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**TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY**

**COLLABORATIVE REFERENCE PROGRAM
FOR PAPER**

REPORT NO. 60G



**U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards**

QC
100
U56
79-1806
1979
C.2

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	pH
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

CTS Thermal Insulation Materials (2 times per year)

19 test methods for thermal insulation materials covering:
thermal properties; strength properties; dimensions, stability,
and density properties; fire properties; and properties of
vapor barriers

ASTM Cement (2 times per year)

Chemical (11 chemical components)
Physical (8 characteristics)

AASHTO Bituminous

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

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

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TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM
FOR PAPER

Report No. 60G

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Office of Engineering Standards
National Engineering Laboratory

NBSIR 79-1806

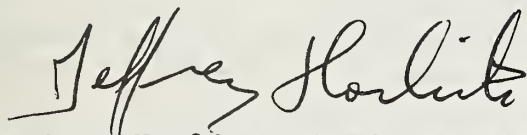
U. S. DEPARTMENT OF COMMERCE
National Bureau of Standards

INTRODUCTION

Reports 60S and 60G comprise the last set of reports for the 78-79 program year. Participants in tests which involve strength properties of paper will receive only the G report; those in tests which measure other properties will receive only the S 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 4 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.



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

August 13, 1979

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 ²	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 ²	J/m ²	14.59
	in.-lb/in. ²	J/m ²	175.1
	kg-m/m ²	J/m ²	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

KEY 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.) and again at the bottom of this table.
- GRAND MEAN - (GR. MEAN) The average of the individual laboratory MEANS, excluding laboratories flagged (see column F) with an X, #, 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. 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. DEV of more than 2 or less than -2 may indicate that the participant is not following the procedure considered standard for this analysis.
- SDR - The standard deviation of repeated measurements; that is, of individual test determinations about their MEAN.
- AVERAGE SDR - The average of the individual laboratory SDR's; an index of the within-laboratory precision of repeated measurements.
- R. SDR - The relative standard deviation of repeated measurements; that is, the ratio of the SDR to the AVERAGE SDR; an indication of the ability of a participant to repeat his measurements relative to the average ability. The greater the number of TEST DETERMINATIONS the closer the R. SDR should be to unity. If R. SDR is outside the limits given below, the participant may not be following the procedure considered standard for this analysis:

<u>No. of test Determinations</u>	<u>Lower limit for R. SDR</u>	<u>Upper limit for R. SDR</u>
3	0.09	2.58
5	0.27	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:
- + - Excluded from grand means because VAR non-standard for this analysis.
 - # - Excluded because data were not understood or because of a non-coded variation reported by the laboratory. (See NOTES following Table 1 for each method).
 - M - Excluded because data for one sample are missing.
 - X - Excluded because plotted point would fall outside of the 99% error ellipse, (see below for explanation of Graph).
 - * - Included in grand means but plotted point falls outside of the 95% error ellipse. The participants should take this as a warning to reexamine his testing procedure.
 - 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.
 - O - Included in grand mean and inside 95% error ellipse.
- 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. SDR - Average of the R. SDR 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°. The solid sloping line, which may or may not lie close to the 45° line, is along the major axis of the error ellipse. The ellipse is drawn so that, on the average, it will include 95% of the points representing the laboratories.

Plotted symbols are as explained above (under F), except that an 'S' is plotted as an 'O'. A participant whose plotted point falls outside of the ellipse should carefully reexamine the testing procedure he 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 Standard or assumed here if there is no TAPPI Standard. This quantity is needed in the computation of TAPPI repeatability and reproducibility from the SD OF MEANS and the AVER SDR. See TAPPI Standard T1206 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.

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.

ANALYSIS T40-1 TABLE 1
AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)
TAPPI STANDARD T460 GS-75, AIR RESISTANCE OF PAPER

LAB CODE	HEAT SET OFFSET BOOK 91 GRAMS PER SQUARE METER					KRAFT ENVELOPE 90 GRAMS PER SQUARE METER					TEST D. = 10		
	SAMPLE E95 MEAN	DEV	N. DEV	SDR	R _s SDR	SAMPLE A81 MEAN	DEV	N. DEV	SDR	R _s SDR	VAR	F	LAB
L100	49.6	1.2	.42	4.3	.96	22.2	.2	.08	2.1	.83	40D	Ø	L100
L106	44.0	-4.4	-1.53	5.2	1.14	21.9	-1.0	-.07	1.4	.57	40D	Ø	L106
L107	48.5	.1	.02	5.2	1.15	21.3	-.7	-.38	2.1	.83	40D	Ø	L107
L121	43.6	-4.8	-1.66	2.5	.54	19.6	-2.5	-1.29	3.1	1.24	40D	Ø	L121
L122	49.0	.6	.20	3.7	.82	21.1	-1.0	-.51	2.7	1.07	40D	Ø	L122
L123	48.8	.4	.12	4.3	.95	20.9	-1.2	-.61	3.1	1.21	40D	Ø	L123
L124G	47.5	-.9	-.31	6.2	1.37	20.8	-1.2	-.62	3.5	1.38	40D	Ø	L124G
L125	48.5	.1	.02	3.2	.72	22.2	.1	.07	2.7	1.08	40D	Ø	L125
L128	48.8	.4	.13	7.6	1.69	21.9	-.1	-.07	2.9	1.15	40D	Ø	L128
L148	49.3	.9	.31	3.5	.78	26.0	4.0	2.08	2.4	.95	40D	Ø	L148
L153	46.3	-2.1	-.74	7.2	1.59	23.5	1.5	.79	1.5	.61	40D	Ø	L153
L158	43.6	-4.8	-1.67	5.8	1.29	17.4	-4.6	-2.43	2.5	.97	40D	Ø	L158
L159	50.2	1.7	.60	4.2	.92	22.3	.3	.14	3.1	1.20	40D	Ø	L159
L163	50.2	1.8	.61	3.9	.86	23.4	1.4	.71	1.7	.68	40D	Ø	L163
L166	51.1	2.7	.94	5.5	1.22	24.3	2.3	1.20	2.3	.90	40D	Ø	L166
L174	49.2	.7	.26	4.5	1.01	19.4	-2.6	-1.39	3.8	1.51	40D	Ø	L174
L176	68.5	20.1	6.94	11.6	2.56	28.5	6.5	3.41	3.6	1.41	40D	#	L176
L182G	48.2	-.2	-.08	4.6	1.03	20.3	-1.8	-.93	2.6	1.01	40D	Ø	L182G
L183	46.3	-2.1	-.74	5.1	1.14	22.9	.9	.48	2.6	1.04	40D	Ø	L183
L190C	44.5	-3.9	-1.36	5.4	1.19	22.8	.8	.40	2.4	.94	40D	Ø	L190C
L190R	48.3	-.1	-.05	5.2	1.15	22.6	.6	.32	2.5	.97	40D	Ø	L190R
L212	44.8	-3.6	-1.25	3.8	.85	18.5	-3.5	-1.82	4.1	1.63	40D	Ø	L212
L219	46.4	-2.0	-.70	4.9	1.08	20.5	-1.5	-.80	1.6	.62	40D	Ø	L219
L223	49.0	.6	.19	5.1	1.13	24.7	2.7	1.40	1.4	.56	40D	Ø	L223
L224	46.4	-2.0	-.70	4.1	.91	22.2	.2	.09	3.3	1.31	40D	Ø	L224
L230G	50.8	2.4	.82	5.5	1.21	21.7	-.3	-.17	2.5	.97	40D	Ø	L230G
L232	48.9	.4	.15	3.1	.68	22.7	.7	.37	2.0	.81	40D	Ø	L232
L236	42.5	-5.9	-2.04	5.3	1.17	21.1	-.9	-.49	1.8	.72	40D	Ø	L236
L238A	49.7	1.3	.44	3.1	.68	23.8	1.7	.91	2.5	.98	40D	Ø	L238A
L241	46.7	-1.8	-.61	4.3	.94	24.0	2.0	1.03	4.4	1.75	40D	Ø	L241
L242	48.6	.2	.06	3.7	.82	23.1	1.1	.56	.8	.32	40D	Ø	L242
L254	48.5	.1	.02	5.0	1.10	23.6	1.6	.81	2.5	.99	40D	Ø	L254
L259	51.2	2.8	.95	8.4	1.86	21.0	-1.0	-.51	3.3	1.31	40D	Ø	L259
L261	48.6	.2	.05	4.7	1.04	22.6	.6	.30	1.9	.74	40D	Ø	L261
L262G	49.0	.6	.21	2.2	.48	23.4	1.4	.71	1.8	.72	40D	Ø	L262G
L265	49.4	1.0	.33	6.1	1.35	21.3	-.7	-.37	1.6	.63	40D	Ø	L265
L274	47.1	-1.3	-.45	1.0	.22	21.1	-.9	-.49	.4	.15	40D	Ø	L274
L278	56.9	8.5	2.93	11.2	2.47	26.5	4.4	2.33	4.2	1.66	40D	*	L278
L285	53.5	5.1	1.75	2.9	.63	23.1	1.1	.57	2.1	.84	40D	Ø	L285
L308	50.9	2.5	.85	5.4	1.20	20.7	-1.3	-.71	2.8	1.10	40D	Ø	L308
L313	49.0	.6	.20	4.6	1.03	22.2	.2	.09	2.5	1.00	40D	Ø	L313
L320	45.2	-3.2	-1.12	3.3	.73	17.8	-4.2	-2.22	3.0	1.20	40D	Ø	L320
L321	51.2	2.8	.95	5.3	1.16	21.4	-.6	-.33	2.3	.91	40D	Ø	L321
L324	49.9	1.5	.51	2.0	.44	22.6	.6	.30	2.5	1.00	40D	Ø	L324
L326	53.1	4.7	1.61	5.6	1.24	23.1	1.1	.58	2.9	1.15	40D	Ø	L326
L328	47.5	-.9	-.32	4.2	.92	23.4	1.4	.73	1.9	.74	40D	Ø	L328
L339	43.6	-4.8	-1.66	5.3	1.18	19.6	-2.4	-1.26	2.2	.89	40D	Ø	L339
L344	45.8	-2.7	-.92	3.9	.87	20.2	-1.8	-.94	2.2	.86	40D	Ø	L344
L376	50.4	2.0	.69	4.8	1.07	23.6	1.6	.84	2.2	.86	40D	Ø	L376
L380	48.2	-.2	-.08	1.0	.23	23.8	1.8	.93	1.5	.58	40D	Ø	L380
L388	54.3	5.9	2.02	5.9	1.30	24.7	2.7	1.40	4.0	1.57	40D	Ø	L388
L394	51.1	2.7	.92	6.9	1.52	21.7	-.3	-.17	3.6	1.41	40D	Ø	L394
L396M	51.4	2.9	1.02	4.8	1.06	21.9	-.1	-.05	3.7	1.44	40D	Ø	L396M
L484	41.2	-7.3	-2.51	3.5	.77	17.7	-4.3	-2.28	3.1	1.23	40H	*	L484
L576	47.8	-.7	-.23	4.2	.93	24.1	2.1	1.09	3.2	1.26	40D	Ø	L576
L585	49.6	1.1	.39	4.9	1.09	20.9	-1.1	-.58	4.0	1.58	40D	Ø	L585
L597	49.6	1.2	.40	3.6	.80	21.7	-.3	-.17	3.3	1.30	40D	Ø	L597
L604	45.4	-3.0	-1.05	5.1	1.12	21.9	-.1	-.04	2.3	.90	40D	Ø	L604
L616	52.0	3.6	1.23	1.9	.43	23.1	1.1	.56	1.2	.47	40D	Ø	L616
L651	46.6	-1.8	-.63	4.7	1.04	20.8	-1.2	-.64	3.6	1.40	40D	Ø	L651
L676	50.1	1.6	.56	4.9	1.07	25.4	3.4	1.78	1.7	.67	40D	Ø	L676
L697	47.1	-1.3	-.46	4.1	.90	19.5	-2.5	-1.33	3.9	1.53	40D	Ø	L697

GR. MEAN = 48.4 GURLEY UNITS GRAND MEAN = 22.0 GURLEY UNITS TEST DETERMINATIONS = 10
SD MEANS = 2.9 GURLEY UNITS SD OF MEANS = 1.9 GURLEY UNITS 61 LABS IN GRAND MEANS
AVERAGE SDR = 4.5 GURLEY UNITS AVERAGE SDR = 2.5 GURLEY UNITS

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T40-1 TABLE 1
 AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)
 TAPPI STANDARD T460 GS-75, AIR RESISTANCE OF PAPER

LAB CODE	HEAT SET OFFSET BOOK 91 GRAMS PER SQUARE METER					KRAFT ENVELOPE 90 GRAMS PER SQUARE METER					TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L115	49.8	1.4	.47	3.8	.85	21.3	-.7	-.38	3.8	1.48	40U	*	L115
L291	48.2	-.2	-.08	5.4	1.19	22.6	.6	.30	4.4	1.73	40U	*	L291
L564	7.6	-40.9	-14.10	.6	.14	4.0	-18.0	-9.44	.4	.16	40K	*	L564
TOTAL NUMBER OF LABORATORIES REPORTING = 65													

Best values: B95 48.5 ± 4.9 Gurley units
 A81 22.0 ± 2.7 Gurley units

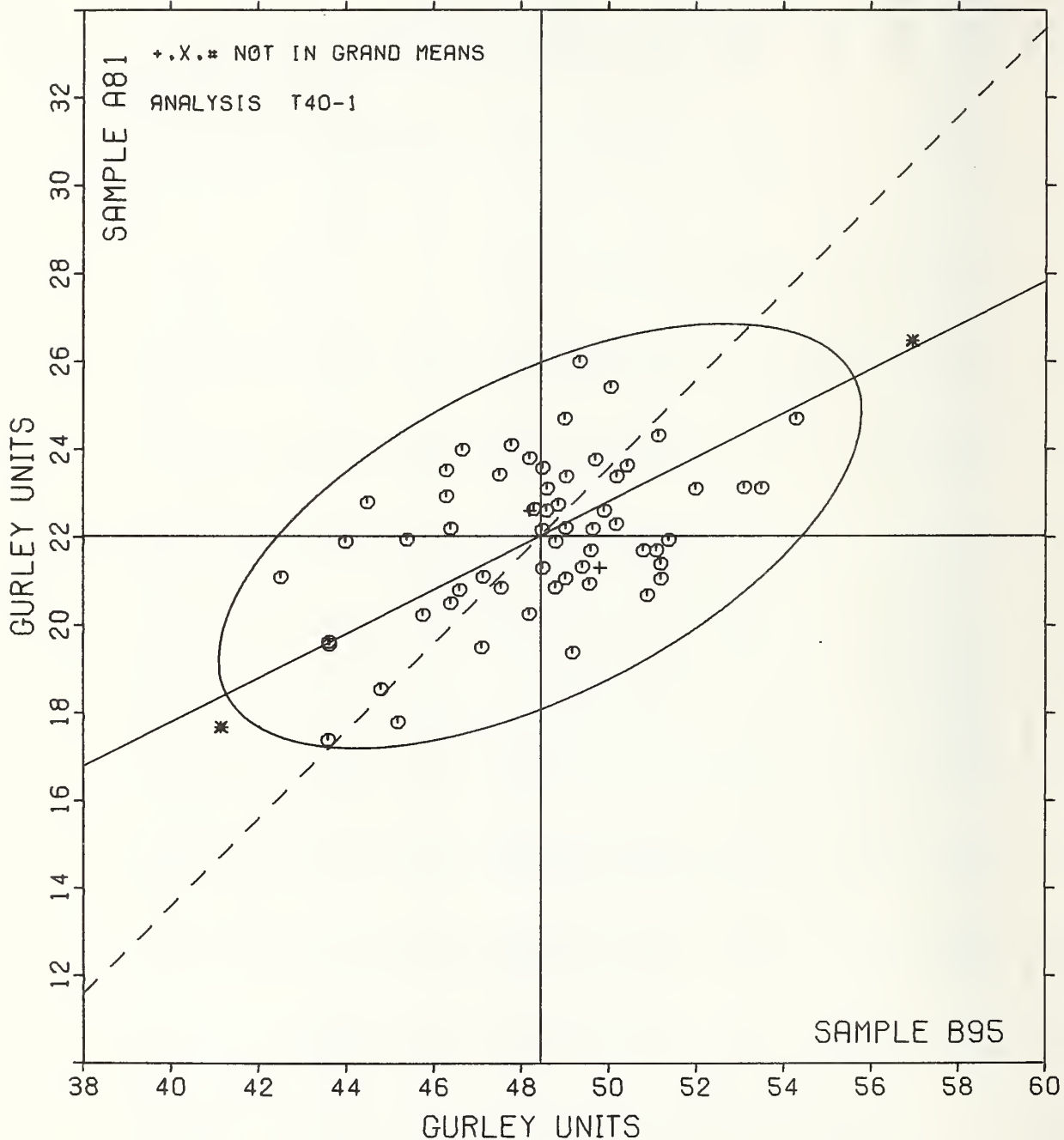
The following laboratories were omitted from the grand means because of extreme test results: 176.

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T40-1 TABLE 2
 AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)
 TAPPI STANDARD T460 6S-7S, AIR RESISTANCE OF PAPER

LAB CODE	F	MEANS		COORDINATES		AVG R ₀ SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		B95	A81	MAJOR	MINOR			
L564	*	7.6	4.0	-44.6	2.2	.15	40K	AIR RESISTANCE, BEKK
L484	*	41.2	17.7	-8.5	-6	1.00	40H	AIR RESISTANCE, REGMED-TYPE GURLEY DENSOMETER - OIL FLOTATION
L236	Ø	42.5	21.1	-5.7	1.8	.95	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L158	Ø	43.6	17.4	-4.4	-2.0	1.13	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L339	Ø	43.6	19.6	-5.4	.0	1.03	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L121	Ø	43.6	19.6	-5.4	-0	.89	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L106	Ø	44.0	21.9	-4.0	1.9	.86	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L190C	Ø	44.5	22.8	-3.2	2.5	1.06	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L212	Ø	44.8	18.5	-4.8	-1.5	1.24	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L320	Ø	45.2	17.8	-4.8	-2.3	.96	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L604	Ø	45.4	21.9	-2.7	1.3	1.01	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L344	Ø	45.8	20.2	-3.2	-4	.86	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L153	Ø	46.3	23.5	-1.2	2.3	1.10	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L183	Ø	46.3	22.9	-1.5	1.8	1.09	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L224	Ø	46.4	22.2	-1.7	1.1	1.11	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L219	Ø	46.4	20.5	-2.5	-5	.85	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L651	Ø	46.6	20.8	-2.2	-3	1.22	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L241	Ø	46.7	24.0	-7	2.6	1.34	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L697	Ø	47.1	19.5	-2.3	-1.7	1.22	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L274	Ø	47.1	21.1	-1.6	-2	.18	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L328	Ø	47.5	23.4	-2	1.7	.83	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L124G	Ø	47.5	20.8	-1.3	-7	1.38	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L576	Ø	47.8	24.1	.3	2.1	1.09	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L291	*	48.2	22.6	.0	.6	1.46	40U	AIR RESISTANCE, SHEFFIELD IN GURLEY UNITS
L380	Ø	48.2	23.8	.6	1.7	.40	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L182G	Ø	48.2	20.3	-1.0	-1.5	1.02	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L190R	Ø	48.3	22.6	.2	.6	1.06	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L125	Ø	48.5	22.2	.1	.1	.90	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L107	Ø	48.5	21.3	-.3	-.7	.99	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L254	Ø	48.5	23.6	.8	1.4	1.04	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L261	Ø	48.6	22.6	.4	.4	.89	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L242	Ø	48.6	23.1	.6	.9	.57	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L123	Ø	48.8	20.9	-.2	-1.2	1.08	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L128	Ø	48.8	21.9	.3	-.3	1.42	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L232	Ø	48.9	22.7	.7	.4	.74	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L223	Ø	49.0	24.7	1.7	2.1	.84	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L122	Ø	49.0	21.1	.1	-1.1	.95	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L313	Ø	49.0	22.2	.6	-.1	1.01	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L262G	Ø	49.0	23.4	1.1	.9	.60	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L174	Ø	49.2	19.4	-.5	-2.7	1.26	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L148	Ø	49.3	26.0	2.6	3.1	.87	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L265	Ø	49.4	21.3	.5	-1.1	.99	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L585	Ø	49.6	20.9	.5	-1.5	1.33	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L597	Ø	49.6	21.7	.9	-.8	1.05	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L100	Ø	49.6	22.2	1.2	-.4	.89	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L238A	Ø	49.7	23.8	1.9	1.0	.83	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L115	*	49.8	21.3	.9	-1.3	1.17	40U	AIR RESISTANCE, SHEFFIELD IN GURLEY UNITS
L324	Ø	49.9	22.6	1.6	-.2	.72	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L676	Ø	50.1	25.4	3.0	2.3	.87	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L159	Ø	50.2	22.3	1.7	-.5	1.06	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L163	Ø	50.2	23.4	2.2	.4	.77	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L376	Ø	50.4	23.6	2.5	.5	.96	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L230G	Ø	50.8	21.7	2.0	-1.4	1.09	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L308	Ø	50.9	20.7	1.6	-2.3	1.15	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L394	Ø	51.1	21.7	2.2	-1.5	1.47	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L166	Ø	51.1	24.3	3.4	.8	1.06	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L321	Ø	51.2	21.4	2.2	-1.8	1.04	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L259	Ø	51.2	21.0	2.0	-2.1	1.59	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L396M	Ø	51.4	21.9	2.6	-1.4	1.25	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L616	Ø	52.0	23.1	3.7	-.6	.45	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L326	Ø	53.1	23.1	4.7	-1.1	1.20	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L285	Ø	53.5	23.1	5.0	-1.3	.74	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L388	Ø	54.3	24.7	6.4	-.2	1.43	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L278	*	56.9	26.5	9.6	.2	2.07	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L176	#	68.5	28.5	20.9	-3.2	1.99	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
GMEANS:		48.4	22.0			1.00		
		95% ELLIPSE:		8.0	3.6	WITH GAMMA = 26 DEGREES		

AIR RESISTANCE, GURLEY

SAMPLE B95 = 48.4 GURLEY UNITS SAMPLE A81 = 22.0 GURLEY UNITS



AIR RESISTANCE, SHEFFIELD UNITS (CC/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) ORIFICE
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	HEAT SET OFFSET BOOK 91 GRAMS PER SQUARE METER					KRAFT ENVELOPE 90 GRAMS PER SQUARE METER					TEST D ₀ = 10			
	B95 MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	A81 MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB	
L114	76.9	4.5	1.32	6.0	.97	126.0	-5.1	-0.64	10.5	.80	40S	Ø	L114	
L121	73.8	1.4	.42	7.2	1.16	120.9	-10.2	-1.27	10.0	.77	40S	Ø	L121	
L124S	72.4	.0	.01	5.1	.82	120.6	-10.5	-1.31	6.3	.48	40S	Ø	L124S	
L132	70.7	-1.7	-0.48	7.4	1.19	138.0	6.9	.86	17.5	1.34	40S	Ø	L132	
L148	79.5	7.1	2.07	7.2	1.17	138.0	6.9	.86	15.0	1.14	40S	Ø	L148	
L150	73.5	1.1	.33	7.0	1.13	138.6	7.5	.93	12.4	.95	40S	Ø	L150	
L157	69.9	-2.5	-0.71	8.3	1.34	132.9	1.8	.22	10.1	.77	40S	Ø	L157	
L158	70.0	-2.4	-0.68	4.1	.66	125.0	-6.1	-0.76	13.3	1.02	40S	Ø	L158	
L173B	76.0	3.6	1.06	8.1	1.30	141.5	10.4	1.29	18.7	1.43	40S	Ø	L173B	
L190C	79.0	6.6	1.92	5.2	.83	142.5	11.4	1.42	20.6	1.57	40S	Ø	L190C	
L213	72.0	-0.4	-0.10	5.4	.87	119.4	-11.7	-1.46	8.8	.67	40S	Ø	L213	
L223	65.5	-6.9	-1.98	5.7	.91	129.9	-1.2	-0.15	18.2	1.39	40S	Ø	L223	
L228	72.4	.0	.01	1.3	.20	172.2	4.1	5.12	18.4	1.40	40S	#	L228	
L230S	66.2	-6.2	-1.78	7.0	1.12	119.9	-11.2	-1.40	13.1	1.00	40S	Ø	L230S	
L233	69.6	-2.8	-0.80	9.1	1.47	134.5	3.4	.42	14.1	1.07	40S	Ø	L233	
L241	90.0	17.6	5.11	3.3	.54	147.5	16.4	2.04	11.8	.90	40S	#	L241	
L249	70.9	-1.5	-0.42	7.0	1.13	126.2	-4.9	-0.61	16.2	1.24	40S	Ø	L249	
L255	96.5	24.1	6.99	5.3	.85	142.7	11.6	1.44	11.0	.84	40S	#	L255	
L257A	74.9	2.5	.74	4.3	.70	127.4	-3.7	-0.46	11.3	.86	40S	Ø	L257A	
L257B	74.0	1.6	.48	5.0	.80	136.9	5.8	.72	14.7	1.12	40S	Ø	L257B	
L257C	75.5	3.1	.91	9.0	1.45	134.8	3.7	.46	14.0	1.07	40S	Ø	L257C	
L260	72.4	.0	.01	5.0	.80	128.4	-2.7	-0.34	7.7	.59	40S	Ø	L260	
L262S	71.8	-0.6	-0.16	3.9	.62	136.6	5.5	.68	6.9	.53	40S	Ø	L262S	
L288	74.0	1.6	.48	9.1	1.47	140.9	9.8	1.22	18.0	1.37	40S	Ø	L288	
L305	75.1	2.7	.80	5.0	.80	126.7	-4.4	-0.55	7.9	.60	40S	Ø	L305	
L318	66.8	-5.6	-1.61	9.1	1.46	120.4	-10.7	-1.34	8.2	.63	40S	Ø	L318	
L352	73.1	.7	.22	6.5	1.05	136.3	5.2	.65	15.9	1.22	40S	Ø	L352	
L354	76.4	4.0	1.17	7.9	1.27	145.1	14.0	1.74	22.0	1.68	40S	Ø	L354	
L360	75.0	2.6	.77	5.1	.81	130.9	-0.2	-0.03	13.1	1.00	40S	Ø	L360	
L366	66.3	-6.1	-1.75	7.5	1.20	117.9	-13.2	-1.65	10.1	.77	40S	Ø	L366	
L372	74.8	2.4	.71	4.1	.66	127.2	-3.9	-0.49	16.6	1.27	40S	Ø	L372	
L390	74.5	2.1	.62	3.7	.59	130.0	-1.1	-0.14	14.1	1.08	40S	Ø	L390	
L562	71.2	-1.2	-0.33	7.3	1.17	146.9	15.8	1.97	17.1	1.31	40S	Ø	L562	
L575	69.5	-2.9	-0.83	4.0	.64	123.8	-7.3	-0.91	12.1	.93	40S	Ø	L575	
L585	71.0	-1.4	-0.39	3.9	.63	124.0	-7.1	-0.89	11.7	.90	40S	Ø	L585	
L597	71.0	-1.4	-0.39	5.8	.93	140.4	9.3	1.16	15.3	1.17	40S	Ø	L597	
L600	72.1	-0.3	-0.07	6.6	1.06	127.9	-3.2	-0.40	6.9	.53	40S	Ø	L600	
L626	65.4	-7.0	-2.01	4.7	.75	122.8	-8.3	-1.04	11.9	.91	40S	Ø	L626	
L684	73.7	1.3	.39	10.2	1.65	143.3	12.2	1.52	16.0	1.22	40S	Ø	L684	
L687	70.9	-1.5	-0.42	4.3	.68	129.0	-2.1	-0.26	12.3	.94	40S	Ø	L687	
L698	74.1	1.7	.51	4.6	.74	131.0	-0.1	-0.01	9.3	.71	40S	Ø	L698	
GR. MEAN =	72.4	SHEFF. UNITS				GRAND MEAN =	131.1	SHEFF. UNITS				TEST DETERMINATIONS = 10		
SD MEANS =	3.5	SHEFF. UNITS				SD OF MEANS =	8.0	SHEFF. UNITS				38 LABS IN GRAND MEANS		
		AVERAGE SDR = 6.2						SHEFF. UNITS				AVERAGE SDR = 13.1		
												SHEFF. UNITS		
L182B	255.5	183.1	53.00	26.5	4.26	515.0	383.9	47.82	89.1	6.80	40B	*	L182B	
L312	75.3	2.9	.85	6.3	1.01	127.4	-3.7	-0.46	10.7	.82	40T	*	L312	
L484	263.0	190.6	55.17	27.9	4.49	510.0	378.9	47.20	57.0	4.35	40B	*	L484	

TOTAL NUMBER OF LABORATORIES REPORTING = 44
Best values: B95 72 ± 6 Sheffield units
A81 130 ± 12 Sheffield units

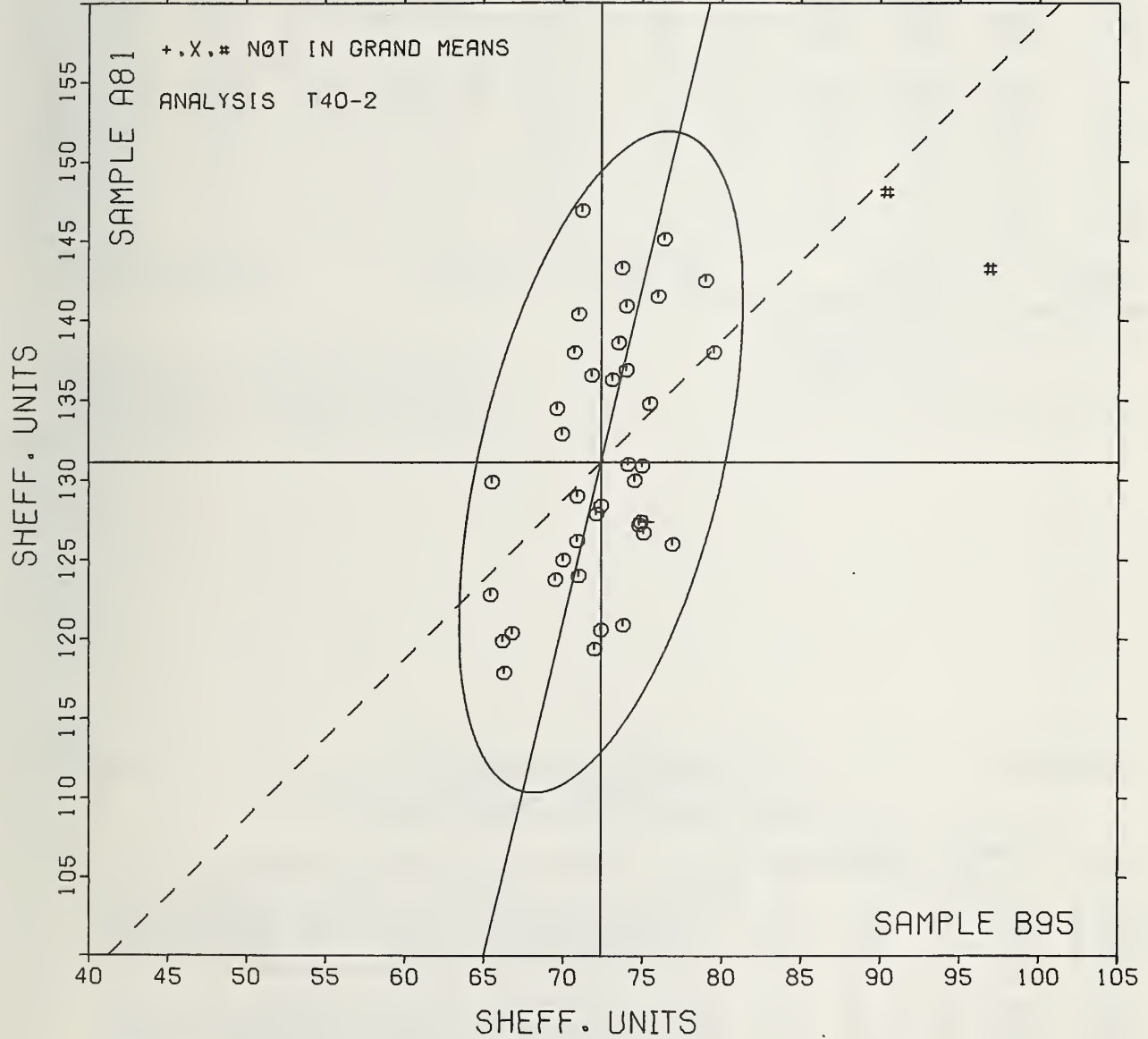
The following laboratories were omitted from the grand means because of extreme test results: 228, 241, 255.

ANALYSIS T40-2 TABLE 2
 AIR RESISTANCE, SHEFFIELD UNITS (CC/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) ORIFICE
 SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		B95	A81	MAJOR	MINOR	R _s SDR	VAR			
L626	Ø	65.4	122.8	-9.7	4.8	.83	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L223	Ø	65.5	129.9	-2.8	6.4	1.15	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L230S	Ø	66.2	119.9	-12.3	3.4	1.06	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L366	Ø	66.3	117.9	-14.3	2.8	.98	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L318	Ø	66.8	120.4	-11.7	2.9	1.04	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L575	Ø	69.5	123.8	-7.8	1.1	.78	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L233	Ø	69.6	134.5	2.7	3.5	1.27	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L157	Ø	69.9	132.9	1.2	2.8	1.06	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L158	Ø	70.0	125.0	-6.5	.9	.84	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L132	Ø	70.7	138.0	6.3	3.2	1.26	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L687	Ø	70.9	129.0	-2.4	.9	.81	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L249	Ø	70.9	126.2	-5.1	.3	1.18	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L597	Ø	71.0	140.4	8.7	3.5	1.05	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L585	Ø	71.0	124.0	-7.2	-3	.76	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L562	Ø	71.2	146.9	15.1	4.8	1.24	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L262S	Ø	71.8	136.6	5.2	1.8	.58	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L213	Ø	72.0	119.4	-11.5	-2.4	.77	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L600	Ø	72.1	127.9	-3.2	-5	.79	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L228	#	72.4	172.2	40.0	9.4	.80	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L124S	Ø	72.4	120.6	-10.2	-2.5	.65	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L260	Ø	72.4	128.4	-2.6	-7	.69	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L352	Ø	73.1	136.3	5.2	.5	1.13	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L150	Ø	73.5	138.6	7.5	.6	1.04	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L684	Ø	73.7	143.3	12.2	1.5	1.43	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L121	Ø	73.8	120.9	-9.6	-3.8	.96	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L288	Ø	74.0	140.5	9.9	.7	1.42	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L257B	Ø	74.0	136.9	6.0	-3	.96	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L698	Ø	74.1	131.0	.3	-1.7	.72	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L390	Ø	74.5	130.0	-6	-2.3	.84	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L372	Ø	74.8	127.2	-3.2	-3.3	.96	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L257A	Ø	74.9	127.4	-3.0	-3.3	.78	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L360	Ø	75.0	130.9	.4	-2.6	.91	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L305	Ø	75.1	126.7	-3.7	-3.7	.70	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L312	*	75.3	127.4	-2.9	-3.7	.91	40T	AIR RESISTANCE,	SHEFFIELD (3 INCH DIAMETER ORIFICE)	
L257C	Ø	75.5	134.8	4.3	-2.2	1.26	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L173B	Ø	76.0	141.5	10.9	-1.2	1.37	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L354	Ø	76.4	145.1	14.5	-7	1.47	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L114	Ø	76.9	126.0	-3.9	-5.6	.89	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L190C	Ø	79.0	142.5	12.6	-3.8	1.20	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L148	Ø	79.5	138.0	8.3	-5.4	1.15	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L241	#	90.0	147.5	20.0	-13.4	.72	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L255	#	96.5	142.7	16.8	-20.8	.85	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L182B	*	255.5	515.0	415.8	-89.6	5.53	40B	AIR RESISTANCE,	BENDTSEN, WG 150	
L484	*	263.0	510.0	412.7	-98.0	4.42	40B	AIR RESISTANCE,	BENDTSEN, WG 150	
GMEANS:		72.4	131.1			1.00				
		95% ELLIPSE:		21.3	7.7			WITH GAMMA = 76 DEGREES		

AIR RESISTANCE, SHEFFIELD

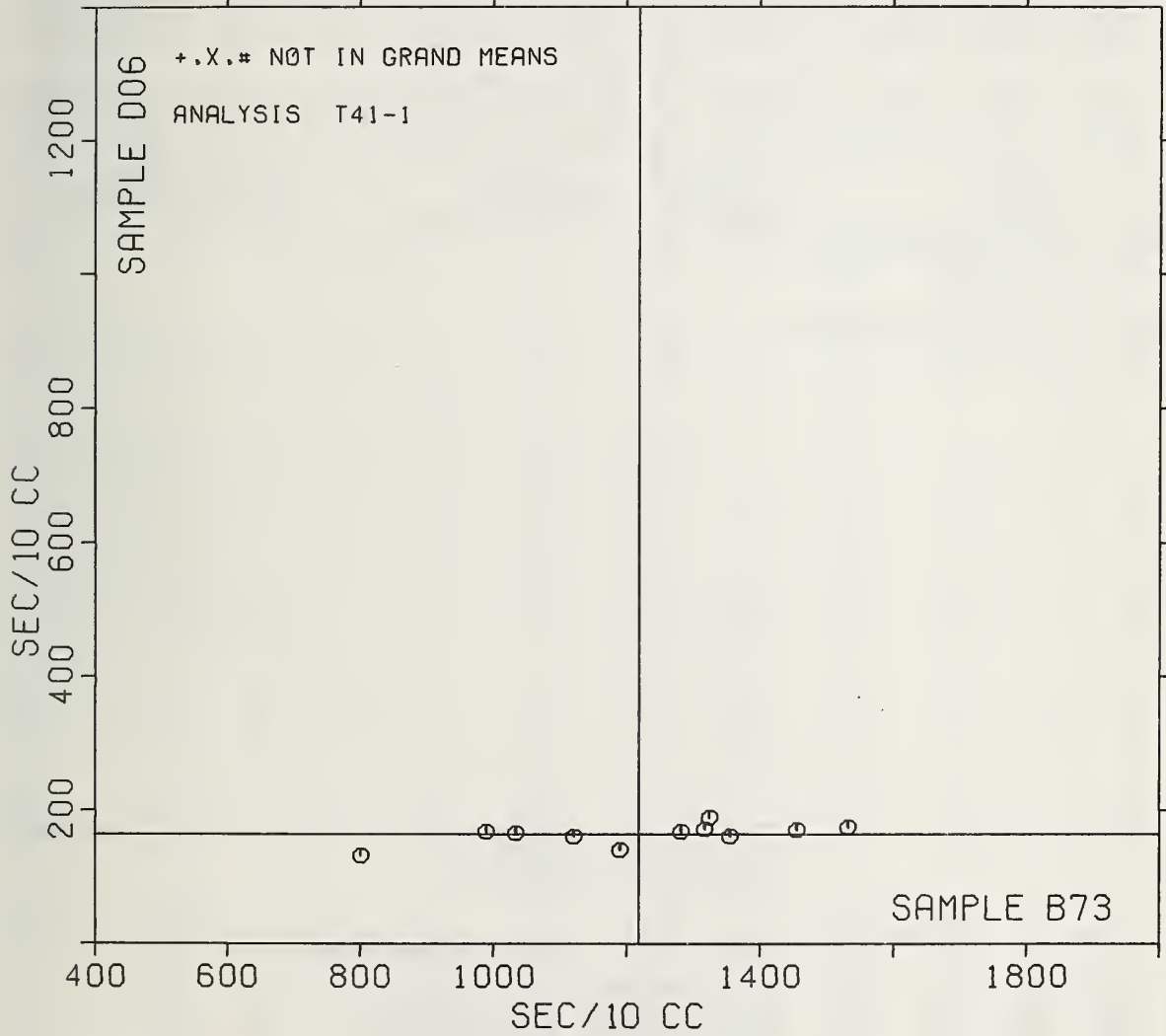
SAMPLE B95 = 72. SHEFF. UNITS SAMPLE A81 = 131. SHEFF. UNITS



AIR RESISTANCE, GURLEY HG FLOTATION

SAMPLE B73 = 1219. SEC/10 CC

SAMPLE D06 = 164. SEC/10 CC



LAB CODE	SAMPLE J50		PRINTING 94 GRAMS PER SQUARE METER				SAMPLE J74		PRINTING 76 GRAMS PER SQUARE METER				TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB		
L122	6.55	.87	1.51	.16	1.45	5.09	.80	2.09	.15	1.25	44P	0	L122		
L136	5.88	-.20	-.35	.08	.72	3.94	-.35	-.92	.07	.58	44P	0	L136		
L182	5.92	-.16	-.28	.05	.49	4.40	.11	.29	.10	.80	44P	0	L182		
L183	5.79	-.29	-.51	.07	.68	4.35	.06	.15	.08	.71	44P	0	L183		
L223	8.25	2.17	3.77	.14	1.30	5.94	1.65	4.30	.10	.83	44P	#	L223		
L288	6.56	.88	1.52	.08	.77	4.29	-.00	-.01	.14	1.21	44P	0	L288		
L317	5.93	-.15	-.26	.22	1.99	4.17	-.12	-.32	.14	1.18	44P	0	L317		
L484	5.92	-.16	-.28	.13	1.21	4.28	-.01	-.03	.15	1.29	44P	0	L484		
L588	5.31	-.77	-1.34	.07	.68	3.81	-.48	-1.26	.12	1.00	44P	0	L588		

GR. MEAN = 6.08 MICRONS GRAND MEAN = 4.29 MICRONS TEST DETERMINATIONS = 10
SD MEANS = .58 MICRONS SD OF MEANS = .38 MICRONS 8 LABS IN GRAND MEANS

AVERAGE SDR = .11 MICRONS AVERAGE SDR = .12 MICRONS
TOTAL NUMBER OF LABORATORIES REPORTING = 9
Best values: J50 6.0 microns
 J74 4.3 microns

The following laboratories were omitted from the grand means because of extreme test results: 223.

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		J50	J74	MAJOR	MINOR	R ₀ SDR	VAR	
L588	0	5.31	3.81	-.91	-.03	.84	44P	SMOOTHNESS, PARKER PRINTSURF
L183	0	5.79	4.35	-.22	.20	.69	44P	SMOOTHNESS, PARKER PRINTSURF
L136	0	5.88	3.94	-.35	-.20	.65	44P	SMOOTHNESS, PARKER PRINTSURF
L484	0	5.52	4.28	-.15	.07	1.25	44P	SMOOTHNESS, PARKER PRINTSURF
L182	0	5.92	4.40	-.08	.18	.64	44P	SMOOTHNESS, PARKER PRINTSURF
L317	0	5.93	4.17	-.19	-.03	1.58	44P	SMOOTHNESS, PARKER PRINTSURF
L122	0	6.95	5.09	1.15	.26	1.35	44P	SMOOTHNESS, PARKER PRINTSURF
L288	0	6.96	4.29	.76	-.44	.99	44P	SMOOTHNESS, PARKER PRINTSURF
L223	#	8.25	5.94	2.70	.34	1.07	44P	SMOOTHNESS, PARKER PRINTSURF
GMEANS:		6.08	4.29			1.00		
		95% ELLIPSE:		2.26	.81	WITH GAMMA = 30 DEGREES		

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T45-1 TABLE 1
 SMOOTHNESS, SHEFFIELD UNITS
 SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE J50 MEAN	PRINTING 94 GRAMS PER SQUARE METER				SAMPLE J74 MEAN	PRINTING 76 GRAMS PER SQUARE METER				TEST D. = 15		
		DEV	N. DEV	SDR	R. SDR		DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L100	274.6	1.1	.10	6.9	.98	80.7	1.4	.19	5.6	1.12	45S	Ø	L100
L107	270.0	-3.5	-.31	5.6	.79	134.4	55.0	7.53	8.6	1.71	45S	#	L107
L108	280.5	6.9	.62	6.5	.92	79.3	-1.1	-.01	4.0	.79	45S	Ø	L108
L114	275.1	1.5	.14	10.3	1.45	90.0	.6	.09	4.8	.95	45S	Ø	L114
L115	272.0	-1.5	-.14	7.3	1.03	83.7	4.3	.59	5.2	1.02	45S	Ø	L115
L121	245.2	-28.3	-2.52	8.0	1.13	76.1	-3.2	-.44	6.1	1.20	45S	*	L121
L122	275.9	2.3	.21	8.3	1.17	80.7	1.4	.19	5.8	1.16	45S	Ø	L122
L123	280.7	7.1	.63	11.6	1.64	81.4	2.0	.28	6.3	1.26	45S	Ø	L123
L124	263.7	-9.8	-.87	4.9	.69	75.3	-4.1	-.56	4.0	.80	45S	Ø	L124
L125	263.3	-10.2	-.91	12.3	1.74	82.7	3.3	.45	6.5	1.29	45S	Ø	L125
L126	277.7	4.2	.37	9.9	1.40	81.9	2.6	.35	5.3	1.05	45S	Ø	L126
L128	273.6	.1	.01	4.9	.69	77.2	-2.2	-.29	3.5	.69	45S	Ø	L128
L132	275.9	2.3	.21	6.4	.91	78.3	-1.0	-.14	5.1	1.01	45S	Ø	L132
L134	283.7	10.1	.90	5.2	.73	76.0	-3.4	-.46	5.7	1.14	45S	Ø	L134
L139S	274.0	.5	.04	5.1	.71	88.8	9.4	1.29	3.5	.70	45S	Ø	L139S
L148	283.9	10.4	.92	9.1	1.28	86.7	7.3	1.00	5.5	1.09	45S	Ø	L148
L150	284.9	11.3	1.01	6.7	.95	81.8	2.4	.33	5.2	1.04	45S	Ø	L150
L152	252.5	-21.1	-1.87	3.1	.44	92.0	12.6	1.73	5.1	1.01	45S	*	L152
L153	290.0	16.5	1.46	5.3	.75	99.2	19.8	2.72	4.8	.95	45S	*	L153
L157	289.5	16.0	1.42	5.3	.75	83.7	4.4	.60	4.3	.85	45S	Ø	L157
L158	268.0	-5.5	-.49	10.7	1.50	80.7	1.3	.18	4.6	.91	45S	Ø	L158
L159	274.4	.9	.08	7.8	1.10	80.2	.8	.12	5.6	1.11	45S	Ø	L159
L162	273.7	.1	.01	7.2	1.01	76.7	-2.7	-.37	4.9	.97	45S	Ø	L162
L166	260.1	-13.4	-1.19	6.3	.89	77.0	-2.4	-.32	5.3	1.04	45S	Ø	L166
L167	276.3	2.8	.25	4.8	.68	81.3	2.0	.27	3.5	.70	45S	Ø	L167
L173B	273.7	.1	.01	7.7	1.08	78.7	-1.7	-.09	4.8	.95	45S	Ø	L173B
L183S	271.9	-1.7	-.15	9.8	1.38	81.7	2.4	.33	6.1	1.21	45S	Ø	L183S
L190C	258.0	-15.5	-1.38	6.8	.95	83.7	4.3	.59	6.4	1.27	45S	Ø	L190C
L190R	257.6	-15.9	-1.42	4.3	.61	66.3	-13.0	-1.78	2.9	.57	45S	Ø	L190R
L195	265.3	-8.3	-.73	7.3	1.03	83.1	3.7	.51	5.5	1.09	45S	Ø	L195
L203	273.0	-.5	-.05	6.2	.88	71.7	-7.6	-1.04	5.7	1.13	45S	Ø	L203
L206	275.9	2.3	.21	6.9	.97	83.5	4.2	.57	5.0	.99	45S	Ø	L206
L211	257.1	-16.4	-1.46	7.2	1.01	67.7	-11.7	-1.60	6.1	1.20	45S	Ø	L211
L213	266.3	-7.2	-.64	6.7	.94	66.5	-12.8	-1.75	5.7	1.12	45S	Ø	L213
L223	264.9	-8.7	-.77	6.5	.92	72.6	-6.8	-.92	4.1	.82	45S	Ø	L223
L224	276.0	2.5	.22	9.1	1.28	61.7	-17.6	-2.41	4.9	.98	45S	*	L224
L226B	259.4	-14.1	-1.26	8.1	1.14	70.2	-9.2	-1.25	5.5	1.10	45S	Ø	L226B
L228	287.3	13.7	1.22	13.0	1.83	80.4	1.0	.14	6.0	1.20	45S	Ø	L228
L230S	277.1	3.6	.32	6.8	.96	80.1	.8	.11	5.8	1.15	45S	Ø	L230S
L231	285.5	12.0	1.07	7.8	1.10	77.9	-1.5	-.20	3.2	.64	45S	Ø	L231
L232S	276.3	2.8	.25	4.0	.56	78.0	-1.4	-.19	4.9	.98	45S	Ø	L232S
L233	241.9	-31.7	-2.81	4.2	.59	75.5	-3.9	-.53	5.0	.99	45S	*	L233
L237	275.0	1.5	.13	5.0	.70	77.3	-2.0	-.28	2.6	.51	45S	Ø	L237
L241	252.3	-21.2	-1.88	6.2	.88	85.1	5.8	.79	3.4	.67	45S	Ø	L241
L249	279.7	6.1	.55	8.0	1.12	78.1	-1.2	-.17	4.4	.88	45S	Ø	L249
L254	263.9	-9.6	-.85	9.6	1.35	84.6	5.2	.72	8.1	1.60	45S	Ø	L254
L255	275.6	2.1	.18	5.6	.78	96.4	17.0	2.33	2.7	.53	45S	Ø	L255
L257A	272.2	-1.3	-.12	5.1	.71	87.6	8.2	1.13	7.2	1.44	45S	Ø	L257A
L257B	283.5	9.9	.88	9.1	1.28	99.1	19.7	2.70	6.7	1.34	45S	*	L257B
L257C	273.7	.1	.01	7.7	1.09	98.3	19.0	2.60	6.2	1.24	45S	*	L257C
L259	296.3	22.8	2.03	5.2	.73	85.1	5.7	.78	4.9	.96	45S	Ø	L259
L260	269.9	-3.7	-.33	3.9	.54	76.8	-2.6	-.35	4.9	.98	45S	Ø	L260
L261	278.7	5.1	.46	7.2	1.01	74.5	-4.9	-.67	2.4	.47	45S	Ø	L261
L262	273.7	.1	.01	8.5	1.19	89.1	9.7	1.33	6.5	1.29	45S	Ø	L262
L275	285.0	11.5	1.02	8.0	1.13	76.3	-3.0	-.41	4.8	.95	45S	Ø	L275
L277	287.5	13.9	1.24	6.2	.88	91.9	12.6	1.72	6.0	1.19	45S	Ø	L277
L278	298.1	24.5	2.18	6.4	.91	82.2	6.8	.94	6.2	1.23	45S	Ø	L278
L281	273.2	-.3	-.03	5.6	.78	76.1	-3.3	-.45	6.2	1.22	45S	Ø	L281
L285	265.7	-7.9	-.70	6.8	.96	67.3	-12.0	-1.64	5.0	.98	45S	Ø	L285
L288	NO DATA REPORTED FOR SAMPLE J50					81.4	2.0	.28	4.0	.79	45S	M	L288
L290	249.9	-23.6	-2.10	4.0	.57	74.5	-4.8	-.66	5.3	1.05	45S	Ø	L290
L291S	286.8	13.3	1.18	4.9	.68	82.5	3.1	.43	6.1	1.20	45S	Ø	L291S
L305	278.5	5.0	.45	8.9	1.26	78.9	-.4	-.06	6.5	1.29	45S	Ø	L305
L308	275.7	2.2	.20	5.3	.75	72.9	-6.4	-.88	4.0	.80	45S	Ø	L308
L312	292.0	18.5	1.64	3.1	.44	85.8	6.4	.88	5.4	1.06	45S	Ø	L312

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T45-1 TABLE 1
 SMOOTHNESS, SHEFFIELD UNITS
 SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE J50 MEAN	PRINTING 94 GRAMS PER SQUARE METER				SAMPLE J74 MEAN	PRINTING 76 GRAMS PER SQUARE METER				TEST D ₀ = 15		
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L317	277.7	4.1	.37	7.3	1.03	73.1	-6.2	-.85	4.9	.97	45S	Ø	L317
L318	272.3	-1.3	-.11	7.5	1.05	76.4	-3.0	-.40	7.6	1.52	45S	Ø	L318
L321	251.7	-21.9	-1.94	4.9	.69	73.7	-5.7	-.78	4.0	.79	45S	Ø	L321
L323	262.0	-11.5	-1.02	7.3	1.03	78.7	-.7	-.09	5.2	1.02	45S	Ø	L323
L326	253.4	-20.1	-1.79	7.9	1.12	87.3	8.0	1.09	4.3	.86	45S	Ø	L326
L328	285.2	11.7	1.04	7.5	1.05	77.3	-2.0	-.28	4.2	.82	45S	Ø	L328
L352	271.9	-1.7	-.15	8.0	1.13	81.1	1.7	.23	4.6	.91	45S	Ø	L352
L360	273.7	.1	.01	3.9	.55	73.2	-6.2	-.84	5.3	1.06	45S	Ø	L360
L366	278.3	4.8	.43	8.2	1.15	75.4	-4.0	-.54	5.3	1.06	45S	Ø	L366
L372	270.0	-3.5	-.31	6.8	.96	64.1	-15.3	-2.09	5.5	1.08	45S	Ø	L372
L376	274.0	.5	.04	5.7	.81	92.1	12.8	1.75	4.5	.90	45S	Ø	L376
L380	268.7	-4.9	-.43	7.7	1.08	73.0	-6.4	-.87	3.7	.73	45S	Ø	L380
L382	284.9	11.3	1.01	5.9	.84	76.3	-3.1	-.42	4.2	.83	45S	Ø	L382
L390	265.0	-8.5	-.76	6.3	.88	76.7	-2.7	-.37	6.5	1.28	45S	Ø	L390
L554	277.0	3.5	.31	10.4	1.47	73.5	-5.8	-.80	5.7	1.14	45S	Ø	L554
L575	299.9	26.3	2.34	7.5	1.05	79.2	-.2	-.02	6.4	1.27	45S	Ø	L575
L585	272.3	-1.2	-.11	9.0	1.27	71.7	-7.7	-1.05	5.2	1.04	45S	Ø	L585
L597	267.0	-6.5	-.58	10.3	1.45	72.9	-6.5	-.89	5.2	1.03	45S	Ø	L597
L600	280.3	6.8	.61	8.4	1.18	83.1	3.7	.51	5.4	1.07	45S	Ø	L600
L626	281.0	7.5	.66	8.3	1.17	71.3	-8.1	-1.11	3.4	.67	45S	Ø	L626
L648	272.3	-1.2	-.11	9.5	1.34	73.0	-6.4	-.87	4.1	.82	45S	Ø	L648
L651	235.0	-38.5	-3.42	4.6	.65	90.7	11.3	1.55	6.8	1.34	45S	X	L651
L670	278.7	5.2	.46	7.2	1.02	78.6	-.8	-.10	3.7	.73	45S	Ø	L670
L679	269.9	-3.7	-.33	5.7	.81	82.3	2.9	.40	4.3	.85	45S	Ø	L679
L688	274.3	.8	.07	8.4	1.19	73.7	-5.7	-.78	5.8	1.15	45S	Ø	L688
L698	285.8	12.3	1.09	5.1	.71	80.4	1.0	.14	4.9	.96	45S	Ø	L698
GR. MEAN = 273.5 SHEFF. UNITS		GRAND MEAN = 79.4 SHEFF. UNITS				TEST DETERMINATIONS = 15							
SD MEANS = 11.3 SHEFF. UNITS		SD OF MEANS = 7.3 SHEFF. UNITS				88 LABS IN GRAND MEANS							
AVERAGE SDR = 7.1 SHEFF. UNITS		AVERAGE SDR = 5.0 SHEFF. UNITS											
L174	316.7	43.2	3.84	3.8	.54	196.6	117.2	16.04	2.5	.50	45R	Ø	L174
TOTAL NUMBER OF LABORATORIES REPORTING = 92													

Best values: J50 274 ± 21 Sheffield units
 J74 79 ± 12 Sheffield units

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

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T45-1 TABLE 2
SMOOTHNESS, SHEFFIELD UNITS
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

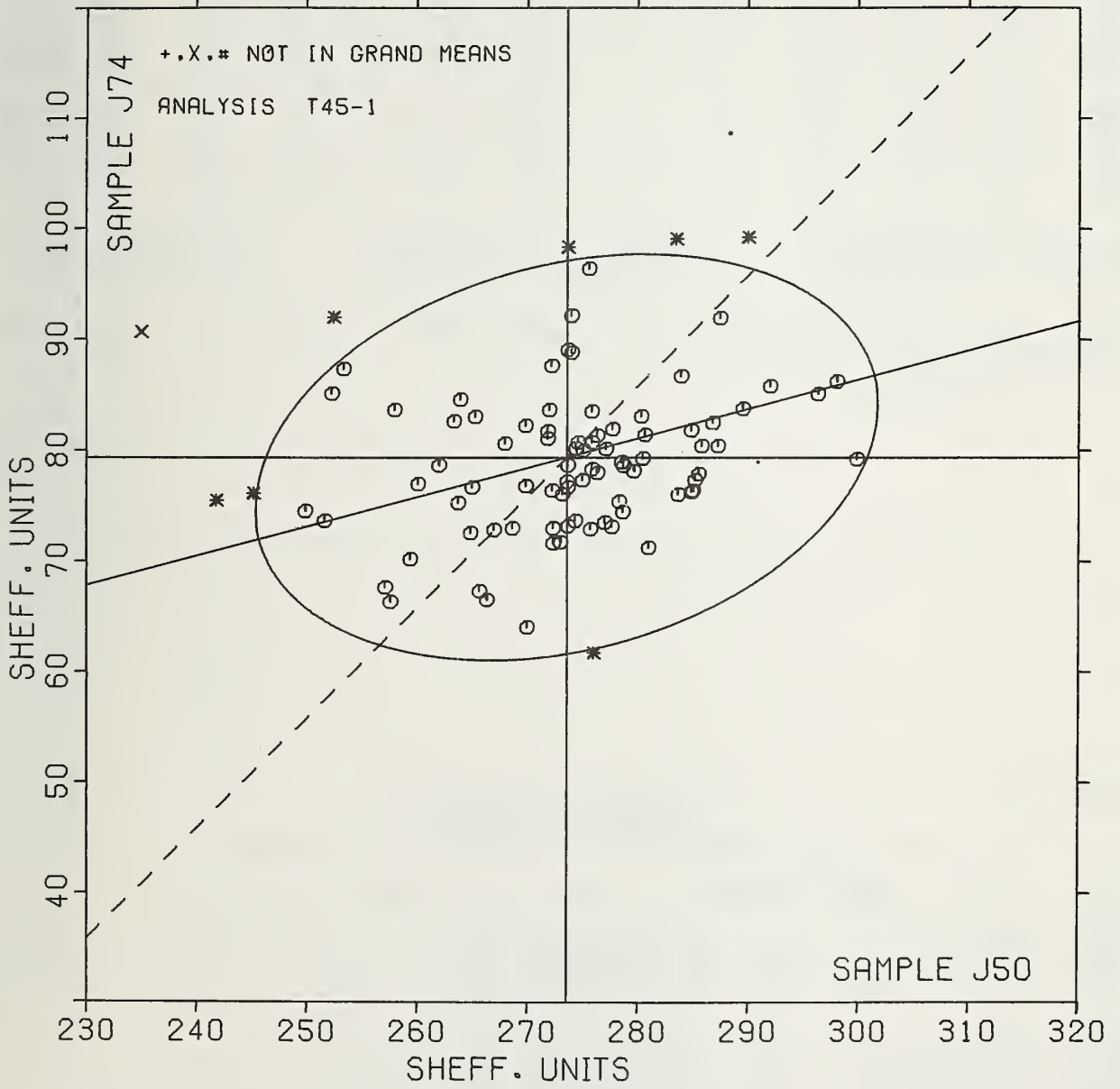
LAB CODE	F	MHANS		COORDINATES		AVG R _s SDR VAR	PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J50	J74	MAJOR	MINOR				
L288	M		81.4			.79 45S	SMOOTHNESS,	SHEFFIELD	
L651	X	235.0	90.7	-34.3	20.8	1.00 45S	SMOOTHNESS,	SHEFFIELD	
L233	*	241.9	75.5	-31.6	4.3	.79 45S	SMOOTHNESS,	SHEFFIELD	
L121	*	245.2	76.1	-28.2	4.1	1.16 45S	SMOOTHNESS,	SHEFFIELD	
L290	Ø	249.9	74.5	-24.0	1.4	.81 45S	SMOOTHNESS,	SHEFFIELD	
L321	Ø	251.7	73.7	-22.6	.1	.74 45S	SMOOTHNESS,	SHEFFIELD	
L241	Ø	252.3	85.1	-19.0	11.0	.78 45S	SMOOTHNESS,	SHEFFIELD	
L152	*	252.5	92.0	-17.1	17.6	.73 45S	SMOOTHNESS,	SHEFFIELD	
L326	Ø	253.4	87.3	-17.4	12.9	.99 45S	SMOOTHNESS,	SHEFFIELD	
L211	Ø	257.1	67.7	-18.8	-7.1	1.10 45S	SMOOTHNESS,	SHEFFIELD	
L190R	Ø	257.6	66.3	-18.7	-8.5	.59 45S	SMOOTHNESS,	SHEFFIELD	
L190C	Ø	258.0	83.7	-13.9	8.1	1.11 45S	SMOOTHNESS,	SHEFFIELD	
L226B	Ø	259.4	70.2	-16.0	-5.2	1.12 45S	SMOOTHNESS,	SHEFFIELD	
L166	Ø	260.1	77.0	-13.5	1.2	.97 45S	SMOOTHNESS,	SHEFFIELD	
L323	Ø	262.0	78.7	-11.3	2.3	1.02 45S	SMOOTHNESS,	SHEFFIELD	
L125	Ø	263.3	82.7	-9.0	5.8	1.52 45S	SMOOTHNESS,	SHEFFIELD	
L124	Ø	263.7	75.3	-10.5	-1.4	.74 45S	SMOOTHNESS,	SHEFFIELD	
L254	Ø	263.9	84.6	-7.9	7.5	1.48 45S	SMOOTHNESS,	SHEFFIELD	
L223	Ø	264.9	72.6	-10.1	-4.3	.87 45S	SMOOTHNESS,	SHEFFIELD	
L390	Ø	265.0	76.7	-8.9	-0.4	1.08 45S	SMOOTHNESS,	SHEFFIELD	
L195	Ø	265.3	83.1	-7.0	5.7	1.06 45S	SMOOTHNESS,	SHEFFIELD	
L285	Ø	265.7	67.3	-10.7	-9.6	.97 45S	SMOOTHNESS,	SHEFFIELD	
L213	Ø	266.3	66.5	-10.2	-10.6	1.03 45S	SMOOTHNESS,	SHEFFIELD	
L597	Ø	267.0	72.9	-8.0	-4.6	1.24 45S	SMOOTHNESS,	SHEFFIELD	
L158	Ø	268.0	80.7	-5.0	2.7	1.21 45S	SMOOTHNESS,	SHEFFIELD	
L380	Ø	268.7	73.0	-6.3	-4.9	.91 45S	SMOOTHNESS,	SHEFFIELD	
L679	Ø	269.9	82.3	-2.8	3.8	.83 45S	SMOOTHNESS,	SHEFFIELD	
L260	Ø	269.9	76.8	-4.2	-1.5	.76 45S	SMOOTHNESS,	SHEFFIELD	
L107	#	270.0	134.4	10.7	54.1	1.25 45S	SMOOTHNESS,	SHEFFIELD	
L372	Ø	270.0	64.1	-7.3	-13.9	1.02 45S	SMOOTHNESS,	SHEFFIELD	
L183S	Ø	271.9	81.7	-1.0	2.7	1.30 45S	SMOOTHNESS,	SHEFFIELD	
L352	Ø	271.9	81.1	-1.2	2.1	1.02 45S	SMOOTHNESS,	SHEFFIELD	
L115	Ø	272.0	83.7	-.4	4.6	1.02 45S	SMOOTHNESS,	SHEFFIELD	
L257A	Ø	272.2	87.6	.8	8.3	1.07 45S	SMOOTHNESS,	SHEFFIELD	
L318	Ø	272.3	76.4	-2.0	-2.5	1.29 45S	SMOOTHNESS,	SHEFFIELD	
L648	Ø	272.3	73.0	-2.8	-5.8	1.08 45S	SMOOTHNESS,	SHEFFIELD	
L585	Ø	272.3	71.7	-3.1	-7.1	1.16 45S	SMOOTHNESS,	SHEFFIELD	
L203	Ø	273.0	71.7	-2.5	-7.2	1.00 45S	SMOOTHNESS,	SHEFFIELD	
L281	Ø	273.2	76.1	-1.2	-3.1	1.00 45S	SMOOTHNESS,	SHEFFIELD	
L128	Ø	273.6	77.2	-.5	-2.1	.69 45S	SMOOTHNESS,	SHEFFIELD	
L173B	Ø	273.7	78.7	-.0	-.7	1.02 45S	SMOOTHNESS,	SHEFFIELD	
L360	Ø	273.7	73.2	-1.4	-6.0	.80 45S	SMOOTHNESS,	SHEFFIELD	
L262	Ø	273.7	89.1	2.6	9.4	1.24 45S	SMOOTHNESS,	SHEFFIELD	
L257C	*	273.7	98.3	5.0	18.3	1.16 45S	SMOOTHNESS,	SHEFFIELD	
L162	Ø	273.7	76.7	-.6	-2.6	.99 45S	SMOOTHNESS,	SHEFFIELD	
L376	Ø	274.0	92.1	3.7	12.2	.85 45S	SMOOTHNESS,	SHEFFIELD	
L139S	Ø	274.0	88.8	2.9	9.0	.71 45S	SMOOTHNESS,	SHEFFIELD	
L688	Ø	274.3	73.7	-.7	-5.7	1.17 45S	SMOOTHNESS,	SHEFFIELD	
L159	Ø	274.4	80.2	1.1	.6	1.10 45S	SMOOTHNESS,	SHEFFIELD	
L100	Ø	274.6	80.7	1.4	1.1	1.05 45S	SMOOTHNESS,	SHEFFIELD	
L237	Ø	275.0	77.3	.9	-2.3	.61 45S	SMOOTHNESS,	SHEFFIELD	
L114	Ø	275.1	80.0	1.7	.2	1.20 45S	SMOOTHNESS,	SHEFFIELD	
L255	Ø	275.6	96.4	6.4	15.9	.66 45S	SMOOTHNESS,	SHEFFIELD	
L308	Ø	275.7	72.9	.5	-6.8	.78 45S	SMOOTHNESS,	SHEFFIELD	
L132	Ø	275.9	78.3	2.0	-1.6	.96 45S	SMOOTHNESS,	SHEFFIELD	
L206	Ø	275.9	83.5	3.3	3.4	.98 45S	SMOOTHNESS,	SHEFFIELD	
L122	Ø	275.9	80.7	2.6	.7	1.17 45S	SMOOTHNESS,	SHEFFIELD	
L224	*	276.0	61.7	-2.1	-17.7	1.13 45S	SMOOTHNESS,	SHEFFIELD	
L232S	Ø	276.3	78.0	2.4	-2.0	.77 45S	SMOOTHNESS,	SHEFFIELD	
L167	Ø	276.3	81.3	3.2	1.2	.69 45S	SMOOTHNESS,	SHEFFIELD	
L554	Ø	277.0	73.5	1.9	-6.5	1.31 45S	SMOOTHNESS,	SHEFFIELD	
L230S	Ø	277.1	80.1	3.7	-.2	1.05 45S	SMOOTHNESS,	SHEFFIELD	
L317	Ø	277.7	73.1	2.4	-7.1	1.00 45S	SMOOTHNESS,	SHEFFIELD	
L126	Ø	277.7	81.9	4.7	1.4	1.23 45S	SMOOTHNESS,	SHEFFIELD	
L366	Ø	278.3	75.4	3.6	-5.1	1.11 45S	SMOOTHNESS,	SHEFFIELD	

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T45-1 TABLE 2
 SMOOTHNESS, SHEFFIELD UNITS
 SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J50	J74	MAJØB	MINGE	R.SDR	VAR			
L305	Ø	278.5	78.9	4.7	-1.7	1.27	45S	SMOOTHNESS,	SHEFFIELD	
L261	Ø	278.7	74.5	3.7	-6.0	.74	45S	SMOOTHNESS,	SHEFFIELD	
L670	Ø	278.7	78.6	4.8	-2.1	.88	45S	SMOOTHNESS,	SHEFFIELD	
L249	Ø	279.7	78.1	5.6	-2.8	1.00	45S	SMOOTHNESS,	SHEFFIELD	
L600	Ø	280.3	83.1	7.5	1.8	1.12	45S	SMOOTHNESS,	SHEFFIELD	
L108	Ø	280.5	79.3	6.7	-1.9	.86	45S	SMOOTHNESS,	SHEFFIELD	
L123	Ø	280.7	81.4	7.4	.1	1.45	45S	SMOOTHNESS,	SHEFFIELD	
L626	Ø	281.0	71.3	5.2	-9.7	.92	45S	SMOOTHNESS,	SHEFFIELD	
L257B	*	283.5	99.1	14.7	16.5	1.31	45S	SMOOTHNESS,	SHEFFIELD	
L134	Ø	283.7	76.0	8.9	-5.8	.93	45S	SMOOTHNESS,	SHEFFIELD	
L148	Ø	283.9	86.7	11.9	4.4	1.18	45S	SMOOTHNESS,	SHEFFIELD	
L150	Ø	284.9	81.8	11.6	-.5	.99	45S	SMOOTHNESS,	SHEFFIELD	
L382	Ø	284.9	76.3	10.2	-5.9	.83	45S	SMOOTHNESS,	SHEFFIELD	
L275	Ø	285.0	76.3	10.3	-5.9	1.04	45S	SMOOTHNESS,	SHEFFIELD	
L328	Ø	285.2	77.3	10.8	-4.9	.94	45S	SMOOTHNESS,	SHEFFIELD	
L231	Ø	285.5	77.9	11.2	-4.5	.87	45S	SMOOTHNESS,	SHEFFIELD	
L698	Ø	285.8	80.4	12.1	-2.1	.84	45S	SMOOTHNESS,	SHEFFIELD	
L291S	Ø	286.8	82.5	13.6	-.4	.94	45S	SMOOTHNESS,	SHEFFIELD	
L228	Ø	287.3	80.4	13.6	-2.5	1.51	45S	SMOOTHNESS,	SHEFFIELD	
L277	Ø	287.5	91.9	16.7	8.6	1.03	45S	SMOOTHNESS,	SHEFFIELD	
L157	Ø	289.5	83.7	16.6	.1	.80	45S	SMOOTHNESS,	SHEFFIELD	
L153	*	290.0	99.2	21.0	15.0	.85	45S	SMOOTHNESS,	SHEFFIELD	
L312	Ø	292.0	85.8	19.5	1.5	.75	45S	SMOOTHNESS,	SHEFFIELD	
L259	Ø	296.3	85.1	23.5	-.3	.85	45S	SMOOTHNESS,	SHEFFIELD	
L278	Ø	298.1	86.2	25.5	.3	1.07	45S	SMOOTHNESS,	SHEFFIELD	
L575	Ø	299.9	79.2	25.4	-6.9	1.16	45S	SMOOTHNESS,	SHEFFIELD	
L174	*	316.7	196.6	71.8	102.3	.52	45R	SMOOTHNESS,	SHEFFIELD,	NON-STANDARD INSTRUMENT
GMEANS:		273.5	79.4			1.00				
		95% ELLIPSE:		28.8	17.3	WITH GAMMA = 14 DEGREES				

SMOOTHNESS, SHEFFIELD

SAMPLE J50 = 274. SHEFF. UNITS SAMPLE J74 = 79. SHEFF. UNITS



TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T45-2 TABLE 1
 SMOOTHNESS, BEKK SECONDS
 TAPPI SUGGESTED METHOD T479 SU-71, SMOOTHNESS OF PAPER (BEKK METHOD)

LAB CODE	SAMPLE J50		PRINTING 94 GRAMS PER SQUARE METER				SAMPLE J74		PRINTING 76 GRAMS PER SQUARE METER				TEST D ₀ = 15		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB		
L139B	10.59	.28	.41	.52	.90	87.13	7.18	.69	8.13	.91	45K	Ø	L139B		
L162	10.20	-.10	-.15	.41	.72	82.20	2.24	.22	7.84	.88	45K	Ø	L162		
L182K	9.31	-1.00	-1.47	.74	1.29	71.53	-8.42	-.81	5.57	.62	45K	Ø	L182K		
L190C	10.33	.03	.04	.62	1.07	78.27	-1.69	-.16	7.74	.87	45K	Ø	L190C		
L230B	8.93	-1.37	-2.01	.70	1.22	90.47	10.51	1.01	6.85	.77	45K	Ø	L230B		
L232B	10.07	-.24	-.35	.34	.58	69.77	-10.18	-.98	6.49	.73	45K	Ø	L232B		
L274K	10.75	.44	.65	.96	1.66	68.48	-11.48	-1.10	3.27	.37	45K	Ø	L274K		
L291K	10.83	.52	.77	.78	1.34	101.87	21.91	2.11	10.78	1.21	45K	Ø	L291K		
L564	11.20	.90	1.31	.56	.97	71.27	-8.69	-.84	5.62	.63	45K	Ø	L564		
L581	10.27	-.04	-.06	.46	.79	84.13	4.18	.40	10.88	1.22	45K	Ø	L581		
L697	10.89	.58	.85	.28	.48	74.41	-5.54	-.53	24.99	2.80	45K	Ø	L697		
GR. MEAN = 10.30 BEKK SECONDS			GRAND MEAN = 79.96 BEKK SECONDS				TEST DETERMINATIONS = 15								
SD MEANS = .68 BEKK SECONDS			SD OF MEANS = 10.39 BEKK SECONDS				11 LABS IN GRAND MEANS								
AVERAGE SDR =			.58 BEKK SECONDS				AVERAGE SDR = 8.92 BEKK SECONDS								
L250M	10.21	-.10	-.14	.99	1.71	67.73	-12.22	-1.18	4.40	.49	45L	+	L250M		
L251	9.79	-.52	-.76	.47	.82	74.53	-5.42	-.52	4.94	.55	45L	+	L251		
TOTAL NUMBER OF LABORATORIES REPORTING = 13															

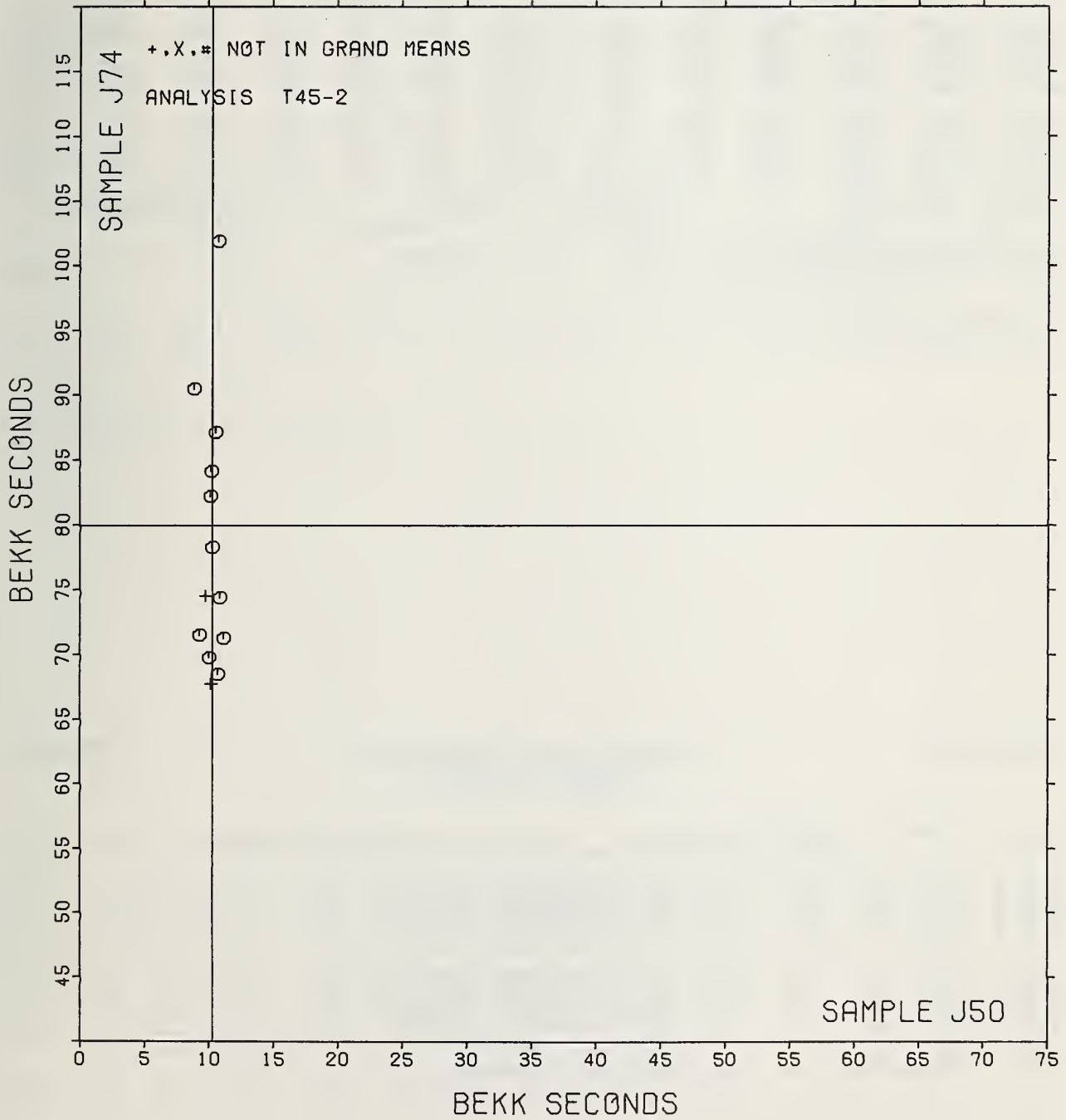
Best values: J50 10 Bekk seconds
 J74 79 Bekk seconds

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T45-2 TABLE 2
 SMOOTHNESS, BEKK SECONDS
 TAPPI SUGGESTED METHOD T479 SU-71, SMOOTHNESS OF PAPER (BEKK METHOD)

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY--TEST INSTRUMENT--CONDITIONS
		J50	J74	MAJOR	MINOR	R ₀ SDR	VAR	
L230B	Ø	8.53	90.47	-10.52	-1.31	.99	45K	SMOOTHNESS, BEKK
L182K	Ø	9.31	71.53	8.42	-1.05	.95	45K	SMOOTHNESS, BEKK
L251	+	9.79	74.53	5.42	-.55	.69	45L	SMOOTHNESS, BEKK, 20 C, 65% RH
L232B	Ø	10.07	69.77	10.18	-.30	.65	45K	SMOOTHNESS, BEKK
L162	Ø	10.20	82.20	-2.24	-.09	.80	45K	SMOOTHNESS, BEKK
L250M	+	10.21	67.73	12.22	-.17	1.10	45L	SMOOTHNESS, BEKK, 20 C, 65% RH
L581	Ø	10.27	84.13	-4.18	-.01	1.01	45K	SMOOTHNESS, BEKK
L190C	Ø	10.33	78.27	1.69	.02	.97	45K	SMOOTHNESS, BEKK
L139B	Ø	10.59	87.13	-7.17	.33	.91	45K	SMOOTHNESS, BEKK
L274K	Ø	10.75	68.48	11.48	.37	1.01	45K	SMOOTHNESS, BEKK
L291K	Ø	10.83	101.87	-21.91	.66	1.28	45K	SMOOTHNESS, BEKK
L697	Ø	10.89	74.41	5.55	.55	1.64	45K	SMOOTHNESS, BEKK
L564	Ø	11.20	71.27	8.70	.84	.80	45K	SMOOTHNESS, BEKK
GMEANS:		10.30	79.96			1.00		
		95% ELLIPSE:		31.96	2.08	WITH GAMMA = -89 DEGREES		

SMOOTHNESS, BEKK

SAMPLE J50 = 10.3 BEKK SECONDS SAMPLE J74 = 80.0 BEKK SECONDS



LAB CODE	SAMPLE E50 91 GRAMS PER SQUARE METER					SAMPLE B80 75 GRAMS PER SQUARE METER					TEST D. 4		
	MEAN	DEV	N, DEV	SDR	R, SDR	MEAN	DEV	N, DEV	SDR	R, SDR	VAR	F	LAB
L126	63.52	-1.55	-0.29	.29	.49	25.17	.07	.02	.85	.68	56K	Ø	L126
L149	58.75	-6.32	-1.17	.50	.85	23.75	-1.36	-0.47	2.50	2.01	56K	Ø	L149
L182	66.27	1.20	.22	.43	.72	25.32	.22	.08	.85	.68	56K	Ø	L182
L213	68.22	3.15	.59	.79	1.34	27.60	2.49	.87	1.43	1.15	56K	Ø	L213
L277	69.75	4.68	.87	.50	.85	26.25	1.14	.40	.50	.40	56K	Ø	L277
L291	67.25	2.18	.40	1.04	1.76	22.75	-2.36	-0.82	1.26	1.01	56K	Ø	L291
L333	59.25	-5.82	-1.08	.50	.85	22.00	-3.11	-1.08	.82	.66	56K	Ø	L333
L339	73.87	8.80	1.64	.25	.42	30.87	5.77	2.01	1.44	1.15	56K	Ø	L339
L564	32.25	-32.82	-6.10	.50	.85	60.50	35.39	12.32	1.00	.80	56K	#	L564
L616	.25	-64.82	-12.04	.00	.00	.60	-24.51	-8.53	.00	.00	56K	#	L616
L643	58.75	-6.32	-1.17	1.01	1.72	22.25	-2.86	-0.99	1.56	1.25	56K	Ø	L643
GR. MEAN = 65.07 K & N UNITS					GRAND MEAN = 25.11 K & N UNITS					TEST DETERMINATIONS = 4			
SD MEANS = 5.38 K & N UNITS					SD OF MEANS = 2.87 K & N UNITS					9 LABS IN GRAND MEANS			
AVERAGE SDR = .59 K & N UNITS					AVERAGE SDR = 1.24 K & N UNITS								

L651 28.47 -36.60 -6.80 .96 1.63 51.37 26.27 9.14 .85 .68 56Ø * L651
 L688 25.02 -40.05 -7.44 .44 .75 56.20 31.09 10.82 .98 .79 56Ø * L688
 TOTAL NUMBER OF LABORATORIES REPORTING = 13
 Best values: E50 65 K + N units
 B80 25 K + N units

The following laboratories were omitted from the grand means because of extreme test results: 564, 616.

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		E50	B80	MAJOR	MINOR	R, SDR	VAR	
L616	#	.25	.60	-69.04	6.02	.00	56K	INK ABSORPTION, K&N INK TEST
L688	*	25.02	56.20	-22.61	45.38	.77	56Ø	INK ABSORPTION: ØWN METHOD
L651	*	28.47	51.37	-21.55	35.54	1.16	56Ø	INK ABSORPTION: ØWN METHOD
L564	#	32.25	60.50	-14.23	46.12	.83	56K	INK ABSORPTION, K&N INK TEST
L643	Ø	58.75	22.25	76.94	.17	1.49	56K	INK ABSORPTION, K&N INK TEST
L149	Ø	58.75	23.75	-6.29	1.52	1.43	56K	INK ABSORPTION, K&N INK TEST
L333	Ø	59.25	22.00	-6.59	-.28	.75	56K	INK ABSORPTION, K&N INK TEST
L126	Ø	63.52	25.17	-1.37	.73	.58	56K	INK ABSORPTION, K&N INK TEST
L182	Ø	66.27	25.32	1.18	-.33	.70	56K	INK ABSORPTION, K&N INK TEST
L291	Ø	67.25	22.75	.54	-3.07	1.39	56K	INK ABSORPTION, K&N INK TEST
L213	Ø	68.22	27.60	3.92	.88	1.25	56K	INK ABSORPTION, K&N INK TEST
L277	Ø	69.75	26.25	4.71	-1.00	.62	56K	INK ABSORPTION, K&N INK TEST
L339	Ø	73.87	30.87	10.43	1.38	.79	56K	INK ABSORPTION, K&N INK TEST
GMEANS:		65.07	25.11			1.00		
		95% ELLIPSE:		19.53	4.67	WITH GAMMA = 25 DEGREES		

ANALYSIS T60-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT

TAPPI STANDARD T425 GS-75, OPACITY OF PAPER (15 DBG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE K24 MEAN	PRINTING 103 GRAMS PER SQUARE METER				R ₀ SDR	SAMPLE G01 MEAN	PRINTING 116 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	N ₀ DEV	SDR	R ₀ SDR			DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L105	55.94	.55	1.47	.18	.67	96.42	.60	1.36	.16	.67	60H	Ø	L105	
L108	55.32	-.07	-.20	.30	1.09	95.69	-.13	-.29	.18	.74	60B	Ø	L108	
L115	95.48	.09	.23	.21	.78	96.23	.41	.93	.24	1.00	60B	Ø	L115	
L118	95.54	.15	.39	.30	1.10	95.86	.04	.09	.13	.53	60B	Ø	L118	
L121	55.51	.12	.31	.17	.60	95.89	.07	.16	.22	.93	60B	Ø	L121	
L122	95.17	-.22	-.60	.31	1.13	95.73	-.09	-.20	.21	.88	60D	Ø	L122	
L123	94.82	-.57	-1.54	.22	.80	95.85	.03	.07	.33	1.36	60W	X	L123	
L124	55.47	.08	.21	.51	1.84	96.04	.22	.50	.36	1.48	60B	Ø	L124	
L125	54.76	-.63	-1.70	.30	1.07	95.37	-.45	-1.01	.17	.71	60H	Ø	L125	
L131	94.61	-.78	-2.10	.23	.83	95.39	-.43	-.97	.31	1.29	60R	*	L131	
L132	95.09	-.30	-.82	.31	1.13	95.79	-.03	-.06	.14	.60	60B	Ø	L132	
L134	56.00	.61	1.63	.00	.00	96.10	.28	.63	.32	1.31	60R	Ø	L134	
L136	55.30	-.09	-.25	.31	1.11	95.63	-.19	-.42	.33	1.36	60H	Ø	L136	
L139	95.28	-.11	-.31	.32	1.16	95.64	-.18	-.40	.15	.63	60B	Ø	L139	
L148H	95.10	-.29	-.79	.30	1.08	95.53	-.29	-.65	.25	1.06	60H	Ø	L148H	
L150	56.00	.61	1.63	.24	.85	96.75	.93	2.10	.42	1.77	60B	Ø	L150	
L152	95.71	.32	.85	.18	.65	96.19	.37	.84	.23	.95	60B	Ø	L152	
L153	55.40	.01	.02	.39	1.43	95.75	-.07	-.15	.26	1.09	60B	Ø	L153	
L157	55.89	.50	1.33	.33	1.21	96.10	.28	.63	.32	1.31	60B	Ø	L157	
L158	55.54	.15	.39	.17	.62	95.89	.07	.16	.29	1.21	60D	Ø	L158	
L159	95.51	.12	.31	.12	.43	95.97	.15	.34	.20	.83	60R	Ø	L159	
L162	55.59	.20	.53	.28	1.03	96.27	.45	1.02	.25	1.06	60W	Ø	L162	
L166	95.19	-.20	-.55	.31	1.14	55.78	-.04	-.09	.29	1.19	60B	Ø	L166	
L173A	55.34	-.05	-.14	.12	.43	95.48	-.34	-.76	.06	.26	60B	Ø	L173A	
L190C	95.51	.12	.31	.21	.77	95.90	.08	.18	.38	1.59	60B	Ø	L190C	
L190R	95.54	.15	.39	.22	.79	95.95	.13	.30	.10	.40	60B	Ø	L190R	
L206	55.54	.15	.39	.31	1.14	95.76	-.06	-.13	.19	.79	60B	Ø	L206	
L210B	55.42	.03	.07	.36	1.32	95.93	.11	.25	.13	.52	60B	Ø	L210B	
L210D	55.43	.04	.10	.21	.76	95.95	.13	.30	.22	.90	60D	Ø	L210D	
L211S	55.22	-.17	-.47	.21	.78	95.61	-.21	-.47	.17	.72	60R	Ø	L211S	
L212	95.60	.21	.55	.62	2.23	96.06	.24	.54	.69	2.87	60B	Ø	L212	
L213	55.74	.35	.93	.49	1.76	96.48	.66	1.49	.35	1.45	60B	Ø	L213	
L223B	55.39	-.00	-.01	.37	1.35	96.05	.23	.52	.25	1.02	60B	Ø	L223B	
L225	55.57	.18	.47	.29	1.05	96.03	.21	.48	.18	.73	60B	Ø	L225	
L226B	95.42	.03	.07	.23	.83	95.79	-.03	-.06	.26	1.08	60B	Ø	L226B	
L228	94.98	-.41	-1.11	.19	.68	95.38	-.44	-.99	.19	.78	60H	Ø	L228	
L230	95.58	.19	.50	.36	1.32	95.91	.09	.21	.22	.91	60B	Ø	L230	
L236B	95.02	-.37	-1.00	.49	1.79	95.62	-.20	-.45	.37	1.53	60B	Ø	L236B	
L238A	54.73	-.66	-1.78	.21	.75	95.13	-.69	-1.55	.14	.59	60R	Ø	L238A	
L241	55.66	.27	.72	.25	.92	96.20	.38	.86	.16	.68	60B	Ø	L241	
L254	95.57	.18	.47	.33	1.21	96.06	.24	.54	.18	.76	60H	Ø	L254	
L255	54.77	-.62	-1.67	.23	.84	94.99	-.83	-1.87	.25	1.04	60B	Ø	L255	
L259	55.10	-.29	-.79	.30	1.09	95.66	-.16	-.36	.32	1.33	60B	Ø	L259	
L261	56.40	1.01	2.70	.32	1.15	97.00	1.18	2.66	.00	.00	60B	*	L261	
L262	55.51	.12	.31	.19	.67	96.00	.18	.41	.22	.90	60R	Ø	L262	
L275	95.23	-.16	-.44	.13	.45	96.04	.22	.50	.18	.76	60R	Ø	L275	
L278	55.60	.21	.55	.33	1.21	95.93	.11	.25	.16	.65	60B	Ø	L278	
L281	55.57	.18	.47	.27	.98	96.21	.39	.88	.22	.91	60D	Ø	L281	
L285D	94.81	-.58	-1.57	.27	.99	95.13	-.69	-1.55	.13	.52	60D	Ø	L285D	
L285R	54.85	-.54	-1.46	.41	1.50	95.06	-.76	-1.71	.08	.35	60R	Ø	L285R	
L288	55.59	.20	.53	.29	1.06	96.09	.27	.61	.15	.63	60D	Ø	L288	
L305	54.86	-.53	-1.43	.19	.69	94.84	-.98	-2.20	.15	.63	60R	Ø	L305	
L308	95.91	.52	1.39	.35	1.26	96.65	.83	1.87	.50	2.07	60H	Ø	L308	
L315	55.23	-.16	-.44	.24	.85	95.65	-.17	-.38	.14	.60	60D	Ø	L315	
L317	54.99	-.40	-1.08	.31	1.11	95.50	-.32	-.72	.29	1.22	60B	Ø	L317	
L318	95.45	.06	.15	.44	1.59	96.01	.19	.43	.33	1.36	60B	Ø	L318	
L323	55.95	.56	1.49	.26	.95	96.65	.83	1.87	.16	.69	60W	Ø	L323	
L326	95.06	-.33	-.90	.20	.71	95.17	-.65	-1.46	.27	1.11	60B	Ø	L326	
L328	54.00	-1.39	-3.74	1.75	6.33	96.25	.43	.97	1.32	5.47	60B	X	L328	
L339	95.40	.01	.02	.52	1.87	95.60	-.22	-.49	.52	2.15	60B	Ø	L339	
L341	95.26	-.13	-.36	.30	1.07	95.25	-.57	-1.28	.27	1.13	60R	Ø	L341	
L352	55.11	-.28	-.76	.26	.94	95.82	.00	.00	.17	.70	60R	Ø	L352	
L354	95.00	-.39	-1.06	.00	.00	95.00	-.82	-1.84	.00	.00	60B	Ø	L354	
L390	95.56	.17	.45	.21	.77	95.62	-.20	-.45	1.08	4.49	60B	Ø	L390	
L396	95.00	-.39	-1.06	.00	.00	95.00	-.82	-1.84	.00	.00	60B	Ø	L396	

OPACITY (89% REFLECTANCE BACKING) IN PERCENT
TAPPI STANDARD T425 GS-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE K24 MEAN	PRINTING 103 GRAMS PER SQUARE METER					SAMPLE G01 MEAN	PRINTING 116 GRAMS PER SQUARE METER					TEST D ₀ = 10		
		DEV	N.DEV	SDR	R ₀ SDR	DEV		N.DEV	SDR	R ₀ SDR	VAR	F	LAB		
L523	95.30	-.09	-.25	.21	.74	95.86	.04	.09	.20	.81	60R	0	L523		
L571	95.50	.11	.29	.31	1.12	95.98	.16	.36	.16	.67	60D	0	L571		
L573	95.52	.13	.34	.19	.70	95.92	.10	.23	.18	.73	60H	0	L573		
L581	95.53	.14	.37	.32	1.15	95.95	.13	.30	.21	.86	60B	0	L581		
L592	94.94	-.45	-1.22	.46	1.68	95.30	-.52	-1.17	.21	.85	60W	0	L592		
L594	95.84	.45	1.20	.26	.95	95.92	.10	.23	.09	.38	60D	0	L594		
L597	95.00	-.39	-1.06	.00	.00	95.20	-.62	-1.39	.42	1.75	60B	0	L597		
L599	95.25	-.14	-.39	.35	1.28	95.75	-.07	-.15	.42	1.77	60B	0	L599		
L608	96.15	.76	2.03	.18	.67	96.57	.75	1.69	.29	1.22	60D	0	L608		
L673R	95.83	.44	1.17	.35	1.28	96.05	.23	.52	.10	.40	60E	0	L673R		
L673T	95.40	.01	.02	.34	1.23	95.79	-.03	-.06	.19	.77	60E	0	L673T		
L688	96.24	.85	2.27	.40	1.44	96.65	.83	1.87	.30	1.24	60B	0	L688		
L692	95.29	-.10	-.28	.33	1.21	95.80	-.02	-.04	.20	.83	60D	0	L692		
L698	94.65	-.74	-2.00	.26	.94	95.11	-.71	-1.60	.14	.57	60D	0	L698		
GR. MEAN = 95.39 PERCENT		GRAND MEAN = 95.82 PERCENT					TEST DETERMINATIONS = 10								
SD MEANS = .37 PERCENT		SD OF MEANS = .44 PERCENT					77 LABS IN GRAND MEANS								
AVERAGE SDR = .28 PERCENT		AVERAGE SDR = .24 PERCENT													
L100	95.56	.17	.45	.20	.73	95.98	.16	.36	.19	.80	60E	0	L100		
L224	95.86	.47	1.25	.21	.75	95.62	-.20	-.45	.56	2.32	60P	0	L224		
L232	95.00	-.39	-1.06	.00	.00	95.30	-.52	-1.17	.42	1.75	60P	0	L232		
L249	95.11	-.28	-.76	.21	.75	95.54	-.28	-.63	.40	1.65	60P	0	L249		
L256	94.96	-.43	-1.16	.32	1.16	95.45	-.37	-.83	.20	.81	60N	0	L256		
L260	95.49	.10	.26	.19	.67	95.71	-.11	-.24	.26	1.08	60P	0	L260		
L274P	95.00	-.39	-1.06	.41	1.48	96.05	.23	.52	.37	1.53	60P	0	L274P		
L277	4.80	-90.59	-243.23	.42	1.53	4.40	-91.42	-205.99	.52	2.15	60P	0	L277		
L312	94.55	-.84	-2.27	.28	1.03	94.90	-.92	-2.07	.32	1.31	60P	0	L312		
L380	95.00	-.39	-1.06	.00	.00	95.00	-.82	-1.84	.00	.00	60P	0	L380		
L564	95.00	-.39	-1.06	.00	.00	95.10	-.72	-1.62	.32	1.31	60P	0	L564		
L687	95.80	.41	1.09	.67	2.45	96.30	.48	1.09	.35	1.45	60P	0	L687		

TOTAL NUMBER OF LABORATORIES REPORTING = 91

Best values: K24 95.4 ± 0.6 percent
G01 95.8 ± 0.8 percent

OPACITY (89% REFLECTANCE BACKING) IN PERCENT
TAPPI STANDARD T425 6S-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

L&B CODE	F	MEANS		COORDINATES		AVG		PROPERTY	TEST INSTRUMENT	CONDITIONS
		K24	G01	MAJOR	MINOR	R _s	VAR			
L277	*	4.80	4.40	-128.15	11.93	1.84	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L328	X	94.00	96.25	-.55	1.35	5.90	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L312	*	94.55	94.90	-1.25	.07	1.17	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L131	*	94.61	95.39	-.83	.33	1.06	60R	OPACITY (WHITE BACKING),	TBWING-ALBERT (FORMERLY SRL)	
L698	Ø	94.65	95.11	-1.02	.12	.75	60D	OPACITY (WHITE BACKING),	BNL-2	
L238A	Ø	94.73	95.13	-.95	.08	.67	60R	OPACITY (WHITE BACKING),	TBWING-ALBERT (FORMERLY SRL)	
L125	Ø	94.76	95.37	-.75	.20	.89	60B	OPACITY (WHITE BACKING),	BUYGEN	
L255	Ø	94.77	94.99	-1.04	-.04	.94	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L285D	Ø	94.81	95.13	-.90	.01	.75	60D	OPACITY (WHITE BACKING),	BNL-2	
L123	X	94.82	95.85	-.34	.46	1.08	60W	OPACITY (WHITE BACKING),	BUYGEN, DIGITAL	
L285R	Ø	94.85	95.06	-.93	-.06	.93	60R	OPACITY (WHITE BACKING),	TBWING-ALBERT (FORMERLY SRL)	
L305	Ø	94.86	94.84	-1.09	-.21	.66	60R	OPACITY (WHITE BACKING),	TBWING-ALBERT (FORMERLY SRL)	
L592	Ø	94.94	95.30	-.69	.02	1.26	60W	OPACITY (WHITE BACKING),	BUYGEN, DIGITAL	
L256	*	94.96	95.45	-.56	.10	.99	60N	OPACITY (WHITE BACKING),	BUNTER	
L228	Ø	94.98	95.38	-.60	.04	.73	60B	OPACITY (WHITE BACKING),	BUYGEN	
L317	Ø	94.99	95.50	-.50	.11	1.17	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L274P	*	55.00	96.05	-.07	.45	1.51	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L564	*	55.00	95.10	-.80	-.15	.66	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L380	*	55.00	95.00	-.88	-.22	.00	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L232	*	55.00	95.30	-.65	-.03	.88	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L597	Ø	95.00	95.20	-.73	-.09	.88	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L396	Ø	95.00	95.00	-.88	-.22	.00	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L354	Ø	95.00	95.00	-.88	-.22	.00	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L236B	Ø	95.02	95.62	-.39	.16	1.66	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L326	Ø	95.06	95.17	-.71	-.15	.91	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L132	Ø	95.09	95.79	-.21	.22	.86	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L259	Ø	95.10	95.66	-.31	.13	1.21	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L148B	Ø	95.10	95.53	-.41	.04	1.07	60B	OPACITY (WHITE BACKING),	BUYGEN	
L352	Ø	95.11	95.82	-.18	.22	.82	60R	OPACITY (WHITE BACKING),	TBWING-ALBERT (FORMERLY SRL)	
L249	*	95.11	95.54	-.40	.04	1.20	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L122	Ø	95.17	95.73	-.21	.12	1.01	60D	OPACITY (WHITE BACKING),	BNL-2	
L166	Ø	95.19	95.78	-.16	.13	1.16	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L211S	Ø	95.22	95.61	-.27	.00	.75	60R	OPACITY (WHITE BACKING),	TBWING-ALBERT (FORMERLY SRL)	
L315	Ø	95.23	95.65	-.23	.02	.73	60D	OPACITY (WHITE BACKING),	BNL-2	
L275	Ø	95.23	96.04	.07	.27	.61	60R	OPACITY (WHITE BACKING),	TBWING-ALBERT (FORMERLY SRL)	
L599	Ø	95.25	95.75	-.14	.07	1.52	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L341	Ø	95.26	95.25	-.52	-.26	1.10	60R	OPACITY (WHITE BACKING),	TBWING-ALBERT (FORMERLY SRL)	
L139	Ø	95.28	95.64	-.21	-.03	.89	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L692	Ø	95.29	95.80	-.08	.07	1.02	60D	OPACITY (WHITE BACKING),	BNL-2	
L136	Ø	95.30	95.63	-.21	-.05	1.23	60B	OPACITY (WHITE BACKING),	HUYGEN	
L523	Ø	95.30	95.86	-.03	.10	.78	60R	OPACITY (WHITE BACKING),	TBWING-ALBERT (FORMERLY SRL)	
L108	Ø	95.32	95.69	-.15	-.02	.92	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L173A	Ø	95.34	95.48	-.30	-.17	.34	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L223B	Ø	95.39	96.05	.18	.15	1.19	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L673T	Ø	95.40	95.79	-.02	-.02	1.00	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L153	Ø	95.40	95.75	-.05	-.05	1.26	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L339	Ø	95.40	95.60	-.16	-.14	2.01	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L226B	Ø	95.42	95.79	-.01	-.04	.96	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L210B	Ø	95.42	95.93	.10	.05	.92	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L210D	Ø	95.43	95.55	.12	.06	.83	60D	OPACITY (WHITE BACKING),	BNL-2	
L318	Ø	95.45	96.01	.18	.08	1.47	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L124	Ø	95.47	96.04	.22	.08	1.66	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L115	Ø	95.48	96.23	.37	.19	.89	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L260	*	95.49	95.71	-.02	-.14	.88	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L571	Ø	95.50	95.98	.19	.02	.90	60D	OPACITY (WHITE BACKING),	BNL-2	
L121	Ø	95.51	95.89	.13	-.04	.77	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L262	Ø	95.51	96.00	.21	.03	.78	60R	OPACITY (WHITE BACKING),	TBWING-ALBERT (FORMERLY SRL)	
L159	Ø	95.51	95.97	.19	.01	.63	60R	OPACITY (WHITE BACKING),	TBWING-ALBERT (FORMERLY SRL)	
L190C	Ø	95.51	95.90	.14	-.04	1.18	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L573	Ø	95.52	95.92	.16	-.03	.71	60B	OPACITY (WHITE BACKING),	HUYGEN	
L581	Ø	95.53	95.95	.19	-.02	1.00	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L206	Ø	95.54	95.76	.05	-.15	.96	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L190R	Ø	95.54	95.95	.19	-.03	.60	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	
L158	Ø	95.54	95.89	.15	-.07	.92	60D	OPACITY (WHITE BACKING),	BNL-2	
L118	Ø	95.54	95.86	.13	-.09	.81	60B	OPACITY (WHITE BACKING),	BAUSCH * LOMB	

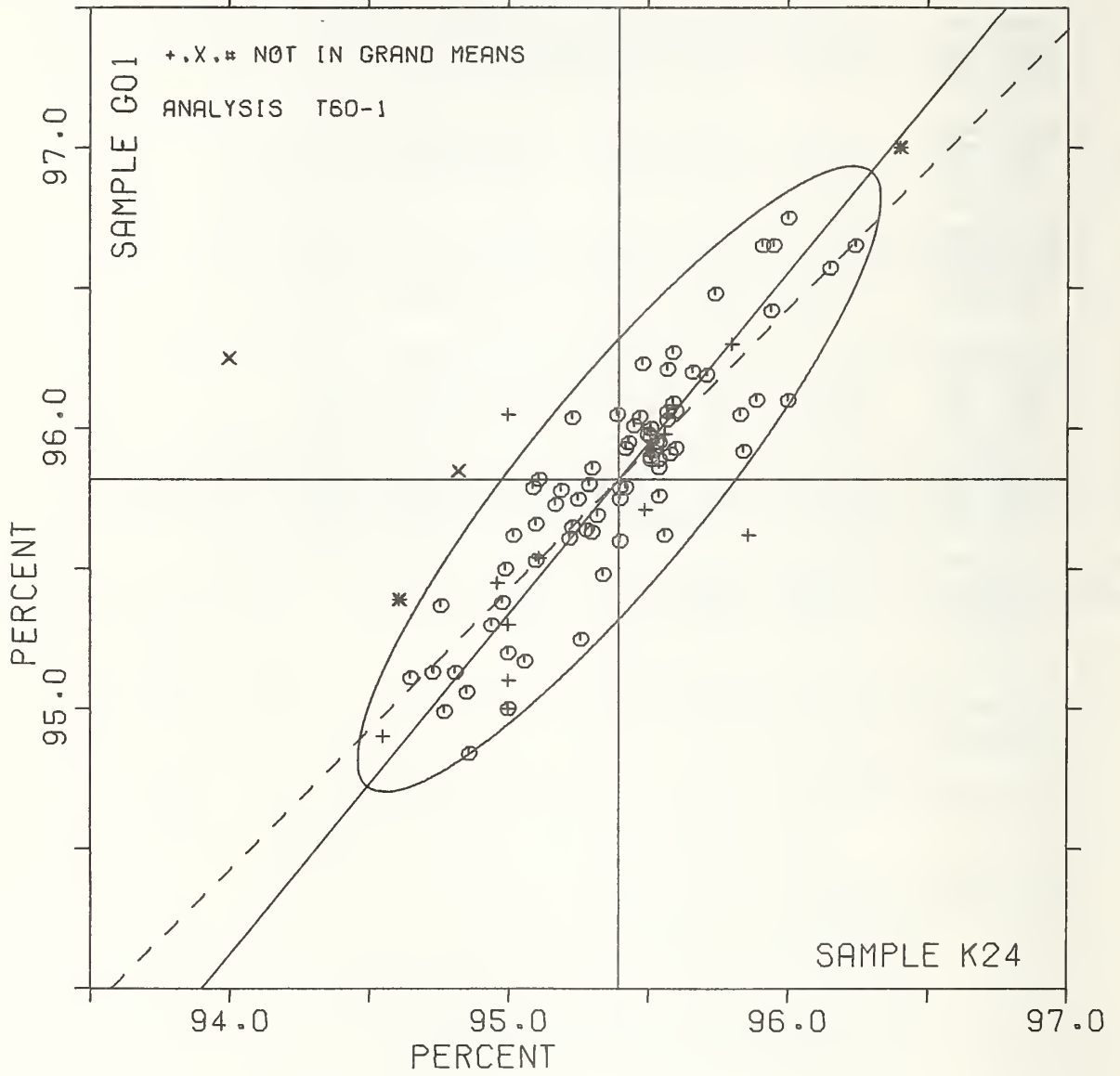
OPACITY (89% REFLECTANCE BACKING) IN PERCENT
TAPPI STANDARD T425 68-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		K24	G01	MAJOR	MINOR	R _s SDR	VAR	
L390	Ø	95.56	95.62	-.05	-.25	2.63	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L100	*	95.56	95.98	.23	-.03	.77	60E	OPACITY (WHITE BACKING), ZEISS ELREPHO, FMY-C(10) FILTER
L281	Ø	95.57	96.21	.41	.11	.94	60D	OPACITY (WHITE BACKING), BNL-2
L225	Ø	95.57	96.03	.28	-.00	.89	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L254	Ø	95.57	96.06	.30	.02	.99	60H	OPACITY (WHITE BACKING), HUYGEN
L230	Ø	95.58	95.91	.19	-.09	1.11	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L288	Ø	95.59	96.09	.33	.02	.85	60D	OPACITY (WHITE BACKING), BNL-2
L162	Ø	95.59	96.27	.47	.14	1.04	60W	OPACITY (WHITE BACKING), HUYGEN, DIGITAL
L278	Ø	95.60	95.93	.22	-.09	.93	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L212	Ø	95.60	96.06	.32	-.01	2.55	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L241	Ø	95.66	96.20	.46	.04	.80	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L152	Ø	95.71	96.19	.49	-.01	.80	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L213	Ø	95.74	96.48	.73	.15	1.61	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L687	*	95.80	96.30	.63	-.01	1.95	60P	OPACITY (WHITE BACKING), PHOTOVOLT
L673R	Ø	95.83	96.05	.46	-.19	.84	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L594	Ø	95.84	95.92	.36	-.28	.67	60D	OPACITY (WHITE BACKING), BNL-2
L224	*	95.86	95.62	.14	-.49	1.54	60P	OPACITY (WHITE BACKING), PHOTOVOLT
L157	Ø	95.89	96.10	.53	-.20	1.26	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L308	Ø	95.91	96.65	.97	.13	1.67	60H	OPACITY (WHITE BACKING), HUYGEN
L105	Ø	95.94	96.42	.81	-.04	.67	60H	OPACITY (WHITE BACKING), HUYGEN
L323	Ø	95.95	96.65	1.00	.10	.82	60W	OPACITY (WHITE BACKING), HUYGEN, DIGITAL
L150	Ø	96.00	96.75	1.10	.12	1.31	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L134	Ø	96.00	96.10	.60	-.29	.66	60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L608	Ø	96.15	96.57	1.06	-.11	.95	60D	OPACITY (WHITE BACKING), BNL-2
L688	Ø	96.24	96.65	1.18	-.13	1.34	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L261	*	96.40	97.00	1.55	-.03	.57	60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
GMEANS:		95.39	95.62			1.00		
		95% ELLIPSE:		1.42	.33			WITH GAMMA = 50 DEGREES

OPACITY, B&L TYPE, 89% BACKING

SAMPLE K24 = 95.4 PERCENT

SAMPLE G01 = 95.8 PERCENT



OPACITY (PAPER BACKING) IN PERCENT
TAPPI SUGGESTED METHOD T519 GS-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	SAMPLE K24 MEAN	PRINTING 103 GRAMS PER SQUARE METER				SAMPLE G01 MEAN	PRINTING 116 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L100	96.29	.04	.24	.20	1.16	94.50	.11	.45	.15	.91	60J	Ø	L100
L150	96.14	-.11	-.68	.17	.95	94.29	-.10	-.44	.17	1.04	60J	Ø	L150
L182E	96.10	-.15	-.54	.14	.81	94.19	-.20	-.86	.14	.89	60J	Ø	L182E
L219	NO DATA	REPORTED FOR SAMPLE K24				94.15	-.24	-1.01	.21	1.28	60F	M	L219
L233F	96.12	-.13	-.82	.19	1.07	94.14	-.25	-1.08	.11	.66	60F	Ø	L233F
L236	96.04	-.21	-1.31	.14	.81	94.31	-.09	-.37	.18	1.08	60J	Ø	L236
L242	96.25	-.00	-.01	.14	.82	94.43	.04	.15	.21	1.26	60J	Ø	L242
L244	96.03	-.22	-1.38	.09	.54	94.05	-.34	-1.46	.11	.66	60F	Ø	L244
L250T	96.20	-.05	-.32	.18	1.01	94.45	.06	.24	.16	1.01	60J	Ø	L250T
L251	97.89	1.64	10.24	.16	.93	96.80	2.41	10.19	.20	1.20	60F	#	L251
L309	96.24	-.01	-.05	.14	.79	94.29	-.10	-.43	.12	.76	60J	Ø	L309
L313	96.41	.16	.99	.19	1.09	94.59	.20	.83	.17	1.06	60J	Ø	L313
L360	96.18	-.07	-.44	.18	1.00	94.08	-.31	-1.33	.24	1.46	60F	Ø	L360
L446	96.35	.10	.61	.14	.78	94.48	.09	.38	.18	1.10	60J	Ø	L446
L484	96.28	.03	.18	.40	2.31	94.48	.09	.36	.24	1.49	60F	Ø	L484
L575	96.53	.28	1.76	.17	.97	94.68	.29	1.23	.14	.85	60J	Ø	L575
L598	96.26	.01	.06	.17	.98	94.37	-.02	-.10	.14	.87	60J	Ø	L598
L678	96.59	.34	2.12	.16	.91	94.97	.58	2.44	.15	.91	60J	Ø	L678

GR. MEAN = 96.25 PERCENT GRAND MEAN = 94.39 PERCENT TEST DETERMINATIONS = 10
SD MEANS = .16 PERCENT SD OF MEANS = .24 PERCENT 16 LABS IN GRAND MEANS
AVERAGE SDR = .18 PERCENT AVERAGE SDH = .16 PERCENT

L626 96.09 -.16 -1.01 .07 .42 93.91 -.48 -2.05 .17 1.02 60Q • L626

TOTAL NUMBER OF LABORATORIES REPORTING = 19

Best values: K24 96.2 ± 0.3 percent
G01 94.4 ± 0.4 percent

The following laboratories were omitted from the grand means because of extreme test results: 251.

OPACITY (PAPER BACKING) IN PERCENT
TAPPI SUGGESTED METHOD T519 GS-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

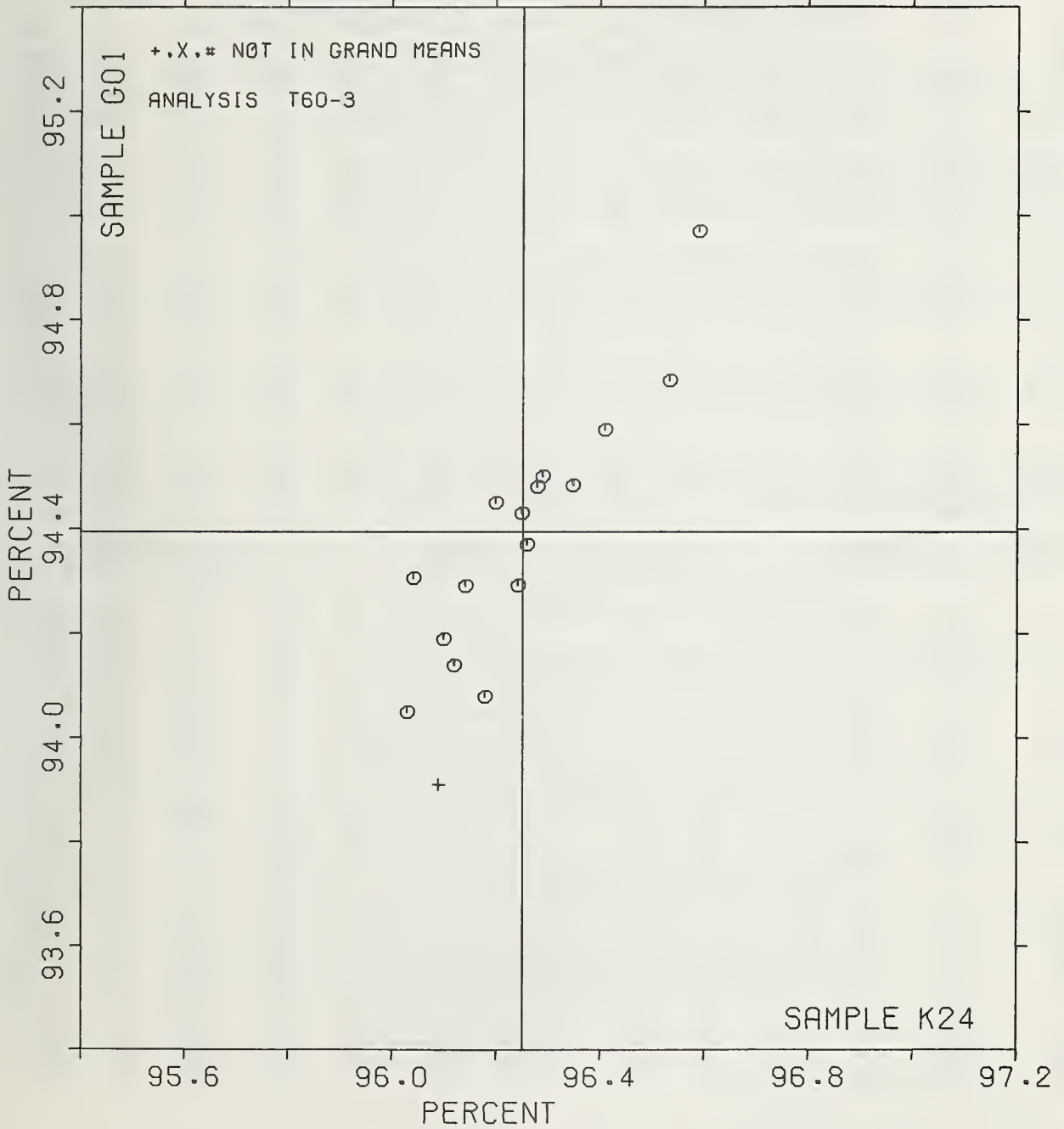
LAB CODE	F	MEANS		COORDINATES		AVG R ₀ SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS		
		K24	G01	MAJOR	MINOR			PROPERTY	TEST INSTRUMENT	CONDITIONS
L219	M	94.15				1.28	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP		
L244	Ø	96.03	94.05	-.41	-.00	.60	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP		
L236	Ø	96.04	94.31	-.19	.13	.95	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER		
L626	*	96.09	93.91	-.49	-.13	.72	60Q	OPACITY (PAPER BACKING), PHOTOVOLT		
L182E	Ø	96.10	94.19	-.25	.02	.85	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER		
L233F	Ø	96.12	94.14	-.28	-.03	.86	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP		
L150	Ø	96.14	94.29	-.15	.04	.99	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER		
L360	Ø	96.18	94.08	-.30	-.11	1.23	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP		
L250T	Ø	96.20	94.45	.02	.07	1.01	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER		
L309	Ø	96.24	94.29	-.09	-.05	.78	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER		
L242	Ø	96.25	94.43	.03	.02	1.04	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER		
L598	Ø	96.26	94.37	-.02	-.02	.92	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER		
L484	Ø	96.28	94.48	.09	.02	1.90	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP		
L100	Ø	96.29	94.50	.11	.03	1.03	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER		
L446	Ø	96.35	94.48	.13	-.03	.94	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER		
L313	Ø	96.41	94.59	.25	-.03	1.07	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER		
L575	Ø	96.53	94.68	.40	-.08	.91	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER		
L678	Ø	96.59	94.97	.67	.03	.91	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER		
L251	#	97.89	96.80	2.91	-.06	1.06	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP		

GMEANS: 96.25 94.39 1.00
95% ELLIPSE: .79 .16 WITH GAMMA = 56 DEGREES

OPACITY, ELREPHO TYPE, PAPER BACKING

SAMPLE K24 = 96.25 PERCENT

SAMPLE G01 = 94.39 PERCENT



DIRECTIONAL BLUE REFLECTANCE IN PERCENT

TAPPI STANDARD T452 68-77, 'BRIGHTNESS'; MARTIN SWEETS (ACBT & GE) IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE E79					SAMPLE J98					TEST D. # 8		
	MEAN	DEV	N, DEV	SDR	R, SDR	MEAN	DEV	N, DEV	SDR	R, SDR	VAR	F	LAB
L108	56.15	.15	.51	.14	1.19	75.92	-.04	-.11	.13	.99	65M	Ø	L108
L122	56.39	.39	1.32	.14	1.14	76.02	.06	.18	.07	.55	65M	Ø	L122
L132	55.62	-.37	-1.27	.07	.60	76.17	.21	.60	.13	.99	65N	Ø	L132
L158	57.04	1.04	3.52	.07	.63	77.29	1.32	3.78	.12	.94	65N	#	L158
L176A	54.11	-1.89	-6.40	.04	.30	74.51	-1.45	-4.15	.12	.97	65A	#	L176A
L190C	95.66	-.34	-1.14	.09	.77	75.45	-.51	-1.47	.12	.93	65A	Ø	L190C
L210M	55.74	-.26	-.89	.15	1.27	75.94	-.03	-.08	.19	1.49	65M	Ø	L210M
L210N	56.00	.00	.00	.05	.45	76.41	.45	1.28	.15	1.13	65N	Ø	L210N
L211	54.19	-1.81	-6.15	.69	5.80	76.31	.35	1.00	.10	.77	65N	#	L211
L225	56.04	.04	.13	.12	1.00	75.74	-.23	-.65	.18	1.37	65N	Ø	L225
L259	95.81	-.19	-.63	.23	1.93	75.75	-.21	-.61	.12	.93	65M	Ø	L259
L275	56.02	.03	.09	.18	1.54	76.24	.27	.78	.13	1.01	65N	Ø	L275
L285	55.62	-.37	-1.27	.15	1.25	75.84	-.13	-.36	.14	1.09	65N	Ø	L285
L288	56.10	.10	.34	.08	.64	76.26	.30	.85	.11	.82	65N	Ø	L288
L308	56.10	.10	.34	.08	.64	76.49	.52	1.50	.08	.65	65N	Ø	L308
L315	96.22	.23	.77	.10	.87	76.30	.34	.96	.16	1.24	65N	Ø	L315
L317	55.51	-.49	-1.65	.10	.83	75.35	-.61	-1.76	.19	1.49	65M	Ø	L317
L523	55.74	-.26	-.89	.05	.44	75.66	-.30	-.86	.15	1.17	65N	Ø	L523
L543	96.31	.31	1.06	.17	1.45	76.36	.40	1.14	.11	.82	65M	Ø	L543
L565	55.84	-.16	-.55	.07	.63	75.65	-.31	-.90	.14	1.10	65A	Ø	L565
L598	96.16	.16	.55	.13	1.10	75.89	-.08	-.22	.08	.65	65M	Ø	L598
L636	56.54	.54	1.83	.20	1.68	75.46	-.50	-1.43	.28	2.15	65M	#	L636
L673R	97.56	1.56	5.30	.09	.77	76.01	.05	.14	.08	.65	65N	#	L673R
L692	56.40	.40	1.36	.15	1.27	76.36	.40	1.14	.07	.58	65N	Ø	L692

GR. MEAN = 56.00 PERCENT GRAND MEAN = 75.96 PERCENT TEST DETERMINATIONS = 8
SD MEANS = .29 PERCENT SD OF MEANS = .35 PERCENT 20 LABS IN GRAND MEANS
AVERAGE SDR = .12 PERCENT AVERAGE SDR = .13 PERCENT

L105	56.77	.78	2.63	.14	1.17	76.64	.67	1.93	.13	1.01	65T	♦	L105
L213	57.07	1.08	3.65	.07	.60	76.19	.22	.64	.10	.77	65T	♦	L213
L219	97.76	1.76	5.98	.05	.44	77.75	1.79	5.11	.08	.59	65P	♦	L219
L223	97.81	1.81	6.15	.06	.54	77.30	1.34	3.82	.13	1.02	65G	♦	L223
L224	56.24	.24	.81	.07	.63	76.56	.60	1.71	.09	.71	65H	♦	L224
L232	96.00	.00	.00	.00	.00	77.37	1.41	4.04	.23	1.79	65P	♦	L232
L241	55.96	-.04	-.13	.05	.44	76.42	.46	1.32	.17	1.29	65I	♦	L241
L249	96.02	.03	.09	.07	.60	77.11	1.15	3.29	.17	1.34	65P	♦	L249
L256	95.86	-.14	-.46	.12	1.00	75.26	-.70	-2.01	.12	.92	65H	♦	L256
L260	95.85	-.15	-.51	.16	1.35	75.92	-.04	-.11	.14	1.08	65P	♦	L260
L277	93.37	-2.62	-8.90	.52	4.36	81.25	5.29	15.12	.46	3.59	65P	♦	L277
L278	95.81	-.19	-.63	.30	2.52	75.87	-.09	-.25	.23	1.79	65P	♦	L278
L312	56.56	.56	1.91	.50	4.17	78.37	2.41	6.90	.52	4.01	65P	♦	L312
L321	100.00	4.00	13.57	.00	.00	79.50	3.54	10.12	.00	.00	65P	♦	L321
L339	98.82	2.83	9.59	.12	.98	79.00	3.04	8.69	.00	.00	65P	♦	L339
L380	95.25	-.75	-2.54	.46	3.90	79.00	3.04	8.69	.00	.00	65P	♦	L380
L442	98.12	2.13	7.21	.09	.75	75.45	-.51	-1.47	.09	.72	65T	♦	L442
L562	97.00	1.00	3.40	.00	.00	81.50	5.54	15.84	.00	.00	65P	♦	L562
L564	96.25	.25	.85	.46	3.90	78.00	2.04	5.83	.00	.00	65P	♦	L564
L591	98.68	2.68	9.09	.08	.70	75.86	-.10	-.29	.13	1.00	65H	♦	L591
L617	97.15	1.15	3.90	.05	.45	77.60	1.64	4.68	.09	.72	65G	♦	L617
L626	98.65	2.65	8.99	.19	1.62	78.89	2.92	8.36	.08	.65	65P	♦	L626
L684	92.41	-3.59	-12.17	.22	1.82	75.32	-.64	-1.83	.16	1.23	65H	♦	L684
L695	58.75	2.75	9.33	.27	2.25	78.06	2.10	6.00	.42	3.24	65P	♦	L695
L698	56.60	.60	2.04	.08	.64	76.40	.44	1.25	.29	2.27	65I	♦	L698

TOTAL NUMBER OF LABORATORIES REPORTING = 49

Best values: E79 96.0 ± 0.4 percent
J98 76.0 ± 0.5 percent

The following laboratories were omitted from the grand means because of extreme test results: 158, 176A, 211, 673R.

ANALYSIS T65-1 TABLE 2

DIRECTIONAL BLUE REFLECTANCE IN PERCENT

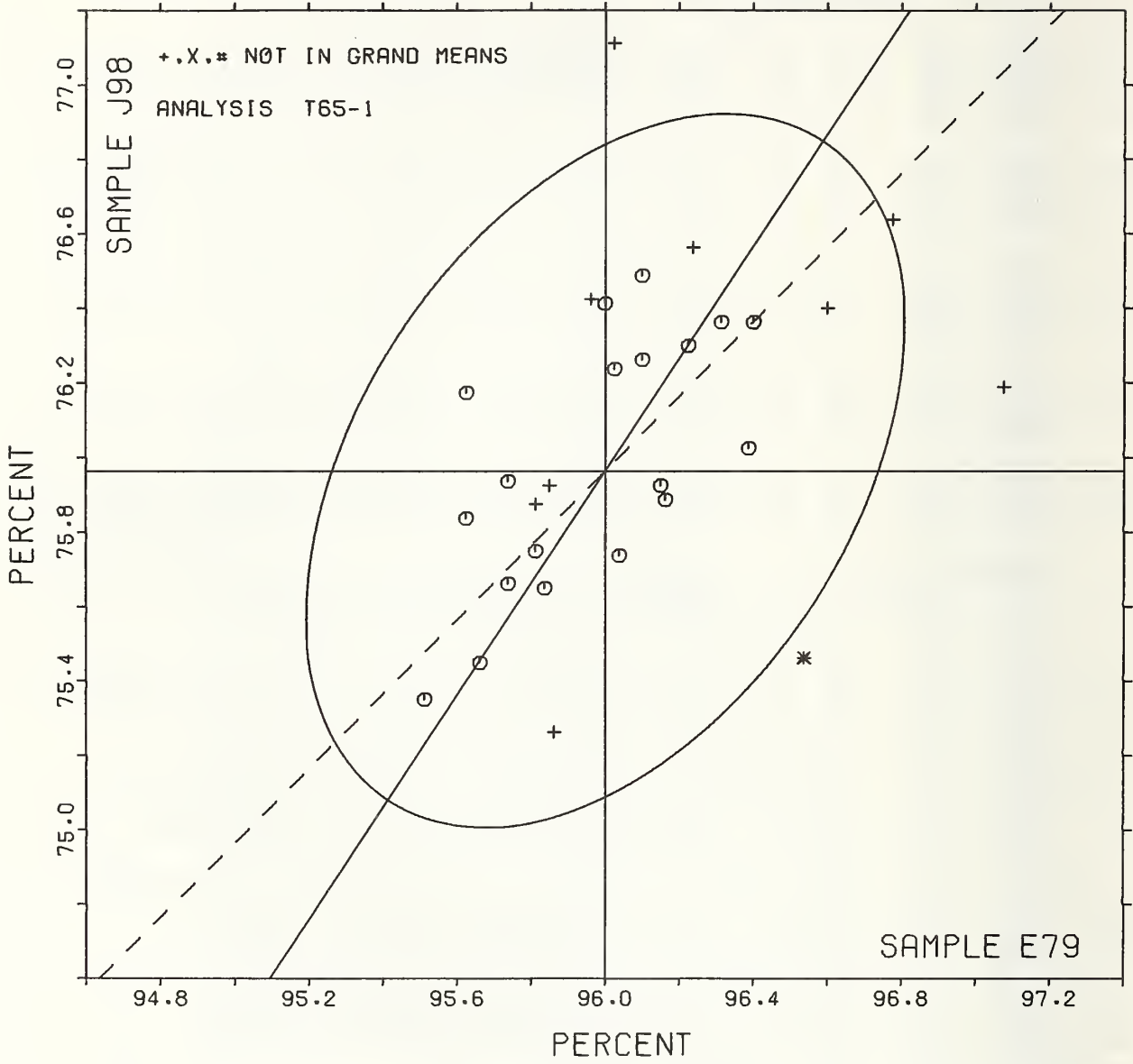
TAPPI STANDARD T452 6S-77, 'BRIGHTNESS'; MARTIN SWEETS (ACBT & GE) IS STANDARD FOR TEIS ANALYSIS

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		E79	J98	MAJOR	MINOR	R ₀ SDR	VAR	
L684	*	92.41	75.32	-2.51	2.64	1.52	65E	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L277	*	93.37	81.25	2.95	5.11	3.97	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L176A	#	94.11	74.51	-2.25	.77	.63	65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT), S-2
L211	#	94.19	76.31	-.71	1.70	3.29	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/M.S., S-4
L380	*	95.25	79.00	2.12	2.30	1.95	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L317	Ø	95.51	75.35	-.78	.07	1.16	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L132	Ø	95.62	76.17	-.03	.43	.79	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/M.S., S-4
L285	Ø	95.62	75.84	-.31	.24	1.17	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/M.S., S-4
L190C	Ø	95.66	75.45	-.61	-.00	.85	65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT), S-2
L210M	Ø	95.74	75.94	-.17	.20	1.38	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L523	Ø	95.74	75.66	-.40	.05	.80	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/M.S., S-4
L278	*	95.81	75.87	-.18	.11	2.16	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L259	Ø	95.81	75.75	-.28	.04	1.43	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L565	Ø	95.84	75.65	-.35	-.04	.86	65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT), S-2
L260	*	95.85	75.92	-.11	.10	1.21	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L256	*	95.86	75.26	-.66	-.27	.96	65H	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L241	*	95.96	76.42	.36	.29	.86	65I	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
L210N	Ø	96.00	76.41	.37	.25	.79	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/M.S., S-4
L232	*	96.00	77.37	1.18	.78	.90	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L275	Ø	96.02	76.24	.24	.13	1.28	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L249	*	96.02	77.11	.97	.61	.97	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L225	Ø	96.04	75.74	-.17	-.16	1.19	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/M.S., S-4
L288	Ø	96.10	76.26	.30	.08	.73	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/M.S., S-4
L308	Ø	96.10	76.49	.49	.21	.64	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/M.S., S-4
L108	Ø	96.15	75.92	.05	-.15	1.09	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L598	Ø	96.16	75.89	.03	-.18	.87	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L315	Ø	96.22	76.30	.40	-.00	1.06	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/M.S., S-4
L224	*	96.24	76.56	.63	.13	.67	65H	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L564	*	96.25	78.00	1.84	.92	1.95	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L543	Ø	96.31	76.36	.51	-.04	1.14	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L122	Ø	96.39	76.02	.27	-.29	.84	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L692	Ø	96.40	76.36	.55	-.11	.92	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/M.S., S-4
L636	#	96.54	75.46	-.12	-.73	1.92	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L312	*	96.56	78.37	2.32	.86	4.09	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L698	*	96.60	76.40	.70	-.26	1.45	65I	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
L105	*	96.77	76.64	.99	-.27	1.09	65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M
L562	*	97.00	81.50	5.17	2.23	.00	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L158	#	97.04	77.29	1.68	-.13	.78	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/M.S., S-4
L213	*	97.07	76.19	.78	-.77	.68	65T	BLUE REFLECTANCE (DIRECTIONAL); HUNTER D25D2M
L617	*	97.15	77.60	2.00	-.05	.58	65G	BLUE REFLECTANCE (DIRECTIONAL), GARDNER
L673R	#	97.56	76.01	.90	-1.28	.71	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/M.S., S-4
L219	*	97.76	77.75	2.46	-.48	.51	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L223	*	97.81	77.30	2.12	-.77	.78	65G	BLUE REFLECTANCE (DIRECTIONAL), GARDNER
L442	*	98.12	75.45	.75	-2.06	.73	65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M
L626	*	98.65	78.89	3.90	-.59	1.13	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L591	*	98.68	75.86	1.40	-2.29	.85	65H	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L695	*	98.75	78.06	3.27	-1.13	2.74	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L339	*	98.82	79.00	4.09	-.68	.49	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L321	*	100.00	79.50	5.16	-1.38	.00	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
GMEANS:		96.00	75.96			1.00		
		95% ELLIPSE:		1.06	.67			WITH GAMMA = 56 DEGREES

BLUE REFLECTANCE, DIRECTIONAL

SAMPLE E79 = 96.00 PERCENT

SAMPLE J98 = 75.96 PERCENT



DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)

TAPPI SUGGESTED METHOD T525 SU-72, BRIGTENESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	SAMPLE E79		PRINTING PER SQUARE METER			SAMPLE J98		PRINTING PER SQUARE METER			TEST D ₀ = 8		
	MBAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L100	97.99	1.56	2.05	.12	1.73	75.86	.03	.06	.09	.73	65F	Ø	L100
L121	97.27	.84	1.10	.10	1.52	76.76	.93	1.75	.18	1.42	65K	Ø	L121
L136	96.73	.29	.39	.05	.69	76.41	.57	1.08	.14	1.10	65F	Ø	L136
L150	97.00	.57	.75	.08	1.11	75.21	-.63	-1.18	.18	1.43	65Q	Ø	L150
L170	95.31	-1.12	-1.47	.04	.52	75.41	-.42	-.79	.10	.78	65B	Ø	L170
L182	96.12	-.31	-.41	.07	1.05	75.64	-.20	-.37	.16	1.23	65F	Ø	L182
L210K	95.77	-.66	-.87	.11	1.57	77.13	1.30	2.45	.14	1.10	65K	Ø	L210K
L236	96.74	.30	.40	.06	.86	75.51	-.32	-.61	.12	.98	65F	Ø	L236
L242	96.68	.24	.32	.05	.69	75.61	-.22	-.42	.11	.89	65F	Ø	L242
L250T	96.83	.40	.52	.09	1.32	76.10	.27	.51	.10	.82	65F	Ø	L250T
L280	96.29	-.14	-.18	.08	1.11	75.78	+.05	-.09	.21	1.64	65Q	Ø	L280
L313	96.62	.19	.25	.05	.68	76.33	.49	.93	.12	.94	65K	Ø	L313
L325	95.35	-1.08	-1.42	.10	1.47	75.77	-.06	-.11	.13	1.04	65F	Ø	L325
L446	96.10	-.34	-.44	.05	.70	75.24	-.60	-1.12	.05	.40	65F	Ø	L446
L573	97.56	1.13	1.48	.00	.00	75.70	-.13	-.25	.07	.56	65F	Ø	L573
L575	95.38	-1.06	-1.39	.05	.77	75.81	-.02	-.04	.13	.99	65F	Ø	L575
L598	96.30	-.14	-.18	.08	1.11	75.33	-.51	-.96	.13	1.03	65K	Ø	L598
L680	95.76	-.67	-.89	.07	1.09	75.40	-.43	-.82	.12	.92	65K	Ø	L680

GR. MEAN = 96.43 PERCENT GRAND MEAN = 75.83 PERCENT TEST DETERMINATIONS = 8
SD MEANS = .76 PERCENT SD OF MEANS = .53 PERCENT 18 LABS IN GRAND MEANS
AVERAGE SDR = .07 PERCENT AVERAGE SDR = .13 PERCENT

L289 95.62 -0.81 -1.06 .07 1.04 76.07 .24 .45 .13 1.01 65Ø * L289

TOTAL NUMBER OF LABORATORIES REPORTING = 19

Best values: E79 96.5 ± 1.2 percent
J98 75.7 ± 0.9 percent

DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)

TAPPI SUGGESTED METHOD T525 SU-72, BRIGTENESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

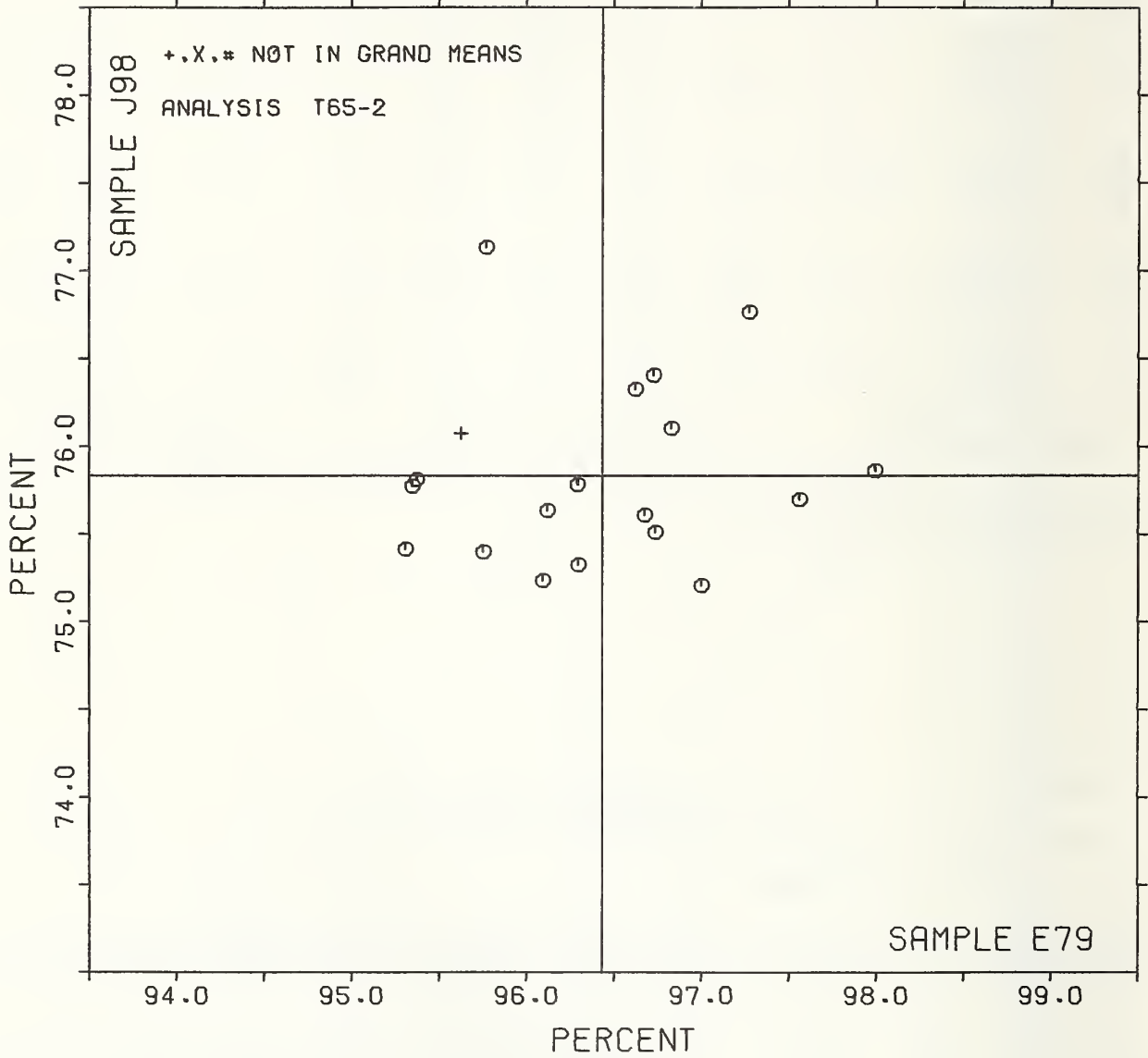
LAB CODE	F	MBANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS					
		E79	J98	MAJOR	MINOR	R ₀ SDR	VAR						
L170	Ø	95.31	75.41	-1.17	-.23	.65	65B	DIFFUSE REFLECTANCE,	BLREPEØ,	GL.TRAP,	NBS ABSOLUTE BASE		
L325	Ø	95.35	75.77	-1.08	.12	1.26	65F	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	NRC-PTB ABSOLUTE BASE		
L575	Ø	95.38	75.81	-1.05	.15	.98	65F	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	NRC-PTB ABSOLUTE BASE		
L289	*	95.62	76.07	-.76	.37	1.02	65Ø	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	SPECIFIC CALIBRATION		
L680	Ø	95.76	75.40	-.74	-.32	1.01	65K	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	MØ (ZEISS) BASE		
L210K	Ø	95.77	77.13	-.44	1.39	1.34	65K	DIFFUSE REFLECTANCE,	BLREPEØ,	GL.TRAP,	MØ (ZEISS) BASE		
L446	Ø	96.10	75.24	-.43	-.53	.55	65F	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	NRC-PTB ABSOLUTE BASE		
L182	Ø	96.12	75.64	-.34	-.14	1.14	65F	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	NRC-PTB ABSOLUTE BASE		
L280	Ø	96.29	75.78	-.15	-.03	1.38	65Q	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	ZEISS ABSOLUTE BASE		
L598	Ø	96.30	75.33	-.22	-.48	1.07	65K	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	MØ (ZEISS) BASE		
L313	Ø	96.62	76.33	.27	.46	.81	65K	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	MØ (ZEISS) BASE		
L242	Ø	96.68	75.61	.20	-.26	.79	65F	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	NRC-PTB ABSOLUTE BASE		
L136	Ø	96.73	76.41	.38	.52	.90	65F	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	NRC-PTB ABSOLUTE BASE		
L236	Ø	96.74	75.51	.25	-.37	.92	65F	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	NRC-PTB ABSOLUTE BASE		
L250T	Ø	96.83	76.10	.43	.20	1.07	65F	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	NRC-PTB ABSOLUTE BASE		
L150	Ø	97.00	75.21	.46	-.71	1.27	65Q	DIFFUSE REFLECTANCE,	BLREPEØ,	GL.TRAP,	ZEISS ABSOLUTE BASE		
L121	Ø	97.27	76.76	.98	.78	1.47	65K	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	MØ (ZEISS) BASE		
L573	Ø	97.56	75.70	1.09	-.32	.28	65F	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	NRC-PTB ABSOLUTE BASE		
L100	Ø	97.99	75.86	1.54	-.23	1.23	65F	DIFFUSE REFLECTANCE,	ELREPEØ,	GL.TRAP,	NRC-PTB ABSOLUTE BASE		

GMEANS: 96.43 75.83 1.00
95% ELLIPSE: 2.13 1.45 WITE GAMMA = 9 DEGREES

BLUE REFLECTANCE, DIFFUSE, WITH TRAP

SAMPLE E79 = 96.4 PERCENT

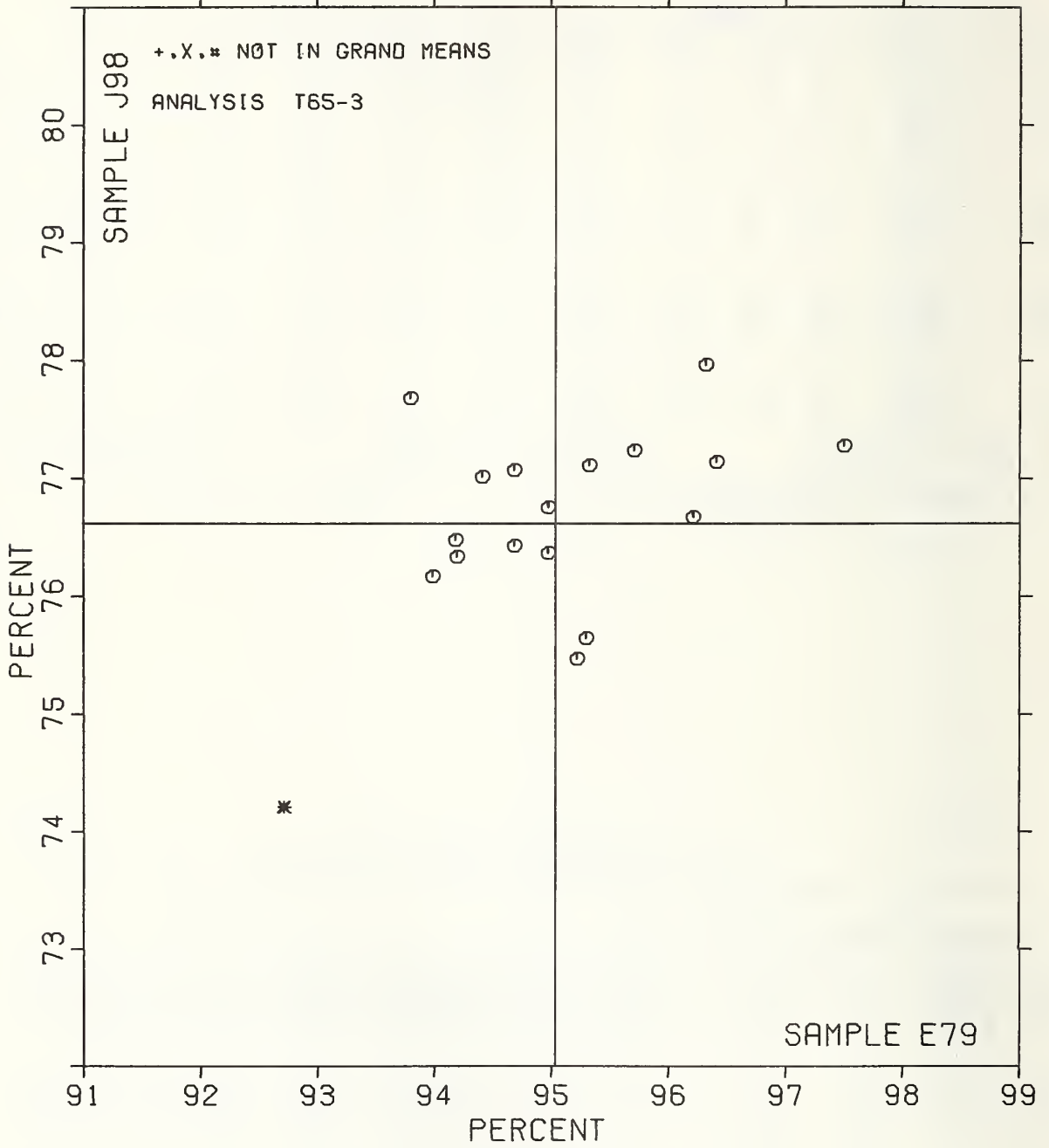
SAMPLE J98 = 75.8 PERCENT



BLUE REFLECTANCE, DIFFUSE, NO TRAP

SAMPLE E79 = 95.0 PERCENT

SAMPLE J98 = 76.6 PERCENT



SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS
TAPPI STANDARD 1480 GS-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	COATED PRINTING					COATED DULL					TEST D. = 10		
	E92 MEAN	167 DEV	GEAMS N, DEV	PER SDR	SQUARE R, SDR	G05 MEAN	116 DEV	GRAMS N, DEV	PER SDR	SQUARE R, SDR	VAR	F	LAB
L108	49.58	.35	.22	.67	.73	37.18	-.64	-.38	.98	.85	75H	Ø	L108
L121	50.62	1.39	.86	1.31	1.42	37.93	.11	.07	1.48	1.29	75K	Ø	L121
L122	48.83	-.40	-.24	.92	1.00	37.32	-.50	-.29	1.49	1.30	75H	Ø	L122
L128	50.10	.87	.54	.57	.62	36.50	-1.32	-.78	1.84	1.61	75G	Ø	L128
L134	48.30	-.93	-.57	1.34	1.45	37.50	-.32	-.19	.85	.74	75H	Ø	L134
L136	53.48	4.25	2.62	.80	.87	41.41	3.59	2.11	1.52	1.33	75G	*	L136
L149	48.30	-.93	-.57	1.16	1.26	35.10	-2.72	-1.60	1.45	1.26	75G	Ø	L149
L153	51.20	1.97	1.22	1.01	1.09	40.50	2.68	1.58	1.33	1.16	75G	Ø	L153
L162	53.71	4.48	2.77	.71	.77	42.80	4.98	2.93	1.26	1.10	75G	*	L162
L173A	47.80	-1.43	-.88	.79	.86	35.50	-2.32	-1.36	.85	.74	75G	Ø	L173A
L182	47.44	-1.79	-1.10	.86	.93	36.72	-1.10	-.65	.91	.80	75H	Ø	L182
L189	50.25	1.02	.63	.98	1.06	40.20	2.38	1.40	.92	.80	75P	Ø	L189
L190C	47.23	-2.00	-1.23	.85	.92	36.38	-1.44	-.85	1.28	1.12	75G	Ø	L190C
L190R	49.72	.49	.30	.75	.81	38.21	.39	.23	1.00	.87	75G	Ø	L190R
L206	48.33	-.90	-.55	.86	.93	37.58	-.24	-.14	1.03	.90	75H	Ø	L206
L210	50.19	.96	.59	1.23	1.34	37.44	-.38	-.22	1.05	.91	75H	Ø	L210
L211	49.48	.25	.16	.98	1.06	37.45	-.37	-.22	1.79	1.57	75H	Ø	L211
L212	51.40	2.17	1.34	.52	.56	42.90	5.08	2.99	.99	.87	75P	X	L212
L213	49.40	.17	.11	1.07	1.17	37.30	-.52	-.30	.95	.83	75H	Ø	L213
L223	48.72	-.51	-.31	.69	.75	38.88	1.06	.62	1.57	1.37	75H	Ø	L223
L224	48.20	-1.03	-.63	.63	.69	35.90	-1.92	-1.13	1.10	.96	75H	Ø	L224
L230	49.20	-.03	-.02	1.23	1.33	36.60	-1.22	-.72	1.51	1.31	75H	Ø	L230
L251	47.90	-1.33	-.82	.46	.50	36.75	-1.07	-.63	.92	.80	75G	Ø	L251
L255	49.80	.57	.35	.63	.69	38.50	.68	.40	1.08	.94	75G	Ø	L255
L256	53.37	4.14	2.56	.69	.75	42.00	4.18	2.46	.46	.40	75H	*	L256
L259	51.15	1.92	1.19	.97	1.06	39.18	1.36	.80	1.62	1.41	75H	Ø	L259
L262	49.95	.72	.45	.80	.87	38.60	.78	.46	.97	.84	75K	Ø	L262
L274	53.80	4.57	2.82	.42	.46	47.00	9.18	5.40	.82	.71	75P	#	L274
L277A	49.14	-.05	-.05	1.16	1.26	38.07	.25	.15	1.05	.92	75H	Ø	L277A
L277B	48.95	-.28	-.17	1.23	1.34	37.96	.14	.08	1.26	1.10	75H	Ø	L277B
L278	48.60	-.63	-.39	.39	.43	36.98	-.84	-.49	.50	.44	75G	Ø	L278
L279	49.50	.27	.17	.85	.92	35.80	-2.02	-1.19	1.48	1.29	75G	Ø	L279
L288	49.33	.10	.06	.91	.98	38.68	.86	.51	1.05	.92	75H	Ø	L288
L291	48.99	-.24	-.15	.85	.92	37.11	-.71	-.42	1.07	.94	75H	Ø	L291
L315	48.70	-.53	-.32	1.70	1.85	38.70	.88	.52	1.34	1.17	75G	Ø	L315
L317	49.20	-.03	-.02	1.23	1.33	37.90	.08	.05	1.20	1.04	75H	Ø	L317
L321	51.20	1.97	1.22	.92	1.00	39.20	1.38	.81	1.14	.99	75G	Ø	L321
L323	47.69	-1.54	-.95	1.34	1.45	36.14	-1.68	-.99	1.37	1.19	75H	Ø	L323
L328	48.55	-.68	-.42	.60	.65	37.06	-.76	-.45	.95	.82	75H	Ø	L328
L339	53.80	4.57	2.82	1.18	1.28	44.90	7.08	4.16	1.71	1.49	75P	#	L339
L372	50.00	.77	.48	.00	.00	39.00	1.18	.69	1.05	.92	75B	Ø	L372
L388	50.15	.92	.57	1.40	1.52	40.20	2.38	1.40	1.01	.88	75P	Ø	L388
L396	49.60	.37	.23	1.17	1.27	38.30	.48	.28	1.16	1.01	75G	Ø	L396
L456	48.33	-.90	-.55	.90	.98	37.71	-.11	-.06	1.10	.96	75H	Ø	L456
L483	49.40	.17	.11	.99	1.07	37.26	-.56	-.33	.98	.86	75H	Ø	L483
L564	48.60	-.63	-.39	1.17	1.27	41.50	3.68	2.16	1.08	.94	75P	X	L564
L573	49.10	-.13	-.08	1.29	1.40	36.90	-.92	-.54	.99	.87	75G	Ø	L573
L583	49.83	.60	.37	.94	1.02	39.24	1.42	.84	1.27	1.11	75H	Ø	L583
L592	46.05	-3.18	-1.96	.97	1.05	34.39	-3.43	-2.02	.53	.46	75H	Ø	L592
L598	48.02	-1.21	-.74	.74	.80	36.79	-1.03	-.60	.98	.86	75H	Ø	L598
L643	48.34	-.89	-.55	.63	.69	38.73	.91	.54	1.34	1.17	75H	Ø	L643
L668	45.42	-3.81	-2.35	1.02	1.11	36.42	-1.40	-.82	1.33	1.16	75G	*	L668
L670	49.98	.75	.46	1.13	1.23	38.75	.93	.55	1.18	1.03	75H	Ø	L670
L688	46.50	-2.73	-1.68	.80	.87	35.19	-2.63	-1.55	.80	.70	75G	Ø	L688
L697	47.73	-1.50	-.92	.40	.43	36.85	-.97	-.57	1.10	.96	75H	Ø	L697

GR. MEAN = 49.23 GLOSS UNITS GRAND MEAN = 37.82 GLOSS UNITS TEST DETERMINATIONS = 10
SD MEANS = 1.62 GLOSS UNITS SD OF MEANS = 1.70 GLOSS UNITS 51 LABS IN GRAND MEANS
AVERAGE SDR = .92 GLOSS UNITS AVERAGE SDR = 1.15 GLOSS UNITS

L250 47.70 -1.53 -.94 .48 .52 37.60 -.22 -.13 .84 .74 75Q * L250
TOTAL NUMBER OF LABORATORIES REPORTING = 56

Best values: E92 49 ± 3 gloss units
G05 37 ± 3 gloss units

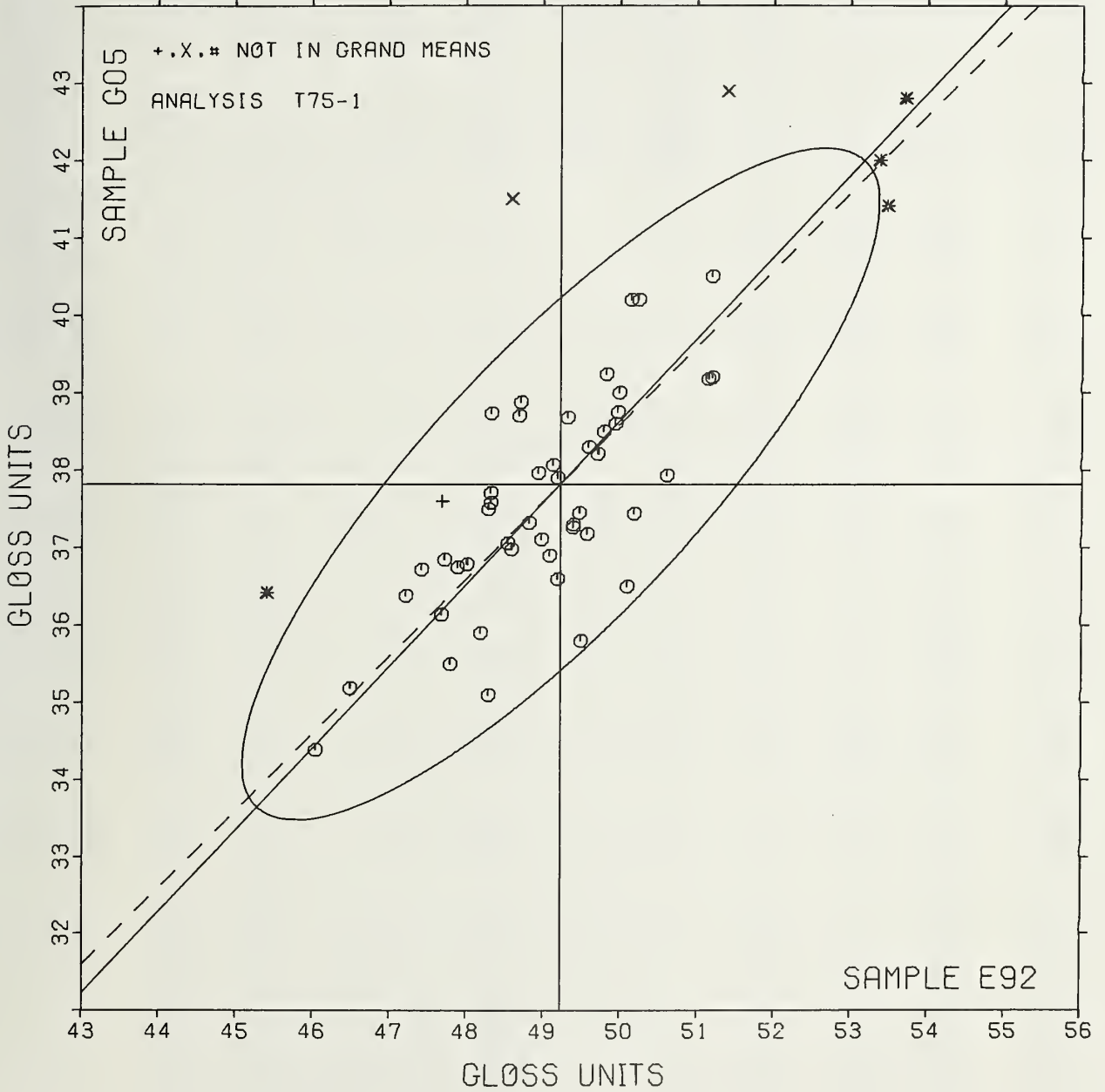
The following laboratories were omitted from the grand means because of extreme test results: 274, 339.

SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS
TAPPI STANDARD 1480 65-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		E92	G05	MAJOR	MINOR	R,SDR	VAR	
L668	*	45.42	36.42	-3.63	1.81	1.13	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L592	Ø	46.05	34.39	-4.67	-0.04	.76	75E	SPECULAR GLOSS (75 DEGREE), EUNTER
L688	Ø	46.50	35.19	-3.78	.18	.79	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L190C	Ø	47.23	36.38	-2.42	.46	1.02	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L182	Ø	47.44	36.72	-2.03	.55	.86	75H	SPECULAR GLOSS (75 DEGREE), EUNTER
L323	Ø	47.69	36.14	-2.28	-0.03	1.32	75E	SPECULAR GLOSS (75 DEGREE), HUNTER
L250	*	47.70	37.60	-1.21	.96	.63	75Q	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT, 20 C, 65% RH
L697	Ø	47.73	36.85	-1.73	.42	.70	75E	SPECULAR GLOSS (75 DEGREE), HUNTER
L173A	Ø	47.80	35.50	-2.67	-0.55	.80	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L251	Ø	47.90	36.75	-1.69	.23	.65	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L598	Ø	48.02	36.79	-1.58	.17	.83	75H	SPECULAR GLOSS (75 DEGREE), EUNTER
L224	Ø	48.20	35.90	-2.10	-0.57	.82	75H	SPECULAR GLOSS (75 DEGREE), EUNTER
L149	Ø	48.30	35.10	-2.61	-1.19	1.26	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L134	Ø	48.30	37.50	-.87	.46	1.10	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L456	Ø	48.33	37.71	-.69	.58	.97	75H	SPECULAR GLOSS (75 DEGREE), EUNTER
L206	Ø	48.33	37.58	-.79	.49	.92	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L643	Ø	48.34	38.73	.05	1.27	.93	75H	SPECULAR GLOSS (75 DEGREE), EUNTER
L328	Ø	48.55	37.06	-1.02	-.03	.74	75E	SPECULAR GLOSS (75 DEGREE), EUNTER
L278	Ø	48.60	36.98	-1.04	-.12	.43	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L564	X	48.60	41.50	2.25	2.98	1.11	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L315	Ø	48.70	38.70	.28	.99	1.51	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L223	Ø	48.72	38.88	.42	1.10	1.06	75E	SPECULAR GLOSS (75 DEGREE), EUNTER
L122	Ø	48.83	37.32	-.63	-.05	1.15	75E	SPECULAR GLOSS (75 DEGREE), EUNTER
L277E	Ø	48.95	37.96	-.09	-.30	1.22	75E	SPECULAR GLOSS (75 DEGREE), EUNTER
L291	Ø	48.99	37.11	-.68	-.31	.93	75E	SPECULAR GLOSS (75 DEGREE), EUNTER
L573	Ø	49.10	36.90	-.76	-.54	1.13	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L277A	Ø	49.14	38.07	.12	.24	1.09	75H	SPECULAR GLOSS (75 DEGREE), EUNTER
L230	Ø	49.20	36.60	-.90	-.82	1.32	75H	SPECULAR GLOSS (75 DEGREE), EUNTER
L317	Ø	49.20	37.90	.04	.07	1.19	75E	SPECULAR GLOSS (75 DEGREE), HUNTER
L288	Ø	49.33	38.68	.70	.52	.95	75E	SPECULAR GLOSS (75 DEGREE), EUNTER
L483	Ø	49.40	37.26	-.29	-.51	.96	75E	SPECULAR GLOSS (75 DEGREE), EUNTER
L213	Ø	49.40	37.30	-.26	-.48	1.00	75E	SPECULAR GLOSS (75 DEGREE), EUNTER
L211	Ø	49.48	37.45	-.09	-.44	1.31	75H	SPECULAR GLOSS (75 DEGREE), EUNTER
L279	Ø	49.50	35.80	-1.28	-1.58	1.11	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L108	Ø	49.58	37.18	-.22	-.70	.79	75E	SPECULAR GLOSS (75 DEGREE), EUNTER
L396	Ø	49.60	38.30	.61	.06	1.14	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L190R	Ø	49.72	38.21	.62	-.09	.84	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L255	Ø	49.80	38.50	.89	.05	.81	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L583	Ø	49.83	39.24	1.45	.54	1.06	75E	SPECULAR GLOSS (75 DEGREE), HUNTER
L262	Ø	49.95	38.60	1.06	.01	.85	75K	SPECULAR GLOSS (75 DEGREE), GAERTNER (K-C TYPE)
L670	Ø	49.98	38.75	1.19	.09	1.13	75E	SPECULAR GLOSS (75 DEGREE), EUNTER
L372	Ø	50.00	39.00	1.39	.25	.46	75E	SPECULAR GLOSS (75 DEGREE), BAUSCH + LÖMÉ
L128	Ø	50.10	36.50	-.36	-1.54	1.11	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L388	Ø	50.15	40.20	2.37	.96	1.20	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L210	Ø	50.19	37.44	.39	-.96	1.13	75E	SPECULAR GLOSS (75 DEGREE), EUNTER
L189	Ø	50.25	40.20	2.43	.89	.93	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L121	Ø	50.62	37.93	1.04	-.94	1.36	75E	SPECULAR GLOSS (75 DEGREE), HUNTER
L259	Ø	51.15	39.18	2.31	-.46	1.23	75H	SPECULAR GLOSS (75 DEGREE), EUNTER
L153	Ø	51.20	40.50	3.30	.40	1.13	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L321	Ø	51.20	39.20	2.36	-.49	.99	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L212	X	51.40	42.90	5.19	1.91	.71	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L256	*	53.37	42.00	5.88	-.14	.58	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L136	*	53.48	41.41	5.53	-.63	1.10	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L162	*	53.71	42.80	6.70	.16	.93	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L339	#	53.80	44.90	8.29	1.53	1.39	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L274	#	53.80	47.00	9.82	2.97	.59	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
GMEANS:		49.23	37.82			1.00		
		95% ELLIPSE:		5.74	1.74			WIDE GAMMA = 46 DEGREES

SPECULAR GLOSS, 75 DEGREE

SAMPLE E92 = 49.2 GLOSS UNITS SAMPLE G05 = 37.8 GLOSS UNITS



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

LAB CODE	SAMPLE J66 MEAN	PRINTING 93 GRAMS PER SQUARE METER				SAMPLE J62 MEAN	PRINTING 73 GRAMS PER SQUARE METER				TEST D. - 10		
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L100	6.476	.139	1.29	.063	.67	2.762	.077	1.10	.030	.76	90V	Ø	L100
L105	6.446	.109	1.01	.125	1.35	2.762	.077	1.10	.039	.98	90Q	Ø	L105
L118	6.433	.096	.89	.075	.81	2.713	.028	.40	.013	.33	90Q	Ø	L118
L122	6.220	-.117	-1.09	.094	1.02	2.727	.042	.60	.031	.77	90V	Ø	L122
L123F	6.535	.198	1.84	.075	.80	2.835	.150	2.14	.034	.84	90F	Ø	L123F
L125	6.435	.098	.91	.077	.83	2.730	.045	.64	.047	1.16	90T	Ø	L125
L128	6.292	-.045	-.42	.076	.81	2.678	-.007	-.10	.046	1.14	90T	Ø	L128
L153	6.192	-.145	-1.35	.053	.57	2.673	.188	2.68	.044	1.09	90T	X	L153
L158	6.360	.023	.21	.052	.56	2.670	-.015	-.21	.048	1.20	90T	Ø	L158
L159	6.342	.005	.05	.096	1.03	2.743	.058	.83	.046	1.15	90T	Ø	L159
L162	6.310	-.027	-.25	.110	1.19	2.720	.035	.50	.063	1.57	90D	Ø	L162
L166	6.210	-.127	-1.18	.063	.68	2.598	-.087	-1.23	.049	1.21	90T	Ø	L166
L173B	6.395	.058	.54	.076	.82	2.718	.033	.47	.037	.91	90F	Ø	L173B
L174	.006	-6.331	-58.81	.000	.00	.003	-2.682	-38.14	.000	.00	90T	#	L174
L182	6.336	-.001	-.01	.055	.59	2.746	.061	.87	.046	1.14	90L	Ø	L182
L183	6.507	.170	1.58	.102	1.10	2.721	.036	.51	.036	.90	90T	Ø	L183
L185	6.430	.093	.86	.125	1.35	2.690	.005	.07	.032	.79	90A	Ø	L185
L190C	6.200	-.137	-1.27	.094	1.02	2.660	-.025	-.35	.052	1.28	90T	Ø	L190C
L203A	6.065	-.272	-2.53	.151	1.63	2.610	-.075	-1.06	.070	1.74	90T	*	L203A
L203C	6.410	.073	.68	.152	1.64	2.770	.085	1.21	.098	2.43	90T	Ø	L203C
L212	6.436	.099	.92	.074	.80	2.695	.010	.14	.050	1.25	90T	Ø	L212
L213	6.370	.033	.31	.157	1.69	2.700	.015	.22	.000	.00	90T	Ø	L213
L223	6.372	.035	.33	.090	.96	2.740	.055	.78	.027	.66	90V	Ø	L223
L228	6.390	.053	.49	.074	.79	2.770	.085	1.21	.048	1.20	90T	Ø	L228
L233	6.347	.010	.09	.075	.80	2.571	-.114	-1.62	.050	1.24	90Q	Ø	L233
L238A	6.250	-.087	-.81	.080	.86	2.584	-.101	-1.43	.030	.73	90T	Ø	L238A
L241	6.430	.093	.86	.125	1.35	2.780	.095	1.35	.042	1.05	90T	Ø	L241
L242P	6.300	-.037	-.34	.088	.95	2.640	-.045	-.64	.032	.80	90Ø	Ø	L242P
L242F	6.324	-.013	-.12	.138	1.49	2.596	-.088	-1.26	.047	1.17	90F	Ø	L242F
L249	6.326	-.011	-.10	.079	.85	2.671	-.014	-.20	.015	.38	90T	Ø	L249
L259	6.305	-.032	-.30	.051	.55	2.565	-.120	-1.70	.020	.50	90T	Ø	L259
L260	6.303	-.034	-.31	.045	.49	2.704	.019	.27	.039	.98	90T	Ø	L260
L261	6.484	.147	1.37	.080	.87	2.753	.068	.97	.021	.53	90T	Ø	L261
L262	6.300	-.037	-.34	.053	.57	2.630	-.055	-.78	.042	1.05	90T	Ø	L262
L274D	6.300	-.037	-.34	.094	1.02	2.760	.075	1.07	.084	2.10	90D	Ø	L274D
L285	6.431	.094	.87	.129	1.39	2.720	.035	.50	.041	1.02	90T	Ø	L285
L291	6.230	-.107	-.99	.082	.89	2.640	-.045	-.64	.052	1.28	90T	Ø	L291
L305	6.330	-.007	-.06	.116	1.25	2.650	-.035	-.50	.082	2.03	90T	Ø	L305
L309	6.279	-.058	-.54	.160	1.72	2.670	-.015	-.21	.042	1.04	90T	Ø	L309
L318	6.265	-.072	-.67	.082	.88	2.590	-.095	-1.35	.039	.98	90T	Ø	L318
L320	.006	-6.331	-58.81	.000	.00	.003	-2.682	-38.14	.000	.00	90T	#	L320
L323	6.195	-.142	-1.32	.055	.59	2.628	-.057	-.81	.018	.45	90T	Ø	L323
L324	6.270	-.067	-.62	.123	1.32	2.685	.000	.00	.024	.60	90T	Ø	L324
L326	6.420	.083	.77	.079	.85	2.715	.030	.43	.024	.60	90T	Ø	L326
L328	6.235	-.102	-.95	.091	.99	2.665	-.020	-.28	.041	1.02	90T	Ø	L328
L331	6.310	-.027	-.25	.142	1.53	2.819	.134	1.91	.052	1.30	90T	*	L331
L339	6.200	-.137	-1.27	.133	1.44	2.540	-.145	-2.06	.052	1.28	90T	Ø	L339
L341	6.491	.154	1.43	.082	.88	2.743	.058	.83	.035	.87	90T	Ø	L341
L352	6.358	.021	.20	.058	.63	2.736	.051	.73	.066	1.64	90Q	Ø	L352
L356	6.222	-.115	-1.07	.136	1.47	2.558	-.127	-1.80	.042	1.03	90T	Ø	L356
L358	6.248	-.089	-.83	.094	1.02	2.646	-.039	-.55	.039	.96	90T	Ø	L358
L376	6.530	.193	1.79	.142	1.53	2.640	-.045	-.64	.070	1.74	90T	*	L376
L380	6.290	-.047	-.44	.074	.79	2.720	.035	.50	.042	1.05	90T	Ø	L380
L382	6.482	.145	1.35	.092	.99	2.770	.085	1.21	.025	.62	90T	Ø	L382
L390	6.296	-.041	-.38	.074	.80	2.608	-.077	-1.09	.030	.75	90T	Ø	L390
L442	6.571	.234	2.17	.074	.80	2.815	.130	1.85	.030	.74	90V	Ø	L442
L556	6.362	.025	.23	.093	1.00	2.748	.063	.90	.029	.73	90T	Ø	L556
L557	6.250	-.087	-.81	.158	1.70	2.640	-.045	-.64	.070	1.74	90T	Ø	L557
L571	6.280	-.057	-.53	.140	1.51	2.560	-.125	-1.77	.052	1.28	90V	Ø	L571
L575	6.183	-.154	-1.43	.074	.79	2.665	-.020	-.28	.027	.68	90T	Ø	L575
L581	6.435	.098	.91	.091	.99	2.700	.015	.22	.041	1.02	90T	Ø	L581
L585	6.440	.103	.96	.135	1.45	2.690	.005	.07	.032	.79	90T	Ø	L585
L626	6.100	-.237	-2.20	.077	.83	2.613	-.072	-1.02	.034	.84	90T	Ø	L626
L679	6.190	-.147	-1.36	.046	.49	2.595	-.090	-1.28	.044	1.09	90T	Ø	L679
L693	6.356	.019	.18	.115	1.24	2.677	-.008	-.11	.027	.66	90T	Ø	L693

GR. MEAN = 6.337 MILS
SD OF MEANS = .108 MILS

GRAND MEAN = 2.685 MILS
SD OF MEANS = .070 MILS

TEST DETERMINATIONS = 10
62 LABS IN GRAND MEANS

AVERAGE SDR = .093 MILS
GR. MEAN = 160.96 MICROMETER

AVERAGE SDR = .040 MILS
GRAND MEAN = 68.19 MICROMETER

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 1
THICKNESS (CALIPER), THOUSANDS OF AN INCH
TAPPI STANDARD T411 CS-76

JUNE 1979

LAB CODE	SAMPLE J66		PRINTING 93 GRAMS PER SQUARE METER				SAMPLE J82		PRINTING 73 GRAMS PER SQUARE METER				TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB		
L106	6.010	-.327	-3.04	.032	.34	8.000	5.315	75.58	.000	.00	90C	*	L106		
L203B	6.310	-.027	-.25	.120	1.29	2.770	.085	1.21	.106	2.63	90C	*	L203B		
L251	6.178	-.159	-1.48	.058	.63	2.644	-.041	-.58	.022	.56	90W	*	L251		
L274C	6.310	-.027	-.25	.074	.79	2.750	.065	.93	.085	2.11	90C	*	L274C		
L344	6.200	-.137	-1.27	.170	1.83	2.650	-.035	-.50	.053	1.31	90U	*	L344		
L484	6.405	.069	.64	.081	.87	2.728	.044	.62	.019	.47	90E	*	L484		
L563	6.550	.213	1.98	.097	1.05	2.780	.095	1.35	.063	1.57	90U	*	L563		
L576	6.289	-.048	-.44	.126	1.36	2.881	.196	2.79	.047	1.16	90C	*	L576		
L616	2.416	-3.921	-36.42	.034	.36	2.740	.055	.78	.097	2.40	90C	*	L616		
L684	6.200	-.137	-1.27	.105	1.14	2.810	.125	1.78	.057	1.41	90U	*	L684		

TOTAL NUMBER OF LABORATORIES REPORTING = 75

Best values: J66 6.33 ± 0.17 mils
J82 2.69 ± 0.11 mils

Data from the following laboratories appear to be
off by a multiplicative factor: 174, 320.

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---THST INSTRUMENT---	CONDITIONS
		J66	J82	MAJOR	MINOR	E. SDR	VAR		
L320	#	.006	.003	-6.851	.581	.00	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L174	#	.006	.003	-6.851	.581	.00	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L616	*	2.416	2.740	-3.442	1.878	1.38	90C	THICKNESS (CALIPER), CADY,	HAND DRIVEN
L106	*	6.010	8.000	2.190	4.854	.17	90C	THICKNESS (CALIPER), CADY,	HAND DRIVEN
L203A	*	6.065	2.610	-.275	.061	1.68	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L626	Ø	6.100	2.613	-.243	.047	.83	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L251	*	6.178	2.644	-.160	.038	.59	90W	THICKNESS (CALIPER), L * W,	MOTOR DRIVEN, 20 C, 65% RH
L575	Ø	6.183	2.665	-.145	.054	.73	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L679	Ø	6.190	2.595	-.172	-.011	.79	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L153	X	6.192	2.873	-.040	.234	.83	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L323	Ø	6.195	2.628	-.152	.016	.52	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L684	*	6.200	2.810	-.063	.175	1.27	90U	THICKNESS (CALIPER), TMI,	HAND DRIVEN
L344	*	6.200	2.650	-.137	.033	1.57	90U	THICKNESS (CALIPER), TMI,	HAND DRIVEN
L339	Ø	6.200	2.540	-.189	-.064	1.36	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L190C	Ø	6.200	2.660	-.133	.042	1.15	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L166	Ø	6.210	2.558	-.153	-.018	.95	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L122	Ø	6.220	2.727	-.084	.092	.89	90V	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN, DIGITIZED
L356	Ø	6.222	2.558	-.161	-.059	1.25	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L291	Ø	6.230	2.640	-.115	.010	1.09	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L328	Ø	6.235	2.665	-.099	.030	1.00	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L358	Ø	6.248	2.646	-.097	.007	.99	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L557	Ø	6.250	2.640	-.098	.001	1.72	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L238A	Ø	6.250	2.584	-.124	-.049	.80	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L318	Ø	6.265	2.590	-.108	-.050	.93	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L324	Ø	6.270	2.685	-.059	.031	.96	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L309	Ø	6.279	2.670	-.058	.014	1.38	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L571	Ø	6.280	2.560	-.109	-.084	1.40	90V	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN, DIGITIZED
L576	*	6.289	2.881	.049	.196	1.26	90C	THICKNESS (CALIPER), CADY,	HAND DRIVEN
L380	Ø	6.290	2.720	-.025	.053	.92	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L128	Ø	6.292	2.678	-.043	.015	.97	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L390	Ø	6.296	2.608	-.072	-.049	.77	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L262	Ø	6.300	2.630	-.058	-.031	.81	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L274D	Ø	6.300	2.760	.002	.084	1.56	90D	THICKNESS (CALIPER), CADY,	MOTOR DRIVEN
L242Ø	Ø	6.300	2.640	-.054	-.023	.87	90Ø	THICKNESS (CALIPER), MESSMER,	MOTOR DRIVEN, BS3983
L260	Ø	6.303	2.704	-.021	.033	.73	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L259	Ø	6.305	2.565	-.084	-.091	.53	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L274C	*	6.310	2.750	.007	.070	1.45	90C	THICKNESS (CALIPER), CADY,	HAND DRIVEN
L203B	*	6.310	2.770	.016	.088	1.96	90C	THICKNESS (CALIPER), CADY,	HAND DRIVEN
L331	#	6.310	2.819	.039	.131	1.42	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L162	Ø	6.310	2.720	-.007	.044	1.38	90D	THICKNESS (CALIPER), CADY,	MOTOR DRIVEN
L242P	Ø	6.324	2.596	-.053	-.072	1.33	90P	THICKNESS (CALIPER), MESSMER,	MOTOR DRIVEN, ISØ R534
L249	Ø	6.326	2.671	-.016	-.007	.61	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L305	Ø	6.330	2.650	-.022	-.028	1.64	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L182	Ø	6.336	2.746	.027	.055	.86	90L	THICKNESS (CALIPER), L * W,	MOTOR DRIVEN
L159	Ø	6.342	2.743	.032	.049	1.09	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L233	Ø	6.347	2.571	-.044	-.105	1.02	90Q	THICKNESS (CALIPER), EMVECO,	MOTOR DRIVEN
L693	Ø	6.356	2.677	.013	-.016	.95	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L352	Ø	6.358	2.736	.043	.035	1.13	90Q	THICKNESS (CALIPER), EMVECO,	MOTOR DRIVEN
L158	Ø	6.360	2.670	.014	-.024	.88	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L556	Ø	6.362	2.748	.052	.044	.87	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L213	Ø	6.370	2.700	.036	-.002	.84	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L223	Ø	6.372	2.740	.057	.032	.81	90V	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN, DIGITIZED
L228	Ø	6.390	2.770	.087	.051	1.00	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L173B	Ø	6.395	2.718	.067	.002	.87	90F	THICKNESS (CALIPER), FEDERAL,	MOTOR DRIVEN
L484	*	6.405	2.728	.081	.006	.67	90E	THICKNESS (CALIPER), SCHÖPPER,	HAND DRIVEN
L203C	Ø	6.410	2.770	.104	.041	2.04	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L326	Ø	6.420	2.715	.088	-.012	.73	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L185	Ø	6.430	2.690	.085	-.039	1.07	90A	THICKNESS (CALIPER), AMTHOR,	MOTOR DRIVEN
L241	Ø	6.430	2.780	.127	.041	1.20	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L285	Ø	6.431	2.720	.100	-.013	1.20	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L118	Ø	6.433	2.713	.098	-.020	.57	90Q	THICKNESS (CALIPER), EMVECO,	MOTOR DRIVEN
L581	Ø	6.435	2.700	.094	-.032	1.00	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L125	Ø	6.435	2.730	.108	-.006	1.00	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L212	Ø	6.436	2.695	.092	-.037	1.02	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN
L585	Ø	6.440	2.690	.094	-.044	1.12	90T	THICKNESS (CALIPER), TMI,	MOTOR DRIVEN

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 2
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI STANDARD T411 68-76

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J66	J82	MAJOR	MINOR	R _s	SDR VAR			
L105	Ø	6.446	2.762	.133	.017	1.16	90Q	THICKNESS (CALIPER),	EMVECO,	MOTOR DRIVEN
L100	Ø	6.476	2.762	.159	.003	.72	90V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L382	Ø	6.482	2.770	.168	.008	.81	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L261	Ø	6.484	2.753	.162	-.008	.70	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L341	Ø	6.491	2.743	.163	-.020	.88	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L183	Ø	6.507	2.721	.167	-.047	1.00	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L376	*	6.530	2.640	.150	-.130	1.63	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L123F	Ø	6.535	2.835	.245	.040	.82	90F	THICKNESS (CALIPER),	FEDERAL,	MOTOR DRIVEN
L563	+	6.550	2.780	.233	-.015	1.31	90U	THICKNESS (CALIPER),	TMI,	HAND DRIVEN
L442	Ø	6.571	2.815	.268	.006	.77	90V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
GMEANS:		6.337	2.685			1.00				
		95% ELLIPSE:		.301	.124	WITH GAMMA = 27 DEGREES				

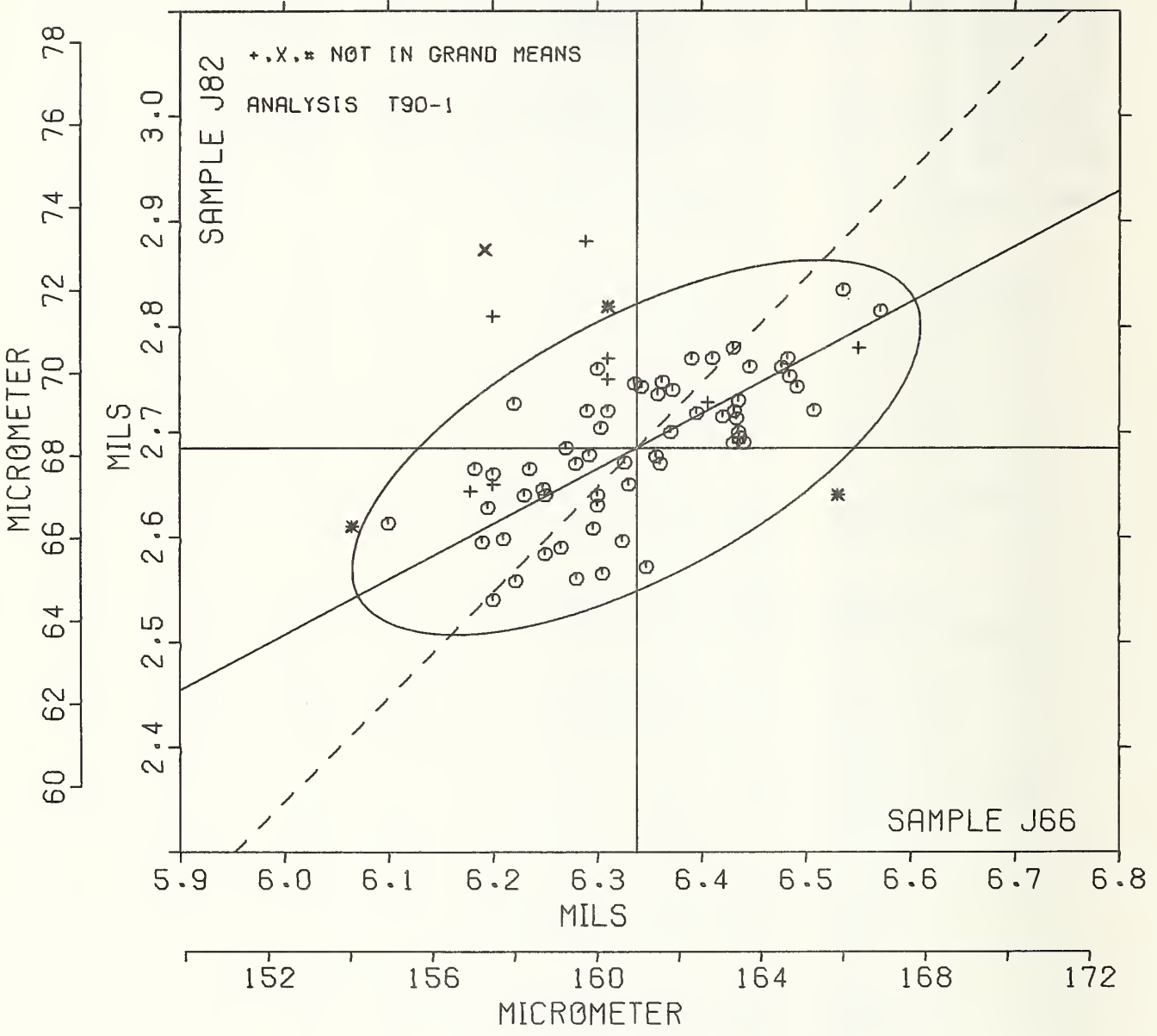
THICKNESS (CALIPER)

SAMPLE J66 = 6.34 MILS

SAMPLE J82 = 2.68 MILS

SAMPLE J66 = 161.0 MICRØMETER

SAMPLE J82 = 68.2 MICRØMETER



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T95-1 TABLE 1
GRAMMAGE (MASS PER UNIT AREA)
TAPPI STANDARD T410 GS-68

LAB CODE	SAMPLE D34 MHAN	OFFSET ENAMEL COATED 117 GRAMS PER SQUARE METER				SAMPLE D35 MEAN	NEWSPRINT 55 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L100	119.20	.26	.30	.92	1.33	55.50	.06	.07	.65	.81	95C	Ø	L100
L121	117.90	-1.04	-1.24	.75	1.09	54.83	-.61	-.75	.79	.98	95B	Ø	L121
L162	116.97	-1.97	-2.34	1.17	1.70	56.02	.58	.70	1.20	1.49	95K	Ø	L162
L213	118.08	-.87	-1.03	.66	.96	54.41	-1.03	-1.26	.69	.85	95F	Ø	L213
L233	118.68	-.27	-.32	.61	.89	55.22	-.23	-.27	.56	.69	95T	Ø	L233
L249	119.49	.55	.65	.56	.81	55.83	.39	.47	.47	.58	95I	Ø	L249
L274	119.00	.06	.07	.47	.68	57.00	1.56	1.89	.47	.58	95E	Ø	L274
L280	118.27	-.67	-.80	.69	1.00	55.13	-.31	-.38	1.00	1.24	95T	Ø	L280
L305	117.80	-1.14	-1.36	.79	1.14	240.00	184.56	224.68	1.05	1.31	95T	#	L305
L339	120.00	1.06	1.25	.00	.00	56.02	.58	.70	.13	.16	95T	Ø	L339
L342	119.26	.32	.37	.86	1.24	55.86	.42	.51	.51	.64	95C	Ø	L342
L344	120.09	1.14	1.35	.33	.48	53.35	-2.10	-2.55	3.80	4.71	95T	Ø	L344
L442	118.70	-.24	-.29	.35	.51	55.54	.10	.12	.20	.25	95K	Ø	L442
L484	119.20	.26	.30	.92	1.33	65.54	10.10	12.29	.58	.71	95H	#	L484
L557	118.73	-.21	-.25	1.55	2.24	56.10	.66	.80	.93	1.15	95C	Ø	L557
L559	119.29	.35	.41	.50	.73	55.46	.02	.02	.65	.80	95K	Ø	L559
L571	72.57	-46.37	-55.02	1.02	1.48	34.27	-21.18	-25.78	.43	.53	95P	#	L571
L597	122.80	3.86	4.57	1.69	2.45	58.00	2.56	3.11	.00	.00	95C	#	L597
L688	119.58	.64	.76	.84	1.22	55.79	.34	.42	.54	.67	95T	Ø	L688
L693	119.88	.94	1.11	.77	1.11	55.04	-.40	-.49	.31	.39	95G	Ø	L693

GR. MEAN = 118.94 G/SQ.METER GRAND MEAN = 55.44 G/SQ.METER TEST DETERMINATIONS = 10
SD MEANS = .84 G/SQ.METER SD OF MEANS = .82 G/SQ.METER 16 LABS IN GRAND MEANS
AVERAGE SDR = .69 G/SQ.METER AVERAGE SDR = .81 G/SQ.METER

TOTAL NUMBER OF LABORATORIES REPORTING = 20
Best values: D34 119.0 ± 1.1 grams per square meter
D35 55.5 ± 1.4 grams per square meter

The following laboratories were omitted from the grand means because of extreme test results: 305, 484, 597.

Data from the following laboratories appear to be off by a multiplicative factor: 571.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T95-1 TABLE 2
GRAMMAGE (MASS PER UNIT AREA)
TAPPI STANDARD T410 GS-68

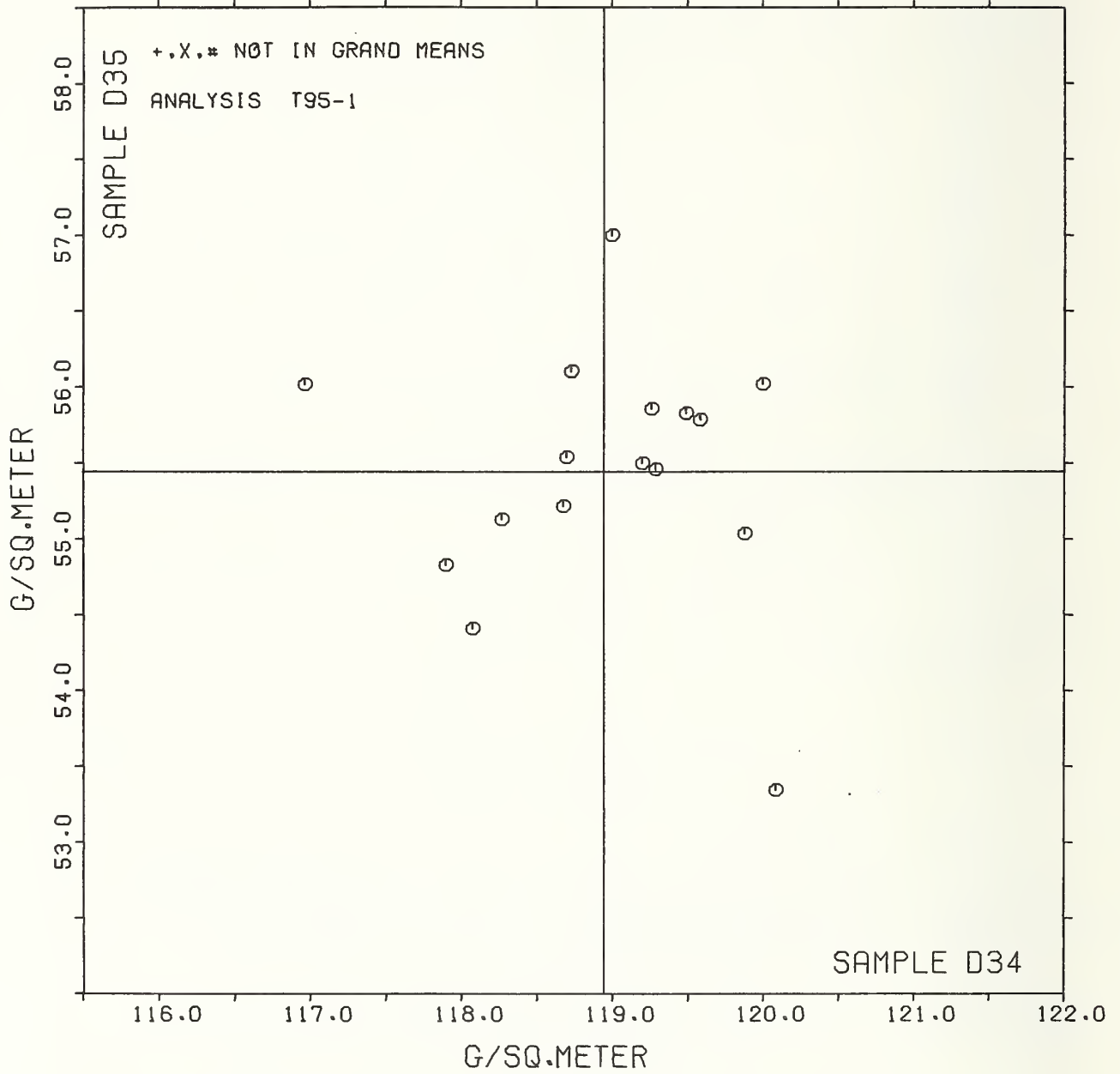
LAB CODE	F	MHANS		COORDINATES		AVG R ₀ SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS			
		D34	D35	MAJOR	MINOR			PROPERTY	TEST INSTRUMENT	CONDITIONS	
L571	#	72.57	34.27	-23.93	-45.01	1.01	95P	EASIS	WEIGHT (GRAMMAGE),	PRODUCTION	REAM CUTTER
L162	Ø	116.97	56.02	-1.92	-.74	1.59	95K	BASIS	WEIGHT (GRAMMAGE),	WEIGHED AS	RECEIVED
L305	#	117.80	240.00	-113.17	145.79	1.23	95T	BASIS	WEIGHT (GRAMMAGE),	TEMPLATE	CUT
L121	Ø	117.90	54.83	-.46	-1.12	1.04	95B	BASIS	WEIGHT (GRAMMAGE),	CENCGRA	CUTTER
L213	Ø	118.08	54.41	-.06	-1.35	.90	95F	BASIS	WEIGHT (GRAMMAGE),	FOUR-SQUARE	CUTTER
L280	Ø	118.27	55.13	-.35	-.66	1.12	95T	BASIS	WEIGHT (GRAMMAGE),	TEMPLATE	CUT
L233	Ø	118.68	55.22	-.07	-.34	.79	95T	BASIS	WEIGHT (GRAMMAGE),	TEMPLATE	CUT
L442	Ø	118.70	55.54	-.25	-.07	.38	95K	BASIS	WEIGHT (GRAMMAGE),	WEIGHED AS	RECEIVED
L557	Ø	118.73	56.10	-.57	.39	1.70	95C	BASIS	WEIGHT (GRAMMAGE),	CUTTING	BOARD
L274	Ø	119.00	57.00	-.90	1.27	.63	95B	BASIS	WEIGHT (GRAMMAGE),	CENCGRA	CUTTER
L100	Ø	119.20	55.50	.17	.20	1.07	95C	BASIS	WEIGHT (GRAMMAGE),	CUTTING	BOARD
L484	#	119.20	65.54	-5.94	8.17	1.02	95H	BASIS	WEIGHT (GRAMMAGE),	SQUARE AND	BLADE
L342	Ø	119.26	55.86	-.00	.52	.94	95C	BASIS	WEIGHT (GRAMMAGE),	CUTTING	BOARD
L559	Ø	119.29	55.46	.26	.22	.77	95K	BASIS	WEIGHT (GRAMMAGE),	WEIGHED AS	RECEIVED
L249	Ø	119.49	55.83	.20	.64	.69	95I	BASIS	WEIGHT (GRAMMAGE),	INGENTØ	PAPER CUTTER
L688	Ø	119.58	55.79	.30	.66	.94	95T	BASIS	WEIGHT (GRAMMAGE),	TEMPLATE	CUT
L693	Ø	119.88	55.04	.99	.25	.75	95G	BASIS	WEIGHT (GRAMMAGE),	PRECISION	CUTTER
L339	Ø	120.00	56.02	.49	1.10	.08	95T	BASIS	WEIGHT (GRAMMAGE),	TEMPLATE	CUT
L344	Ø	120.09	53.35	2.18	-.97	2.59	95T	BASIS	WEIGHT (GRAMMAGE),	TEMPLATE	CUT
L597	#	122.80	58.00	1.50	4.37	1.22	95C	BASIS	WEIGHT (GRAMMAGE),	CUTTING	BOARD

GMEANS: 118.94 55.44 1.00
95% ELLIPSE: 2.47 2.24 WITH GAMMA = -37 DEGREES

GRAMMAGE (MASS PER UNIT AREA)

SAMPLE D34 = 118.9 G/SQ.METER

SAMPLE D35 = 55.4 G/SQ.METER



SUMMARY TABLE

TEST METHOD	SAMPLE CODE	GRAND MEAN	SD OF MBAN	AVER SDR	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
AIR RESISTANCE, GURLEY T40-1 GURLEY UNITS	B95	48.4	2.9	4.5	10	61	65	10	4.0	8.0
	A81	22.0	1.9	2.5					2.2	5.3
AIR RESISTANCE, SHEFFIELD T40-2 SHEFF. UNITS	B95	72.4	3.5	6.2	10	38	44	10	5.4	9.6
	A81	131.1	8.0	13.1					11.5	22.2
AIR RESISTANCE, GURLEY HG FLOTATION T41-1 SEC/10 CC	B73	1219.	217.	485.	10	11	13	10	425.	600.
	D06	164.	16.	21.					18.	44.
SMOOTHNESS, PARKER PRINTSURF T44-1 MICRONS	J50	6.08	.58	.11	10	8	9	10	.10	1.60
	J74	4.29	.38	.12					.11	1.06
SMOOTHNESS, SHEFFIELD T45-1 SHEFF. UNITS	J50	273.5	11.3	7.1	15	88	92	10	6.2	31.4
	J74	79.4	7.3	5.0					4.4	20.4
SMOOTHNESS, BEKK T45-2 BEKK SECONDS	J50	10.30	.68	.58	15	11	13	10	.51	1.91
	J74	79.96	10.39	8.92					7.82	29.14
SMOOTHNESS, BENDTSEN T47-1 ML/MIN	J50	482.4	55.1	45.9	10	8	9	10	40.2	152.7
	J74	93.1	7.1	9.3					8.2	19.7
K & N INK ABSORPTION T56-1 K & N UNITS	E50	65.07	5.38	.59	4	9	13	4	.82	14.91
	B80	25.11	2.87	1.24					1.72	7.96
PH, COLD T57-1 PH UNITS	J18	4.734	.217	.068	5	7	8	2	.134	.611
	A99	5.606	.288	.142					.278	.826
PH, HOT T57-2 PH UNITS	J18	4.412	.109	.026	5	5	6	2	.051	.305
	A99	5.100	.057	.044					.086	.172
OPACITY, B&L TYPE, 29% BACKING T60-1 PERCENT	K24	95.39	.37	.28	10	77	91	5	.34	1.06
	G01	95.82	.44	.24					.30	1.25
OPACITY, B&L TYPE, PAPER BACKING T60-2 PERCENT	K24	95.65	.14	.23	10	6	7	5	.29	.44
	G01	93.88	.33	.27					.34	.94
OPACITY, ELREPHO TYPE, PAPER BACKING T60-3 PERCENT	K24	96.25	.16	.18	10	16	19	5	.22	.47
	G01	94.39	.24	.16					.20	.67
BLUE REFLECTANCE, DIRECTIONAL T65-1 PERCENT	E79	96.00	.29	.12	8	20	49	6	.13	.82
	J98	75.96	.35	.13					.15	.97
BLUE REFLECTANCE, DIFFUSE, WITH TRAP T65-2 PERCENT	E79	96.43	.76	.07	8	18	19	6	.08	2.11
	J98	75.83	.53	.13					.14	1.47
BLUE REFLECTANCE, DIFFUSE, NO TRAP T65-3 PERCENT	E79	95.04	1.13	.11	8	18	18	6	.12	3.13
	J98	76.62	.88	.11					.12	2.44
SPECULAR GLOSS, 75 DEGREE T75-1 GLOSS UNITS	E92	49.23	1.62	.92	10	51	56	5	1.14	4.56
	G05	37.82	1.70	1.15					1.42	4.82
THICKNESS (CALIPER) T90-1 MILS	J66	6.337	.108	.093	10	62	75	10	.081	.298
	J82	2.685	.070	.040					.035	.195
GRAMMAGE (MASS PER UNIT AREA) T95-1 G/SQ.METER	D34	118.94	.84	.69	10	16	20	3	1.10	2.51
	D35	55.44	.82	.81					1.29	2.52

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