1.55		5.31	-.37	-1.24	.10	.97		44P	0	L588
L669	5.67	.29	.09	.12	1.13		5.83	.15	.49	.15	1.42		44P	0	L669
GR. MEAN = 5.38 MICRONS															
SD MEANS = .33 MICRONS															
AVERAGE SDR = .11 MICRONS															
TOTAL NUMBER OF LABORATORIES REPORTING = 6															
Best values: K46 5.4 microns															
A84 5.7 microns															

TEST DETERMINATIONS = 10  
6 LABS IN GRAND MEANS

AVERAGE SDR = .10 MICRONS

TAPPI COLLABORATIVE REFERENCE PROGRAM  
ANALYSIS T44-1 TABLE 2  
SMOOTHNESS, PARKER PRINTSURF

NOVEMBER 1979

LAB CODE	F	MEANS		COORDINATES		AVG	PROPERTY--TEST INSTRUMENT--CONDITIONS								
		K46	A84	MAJOR	MINOR										
L588	0	4.90	5.31	-.01	.05	1.20	44P	SMOOTHNESS,	PARKER	PRINTSURF					
L288	0	5.13	5.50	-.31	.04	.09	44P	SMOOTHNESS,	PARKER	PRINTSURF					
L122	0	5.30	5.52	-.17	-.06	.09	44P	SMOOTHNESS,	PARKER	PRINTSURF					
L182	0	5.63	5.78	.25	-.09	.04	44P	SMOOTHNESS,	PARKER	PRINTSURF					
L317	0	5.67	6.15	.03	.16	1.15	44P	SMOOTHNESS,	PARKER	PRINTSURF					
L669	0	5.67	5.83	.31	-.09	1.27	44P	SMOOTHNESS,	PARKER	PRINTSURF					
GMEANS:		5.38	5.68			1.00									
		95% ELLIPSE:		1.80	.41	WICH GAMMA = 42 DEGREES									

ANALYSIS T45-1 TABLE 1  
SMOOTHNESS, SHEFFIELD UNITS  
TAPPI USEFUL TEST METHOD UM 516, SMOOTHNESS OF PAPER (SHEFFIELD)

LAB CODE	SAMPLE K46		PRINTING 60 GRAMS PER SQUARE METER				SAMPLE A84		VELLUM ENVELOPE 91 GRAMS PER SQUARE METER				TEST D <sub>0</sub> = 15		
	MEAN	DEV	NO DEV	SDR	R <sub>0</sub> SDR		MEAN	DEV	NO DEV	SDR	R <sub>0</sub> SDR		VAR	F	LAB
L107	211.3	43.5	5.64	10.0	1.11		252.3	35.1	3.45	7.7	.90		45S	#	L107
L108	167.2	.0	.07	8.1	.85		256.7	19.5	1.91	3.2	.37		45S	*	L108
L114	164.8	-3.0	.33	9.1	.95		215.1	-2.1	.21	5.5	.63		45S	Ø	L114
L115	166.7	-1.1	.13	7.7	.80		213.0	-4.2	.41	13.2	1.53		45S	Ø	L115
L121	160.0	-1.8	.21	8.3	.89		198.0	-19.2	-1.88	9.4	1.09		45S	*	L121
L122	165.5	-2.3	.27	5.9	.62		219.7	2.5	.25	7.5	.87		45S	Ø	L122
L123	165.2	-2.0	.30	11.1	1.15		220.1	2.9	.28	9.1	1.05		45S	Ø	L123
L124	167.6	.2	.02	9.1	.95		212.7	-4.5	.44	7.8	.91		45S	Ø	L124
L125	163.7	-4.1	.40	5.7	.60		209.4	-7.8	.76	13.5	1.56		45S	Ø	L125
L126	184.7	16.9	1.50	13.4	1.40		227.5	10.3	1.01	8.5	.98		45S	Ø	L126
L128	159.3	-8.5	.33	9.0	.94		219.1	2.0	.19	8.5	.99		45S	Ø	L128
L132	184.0	16.2	1.03	11.2	1.17		222.7	5.5	.54	10.2	1.18		45S	Ø	L132
L134	164.0	-3.8	.44	10.7	1.12		204.0	-13.2	-1.29	5.7	.66		45S	Ø	L134
L139S	173.3	7.5	.88	8.1	.85		223.0	7.8	.77	6.0	.69		45S	Ø	L139S
L148	173.5	5.7	.80	7.8	.81		226.6	9.4	.93	8.8	1.02		45S	Ø	L148
L150	172.1	4.3	.30	11.7	1.22		224.7	7.5	.74	7.9	.91		45S	Ø	L150
L152	187.9	20.1	2.33	12.0	1.26		234.7	17.5	1.72	8.5	.99		45S	Ø	L152
L155	166.7	-1.1	.13	10.3	1.07		206.7	-10.5	-1.03	26.4	3.05		45S	Ø	L155
L157	159.5	-8.3	.30	11.2	1.17		215.7	-1.5	.15	8.9	1.04		45S	Ø	L157
L158	153.7	-12.1	-1.42	11.5	1.20		199.7	-17.5	-1.72	13.6	1.57		45S	Ø	L158
L159	177.1	9.3	1.00	12.3	1.26		218.9	1.7	.17	6.7	.77		45S	Ø	L159
L162	164.0	-3.8	.44	4.4	.46		221.7	4.6	.45	5.7	.66		45S	Ø	L162
L166	154.7	-13.1	-1.33	10.4	1.08		205.4	-11.8	-1.16	6.6	.76		45S	Ø	L166
L167	173.0	5.2	.81	7.0	.73		223.7	6.5	.64	6.1	.71		45S	Ø	L167
L183S	168.3	.5	.03	4.7	.49		228.7	11.6	1.14	8.1	.94		45S	Ø	L183S
L190C	167.7	.1	.01	12.0	1.25		212.5	-4.6	.46	8.1	.94		45S	Ø	L190C
L195	161.6	-6.2	.32	9.7	1.01		216.3	-10.8	-1.06	7.9	.91		45S	Ø	L195
L203	168.7	.9	.10	15.3	1.62		211.0	-6.2	.61	7.8	.91		45S	Ø	L203
L206	169.1	1.3	.13	3.9	.62		216.3	-6.9	.68	6.3	.73		45S	Ø	L206
L211	164.3	-3.3	.40	9.0	1.62		211.3	-5.8	.57	8.8	1.02		45S	Ø	L211
L213	146.1	-21.7	-2.33	6.8	.71		155.3	-21.8	-2.15	5.9	.68		45S	*	L213
L223	157.2	-10.6	-1.24	7.5	.78		214.0	-3.2	.31	9.1	1.05		45S	Ø	L223
L224	182.6	14.8	1.73	12.3	1.29		232.7	15.5	1.52	7.3	.84		45S	Ø	L224
L226B	164.3	-3.5	.41	10.7	1.74		211.0	-6.2	.61	10.4	1.20		45S	Ø	L226B
L228	167.7	.1	.01	6.0	.68		225.2	8.0	.79	8.9	1.03		45S	Ø	L228
L230S	164.0	-3.8	.44	3.9	.40		219.7	2.5	.25	7.4	.86		45S	Ø	L230S
L231	182.7	14.9	1.74	13.0	1.55		224.9	9.7	.95	7.6	.88		45S	Ø	L231
L232S	167.7	.1	.02	8.4	.88		246.7	29.5	2.90	6.2	.71		45S	X	L232S
L233	163.7	-2.1	.23	8.3	.89		211.4	-5.8	.57	9.4	1.09		45S	Ø	L233
L237	168.6	.8	.03	5.2	.54		226.3	9.1	.89	7.5	.87		45S	Ø	L237
L241	148.3	-19.5	-2.27	9.2	.96		207.2	-10.0	.98	9.3	1.08		45S	Ø	L241
L249	170.1	2.3	.27	10.1	1.05		222.1	5.0	.49	5.9	.68		45S	Ø	L249
L254	165.8	-2.0	.23	12.1	1.27		229.2	12.0	1.18	10.4	1.20		45S	Ø	L254
L255	162.8	-5.0	.30	10.4	1.09		201.4	-15.8	-1.55	7.1	.83		45S	Ø	L255
L259	186.5	18.7	2.18	10.0	1.05		243.7	26.5	2.60	5.2	.60		45S	*	L259
L260	167.5	.3	.04	5.0	.59		245.9	-11.3	-1.11	7.3	.85		45S	Ø	L260
L261	162.9	-4.9	.37	10.0	1.67		218.0	.8	.08	8.8	1.02		45S	Ø	L261
L262	168.1	.3	.04	10.1	1.05		218.7	1.5	.15	7.9	.91		45S	Ø	L262
L275	162.4	-5.4	.33	10.2	1.07		217.8	.6	.06	7.5	.87		45S	Ø	L275
L278	165.3	-2.5	.30	10.9	1.13		219.8	2.6	.26	5.6	.65		45S	Ø	L278
L281	169.6	1.8	.21	9.0	.93		213.5	-3.6	.36	8.6	.99		45S	Ø	L281
L285	160.7	-7.1	.83	10.8	1.13		226.7	9.5	.93	11.1	1.29		45S	Ø	L285
L288	169.9	2.1	.23	6.1	.63		225.3	8.1	.80	8.8	1.02		45S	Ø	L288
L290	165.7	-2.1	.24	6.8	.71		165.9	-31.3	-3.07	5.0	.57		45S	X	L290
L291S	174.8	7.0	.82	8.0	.84		232.6	15.4	1.52	8.0	.92		45S	Ø	L291S
L301	165.3	-2.5	.30	9.0	.54		210.7	-6.5	.64	9.8	1.13		45S	Ø	L301
L308	167.1	.7	.00	10.8	1.13		212.7	-4.5	.44	8.3	.97		45S	Ø	L308
L312	168.9	1.1	.12	12.1	1.26		233.3	36.1	3.55	6.2	.72		45S	X	L312
L317	167.1	.7	.06	9.7	1.02		218.7	1.6	.15	9.9	1.15		45S	Ø	L317
L318	166.1	-1.7	.19	9.8	1.02		216.4	.8	.08	11.0	1.27		45S	Ø	L318
L321	141.7	-26.1	-3.63	8.4	.87		174.3	-42.8	-4.21	5.3	.61		45S	#	L321
L323	175.7	7.9	.92	11.0	1.21		225.0	11.8	1.16	8.5	.98		45S	Ø	L323
L326	153.7	-12.1	-1.42	7.3	.76		200.9	-16.2	-1.59	6.5	.75		45S	Ø	L326
L328	164.8	-3.0	.33	9.3	1.00		215.5	-1.7	.17	8.1	.94		45S	Ø	L328
L348	168.7	.9	.10	8.4	.88		209.3	-7.8	.77	7.7	.89		45S	Ø	L348

## ANALYSIS T45-1 TABLE 1

## SMOOTHNESS, SHEFFIELD UNITS

## TAPPI USEFUL TEST METHOD UM 518, SMOOTHNESS OF PAPER (SHEFFIELD)

LAB CODE	SAMPLE K46 MEAN	PRINTING 60 GRAMS PER SQUARE METER				SAMPLE A84 MEAN	VELLUM ENVELOPE 51 GRAMS PER SQUARE METER				TEST D <sub>0</sub> = 15		
		DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR		DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	VAR	F	LAB
L349	159.3	-8.3	-1.00	6.9	.72	201.5	-15.6	-1.54	10.6	1.22	45S	Ø	L349
L352	170.0	2.2	.40	11.3	1.20	227.0	9.8	.97	11.8	1.36	45S	Ø	L352
L360	169.5	1.7	.13	12.0	1.25	218.0	.8	.08	10.8	1.25	45S	Ø	L360
L376	178.2	10.4	1.21	11.9	1.24	220.3	3.2	.31	6.4	.74	45S	Ø	L376
L380	168.3	.5	.00	5.1	.53	210.0	-1.2	-.12	7.1	.82	45S	Ø	L380
L382	163.7	-4.1	-.40	5.8	.61	215.7	-1.5	-.15	8.0	.92	45S	Ø	L382
L390	170.7	2.9	.33	11.8	1.23	211.3	-5.8	-.57	9.5	1.10	45S	Ø	L390
L562	170.3	8.5	1.00	10.2	1.00	221.4	4.2	.42	5.0	.58	45S	Ø	L562
L571	189.7	21.9	2.03	17.4	1.81	235.3	18.2	1.78	7.4	.86	45S	*	L571
L575	175.0	7.2	.84	10.9	1.14	229.6	11.8	1.16	7.4	.86	45S	Ø	L575
L585	165.5	-2.3	-.20	10.3	1.72	225.0	7.8	.77	7.3	.85	45S	Ø	L585
L587	166.1	-1.7	-.20	10.0	1.04	202.0	-15.2	-1.49	7.7	.90	45S	Ø	L587
L600	172.3	4.3	.32	9.7	1.01	215.1	2.0	.19	7.5	.87	45S	Ø	L600
L604	163.5	-2.3	-.27	8.3	.89	211.5	-5.6	-.55	7.5	.87	45S	Ø	L604
L626	162.6	-5.2	-.61	11.4	1.19	211.5	-5.7	-.56	9.5	1.10	45S	Ø	L626
L636	174.8	7.0	.82	8.0	.90	217.1	-.0	-.00	7.4	.86	45S	Ø	L636
L651	195.5	27.7	3.43	5.4	.56	219.3	2.1	.21	6.0	.69	45S	X	L651
L670	188.3	20.5	2.40	10.8	1.13	238.5	21.3	2.09	5.5	.64	45S	Ø	L670
L698	158.1	-9.7	-1.14	3.7	.59	207.3	-9.9	-.97	9.6	1.12	45S	Ø	L698
L702	152.7	-15.1	-1.77	9.2	.96	202.7	-14.5	-1.42	11.2	1.29	45S	Ø	L702
L704	166.0	-1.8	-.21	3.4	.56	NO DATA REPORTED FOR SAMPLE A84					45S	M	L704
L728	155.6	-12.2	-1.42	4.7	.49	205.4	-11.8	-1.16	12.7	1.47	45S	Ø	L728
L729	183.5	15.7	1.04	20.0	2.72	155.7	-31.5	-3.09	24.8	2.88	45S	X	L729
L738	144.7	-23.1	-2.70	7.2	.75	161.3	-35.8	-3.52	16.0	1.85	45S	X	L738

GR. MEAN = 167.8 SHEFF. UNITS

GRAND MEAN = 217.2 SHEFF. UNITS

TEST DETERMINATIONS = 15

SD MEANS = 8.6 SHEFF. UNITS

SD OF MEANS = 10.2 SHEFF. UNITS

80 LABS IN GRAND MEANS

AVERAGE SDR = 9.6 SHEFF. UNITS

AVERAGE SDR = 8.6 SHEFF. UNITS

TOTAL NUMBER OF LABORATORIES REPORTING = 89

Best values: K46 167 ± 16 Sheffield units

A84 217 ± 17 Sheffield units

The following laboratories were omitted from the  
grand means because of extreme test results: 107,  
321.



## ANALYSIS T45-1 TABLE 2

## SMOOTHNESS, SHEFFIELD UNITS

## TAPPI Useful TEST METHOD JM 518, SMOOTHNESS OF PAPER (SHEFFIELD)

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY--	TEST INSTRUMENT--	CONDITIONS
		K46	A84	MAJOR	MINOR	MEAN	VAR			
L321	#	141.7	174.3	-49.8	-6.0	0.74	455	SMOOTHNESS,	SHEFFIELD	
L738	X	144.7	181.3	-42.5	-4.1	1.00	455	SMOOTHNESS,	SHEFFIELD	
L213	*	146.1	195.3	-30.6	3.5	0.69	455	SMOOTHNESS,	SHEFFIELD	
L241	Ø	148.3	207.2	-19.9	9.1	1.00	455	SMOOTHNESS,	SHEFFIELD	
L702	Ø	152.7	202.7	-20.8	2.9	1.13	455	SMOOTHNESS,	SHEFFIELD	
L166	Ø	154.7	205.4	-17.4	3.0	0.92	455	SMOOTHNESS,	SHEFFIELD	
L728	Ø	155.6	205.4	-16.8	2.3	0.98	455	SMOOTHNESS,	SHEFFIELD	
L326	Ø	155.7	200.9	-20.3	-0.5	0.70	455	SMOOTHNESS,	SHEFFIELD	
L158	Ø	155.7	199.7	-21.3	-1.3	1.36	455	SMOOTHNESS,	SHEFFIELD	
L223	Ø	157.2	214.0	-9.1	6.4	0.91	455	SMOOTHNESS,	SHEFFIELD	
L698	Ø	158.1	207.3	-13.8	1.5	0.65	455	SMOOTHNESS,	SHEFFIELD	
L349	Ø	159.3	201.5	-17.6	-3.0	0.97	455	SMOOTHNESS,	SHEFFIELD	
L128	Ø	159.3	219.1	-3.7	7.9	0.90	455	SMOOTHNESS,	SHEFFIELD	
L157	Ø	159.3	215.7	-6.3	5.6	1.10	455	SMOOTHNESS,	SHEFFIELD	
L285	Ø	160.7	226.7	3.0	11.5	1.21	455	SMOOTHNESS,	SHEFFIELD	
L195	Ø	161.6	206.3	-12.3	-1.9	0.96	455	SMOOTHNESS,	SHEFFIELD	
L275	Ø	162.4	217.8	-2.9	4.6	0.97	455	SMOOTHNESS,	SHEFFIELD	
L626	Ø	162.6	211.5	-7.7	0.5	1.15	455	SMOOTHNESS,	SHEFFIELD	
L255	Ø	162.8	201.4	-15.3	-5.9	0.90	455	SMOOTHNESS,	SHEFFIELD	
L261	Ø	162.9	218.0	-2.4	4.3	1.03	455	SMOOTHNESS,	SHEFFIELD	
L382	Ø	163.7	215.7	-3.7	2.3	0.77	455	SMOOTHNESS,	SHEFFIELD	
L125	Ø	163.7	209.4	-8.7	-1.6	1.00	455	SMOOTHNESS,	SHEFFIELD	
L134	Ø	164.0	204.0	-12.7	-5.2	0.69	455	SMOOTHNESS,	SHEFFIELD	
L162	Ø	164.0	221.7	1.2	5.8	0.90	455	SMOOTHNESS,	SHEFFIELD	
L230S	Ø	164.0	219.7	-8.4	4.5	0.93	455	SMOOTHNESS,	SHEFFIELD	
L226B	Ø	164.3	211.0	-7.0	-1.1	1.47	455	SMOOTHNESS,	SHEFFIELD	
L211	Ø	164.3	211.3	-6.7	-0.9	1.02	455	SMOOTHNESS,	SHEFFIELD	
L328	Ø	164.8	215.5	-3.2	1.3	0.97	455	SMOOTHNESS,	SHEFFIELD	
L114	Ø	164.8	215.1	-3.5	1.0	0.75	455	SMOOTHNESS,	SHEFFIELD	
L123	Ø	165.2	220.1	0.7	3.8	1.10	455	SMOOTHNESS,	SHEFFIELD	
L301	Ø	165.3	210.7	-6.7	-2.0	1.04	455	SMOOTHNESS,	SHEFFIELD	
L278	Ø	165.3	219.8	0.5	3.6	0.99	455	SMOOTHNESS,	SHEFFIELD	
L122	Ø	165.5	219.7	0.5	3.4	0.74	455	SMOOTHNESS,	SHEFFIELD	
L604	Ø	165.5	211.5	-3.9	-1.7	0.88	455	SMOOTHNESS,	SHEFFIELD	
L585	Ø	165.5	225.0	4.7	6.6	1.28	455	SMOOTHNESS,	SHEFFIELD	
L233	Ø	165.7	211.4	-5.9	-1.9	0.99	455	SMOOTHNESS,	SHEFFIELD	
L290	X	165.7	185.9	-25.8	-17.8	0.64	455	SMOOTHNESS,	SHEFFIELD	
L254	Ø	165.8	229.2	8.2	9.0	1.23	455	SMOOTHNESS,	SHEFFIELD	
L704	M	166.0				0.90	455	SMOOTHNESS,	SHEFFIELD	
L121	*	166.0	198.0	-16.2	-10.5	0.99	455	SMOOTHNESS,	SHEFFIELD	
L587	Ø	166.1	202.0	-13.6	-8.6	0.97	455	SMOOTHNESS,	SHEFFIELD	
L318	Ø	166.1	216.4	-1.6	0.8	1.15	455	SMOOTHNESS,	SHEFFIELD	
L155	Ø	166.7	206.7	-8.9	-5.6	2.00	455	SMOOTHNESS,	SHEFFIELD	
L115	Ø	166.7	213.0	-4.0	-1.7	1.17	455	SMOOTHNESS,	SHEFFIELD	
L317	Ø	167.1	218.7	0.8	1.5	1.08	455	SMOOTHNESS,	SHEFFIELD	
L308	Ø	167.1	212.7	-3.9	-2.3	1.05	455	SMOOTHNESS,	SHEFFIELD	
L108	*	167.2	236.7	14.9	12.6	0.61	455	SMOOTHNESS,	SHEFFIELD	
L260	Ø	167.5	205.9	-9.1	-6.7	0.72	455	SMOOTHNESS,	SHEFFIELD	
L124	Ø	167.6	212.7	-3.7	-2.6	0.93	455	SMOOTHNESS,	SHEFFIELD	
L232S	X	167.7	246.7	23.1	18.4	0.60	455	SMOOTHNESS,	SHEFFIELD	
L190C	Ø	167.7	212.5	-3.7	-2.8	1.09	455	SMOOTHNESS,	SHEFFIELD	
L228	Ø	167.7	225.2	6.3	3.0	0.85	455	SMOOTHNESS,	SHEFFIELD	
L262	Ø	168.1	218.7	1.4	0.7	0.98	455	SMOOTHNESS,	SHEFFIELD	
L183S	Ø	168.3	228.7	9.4	6.8	0.71	455	SMOOTHNESS,	SHEFFIELD	
L380	Ø	168.3	216.0	-6.6	-1.1	0.68	455	SMOOTHNESS,	SHEFFIELD	
L237	Ø	168.6	226.3	7.0	5.0	0.71	455	SMOOTHNESS,	SHEFFIELD	
L348	Ø	168.7	209.3	-3.6	-5.5	0.68	455	SMOOTHNESS,	SHEFFIELD	
L203	Ø	168.7	211.0	-4.3	-4.5	1.26	455	SMOOTHNESS,	SHEFFIELD	
L312	X	168.9	253.3	29.0	21.5	0.99	455	SMOOTHNESS,	SHEFFIELD	
L206	Ø	169.1	210.3	-4.6	-5.3	0.67	455	SMOOTHNESS,	SHEFFIELD	
L360	Ø	169.5	218.0	1.7	-0.8	1.25	455	SMOOTHNESS,	SHEFFIELD	
L281	Ø	169.6	213.5	-1.7	-3.7	0.90	455	SMOOTHNESS,	SHEFFIELD	
L288	Ø	169.9	225.3	7.7	3.3	0.62	455	SMOOTHNESS,	SHEFFIELD	
L352	Ø	170.0	227.0	9.1	4.4	1.28	455	SMOOTHNESS,	SHEFFIELD	
L249	Ø	170.1	222.1	5.3	1.2	0.67	455	SMOOTHNESS,	SHEFFIELD	

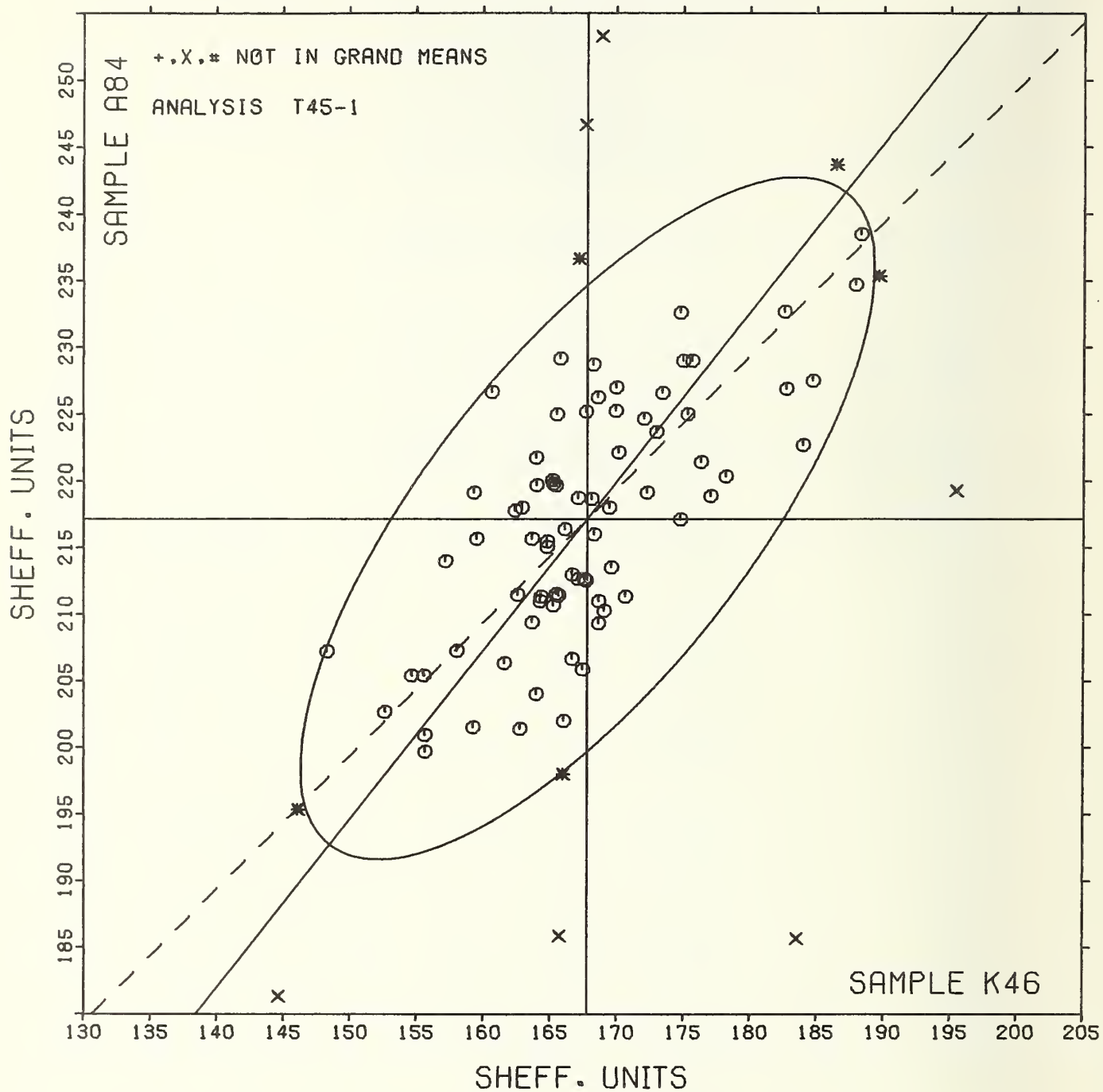
ANALYSIS T45-1 TABLE 2  
SMOOTHNESS, SHEFFIELD UNITS  
TAPPI USEFUL TEST METHOD JM 518, SMOOTHNESS OF PAPER (SHEFFIELD)

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		R46	A84	MAJOR	MINOR	R <sub>0</sub>	VAR			
L390	Ø	170.7	211.3	-2.8	-5.9	1.47	458	SMOOTHNESS,	SHEFFIELD	
L150	Ø	172.1	224.7	8.5	1.3	1.07	458	SMOOTHNESS,	SHEFFIELD	
L600	Ø	172.3	219.1	4.3	-2.3	.94	458	SMOOTHNESS,	SHEFFIELD	
L167	Ø	173.0	223.7	8.3	-0.1	.72	458	SMOOTHNESS,	SHEFFIELD	
L148	Ø	173.5	226.6	10.9	1.4	.52	458	SMOOTHNESS,	SHEFFIELD	
L636	Ø	174.3	217.1	4.3	-5.5	.88	458	SMOOTHNESS,	SHEFFIELD	
L291S	Ø	174.8	232.6	10.4	4.1	.88	458	SMOOTHNESS,	SHEFFIELD	
L575	Ø	175.0	229.0	13.7	1.7	1.00	458	SMOOTHNESS,	SHEFFIELD	
L139S	Ø	175.3	225.0	10.8	-1.1	.77	458	SMOOTHNESS,	SHEFFIELD	
L323	Ø	175.7	229.0	14.2	1.2	1.10	458	SMOOTHNESS,	SHEFFIELD	
L562	Ø	176.3	221.4	8.0	-4.1	.82	458	SMOOTHNESS,	SHEFFIELD	
L159	Ø	177.1	218.9	7.1	-6.2	1.02	458	SMOOTHNESS,	SHEFFIELD	
L376	Ø	178.2	220.3	8.9	-5.2	.99	458	SMOOTHNESS,	SHEFFIELD	
L224	Ø	182.6	232.7	21.3	-2.0	1.07	458	SMOOTHNESS,	SHEFFIELD	
L231	Ø	182.7	226.9	16.9	-5.7	1.22	458	SMOOTHNESS,	SHEFFIELD	
L729	X	183.5	185.7	-15.0	-31.9	2.80	458	SMOOTHNESS,	SHEFFIELD	
L132	Ø	184.0	222.7	14.4	-9.3	1.17	458	SMOOTHNESS,	SHEFFIELD	
L126	Ø	184.7	227.5	18.0	-5.9	1.19	458	SMOOTHNESS,	SHEFFIELD	
L259	*	186.5	243.7	32.4	1.8	.82	458	SMOOTHNESS,	SHEFFIELD	
L152	Ø	187.9	234.7	26.2	-5.0	1.12	458	SMOOTHNESS,	SHEFFIELD	
L670	Ø	188.3	238.5	29.4	-2.9	.88	458	SMOOTHNESS,	SHEFFIELD	
L571	*	189.7	235.3	27.8	-5.9	1.34	458	SMOOTHNESS,	SHEFFIELD	
L651	X	195.5	219.3	18.8	-20.4	.83	458	SMOOTHNESS,	SHEFFIELD	
L107	#	211.3	252.3	54.5	-12.4	1.00	458	SMOOTHNESS,	SHEFFIELD	
GMEANS:		167.8	217.2			1.00				
		95% ELLIPSE:		31.1	12.1	WITH GAMMA = 51 DEGREES				



# SMOOTHNESS. SHEFFIELD

SAMPLE K46 = 168. SHEFF. UNITS    SAMPLE A84 = 217. SHEFF. UNITS



TAPPI COLLABORATIVE REFERENCE PROGRAM  
ANALYSIS T45-2 TABLE 1  
SMOOTHNESS, BEKK SECONDS

NOVEMBER 1979

## TAPPI SUGGESTED METHOD T479 SU-71, SMOOTHNESS OF PAPER (BEKK METHOD)

LAB CODE	SAMPLE K46 MEAN	PRINTING				SAMPLE A84 MEAN	VELLUM ENVELOPE				TEST D <sub>0</sub> = 15		
		50 GRAMS PER SQUARE METER	NO. OF	SD	R <sub>0</sub> SDR		91 GRAMS PER SQUARE METER	DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	VAR	F LAB
L139B	28.60	1.03	0.44	2.10	0.81	16.20	1.39	1.11	0.68	0.70	45K	0	L139B
L162	27.87	0.29	0.12	3.14	1.21	15.68	0.87	0.70	0.87	0.90	45K	0	L162
L182K	26.67	0.91	0.30	1.91	0.74	13.44	-1.37	-1.09	0.96	0.99	45K	0	L182K
L190C	28.80	1.23	0.24	2.83	1.09	15.40	0.59	0.47	1.06	1.09	45K	0	L190C
L230B	22.80	-4.77	-2.03	2.85	1.11	12.40	-2.41	-1.92	0.74	0.76	45K	0	L230B
L243K	27.87	0.29	0.12	2.10	0.81	14.49	-0.31	-0.25	0.88	0.91	45K	0	L243K
L291K	31.12	3.55	1.01	3.09	1.42	16.00	1.19	0.95	1.93	2.00	45K	0	L291K
L581	25.60	-1.97	-0.04	2.29	0.88	14.40	-0.41	-0.32	0.63	0.65	45K	0	L581
L697	28.84	1.27	0.24	2.40	0.95	15.23	0.43	0.34	0.96	0.99	45K	0	L697

GR. MEAN = 27.57 BEKK SECONDS

GRAND MEAN = 14.81 BEKK SECONDS

TEST DETERMINATIONS = 15

SD MEANS = 2.36 BEKK SECONDS

SD OF MEANS = 1.25 BEKK SECONDS

9 LABS IN GRAND MEANS

AVERAGE SDR =

2.00 BEKK SECONDS

AVERAGE SDR =

0.97 BEKK SECONDS

L250M	25.73	-1.84	-0.70	1.58	0.61	13.87	-0.94	-0.75	1.13	1.16	45L	+	L250M
L251	22.73	-4.84	-2.03	2.15	0.84	11.43	-3.38	-2.69	0.68	0.70	45L	+	L251

TOTAL NUMBER OF LABORATORIES REPORTING = 11

Best values: K46 27.7 Bekk seconds

A84 14.8 Bekk seconds

TAPPI COLLABORATIVE REFERENCE PROGRAM  
ANALYSIS T45-2 TABLE 2  
SMOOTHNESS, BEKK SECONDS

NOVEMBER 1979

## TAPPI SUGGESTED METHOD T479 SU-71, SMOOTHNESS OF PAPER (BEKK METHOD)

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS					
		K46	A84	MAJOR	MINOR	MAJOR	VAR						
L251	+	22.73	11.43	-5.83	-0.90	0.77	45L	SMOOTHNESS, BEKK, 20 C, 65% RH					
L230B	0	22.80	12.40	-5.34	-0.05	0.94	45K	SMOOTHNESS, BEKK					
L581	0	25.60	14.40	-1.95	0.51	0.77	45K	SMOOTHNESS, BEKK					
L250M	+	25.73	13.87	-2.07	-0.03	0.69	45L	SMOOTHNESS, BEKK, 20 C, 65% RH					
L182K	0	26.67	13.44	-1.42	-0.83	0.66	45K	SMOOTHNESS, BEKK					
L162	0	27.87	15.68	0.00	0.66	1.06	45K	SMOOTHNESS, BEKK					
L243K	0	27.87	14.49	0.13	-0.41	0.66	45K	SMOOTHNESS, BEKK					
L139B	0	28.60	16.20	1.54	0.80	0.75	45K	SMOOTHNESS, BEKK					
L190C	0	28.80	15.40	1.30	-0.01	1.09	45K	SMOOTHNESS, BEKK					
L697	0	28.84	15.23	1.33	-0.17	0.97	45K	SMOOTHNESS, BEKK					
L291K	0	31.12	16.00	3.71	-0.49	1.71	45K	SMOOTHNESS, BEKK					
GMEANS:		27.57	14.81			1.00							
		95% ELLIPSE:		8.59	1.82			WITH GAMMA = 26 DEGREES					

## ANALYSIS T47-1 TABLE 1

SMOOTHNESS, BENDTSEN (MILLILITERS/MINUTE)

TAPPI USEFUL TEST METHOD UM 535, SMOOTHNESS OF PAPER AND PAPERBOARD (BENDTSEN TESTER)

LAB CODE	PRINTING					VELLUM ENVELOPE					TEST D <sub>0</sub> = 10		
	K46 MEAN	60 GRAMS PER SQUARE METER DEV	NO. DEV	SDR	R <sub>0</sub> SDR	A84 MEAN	91 GRAMS PER SQUARE METER DEV	NO. DEV	SDR	R <sub>0</sub> SDR	VAR	F	LAB
L182B	234.	14.	0.07	27.	1.05	328.	18.	0.62	25.	0.94	47B	Ø	L182B
L242	227.	7.	0.43	28.	1.07	318.	8.	0.26	30.	1.15	47B	Ø	L242
L243B	240.	19.	1.22	37.	1.41	363.	52.	1.80	37.	1.42	47B	Ø	L243B
L244	228.	8.	0.49	30.	1.15	306.	-4.	0.15	29.	1.11	47B	Ø	L244
L280	223.	2.	0.13	39.	1.51	284.	-26.	0.90	30.	1.15	47B	Ø	L280
L313	212.	-9.	0.33	25.	0.95	315.	5.	0.16	18.	0.68	47B	Ø	L313
L333	210.	-11.	0.07	8.	0.33	289.	-21.	0.74	19.	0.71	47B	Ø	L333
L685	224.	3.	0.21	30.	1.15	327.	17.	0.57	28.	1.05	47B	Ø	L685
L739	187.	-34.	2.12	10.	0.40	263.	-47.	1.61	21.	0.80	47B	Ø	L739

GR. MEAN = 221. ML/MIN

GRAND MEAN = 310. ML/MIN

TEST DETERMINATIONS = 10

SD MEANS = 16. ML/MIN

SD OF MEANS = 29. ML/MIN

9 LABS IN GRAND MEANS

AVERAGE SDR = 20. ML/MIN

AVERAGE SDR = 26. ML/MIN

TOTAL NUMBER OF LABORATORIES REPORTING = 9

Best values: K46 220 milliliter per minute

A84 315 milliliter per minute

## ANALYSIS T47-1 TABLE 2

SMOOTHNESS, BENDTSEN (MILLILITERS/MINUTE)

TAPPI USEFUL TEST METHOD UM 535, SMOOTHNESS OF PAPER AND PAPERBOARD (BENDTSEN TESTER)

LAB CODE	F	MEANS		COORDINATES		AVG R <sub>0</sub> SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS						
		K46	A84	MAJOR	MINOR								
L739	Ø	187.	263.	-57.	10.	0.06 47B	SMOOTHNESS, BENDTSEN, WG 150						
L333	Ø	210.	289.	-24.	0.	0.52 47B	SMOOTHNESS, BENDTSEN, WG 150						
L313	Ø	212.	315.	0.	10.	0.62 47B	SMOOTHNESS, BENDTSEN, WG 150						
L280	Ø	223.	284.	-23.	-13.	1.33 47B	SMOOTHNESS, BENDTSEN, WG 150						
L685	Ø	224.	327.	10.	4.	1.09 47B	SMOOTHNESS, BENDTSEN, WG 150						
L242	Ø	227.	318.	10.	-3.	1.11 47B	SMOOTHNESS, BENDTSEN, WG 150						
L244	Ø	228.	306.	-1.	-9.	1.13 47B	SMOOTHNESS, BENDTSEN, WG 150						
L182B	Ø	234.	328.	22.	-5.	0.99 47B	SMOOTHNESS, BENDTSEN, WG 150						
L243B	Ø	240.	363.	50.	6.	1.41 47B	SMOOTHNESS, BENDTSEN, WG 150						
GMEANS:		221.	310.			1.00							
		95% ELLIPSE:	100.	27.		WITH GAMMA = 64 DEGREES							

TAPPI COLLABORATIVE REFERENCE PROGRAM  
ANALYSIS T53-1 TABLE 1  
MOISTURE IN PAPER, PERCENT  
TAPPI SUGGESTED METHOD T412 SU-69

NOVEMBER 1979

LAB CODE	SAMPLE	DOWN DRAFT					SAMPLE	KRAFT WRAPPING					TEST D <sub>0</sub> = 10		
	G10	76 GRAMS PER SQUARE METER					E66	83 GRAMS PER SQUARE METER					VAR	F	LAB
	MEAN	DEV	MAJ DEV	SD	MAJ SDR	MEAN	DEV	MAJ DEV	SDR	MAJ SDR					
L134	6.04	.15	.02	.00	.36	6.34	.44	1.05	.13	.53	53M	0	L134		
L141	6.26	.37	.05	.15	1.00	6.16	.26	.62	.09	.38	53D	0	L141		
L162	5.01	-.88	-.20	.11	.00	5.31	-.50	-1.41	.19	.81	53M	0	L162		
L213	5.60	-.29	-.05	.17	1.18	5.72	-.10	-.45	.14	.59	53M	0	L213		
L244	6.37	.48	1.13	.12	.83	6.53	.63	1.51	.08	.35	53D	0	L244		
L291	6.23	.34	.02	.52	2.24	6.37	.47	1.11	.55	2.32	53D	0	L291		
L442	5.88	-.01	-.03	.19	1.31	5.67	-.13	-.56	.17	.72	53D	0	L442		
L570	6.16	.27	.04	.25	1.76	5.69	-.21	-.49	.83	3.51	53D	0	L570		
L571	5.81	-.08	-.14	.07	.51	5.76	-.14	-.33	.13	.57	53M	0	L571		
L592	7.40	1.51	3.02	.10	1.09	7.66	1.76	4.20	.27	1.13	53M	#	L592		
L728	5.54	-.33	-.04	.05	.30	5.45	-.45	-1.07	.05	.22	53H	0	L728		
L729	2.62	-3.27	-7.04	.13	.92	3.11	-2.79	-6.65	.24	1.02	53D	#	L729		

GR<sub>0</sub> MEAN = 5.89 PERCENT  
SD MEANS = .42 PERCENT

GRAND MEAN = 5.90 PERCENT  
SD OF MEANS = .42 PERCENT

TEST DETERMINATIONS = 10  
10 LABS IN GRAND MEANS

AVERAGE SDR = .14 PERCENT

AVERAGE SDR = .24 PERCENT

L376	6.59	.70	1.00	.10	.72	6.33	.43	1.02	.50	2.11	53X	+	L376
L739	5.78	-.11	-.20	.11	.75	5.83	-.07	-.17	.11	.48	53X	+	L739

TOTAL NUMBER OF LABORATORIES REPORTING = 14

Best values: G10 5.9 percent  
E66 5.9 percent

The following laboratories were omitted from the grand means because of extreme test results: 592, 729.

TAPPI COLLABORATIVE REFERENCE PROGRAM  
ANALYSIS T53-1 TABLE 2  
MOISTURE IN PAPER, PERCENT  
TAPPI SUGGESTED METHOD T412 SU-69

NOVEMBER 1979

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS						
		G10	E66	MAJOR	MINOR	R <sub>0</sub> SDR	VAR							
L729	#	2.62	3.11	-4.28	.35	.57	53D	MOISTURE CONTENT, EVEN DRYING METHOD						
L162	0	5.01	5.31	-1.04	.21	.00	53M	MOISTURE CONTENT, MOISTREX						
L728	0	5.54	5.45	-.57	-.07	.29	53H	MOISTURE CONTENT, HART						
L213	0	5.60	5.72	-.33	.08	.09	53M	MOISTURE CONTENT, MOISTREX						
L739	+	5.78	5.83	-.13	.03	.01	53X	MOISTURE CONTENT: DESCRIBE METHOD						
L571	0	5.81	5.76	-.16	-.04	.54	53M	MOISTURE CONTENT, MOISTREX						
L442	0	5.88	5.67	-.17	-.16	1.01	53D	MOISTURE CONTENT, EVEN DRYING METHOD						
L134	0	6.04	6.34	.42	.20	.45	53M	MOISTURE CONTENT, MOISTREX						
L570	0	6.16	5.69	.04	-.34	2.04	53D	MOISTURE CONTENT, EVEN DRYING METHOD						
L291	0	6.23	6.37	.57	.08	2.28	53D	MOISTURE CONTENT, EVEN DRYING METHOD						
L141	0	6.26	6.16	.45	-.08	.72	53D	MOISTURE CONTENT, EVEN DRYING METHOD						
L244	0	6.37	6.53	.79	.11	.59	53D	MOISTURE CONTENT, EVEN DRYING METHOD						
L376	+	6.59	6.33	.80	-.20	1.42	53X	MOISTURE CONTENT: DESCRIBE METHOD						
L592	#	7.40	7.66	2.31	.17	1.11	53M	MOISTURE CONTENT, MOISTREX						
GMEANS:		5.89	5.90			1.00								
		95% ELLIPSE:		1.79	.54			WITH GAMMA = 45 DEGREES						

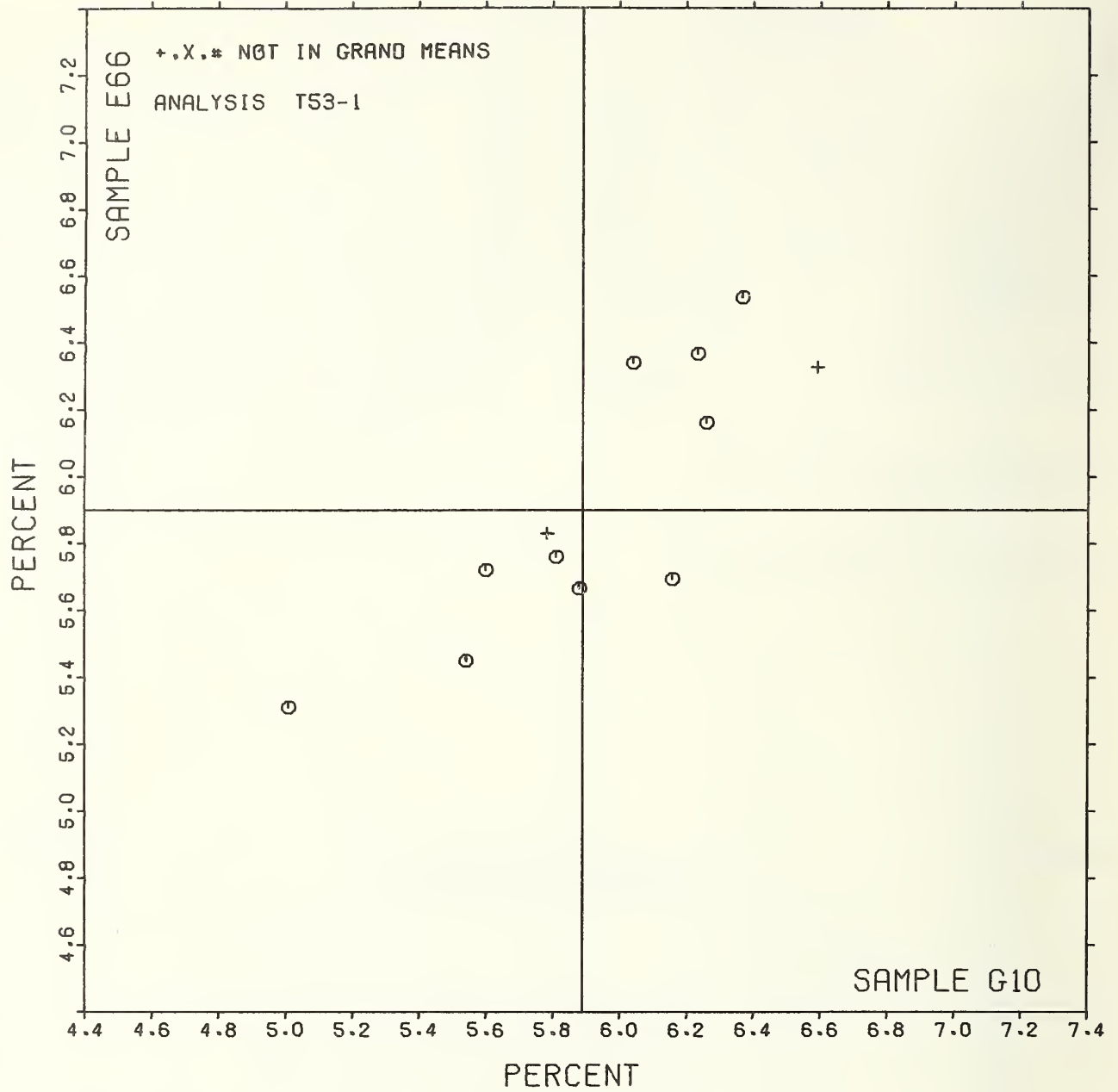
# MOISTURE

SAMPLE G10 = 5.9

PERCENT

SAMPLE E66 = 5.9

PERCENT





## ANALYSIS T56-1 TABLE 1

## K &amp; N INK ABSORPTION

TAPPI USEFUL TEST METHOD UM 353, PRINTING INK METHOD AND BRITISH STANDARD 4574-70

LAB CODE	SAMPLE B92 76 GRAMS PER SQUARE METER					SAMPLE E43 150 GRAMS PER SQUARE METER					TEST D <sub>0</sub> = 4		
	MEAN	DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	MEAN	DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	VAR	F	LAB
L126	23.8	1.5	0.34	0.7	1.042	31.8	2.3	0.51	0.5	0.87	56K	0	L126
L182	20.6	-1.6	-0.30	0.1	0.26	32.2	2.7	0.61	0.6	0.93	56K	0	L182
L291	18.4	-3.9	-0.33	1.0	2.03	24.3	-5.2	-1.17	1.1	1.83	56K	0	L291
L333	23.1	0.8	0.17	0.9	1.81	30.3	0.8	0.18	0.5	0.79	56K	0	L333
L337	14.5	-7.7	-1.70	0.2	0.49	22.9	-6.6	-1.46	0.8	1.41	56K	0	L337
L339	30.0	7.7	1.09	0.0	0.00	34.2	4.7	1.06	1.0	1.61	56K	0	L339
L616	24.0	1.7	0.30	0.0	0.00	26.0	-3.5	-0.78	0.0	0.00	56K	0	L616
L643	23.7	1.5	0.32	1.0	1.98	34.2	4.7	1.06	0.3	0.56	56K	0	L643

GR. MEAN = 22.3 K &amp; N UNITS

GRAND MEAN = 29.5 K &amp; N UNITS

TEST DETERMINATIONS = 4

SD MEANS = 4.6 K &amp; N UNITS

SD OF MEANS = 4.5 K &amp; N UNITS

8 LABS IN GRAND MEANS

AVERAGE SDR = 0.5 K &amp; N UNITS

AVERAGE SDR = 0.6 K &amp; N UNITS

TOTAL NUMBER OF LABORATORIES REPORTING = 6

Best values: B92 22 K &amp; N units

E43 30 K &amp; N units

## ANALYSIS T56-1 TABLE 2

## K &amp; N INK ABSORPTION

TAPPI USEFUL TEST METHOD UM 353, PRINTING INK METHOD AND BRITISH STANDARD 4574-70

LAB CODE	F	MEANS		COORDINATES		AVG R <sub>0</sub> SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		B92	E43	MAJOR	MINOR		
L337	0	14.5	22.9	-10.1	0.7	0.95	50K INK ABSORPTION, K&N INK TEST
L291	0	18.4	24.3	-6.4	-1.0	1.09	56K INK ABSORPTION, K&N INK TEST
L182	0	20.6	32.2	0.7	3.1	0.60	50K INK ABSORPTION, K&N INK TEST
L333	0	23.1	30.3	1.1	0.0	1.00	50K INK ABSORPTION, K&N INK TEST
L643	0	23.7	34.2	4.4	-2.4	1.02	56K INK ABSORPTION, K&N INK TEST
L126	0	23.8	31.8	2.7	0.6	1.14	50K INK ABSORPTION, K&N INK TEST
L616	0	24.0	26.0	-1.2	-3.7	0.60	50K INK ABSORPTION, K&N INK TEST
L339	0	30.0	34.2	8.8	-2.0	0.60	50K INK ABSORPTION, K&N INK TEST
GMEANS:		22.3	29.5			1.00	
		55% ELLIPSE:	20.8	7.7			WITH GAMMA = 44 DEGREES

## ANALYSIS T60-1 TABLE 1

SPECIFIC (GSM REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS

TAPPI OFFICIAL TEST METHOD T425 G3-75, CAPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - BAL TYPE

LAB CODE	SAMPLE E86 MEAN	GONDU 79 GRAMS PER SQUARE METER					SAMPLE G21 MEAN	M.F.P. RELEASE PAPER 73 GRAMS PER SQUARE METER					TEST D <sub>0</sub> = 10		
		DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR			DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR		VAR	F	LAB
L105	89.99	.30	.30	.33	.93		85.24	-.19	-.24	1.57	1.48		60H	Ø	L105
L108	92.43	.28	.37	.32	.89		89.29	.38	.75	.53	.50		60B	#	L108
L115	90.16	.53	.44	.24	.68		86.39	.96	1.18	.79	.74		60B	Ø	L115
L118	89.59	-.04	-.08	.32	.91		85.88	.45	.55	.75	.70		60B	Ø	L118
L122	89.44	-.19	-.30	.33	.93		84.50	-.93	-1.15	1.31	1.24		60D	Ø	L122
L123	89.52	-.11	-.44	.23	.65		86.65	1.22	1.50	.66	.62		60W	Ø	L123
L124	89.09	-.54	-1.03	.48	1.30		85.75	.32	.39	.88	.82		60B	Ø	L124
L125	89.88	.25	.40	.23	.65		85.37	-.06	-.08	1.24	1.16		60H	Ø	L125
L132	89.38	-.25	-.40	.30	.98		84.71	-.72	-.89	.89	.83		60B	Ø	L132
L139	89.60	-.03	-.00	.22	.61		85.55	.12	.14	.81	.77		60B	Ø	L139
L148H	89.15	-.46	-.34	.35	1.56		84.12	-1.31	-1.62	1.57	1.47		60H	Ø	L148H
L152	90.30	.67	1.29	.24	.86		87.17	1.74	2.14	.90	.85		60B	Ø	L152
L157	90.75	1.12	2.10	.35	1.00		86.00	.57	.70	1.63	1.54		60B	Ø	L157
L158	90.26	.63	1.21	.32	.91		86.32	.89	1.09	.73	.68		60D	Ø	L158
L162	90.17	.54	1.04	.36	1.00		86.26	.83	1.02	1.02	.96		60W	Ø	L162
L166	88.85	-.78	-1.30	.54	1.03		85.31	-.12	-.15	1.05	.98		60B	Ø	L166
L172	89.83	.20	.30	.34	.96		85.65	.22	.27	1.04	.98		60B	Ø	L172
L190C	88.89	-.74	-1.42	.15	.43		83.95	-1.48	-1.83	1.59	1.49		60B	Ø	L190C
L206	89.90	.27	.34	.28	.80		85.08	-.35	-.44	.86	.81		60B	Ø	L206
L210B	90.41	.78	1.30	.27	.77		86.85	1.42	1.74	.85	.80		60B	Ø	L210B
L210D	89.92	.29	.30	.34	.89		86.13	.70	.86	1.30	1.23		60D	Ø	L210D
L211S	89.04	-.59	-1.10	.28	.80		84.31	-1.12	-1.38	.88	.83		60R	Ø	L211S
L212	89.72	.09	.17	.39	1.11		86.00	.57	.70	1.22	1.15		60H	Ø	L212
L213	90.06	.43	.60	.64	1.80		85.33	-.10	-.13	1.01	.95		60B	Ø	L213
L223B	90.17	.54	1.04	.33	.93		86.30	.87	1.07	.91	.85		60B	Ø	L223B
L225	89.70	.07	.14	.44	1.25		85.47	.04	.04	.59	.56		60B	Ø	L225
L226B	88.81	-.82	-1.37	.35	.59		85.18	-.25	-.31	.95	.90		60B	Ø	L226B
L228	89.76	.13	.20	.58	1.63		84.84	-.59	-.73	1.11	1.04		60H	Ø	L228
L230	89.41	-.22	-.42	.15	.43		85.44	.01	.01	.84	.79		60B	Ø	L230
L238A	88.49	-1.14	-2.19	.17	.49		84.31	-1.12	-1.38	.57	.54		60R	Ø	L238A
L241	90.26	.63	1.21	.30	1.40		85.95	.56	.68	1.85	1.74		60B	Ø	L241
L243	89.38	-.25	-.40	.32	.90		85.83	.40	.49	.99	.93		60B	Ø	L243
L254	88.92	-.71	-1.30	.59	1.06		84.24	-1.19	-1.47	1.11	1.04		60H	Ø	L254
L259	90.07	.44	.60	.30	.85		86.65	1.22	1.50	.97	.92		60B	Ø	L259
L262	89.84	.21	.40	.16	.44		84.52	-.91	-1.13	.85	.80		60R	Ø	L262
L275	89.51	-.12	-.20	.37	1.03		85.25	-.18	-.23	.63	.59		60R	Ø	L275
L278	90.30	.67	1.29	1.57	4.42		84.70	-.73	-.90	1.57	1.47		60B	*	L278
L285D	89.36	-.27	-.40	.22	.61		85.61	.38	.46	1.03	.97		60D	Ø	L285D
L288	90.04	.41	.79	.25	.69		85.82	.39	.47	.92	.86		60D	Ø	L288
L301	89.54	-.09	-.17	.35	.98		84.84	-.59	-.73	.97	.91		60B	Ø	L301
L308	90.22	.59	1.10	.34	.97		86.25	.82	1.00	1.02	.96		60H	Ø	L308
L317	89.82	.19	.37	.31	.88		86.27	.84	1.03	1.38	1.29		60B	Ø	L317
L323	90.15	.52	1.00	.40	1.28		85.63	.40	.49	.60	.56		60W	Ø	L323
L339	89.80	.17	.33	.63	1.78		85.50	.07	.08	1.27	1.19		60B	Ø	L339
L341	89.16	-.47	-.80	.22	.63		84.62	-.81	-1.00	.67	.63		60R	Ø	L341
L348	89.47	-.16	-.31	.37	1.05		85.69	.26	.31	.89	.83		60D	Ø	L348
L349	88.84	-.79	-1.31	.59	1.05		84.33	-1.10	-1.36	.76	.71		60D	Ø	L349
L354	88.90	-.73	-1.40	.52	.89		84.40	-1.03	-1.27	1.17	1.10		60B	Ø	L354
L390	90.40	.77	1.40	.52	1.46		86.30	.87	1.07	1.64	1.54		60B	Ø	L390
L523	89.38	-.25	-.40	.27	.75		84.57	-.46	-.57	1.16	1.09		60R	Ø	L523
L543	89.08	-.55	-1.00	.36	.86		85.77	.34	.41	.56	.52		60D	Ø	L543
L571	89.23	-.40	-.77	3.28	9.23		86.61	1.18	1.45	.93	.87		60D	*	L571
L573	89.72	.09	.17	.33	.92		85.48	.05	.06	1.40	1.31		60H	Ø	L573
L581	89.99	.36	.60	.37	1.04		85.41	-.02	-.03	.99	.93		60B	Ø	L581
L587	89.55	-.08	-.10	.33	.94		84.90	-.53	-.66	.67	.63		60B	Ø	L587
L592	88.86	-.77	-1.40	.36	1.02		83.77	-1.66	-2.05	1.41	1.33		60W	Ø	L592
L594	89.54	-.09	-.17	.31	.80		85.39	-.04	-.05	.84	.79		60D	Ø	L594
L608	90.38	.75	1.44	.33	.94		86.69	1.26	1.55	1.66	1.56		60D	Ø	L608
L636	89.15	-.48	-.80	.23	.65		85.62	.19	.23	1.08	1.02		60R	Ø	L636
L654	89.71	.08	.10	.44	1.25		85.95	.52	.64	1.16	1.10		60D	Ø	L654
L673R	89.70	.07	.14	.41	1.15		85.69	.26	.31	1.35	1.27		60B	Ø	L673R
L673T	89.69	.06	.12	.40	1.28		85.29	-.14	-.18	1.71	1.61		60B	Ø	L673T
L692	89.57	-.06	-.11	.29	.83		84.18	-1.25	-1.54	1.24	1.17		60D	Ø	L692
L698	88.30	-1.33	-2.50	.39	1.09		83.72	-1.71	-2.11	1.83	1.73		60D	*	L698
L712	90.21	.58	1.11	.58	1.62		85.46	.03	.03	1.39	1.30		60B	Ø	L712

GR. MEAN = 89.63 PERCENT  
SD MEANS = .52 PERCENTGRAND MEAN = 85.43 PERCENT  
SD OF MEANS = .81 PERCENTTEST DETERMINATIONS = 10  
64 LABS IN GRAND MEANS

AVERAGE SDR = .45 PERCENT

AVERAGE SDR = 1.06 PERCENT

## ANALYSIS T60-1 TABLE 1

OPACITY (% REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS

TAPPI OFFICIAL TEST METHOD T425 G3-75, OPACITY OF PAPER (15 DEG/DIFFUSE, ILLUMINANT A) - B&amp;L TYPE

LAB CODE	SAMPLE E86 MEAN	BOND 79 GRAMS PER SQUARE METER				SAMPLE G21 MEAN	MOP RELEASE PAPER 73 GRAMS PER SQUARE METER				TEST D <sub>0</sub> = 10		
		DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR		DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	VAR	F	LAB
L224	89.18	-0.45	-0.00	0.25	0.78	84.07	-1.36	-1.68	1.19	1.11	60P	*	L224
L232	89.80	0.17	0.33	0.35	0.99	85.10	-0.33	-0.41	0.99	0.94	60P	*	L232
L249	90.09	0.40	0.08	0.30	1.59	86.06	1.23	1.51	0.71	0.67	60P	*	L249
L256	88.87	-0.76	-1.00	0.45	1.27	83.97	-1.46	-1.80	1.63	1.53	60N	*	L256
L312	88.10	-1.53	-2.00	0.32	0.89	83.05	-1.78	-2.20	0.58	0.55	60P	*	L312
L380	89.00	-0.63	-1.01	0.00	0.00	83.40	-2.03	-2.51	0.52	0.49	60P	*	L380
L625	89.05	0.02	0.04	0.47	1.34	85.65	0.22	0.27	0.78	0.74	60P	*	L625
L685B	89.40	-0.23	-0.44	0.42	1.13	85.20	-0.23	-0.29	1.06	1.00	60P	*	L685B
L687	89.23	-0.40	-0.77	0.34	0.90	84.91	-0.52	-0.65	1.11	1.04	60P	*	L687
L702	89.15	-0.48	-0.92	0.41	1.10	84.90	-0.53	-0.66	0.81	0.76	60P	*	L702
L704	89.30	-0.33	-0.00	0.48	1.30	NO DATA REPORTED FOR SAMPLE G21					60P	*	L704
L706	89.67	0.04	0.00	0.20	0.73	86.09	1.26	1.55	1.01	0.95	60X	*	L706
L738	90.13	0.50	0.00	0.34	0.97	86.79	1.36	1.67	0.96	0.90	60X	*	L738
TOTAL NUMBER OF LABORATORIES PARTICIPATING = 70													
Best values: E86 89.7 ± 0.9 percent													
G21 85.5 ± 1.2 percent													

The following laboratories were omitted from the grand means because of extreme test results: 108.



## ANALYSIS T60-1 TABLE 2

OPACITY (8% REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS  
TAPPI OFFICIAL TEST METHOD T425 CS-70, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS		
		EE6	G21	MAJOR	MINOR	MAJOR	VAR			
L312	*	88.10	83.65	-2.29	.03	.72	00P	OPACITY (WHITE BACKING)	82 T0	95%, PHOTOVOLT
L698	*	88.30	83.72	-2.13	.39	1.41	60D	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L238A	0	88.49	84.31	-1.52	.49	.51	60X	OPACITY (WHITE BACKING)	82 T0	95%, THWING-ALBERT (WAS SRL)
L226B	0	88.81	85.18	-0.00	.01	.94	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L349	0	88.84	84.33	-1.34	.19	1.18	60D	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L166	0	88.85	85.31	-0.47	.63	1.01	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L592	0	88.86	83.77	-1.83	-.09	1.18	60W	OPACITY (WHITE BACKING)	82 T0	95%, HUYGEN, DIGITAL
L256	*	88.87	83.97	-1.00	-.00	1.40	60N	OPACITY (WHITE BACKING)	82 T0	95%, HUNTER
L190C	0	88.89	83.95	-1.00	-.03	.96	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L354	0	88.90	84.40	-1.20	.17	1.00	60B	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L254	0	88.92	84.24	-1.39	.08	1.05	60H	OPACITY (WHITE BACKING)	82 T0	95%, HUYGEN
L380	*	89.00	83.40	-2.09	-.38	.24	00P	OPACITY (WHITE BACKING)	82 T0	95%, PHOTOVOLT
L211S	0	89.04	84.31	-1.27	.60	.61	60E	OPACITY (WHITE BACKING)	82 T0	95%, THWING-ALBERT (WAS SRL)
L543	0	89.08	85.77	.04	.64	.09	60D	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L124	0	89.09	85.75	.03	.02	1.09	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L636	0	89.15	85.62	-0.60	.51	.64	60R	OPACITY (WHITE BACKING)	82 T0	95%, THWING-ALBERT (WAS SRL)
L148H	0	89.15	84.12	-1.59	-.18	1.02	60H	OPACITY (WHITE BACKING)	82 T0	95%, HUYGEN
L702	*	89.15	84.90	-0.70	.18	.50	60P	OPACITY (WHITE BACKING)	82 T0	95%, PHOTOVOLT
L341	0	89.16	84.62	-0.94	.04	.03	60R	OPACITY (WHITE BACKING)	82 T0	95%, THWING-ALBERT (WAS SRL)
L224	*	89.18	84.07	-1.42	-.23	.95	60P	OPACITY (WHITE BACKING)	82 T0	95%, PHOTOVOLT
L687	*	89.23	84.91	-0.03	.11	1.00	60P	OPACITY (WHITE BACKING)	82 T0	95%, PHOTOVOLT
L571	*	89.23	86.61	.80	.90	5.05	60D	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L704	*	89.30				1.00	60P	OPACITY (WHITE BACKING)	82 T0	95%, PHOTOVOLT
L285D	0	89.36	85.81	.21	.41	.79	60D	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L132	0	89.38	84.71	-0.70	-.11	.91	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L523	0	89.38	84.97	-0.33	.01	.92	60R	OPACITY (WHITE BACKING)	82 T0	95%, THWING-ALBERT (WAS SRL)
L243	0	89.38	85.83	.24	.40	.91	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L685B	*	89.40	85.20	-0.31	.09	1.09	60P	OPACITY (WHITE BACKING)	82 T0	95%, PHOTOVOLT
L230	0	89.41	85.44	-0.10	.20	.61	60B	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L122	0	89.44	84.50	-0.92	-.26	1.08	60D	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L348	0	89.47	85.69	.15	.26	.94	60D	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L275	0	89.51	85.25	-0.22	.02	.61	60R	OPACITY (WHITE BACKING)	82 T0	95%, THWING-ALBERT (WAS SRL)
L123	0	89.52	86.65	1.03	.06	.04	60W	OPACITY (WHITE BACKING)	82 T0	95%, HUYGEN, DIGITAL
L594	0	89.54	85.35	-0.08	.06	.63	60D	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L301	0	89.54	84.84	-0.57	-.20	.94	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L587	0	89.55	84.90	-0.51	-.18	.79	60B	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L692	0	89.57	84.18	-1.14	-.33	1.00	60D	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L118	0	89.59	85.88	.38	.24	.60	60B	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L139	0	89.60	85.55	.09	.08	.69	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L625	*	89.65	85.65	.20	.68	1.04	60P	OPACITY (WHITE BACKING)	82 T0	95%, PHOTOVOLT
L706	*	89.67	86.65	1.13	.54	.64	00X	OPACITY, 82 T0	95%: GIVE INSTRUMENT MAKE, MODEL, BACKING	
L673T	0	89.69	85.25	-0.10	-.12	1.45	60B	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L673R	0	89.70	85.69	.20	.06	1.21	60B	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L225	0	89.70	85.47	.06	-.05	.90	60B	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L654	0	89.71	85.95	.49	.17	1.17	60D	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L212	0	89.72	86.00	.34	.18	1.15	60H	OPACITY (WHITE BACKING)	82 T0	95%, HUYGEN
L573	0	89.72	85.48	.08	-.06	1.12	60H	OPACITY (WHITE BACKING)	82 T0	95%, HUYGEN
L228	0	89.76	84.84	-0.47	-.39	1.04	60H	OPACITY (WHITE BACKING)	82 T0	95%, HUYGEN
L232	*	89.80	85.10	-0.22	-.31	.90	60P	OPACITY (WHITE BACKING)	82 T0	95%, PHOTOVOLT
L339	0	89.80	85.50	.14	-.12	1.49	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L317	0	89.82	86.27	.83	.22	1.09	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L172	0	89.83	85.65	.28	-.08	.97	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L262	0	89.84	84.52	-0.71	-.61	.62	60X	OPACITY (WHITE BACKING)	82 T0	95%, THWING-ALBERT (WAS SRL)
L125	0	89.88	85.37	.00	-.25	.91	60H	OPACITY (WHITE BACKING)	82 T0	95%, HUYGEN
L206	0	89.90	85.08	-0.19	-.40	.60	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L210D	0	89.92	86.13	.75	.06	1.60	60D	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L105	0	89.99	85.24	-0.01	-.41	1.21	60H	OPACITY (WHITE BACKING)	82 T0	95%, HUYGEN
L581	0	89.99	85.41	.15	-.33	.98	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L288	0	90.04	85.82	.53	-.19	.78	60D	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L213	0	90.06	85.33	.11	-.43	1.08	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB
L259	0	90.07	86.65	1.28	.17	.68	60B	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L249	*	90.09	86.66	1.30	.16	1.13	00P	OPACITY (WHITE BACKING)	82 T0	95%, PHOTOVOLT
L738	*	90.13	86.79	1.43	.18	.94	60X	OPACITY, 82 T0	95%: GIVE INSTRUMENT MAKE, MODEL, BACKING	
L323	0	90.15	85.83	.59	-.28	.92	60W	OPACITY (WHITE BACKING)	82 T0	95%, HUYGEN, DIGITAL
L115	0	90.16	86.39	1.09	-.03	.71	60B	OPACITY (WHITE BACKING)	82 T0	95%, HAUSCH * LOMB



## ANALYSIS T60-1 TABLE 2

OPACITY (8% REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS

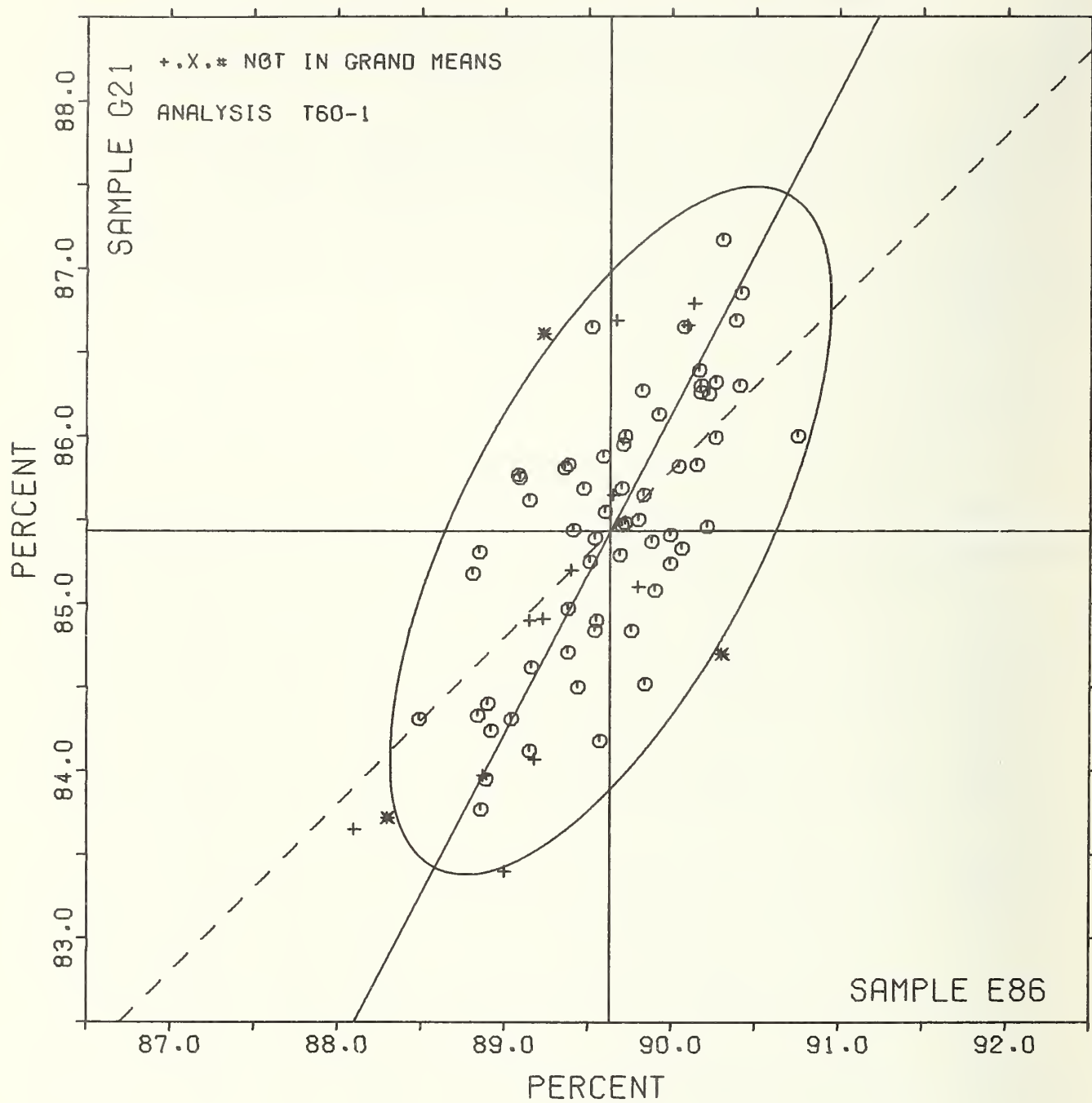
TAPPI OFFICIAL TEST METHOD T425 G3-73, OPACITY OF PAPER (15 DEG/DIFFUSE, ILLUMINANT A) - B&amp;L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG NO. SUR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		E86	G21	MAJOR	MINOR		
L223B	Ø	50.17	86.30	1.02	-0.08	0.09 60.0	OPACITY (WHITE BACKING)82 TØ 95%, BAUSCH * LOMB
L162	Ø	50.17	86.26	0.98	-0.10	0.08 60.0	OPACITY (WHITE BACKING)82 TØ 95%, HUYGEN, DIGITAL
L712	Ø	50.21	85.46	0.29	-0.50	1.45 60.0	OPACITY (WHITE BACKING)82 TØ 95%, BAUSCH * LOMB
L308	Ø	50.22	86.25	1.00	-0.15	0.56 60.0	OPACITY (WHITE BACKING)82 TØ 95%, HUYGEN
L241	Ø	50.26	85.59	0.78	-0.30	1.07 60.0	OPACITY (WHITE BACKING)82 TØ 95%, BAUSCH * LOMB
L158	Ø	50.26	86.32	1.08	-0.15	0.06 60.0	OPACITY (WHITE BACKING)82 TØ 95%, BNL-2
L278	*	50.30	84.70	-0.34	-0.93	2.04 60.0	OPACITY (WHITE BACKING)82 TØ 95%, BAUSCH * LOMB
L152	Ø	50.30	87.17	1.85	0.21	0.70 60.0	OPACITY (WHITE BACKING)82 TØ 95%, BAUSCH * LOMB
L608	Ø	50.38	86.69	1.40	-0.08	1.25 60.0	OPACITY (WHITE BACKING)82 TØ 95%, BNL-2
L390	Ø	50.40	86.30	1.12	-0.28	1.00 60.0	OPACITY (WHITE BACKING)82 TØ 95%, BAUSCH * LOMB
L210B	Ø	50.41	86.85	1.02	-0.04	0.79 60.0	OPACITY (WHITE BACKING)82 TØ 95%, BAUSCH * LOMB
L157	Ø	50.75	86.00	1.02	-0.73	1.27 60.0	OPACITY (WHITE BACKING)82 TØ 95%, BAUSCH * LOMB
L108	#	92.43	89.29	4.71	-0.70	0.70 60.0	OPACITY (WHITE BACKING)82 TØ 95%, BAUSCH * LOMB
GMEANS:		55.63	85.43			1.00	
		55% ELLIPSE:		2.27	0.90		WITH GAMMA = 62 DEGREES

OPACITY, B&L, 89% BACKING, FINE P.

SAMPLE E86 = 89.6 PERCENT

SAMPLE G21 = 85.4 PERCENT



OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY FINE PAPERS  
TAPPI OFFICIAL TEST METHOD T519 05-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	SAMPLE E86		BOND 79 GRAMS PER SQUARE METER				SAMPLE G21		M <sub>0</sub> F <sub>0</sub> RELEASE PAPER 73 GRAMS PER SQUARE METER				TEST D <sub>0</sub> " 10		
	MEAN	DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR		MEAN	DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR		VAR	F	LAB
L182E	91.96	-.02	-.007	.028	1.030		87.06	.034	.071	.099	1.004		60J	0	L182E
L233	92.01	.03	.012	.025	1.017		86.03	-.069	-1.045	.080	.084		60J	0	L233
L242	92.00	.02	.000	.021	1.000		87.09	.037	.078	.083	.088		60J	0	L242
L244	91.64	-.34	-1.027	.023	1.010		86.09	-.63	-1.032	1.025	1.032		60F	0	L244
L250T	92.02	.22	.004	.023	1.007		86.77	.005	.010	.097	1.002		60J	0	L250T
L251	94.57	2.59	9.77	.009	.042		90.96	4.24	8.91	1.009	1.015		60F	#	L251
L309	91.64	-.34	-1.027	.023	1.007		86.33	-.39	-.82	.072	.076		60J	0	L309
L313	92.33	.35	1.033	.010	.074		87.03	.031	.065	.096	1.001		60J	0	L313
L360	91.51	-.47	-1.070	.018	.085		86.31	-.41	-.86	1.006	1.011		60F	0	L360
L446	92.06	.09	.003	.020	1.025		86.63	-.09	-.19	.079	.083		60J	0	L446
L575	92.12	.14	.000	.019	.091		87.35	.063	1.032	.084	.088		60J	0	L575
L598	91.90	-.08	-.029	.014	.067		86.23	-.49	-1.003	1.045	1.053		60J	0	L598
L678	92.41	.43	1.000	.020	.096		87.35	.063	1.032	.074	.079		60J	0	L678
L685A	91.93	-.05	-.010	.019	.092		87.09	.037	.078	.092	.098		60F	0	L685A

GR<sub>0</sub> MEAN = 91.98 PERCENT

SD MEANS = .27 PERCENT

GRAND MEAN = 86.72 PERCENT

SD OF MEANS = .48 PERCENT

TEST DETERMINATIONS = 10

13 LABS IN GRAND MEANS

AVERAGE SDR = .021 PERCENT

AVERAGE SDR = .95 PERCENT

L118	91.37	-.61	-2.029	.019	.092		85.78	-.94	-1.97	.075	.079		60C	+	L118
L190C	91.62	-.30	-1.033	.033	1.037		86.08	-.64	-1.34	.092	.097		60C	+	L190C
L243	91.53	-.45	-1.009	.021	.097		85.91	-.81	-1.070	1.016	1.022		60C	+	L243
L543	91.01	-.97	-3.000	.038	1.082		85.36	-1.36	-2.86	.097	1.002		60V	+	L543
L626	91.50	-.48	-1.000	.000	.000		85.75	-.97	-2.04	1.003	1.009		60Q	+	L626

TOTAL NUMBER OF LABORATORIES REPORTING = 19

Best values: E86 92.0 ± 0.4 percent

G21 86.8 ± 0.7 percent

The following laboratories were omitted from the  
grand means because of extreme test results: 251.OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY FINE PAPERS  
TAPPI OFFICIAL TEST METHOD T519 05-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	F	MEANS		COORDINATES		AVG R <sub>0</sub> SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS							
		E86	G21	MAJOR	MINOR										
L543	+	91.01	85.36	-1.003	.034	1.042	60V	OPACITY (PAPER BACKING) 82 T0 95%,	DIAN0/BNL						
L118	+	91.37	85.78	-1.010	.013	.000	60C	OPACITY (PAPER BACKING) 82 T0 95%,	BAUSCH + LOMB						
L626	+	91.50	85.75	-1.000	.005	.000	60Q	OPACITY (PAPER BACKING) 82 T0 95%,	PH0T0V0LT						
L360	0	91.51	86.31	-.000	.027	.098	60F	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10)N0 TRAP						
L243	+	91.53	85.91	-.092	.009	1.010	60C	OPACITY (PAPER BACKING) 82 T0 95%,	BAUSCH + LOMB						
L190C	+	91.62	86.08	-.073	.007	1.027	60C	OPACITY (PAPER BACKING) 82 T0 95%,	BAUSCH + LOMB						
L244	0	91.64	86.09	-.071	.006	1.021	60F	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10)N0 TRAP						
L309	0	91.64	86.33	-.049	.015	.092	60J	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10) FILTER						
L598	0	91.90	86.23	-.048	-.012	1.010	60J	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10) FILTER						
L685A	0	91.93	87.09	.032	.019	.095	60F	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10)N0 TRAP						
L182E	0	91.96	87.06	.030	.015	1.017	60J	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10) FILTER						
L242	0	92.00	87.09	.030	.013	.094	60J	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10) FILTER						
L233	0	92.01	86.03	-.062	-.031	1.001	60J	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10) FILTER						
L446	0	92.06	86.63	-.000	-.011	1.004	60J	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10) FILTER						
L575	0	92.12	87.35	.003	.012	.090	60J	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10) FILTER						
L250T	0	92.20	86.77	.013	-.018	1.004	60J	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10) FILTER						
L313	0	92.33	87.03	.042	-.020	.008	60J	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10) FILTER						
L678	0	92.41	87.35	.070	-.014	.007	60J	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10) FILTER						
L251	#	94.57	90.96	4.093	-.068	.078	60F	OPACITY (PAPER BACKING) 82 T0 95%,	Z0ELREPH0,FMY-C(10)N0 TRAP						

GMEANS:

91.98 86.72

1.000

55% ELLIPSE:

1.01

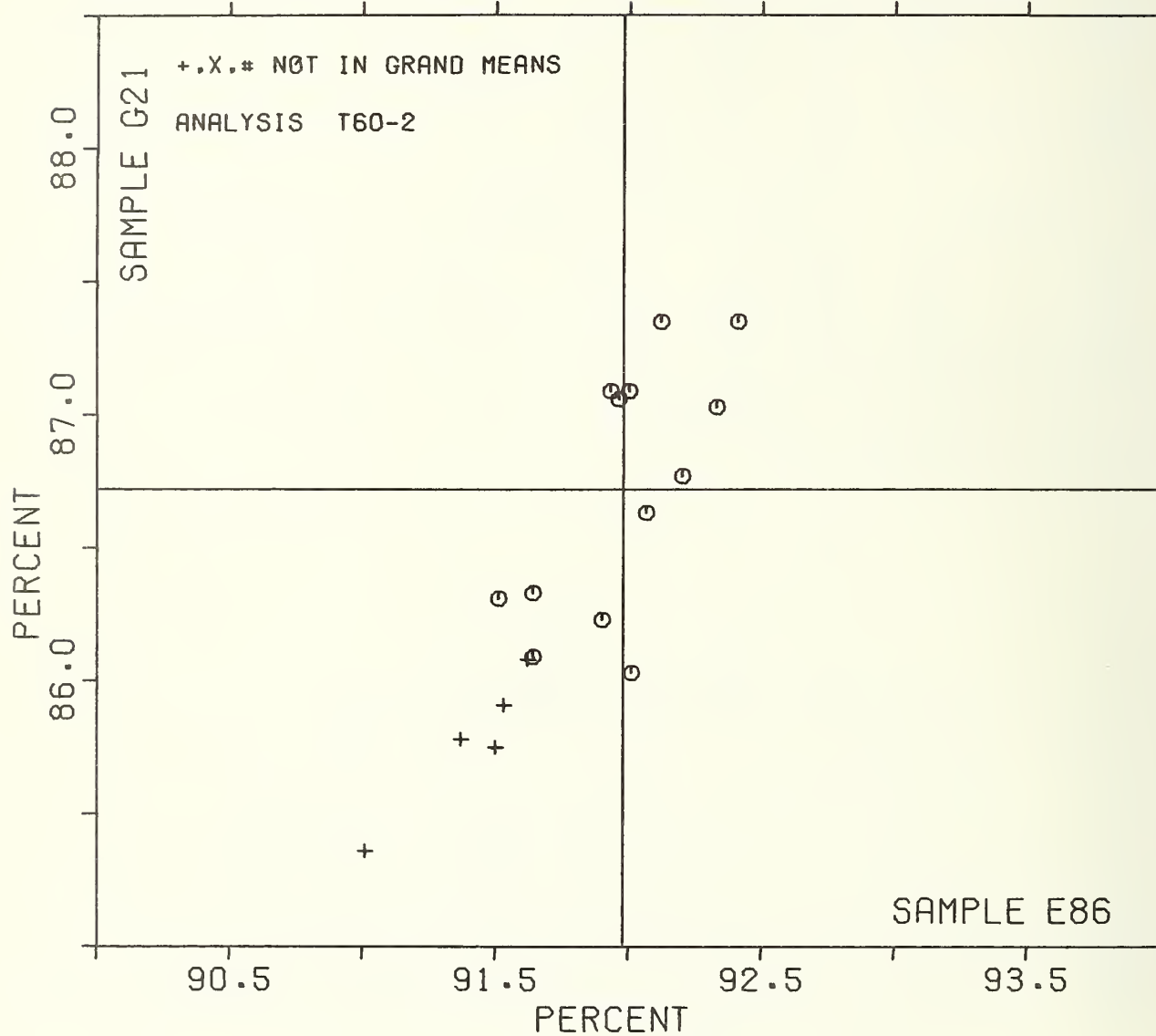
.054

WITH GAMMA = 66 DEGREES

# OPACITY, ELREPHO, PAPER BACKING, FINE P

SAMPLE E86 = 91.98 PERCENT

SAMPLE G21 = 86.72 PERCENT





## ANALYSIS T61-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY NEWS, DIRECTORY, AND CATALOG  
 TAPPI OFFICIAL TEST METHOD 1425 GS-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	15 LB. BOND					RAG BOND					TEST D <sub>0</sub> = 10		
	G13 MEAN	56 GRAMS PER DEV	SQUARE METER N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	B01 MEAN	75 GRAMS PER DEV	SQUARE METER N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	VAR	F	LAB
L121	81.66	.06	.000	.001	.093	75.20	.52	.61	.69	.96	61B	Ø	L121
L122	80.48	-1.12	-1.10	.53	1.41	74.31	-1.41	-1.65	1.28	1.79	61D	Ø	L122
L131	80.46	-1.14	-1.20	.54	.81	74.56	-1.16	-1.36	.54	.76	61R	Ø	L131
L134	83.57	1.97	2.00	.80	1.21	77.00	1.28	1.51	.73	1.02	61R	Ø	L134
L150B	79.35	-2.25	-2.00	.41	.03	75.70	-2.02	-2.37	.71	1.00	61B	Ø	L150B
L159	81.25	-.35	-.37	.07	1.01	75.08	-.04	-.04	.55	.77	61R	Ø	L159
L210B	82.21	.61	.00	.00	1.00	76.02	.30	.36	1.14	1.59	61B	Ø	L210B
L210D	81.78	.10	.10	.54	.82	75.54	-.18	-.21	.85	1.19	61D	Ø	L210D
L255	81.58	-.02	-.00	.75	1.14	75.46	-.26	-.30	.59	.83	61B	Ø	L255
L261	82.90	1.30	1.00	.00	1.33	77.50	1.78	2.10	.53	.74	61B	Ø	L261
L281	82.06	.40	.40	.01	.92	75.97	.25	.30	.81	1.14	61D	Ø	L281
L305	80.33	-1.27	-1.00	.04	.97	NO DATA REPORTED FOR SAMPLE B01					61B	M	L305
L315	81.33	-.27	-.29	.40	.69	75.42	-.30	-.35	.41	.57	61D	Ø	L315
L317	81.57	-.03	-.04	.15	.30	76.03	.31	.37	.54	.76	61B	Ø	L317
L318	81.40	-.20	-.21	1.35	2.05	76.05	.33	.39	.72	1.01	61B	Ø	L318
L326	80.67	-.73	-.77	.04	.97	75.34	-.38	-.44	.82	1.15	61B	Ø	L326
L328	83.00	1.40	1.40	1.00	1.00	75.70	-.02	-.02	1.14	1.59	61B	*	L328
L333	80.83	-.77	-.61	.00	1.01	75.75	.03	.04	.70	.98	61B	Ø	L333
L352	81.68	.08	.00	.40	.06	76.35	.63	.75	.52	.73	61R	Ø	L352
L581	81.15	-.45	-.40	1.11	1.08	75.69	-.03	-.03	.47	.65	61B	Ø	L581
L599	82.15	.55	.37	.55	.80	76.40	.68	.80	.94	1.31	61B	Ø	L599
L713	82.42	.82	.00	.40	.61	76.37	.65	.77	.75	1.05	61R	Ø	L713

GR<sub>0</sub> MEAN = 81.60 PERCENT

GRAND MEAN = 75.72 PERCENT

TEST DETERMINATIONS = 10

SD MEANS = .96 PERCENT

SD OF MEANS = .85 PERCENT

21 LABS IN GRAND MEANS

AVERAGE SDR = .66 PERCENT

AVERAGE SDR = .71 PERCENT

L150J	82.43	.82	.30	.42	.64	75.44	-.27	-.32	.58	.82	61J	*	L150J
L260	81.15	-.45	-.40	.47	.72	75.20	-.52	-.61	.42	.59	61P	*	L260
L738	81.86	.26	.27	.90	1.37	76.41	.69	.82	.72	1.01	61X	*	L738

TOTAL NUMBER OF LABORATORIES REPORTING = 25

Best values: G13 81.6 ± 1.9 percent  
 B01 75.7 ± 1.7 percent

## ANALYSIS T61-1 TABLE 2

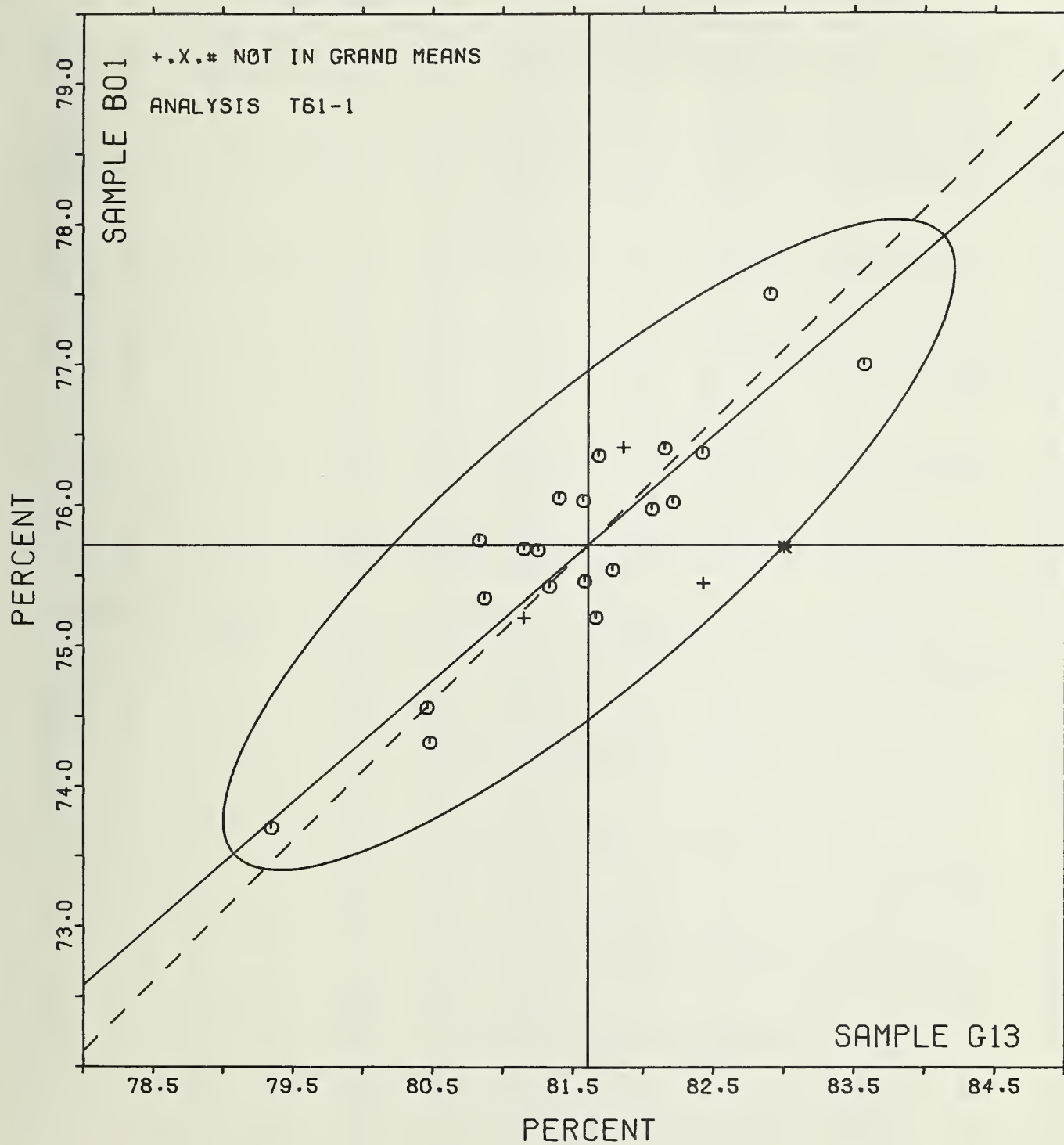
OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY NEWS, DIRECTORY, AND CATALOG  
 TAPPI OFFICIAL TEST METHOD 1425 G5-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY--TEST INSTRUMENT--CONDITIONS	
		G13	B01	MAJOR	MINOR	MAJOR	VAR		
L150B	Ø	79.35	73.70	-3.02	-0.04	0.01	61B	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L305	M	80.33				0.97	61B	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L131	Ø	80.46	74.56	-4.02	-0.12	0.78	61K	OPACITY (WHITE BACKING)70 T6 90%, THWING-ALBERT (WAS SRL)	
L122	Ø	80.48	74.31	-4.77	-0.32	1.00	61D	OPACITY (WHITE BACKING)70 T6 90%, BNL-2	
L333	Ø	80.83	75.75	-0.50	0.53	0.99	61B	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L326	Ø	80.87	75.34	-0.80	0.20	1.00	61B	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L260	+	81.15	75.20	-0.08	-0.09	0.06	61P	OPACITY (WHITE BACKING)70 T6 90%, PHOTOVOLT	
L581	Ø	81.15	75.69	-0.30	0.28	1.17	61B	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L159	Ø	81.25	75.68	-0.29	0.21	0.09	61K	OPACITY (WHITE BACKING)70 T6 90%, THWING-ALBERT (WAS SPL)	
L315	Ø	81.33	75.42	-0.40	-0.04	0.03	61D	OPACITY (WHITE BACKING)70 T6 90%, BNL-2	
L318	Ø	81.40	76.05	0.06	0.39	1.03	61B	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L317	Ø	81.57	76.03	0.18	0.26	0.53	61B	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L255	Ø	81.58	75.46	-0.19	-0.18	0.99	61B	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L121	Ø	81.66	75.20	-0.30	-0.43	0.55	61L	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L352	Ø	81.68	76.35	0.47	0.43	0.70	61K	OPACITY (WHITE BACKING)70 T6 90%, THWING-ALBERT (WAS SRL)	
L210D	Ø	81.78	75.54	0.02	-0.25	1.01	61D	OPACITY (WHITE BACKING)70 T6 90%, BNL-2	
L738	+	81.86	76.41	0.03	0.36	1.19	61X	OPACITY, 70 T6 90%; GIVE INSTRUMENT MAKE, MODEL, BACKING	
L281	Ø	82.06	75.97	0.51	-0.11	1.03	61D	OPACITY (WHITE BACKING)70 T6 90%, BNL-2	
L599	Ø	82.15	76.40	0.00	0.16	1.06	61B	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L210B	Ø	82.21	76.02	0.00	-0.17	1.00	61B	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L713	Ø	82.42	76.37	1.04	-0.04	0.03	61K	OPACITY (WHITE BACKING)70 T6 90%, THWING-ALBERT (WAS SRL)	
L150J	+	82.43	75.44	0.44	-0.74	0.73	61J	OPACITY (PAPER BACKING)70 T6 90%, Z. ELREPHØ, FMY-C(10) FILTER	
L261	Ø	82.90	77.50	2.15	0.50	1.03	61D	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L328	*	83.00	75.70	1.04	-0.93	1.05	61L	OPACITY (WHITE BACKING)70 T6 90%, BAUSCH + LOMB	
L134	Ø	83.57	77.00	2.33	-0.32	1.11	61K	OPACITY (WHITE BACKING)70 T6 90%, THWING-ALBERT (WAS SRL)	
GMEANS:		81.60	75.72			1.00			
		55% ELLIPSE:		3.35	0.97			WITH GAMMA = 41 DEGREES	

OPACITY, B&L, 89% BACKING, NEWS

SAMPLE G13 = 81.6 PERCENT

SAMPLE B01 = 75.7 PERCENT



## ANALYSIS T65-1 TABLE 1

## DIRECTIONAL BLUE REFLECTANCE IN PERCENT

TAPPI STANDARD T452 00-77, 'BRIGHTNESS'; MARTIN SWEETS (ACBT &amp; GE) IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE B47	RELEASE PAPER 82 GRAMS PER SQUARE METER				SAMPLE J34	PRINTING 73 GRAMS PER SQUARE METER				TEST D <sub>0</sub> = 8					
	MEAN	DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	MEAN	DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	VAR	F	LAB			
L108	65.96	.16	.024	.30	1.05	67.65	.38	.80	.18	1.02	65N	0	L108			
L115	65.34	-.46	-.009	.23	.66	67.55	.28	.59	.12	.69	65N	0	L115			
L122	65.27	-.53	-.079	.20	.74	67.22	-.04	-.09	.17	.96	65N	0	L122			
L132	65.14	-.60	-.099	.40	1.03	67.35	.08	.17	.19	1.11	65N	0	L132			
L158	65.57	-.23	-.094	.30	1.04	67.49	.22	.46	.21	1.21	65N	0	L158			
L172	65.65	-.10	-.023	.34	.99	67.15	-.12	-.25	.24	1.41	65A	0	L172			
L176A	65.46	-.34	-.091	.49	1.41	67.79	-1.48	-3.10	.06	.37	65A	+	L176A			
L210M	65.57	-.23	-.094	.41	1.20	67.31	.04	.09	.08	.48	65M	0	L210M			
L210N	66.04	.24	.099	.37	1.06	67.76	.49	1.03	.07	.43	65N	0	L210N			
L211	66.31	.51	.077	.40	1.30	67.51	.24	.51	.32	1.83	65N	0	L211			
L225	66.75	.90	1.042	.38	1.11	67.65	.38	.80	.12	.69	65N	0	L225			
L243	65.34	-.40	-.099	.30	1.04	67.07	-.19	-.40	.09	.51	65A	0	L243			
L256	64.85	-.90	-1.043	.33	.90	66.59	-.68	-1.42	.08	.48	65M	0	L256			
L275	65.59	-.21	-.092	.30	1.00	67.45	.18	.38	.20	1.15	65M	0	L275			
L285	65.62	-.18	-.090	.72	2.11	67.52	.26	.54	.14	.80	65N	0	L285			
L288	65.09	-.71	-1.007	.10	.48	67.30	.03	.07	.08	.44	65N	0	L288			
L308	65.04	-.70	-1.114	.33	.97	67.55	.28	.59	.09	.53	65N	0	L308			
L315	64.97	-.83	-1.024	.23	.67	67.25	-.02	-.04	.13	.75	65N	0	L315			
L317	65.32	-.48	-.071	.30	.60	67.34	.07	.15	.09	.53	65M	0	L317			
L523	66.04	.24	.090	.29	.80	67.05	-.22	-.46	.21	1.19	65N	0	L523			
L543	65.94	.14	.021	.39	1.12	66.95	-.32	-.67	.40	2.33	65M	0	L543			
L565	66.27	.47	.071	.20	.58	67.66	.39	.83	.19	1.11	65A	0	L565			
L598	66.92	1.12	1.009	.21	.62	67.79	.52	1.09	.10	.57	65N	0	L598			
L636A	66.42	.62	.094	.29	.80	67.29	.02	.04	.16	.95	65M	0	L636A			
L636B	67.11	1.31	1.097	.44	1.27	67.74	.47	.98	.14	.81	65M	0	L636B			
L636C	67.14	1.34	1.091	.40	1.34	67.35	.08	.17	.49	2.81	65M	0	L636C			
L673R	65.15	-.60	-.090	.22	.93	66.95	-1.32	-2.76	.56	3.23	65N	+	L673R			
L692	66.51	.71	1.007	.20	.70	67.21	-.06	-.12	.21	1.21	65N	0	L692			
GR <sub>0</sub> MEAN = 65.80 PERCENT														TEST DETERMINATIONS = 8		
SD MEANS = .67 PERCENT														28 LABS IN GRAND MEANS		
AVERAGE SDR = .34 PERCENT																
AVERAGE SDR = .17 PERCENT																
L105	65.95	.10	.022	.39	1.13	66.70	-.57	-1.19	.11	.62	65T	+	L105			
L155	68.46	2.60	3.099	.42	1.22	69.02	1.76	3.68	.21	1.18	65X	+	L155			
L213	66.39	.59	.090	.10	.42	67.16	-.11	-.22	.19	1.11	65T	+	L213			
L223	67.96	2.10	3.024	.29	.84	68.17	.91	1.90	.16	.91	65G	+	L223			
L224	66.64	.84	1.020	.13	.38	67.72	.46	.96	.14	.80	65H	+	L224			
L241	66.94	1.14	1.071	.37	1.09	67.55	.28	.59	.17	.97	65I	+	L241			
L249	68.47	2.67	4.001	.30	1.05	69.09	.82	1.71	.08	.48	65P	+	L249			
L259	64.56	-1.24	-1.000	.24	.71	67.05	-.22	-.46	.13	.75	65H	+	L259			
L260	66.26	.40	.099	.14	.41	66.50	1.23	2.58	.12	.69	65P	+	L260			
L278	67.69	1.89	2.009	.20	.75	66.06	.79	1.66	.18	1.02	65P	+	L278			
L301	66.04	.24	.090	.20	.70	66.10	.83	1.74	.09	.53	65G	+	L301			
L312	70.25	4.45	0.007	.38	1.10	66.69	1.42	2.97	.59	3.42	65P	+	L312			
L321	69.37	3.57	0.000	.44	1.29	69.56	2.29	4.80	.32	1.85	65P	+	L321			
L328	66.56	.76	1.014	.42	1.21	67.44	.17	.35	.32	1.85	65P	+	L328			
L339	73.87	8.07	12.111	.30	1.03	71.50	4.23	8.86	.53	3.08	65P	+	L339			
L380	68.87	3.07	4.001	.00	.00	70.00	2.73	5.72	.00	.00	65P	+	L380			
L442	65.45	-.35	-.090	.20	.58	66.75	-.52	-1.08	.09	.53	65T	+	L442			
L456	65.79	-.01	-.090	.19	.55	66.72	-1.54	-3.23	.22	1.26	65P	+	L456			
L562	75.00	9.20	13.800	.00	.00	73.00	5.73	11.99	.00	.00	65P	+	L562			
L587	65.04	-.70	-1.114	.40	1.15	67.36	.09	.20	.17	.97	65I	+	L587			
L617	67.06	1.20	1.099	.22	.64	69.19	1.92	4.02	.11	.65	65G	+	L617			
L625	67.12	1.32	1.099	.35	1.03	69.06	1.79	3.76	.32	1.85	65P	+	L625			
L626	69.12	3.32	4.099	.23	.67	69.44	2.17	4.54	.18	1.02	65P	+	L626			
L643	66.85	1.05	1.097	.50	1.45	67.19	-.08	-.17	.16	.95	65P	+	L643			
L684	66.12	.32	.099	.12	.34	66.26	-1.01	-2.10	.29	1.69	65H	+	L684			
L695	70.25	4.45	0.007	.40	1.30	70.00	2.73	5.72	.00	.00	65P	+	L695			
L698	65.52	-.28	-.091	.21	.60	67.59	.32	.67	.11	.65	65I	+	L698			
L704	68.19	2.39	3.000	.37	1.08	NO DATA REPORTED FOR SAMPLE J34								65P	+	L704
L706	66.55	.75	1.012	.22	.64	66.55	-.72	-1.50	.09	.53	65X	+	L706			
L738	68.15	2.30	3.002	.77	2.05	67.61	.34	.72	.18	1.04	65X	+	L738			
TOTAL NUMBER OF LABORATORIES REPORTING = 58																
Best values: B47 65.4 ± 1.4 percent																
J34 67.2 ± 0.6 percent																



## ANALYSIS T65-1 TABLE 2

## DIRECTIONAL BLUE REFLECTANCE IN PERCENT

TAPPI STANDARD T452 OS-77, 'BRIGHTNESS'; MARTIN SWEETS (ACBT &amp; GE) IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS		COORDINATES		AVG R <sub>0</sub> SUM	VAL	PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		H47	J34	MAJOR	MINOR					
L259	+	64.56	67.05	-1.21	0.34	0.73	65M	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L256	0	64.85	66.59	-1.15	-0.21	0.72	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L315	0	64.97	67.25	-0.75	0.34	0.71	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L587	+	65.04	67.36	-0.55	0.41	1.06	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2A	
L308	0	65.04	67.55	-0.57	0.58	0.75	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L288	0	65.09	67.30	-0.53	0.34	0.40	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L132	0	65.14	67.35	-0.50	0.36	1.22	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L673R	+	65.15	65.95	-1.15	-0.91	2.08	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L122	0	65.27	67.22	-0.49	0.19	0.85	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L317	0	65.32	67.34	-0.40	0.27	0.69	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L115	0	65.34	67.55	-0.30	0.45	0.67	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L243	0	65.34	67.07	-0.50	0.02	0.78	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L442	+	65.45	66.75	-0.54	-0.32	0.50	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
L176A	+	65.46	65.79	-0.94	-1.19	0.09	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L698	+	65.52	67.59	-0.11	0.41	0.62	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2A	
L210M	0	65.57	67.31	-0.18	0.14	0.64	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L158	0	65.57	67.49	-0.11	0.30	1.12	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L275	0	65.59	67.45	-0.11	0.26	1.10	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L285	0	65.62	67.52	-0.55	0.31	1.45	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L172	0	65.65	67.15	-0.19	-0.04	1.20	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L456	+	65.79	65.72	-0.07	-1.39	0.90	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L543	0	65.94	66.95	-0.01	-0.35	1.72	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L105	+	65.95	66.70	-0.11	-0.58	0.87	65T	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
L108	0	65.96	67.65	0.31	0.28	1.06	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L210N	0	66.04	67.76	0.43	0.34	0.75	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L301	+	66.04	68.10	0.57	0.65	0.65	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L523	0	66.04	67.05	0.12	-0.30	1.02	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L684	+	66.12	66.26	-0.14	-1.05	1.01	65M	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L260	+	66.26	68.50	0.95	0.91	0.55	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L565	0	66.27	67.66	0.60	0.15	0.84	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L211	0	66.31	67.51	0.57	0.00	1.57	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L213	+	66.39	67.16	0.48	-0.35	0.77	65T	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
L636A	0	66.42	67.29	0.57	-0.25	0.90	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L692	0	66.51	67.21	0.62	-0.36	0.58	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L706	+	66.55	66.55	0.37	-0.97	0.59	65X	BLUE REFLECTANCE; GIVE INSTR. ( ) DIFFUSE, ( ) DIRECTNL, TRAP?, BASE?		
L328	+	66.56	67.44	0.70	-0.17	1.53	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L224	+	66.64	67.72	0.95	0.05	0.59	65M	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L225	0	66.75	67.65	1.02	-0.06	0.90	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L643	+	66.85	67.19	0.91	-0.52	1.20	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L598	0	66.92	67.79	1.24	-0.01	0.59	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/M <sub>0</sub> S <sub>0</sub> , S-4	
L241	+	66.94	67.55	1.15	-0.23	1.03	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2A	
L617	+	67.06	69.19	1.90	1.19	0.64	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L636B	0	67.11	67.74	1.39	-0.14	1.04	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L625	+	67.12	69.06	1.57	1.05	1.44	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L636C	0	67.14	67.35	1.24	-0.50	2.08	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L278	+	67.69	68.06	2.05	-0.09	0.89	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L223	+	67.96	68.17	2.34	-0.11	0.87	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L738	+	68.15	67.61	2.27	-0.70	1.04	65X	BLUE REFLECTANCE; GIVE INSTR. ( ) DIFFUSE, ( ) DIRECTNL, TRAP?, BASE?		
L704	+	68.19				1.08	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L155	+	68.46	69.02	3.10	0.44	1.20	65X	BLUE REFLECTANCE; GIVE INSTR. ( ) DIFFUSE, ( ) DIRECTNL, TRAP?, BASE?		
L249	+	68.47	68.09	2.77	-0.41	0.77	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L380	+	68.87	70.00	3.95	1.15	1.21	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L626	+	69.12	69.44	3.93	0.53	0.55	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L321	+	69.37	69.56	4.21	0.54	1.57	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L312	+	70.25	68.69	4.03	-0.63	2.26	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L695	+	70.25	70.00	5.19	0.55	0.67	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L339	+	73.87	71.50	9.11	0.35	2.65	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L562	+	75.00	73.00	10.77	1.22	0.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	

GMEANS:

65.80 67.27

55% ELLIPSE:

1.88

1.07

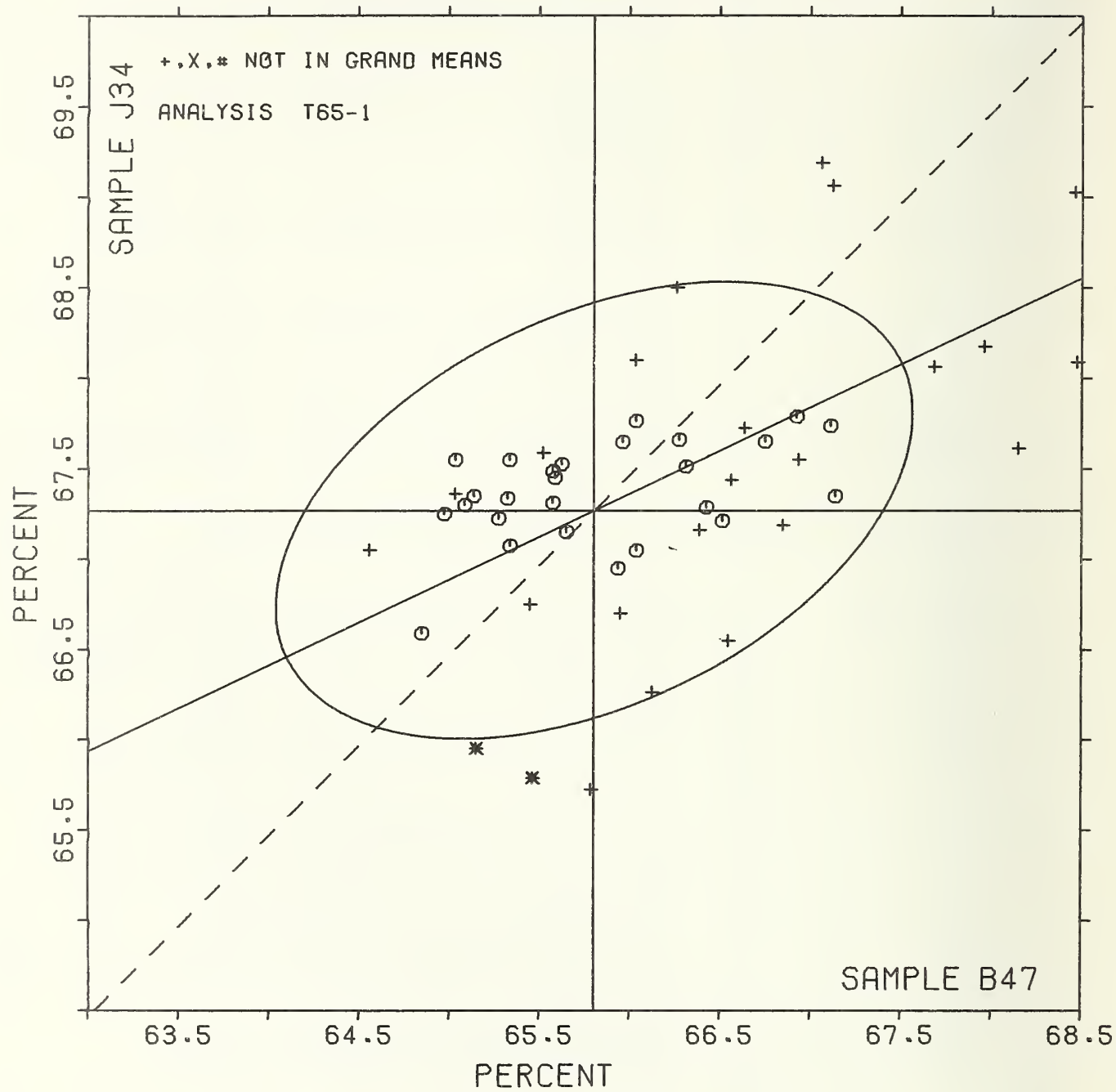
1.00

WILK GAMMA = 25 DEGREES

# BLUE REFLECTANCE, DIRECTIONAL

SAMPLE B47 = 65.8 PERCENT

SAMPLE J34 = 67.3 PERCENT



## ANALYSIS T65-2 TABLE 1

DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)

TAPPI SUGGESTED METHOD T65 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	SAMPLE B47		RELEASED PAPER 82 GRAMS PER SQUARE METER			SAMPLE J34	PRINTING 73 GRAMS PER SQUARE METER				TEST D <sub>0</sub> = 8		
	MEAN	DEV	NO DEV	SDR	R <sub>0</sub> SDR		MEAN	DEV	NO DEV	SDR	R <sub>0</sub> SDR	VAR	F LAB
L121	66.63	.07	.04	.18	.85	67.67	.57	.77	.14	.66	65K	0	L121
L150	64.21	-2.35	-3.00	.42	1.93	67.43	.33	.45	.37	1.73	65Q	#	L150
L170	66.60	.05	.07	.21	.95	67.01	-.08	-.11	.18	.84	65B	0	L170
L182	66.18	-.37	-.00	.10	.70	66.98	-.11	-.15	.19	.90	65F	0	L182
L210K	68.07	1.51	2.00	.10	.69	68.97	1.88	2.52	.13	.61	65K	0	L210K
L242	65.87	-.69	-1.00	.30	1.35	66.61	-.48	-.65	.17	.77	65F	0	L242
L244	67.41	.85	1.27	.20	1.04	66.61	-.48	-.65	.39	1.79	65F	0	L244
L250T	66.74	.18	.27	.30	1.36	66.55	-.54	-.73	.31	1.45	65F	0	L250T
L280	66.71	.15	.23	.13	.58	67.27	.17	.23	.18	.83	65Q	0	L280
L313	67.24	.69	1.00	.29	1.34	66.13	1.04	1.39	.18	.82	65K	0	L313
L325	71.68	5.13	7.00	.48	2.20	71.83	4.74	6.36	.12	.56	65F	#	L325
L349	65.34	-1.21	-1.81	.13	.59	65.77	-1.33	-1.78	.59	2.71	65K	0	L349
L446	66.21	-.35	-.02	.18	.84	66.83	-.26	-.35	.07	.31	65F	0	L446
L573	66.36	-.20	-.29	.24	1.08	67.35	.25	.34	.17	.77	65F	0	L573
L575	66.56	.01	.01	.22	1.02	66.79	-.30	-.41	.30	1.39	65F	0	L575
L598	65.85	-.70	-1.00	.24	1.11	66.97	-.13	-.17	.12	.55	65K	0	L598
L680	66.55	-.00	-.00	.30	1.52	66.90	-.19	-.25	.13	.60	65K	0	L680

GR<sub>0</sub> MEAN = 66.55 PERCENT

GRAND MEAN = 67.09 PERCENT

TEST DETERMINATIONS = 8

SD MEANS = .67 PERCENT

SD OF MEANS = .75 PERCENT

15 LABS IN GRAND MEANS

AVERAGE SDR = .22 PERCENT

AVERAGE SDR = .22 PERCENT

L289 66.17 -.38 -.07 .17 .76 67.31 .22 .29 .08 .39 65B \* L289  
 TOTAL NUMBER OF LABORATORIES REPORTING = 18

Best values: B47 66.5 ± 1.0 percent  
 J34 67.0 ± 1.2 percent

The following laboratories were omitted from the  
 grand means because of extreme test results: 325.

## ANALYSIS T65-2 TABLE 2

DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)

TAPPI SUGGESTED METHOD T65 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

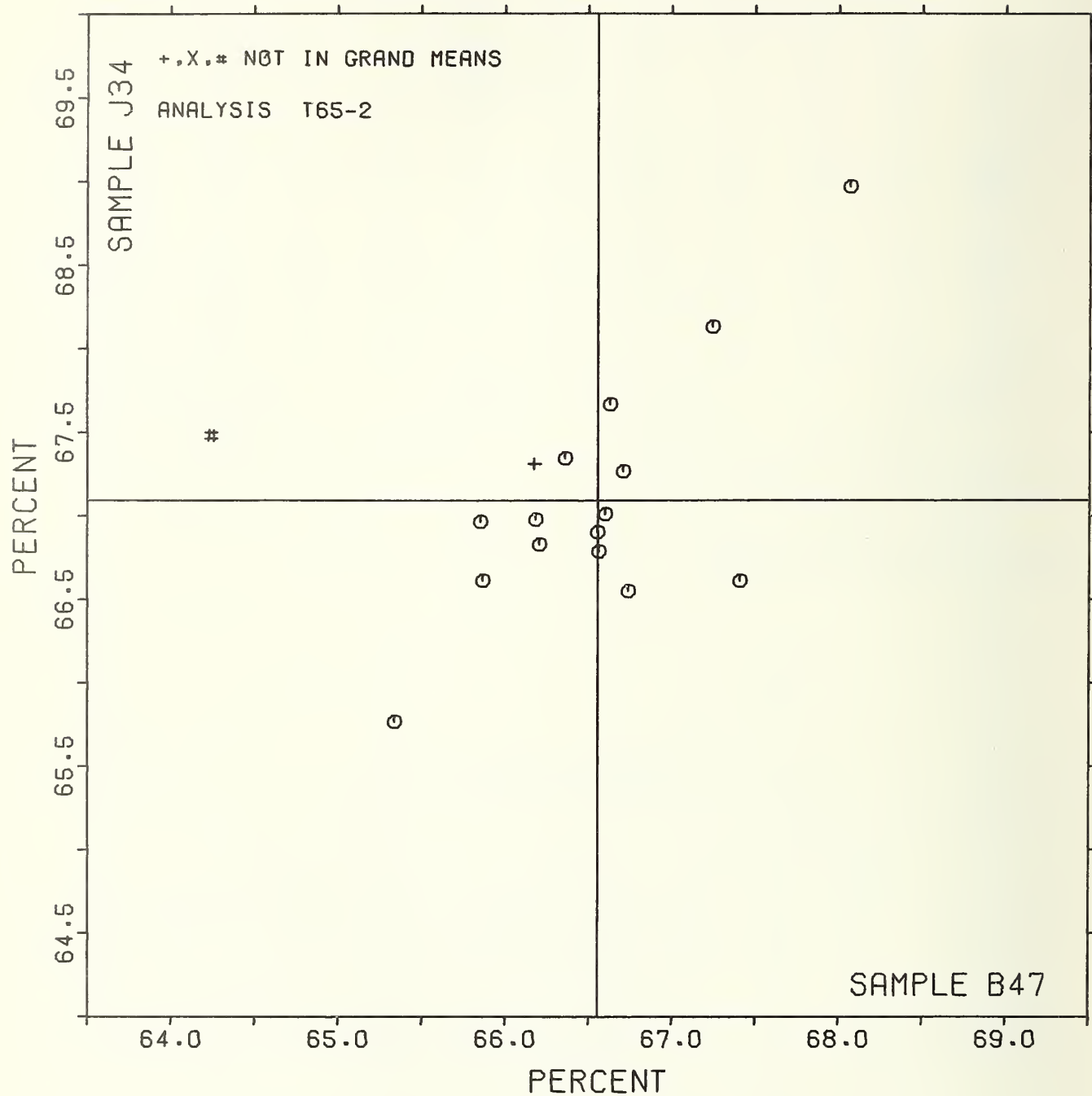
LAB CODE	F	MEANS		COORDINATES		AVG Δ <sub>SDR</sub> VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS						
		B47	J34	MAJOR	MINOR								
L150	#	64.21	67.43	-1.29	1.59	1.00	65Q	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	ZEISS	ABSOLUTE	BASE
L349	0	65.34	65.77	-1.80	.00	1.00	65A	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	MG0 (ZEISS)	BASE	
L598	0	65.85	66.97	-.06	.45	.60	65K	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	MG0 (ZEISS)	BASE	
L242	0	65.87	66.61	-.81	.20	1.00	65F	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	NRC-PTB	ABSOLUTE	BASE
L289	*	66.17	67.31	-.08	.43	.57	650	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	SPECIFIC	CALIBRATION	
L182	0	66.18	66.98	-.33	.21	.66	65F	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	NRC-PTB	ABSOLUTE	BASE
L446	0	66.21	66.83	-.43	.09	.57	65F	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	NRC-PTB	ABSOLUTE	BASE
L573	0	66.36	67.35	.00	.31	.52	65F	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	NRC-PTB	ABSOLUTE	BASE
L680	0	66.55	66.90	-.14	-.12	1.00	65K	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	MG0 (ZEISS)	BASE	
L575	0	66.56	66.79	-.23	-.20	1.00	65F	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	NRC-PTB	ABSOLUTE	BASE
L170	0	66.60	67.01	-.03	-.09	.69	65B	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	NBS	ABSOLUTE	BASE
L121	0	66.63	67.67	.48	.32	.75	65K	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	MG0 (ZEISS)	BASE	
L280	0	66.71	67.27	.23	-.00	.70	65Q	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	ZEISS	ABSOLUTE	BASE
L250T	0	66.74	66.55	-.29	-.50	1.41	65F	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	NRC-PTB	ABSOLUTE	BASE
L313	0	67.24	68.13	1.23	.16	1.08	65K	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	MG0 (ZEISS)	BASE	
L244	0	67.41	66.61	.20	-.96	1.42	65F	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	NRC-PTB	ABSOLUTE	BASE
L210K	0	68.07	68.97	2.41	.19	.65	65A	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	MG0 (ZEISS)	BASE	
L325	#	71.68	71.83	.09	-.76	1.00	65F	DIFFUSE REFLECTANCE,	ELREPH0,	GL0TRAP,	NRC-PTB	ABSOLUTE	BASE
GMEANS:		66.55	67.09			1.00							
		95% ELLIPSE:		2.08	1.02			WITH GAMMA = 49 DEGREES					



# BLUE REFLECTANCE, DIFFUSE, WITH TRAP

SAMPLE B47 = 66.6 PERCENT

SAMPLE J34 = 67.1 PERCENT





## ANALYSIS T65-3 TABLE 1

## DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)

TAPPI SUGGESTED METHOD T65-3 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	RELEASED PAPER					PRINTING					TEST D <sub>0</sub> = 8		
	B47 MEAN	82 GRAMS PER DEV	SQ. METRE N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	J34 MEAN	73 GRAMS PER DEV	SQ. METRE N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	VAR	F	LAB
L152	67.75	-0.48	-0.03	0.11	0.47	67.38	-0.46	-1.43	0.22	1.27	65E	0	L152
L157	68.14	-0.08	-0.10	0.20	1.15	66.00	0.15	0.46	0.12	0.68	65E	0	L157
L161	69.19	0.90	1.00	0.20	1.13	66.24	0.40	1.22	0.30	1.71	65E	0	L161
L194	67.68	-0.54	-0.30	0.24	1.00	67.70	-0.15	-0.47	0.21	1.18	65E	0	L194
L238A	68.49	0.27	0.41	0.09	0.40	66.42	0.57	1.76	0.07	0.40	65E	0	L238A
L241	66.08	-2.15	-3.79	0.21	0.93	66.64	-1.21	-3.74	0.14	0.80	65E	#	L241
L251	67.93	-0.30	-0.32	0.22	0.96	67.32	-0.53	-1.62	0.24	1.39	65E	0	L251
L255	69.18	0.95	1.00	0.30	1.33	67.97	0.12	0.37	0.43	2.45	65D	0	L255
L309	69.00	0.77	1.30	0.26	1.13	67.98	0.13	0.40	0.12	0.69	65J	0	L309
L360	68.14	-0.08	-0.10	0.30	1.53	66.06	0.21	0.65	0.16	0.91	65E	0	L360
L384	68.06	-0.17	-0.29	0.19	0.84	67.87	0.03	0.08	0.05	0.26	65S	0	L384
L565	67.76	-0.47	-0.62	0.18	0.81	67.77	-0.07	-0.22	0.09	0.51	65W	0	L565
L685	67.52	-0.71	-1.20	0.10	0.80	67.45	-0.40	-1.24	0.09	0.53	65E	0	L685
L734	68.12	-0.11	-0.19	0.31	1.38	67.86	0.01	0.03	0.18	1.01	65E	0	L734

GR. MEAN = 68.23 PERCENT

GRAND MEAN = 67.85 PERCENT

TEST DETERMINATIONS = 8

SD MEANS = 0.57 PERCENT

SD OF MEANS = 0.32 PERCENT

13 LABS IN GRAND MEANS

AVERAGE SDR = 0.23 PERCENT

AVERAGE SDR = 0.17 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 14

Best values: B47 68.2 ± 0.9 percent

J34 67.9 ± 0.5 percent

The following laboratories were omitted from the  
grand means because of extreme test results: 241.

## ANALYSIS T65-3 TABLE 2

## DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)

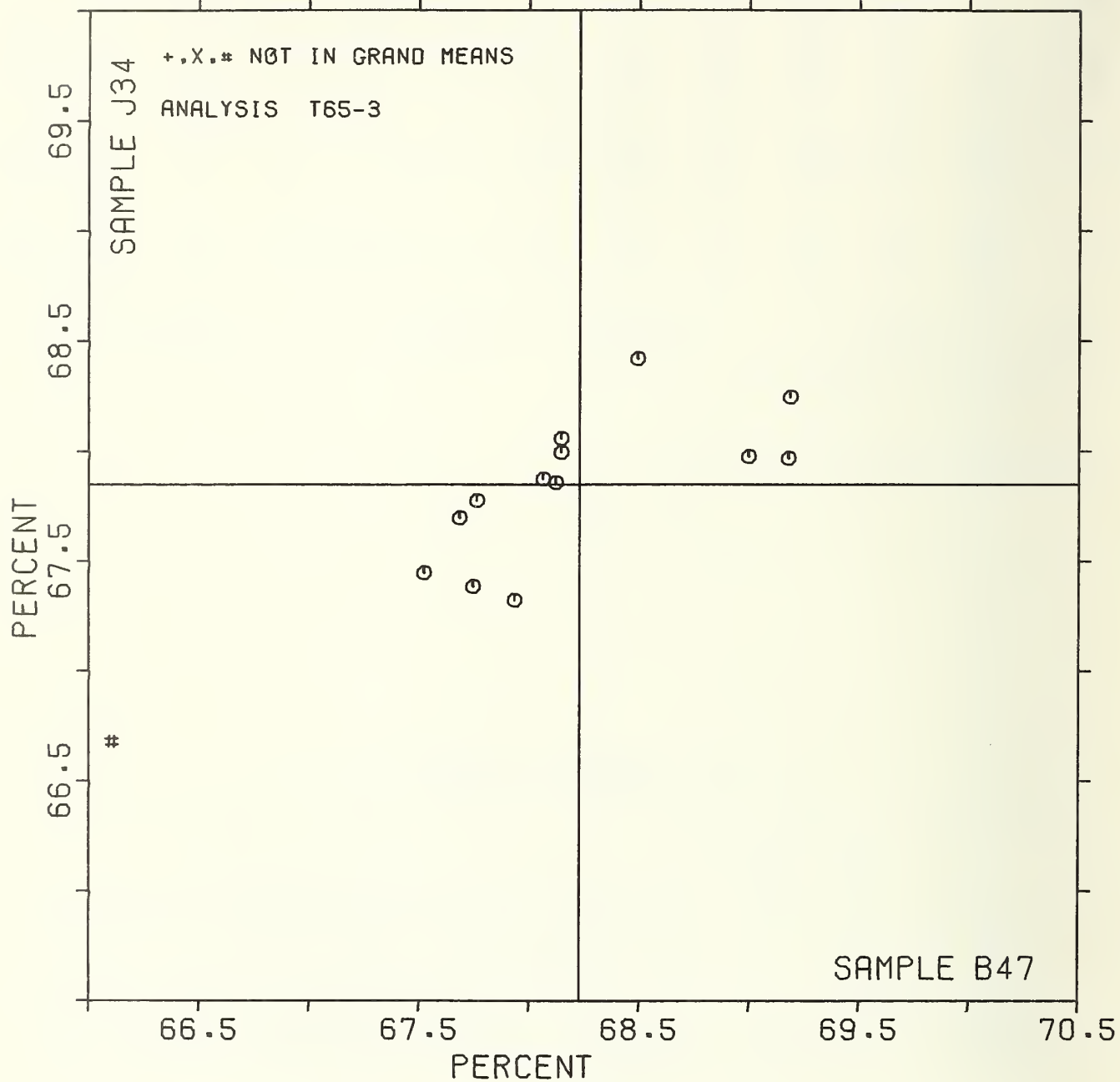
TAPPI SUGGESTED METHOD T65-3 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	F	MEANS		COORDINATES		AVG X <sub>0</sub> SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS					
		B47	J34	MAJOR	MINOR								
L241	#	66.08	66.64	-2.40	-0.21	0.07	0.55	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MG0 (ZEISS) BASE					
L685	0	67.52	67.45	-0.81	-0.07	0.00	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MG0 (ZEISS) BASE					
L194	0	67.68	67.70	-0.50	0.09	1.012	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MG0 (ZEISS) BASE					
L152	0	67.75	67.38	-0.03	-0.22	0.07	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MG0 (ZEISS) BASE					
L565	0	67.76	67.77	-0.40	0.13	0.00	0.5W	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, NBS MG0 BASE					
L251	0	67.93	67.32	-0.49	-0.36	1.018	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MG0 (ZEISS) BASE					
L384	0	68.06	67.87	-0.14	0.09	0.55	0.5S	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, ABSOLUTE-UNKNOWN BASE					
L734	0	68.12	67.86	-0.09	0.05	1.019	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MG0 (ZEISS) BASE					
L157	0	68.14	68.00	-0.02	0.17	0.91	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MG0 (ZEISS) BASE					
L360	0	68.14	68.06	0.01	0.23	1.022	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MG0 (ZEISS) BASE					
L238A	0	68.49	68.42	0.48	0.41	0.40	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MG0 (ZEISS) BASE					
L309	0	69.00	67.98	0.70	-0.20	0.91	0.5J	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, NBS ABSOLUTE					
L255	0	69.18	67.97	0.91	-0.28	1.059	0.5D	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, NEC-PTB ABSOLUTE					
L161	0	69.19	68.24	1.04	-0.03	1.042	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MG0 (ZEISS) BASE					
GMEANS:		68.23	67.85			1.000							
		95% ELLIPSE:		1.81	0.65			WITH GAMMA = 24 DEGREES					

# BLUE REFLECTANCE, DIFFUSE, NO TRAP

SAMPLE B47 = 68.2 PERCENT

SAMPLE J34 = 67.8 PERCENT



SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - HIGH RANGE  
TAPPI OFFICIAL TEST METHOD T480 G-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	SAMPLE E48 MEAN	COATED GLOSS 91 GRAMS PER SQUARE METER				SAMPLE B80 MEAN	COATED OFFSET BOOK 75 GRAMS PER SQUARE METER				TEST D <sub>0</sub> = 10		
		DEV	N <sub>0</sub> DEV	SDR	% SDR		DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	VAR	F	LAB
L108	64.1	-.1	-.000	1.05	.92	62.8	1.8	.79	1.7	.89	75H	0	L108
L121	65.1	.9	.042	1.7	1.08	60.7	-.3	-.13	3.0	1.56	75H	0	L121
L122	65.8	1.5	.73	1.2	.74	63.4	2.4	1.05	1.4	.70	75H	0	L122
L132	67.2	2.9	1.40	1.7	1.06	63.4	2.4	1.07	2.6	1.34	75G	0	L132
L172	62.6	-1.7	-.000	1.0	.65	59.2	-1.8	-.79	1.7	.87	75H	0	L172
L189	64.4	.1	.017	1.0	1.00	59.2	-1.8	-.79	1.2	.63	75P	0	L189
L190C	61.6	-2.0	-1.000	1.7	1.08	59.7	-1.3	-.57	2.1	1.09	75G	0	L190C
L206	65.4	1.2	.033	1.0	1.03	62.6	1.6	.69	2.1	1.10	75H	0	L206
L210	67.8	3.0	1.072	1.9	1.17	65.6	4.7	2.04	2.3	1.20	75H	0	L210
L211	63.0	-1.3	-.002	2.1	1.31	60.1	-.9	-.40	2.3	1.19	75H	0	L211
L230	64.8	.5	.020	2.0	1.25	61.4	.4	.18	1.8	.94	75H	0	L230
L243	64.3	.0	.002	2.3	1.42	61.0	.0	.00	2.1	1.08	75H	0	L243
L251	64.7	.4	.021	1.3	.79	57.3	-3.7	-1.62	1.7	.87	75G	*	L251
L253P	67.6	3.3	1.000	1.5	.97	60.1	-.9	-.40	2.2	1.12	75G	*	L253P
L255	65.2	.9	.043	1.6	1.11	61.6	.7	.29	2.0	1.01	75G	0	L255
L256	66.2	1.9	.94	1.9	1.21	62.9	1.9	.84	2.0	1.04	75H	0	L256
L262	64.6	.4	.19	.7	.42	62.1	1.1	.48	1.9	.95	75K	0	L262
L278	62.5	-1.7	-.000	1.7	1.06	58.9	-4.1	-1.78	1.8	.91	75G	0	L278
L279	64.9	.0	.01	.9	.55	63.4	2.4	1.05	1.3	.65	75G	0	L279
L291	63.1	-1.2	-.000	1.5	.96	60.3	-.6	-.28	1.7	.88	75H	0	L291
L301	65.3	1.0	.040	1.2	.78	63.6	2.8	1.24	1.9	.95	75H	0	L301
L317	63.8	-.4	-.021	1.3	.80	59.8	-1.1	-.50	2.3	1.19	75H	0	L317
L321	64.1	-.2	-.000	1.1	.68	58.4	-2.6	-1.14	1.6	.65	75G	0	L321
L323	60.3	-3.9	-1.007	1.7	1.05	59.7	-1.3	-.56	2.7	1.38	75H	0	L323
L339	67.2	2.9	1.044	1.1	.71	63.4	2.4	1.05	1.8	.91	75P	0	L339
L349	58.3	-6.0	-2.000	1.7	1.09	45.6	-15.4	-6.75	1.9	.97	75H	#	L349
L388	57.6	-6.7	-3.010	1.0	1.11	55.6	-5.3	-2.34	2.3	1.19	75P	*	L388
L483	64.0	-.2	-.012	1.0	1.03	59.8	-1.2	-.52	2.1	1.09	75H	0	L483
L573	63.5	-.8	-.030	2.5	1.60	59.8	-1.2	-.52	1.5	.80	75G	0	L573
L574	60.5	-3.3	-1.001	1.3	.81	56.5	-2.5	-1.10	1.3	.66	75G	0	L574
L587	66.0	1.7	.000	1.9	1.22	64.3	3.3	1.45	2.2	1.14	75H	0	L587
L592	62.9	-1.3	-.003	1.2	.77	56.6	-2.4	-1.04	1.4	.70	75H	0	L592
L598	62.5	-1.8	-.000	1.4	.86	59.9	-1.1	-.49	1.9	.95	75H	0	L598
L643	64.8	.6	.027	1.0	1.00	61.8	.8	.34	2.0	1.03	75H	0	L643
L654	66.3	2.0	.97	1.7	1.09	62.8	1.9	.81	2.6	1.35	75H	0	L654
L668	64.3	.1	.002	2.4	1.51	60.4	-.6	-.26	1.9	.96	75G	0	L668
L670	65.7	1.5	.70	1.2	.72	64.6	3.6	1.56	2.6	1.36	75H	0	L670
L697	63.7	-.5	-.000	2.1	1.34	61.7	.7	.31	1.3	.66	75H	0	L697
L704	63.4	-.9	-.044	.6	.53	NO DATA REPORTED FOR SAMPLE B80					75P	N	L704

GR. MEAN = 64.3 GLOSS UNITS

SD MEANS = 2.1 GLOSS UNITS

AVERAGE SDR = 1.06 GLOSS UNITS

GRAND MEAN = 61.0 GLOSS UNITS

SD OF MEANS = 2.3 GLOSS UNITS

AVERAGE SDR = 1.09 GLOSS UNITS

TEST DETERMINATIONS = 10

37 LABS IN GRAND MEANS

L250 64.9 .6 .034 2.9 1.84 53.7 -7.3 -3.20 1.3 .69 75Q \* L250

L738 63.2 -1.0 -.049 1.7 1.09 58.4 -2.6 -1.15 2.5 1.29 75X \* L738

TOTAL NUMBER OF LABORATORIES REPORTING = 41

Best values: E48 64 ± 4 gloss units

B80 61 ± 3 gloss units

The following laboratories were omitted from the  
grand means because of extreme test results: 349.

SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - HIGH RANGE  
TAPPI OFFICIAL TEST METHOD T480 05-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

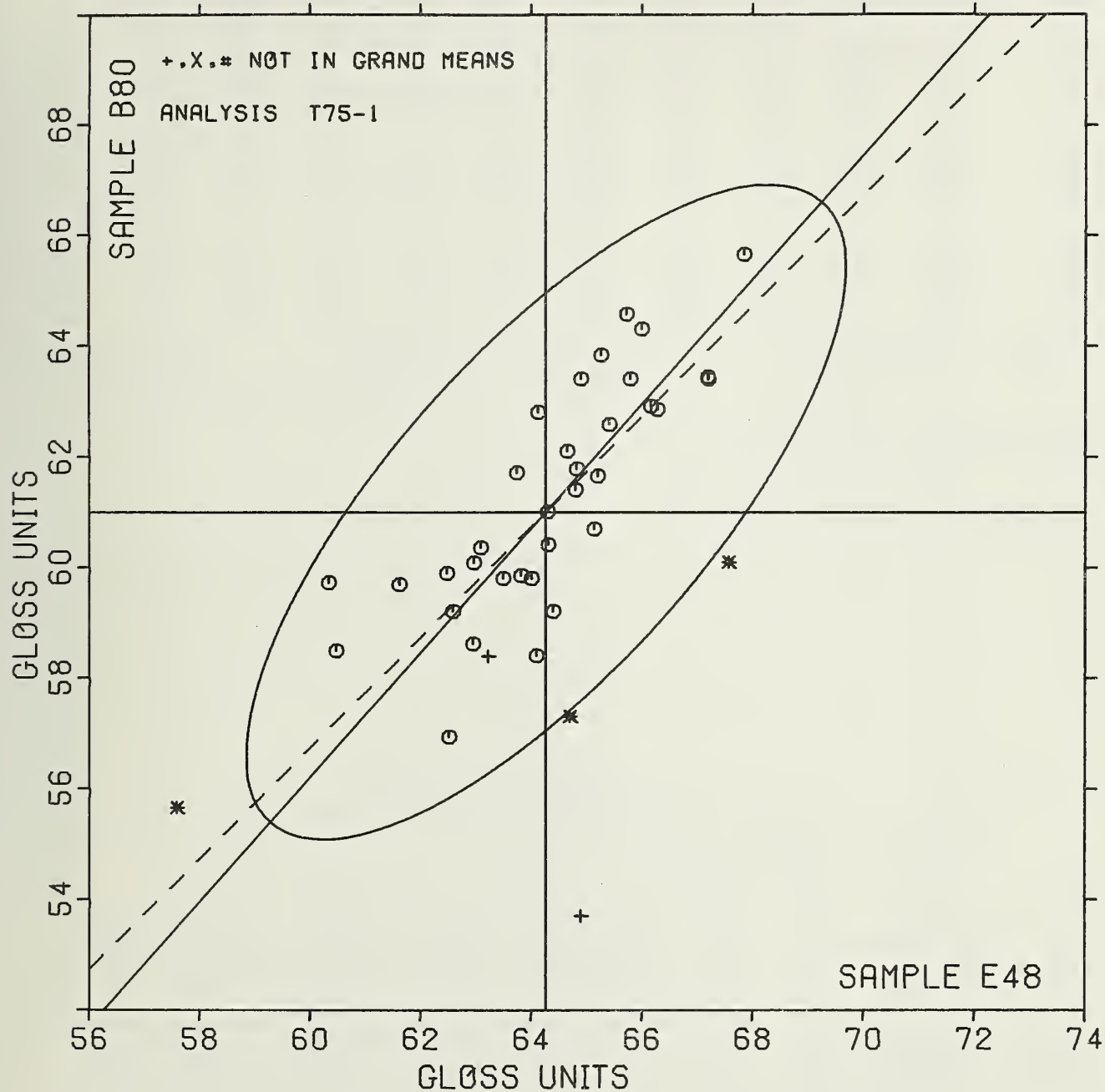
LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY--TEST INSTRUMENT--CONDITIONS				
		E48	B80	MAJOR	MINOR	ROUNDER	VAR					
L388	*	57.0	55.6	-0.4	1.4	1.15	75P	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, PHOTOVOLT	
L349	#	58.3	45.6	-15.0	-0.8	1.03	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L323	@	60.3	59.7	-3.0	2.1	1.21	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L574	@	60.5	58.5	-4.4	1.2	0.74	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, GARDNER	
L190C	@	61.6	59.7	-2.7	1.1	1.09	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, GARDNER	
L598	@	62.5	59.9	-2.0	0.6	0.90	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L278	@	62.5	56.9	-4.2	-1.4	0.98	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, GARDNER	
L172	@	62.6	59.2	-2.0	0.1	0.70	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L592	@	62.9	58.6	-2.0	-0.6	0.73	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L211	@	63.0	60.1	-1.5	0.4	1.25	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L291	@	63.1	60.3	-1.3	0.4	0.92	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L738	*	63.2	58.4	-2.0	-1.0	1.19	75X	SPECULAR	GLOSS, 75	DEGREE: GIVE INSTRUMENT MAKE + MODEL		
L704	M	63.4				0.33	75P	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, PHOTOVOLT	
L573	@	63.5	59.8	-1.4	-0.2	1.20	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, GARDNER	
L697	@	63.7	61.7	0.2	0.9	1.00	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L317	@	63.8	59.8	-1.2	-0.4	0.99	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L483	@	64.0	59.8	-1.1	-0.6	1.06	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L321	@	64.1	58.4	-2.0	-1.6	0.76	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, GARDNER	
L108	@	64.1	62.8	1.3	1.3	0.91	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L243	@	64.3	61.0	0.0	-0.0	1.25	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, BAUSCH + LOMB	
L668	@	64.3	60.4	-0.4	-0.4	1.23	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, GARDNER	
L189	@	64.4	59.2	-1.3	-1.3	0.62	75P	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, PHOTOVOLT	
L262	@	64.6	62.1	1.1	0.4	0.69	75K	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, GAERTNER (K-C TYPE)	
L251	*	64.7	57.3	-2.5	-2.8	0.63	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, GARDNER	
L230	@	64.8	61.4	0.7	-0.1	1.10	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L643	@	64.8	61.8	1.0	0.1	1.02	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L250	*	64.9	53.7	-3.0	-5.3	1.20	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, PHOTOVOLT, 20C, 65%RH	
L279	@	64.9	63.4	2.2	1.1	0.60	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, GARDNER	
L121	@	65.1	60.7	0.4	-0.9	1.32	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L255	@	65.2	61.6	1.1	-0.3	1.06	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, GARDNER	
L301	@	65.3	63.8	2.8	1.1	0.07	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L206	@	65.4	62.6	1.9	0.2	1.06	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L670	@	65.7	64.6	3.0	1.3	1.04	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L122	@	65.8	63.4	2.8	0.5	0.72	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L587	@	66.0	64.3	3.0	0.9	1.18	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L256	@	66.2	62.9	2.7	-0.2	1.12	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L654	@	66.3	62.8	2.7	-0.3	1.22	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	
L132	@	67.2	63.4	3.8	-0.6	1.20	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, GARDNER	
L339	@	67.2	63.4	3.7	-0.6	0.61	75P	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, PHOTOVOLT	
L253P	*	67.6	60.1	1.0	-3.1	1.04	75G	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, GARDNER	
L210	@	67.8	65.6	5.9	0.4	1.19	75H	SPECULAR	GLOSS, 75	DEGREE, 50-95	UNITS, HUNTER	

GMEANS: 64.3 61.0 1.00  
95% ELLIPSE: 7.5 2.9 WITH GAMMA = 48 DEGREES



# SPECULAR GLOSS, 75 DEGREE-HIGH RANGE

SAMPLE E48 = 64.3 GLOSS UNITS      SAMPLE B80 = 61.0 GLOSS UNITS





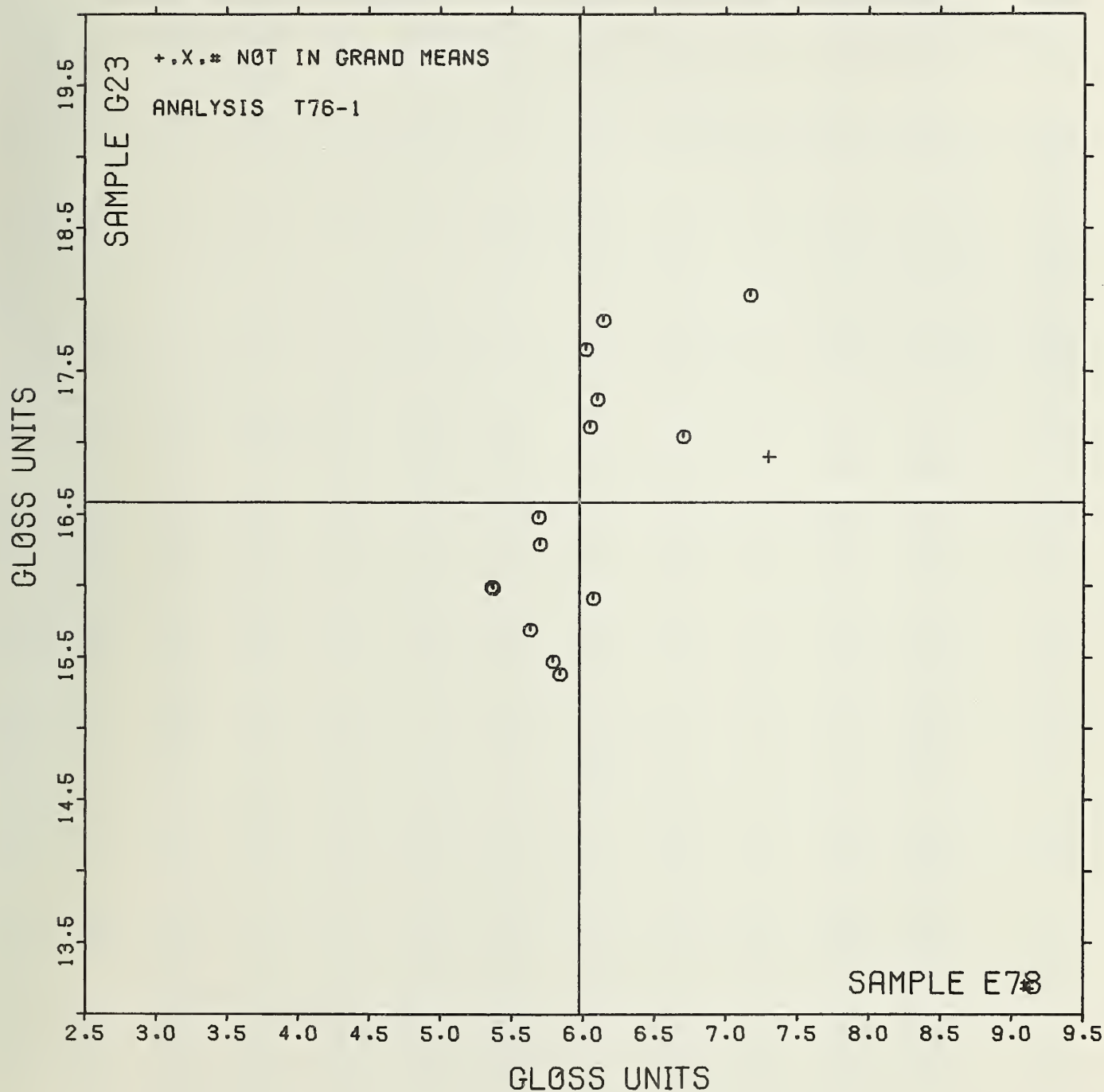
# SPECULAR GLOSS, 75 DEGREE-LOW RANGE

SAMPLE E78 = 6.0

GLOSS UNITS

SAMPLE G23 = 16.6

GLOSS UNITS



TAPPI COLLABORATIVE REFERENCE PROGRAM  
ANALYSIS T90-1 TABLE 1  
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH  
TAPPI OFFICIAL TEST METHOD T411 OS-76

NOVEMBER 1979

LAB CODE	SAMPLE J22 MEAN	PRINTING 89 GRAMS PER SQUARE METER				SAMPLE A88 MEAN	BLEACHED BAG 82 GRAMS PER SQUARE METER				TEST D <sub>0</sub> = 10		
		DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR		DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	VAR	F	LAB
L105	3.010	0.006	0.00	0.032	0.06	5.300	0.043	0.45	0.047	0.81	90Q	Ø	L105
L118	2.982	-0.022	-0.01	0.044	0.93	5.330	0.073	0.76	0.074	1.27	90Q	Ø	L118
L122	3.041	0.037	0.01	0.028	0.59	5.287	0.030	0.31	0.036	0.62	90V	Ø	L122
L123F	3.188	0.184	0.000	0.030	1.05	5.491	0.234	2.41	0.082	1.41	90F	*	L123F
L125	2.944	-0.060	-0.00	0.097	2.04	5.236	-0.021	-0.21	0.065	1.12	90T	Ø	L125
L128	3.006	0.002	0.00	0.041	0.86	5.286	0.029	0.30	0.047	0.81	90T	Ø	L128
L141	3.003	-0.001	-0.00	0.030	0.75	5.213	-0.044	-0.45	0.057	0.98	90T	Ø	L141
L158	2.990	-0.014	-0.00	0.057	1.19	5.270	0.013	0.14	0.067	1.16	90T	Ø	L158
L159	3.040	0.030	0.00	0.049	1.02	5.276	0.019	0.20	0.062	1.07	90T	Ø	L159
L162	2.926	-0.073	-1.00	0.050	1.04	5.255	-0.002	-0.02	0.059	1.02	90V	Ø	L162
L166	3.043	0.039	0.00	0.040	0.97	5.357	0.100	1.03	0.051	0.88	90T	Ø	L166
L172	2.991	-0.013	-0.10	0.048	1.01	5.225	-0.032	-0.32	0.072	1.25	90T	Ø	L172
L174	3.020	0.010	0.00	0.079	1.05	5.440	0.183	1.89	0.107	1.85	90T	Ø	L174
L182	3.061	0.057	0.00	0.040	0.90	5.284	0.027	0.28	0.043	0.75	90L	Ø	L182
L183	3.025	0.021	0.00	0.059	1.24	5.293	0.036	0.38	0.064	1.10	90T	Ø	L183
L190C	2.950	-0.054	-0.70	0.053	1.11	5.130	-0.127	-1.30	0.067	1.16	90T	Ø	L190C
L203A	2.965	-0.039	-0.00	0.047	1.00	5.090	-0.167	-1.71	0.084	1.45	90T	Ø	L203A
L203C	2.975	-0.029	-0.00	0.059	1.04	5.250	-0.007	-0.07	0.041	0.70	90T	Ø	L203C
L212	2.986	-0.018	-0.00	0.052	1.09	5.239	-0.018	-0.18	0.063	1.08	90T	Ø	L212
L213	3.060	-0.004	-0.00	0.000	0.60	5.260	0.003	0.04	0.117	2.02	90T	Ø	L213
L223	2.954	-0.050	-0.70	0.041	0.80	5.206	-0.051	-0.52	0.039	0.67	90V	Ø	L223
L228	3.010	0.006	0.00	0.074	1.55	5.230	-0.027	-0.27	0.048	0.83	90T	Ø	L228
L233	3.106	0.102	1.00	0.060	1.20	5.252	-0.005	-0.05	0.046	0.80	90Q	Ø	L233
L238A	2.988	-0.010	-0.00	0.064	1.34	5.251	-0.006	-0.06	0.062	1.08	90T	Ø	L238A
L241	3.047	0.043	0.00	0.084	1.70	5.398	0.141	1.46	0.067	1.15	90T	Ø	L241
L242Ø	2.825	-0.179	-0.00	0.037	0.78	5.157	-0.099	-1.02	0.066	1.13	90Ø	*	L242Ø
L242P	2.856	-0.148	-0.00	0.000	1.36	5.138	-0.119	-1.22	0.072	1.25	90Ø	Ø	L242P
L249	3.027	0.023	0.00	0.042	0.89	5.275	0.018	0.19	0.059	1.02	90T	Ø	L249
L259	3.083	0.079	1.10	0.024	0.50	5.366	0.109	1.13	0.059	1.01	90Q	Ø	L259
L260	3.024	0.020	0.00	0.033	0.69	5.205	-0.052	-0.53	0.031	0.54	90T	Ø	L260
L261	3.101	0.097	1.00	0.058	1.23	5.375	0.118	1.22	0.052	0.89	90T	Ø	L261
L262	2.995	-0.009	-0.10	0.069	1.44	5.200	-0.057	-0.58	0.058	0.99	90T	Ø	L262
L285	3.070	0.260	0.00	0.040	1.01	5.470	0.213	2.20	0.048	0.83	90T	X	L285
L291	3.128	0.124	1.70	0.044	0.93	5.367	0.110	1.14	0.058	0.99	90T	Ø	L291
L305	2.995	-0.009	-0.10	0.010	0.33	5.205	-0.052	-0.53	0.037	0.64	90T	Ø	L305
L309	2.950	-0.054	-0.70	0.053	1.11	5.330	0.073	0.76	0.067	1.16	90T	Ø	L309
L315	3.075	0.071	0.00	0.054	1.13	5.385	0.128	1.32	0.063	1.08	90T	Ø	L315
L318	2.870	-0.134	-1.00	0.032	0.07	5.175	-0.082	-0.84	0.061	1.05	90T	Ø	L318
L320	2.960	-0.044	-0.00	0.040	0.96	5.215	-0.042	-0.43	0.041	0.71	90T	Ø	L320
L323	3.085	0.081	1.10	0.053	1.11	5.410	0.153	1.58	0.046	0.79	90T	Ø	L323
L324	3.010	0.006	0.00	0.040	0.96	5.185	-0.072	-0.74	0.047	0.82	90T	Ø	L324
L326	3.055	0.051	0.70	0.037	0.77	5.340	0.083	0.86	0.057	0.98	90T	Ø	L326
L328	2.975	-0.029	-0.00	0.029	0.60	5.178	-0.079	-0.81	0.035	0.61	90T	Ø	L328
L333	3.020	0.010	0.00	0.035	0.73	5.275	0.018	0.19	0.075	1.30	90V	Ø	L333
L339	2.966	-0.038	-0.00	0.044	0.93	5.146	-0.111	-1.14	0.039	0.67	90T	Ø	L339
L341	3.084	0.080	1.10	0.033	0.70	5.350	0.093	0.96	0.025	0.44	90T	Ø	L341
L352	3.069	0.060	0.00	0.040	0.97	5.220	-0.037	-0.38	0.022	0.38	90Q	Ø	L352
L356	2.947	-0.057	-0.70	0.014	0.30	5.242	-0.015	-0.15	0.049	0.84	90T	Ø	L356
L358	2.942	-0.062	-0.00	0.049	1.02	5.187	-0.070	-0.72	0.051	0.89	90T	Ø	L358
L376	2.850	-0.154	-2.00	0.110	2.42	5.195	-0.062	-0.63	0.080	1.37	90T	Ø	L376
L380	3.040	0.030	0.00	0.052	1.08	5.280	0.023	0.24	0.042	0.73	90T	Ø	L380
L382	3.035	0.031	0.00	0.041	0.86	5.330	0.073	0.76	0.059	1.01	90T	Ø	L382
L390	2.982	-0.022	-0.01	0.035	0.73	5.248	-0.009	-0.09	0.064	1.10	90T	Ø	L390
L442	3.161	0.157	0.10	0.041	0.80	5.464	0.207	2.14	0.045	0.78	90V	Ø	L442
L556	2.994	-0.010	-0.10	0.039	0.82	5.201	-0.056	-0.57	0.054	0.92	90T	Ø	L556
L571	2.910	-0.094	-1.00	0.057	1.19	5.030	-0.227	-2.33	0.106	1.82	90V	Ø	L571
L574	2.969	-0.035	-0.00	0.040	1.00	5.168	-0.149	-1.53	0.069	1.19	90V	Ø	L574
L575	2.971	-0.033	-0.00	0.042	0.85	5.210	-0.047	-0.48	0.067	1.15	90T	Ø	L575
L576	3.040	0.036	0.00	0.031	0.65	5.110	-0.147	-1.51	0.032	0.54	90T	*	L576
L581	3.090	0.086	1.10	0.032	0.60	5.335	0.078	0.81	0.085	1.47	90T	Ø	L581
L587	2.940	-0.064	-0.00	0.052	1.08	5.320	0.063	0.65	0.042	0.73	90T	Ø	L587
L625	2.985	-0.019	-0.00	0.070	1.57	5.157	-0.100	-1.02	0.071	1.22	90T	Ø	L625
L626	2.909	-0.095	-1.00	0.027	0.57	5.044	-0.213	-2.19	0.066	1.13	90T	Ø	L626
L704	2.895	-0.109	-1.00	0.050	1.04	NO DATA REPORTED FOR SAMPLE A88					90T	M	L704
L713	3.150	0.140	0.00	0.033	0.70	5.405	0.148	1.53	0.050	0.86	90T	Ø	L713



TAPPI COLLABORATIVE REFERENCE PROGRAM  
ANALYSIS T90-1 TABLE 1  
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH  
TAPPI OFFICIAL TEST METHOD T411 OS-76

NOVEMBER 1979

LAB CODE	SAMPLE J22 89 GRAMS PER SQUARE METER					SAMPLE A88 82 GRAMS PER SQUARE METER					TEST D <sub>0</sub> = 10		
	MEAN	DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	MEAN	DEV	N <sub>0</sub> DEV	SDR	R <sub>0</sub> SDR	VAR	F	LAB
L737	2.940	-.064	-.059	.052	1.03	5.205	-.052	-.53	.050	.86	90T	6	L737
GR <sub>0</sub> MEAN = 3.004 MILS					GRAND MEAN = 5.257 MILS					TEST DETERMINATIONS = 10			
SD MEANS = .072 MILS					SD OF MEANS = .097 MILS					64 LABS IN GRAND MEANS			
AVERAGE SDR = .048 MILS					AVERAGE SDR = .058 MILS								
GR <sub>0</sub> MEAN = 76.30 MICROMETER					GRAND MEAN = 133.52 MICROMETER								
L106	3.000	-.004	-.000	.000	.00	5.040	-.217	-2.23	.052	.89	90C	*	L106
L108	2.985	-.019	-.20	.088	1.85	5.130	-.127	-1.30	.042	.73	90C	*	L108
L134	3.129	.125	1.74	.051	1.07	5.437	.180	1.86	.053	.91	90X	*	L134
L185	3.140	.136	1.09	.070	1.47	5.450	.193	1.99	.097	1.67	90B	*	L185
L203B	2.850	-.154	-2.14	.053	1.11	5.060	-.197	-2.02	.052	.89	90C	*	L203B
L243	3.010	.006	.000	.055	1.10	5.262	.005	.06	.058	1.01	90S	*	L243
L251	3.010	.000	.000	.040	.97	5.299	.043	.44	.059	1.02	90W	*	L251
L342	2.925	-.079	-1.10	.042	.89	5.175	-.082	-.84	.026	.45	90U	*	L342
L344	2.930	-.074	-1.03	.189	3.90	5.200	.003	.04	.076	1.20	90U	*	L344
L563	3.030	.026	.000	.007	1.42	5.320	.063	.65	.063	1.09	90U	*	L563
L616	2.880	-.124	-1.72	.000	.00	5.200	-.057	-.58	.000	.00	90C	*	L616
L684	3.050	.046	.004	.053	1.11	5.270	.013	.14	.082	1.42	90U	*	L684
L702	3.020	.016	.22	.092	1.93	5.040	-.217	-2.23	.052	.89	90X	*	L702
L706	3.080	.070	1.03	.063	1.33	5.340	.083	.86	.070	1.20	90X	*	L706
L731	2.987	-.018	-.24	.064	1.34	5.217	-.040	-.41	.062	1.07	90A	*	L731
TOTAL NUMBER OF LABORATORIES REPORTING = 61													
Best values: J22 3.00 ± 0.14 mils													
A88 5.25 ± 0.18 mils													

TAPPI COLLABORATIVE REFERENCE PROGRAM  
ANALYSIS T90-1 TABLE 2  
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH  
TAPPI OFFICIAL TEST METHOD T411 GS-76

NOVEMBER 1979

LAB CODE	F	MEANS		COORDINATES		AVG NO. SUR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS			
		J22	A68	MAJOR	MINOR						
L242B	*	2.825	5.157	-0.181	0.095	0.96	900	THICKNESS (CALIPER),	MESSMER,	METER DRIVEN,	BS3983
L203B	*	2.850	5.060	-0.249	0.020	1.00	90C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN	
L376	Ø	2.850	5.195	-0.130	0.095	1.00	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L242P	Ø	2.856	5.138	-0.160	0.058	1.01	90P	THICKNESS (CALIPER),	MESSMER,	METER DRIVEN,	
L318	Ø	2.870	5.175	-0.142	0.007	0.96	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L616	*	2.880	5.200	-0.110	0.072	0.90	90C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN	ISO R534
L704	M	2.895				1.04	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L626	Ø	2.909	5.044	-0.230	-0.038	0.85	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L571	Ø	2.910	5.030	-0.241	-0.046	1.01	90V	THICKNESS (CALIPER),	TMI,	METER DRIVEN, DIGITIZED	
L342	*	2.925	5.175	-0.112	0.021	0.97	90U	THICKNESS (CALIPER),	TMI,	HAND DRIVEN	
L162	Ø	2.926	5.255	-0.044	0.064	1.03	90V	THICKNESS (CALIPER),	TMI,	METER DRIVEN, DIGITIZED	
L344	*	2.930	5.260	-0.038	0.064	2.08	90U	THICKNESS (CALIPER),	TMI,	HAND DRIVEN	
L737	Ø	2.940	5.205	-0.078	0.025	0.97	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L587	Ø	2.940	5.320	0.018	0.068	0.90	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L358	Ø	2.942	5.187	-0.092	0.013	0.95	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L125	Ø	2.944	5.236	-0.050	0.039	1.05	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L356	Ø	2.947	5.242	-0.044	0.040	0.97	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L190C	Ø	2.950	5.130	-0.135	-0.025	1.03	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L309	Ø	2.950	5.330	0.031	0.086	1.03	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L223	Ø	2.954	5.206	-0.070	0.014	0.77	90V	THICKNESS (CALIPER),	TMI,	METER DRIVEN, DIGITIZED	
L320	Ø	2.960	5.215	-0.053	0.014	0.94	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L203A	Ø	2.965	5.090	-0.160	-0.059	1.02	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L339	Ø	2.966	5.146	-0.113	-0.029	0.90	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L574	Ø	2.969	5.108	-0.143	-0.053	1.09	90V	THICKNESS (CALIPER),	TMI,	METER DRIVEN, DIGITIZED	
L575	Ø	2.971	5.210	-0.057	0.002	1.02	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L328	Ø	2.975	5.178	-0.082	-0.019	0.90	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L203C	Ø	2.975	5.250	-0.021	0.021	0.97	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L118	Ø	2.982	5.330	0.049	0.059	1.01	90Q	THICKNESS (CALIPER),	EMVECO,	METER DRIVEN	
L390	Ø	2.982	5.248	-0.019	0.014	0.91	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L108	*	2.985	5.130	-0.110	-0.054	1.02	90C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN	
L625	Ø	2.985	5.157	-0.054	-0.039	1.09	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L212	Ø	2.986	5.239	-0.025	0.005	1.09	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L731	*	2.937	5.217	-0.043	-0.007	1.00	90A	THICKNESS (CALIPER),	L + W,	HAND DRIVEN	
L238A	Ø	2.988	5.251	-0.013	0.010	1.01	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L158	Ø	2.990	5.270	0.003	0.019	1.06	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L172	Ø	2.991	5.225	-0.033	-0.006	1.03	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L556	Ø	2.994	5.201	-0.032	-0.022	0.97	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L262	Ø	2.995	5.200	-0.052	-0.024	1.02	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L305	Ø	2.995	5.205	-0.048	-0.021	0.95	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L106	*	3.000	5.040	-0.183	-0.110	0.44	90C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN	
L213	Ø	3.000	5.260	0.001	0.005	1.01	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L141	Ø	3.003	5.213	-0.037	-0.023	0.97	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L128	Ø	3.006	5.286	0.026	0.015	0.94	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L243	*	3.010	5.262	0.008	-0.002	1.00	90S	THICKNESS (CALIPER),	SCHÖPPER,	HAND DRIVEN	
L324	Ø	3.010	5.185	-0.050	-0.044	0.89	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L105	Ø	3.010	5.300	0.040	0.019	0.74	90Q	THICKNESS (CALIPER),	EMVECO,	METER DRIVEN	
L228	Ø	3.010	5.230	-0.019	-0.020	1.01	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L251	*	3.010	5.299	0.039	0.019	1.00	90W	THICKNESS (CALIPER),	L + W,	METER DRIVEN, 20 C, 65% RH	
L702	*	3.020	5.040	-0.172	-0.153	1.01	90X	THICKNESS (CALIPER):	GIVE INSTR. MAKE MODEL. ( ) METER, ( ) HAND		
L333	Ø	3.020	5.275	0.024	-0.003	1.00	90V	THICKNESS (CALIPER),	TMI,	METER DRIVEN, DIGITIZED	
L174	Ø	3.020	5.440	0.162	0.088	1.05	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L260	Ø	3.024	5.205	-0.032	-0.045	0.92	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L183	Ø	3.025	5.293	0.042	0.003	1.07	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L249	Ø	3.027	5.275	0.028	-0.009	0.95	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L563	*	3.030	5.320	0.067	0.013	1.02	90U	THICKNESS (CALIPER),	TMI,	HAND DRIVEN	
L382	Ø	3.035	5.330	0.078	0.015	0.94	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L159	Ø	3.040	5.276	0.036	-0.019	1.00	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L576	*	3.040	5.110	-0.102	-0.111	0.90	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L380	Ø	3.040	5.280	0.039	-0.017	0.90	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L122	Ø	3.041	5.287	0.040	-0.014	0.90	90V	THICKNESS (CALIPER),	TMI,	METER DRIVEN, DIGITIZED	
L166	Ø	3.043	5.357	0.105	0.023	0.93	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L241	Ø	3.047	5.358	0.142	0.042	1.04	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L684	*	3.050	5.270	0.037	-0.031	1.02	90U	THICKNESS (CALIPER),	TMI,	HAND DRIVEN	
L326	Ø	3.055	5.340	0.058	0.004	0.98	90T	THICKNESS (CALIPER),	TMI,	METER DRIVEN	
L182	Ø	3.061	5.284	0.054	-0.033	0.95	90L	THICKNESS (CALIPER),	L + W,	METER DRIVEN	

TAPPI COLLABORATIVE REFERENCE PROGRAM  
ANALYSIS T90-1 TABLE 2  
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH  
TAPPI OFFICIAL TEST METHOD T411 GS-76

NOVEMBER 1979

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		J22	A88	MAJOR	MINOR	R <sub>0</sub>	SUR VAX	
L352	Ø	3.069	5.220	.005	-.074	.007	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L315	Ø	3.075	5.385	.140	.012	1.11	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L706	+	3.080	5.340	.112	-.017	1.07	90X	THICKNESS (CALIPER): GIVE INSTR. MAKE+MODEL. ( )MOTOR, ( )HAND
L259	Ø	3.083	5.366	.135	-.005	.70	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L341	Ø	3.084	5.350	.122	-.015	.57	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L323	Ø	3.085	5.410	.173	.017	.95	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L581	Ø	3.090	5.335	.113	-.028	1.06	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L261	Ø	3.101	5.375	.152	-.010	1.06	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L233	Ø	3.106	5.252	.052	-.088	1.03	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L291	Ø	3.128	5.367	.101	-.042	.50	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L134	+	3.129	5.437	.219	-.005	.99	90X	THICKNESS (CALIPER): GIVE INSTR. MAKE+MODEL. ( )MOTOR, ( )HAND
L185	+	3.140	5.450	.230	-.007	1.07	90X	THICKNESS (CALIPER), AMTHOR, HAND DRIVEN
L713	Ø	3.150	5.405	.204	-.040	.75	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L442	Ø	3.161	5.464	.200	-.016	.52	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED
L123F	*	3.188	5.491	.297	-.024	1.03	90T	THICKNESS (CALIPER), FEDERAL, MOTOR DRIVEN
L285	X	3.270	5.470	.525	-.104	.92	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
GMEANS:		3.004	5.257			1.00		
		95% ELLIPSE:		.280	.109			WITH GAMMA = 50 DEGREES

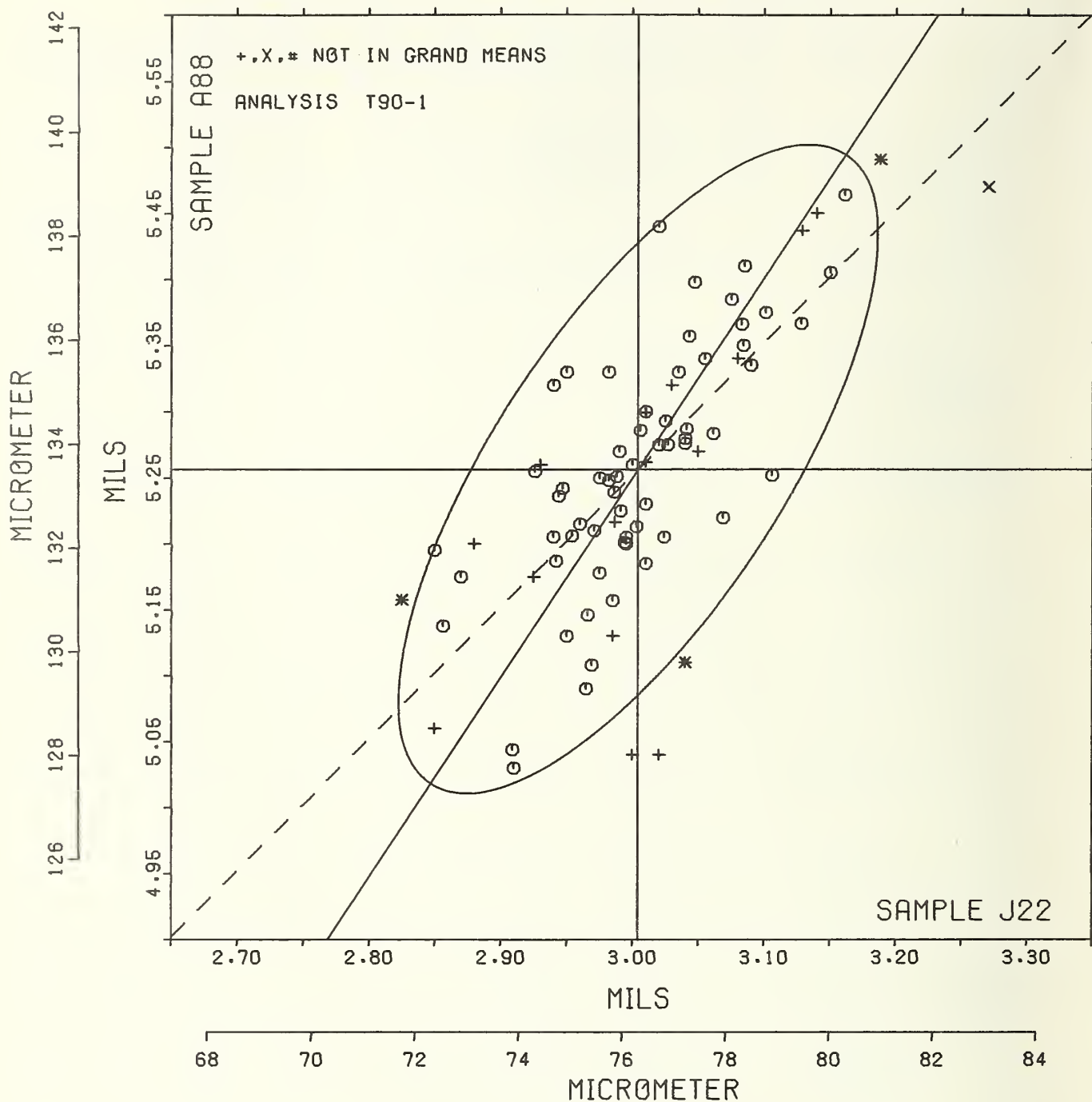
# THICKNESS (CALIPER)

SAMPLE J22 = 3.00 MILS

SAMPLE A88 = 5.26 MILS

SAMPLE J22 = 76.3 MICRØMETER

SAMPLE A88 = 133.5 MICRØMETER





TAPPI COLLABORATIVE REFERENCE PROGRAM  
ANALYSIS T95-1 TABLE 1  
GRAMMAGE (MASS PER UNIT AREA)  
TAPPI OFFICIAL TEST METHOD T410 GS-79

NOVEMBER 1979

LAB CODE	SAMPLE D36 MEAN	COATED OFFSET BOOK				SAMPLE D21 MEAN	BLEACHED KRAFT				TEST D <sub>0</sub> = 10		
		75 GRAMS PER SQUARE METER	NO DEV	SDX	R <sub>0</sub> SDX		106 GRAMS PER SQUARE METER	NO DEV	SDX	R <sub>0</sub> SDR	VAR	F	LAB
L121	76.50	0.15	0.17	0.00	0.00	106.24	0.83	0.66	1.11	1.12	95B	0	L121
L162	77.50	0.85	1.00	0.00	0.00	102.40	-3.02	-2.42	3.13	3.14	95K	0	L162
L213	76.89	0.24	0.29	0.08	1.049	106.56	1.14	0.91	1.24	1.24	95F	0	L213
L233	76.35	-0.30	-0.30	0.03	1.000	105.90	0.48	0.39	0.51	0.51	95T	0	L233
L244	76.01	-0.64	-0.80	0.12	0.31	104.17	-1.25	-1.00	0.42	0.42	95T	0	L244
L249	76.92	0.27	0.33	0.70	1.079	105.77	0.35	0.28	0.55	0.55	95I	0	L249
L280	76.98	0.33	0.41	0.35	0.88	105.35	-0.07	-0.06	1.02	1.02	95T	0	L280
L285	51.63	-25.02	-31.07	0.23	0.59	70.40	-35.02	-28.09	0.82	0.82	95T	#	L285
L305	77.30	0.65	0.81	0.00	0.00	106.60	-54.82	-76.06	0.00	0.00	95T	#	L305
L339	77.44	0.79	0.50	0.00	0.00	106.39	0.97	0.78	0.81	0.82	95T	0	L339
L344	77.31	0.60	0.82	0.10	0.25	106.64	1.22	0.98	0.28	0.28	95T	0	L344
L442	72.13	-4.52	-5.04	0.17	0.44	99.30	-6.12	-4.91	0.38	0.38	95K	#	L442
L571	74.46	-2.19	-2.73	0.57	1.045	103.88	-1.54	-1.24	0.82	0.82	95P	0	L571
L574	76.65	-0.00	-0.00	0.30	0.77	105.80	0.38	0.30	1.03	1.03	95D	0	L574
L616	76.54	-0.11	-0.14	0.55	1.041	106.07	0.65	0.52	1.18	1.18	95T	0	L616
L625	77.50	0.85	1.00	0.71	1.081	104.40	-1.02	-0.82	0.70	0.70	95T	0	L625
L704	76.47	-0.18	-0.23	0.11	0.27	NO DATA REPORTED FOR SAMPLE D21					95T	M	L704
L731	76.10	-0.55	-0.69	0.88	2.024	106.30	0.88	0.71	1.16	1.16	95X	0	L731

GR<sub>0</sub> MEAN = 76.65 G/SQ.METER

GRAND MEAN = 105.42 G/SQ.METER

TEST DETERMINATIONS = 10

SD MEANS = 0.80 G/SQ.METER

SD OF MEANS = 1.25 G/SQ.METER

14 LABS IN GRAND MEANS

AVERAGE SDR = 0.39 G/SQ.METER

AVERAGE SDR = 1.00 G/SQ.METER

TOTAL NUMBER OF LABORATORIES REPORTING = 18

Best values: D36 76.7 ± 1.2 grams per square meter  
D21 105.4 ± 1.6 grams per square meter

The following laboratories were omitted from the grand means because of extreme test results: 285, 305, 442.

TAPPI COLLABORATIVE REFERENCE PROGRAM  
ANALYSIS T95-1 TABLE 2  
GRAMMAGE (MASS PER UNIT AREA)  
TAPPI OFFICIAL TEST METHOD T410 GS-79

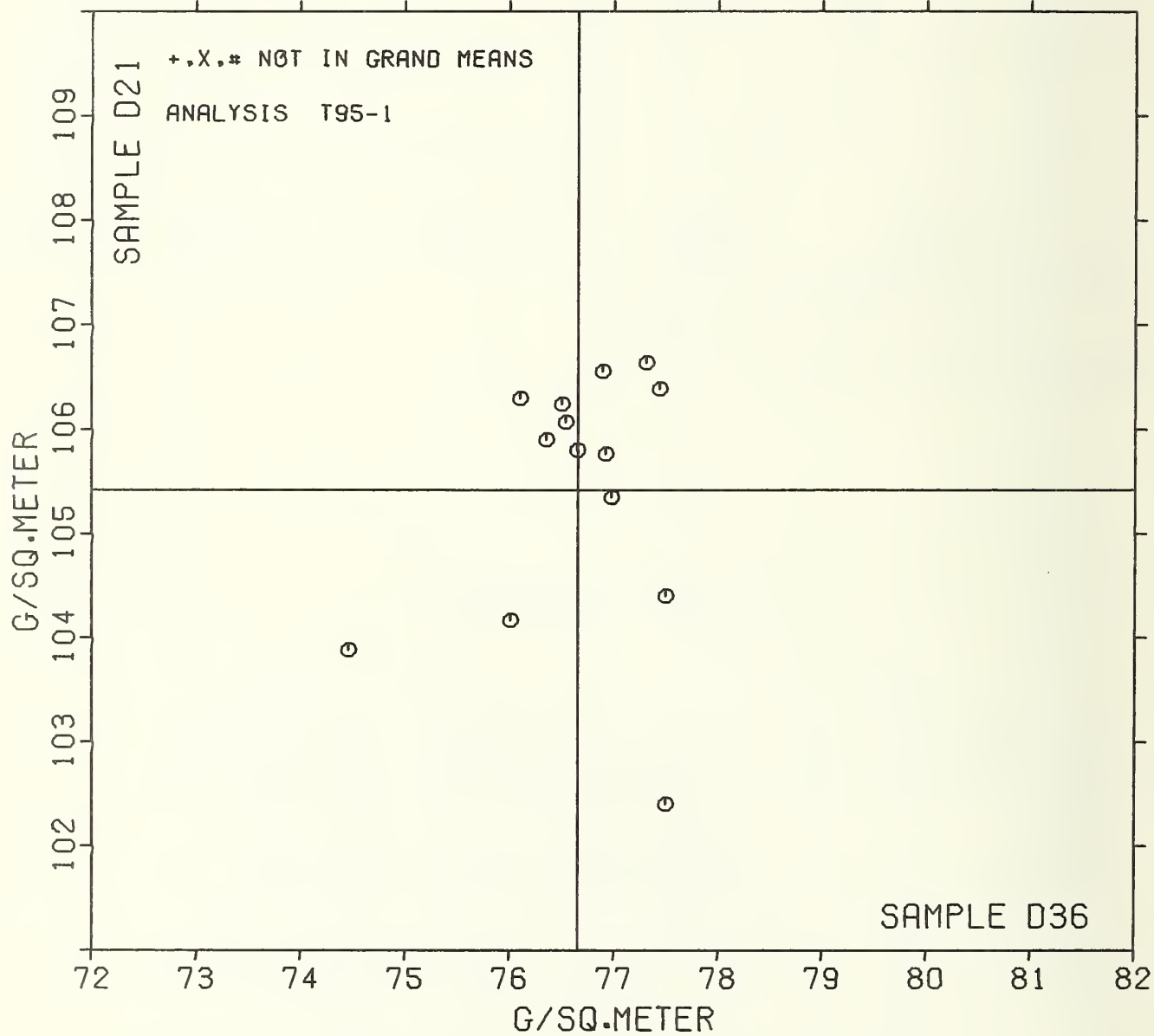
NOVEMBER 1979

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY--	TEST INSTRUMENT--	CONDITIONS
		D36	D21	MAJOR	MINOR	R <sub>0</sub> SDX	VAR			
L285	#	51.63	70.40	-38.37	19.50	0.71	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L442	#	72.13	99.30	-6.73	3.50	0.41	95K	BASIS WEIGHT (GRAMMAGE),	WEIGHED AS RECEIVED	
L571	0	74.46	103.88	-1.85	1.94	1.14	95P	BASIS WEIGHT (GRAMMAGE),	PRODUCTION REAM CUTTER	
L244	0	76.01	104.17	-1.33	0.45	0.50	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L731	0	76.10	106.30	0.79	0.68	1.070	95X	BASIS WEIGHT (GRAMMAGE):	SHEET CUT BY WHAT DEVICE?	
L233	0	76.35	105.90	0.43	0.37	1.060	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L704	M	76.47				0.27	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L121	0	76.50	106.24	0.79	0.28	0.50	95B	BASIS WEIGHT (GRAMMAGE),	CONCRA CUTTER	
L616	0	76.54	106.07	0.03	0.21	1.025	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L574	0	76.65	105.80	0.38	0.00	0.90	95D	BASIS WEIGHT (GRAMMAGE),	DIE CUT	
L213	0	76.89	106.56	1.10	-0.00	1.056	95F	BASIS WEIGHT (GRAMMAGE),	FOUR-SQUARE CUTTER	
L249	0	76.92	105.77	0.39	-0.21	1.117	95A	BASIS WEIGHT (GRAMMAGE),	INGENTO PAPER CUTTER	
L280	0	76.98	105.35	-0.32	-0.23	0.95	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L305	#	77.30	106.60	-93.06	-14.83	0.00	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L344	0	77.31	106.64	1.30	-0.47	0.27	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L339	0	77.44	106.39	1.008	-0.03	0.41	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L162	0	77.50	102.40	-2.80	-1.29	1.057	95K	BASIS WEIGHT (GRAMMAGE),	WEIGHED AS RECEIVED	
L625	0	77.50	104.40	-0.88	-0.99	1.025	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
GMEANS:		76.65	105.42			1.000				
95% ELLIPSE:				3.04	2.29			WITH GAMMA = 81 DEGREES		

# GRAMMAGE (MASS PER UNIT AREA)

SAMPLE D36 = 76.7 G/SQ.METER

SAMPLE D21 = 105.4 G/SQ.METER



## SUMMARY TABLE

TEST METHOD	SAMPLE CODE	GRAND MEAN	SD OF MEAN	AVER SDR	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
AIR RESISTANCE, GURLEY	K22	45.2	2.3	2.9	10	56	64	10	2.5	6.3
T40-1 GURLEY UNITS	B68	44.3	2.1	4.5					3.9	5.7
AIR RESISTANCE, SHEFFIELD	K22	77.0	6.4	4.8	10	38	45	10	4.2	17.8
T40-2 SHEFF. UNITS	B68	77.1	6.8	6.9					6.0	18.8
AIR RESISTANCE, GURLEY HG FLOTTATION	G12	268.	29.	65.	10	14	16	10	57.	80.
T41-1 SEC/10 CC	E37	732.	52.	87.					76.	143.
SMOOTHNESS, PARKER PRINISURF	K40	5.38	.33	.11	10	6	6	10	.10	.91
T44-1 MICRONS	A84	5.68	.30	.10					.09	.83
SMOOTHNESS, SHEFFIELD	K40	167.8	8.6	9.6	15	80	89	10	8.4	24.2
T45-1 SHEFF. UNITS	A84	217.2	10.2	8.6					7.6	28.5
SMOOTHNESS, JEKK	A40	27.57	2.36	2.60	15	9	11	5	3.22	7.04
T45-2 JEKK SECONDS	A84	14.81	1.25	.97					1.20	3.61
SMOOTHNESS, BENDTSEN	K40	221.	16.	26.	10	9	9	10	23.	44.
T47-1 ML/MIN	A84	310.	29.	26.					23.	81.
MOISTURE	G10	5.89	.42	.14	10	10	14	2	.28	1.18
T53-1 PERCENT	E60	5.90	.42	.24					.47	1.23
K & N INK ABSORPTION	B92	22.3	4.0	.5	4	8	8	2	1.0	12.6
T56-1 K & N UNITS	B43	29.5	4.5	.6					1.2	12.5
OPACITY, B&L, 89% BACKING, FINE P.	B60	89.63	.52	.35	10	64	78	5	.44	1.48
T60-1 PERCENT	G21	85.43	.61	1.06					1.32	2.43
OPACITY, ELEPHO, PAPER BACKING, FINE P	B60	91.58	.27	.21	10	13	19	5	.26	.76
T60-2 PERCENT	G21	86.72	.48	.95					1.17	1.56
OPACITY, B&L, 89% BACKING, NEAR	G13	81.00	.50	.66	10	21	25	5	.82	2.71
T61-1 PERCENT	B01	75.72	.85	.71					.89	2.44
BLUE REFLECTANCE, DIRECTIONAL	B47	65.80	.67	.34	8	28	58	5	.43	1.87
T65-1 PERCENT	J34	67.27	.48	.17					.22	1.33
BLUE REFLECTANCE, DIFFUSE, WITH TRAP	B47	60.55	.67	.22	8	15	18	5	.27	1.86
T65-2 PERCENT	J34	67.09	.75	.22					.27	2.07
BLUE REFLECTANCE, DIFFUSE, NO TRAP	B47	68.23	.57	.23	8	13	14	5	.28	1.58
T65-3 PERCENT	J34	67.85	.32	.17					.22	.91
SPECULAR GLOSS, 75 DEGREE-HIGH RANGE	B48	64.3	2.1	1.6	10	37	41	5	2.6	6.0
T75-1 GLOSS UNITS	B80	61.0	2.3	1.9					2.4	6.5
SPECULAR GLOSS, 75 DEGREE-LOW RANGE	B78	5.97	.49	.31	10	14	16	5	.38	1.38
T76-1 GLOSS UNITS	G23	16.58	.90	1.46					1.81	2.81
THICKNESS (CALIPER)	J22	3.004	.072	.048	10	64	81	10	.042	.199
T90-1 MILS	A68	5.257	.097	.058					.051	.269
GRAMMAGE (MASS PER UNIT AREA)	D36	76.65	.60	.39	10	14	18	3	.63	2.28
T95-1 G/SQ.METER	D21	105.42	1.25	1.00					1.60	3.70









