

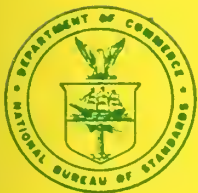
NBS 1279-1369



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

**COLLABORATIVE REFERENCE PROGRAM
FOR PAPER**

REPORT NO. 57G



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

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
A05 Technology Building
National Bureau of Standards
Washington, DC 20234

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM
FOR PAPER

Report No. 57G

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NBSIR 79-1369


U. S. DEPARTMENT OF COMMERCE
National Bureau of Standards

INTRODUCTION

Reports 57S and 57G comprise the third set of reports for the 78-79 program year. Participants in tests which involve strength properties of paper will receive only the S report; those in tests which measure other properties will receive only the G report.

Notes and comments to individual laboratories and "Best Values" applicable to a particular method are given following Table 1 for each method. See page 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. NBS results, identified as L502 in the optical tests, are included on some of the tables.

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

April 23, 1979

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 - In addition to several quantities already defined
(At end of above, the summary shows the following values for
report) 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 compu-
tation 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 CS-75, AIR RESISTANCE OF PAPER

LAB CODE	SAMPLE J48 106 GRAMS PER SQUARE METER PRINTING					SAMPLE K21 103 GRAMS PER SQUARE METER PRINTING					TEST D. - 10			
	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB	
L100	31.0	-.2	-.21	1.7	1.09	48.8	-2.0	-.82	2.4	.53	40D	Ø	L100	
L107	31.9	.7	.62	2.1	1.35	50.5	-.3	-.11	4.3	.94	40D	Ø	L107	
L121	30.9	-.4	-.32	1.5	.95	50.6	-.1	-.06	4.7	.88	40D	Ø	L121	
L122	30.4	-.8	-.72	2.2	1.37	49.7	-1.1	-.44	5.2	1.15	40D	Ø	L122	
L123	30.7	-.5	-.47	1.9	1.18	49.6	-1.2	-.50	5.4	1.19	40D	Ø	L123	
L124G	29.6	-1.6	-1.50	.8	.54	50.9	.1	.05	4.3	.95	40D	Ø	L124G	
L125	30.5	-.7	-.63	1.3	.99	51.3	.5	.21	6.8	1.49	40D	Ø	L125	
L128	31.2	-.0	-.03	1.3	.84	51.0	.2	.09	3.4	.74	40D	Ø	L128	
L141	31.7	.5	.42	1.5	.94	49.8	-.9	-.39	4.9	1.07	40D	Ø	L141	
L148	31.8	.6	.54	1.9	1.21	50.9	.2	.07	4.5	1.00	40D	Ø	L148	
L153	29.8	-1.4	-1.32	1.5	.94	48.6	-2.2	-.90	6.9	1.51	40D	Ø	L153	
L158	29.9	-1.3	-1.23	1.3	.82	54.7	3.9	1.61	2.4	.54	40D	*	L158	
L163	32.9	1.7	1.57	1.2	.79	52.2	1.4	.58	4.0	.88	40D	Ø	L163	
L166	32.7	1.5	1.37	2.1	1.35	50.6	-.2	-.09	7.3	1.60	40D	Ø	L166	
L174	31.0	-.2	-.18	1.5	.94	51.7	1.0	.40	4.4	.95	40D	Ø	L174	
L182G	30.2	-1.0	-.95	1.7	1.08	50.2	-.6	-.24	5.2	1.14	40D	Ø	L182G	
L183	31.9	.7	.61	1.0	.63	52.8	2.0	.84	8.0	1.76	40D	Ø	L183	
L190C	30.0	-1.2	-1.13	1.2	.80	50.9	.1	.05	5.4	1.19	40D	Ø	L190C	
L190R	31.2	-.0	-.02	1.7	1.09	51.9	1.1	.47	4.7	1.03	40D	Ø	L190R	
L212	26.6	-4.6	-4.25	1.3	.84	44.5	-6.3	-2.60	4.5	.99	40D	X	L212	
L219	30.6	-.7	-.62	1.1	.72	49.1	-1.7	-.70	4.3	.95	40D	Ø	L219	
L223	32.2	1.0	.89	1.8	1.16	54.9	4.1	1.71	6.0	1.32	40D	Ø	L223	
L230G	32.3	1.1	.98	1.3	.85	51.8	1.0	.42	4.2	.93	40D	Ø	L230G	
L232	30.8	-.4	-.40	1.5	.96	44.4	-6.4	-2.66	7.1	1.56	40D	*	L232	
L236	32.1	.9	.80	1.6	1.02	49.8	-1.0	-.40	5.6	1.22	40D	Ø	L236	
L238A	30.8	-.4	-.40	1.3	.84	53.3	2.5	1.05	5.1	1.13	40D	Ø	L238A	
L241	28.7	-2.5	-2.33	1.8	1.13	46.2	-4.6	-1.90	3.4	.74	40D	Ø	L241	
L242	31.1	-.1	-.12	1.9	1.22	49.2	-1.6	-.65	3.5	.77	40D	Ø	L242	
L243G	31.1	-.1	-.12	1.8	1.14	52.3	1.5	.63	4.2	.93	40D	Ø	L243G	
L254	32.7	1.4	1.33	1.6	1.01	51.0	.3	.11	4.7	1.04	40D	Ø	L254	
L259	29.8	-1.4	-1.28	1.5	.97	46.9	-3.9	-1.62	4.4	.96	40D	Ø	L259	
L261	31.1	-.1	-.10	1.4	.88	50.0	-.8	-.33	3.2	.71	40D	Ø	L261	
L262G	31.8	.5	.49	1.1	.68	46.2	-4.6	-1.91	1.8	.39	40D	Ø	L262G	
L274	31.3	.1	.10	1.3	.86	47.9	-2.9	-1.21	1.3	.28	40D	Ø	L274	
L278	32.6	1.4	1.26	2.0	1.25	55.1	4.3	1.79	4.5	.98	40D	Ø	L278	
L285	33.0	1.8	1.66	1.0	.61	52.2	1.4	.60	5.4	1.19	40D	Ø	L285	
L301	31.0	-.3	-.23	1.7	1.08	51.9	1.1	.47	3.4	.75	40D	Ø	L301	
L308	32.9	1.7	1.54	2.7	1.71	51.1	.3	.13	6.3	1.37	40D	Ø	L308	
L313	29.3	-1.9	-1.73	1.7	1.12	48.9	-1.9	-.77	4.8	1.05	40D	Ø	L313	
L320	25.2	-6.0	-5.55	.8	.50	41.7	-9.1	-3.77	3.2	.70	40D	#	L320	
L321	29.2	-2.0	-1.87	2.1	1.37	50.6	-.2	-.07	5.0	1.09	40D	Ø	L321	
L324	30.7	-.5	-.47	1.4	.88	50.5	-.3	-.13	3.5	.77	40D	Ø	L324	
L326	32.7	1.5	1.35	1.3	.85	55.2	4.4	1.84	3.7	.81	40D	Ø	L326	
L328	31.4	.2	.19	1.3	.83	49.3	-1.5	-.61	2.8	.62	40D	Ø	L328	
L339	21.2	-10.0	-9.19	1.2	.74	37.4	-13.4	-5.55	3.6	.79	40D	#	L339	
L344	30.2	-1.1	-.97	1.5	.96	50.0	-.8	-.34	4.8	1.06	40D	Ø	L344	
L380	30.5	-.7	-.67	1.6	1.01	46.6	-4.2	-1.73	1.8	.40	40D	Ø	L380	
L388	7.7	-23.5	-21.63	.3	.20	10.6	-40.2	-16.69	.7	.14	40D	#	L388	
L394	31.2	-.0	-.03	1.5	.99	48.3	-2.5	-1.03	2.4	.53	40D	Ø	L394	
L567	32.4	1.1	1.04	1.7	1.10	55.1	4.3	1.80	8.9	1.96	40D	Ø	L567	
L576	30.4	-.8	-.77	1.1	.69	51.5	.7	.30	6.9	1.52	40D	Ø	L576	
L585	33.4	2.2	2.00	1.7	1.08	54.1	3.3	1.39	4.9	1.07	40D	Ø	L585	
L604	31.6	.4	.38	2.0	1.26	51.5	.8	.32	4.2	.92	40D	Ø	L604	
L616	31.9	.7	.66	1.0	.61	52.5	1.7	.72	1.6	.36	40D	Ø	L616	
L651	31.2	-.0	-.03	2.1	1.37	52.0	1.2	.51	5.6	1.22	40D	Ø	L651	
L676	32.4	1.1	1.06	1.1	.68	54.2	3.5	1.43	4.4	.96	40D	Ø	L676	
GR. MEAN	31.2	GURLEY UNITS				GRAND MEAN	50.8	GURLEY UNITS			TEST DETERMINATIONS			10
SD MEANS	1.1	GURLEY UNITS				SD OF MEANS	2.4	GURLEY UNITS			52 LABS IN GRAND MEANS			
		AVERAGE SDR					1.6	GURLEY UNITS			AVERAGE SDR			4.6 GURLEY UNITS
L291	31.4	.2	.15	1.0	.52	51.4	.6	.26	3.2	.70	40U	*	L291	
L484	26.1	-5.2	-4.74	1.4	.86	43.5	-7.3	-3.03	3.4	.74	40H	*	L484	
L564	5.5	-25.7	-23.65	.1	.07	9.2	-41.6	-17.26	.7	.14	40K	*	L564	

TOTAL NUMBER OF LABORATORIES REPORTING = 59

Best values: J48 31.0 ± 1.8 Gurley units
K21 50.8 ± 4.3 Gurley units

The following laboratories were omitted from the grand means because of extreme test results: 320, 339.

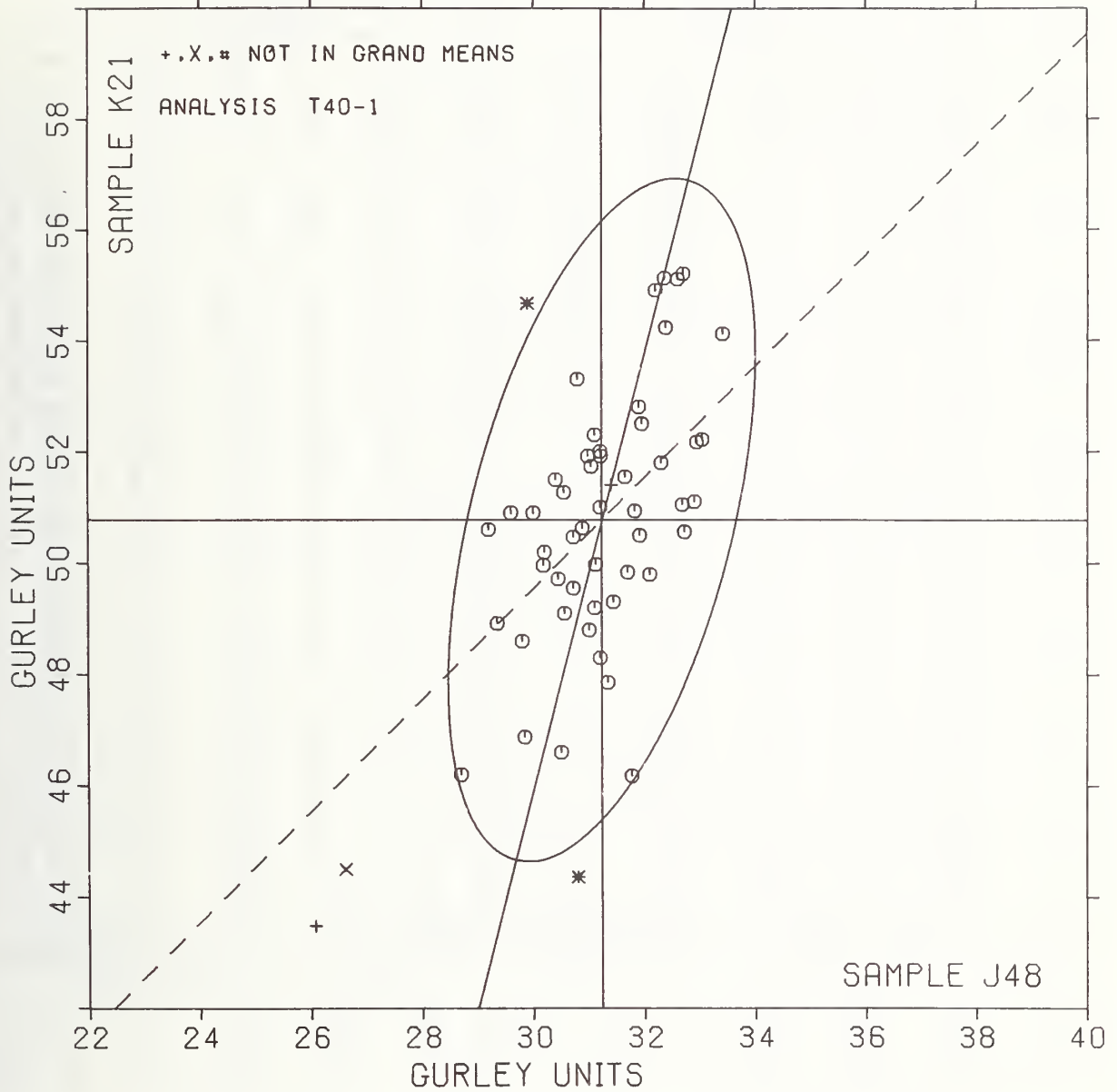
Data from the following laboratories appear to be off by a multiplicative factor: 388.

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T40-1 TABLE 2
 AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)
 TAPPI STANDARD T460 6S-75, AIR RESISTANCE OF PAPER

LAB CODE	F	MEANS		COORDINATES		AVG R.SDR	VAR	PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J48	K21	MAJOR	MINOR					
L564	*	5.5	9.2	-46.7	14.6	.11	40K	AIR RESISTANCE,	BEKK	
L388	#	7.7	10.6	-44.8	12.8	.17	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L339	#	21.2	37.4	-15.4	6.4	.77	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L320	#	25.2	41.7	-10.3	3.6	.60	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L484	*	26.1	43.5	-8.3	3.2	.80	40H	AIR RESISTANCE,	REGMED-TYPE GURLEY DENSOMETER	-OIL FLOTATION
L212	X	26.6	44.5	-7.2	2.9	.91	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L241	Ø	28.7	46.2	-5.1	1.3	.94	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L321	Ø	29.2	50.6	-.7	1.9	1.23	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L313	Ø	29.3	48.9	-2.3	1.4	1.08	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L124G	Ø	29.6	50.9	-.3	1.6	.74	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L153	Ø	29.8	48.6	-2.5	.9	1.23	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L259	Ø	29.8	46.9	-4.1	.4	.97	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L158	*	29.9	54.7	3.4	2.3	.68	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L190C	Ø	30.0	50.9	-.2	1.2	.99	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L344	Ø	30.2	50.0	-1.1	.8	1.01	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L182G	Ø	30.2	50.2	-.8	.9	1.11	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L576	Ø	30.4	51.5	.5	1.0	1.10	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L122	Ø	30.4	49.7	-1.2	.5	1.26	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L380	Ø	30.5	46.6	-4.2	-.3	.71	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L125	Ø	30.5	51.3	.3	.8	1.24	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L219	Ø	30.6	49.1	-1.8	.2	.84	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L123	Ø	30.7	49.6	-1.3	.2	1.19	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L324	Ø	30.7	50.5	-.4	.4	.83	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L238A	Ø	30.8	53.3	2.3	1.0	.98	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L232	*	30.8	44.4	-6.3	-1.2	1.26	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L121	Ø	30.9	50.6	-.2	.3	.92	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L301	Ø	31.0	51.9	1.0	.5	.91	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L100	Ø	31.0	48.8	-2.0	-.3	.81	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L174	Ø	31.0	51.7	.9	.4	.95	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L242	Ø	31.1	49.2	-1.6	-.3	1.00	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L243G	Ø	31.1	52.3	1.4	.5	1.04	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L261	Ø	31.1	50.0	-.8	-.1	.79	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L651	Ø	31.2	52.0	1.2	.3	1.30	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L394	Ø	31.2	48.3	-2.4	-.6	.76	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L128	Ø	31.2	51.0	.2	.1	.79	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L190R	Ø	31.2	51.9	1.1	.3	1.06	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L274	Ø	31.3	47.9	-2.8	-.8	.57	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L291	*	31.4	51.4	.6	-.0	.66	40U	AIR RESISTANCE,	SHEFFIELD IN GURLEY UNITS	
L328	Ø	31.4	49.3	-1.4	-.6	.72	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L604	Ø	31.6	51.5	.9	-.2	1.09	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L141	Ø	31.7	49.8	-.8	-.7	1.00	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L262G	Ø	31.8	46.2	-4.3	-1.7	.53	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L148	Ø	31.8	50.9	.3	-.5	1.10	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L183	Ø	31.9	52.8	2.1	-.1	1.20	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L107	Ø	31.9	50.5	-.1	-.7	1.14	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L616	Ø	31.9	52.5	1.8	-.3	.49	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L236	Ø	32.1	49.8	-.7	-1.1	1.12	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L223	Ø	32.2	54.9	4.2	.1	1.24	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L230G	Ø	32.3	51.8	1.3	-.8	.89	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L567	Ø	32.4	55.1	4.5	-.0	1.53	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L676	Ø	32.4	54.2	3.6	-.3	.82	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L278	Ø	32.6	55.1	4.5	-.3	1.12	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L254	Ø	32.7	51.0	.6	-1.3	1.02	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L326	Ø	32.7	55.2	4.6	-.3	.83	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L166	Ø	32.7	50.6	.2	-1.5	1.48	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L308	Ø	32.9	51.1	.7	-1.5	1.54	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L163	Ø	32.9	52.2	1.8	-1.3	.84	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L285	Ø	33.0	52.2	1.8	-1.4	.90	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
L585	Ø	33.4	54.1	3.8	-1.3	1.08	40D	AIR RESISTANCE,	GURLEY DENSOMETER	- OIL FLOTATION
GMEANS:		31.2	50.8			1.00				
		95% ELLIPSE:		6.3	2.4	WITH GAMMA = 75 DEGREES				

AIR RESISTANCE, GURLEY

SAMPLE J48 = 31.2 GURLEY UNITS SAMPLE K21 = 50.8 GURLEY UNITS



ANALYSIS T40-2 TABLE 1
 AIR RESISTANCE, SHEFFIELD UNITS (CC/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) GRIPICE
 SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	PRINTING J48					PRINTING K21					TEST D. - 10			
	MEAN	106 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	MEAN	103 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	VAR	F	LAB	
L114	111.0	6.0	1.19	4.6	1.07	77.5	5.1	.73	4.9	.78	40S	6	L114	
L121	101.2	-3.8	-.76	5.9	1.38	67.8	-4.6	-.66	5.3	.86	40S	6	L121	
L122S	114.3	9.3	1.85	4.2	.97	81.1	8.7	1.24	10.6	1.71	40S	6	L122S	
L124S	102.0	-3.0	-.60	4.0	.92	64.5	-7.9	-1.14	4.6	.73	40S	6	L124S	
L132	56.4	-8.6	-1.72	2.8	.66	59.3	-13.1	-1.88	8.0	1.29	40S	6	L132	
L148	107.4	2.4	.48	4.2	.98	75.7	3.3	.47	6.4	1.03	40S	6	L148	
L150	107.0	2.0	.40	7.9	1.83	71.1	-1.3	-.19	7.1	1.14	40S	6	L150	
L157	103.1	-1.9	-.38	4.2	.98	72.3	-.1	-.02	4.5	.73	40S	6	L157	
L158	108.5	3.5	.70	4.7	1.10	83.0	10.6	1.52	7.1	1.15	40S	6	L158	
L173B	104.5	-.5	-.10	3.7	.86	69.0	-3.4	-.49	5.7	.91	40S	6	L173B	
L190C	104.0	-1.0	-.20	7.0	1.62	70.5	-1.9	-.28	8.0	1.28	40S	6	L190C	
L213	105.6	.6	.12	2.7	.63	79.0	6.6	.94	8.5	1.37	40S	6	L213	
L223	98.6	-6.4	-1.28	4.4	1.02	66.4	-6.0	-.87	6.7	1.08	40S	6	L223	
L228	108.0	3.0	.60	4.1	.95	73.9	1.5	.21	2.9	.46	40S	6	L228	
L230S	101.8	-3.2	-.64	4.7	1.10	66.2	-6.2	-.89	14.1	2.27	40S	6	L230S	
L241	105.5	.5	.10	3.7	.86	76.0	3.6	.51	3.9	.63	40S	6	L241	
L249	101.8	-3.2	-.64	5.8	1.34	65.0	-7.4	-1.07	5.3	.86	40S	6	L249	
L255	117.8	12.8	2.55	3.4	.79	92.1	19.7	2.82	3.7	.60	40S	*	L255	
L257A	105.8	.8	.16	3.0	.71	84.8	12.4	1.78	7.8	1.25	40S	*	L257A	
L257B	107.4	2.4	.48	4.4	1.01	72.3	-.1	-.02	5.6	.90	40S	6	L257B	
L257C	108.8	3.8	.76	3.8	.89	79.3	6.9	.99	5.0	.81	40S	6	L257C	
L260	106.0	1.0	.20	3.3	.77	68.2	-4.2	-.61	8.1	1.30	40S	6	L260	
L262S	101.5	-3.5	-.70	3.4	.79	75.2	2.8	.40	6.1	.99	40S	6	L262S	
L288	112.9	7.9	1.57	4.4	1.03	77.3	4.9	.70	5.5	.89	40S	6	L288	
L301	112.6	7.6	1.51	4.5	1.05	81.9	9.5	1.36	5.5	.88	40S	6	L301	
L318	105.0	-.0	-.00	3.6	.84	71.0	-1.4	-.21	6.2	1.00	40S	6	L318	
L352	108.7	3.7	.74	4.6	1.08	74.7	2.3	.33	4.1	.66	40S	6	L352	
L354	102.7	-2.3	-.46	5.0	1.16	67.0	-5.4	-.78	8.6	1.38	40S	6	L354	
L360	105.6	.6	.12	5.3	1.22	71.9	-.5	-.08	10.1	1.62	40S	6	L360	
L366	107.4	2.4	.48	4.6	1.08	76.3	3.9	.56	7.2	1.16	40S	6	L366	
L372	103.8	-1.2	-.24	5.7	1.33	68.1	-4.3	-.62	6.0	.96	40S	6	L372	
L390	102.9	-2.1	-.42	3.3	.76	71.3	-1.1	-.16	4.8	.77	40S	6	L390	
L562	144.3	39.3	7.83	9.5	2.21	128.6	56.2	8.06	9.6	1.54	40S	#	L562	
L575	105.5	.5	.10	4.7	1.09	69.3	-3.1	-.45	7.5	1.20	40S	6	L575	
L585	101.0	-4.0	-.80	3.9	.92	68.5	-3.9	-.56	4.1	.66	40S	6	L585	
L597	98.0	-7.0	-1.40	3.3	.77	66.8	-5.6	-.81	6.8	1.09	40S	6	L597	
L600	106.8	1.8	.36	1.6	.38	79.1	6.7	.96	3.7	.60	40S	6	L600	
L626	95.3	-9.7	-1.93	3.5	.80	65.5	-6.9	-.99	2.8	.46	40S	6	L626	
L684	105.5	.5	.10	3.5	.82	66.7	-5.7	-.82	6.0	.96	40S	6	L684	
L687	93.7	-11.3	-2.25	4.1	.96	59.1	-13.3	-1.91	2.6	.42	40S	6	L687	
GR. MEAN	= 105.0 SHEFF. UNITS					GRAND MEAN	= 72.4 SHEFF. UNITS					TEST DETERMINATIONS = 10		
SD MEANS	= 5.0 SHEFF. UNITS					SD OF MEANS	= 7.0 SHEFF. UNITS					39 LABS IN GRAND MEANS		
	AVERAGE SDR = 4.3 SHEFF. UNITS						AVERAGE SDR = 6.2 SHEFF. UNITS							
L182B	376.5	271.5	54.09	13.3	3.10	249.0	176.6	25.35	22.7	3.65	40B	*	L182B	
L243B	416.1	311.1	61.98	26.8	6.22	272.9	200.5	28.78	29.0	4.67	40B	*	L243B	
L312	103.1	-1.9	-.38	3.2	.74	58.2	-14.2	-2.04	2.6	.42	40T	*	L312	
L484	435.0	330.0	65.74	21.2	4.92	300.0	227.6	32.67	20.0	3.22	40B	*	L484	
L587	106.5	1.5	.30	6.3	1.45	74.0	1.6	.23	6.1	.99	40T	*	L587	
TOTAL NUMBER OF LABORATORIES REPORTING	= 45													

Best values: J48 106 ± 9 Sheffield units
 K21 72 ± 9 Sheffield units

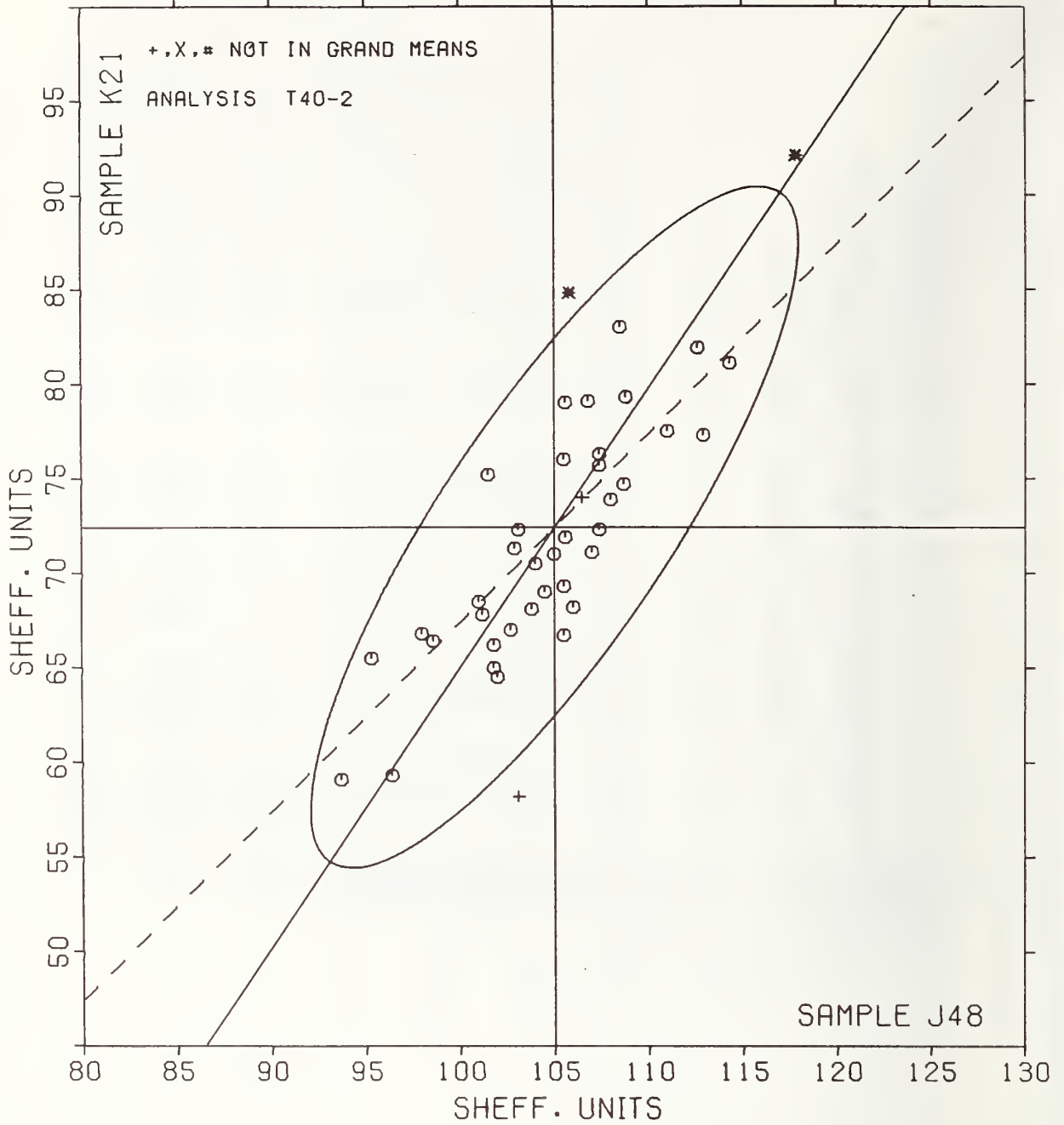
The following laboratories were omitted from the grand means because of extreme test results: 562.

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

L&H CODE	F	MEANS		COORDINATES		AVG R _s SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS			
		J48	K21	MAJOR	MINOR					
L687	Ø	93.7	59.1	-17.4	1.9	.69 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L626	Ø	95.3	65.5	-11.2	4.2	.63 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L132	Ø	56.4	59.3	-15.7	-.2	.97 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L597	Ø	98.0	66.8	-8.5	2.7	.93 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L223	Ø	98.6	66.4	-8.6	1.9	1.05 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L585	Ø	101.0	68.5	-5.5	1.1	.79 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L121	Ø	101.2	67.8	-6.0	.6	1.12 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L262S	Ø	101.5	75.2	.3	4.5	.89 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L249	Ø	101.8	65.0	-8.0	-1.5	1.10 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L230S	Ø	101.8	66.2	-7.0	-.8	1.68 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L124S	Ø	102.0	64.5	-8.3	-1.9	.83 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L354	Ø	102.7	67.0	-5.8	-1.1	1.27 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L390	Ø	102.9	71.3	-2.1	1.1	.77 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L312	*	103.1	58.2	-12.9	-6.4	.58 40T	AIR RESISTANCE,	SHEFFIELD	(3 INCH DIAMETER ORIFICE)	
L157	Ø	103.1	72.3	-1.2	1.5	.85 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L372	Ø	103.8	68.1	-4.3	-1.4	1.14 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L190C	Ø	104.0	70.5	-2.2	-.2	1.45 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L173H	Ø	104.5	69.0	-3.1	-1.5	.88 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L318	Ø	105.0	71.0	-1.2	-.8	.92 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L684	Ø	105.5	65.7	-4.5	-3.6	.89 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L575	Ø	105.5	69.3	-2.3	-2.2	1.15 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L241	Ø	105.5	76.0	3.2	1.6	.75 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L360	Ø	105.6	71.9	-.1	-.8	1.42 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L213	Ø	105.6	79.0	5.8	3.2	1.00 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L257A	*	105.8	84.8	10.7	6.3	.58 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L260	Ø	106.0	68.2	-2.9	-3.2	1.04 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L587	*	106.5	74.0	2.1	-.4	1.22 40T	AIR RESISTANCE,	SHEFFIELD	(3 INCH DIAMETER ORIFICE)	
L600	Ø	106.8	79.1	6.5	2.3	.49 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L150	Ø	107.0	71.1	.0	-2.4	1.49 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L257H	Ø	107.4	72.3	1.2	-2.1	.95 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L366	Ø	107.4	76.3	4.5	.2	1.12 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L148	Ø	107.4	75.7	4.0	-.1	1.00 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L228	Ø	108.0	73.9	2.9	-1.7	.71 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L158	Ø	108.5	83.0	10.7	3.0	1.13 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L352	Ø	108.7	74.7	3.9	-1.8	.87 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L257C	Ø	108.8	79.3	7.8	.7	.85 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L114	Ø	111.0	77.5	7.6	-2.1	.92 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L301	Ø	112.6	81.9	12.1	-1.0	.97 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L288	Ø	112.9	77.3	8.5	-3.8	.96 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L122S	Ø	114.3	81.1	12.4	-2.8	1.34 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L255	*	117.8	92.1	23.5	.4	.69 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L562	#	144.3	128.6	68.5	-1.1	1.87 40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)	
L182H	*	376.5	249.0	258.4	-125.9	3.37 40E	AIR RESISTANCE,	BENDTSEN,	WG 150	
L243H	*	416.1	272.9	340.4	-145.3	5.44 40E	AIR RESISTANCE,	BENDTSEN,	WG 150	
L484	*	435.0	300.0	373.4	-145.8	4.07 40H	AIR RESISTANCE,	BENDTSEN,	WG 150	
GMEANS:		105.0	72.4			1.00				
		55% ELLIPSE:		21.3	6.1		WIDE GAMMA = 55 DEGREES			

AIR RESISTANCE, SHEFFIELD

SAMPLE J48 = 105. SHEFF. UNITS SAMPLe K21 = 72. SHEFF. UNITS



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

LAB CODE	SAMPLE E37 MEAN	BLEACHED HACKING 69 GRAMS PER SQUARE METER				SAMPLE E69 MEAN	RELEASE 96 GRAMS PER SQUARE METER				TEST D. = 10		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L122	751.	-32.	-1.09	53.	.63	662.	0.	.01	98.	1.15	41G	0	L122
L128	776.	-7.	-.24	52.	.62	621.	-41.	-1.06	63.	.74	41G	0	L128
L134	783.	0.	.00	37.	.44	674.	12.	.30	54.	.63	41G	0	L134
L166M	812.	29.	.98	63.	.75	632.	-31.	-.78	78.	.91	41G	0	L166M
L195	783.	-0.	-.02	94.	1.12	662.	0.	.00	87.	1.02	41G	0	L195
L230	801.	18.	.59	109.	1.30	643.	-19.	-.50	111.	1.30	41G	0	L230
L259	722.	-61.	-2.06	48.	.58	634.	-28.	-.72	60.	.70	41G	0	L259
L312	798.	14.	.49	91.	1.08	688.	26.	.66	111.	1.29	41G	0	L312
L358	605.	-178.	-6.02	100.	1.20	645.	-17.	-.43	64.	.74	41G	#	L358
L557	807.	24.	.80	77.	.91	719.	57.	1.46	68.	.80	41G	0	L557
L558	812.	29.	.98	87.	1.04	685.	23.	.59	112.	1.30	41G	0	L558
L574	823.	40.	1.34	96.	1.15	684.	22.	.56	87.	1.01	41G	0	L574
L576	758.	-25.	-.86	75.	.89	585.	-78.	-1.99	102.	1.19	41G	0	L576
L618	756.	-27.	-.92	209.	2.49	720.	58.	1.48	83.	.96	41G	0	L618
GR. MEAN = 783. SEC/10 CC						GRAND MEAN = 662. SEC/10 CC		TEST DETERMINATIONS = 10					
SD MEANS = 30. SEC/10 CC						SD OF MEANS = 39. SEC/10 CC		13 LABS IN GRAND MEANS					
		AVERAGE SDR = 84. SEC/10 CC						AVERAGE SDR = 86. SEC/10 CC					
TOTAL NUMBER OF LABORATORIES REPORTING = 14													

Best values: E37 775 + 50 seconds per 10cc,
 E69 660 + 60 mercury density
 (direct reading)

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

The following laboratories were omitted from the grand means because of extreme test results: 358.

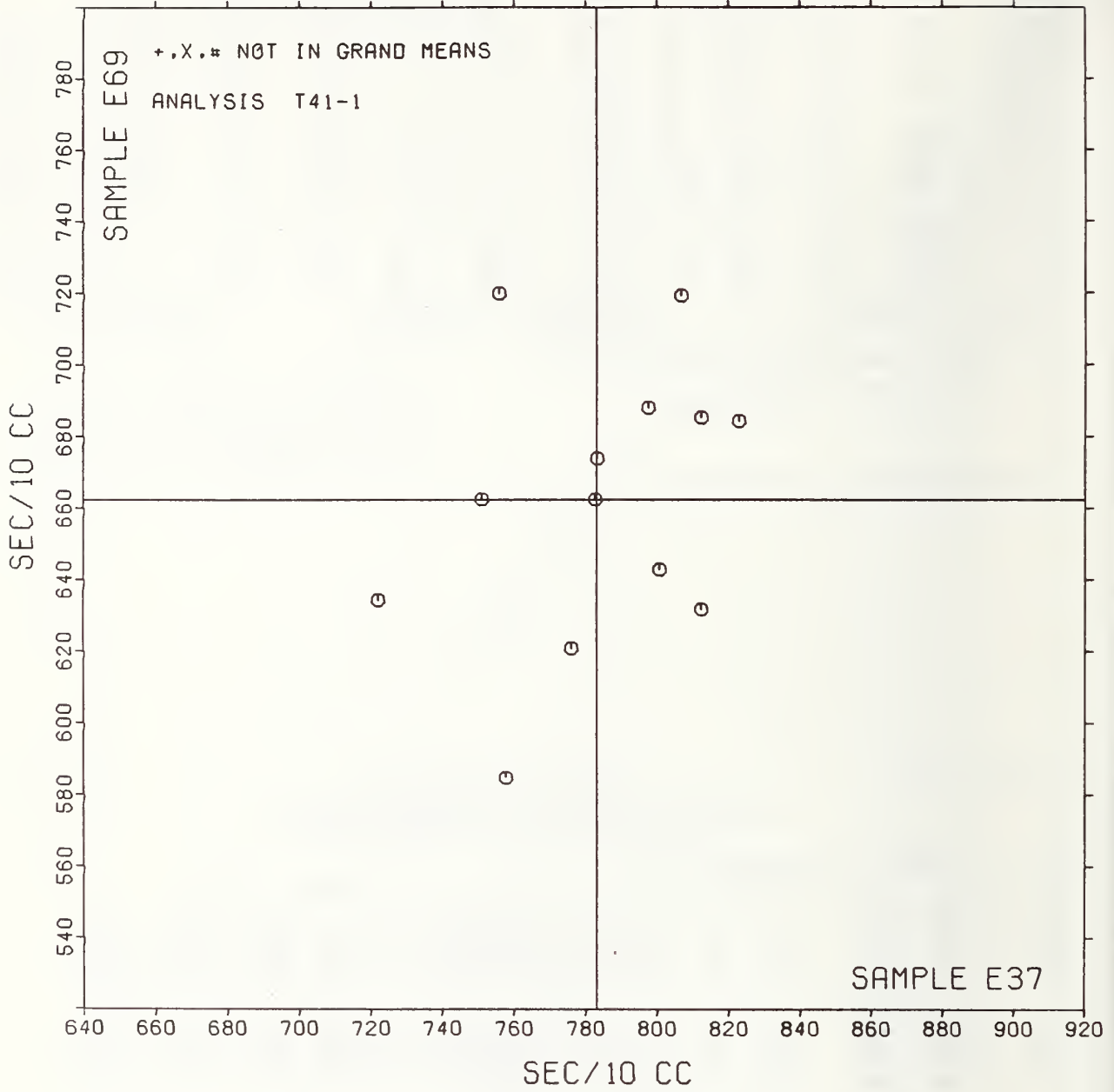
 ANALYSIS T41-1 TABLE 2
 AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
 DIRECT READING, SEC/10 CC, MERCURY DENSITY

LAB CODE	F	MEANS		COORDINATES		AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---	CONDITIONS
		E37	E69	MAJOR	MINOR				
L358	#	605.	645.	-90.	155.	.97	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L259	0	722.	634.	-51.	44.	.64	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L122	0	751.	662.	-13.	29.	.89	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L618	0	756.	720.	41.	49.	1.73	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L576	0	758.	585.	-81.	-9.	1.04	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L128	0	776.	621.	-41.	-11.	.68	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L195	0	783.	662.	-0.	0.	1.07	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L134	0	783.	674.	11.	5.	.53	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L312	0	798.	688.	29.	-2.	1.19	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L230	0	801.	643.	-10.	-24.	1.30	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L557	0	807.	719.	62.	2.	.86	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L166M	0	812.	632.	-16.	-39.	.83	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L558	0	812.	685.	33.	-17.	1.17	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L574	0	823.	684.	37.	-27.	1.08	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
GMEANS:		783.	662.			1.00			
		95% ELLIPSE:		121.	79.	WITH GAMMA = 65 DEGREES			

AIR RESISTANCE, GURLEY HG FLOTATION

SAMPLE E37 = 783. SEC/10 CC

SAMPLE E69 = 662. SEC/10 CC



LAB CODE	SAMPLE J73 MEAN	PRINTING 76 GRAMS PER SQUARE METER					SAMPLE K45 MEAN	PRINTING 60 GRAMS PER SQUARE METER					TEST D. * 10		
		DEV	N.DEV	SDR	R.SDR			DEV	N.DEV	SDR	R.SDR	VAR	F	LAB	
L122	4.47	-.02	-.07	.14	1.01	6.22	.76	1.54	.12	.94	44P	Ø	L122		
L136	4.90	.41	1.15	.18	1.36	5.79	.33	.67	.24	1.84	44P	Ø	L136		
L182	4.67	.19	.52	.09	.64	5.56	.11	.21	.11	.80	44P	Ø	L182		
L183	4.12	-.37	-1.03	.12	.91	4.84	-.62	-1.25	.10	.73	44P	Ø	L183		
L223	4.57	.08	.23	.15	1.15	5.59	.13	.27	.15	1.14	44P	Ø	L223		
L288	5.09	.60	1.68	.14	1.02	6.09	.63	1.27	.12	.91	44P	Ø	L288		
L317	4.55	.06	.17	.16	1.18	5.40	-.06	-.12	.15	1.13	44P	Ø	L317		
L484	4.27	-.22	-.51	.13	.99	4.95	-.50	-1.02	.12	.92	44P	Ø	L484		
L588	3.87	-.62	-1.73	.14	1.05	4.79	-.67	-1.35	.11	.84	44P	Ø	L588		
L669	4.38	-.11	-.31	.09	.68	5.35	-.11	-.22	.10	.74	44P	Ø	L669		

GR. MEAN = 4.49 MICRONS GRAND MEAN = 5.46 MICRONS TEST DETERMINATIONS = 10
SD MEANS = .36 MICRONS SD OF MEANS = .50 MICRONS 10 LABS IN GRAND MEANS
AVERAGE SDR = .13 MICRONS AVERAGE SDR = .13 MICRONS
TOTAL NUMBER OF LABORATORIES REPORTING = 10
Best values: J73 4.5 microns
K45 5.5 microns

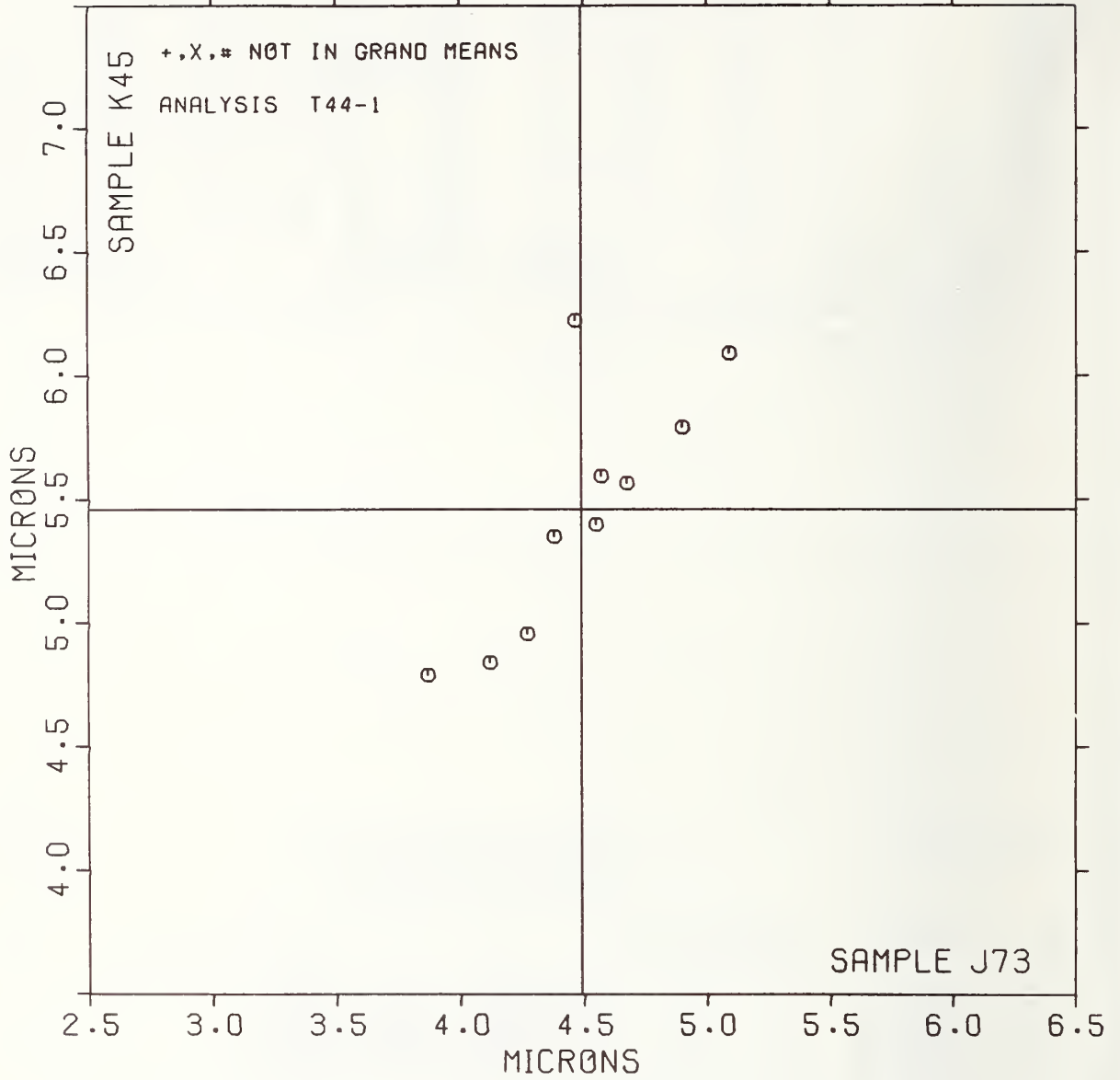
LAB CODE	F	MEANS		COORDINATES		AVG R.SDR	VAR	PROPERTY	TEST INSTRUMENT	CONDITIONS
		J73	K45	MAJOR	MINOR					
L588	Ø	3.87	4.79	-.90	.14	.95	44P	SMOOTHNESS,	PARKER	PRINTSURF
L183	Ø	4.12	4.84	-.72	-.04	.82	44P	SMOOTHNESS,	PARKER	PRINTSURF
L484	Ø	4.27	4.95	-.54	-.10	.96	44P	SMOOTHNESS,	PARKER	PRINTSURF
L669	Ø	4.38	5.35	-.15	.03	.71	44P	SMOOTHNESS,	PARKER	PRINTSURF
L122	Ø	4.47	6.22	.62	.44	.98	44P	SMOOTHNESS,	PARKER	PRINTSURF
L317	Ø	4.55	5.40	-.02	-.08	1.15	44P	SMOOTHNESS,	PARKER	PRINTSURF
L223	Ø	4.57	5.59	.16	.01	1.14	44P	SMOOTHNESS,	PARKER	PRINTSURF
L182	Ø	4.67	5.56	.19	-.10	.72	44P	SMOOTHNESS,	PARKER	PRINTSURF
L136	Ø	4.90	5.79	.50	-.16	1.60	44P	SMOOTHNESS,	PARKER	PRINTSURF
L288	Ø	5.09	6.09	.86	-.15	.96	44P	SMOOTHNESS,	PARKER	PRINTSURF

GMEANS: 4.49 5.46 1.00
95% ELLIPSE: 1.85 .57 WIDE GAMMA = 56 DEGREES

SMOOTHNESS, PARKER PRINTSURF

SAMPLE J73 = 4.5 MICRONS

SAMPLE K45 = 5.5 MICRONS



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

LAB CODE	SAMPLE J73 MEAN	PRINTING 76 GRAMS PER SQUARE METER				SAMPLE K45 MEAN	PRINTING 60 GRAMS PER SQUARE METER				TEST D. - 15		
		DEV	N.DEV	SDR	R,SDR		DEV	N.DEV	SDR	R,SDR	VAR	F	LAB
L100	89.2	3.4	.54	5.3	1.06	153.2	-2.5	-.34	8.5	1.01	45S	Ø	L100
L107	134.7	48.5	7.69	9.7	1.94	198.3	37.6	5.15	15.8	1.88	45S	#	L107
L108	84.0	-1.8	-.28	2.1	.43	154.6	-6.1	-.84	8.1	.97	45S	Ø	L108
L114	84.7	-1.1	-.18	3.5	.70	159.4	-1.3	-.18	5.9	.71	45S	Ø	L114
L121	78.7	-7.1	-1.12	3.7	.74	151.0	-9.7	-1.33	8.3	.99	45S	Ø	L121
L122	94.1	8.3	1.37	7.2	1.44	160.6	-.1	-.01	9.4	1.12	45S	Ø	L122
L123	85.8	.0	.00	7.1	1.41	157.5	-3.2	-.44	8.2	.97	45S	Ø	L123
L124	80.6	-5.2	-.81	4.2	.33	159.3	-1.4	-.20	6.6	.78	45S	Ø	L124
L125	92.0	-3.8	-.59	5.9	1.18	154.0	-6.7	-.92	9.7	1.15	45S	Ø	L125
L126	80.4	-5.4	-.85	5.2	1.03	156.3	-4.4	-.61	9.1	1.08	45S	Ø	L126
L128	86.1	.4	.06	5.8	1.16	151.9	-8.8	-1.20	9.2	1.09	45S	Ø	L128
L132	87.1	1.4	.21	6.9	1.39	167.1	6.4	.88	11.8	1.40	45S	Ø	L132
L134	77.4	-8.4	-1.32	3.8	.75	154.9	-5.8	-.80	5.6	.57	45S	Ø	L134
L139S	98.0	12.2	1.92	3.7	.74	163.5	2.8	.39	7.1	.84	45S	Ø	L139S
L148	89.7	3.5	.61	6.4	1.28	173.5	12.8	1.76	9.7	1.16	45S	Ø	L148
L150	81.8	-4.0	-.63	4.6	.91	170.2	9.5	1.30	19.9	2.36	45S	Ø	L150
L152	98.8	13.0	2.05	5.9	1.18	165.2	4.5	.62	4.7	.55	45S	Ø	L152
L153	105.3	19.5	3.07	4.3	.86	169.3	8.6	1.17	9.5	1.14	45S	*	L153
L157	89.0	3.2	.51	2.8	.56	182.4	21.7	2.97	16.2	1.93	45S	*	L157
L158	82.3	-3.4	-.54	5.6	1.12	159.3	-1.4	-.19	5.9	.71	45S	Ø	L158
L162	88.7	2.9	.45	4.4	.88	163.7	3.0	.41	6.7	.79	45S	Ø	L162
L166	83.2	-2.6	-.41	4.6	.92	155.3	-5.4	-.74	8.8	1.04	45S	Ø	L166
L167	87.7	1.5	.30	3.7	.74	161.5	.8	.11	5.2	.61	45S	Ø	L167
L173B	82.0	-3.8	-.59	2.5	.51	151.0	.3	.04	7.4	.88	45S	Ø	L173B
L174	202.9	117.2	10.42	4.0	.79	246.9	86.2	11.80	4.3	.51	45R	#	L174
L183S	87.3	1.6	.24	5.2	1.04	170.6	9.9	1.36	8.5	1.01	45S	Ø	L183S
L190C	90.7	4.9	.77	5.9	1.18	206.7	46.0	5.30	9.0	1.07	45S	#	L190C
L190R	74.3	-11.4	-1.80	4.2	.84	152.4	-8.3	-1.14	6.8	.81	45S	Ø	L190R
L195	81.1	-4.6	-.73	4.3	.87	152.3	-8.4	-1.15	7.3	.87	45S	Ø	L195
L203	80.1	-5.7	-.90	3.5	.79	155.4	-5.3	-.73	8.0	.95	45S	Ø	L203
L206	92.7	7.0	1.09	4.0	.80	162.8	2.1	.29	7.5	.89	45S	Ø	L206
L211	78.3	-7.5	-1.18	3.2	.63	158.4	-2.3	-.32	8.7	1.04	45S	Ø	L211
L213	78.5	-7.2	-1.14	5.3	1.07	149.9	-10.8	-1.48	9.9	1.17	45S	Ø	L213
L219	52.7	6.5	1.08	5.9	1.18	167.3	6.6	.91	10.0	1.19	45S	Ø	L219
L223	76.9	-3.5	-1.40	4.6	.92	160.0	-.7	-.10	7.2	.86	45S	Ø	L223
L226B	72.8	-13.0	-2.04	3.8	.76	153.9	-6.8	-.94	11.5	1.37	45S	Ø	L226B
L228	85.1	-.6	-.10	2.8	.56	165.4	5.7	.78	8.5	1.01	45S	Ø	L228
L230S	86.0	.2	.03	5.2	1.04	161.9	1.2	.17	5.0	.60	45S	Ø	L230S
L231	88.3	2.6	.40	5.2	1.03	158.8	8.1	1.11	6.5	.77	45S	Ø	L231
L232S	85.0	-.8	-.12	5.7	1.13	164.7	4.0	.54	9.5	1.13	45S	Ø	L232S
L237	85.4	-.4	-.05	3.9	.78	159.3	-1.4	-.20	7.3	.87	45S	Ø	L237
L241	100.3	14.6	2.29	7.9	1.58	155.9	-4.8	-.66	7.4	.88	45S	*	L241
L249	82.7	-3.0	-.48	4.2	.84	159.6	-1.1	-.15	8.4	1.00	45S	Ø	L249
L254	97.4	11.6	1.83	4.2	.84	169.9	9.2	1.25	7.9	.95	45S	Ø	L254
L255	88.5	2.8	.43	3.9	.77	189.9	29.2	3.99	12.2	1.45	45S	#	L255
L257A	84.8	-1.0	-.15	5.0	.99	158.7	-2.0	-.27	5.8	.69	45S	Ø	L257A
L257B	94.7	9.0	1.41	6.1	1.22	170.6	9.9	1.36	8.1	.96	45S	Ø	L257B
L257C	96.7	11.0	1.72	6.8	1.36	166.3	5.6	.76	6.5	.77	45S	Ø	L257C
L259	91.2	5.4	.85	4.1	.81	186.3	25.6	3.51	17.2	2.04	45S	X	L259
L260	87.1	1.4	.21	5.9	1.18	164.2	3.5	.48	4.6	.55	45S	Ø	L260
L261	88.4	2.6	.41	7.4	1.48	159.9	-.8	-.11	8.2	.98	45S	Ø	L261
L262	87.5	1.7	.26	4.5	.89	153.1	-7.6	-1.05	6.4	.77	45S	Ø	L262
L275	80.9	-4.8	-.76	4.3	.86	159.0	-1.7	-.23	12.5	1.48	45S	Ø	L275
L278	96.2	10.4	1.64	6.0	1.20	171.7	11.0	1.51	12.6	1.50	45S	Ø	L278
L281	84.4	-1.4	-.22	5.6	1.12	166.3	5.6	.76	7.4	.88	45S	Ø	L281
L285	88.5	2.7	.42	7.1	1.43	156.7	-4.0	-.55	10.8	1.29	45S	Ø	L285
L288	90.7	4.9	.77	6.0	1.20	166.6	5.9	.81	8.7	1.03	45S	Ø	L288
L290	72.2	-13.6	-2.14	4.5	.89	162.4	1.7	.23	7.8	.93	45S	*	L290
L291S	88.6	2.8	.44	3.5	.69	165.7	5.0	.69	9.2	1.10	45S	Ø	L291S
L301	88.1	2.4	.37	5.8	1.15	158.6	-2.1	-.29	5.4	.65	45S	Ø	L301
L308	79.0	-6.8	-1.07	2.6	.52	155.5	-5.2	-.72	5.7	.68	45S	Ø	L308
L312	92.3	6.6	1.03	3.2	.64	213.3	52.6	7.21	11.9	1.42	45S	#	L312
L317	83.7	-2.1	-.33	7.3	1.46	155.1	-5.6	-.77	11.2	1.33	45S	Ø	L317
L318	82.1	-3.6	-.57	3.5	.70	164.5	3.8	.52	15.1	1.80	45S	Ø	L318
L321	80.3	-5.5	-.87	2.9	.59	142.4	-18.3	-2.51	7.0	.83	45S	*	L321

ANALYSIS T45-1 TABLE 1
SMOOTHNESS, SHEFFIELD UNITS
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE J73 MEAN	PRINTING 76 GEAMS PER SQUARE METER				SAMPLE K45 MEAN	PRINTING 60 GEAMS PER SQUARE METER				TEST D. = 15		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L323	81.3	-4.4	-.70	7.4	1.48	152.3	-8.4	-1.15	8.8	1.05	45S	Ø	L323
L326	90.0	4.2	.66	4.5	.89	156.7	-4.0	-.54	6.0	.72	45S	Ø	L326
L328	83.6	-2.2	-.34	4.3	.86	157.7	-3.0	-.41	8.7	1.03	45S	Ø	L328
L349	79.9	-5.8	-.92	5.7	1.15	160.1	-.6	-.08	11.7	1.39	45S	Ø	L349
L352	90.3	4.6	.72	5.7	1.14	164.4	3.7	.51	7.1	.84	45S	Ø	L352
L360	78.7	-7.0	-1.11	6.0	1.20	166.1	5.4	.74	13.2	1.57	45S	Ø	L360
L366	88.3	2.6	.40	5.0	1.00	160.3	-.4	-.05	7.5	.89	45S	Ø	L366
L372	83.6	-2.2	-.34	5.2	1.04	156.3	-4.4	-.61	8.0	.95	45S	Ø	L372
L380	86.3	.5	.08	2.8	.56	155.3	-5.4	-.74	7.2	.86	45S	Ø	L380
L382	83.3	-2.4	-.39	2.4	.49	158.7	-2.0	-.27	7.2	.85	45S	Ø	L382
L390	81.1	-4.7	-.74	7.3	1.46	155.4	-5.3	-.73	11.8	1.40	45S	Ø	L390
L554	79.5	-6.3	-.99	3.9	.77	154.5	-6.2	-.85	7.8	.93	45S	Ø	L554
L567	84.7	-1.1	-.18	3.8	.75	155.1	-5.6	-.77	11.4	1.36	45S	Ø	L567
L575	89.1	3.4	.53	6.5	1.29	180.1	19.4	2.66	13.2	1.58	45S	*	L575
L585	85.3	-.4	-.07	9.9	1.98	155.9	-4.8	-.66	10.1	1.20	45S	Ø	L585
L587	89.9	4.2	.65	5.6	1.12	159.7	-1.0	-.14	4.4	.53	45S	Ø	L587
L597	81.8	-4.0	-.63	6.4	1.27	152.1	-8.6	-1.18	6.5	.77	45S	Ø	L597
L600	92.2	6.4	1.01	5.5	1.10	164.3	3.6	.49	6.4	.76	45S	Ø	L600
L626	76.3	-9.4	-1.49	3.5	.70	156.3	-4.4	-.60	6.6	.78	45S	Ø	L626
L648	78.9	-6.8	-1.08	5.1	1.01	151.2	-9.5	-1.30	8.1	.97	45S	Ø	L648
L651	93.1	7.4	1.16	4.4	.88	150.5	-10.2	-1.40	8.9	1.06	45S	*	L651
L670	84.3	-1.4	-.23	5.0	.99	171.5	10.8	1.47	12.0	1.43	45S	Ø	L670
L679	93.7	8.0	1.25	5.5	1.10	181.7	21.0	2.87	10.5	1.25	45S	*	L679
L688	88.9	3.2	.50	5.2	1.05	165.9	5.2	.71	7.3	.87	45S	Ø	L688

GR. MEAN = 85.8 SHEFF. UNITS

SD MEANS = 6.4 SHEFF. UNITS

AVERAGE SDR = 5.0 SHEFF. UNITS

TOTAL NUMBER OF LABORATORIES REPORTING = 89

Best values: J73 86 ± 11 Sheffield units

K45 160 ± 11 Sheffield units

GRAND MEAN = 160.7 SHEFF. UNITS

SD OF MEANS = 7.3 SHEFF. UNITS

AVERAGE SDR = 8.4 SHEFF. UNITS

TEST DETERMINATIONS = 15

83 LABS IN GRAND MEANS

The following laboratories were omitted from the grand means because of extreme test results: 107, 174, 190C, 255, 312.

TAPPI COLLAGENATIVE REFERENCE PROGRAM
ANALYSIS T46-1 TABLE 2
SMOOTHNESS, SHEFFIELD UNITS
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS		COORDINATES		AVG N. SDN VAN	PROPERTY---TEST INSTRUMENT---CONDITIONS		
		J73	K46	MAJOS	MINOS		SMOOTHNESS,	SHEFFIELD	
L290	*	72.2	162.4	-6.8	11.9	.91	458	SMOOTHNESS,	SHEFFIELD
L226B	o	72.8	153.9	-13.3	6.2	1.06	458	SMOOTHNESS,	SHEFFIELD
L190R	o	74.3	152.4	-13.5	4.1	.82	458	SMOOTHNESS,	SHEFFIELD
L626	o	76.3	156.3	-9.2	4.9	.74	458	SMOOTHNESS,	SHEFFIELD
L223	o	76.9	160.0	-5.9	6.7	.89	458	SMOOTHNESS,	SHEFFIELD
L134	o	77.4	154.9	-9.7	3.2	.71	458	SMOOTHNESS,	SHEFFIELD
L211	o	78.3	158.4	-6.4	4.6	.84	458	SMOOTHNESS,	SHEFFIELD
L213	o	78.5	149.9	-13.0	-.7	1.12	458	SMOOTHNESS,	SHEFFIELD
L121	o	78.7	151.0	-12.0	-.2	.86	458	SMOOTHNESS,	SHEFFIELD
L360	o	78.7	166.1	.1	8.9	1.38	458	SMOOTHNESS,	SHEFFIELD
L648	o	78.9	151.2	-11.7	-.3	.99	458	SMOOTHNESS,	SHEFFIELD
L308	o	79.0	155.5	-8.3	2.3	.60	458	SMOOTHNESS,	SHEFFIELD
L554	o	79.5	154.5	-8.7	1.3	.85	458	SMOOTHNESS,	SHEFFIELD
L349	o	79.9	160.1	-4.0	4.3	1.27	458	SMOOTHNESS,	SHEFFIELD
L203	o	80.1	155.4	-7.7	1.4	.87	458	SMOOTHNESS,	SHEFFIELD
L321	*	80.3	142.4	-17.9	-6.4	.71	458	SMOOTHNESS,	SHEFFIELD
L126	o	80.4	156.3	-6.8	1.6	1.05	458	SMOOTHNESS,	SHEFFIELD
L124	o	80.6	159.3	-4.3	3.3	.81	458	SMOOTHNESS,	SHEFFIELD
L275	o	80.9	159.0	-4.3	2.8	1.17	458	SMOOTHNESS,	SHEFFIELD
L390	o	81.1	155.4	-7.1	.6	1.43	458	SMOOTHNESS,	SHEFFIELD
L195	o	81.1	152.3	-9.5	-1.3	.87	458	SMOOTHNESS,	SHEFFIELD
L323	o	81.3	152.3	-9.4	-1.5	1.27	458	SMOOTHNESS,	SHEFFIELD
L597	o	81.8	152.1	-9.3	-2.0	1.02	458	SMOOTHNESS,	SHEFFIELD
L150	o	81.8	170.2	5.2	8.9	1.64	458	SMOOTHNESS,	SHEFFIELD
L173B	o	82.0	161.0	-2.0	3.2	.69	458	SMOOTHNESS,	SHEFFIELD
L125	o	82.0	154.0	-7.6	-1.0	1.17	458	SMOOTHNESS,	SHEFFIELD
L318	o	82.1	164.5	.9	5.2	1.25	458	SMOOTHNESS,	SHEFFIELD
L158	o	82.3	159.3	-3.2	1.9	.91	458	SMOOTHNESS,	SHEFFIELD
L249	o	82.7	159.6	-2.7	1.8	.92	458	SMOOTHNESS,	SHEFFIELD
L166	o	83.2	155.3	-5.8	-1.2	.58	458	SMOOTHNESS,	SHEFFIELD
L382	o	83.3	158.7	-3.0	.8	.67	458	SMOOTHNESS,	SHEFFIELD
L372	o	83.6	156.3	-4.9	-.9	.59	458	SMOOTHNESS,	SHEFFIELD
L328	o	83.6	157.7	-3.7	-.0	.95	458	SMOOTHNESS,	SHEFFIELD
L317	o	83.7	155.1	-5.8	-1.7	1.40	458	SMOOTHNESS,	SHEFFIELD
L108	o	84.0	154.6	-5.9	-2.3	.70	458	SMOOTHNESS,	SHEFFIELD
L670	o	84.3	171.5	7.7	7.6	1.21	458	SMOOTHNESS,	SHEFFIELD
L281	o	84.4	166.3	3.6	4.5	1.00	458	SMOOTHNESS,	SHEFFIELD
L114	o	84.7	159.4	-1.7	.1	.70	458	SMOOTHNESS,	SHEFFIELD
L567	o	84.7	155.1	-5.2	-2.5	1.05	458	SMOOTHNESS,	SHEFFIELD
L257A	o	84.8	158.7	-2.2	-.4	.84	458	SMOOTHNESS,	SHEFFIELD
L2329	o	85.0	164.7	2.7	3.0	1.13	458	SMOOTHNESS,	SHEFFIELD
L228	o	85.1	166.4	4.2	3.9	.79	458	SMOOTHNESS,	SHEFFIELD
L585	o	85.3	158.9	-4.1	-2.6	1.59	458	SMOOTHNESS,	SHEFFIELD
L237	o	85.4	159.3	-1.4	-.6	.82	458	SMOOTHNESS,	SHEFFIELD
L123	o	85.8	157.5	-2.6	-2.0	1.19	458	SMOOTHNESS,	SHEFFIELD
L2308	o	86.0	161.9	1.1	.6	.82	458	SMOOTHNESS,	SHEFFIELD
L128	o	86.1	151.9	-6.8	-5.6	1.13	458	SMOOTHNESS,	SHEFFIELD
L380	o	86.3	155.3	-4.0	-3.6	.71	458	SMOOTHNESS,	SHEFFIELD
L132	o	87.1	167.1	5.9	2.8	1.40	458	SMOOTHNESS,	SHEFFIELD
L260	o	87.1	164.2	3.6	1.0	.87	458	SMOOTHNESS,	SHEFFIELD
L183S	o	87.3	170.6	8.8	4.7	1.03	458	SMOOTHNESS,	SHEFFIELD
L262	o	87.5	153.1	-5.1	-5.9	.83	458	SMOOTHNESS,	SHEFFIELD
L167	o	87.7	141.8	1.8	-1.0	.68	458	SMOOTHNESS,	SHEFFIELD
L301	o	88.1	158.6	-.3	-3.2	.90	458	SMOOTHNESS,	SHEFFIELD
L231	o	88.3	168.8	8.0	2.8	.90	458	SMOOTHNESS,	SHEFFIELD
L366	o	88.3	160.3	1.2	-2.3	.95	458	SMOOTHNESS,	SHEFFIELD
L261	o	88.4	159.9	1.0	-2.6	1.23	458	SMOOTHNESS,	SHEFFIELD
L285	o	88.5	156.7	-1.6	-4.6	1.36	458	SMOOTHNESS,	SHEFFIELD
L255	#	88.5	189.9	24.9	15.4	1.11	458	SMOOTHNESS,	SHEFFIELD
L291S	o	88.6	165.7	5.7	.8	.90	458	SMOOTHNESS,	SHEFFIELD
L162	o	88.7	163.7	4.1	-.5	.84	458	SMOOTHNESS,	SHEFFIELD
L688	o	88.9	165.9	6.0	.6	.96	458	SMOOTHNESS,	SHEFFIELD
L157	*	89.0	182.4	19.2	10.5	1.24	458	SMOOTHNESS,	SHEFFIELD
L575	*	89.1	180.1	17.5	9.0	1.43	458	SMOOTHNESS,	SHEFFIELD
L100	o	89.2	158.2	.1	-4.2	1.04	458	SMOOTHNESS,	SHEFFIELD

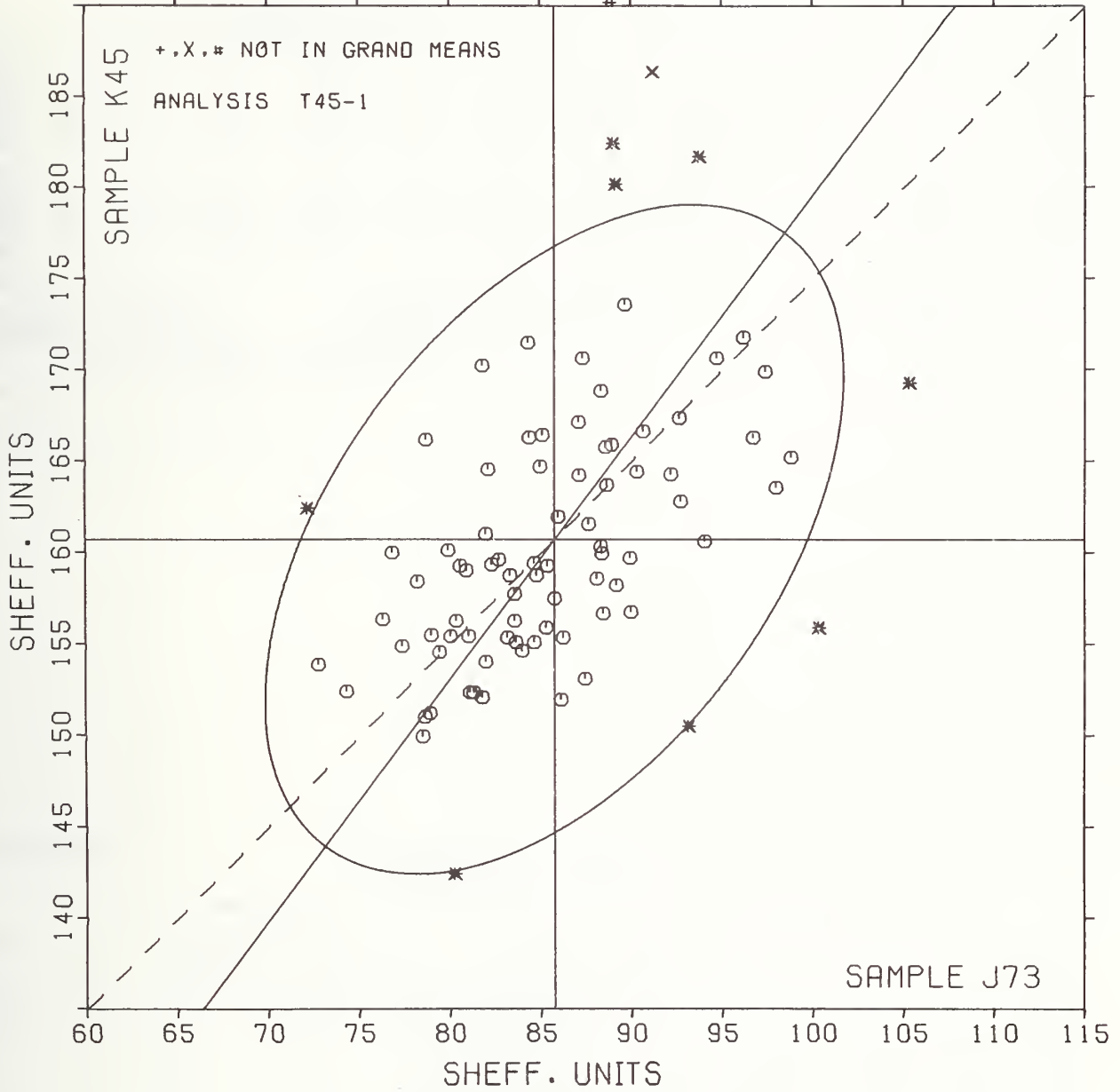
TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS 145-1 TABLE 2
 SMOOTHNESS, SHEFFIELD UNITS
 SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

DECEMBER 1978

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS		
		J73	K45	MAJOR	MINOR	R.SDR	VAR			
L148	Ø	89.7	173.5	12.6	4.6	1.22	45S	SMOOTHNESS, SHEFFIELD		
L587	Ø	89.9	159.7	1.7	-3.9	.82	45S	SMOOTHNESS, SHEFFIELD		
L326	Ø	90.0	156.7	-.6	-5.8	.81	45S	SMOOTHNESS, SHEFFIELD		
L352	Ø	90.3	164.4	5.7	-1.4	.99	45S	SMOOTHNESS, SHEFFIELD		
L190C	#	50.7	206.7	39.6	23.8	1.13	45S	SMOOTHNESS, SHEFFIELD		
L288	Ø	90.7	166.6	7.6	-.3	1.12	45S	SMOOTHNESS, SHEFFIELD		
L259	X	91.2	186.3	23.7	11.1	1.43	45S	SMOOTHNESS, SHEFFIELD		
L600	Ø	92.2	164.3	6.7	-3.0	.93	45S	SMOOTHNESS, SHEFFIELD		
L312	#	92.3	213.3	46.0	26.5	1.03	45S	SMOOTHNESS, SHEFFIELD		
L219	Ø	92.7	167.3	9.4	-1.5	1.19	45S	SMOOTHNESS, SHEFFIELD		
L206	Ø	92.7	162.8	5.9	-4.3	.84	45S	SMOOTHNESS, SHEFFIELD		
L651	*	93.1	150.5	-3.7	-12.0	.97	45S	SMOOTHNESS, SHEFFIELD		
L679	*	93.7	181.7	21.5	6.3	1.17	45S	SMOOTHNESS, SHEFFIELD		
L122	Ø	94.1	160.6	4.9	-6.7	1.28	45S	SMOOTHNESS, SHEFFIELD		
L257B	Ø	94.7	170.6	13.3	-1.2	1.09	45S	SMOOTHNESS, SHEFFIELD		
L278	Ø	96.2	171.7	15.1	-1.7	1.35	45S	SMOOTHNESS, SHEFFIELD		
L257C	Ø	96.7	166.3	11.0	-5.4	1.06	45S	SMOOTHNESS, SHEFFIELD		
L254	Ø	97.4	169.9	14.3	-3.8	.89	45S	SMOOTHNESS, SHEFFIELD		
L139S	Ø	98.0	163.5	9.6	-8.0	.79	45S	SMOOTHNESS, SHEFFIELD		
L152	Ø	98.8	165.2	11.4	-7.7	.87	45S	SMOOTHNESS, SHEFFIELD		
L241	*	100.3	155.9	4.9	-14.5	1.23	45S	SMOOTHNESS, SHEFFIELD		
L153	*	105.3	169.3	18.6	-10.5	1.00	45S	SMOOTHNESS, SHEFFIELD		
L107	#	134.7	198.3	59.5	-16.4	1.91	45S	SMOOTHNESS, SHEFFIELD		
L174	#	202.9	246.9	139.3	-41.6	.65	45R	SMOOTHNESS, SHEFFIELD, NON-STANDARD INSTRUMENT		
GMEANS:		85.8	160.7			1.00				
		95% ELLIPSE:		21.0	12.2	WITH GAMMA = 52 DEGREES				

SMOOTHNESS, SHEFFIELD

SAMPLE J73 = 86. SHEFF. UNITS SAMPLE K45 = 161. SHEFF. UNITS



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

LAB CODE	SAMPLE J73 MEAN	PRINTING 76 GRAMS PER SQUARE METER				SAMPLE K45 MEAN	PRINTING 60 GRAMS PER SQUARE METER				TEST D. # 15				
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB		
L139B	71.9	.8	.21	7.4	1.36	30.3	2.2	1.29	2.2	.84	45K	0	L139B		
L162	56.7	25.6	6.79	6.8	1.25	18.6	-9.4	-5.48	1.5	.57	45K	#	L162		
L182K	64.7	-6.3	-1.68	5.0	.92	26.0	-2.0	-1.18	2.4	.91	45K	0	L182K		
L190C	74.1	3.0	.79	5.7	1.05	30.5	2.4	1.41	3.1	1.19	45K	0	L190C		
L212	72.8	1.7	.46	5.3	.98	27.1	-1.0	-.55	2.5	.94	45K	0	L212		
L230B	73.7	2.6	.69	5.5	1.01	25.9	-2.2	-1.27	2.8	1.07	45K	0	L230B		
L232B	64.8	-6.3	-1.66	4.2	.78	27.1	-.9	-.54	2.4	.91	45K	0	L232B		
L243K	74.9	3.8	1.00	6.7	1.23	28.5	.5	.28	2.6	.99	45K	0	L243K		
L291K	86.4	15.4	4.07	6.1	1.13	35.0	6.9	4.04	3.1	1.18	45K	#	L291K		
L564	70.9	-.1	-.04	4.3	.79	29.4	1.4	.79	4.0	1.52	45K	0	L564		
L581	71.9	.9	.23	4.8	.88	27.7	-.4	-.22	1.7	.63	45K	0	L581		
GR. MEAN	71.1 BEKK SECONDS				GRAND MEAN				28.0 BEKK SECONDS				TEST DETERMINATIONS		
SD MEANS	3.8 BEKK SECONDS				SD OF MEANS				1.7 BEKK SECONDS				9 LABS IN GRAND MEANS		
	AVERAGE SDR = 5.4 BEKK SECONDS				AVERAGE SDR = 2.6 BEKK SECONDS										
L250M	66.0	-5.1	-1.34	4.2	.77	33.0	5.0	2.88	3.1	1.17	45L	0	L250M		
TOTAL NUMBER OF LABORATORIES REPORTING = 12															
Best values: J73 70 Bekk seconds															
K45 29 Bekk seconds															

The following laboratories were omitted from the grand means because of extreme test results: 162, 291K.

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 R.SDR	VAR	PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J73	K45	MAJOR	MINOR					
L182K	0	64.7	26.0	-6.6	-.6	.91	45K	SMOOTHNESS,	BEKK	
L232B	0	64.8	27.1	-6.3	.5	.84	45K	SMOOTHNESS,	BEKK	
L250M	+	66.0	33.0	-3.8	6.0	.97	45L	SMOOTHNESS,	BEKK,	20 C, 65% RH
L564	0	70.9	29.4	.2	1.4	1.15	45K	SMOOTHNESS,	BEKK	
L139B	0	71.9	30.3	1.3	2.0	1.10	45K	SMOOTHNESS,	BEKK	
L581	0	71.9	27.7	.8	-.6	.76	45K	SMOOTHNESS,	BEKK	
L212	0	72.8	27.1	1.5	-1.3	.96	45K	SMOOTHNESS,	BEKK	
L230B	0	73.7	25.9	2.0	-2.7	1.04	45K	SMOOTHNESS,	BEKK	
L190C	0	74.1	30.5	3.5	1.7	1.12	45K	SMOOTHNESS,	BEKK	
L243K	0	74.9	28.5	3.8	-.4	1.11	45K	SMOOTHNESS,	BEKK	
L291K	#	86.4	35.0	16.5	3.4	1.15	45K	SMOOTHNESS,	BEKK	
L162	#	56.7	18.6	22.9	-14.9	.91	45K	SMOOTHNESS,	BEKK	
GMEANS:		71.1	28.0			1.00				
		95% ELLIPSE:		12.7	5.0	WITH GAMMA = 12 DEGREES				

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS 157-1 TABLE 1
 HYDROGEN ION CONCENTRATION (PH), COLD
 TAPPI STANDARD T509 68-77

LAB CODE	SAMPLE J62 86 GRAMS PER SQUARE METER					SAMPLE J78 89 GRAMS PER SQUARE METER					TEST D. - 5		
	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L174C	4.50	-1.11	-1.66	.00	.00	6.90	-.52	-1.05	.00	.00	57F	0	L174C
L182C	5.70	.09	.16	.10	.96	7.24	-.18	-.37	.07	.98	57D	0	L182C
L274	5.68	.07	.13	.03	.29	8.40	.97	1.96	.00	.06	57V	0	L274
L328	5.56	.35	.59	.11	1.06	7.42	-.00	-.01	.08	1.11	57M	0	L328
L356	5.47	-.13	-.22	.27	2.46	7.21	-.21	-.43	.15	2.01	57V	0	L356
L442	5.47	-.13	-.23	.05	.42	7.70	.28	.55	.05	.73	57G	0	L442
L484A	6.46	.85	1.43	.19	1.81	7.10	-.32	-.65	.16	2.11	57Y	0	L484A
GR. MEAN - 5.61 PH UNITS					GRAND MEAN - 7.42 PH UNITS					TEST DETERMINATIONS - 5			
SD MEANS - .60 PH UNITS					SD OF MEANS - .50 PH UNITS					7 LABS IN GRAND MEANS			
AVERAGE SDR - .11 PH UNITS					AVERAGE SDR - .08 PH UNITS								
TOTAL NUMBER OF LABORATORIES REPORTING - 7													
Best values: J62 5.6 pH units													
J78 7.3 pH units													

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS 157-1 TABLE 2
 HYDROGEN ION CONCENTRATION (PH), COLD
 TAPPI STANDARD T509 68-77

LAB CODE	F	MEANS		COORDINATES		AVG R.SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		J62	J78	MAJOR	MINOR		
L174C	0	4.50	6.90	-1.22	-.04	.00	57F PH, COLD, FISHER ACCUMET MODEL 220
L442	0	5.47	7.70	-.01	.31	.57	57G PH, COLD, UNION DIGITAL IONALYZER
L356	0	5.47	7.21	-.21	-.14	2.24	57V PH, COLD, BECKMAN EXPANOMATIC
L274	0	5.68	8.40	.46	.86	.17	57V PH, COLD, BECKMAN EXPANOMATIC
L182C	0	5.70	7.24	.01	-.20	.97	57D PH, COLD, RADIOMETER TYPE PH M 28
L328	0	5.96	7.42	.32	-.15	1.09	57M PH, COLD, BECKMAN ZEROMATIC
L484A	0	6.46	7.10	.65	-.64	1.96	57Y PH, COLD, BECKMAN MODEL H2
GMEANS:		5.61	7.42			1.00	
		95% ELLIPSE:		2.30	1.75	WIDE GAMMA = 23 DEGREES	

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

LAB CODE	SAMPLE J58 MEAN	PRINTING 94 GRAMS PER SQUARE METER				SAMPLE B86 MEAN	BOND 79 GRAMS PER SQUARE METER				TEST D. = 10		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L105	92.96	.11	.23	.19	.58	90.02	.25	.40	.41	1.09	60H	Ø	L105
L108	92.75	-.10	-.21	.33	1.03	89.63	-.14	-.23	.47	1.26	60B	Ø	L108
L121	93.46	.61	1.28	.46	1.40	89.98	.21	.34	.42	1.13	60B	Ø	L121
L122	92.70	-.15	-.32	.41	1.27	90.08	.31	.50	.40	1.07	60D	Ø	L122
L123	92.72	-.13	-.28	.29	.89	89.54	-.23	-.38	.29	.77	60W	Ø	L123
L124	91.46	-1.39	-2.92	.50	1.54	88.76	-1.01	-1.64	.38	1.01	60B	X	L124
L125	92.02	-.83	-1.75	.43	1.33	88.91	-.86	-1.40	.41	1.10	60H	Ø	L125
L131	92.00	-.85	-1.79	.00	.00	88.50	-1.27	-2.06	.53	1.41	60R	Ø	L131
L132	92.44	-.41	-.86	.46	1.41	89.15	-.62	-1.01	.34	.90	60B	Ø	L132
L134	93.27	.42	.88	.24	.73	90.09	.32	.52	.27	.72	60R	Ø	L134
L136	92.41	-.44	-.93	.22	.69	89.43	-.34	-.55	.29	.78	60B	Ø	L136
L139	92.60	-.25	-.53	.32	.98	89.36	-.41	-.67	.40	1.07	60B	Ø	L139
L148B	92.24	-.61	-1.28	.32	.98	88.89	-.88	-1.43	.44	1.17	60B	Ø	L148B
L150	93.25	.40	.84	.35	1.09	90.45	.68	1.10	.50	1.33	60B	Ø	L150
L152	93.37	.52	1.09	.20	.62	90.57	.80	1.29	.25	.66	60B	Ø	L152
L153	93.00	.15	.31	.41	1.25	89.70	-.07	-.12	.35	.94	60B	Ø	L153
L157	93.35	.50	1.05	.24	.74	90.65	.88	1.42	.34	.90	60B	Ø	L157
L158	93.06	.21	.44	.39	1.19	90.11	.34	.55	.45	1.21	60D	Ø	L158
L162	93.11	.26	.54	.28	.87	89.49	-.28	-.46	.62	1.67	60W	Ø	L162
L166	92.73	-.12	-.26	.36	1.09	89.20	-.57	-.93	.30	.81	60B	Ø	L166
L173A	93.15	.30	.63	.38	1.17	90.60	.83	1.34	.44	1.18	60B	Ø	L173A
L190C	92.53	-.32	-.68	.44	1.34	89.53	-.24	-.39	.44	1.17	60B	Ø	L190C
L190R	92.98	.13	.27	.30	.94	89.67	-.10	-.17	.34	.92	60B	Ø	L190R
L206	92.94	.09	.19	.46	1.42	85.83	.05	.09	.28	.75	60B	Ø	L206
L210B	92.78	-.07	-.15	.48	1.49	89.87	.10	.16	.25	.67	60B	Ø	L210B
L210D	93.28	.43	.90	.18	.54	90.15	.38	.61	.25	.66	60D	Ø	L210D
L211S	92.19	-.66	-1.39	.38	1.16	88.70	-1.07	-1.74	.37	.99	60R	Ø	L211S
L212	93.30	.45	.94	.67	2.07	89.70	-.07	-.12	.82	2.20	60B	Ø	L212
L213	93.04	.19	.40	.23	.70	90.40	.63	1.02	.76	2.04	60B	Ø	L213
L225	93.05	.20	.42	.30	.93	90.17	.40	.65	.40	1.07	60B	Ø	L225
L226B	92.89	.04	.08	.51	1.58	89.58	-.19	-.31	.27	.73	60B	Ø	L226B
L228	92.89	.04	.08	.15	.47	89.37	-.40	-.65	.35	.94	60B	Ø	L228
L230	93.09	.24	.50	.40	1.22	89.80	.03	.05	.34	.91	60B	Ø	L230
L236B	93.24	.35	.82	.34	1.05	91.68	1.91	3.09	.38	1.01	60B	X	L236B
L238A	91.81	-1.04	-2.19	.27	.83	88.66	-1.11	-1.80	.26	.71	60R	Ø	L238A
L241	93.14	.25	.61	.18	.55	90.54	.77	1.24	.50	1.34	60B	Ø	L241
L243	92.57	-.28	-.59	.41	1.26	89.24	-.53	-.86	.36	.97	60B	Ø	L243
L254	93.29	.44	.92	.32	.98	90.07	.30	.48	.51	1.37	60H	Ø	L254
L255	93.24	.39	.82	.29	.90	90.05	.28	.45	.37	1.00	60B	Ø	L255
L259	93.15	.30	.63	.33	1.01	90.23	.46	.74	.43	1.16	60B	Ø	L259
L261	93.37	.52	1.09	.42	1.30	90.90	1.13	1.83	.21	.56	60B	Ø	L261
L262	93.51	.65	1.38	.16	.49	90.99	1.22	1.97	.12	.32	60R	Ø	L262
L275	92.68	-.17	-.36	.21	.66	89.33	-.44	-.72	.25	.66	60R	Ø	L275
L278	93.02	.17	.35	.50	1.54	89.88	.11	.18	.47	1.25	60B	Ø	L278
L281	93.16	.31	.65	.16	.48	89.98	.21	.34	.30	.82	60D	Ø	L281
L285D	92.23	-.62	-1.31	.50	1.53	89.06	-.71	-1.15	.40	1.07	60D	Ø	L285D
L285R	91.90	-.95	-2.00	.29	.89	88.97	-.80	-1.30	.34	.92	60R	Ø	L285R
L288	93.30	.45	.94	.50	1.55	90.11	.34	.55	.24	.64	60D	Ø	L288
L301	92.22	-.63	-1.33	.36	1.11	88.85	-.92	-1.49	.27	.72	60B	Ø	L301
L308	93.12	.27	.56	.30	.61	90.18	.41	.66	.29	.78	60B	Ø	L308
L315	92.47	-.38	-.80	.38	1.18	89.80	.03	.05	.45	1.22	60D	Ø	L315
L317	92.47	-.38	-.80	.28	.86	89.61	-.16	-.26	.43	1.14	60B	Ø	L317
L318	92.50	-.35	-.74	.41	1.25	89.65	-.12	-.20	.53	1.42	60B	Ø	L318
L323	93.58	.73	1.53	.32	.97	90.50	.73	1.18	.31	.84	60W	Ø	L323
L326	93.38	.53	1.11	.33	1.02	90.04	.27	.43	.41	1.11	60B	Ø	L326
L328	93.00	.15	.31	.12	.35	89.99	.22	.35	.13	.34	60B	Ø	L328
L339	92.90	.05	.10	.57	1.74	90.00	.23	.37	.00	.00	60B	Ø	L339
L349	92.71	-.14	-.30	.26	.80	90.02	.25	.40	.37	.98	60D	Ø	L349
L352	92.16	-.69	-1.45	.27	.82	85.19	-.58	-.94	.32	.85	60R	Ø	L352
L354	92.00	-.85	-1.79	.00	.00	88.60	-1.17	-1.90	.52	1.38	60B	Ø	L354
L390	93.61	.76	1.59	.41	1.28	90.56	1.19	1.93	.34	.92	60B	Ø	L390
L396	92.50	-.35	-.74	.53	1.62	88.90	-.87	-1.41	.74	1.93	60B	Ø	L396
L543	92.34	-.51	-1.07	.22	.67	89.60	-.17	-.28	.41	1.09	60D	Ø	L543
L567	94.14	1.25	2.71	.47	1.46	91.40	1.63	2.64	.34	.92	60D	*	L567
L573	93.07	.22	.46	.36	1.11	89.83	.05	.09	.22	.58	60H	Ø	L573

ANALYSIS T60-1 TABLE 1

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 J58 MEAN	PRINTING 94 GEAMS PER SQUARE METER				SAMPLE E86 MEAN	BOND 79 GEAMS PER SQUARE METER				TEST D. = 10		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L581	92.84	-.01	-.02	.32	.97	89.88	.11	.18	.39	1.03	60B	0	L581
L587	93.02	.17	.35	.23	.72	89.99	.22	.35	.39	1.04	60B	0	L587
L592	91.89	-.96	-2.02	.33	1.01	88.59	-1.18	-1.92	.38	1.01	60W	0	L592
L594	92.68	-.17	-.36	.30	.93	89.57	-.20	-.33	.39	1.05	60D	0	L594
L597	90.84	-2.01	-4.23	1.11	3.40	89.89	.12	.19	.07	.20	60B	X	L597
L599	92.65	-.20	-.42	.41	1.27	89.75	-.02	-.04	.26	.71	60B	0	L599
L673R	93.13	.28	.58	.27	.82	89.81	.04	.06	.40	1.06	60B	0	L673R
L673T	92.78	-.07	-.15	.30	.93	89.48	-.29	-.47	.40	1.08	60B	0	L673T
L688	93.39	.54	1.13	.27	.84	90.49	.72	1.16	.25	.66	60B	0	L688

GR. MEAN = 92.85 PERCENT GRAND MEAN = 89.77 PERCENT TEST DETERMINATIONS = 10
 SD MEANS = .48 PERCENT SD OF MEANS = .62 PERCENT 71 LABS IN GRAND MEANS
 AVERAGE SDR = .33 PERCENT AVERAGE SDR = .37 PERCENT

L100	92.58	-.27	-.57	.19	.59	89.69	-.08	-.13	.17	.45	60E	0	L100
L223B	92.79	-.06	-.13	.44	1.34	90.18	.41	.66	.25	.67	60E	0	L223B
L232	92.35	-.50	-1.05	.58	1.78	88.95	-.82	-1.33	.16	.42	60P	0	L232
L249	92.60	-.25	-.53	.51	1.58	89.98	.21	.34	.38	1.01	60P	0	L249
L256	91.94	-.91	-1.92	.24	.74	88.79	-.98	-1.59	.24	.65	60N	0	L256
L260	92.89	.04	.08	.23	.72	89.59	-.18	-.29	.26	.70	60P	0	L260
L274P	93.50	.65	1.36	.41	1.25	90.55	.78	1.26	.44	1.17	60P	0	L274P
L312	92.15	-.70	-1.47	.67	2.06	89.10	-.67	-1.09	.52	1.38	60P	0	L312
L380	92.35	-.50	-1.05	.41	1.27	88.60	-1.17	-1.90	.52	1.38	60P	0	L380
L564	91.30	-1.55	-3.26	.48	1.48	88.10	-1.67	-2.71	.32	.85	60P	0	L564
L685B	92.54	-.31	-.65	.36	1.10	89.59	-.18	-.29	.43	1.15	60P	0	L685B
L687	92.09	-.76	-1.60	.46	1.42	88.94	-.83	-1.35	.52	1.39	60P	0	L687

TOTAL NUMBER OF LABORATORIES REPORTING = 86

Best values: J58 92.8 ± 0.8 percent
 E86 89.8 ± 1.0 percent

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J58	E86	MAJOR	MINOR	R.SDR	VAR			
L597	X	90.84	89.89	-1.11	1.68	1.80	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MH	
L564	*	51.30	88.10	-2.27	.24	1.17	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L124	X	91.46	88.76	-1.64	.51	1.28	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L238A	Ø	51.81	88.66	-1.51	.17	.77	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L592	Ø	91.89	88.59	-1.52	.06	1.01	60W	OPACITY (WHITE BACKING),	HUYGEN,DIGITAL	
L285R	Ø	51.90	88.97	-1.21	.28	.91	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L256	*	51.94	88.79	-1.33	.14	.70	60N	OPACITY (WHITE BACKING),	HUNTER	
L354	Ø	52.00	88.60	-1.45	-.02	.69	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L131	Ø	52.00	88.50	-1.53	-.08	.71	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L125	Ø	92.02	88.91	-1.19	.15	1.22	60H	OPACITY (WHITE BACKING),	BUYGEN	
L687	*	92.09	88.94	-1.12	.11	1.40	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L312	*	92.15	89.10	-.96	.16	1.72	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L352	Ø	92.16	89.19	-.88	.20	.84	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L211S	Ø	92.19	88.70	-1.25	-.11	1.08	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L301	Ø	92.22	88.85	-1.12	-.05	.91	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MH	
L285D	Ø	92.23	89.06	-.94	.07	1.30	60D	OPACITY (WHITE BACKING),	HNL-2	
L148B	Ø	92.24	88.89	-1.07	-.04	1.08	60B	OPACITY (WHITE BACKING),	BUYGEN	
L543	Ø	92.34	89.60	-.44	.31	.88	60D	OPACITY (WHITE BACKING),	HNL-2	
L380	*	92.35	88.60	-1.24	-.30	1.32	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L232	*	52.35	88.95	-.96	-.09	1.10	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L136	Ø	92.41	89.43	-.54	.15	.73	60B	OPACITY (WHITE BACKING),	HUYGEN	
L132	Ø	92.44	89.15	-.74	-.04	1.16	60H	OPACITY (WHITE BACKING),	HAUSCH * L6MH	
L317	Ø	92.47	89.61	-.36	.21	1.00	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L315	Ø	92.47	89.80	-.21	.32	1.20	60D	OPACITY (WHITE BACKING),	HNL-2	
L318	Ø	92.50	89.65	-.31	.21	1.34	60H	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L396	Ø	92.50	88.90	-.91	-.24	1.80	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MH	
L190C	Ø	52.53	89.53	-.39	.11	1.26	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MH	
L685B	*	92.54	89.59	-.33	.14	1.12	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L243	Ø	52.57	89.24	-.59	-.09	1.11	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MH	
L100	*	92.58	89.69	-.23	.17	.52	60B	OPACITY (WHITE BACKING),	ZEISS ELRFBPØ, FMY-C(10) FILTER	
L249	*	52.60	89.98	.02	.33	1.29	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L139	Ø	52.60	89.36	-.48	-.05	1.03	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MH	
L599	Ø	92.65	89.75	-.14	.15	.59	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MH	
L594	Ø	52.68	89.57	-.26	.02	.99	60D	OPACITY (WHITE BACKING),	HNL-2	
L275	Ø	52.68	89.33	-.46	-.13	.66	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L122	Ø	92.70	90.08	.16	.31	1.17	60D	OPACITY (WHITE BACKING),	HNL-2	
L349	Ø	92.71	90.02	.11	.26	.89	60D	OPACITY (WHITE BACKING),	HNL-2	
L123	Ø	52.72	89.54	-.26	-.03	.83	60W	OPACITY (WHITE BACKING),	BUYGEN,DIGITAL	
L166	Ø	92.73	89.20	-.53	-.25	.95	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L108	Ø	92.75	89.63	-.17	-.00	1.14	60H	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L673T	Ø	92.78	89.48	-.28	-.12	1.01	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L210B	Ø	52.78	89.87	.04	.12	1.08	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L223B	*	52.79	90.18	.29	.29	1.00	60B	OPACITY (WHITE BACKING),	ZEISS ELRFBPØ, FMY-C(10) FILTER	
L581	Ø	92.84	89.88	.08	.07	1.00	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L228	Ø	92.89	89.37	-.30	-.27	.70	60B	OPACITY (WHITE BACKING),	BUYGEN	
L260	*	52.89	89.59	-.12	-.14	.71	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L226H	Ø	52.89	89.58	-.13	-.15	1.16	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MH	
L339	Ø	92.90	90.00	.21	.10	.87	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L206	Ø	52.94	89.83	.10	-.04	1.08	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MH	
L105	Ø	52.96	90.02	.26	.06	.84	60B	OPACITY (WHITE BACKING),	BUYGEN	
L190R	Ø	92.98	89.67	-.00	-.16	.93	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L153	Ø	93.00	89.70	.03	-.16	1.10	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L328	Ø	93.00	89.99	.26	.01	.35	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L587	Ø	93.02	89.99	.28	-.00	.88	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L278	Ø	93.02	89.88	.19	-.07	1.40	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L213	Ø	93.04	90.40	.62	.23	1.37	60H	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L225	Ø	93.05	90.17	.44	.08	1.00	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L158	Ø	93.06	90.11	.40	.04	1.20	60D	OPACITY (WHITE BACKING),	HNL-2	
L573	Ø	93.07	89.83	.18	-.14	.85	60B	OPACITY (WHITE BACKING),	BUYGEN	
L230	Ø	93.09	89.80	.17	-.17	1.06	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L162	Ø	93.11	89.49	-.07	-.38	1.27	60W	OPACITY (WHITE BACKING),	BUYGEN,DIGITAL	
L308	Ø	93.12	90.18	.49	.03	.69	60B	OPACITY (WHITE BACKING),	BUYGEN	
L673R	Ø	93.13	89.81	.20	-.20	.94	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MB	
L241	Ø	93.14	90.54	.79	.23	.94	60B	OPACITY (WHITE BACKING),	HAUSCH * L6MH	
L173A	Ø	93.15	90.60	.84	.26	1.18	60H	OPACITY (WHITE BACKING),	HAUSCH * L6MH	

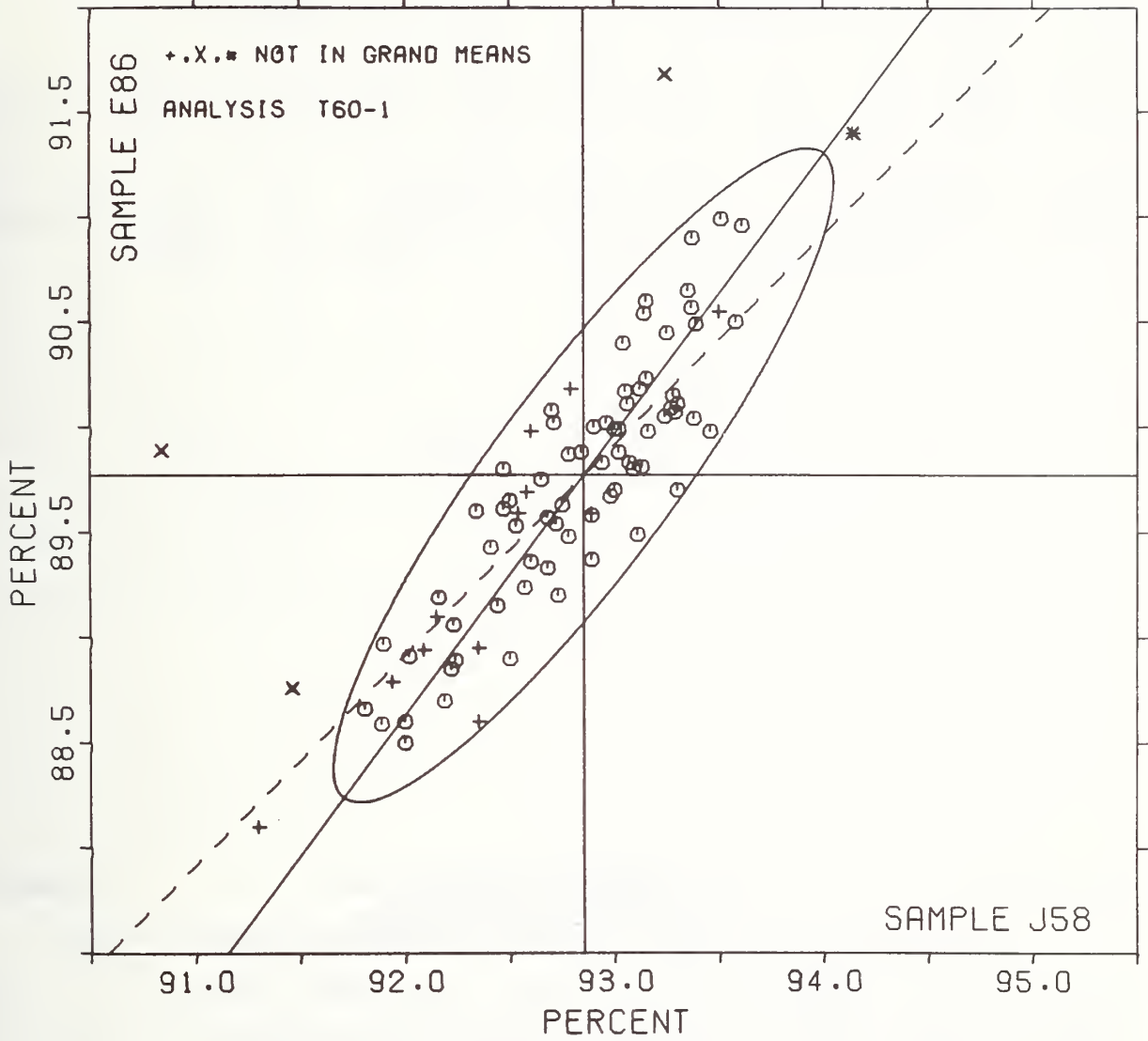
OPACITY (89% REFLECTANCE BACKING) IN PERCENT
TAPPI STANDARD T425 69-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J58	B86	MAJOR	MINOR	R.SDR	VAR			
L259	Ø	93.15	90.23	.55	.04	1.09	60B	OPACITY (WHITE BACKING),	BAUSCB	* LOMB
L281	Ø	93.16	89.98	.35	-.12	.65	60D	OPACITY (WHITE BACKING),	BNL-2	
L255	Ø	93.24	90.05	.46	-.14	.95	60B	OPACITY (WHITE BACKING),	BAUSCB	* LOMB
L236B	X	93.24	91.68	1.76	.83	1.03	60B	OPACITY (WHITE BACKING),	BAUSCB	* LOMB
L150	Ø	93.25	90.45	.78	.09	1.21	60B	OPACITY (WHITE BACKING),	BAUSCB	* LOMB
L134	Ø	93.27	90.09	.51	-.14	.72	60R	OPACITY (WHITE BACKING),	TWING-ALBERT (FORMERLY SRL)	
L210D	Ø	93.28	90.15	.56	-.12	.60	60D	OPACITY (WHITE BACKING),	BNL-2	
L254	Ø	93.29	90.07	.50	-.17	1.17	60B	OPACITY (WHITE BACKING),	BUYGEN	
L212	Ø	93.30	89.70	.21	-.40	2.14	60B	OPACITY (WHITE BACKING),	BAUSCB	* LOMB
L288	Ø	93.30	90.11	.54	-.16	1.09	60D	OPACITY (WHITE BACKING),	BNL-2	
L157	Ø	93.35	90.65	1.00	.13	.82	60B	OPACITY (WHITE BACKING),	BAUSCB	* LOMB
L152	Ø	93.37	90.57	.95	.06	.64	60B	OPACITY (WHITE BACKING),	BAUSCB	* LOMB
L261	Ø	93.37	90.90	1.21	.26	.93	60B	OPACITY (WHITE BACKING),	BAUSCB	* LOMB
L326	Ø	93.38	90.04	.53	-.26	1.07	60B	OPACITY (WHITE BACKING),	BAUSCB	* LOMB
L688	Ø	93.39	90.49	.90	-.00	.75	60B	OPACITY (WHITE BACKING),	BAUSCB	* LOMB
L121	Ø	93.46	89.98	.53	-.36	1.26	60B	OPACITY (WHITE BACKING),	BAUSCB	* LOMB
L274P	*	93.50	90.55	1.01	-.05	1.21	60P	OPACITY (WHITE BACKING),	PBCOVOLT	
L262	Ø	93.51	90.99	1.37	.20	.41	60R	OPACITY (WHITE BACKING),	TWING-ALBERT (FORMERLY SRL)	
L323	Ø	93.58	90.50	1.02	-.15	.90	60W	OPACITY (WHITE BACKING),	BUYGEN, DIGITAL	
L390	Ø	93.61	90.96	1.41	.10	1.10	60B	OPACITY (WHITE BACKING),	BAUSCB	* LOMB
L567	*	94.14	91.40	2.08	-.06	1.19	60D	OPACITY (WHITE BACKING),	BNL-2	
GMBANS:		92.85	89.77			1.00				
		95% BLLIPSB:		1.91	.44			WITH GAMMA = 53 DEGREES		

OPACITY, B&L TYPE, 89% BACKING

SAMPLE J58 = 92.9 PERCENT

SAMPLE E86 = 89.8 PERCENT



ANALYSIS T60-2 TABLE 1
OPACITY (PAPER BACKING) IN PERCENT

TAPPI STANDARD T425 68-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE J58 MEAN	PRINTING 94 GEAMS PER SQUARE METER				SAMPLE E86 MEAN	BOND 79 GRAMS PER SQUARE METER				TEST D.° 10		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L190C	93.04	.37	.40	.34	.99	91.39	.17	.15	.24	.70	60C	6	L190C
L190R	93.24	.57	.62	.30	.88	91.56	.34	.29	.31	.91	60C	6	L190R
L236B	92.14	-.53	-.57	.34	.99	89.16	-2.06	-1.76	.31	.90	60C	6	L236B
L243	93.22	.55	.60	.35	1.02	91.50	.28	.24	.28	.81	60C	6	L243
L274	93.35	.68	.74	.47	1.38	90.95	-.27	-.23	.60	1.73	60C	6	L274
L543	91.02	-1.65	-1.79	.25	.73	92.74	1.52	1.30	.33	.95	60V	6	L543
GR. MEAN = 92.67 PERCENT		GRAND MEAN = 91.22 PERCENT				TEST DETERMINATIONS = 10							
SD MEANS = .92 PERCENT		SD OF MEANS = 1.17 PERCENT				6 LABS IN GRAND MEANS							
		AVERAGE SDR = .34 PERCENT				AVERAGE SDR = .35 PERCENT							
TOTAL NUMBER OF LABORATORIES REPORTING = 6													

ANALYSIS T60-2 TABLE 2
OPACITY (PAPER 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
		J58	E86	MAJOR	MINOR	E.SDR	VAR			
L543	6	91.02	92.74	-2.01	-.59	.84	60V	OPACITY (PAPER BACKING),	DIANC/BNL	
L236B	6	92.14	89.16	1.73	-1.23	.95	60C	OPACITY (PAPER BACKING),	BAUSCB • LOMB	
L190C	6	93.04	91.39	-.03	.41	.85	60C	OPACITY (PAPER BACKING),	BAUSCB • LOMB	
L243	6	93.22	91.50	-.07	.62	.91	60C	OPACITY (PAPER BACKING),	BAUSCB • LOMB	
L190R	6	93.24	91.56	-.11	.66	.90	60C	OPACITY (PAPER BACKING),	BAUSCB • LOMB	
L274	6	93.35	90.95	.49	.54	1.56	60C	OPACITY (PAPER BACKING),	BAUSCB • LOMB	
GMEANS:		92.67	91.22			1.00				
		95% ELLIPSE:		5.04	3.62	WITH GAMMA --68 DEGRBBS				

ANALYSIS T60-3 TABLE 1
 OPACITY (PAPER BACKING) IN PERCENT
 TAPPI SUGGESTED METHOD T519 68-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	SAMPLE J58		PRINTING 54 GRAMS PER SQUARE METER				SAMPLE E86		BOND 79 GRAMS PER SQUARE METER				TEST D.° 10		
	MEAN	DEV	N. DEV	SDR	R. SDR	MEAN	DEV	N. DEV	SDR	R. SDR	VAR	F	LAB		
L100	93.70	.09	.49	.18	.92	92.21	.16	.75	.10	.46	60J	0	L100		
L150	93.58	-.03	-.15	.18	.95	91.98	-.07	-.33	.23	1.07	60J	0	L150		
L182E	93.48	-.13	-.73	.19	.97	92.06	.01	.04	.23	1.08	60J	0	L182E		
L236	93.47	-.14	-.78	.22	1.12	91.85	-.20	-.95	.27	1.26	60J	0	L236		
L242	93.55	-.06	-.34	.19	.99	92.04	-.01	-.05	.30	1.39	60J	0	L242		
L244	93.27	-.34	-1.89	.18	.92	91.67	-.38	-1.81	.23	1.05	60P	0	L244		
L250T	93.56	-.05	-.28	.32	1.67	92.00	-.05	-.24	.33	1.55	60J	0	L250T		
L309	93.13	-.48	-2.67	.23	1.20	90.05	-2.00	-9.48	.28	1.32	60J	#	L309		
L313	93.81	.20	1.10	.15	.79	92.34	.29	1.37	.23	1.05	60F	0	L313		
L360	93.37	-.24	-1.34	.16	.81	91.80	-.25	-1.19	.20	.93	60F	0	L360		
L446	93.65	.04	.23	.16	.83	92.02	-.03	-.14	.18	.86	60J	0	L446		
L484	93.64	.03	.16	.13	.70	92.18	.13	.61	.13	.61	60F	0	L484		
L575	93.68	.07	.38	.29	1.49	92.02	-.03	-.15	.24	1.13	60J	0	L575		
L598	93.91	.30	1.66	.16	.83	92.44	.32	1.84	.13	.63	60J	0	L598		
L678	93.91	.30	1.67	.20	1.02	92.29	.24	1.12	.29	1.34	60J	0	L678		
L685A	93.58	-.03	-.17	.19	.97	91.87	-.18	-.86	.13	.58	60F	0	L685A		

GR. MEAN = 93.61 PERCENT GRAND MEAN = 92.05 PERCENT TEST DETERMINATIONS = 10
 SD MEANS = .18 PERCENT SD OF MEANS = .21 PERCENT 15 LABS IN GRAND MEANS
 AVERAGE SDR = .19 PERCENT AVERAGE SDR = .22 PERCENT

L626 92.90 -.71 -3.95 .21 1.10 91.00 -1.05 -4.98 .00 .00 60Q * L626
 TOTAL NUMBER OF LABORATORIES REPORTING = 17

Best values: J58 93.6 ± 0.3 percent
 E86 92.1 ± 0.4 percent

The following laboratories were omitted from the grand means because of extreme test results: 309.

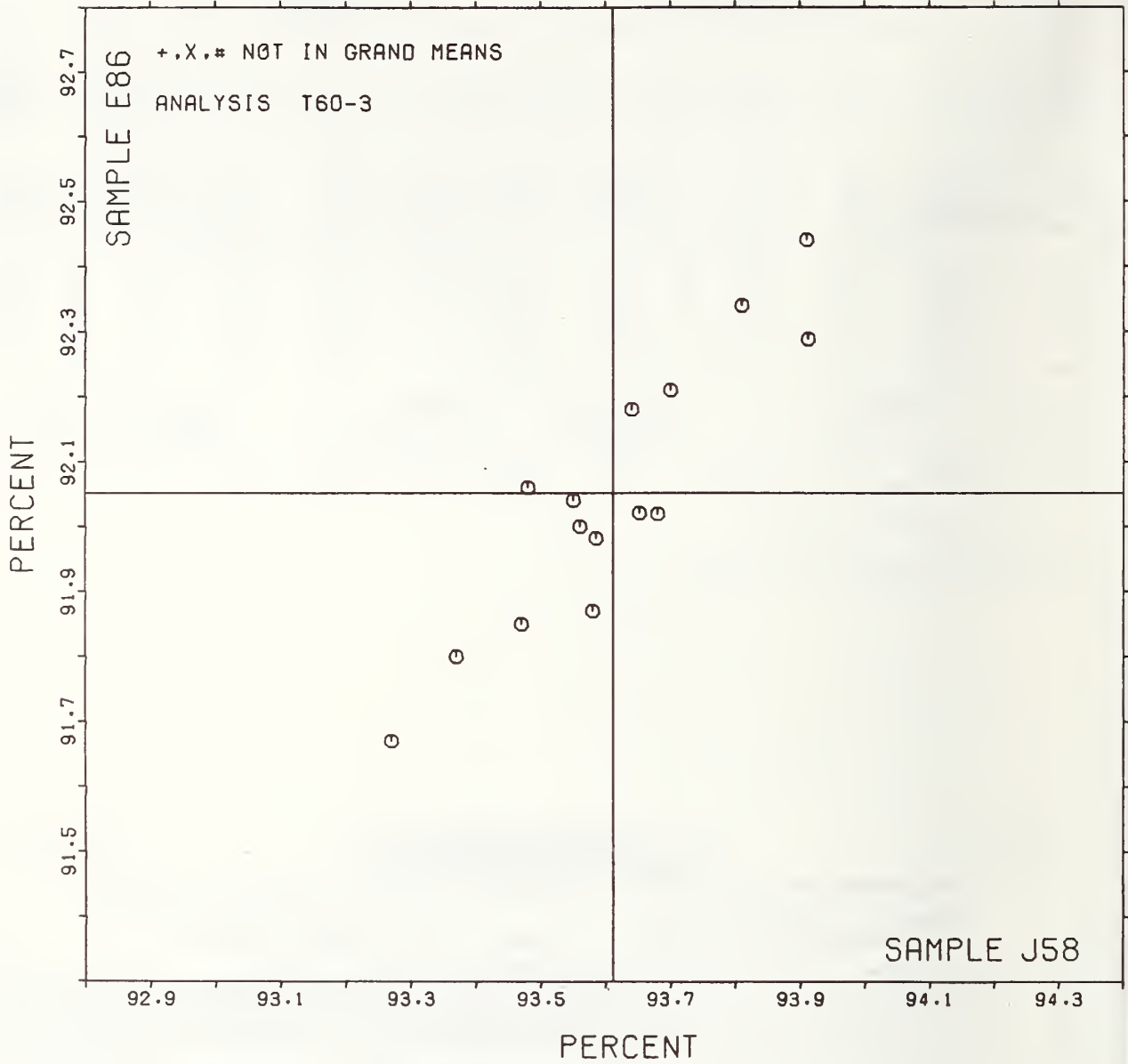
ANALYSIS T60-3 TABLE 2
 OPACITY (PAPER BACKING) IN PERCENT
 TAPPI SUGGESTED METHOD T519 68-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J58	E86	MAJOR	MINOR	R. SDR	VAR			
L626	*	92.90	91.00	-1.26	-.13	.55	60Q	OPACITY (PAPER BACKING),	PHOTOVOLT	
L309	#	93.13	90.05	-1.84	-.92	1.26	60J	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) FILTER	
L244	0	93.27	91.67	-.51	.02	.59	60F	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) NO TRAP	
L360	0	93.37	91.80	-.35	.02	.87	60J	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) NO TRAP	
L236	0	93.47	91.85	-.25	-.02	1.19	60P	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) FILTER	
L182E	0	93.48	92.06	-.08	.11	1.03	60J	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) FILTER	
L242	0	93.55	92.04	-.05	.04	1.19	60J	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) FILTER	
L250T	0	93.56	92.00	-.07	.01	1.61	60J	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) FILTER	
L685A	0	93.58	91.87	-.16	-.09	.78	60F	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) NO TRAP	
L150	0	93.58	91.98	-.07	-.02	1.01	60J	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) FILTER	
L484	0	93.64	92.18	.12	.06	.66	60F	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) NO TRAP	
L446	0	93.65	92.02	.00	-.05	.34	60J	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) FILTER	
L575	0	93.68	92.02	.02	-.07	1.31	60J	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) FILTER	
L100	0	93.70	92.21	.18	.03	.69	60J	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) FILTER	
L313	0	93.81	92.34	.35	.03	.92	60F	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) NO TRAP	
L598	0	93.91	92.44	.49	.02	.73	60J	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) FILTER	
L678	0	93.91	92.29	.37	-.08	1.18	60J	OPACITY (PAPER BACKING),	ZBISS ELREPHO, PMY-C(10) FILTER	
GMEANS:		93.61	92.05			1.00				
		95% ELLIPSE:		.78	.16	WITH GAMMA = 49 DEGREES				

OPACITY, ELREPHO TYPE, PAPER BACKING

SAMPLE J58 = 93.61 PERCENT

SAMPLE E86 = 92.05 PERCENT



DIRECTIONAL BLUE REFLECTANCE IN PERCENT
TAPPI STANDARD T452 GS-77, 'BRIGHTNESS'; MARTIN SWEETS (ACBT & GB) IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE J97 MEAN	PRINTING 89 GRAMS PER SQUARE METER				SAMPLE J36 MEAN	PRINTING 94 GRAMS PER SQUARE METER				TEST D. - 8		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L108	76.34	.60	1.57	.24	1.35	84.47	.56	1.09	.13	1.05	65M	Ø	L108
L122	75.60	-.14	-.36	.35	2.01	83.37	-.54	-1.04	.05	.38	65N	Ø	L122
L132	75.01	-.73	-1.90	.21	1.19	83.46	-.45	-.87	.07	.61	65N	Ø	L132
L158	76.14	.40	1.04	.13	.74	84.55	.64	1.23	.11	.88	65N	Ø	L158
L190C	76.09	.35	.91	.22	1.23	83.94	.02	.05	.15	1.23	65A	Ø	L190C
L210M	75.69	-.05	-.13	.12	.71	83.40	-.51	-.99	.09	.76	65M	Ø	L210M
L210N	75.80	.06	.16	.09	.53	83.52	-.39	-.75	.10	.85	65N	Ø	L210N
L211	74.92	-.81	-2.13	.15	.84	82.15	-1.76	-3.40	.12	.98	65N	#	L211
L225	75.75	.01	.03	.19	1.09	83.47	-.44	-.85	.14	1.14	65N	Ø	L225
L243	75.16	-.58	-1.50	.12	.67	83.54	-.38	-.73	.12	.97	65A	Ø	L243
L259	75.44	-.30	-.79	.27	1.51	83.75	-.16	-.31	.09	.76	65M	Ø	L259
L275	75.40	-.34	-.88	.15	.86	83.51	-.40	-.77	.16	1.35	65M	Ø	L275
L285	75.87	.14	.36	.21	1.20	84.70	.79	1.52	.28	2.32	65N	Ø	L285
L288	75.56	-.18	-.46	.14	.80	84.01	.10	.19	.08	.68	65N	Ø	L288
L308	76.34	.60	1.57	.15	.85	85.01	1.10	2.12	.06	.53	65N	Ø	L308
L315	75.44	-.30	-.79	.12	.67	83.66	-.25	-.48	.17	1.38	65N	Ø	L315
L317	75.15	-.59	-1.54	.21	1.17	83.40	-.51	-.99	.12	.98	65M	Ø	L317
L543	76.21	.47	1.24	.12	.71	83.56	-.35	-.68	.16	1.31	65M	Ø	L543
L565	75.69	-.05	-.13	.14	.77	83.94	.02	.05	.09	.75	65A	Ø	L565
L598	75.97	.24	.62	.07	.40	84.79	.87	1.69	.08	.66	65M	Ø	L598
L636	75.91	.17	.46	.30	1.73	84.30	.39	.75	.15	1.24	65M	Ø	L636
L673R	75.94	.20	.52	.14	.80	83.80	-.11	-.22	.14	1.16	65N	Ø	L673R
GR. MEAN = 75.74 PERCENT		GRAND MEAN = 83.91 PERCENT						TEST DETERMINATIONS = 8					
SD MEANS = .38 PERCENT		SD OF MEANS = .52 PERCENT						21 LABS IN GRAND MEANS					
AVERAGE SDR = .18 PERCENT		AVERAGE SDR = .12 PERCENT											
L105	75.54	-.20	-.52	.11	.60	83.87	-.04	-.07	.07	.58	65T	*	L105
L213	76.02	.29	.75	.21	1.20	84.47	.56	1.09	.07	.58	65T	*	L213
L219	78.00	2.26	5.91	.00	.00	85.00	1.09	2.10	.00	.00	65P	*	L219
L223	76.69	.95	2.48	.11	.64	85.62	1.71	3.31	.12	.95	65G	*	L223
L232	77.87	2.14	5.58	.23	1.31	85.50	1.59	3.06	.00	.00	65P	*	L232
L241	75.99	.25	.65	.21	1.19	84.96	1.05	2.03	.11	.87	65I	*	L241
L249	77.31	1.57	4.11	.24	1.34	84.44	.52	1.01	.44	3.61	65P	*	L249
L256	75.44	-.30	-.79	.09	.52	83.69	-.23	-.44	.06	.53	65H	*	L256
L260	75.71	-.03	-.07	.16	.88	84.66	.75	1.45	.11	.87	65P	*	L260
L278	78.62	2.89	7.55	.23	1.31	86.05	2.14	4.13	.09	.76	65P	*	L278
L301	76.02	.29	.75	.20	1.12	84.04	.12	.24	.15	1.23	65G	*	L301
L312	79.00	3.26	8.53	.00	.00	85.00	1.09	2.10	.00	.00	65P	*	L312
L321	76.87	1.14	2.97	.23	1.31	85.06	1.15	2.22	.18	1.45	65P	*	L321
L328	76.05	.31	.82	.13	.74	84.09	.17	.34	.12	1.02	65P	*	L328
L339	80.00	4.26	11.14	.00	.00	87.00	3.09	5.96	.00	.00	65P	*	L339
L380	78.00	2.26	5.91	.00	.00	84.00	.09	.17	.00	.00	65P	*	L380
L442	81.55	5.81	15.19	.08	.43	91.16	7.25	14.00	.09	.75	65T	*	L442
L562	81.06	5.32	13.92	.18	1.00	86.37	2.46	4.75	.44	3.63	65P	*	L562
L564	76.25	.51	1.34	.46	2.63	83.75	-.16	-.31	.46	3.79	65P	*	L564
L587	75.66	-.08	-.20	.13	.74	83.81	-.10	-.19	.06	.53	65I	*	L587
L617	75.24	-.50	-1.31	.11	.60	83.27	-.64	-1.23	.07	.58	65G	*	L617
L626	77.87	2.14	5.58	.23	1.31	85.00	1.09	2.10	.00	.00	65P	*	L626
L684	74.86	-.88	-2.29	.48	2.74	83.02	-.89	-1.72	.21	1.68	65H	*	L684

TOTAL NUMBER OF LABORATORIES REPORTING = 45

Best values: J97 75.6 ± 0.7 percent
J36 83.6 ± 1.0 percent

The following laboratories were omitted from the grand means because of extreme test results: 211.

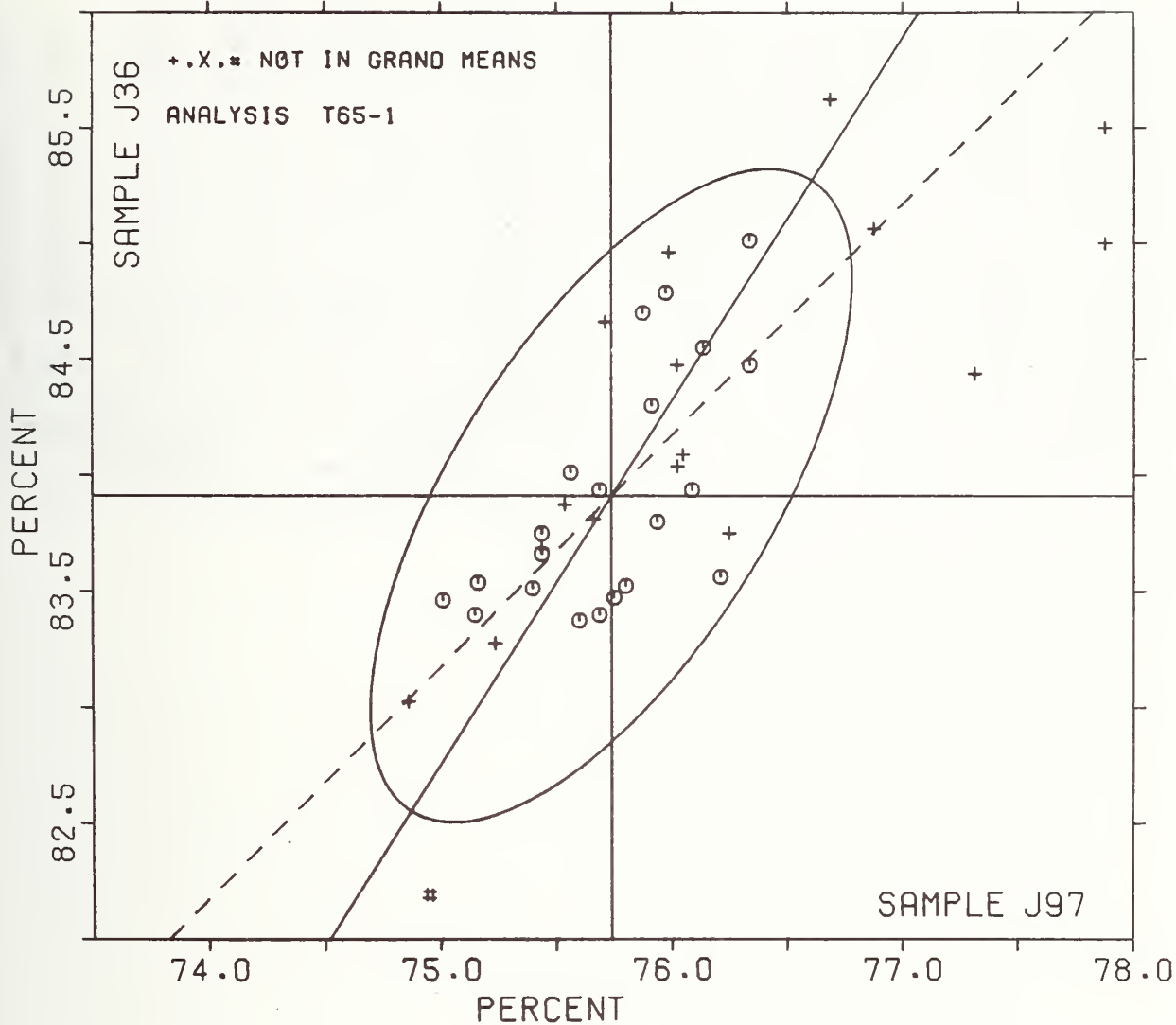
DIRECTIONAL BLUE REFLECTANCE IN PERCENT
TAPPI STANDARD T452 6S-77, BRIGHTNESS¹; MARTIN SWEETS (ACBT & GE) IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J97	J36	MAJOR	MINOR	R.SDR	VAR			
L684	*	74.86	83.02	-1.22	.26	2.21	65E	BLUE REFLECTANCE (DIRECTIONAL),	BUNTER	
L211	#	74.92	82.15	-1.92	-.26	.91	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECNIDYNE/DIANG/M.S.,	S-4
L132	Ø	75.01	83.46	-.77	.37	.90	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECNIDYNE/DIANG/M.S.,	S-4
L317	Ø	75.15	83.40	-.75	.22	1.08	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE),	S-1
L243	Ø	75.16	83.54	-.63	.28	.82	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACET),	S-2
L617	*	75.24	83.27	-.81	.08	.59	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L275	Ø	75.40	83.51	-.52	.07	1.10	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE),	S-1
L256	*	75.44	83.69	-.35	.13	.52	65E	BLUE REFLECTANCE (DIRECTIONAL),	BUNTER	
L315	Ø	75.44	83.66	-.37	.12	1.03	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECNIDYNE/DIANG/M.S.,	S-4
L259	Ø	75.44	83.75	-.30	.17	1.14	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE),	S-1
L105	*	75.54	83.87	-.14	.15	.59	65T	BLUE REFLECTANCE (DIRECTIONAL),	BUNTER D25D2M	
L288	Ø	75.56	84.01	-.01	.20	.74	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECNIDYNE/DIANG/M.S.,	S-4
L122	Ø	75.60	83.37	-.53	-.17	1.20	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECNIDYNE/DIANG/M.S.,	S-4
L587	*	75.66	83.81	-.13	.01	.63	65I	BLUE REFLECTANCE (DIRECTIONAL),	BUNTER D25D2A	
L210M	Ø	75.69	83.40	-.46	-.23	.73	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE),	S-1
L565	Ø	75.69	83.94	-.01	.06	.76	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACET),	S-2
L260	*	75.71	84.66	.62	.42	.87	65P	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L225	Ø	75.75	83.47	-.36	-.25	1.12	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECNIDYNE/DIANG/M.S.,	S-4
L210N	Ø	75.80	83.52	-.29	-.26	.69	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECNIDYNE/DIANG/M.S.,	S-4
L285	Ø	75.87	84.70	.74	.31	1.76	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECNIDYNE/DIANG/M.S.,	S-4
L636	Ø	75.91	84.30	.42	.06	1.48	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE),	S-1
L673R	Ø	75.94	83.80	.01	-.23	.98	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECNIDYNE/DIANG/M.S.,	S-4
L598	Ø	75.97	84.79	.86	.27	.54	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE),	S-1
L241	*	75.99	84.96	1.02	.35	1.03	65I	BLUE REFLECTANCE (DIRECTIONAL),	BUNTER D25D2A	
L301	*	76.02	84.04	.26	-.18	1.18	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L213	*	76.02	84.47	.63	.06	.89	65T	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
L328	*	76.05	84.09	.31	-.17	.88	65P	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L190C	Ø	76.09	83.94	.21	-.28	1.23	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACET),	S-2
L158	Ø	76.14	84.55	.75	.01	.81	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECNIDYNE/DIANG/M.S.,	S-4
L543	Ø	76.21	83.56	-.04	-.59	1.01	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE),	S-1
L564	*	76.25	83.75	.14	-.52	3.21	65P	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L308	Ø	76.34	85.01	1.25	.09	.69	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECNIDYNE/DIANG/M.S.,	S-4
L108	Ø	76.34	84.47	.80	-.20	1.20	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE),	S-1
L223	*	76.69	85.62	1.95	.12	.80	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L321	*	76.87	85.06	1.58	-.34	1.38	65P	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L249	*	77.31	84.44	1.29	-1.05	2.47	65P	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L626	*	77.87	85.00	2.06	-1.22	.66	65P	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L232	*	77.87	85.50	2.49	-.95	.66	65P	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L219	*	78.00	85.00	2.13	-1.32	.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L380	*	78.00	84.00	1.29	-1.86	.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L278	*	78.62	86.05	3.35	-1.29	1.04	65F	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L312	*	79.00	85.00	2.67	-2.17	.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L339	*	80.00	87.00	4.89	-1.94	.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L562	*	81.06	86.37	4.94	-3.17	2.32	65P	BLUE REFLECTANCE (DIRECTIONAL),	FB0T0V0LT	
L442	*	81.55	91.16	9.24	-1.01	.59	65T	BLUE REFLECTANCE (DIRECTIONAL),	BUNTER D25D2M	
GMEANS:		75.74	83.91			1.00				
		95% ELLIPSE:		1.61	.69			WITH GAMMA = 57 DEGREES		

BLUE REFLECTANCE, DIRECTIONAL

SAMPLE J97 = 75.7 PERCENT

SAMPLE J36 = 83.9 PERCENT



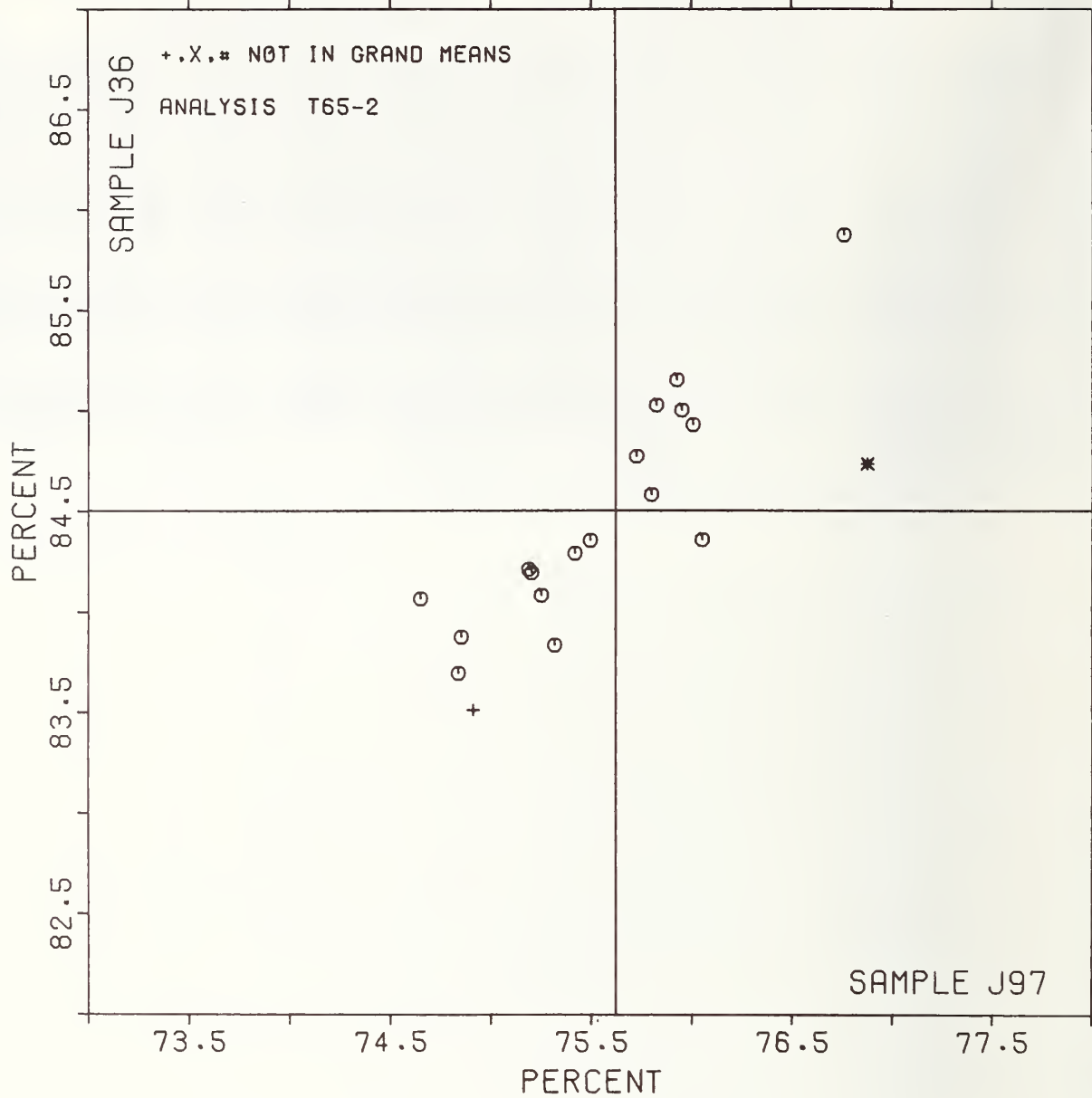
DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)
TAPPI SUGGESTED METHOD T525 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	F	MEANS		COORDINATES		AVG R.SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		J97	J36	MAJOR	MINOR		
L150	0	74.65	84.07	-1.01	.32	1.10 65Q	DIFFUSE REFLECTANCE, ELREPH0, GL.TRAP, ZEISS ABSOLUTE BASE
L680	0	74.84	83.70	-1.12	-.08	.90 65K	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, M00 (ZEISS) BASE
L100	0	74.85	83.88	-.99	.04	.96 65P	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, NRC-PTB ABSOLUTE BASE
L289	*	74.91	83.51	-1.19	-.27	1.09 650	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, SPECIFIC CALIBRATION
L280	0	75.19	84.21	-.51	.07	1.40 65Q	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, ZEISS ABSOLUTE BASE
L446	0	75.20	84.20	-.51	.05	.82 65P	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, NRC-PTB ABSOLUTE BASE
L349	0	75.25	84.08	-.55	-.07	.96 65K	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, M00 (ZEISS) BASE
L575	0	75.32	83.84	-.67	-.30	1.58 65P	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, NRC-PTB ABSOLUTE BASE
L242	0	75.42	84.29	-.29	-.02	.90 65P	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, NRC-PTB ABSOLUTE BASE
L182	0	75.50	84.36	-.19	-.03	1.01 65P	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, NRC-PTB ABSOLUTE BASE
L636	0	75.73	84.77	.26	.13	.85 65K	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, M00 (ZEISS) BASE
L250T	0	75.80	84.58	.19	-.06	1.44 65P	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, NRC-PTB ABSOLUTE BASE
L236	0	75.82	85.03	.50	.25	.66 65P	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, NRC-PTB ABSOLUTE BASE
L325	0	75.93	85.15	.66	.28	.93 65P	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, NRC-PTB ABSOLUTE BASE
L136	0	75.95	85.00	.58	.15	.86 65P	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, NRC-PTB ABSOLUTE BASE
L210K	0	76.01	84.93	.57	.06	.81 65K	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, M00 (ZEISS) BASE
L598	0	76.05	84.36	.23	-.39	.78 65K	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, M00 (ZEISS) BASE
L573	0	76.76	85.87	1.76	.26	1.05 65P	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, NRC-PTB ABSOLUTE BASE
L121	*	76.88	84.73	1.09	-.67	1.42 65K	DIPPUSE REFLECTANCE, ELREPH0, GL.TRAP, M00 (ZEISS) BASE
GMEANS:		75.62	84.50			1.00	
		95% ELLIPSE:		2.18	.70	WITH GAMMA = 41 DEGREES	

BLUE REFLECTANCE, DIFFUSE, WITH TRAP

SAMPLE J97 = 75.6 PERCENT

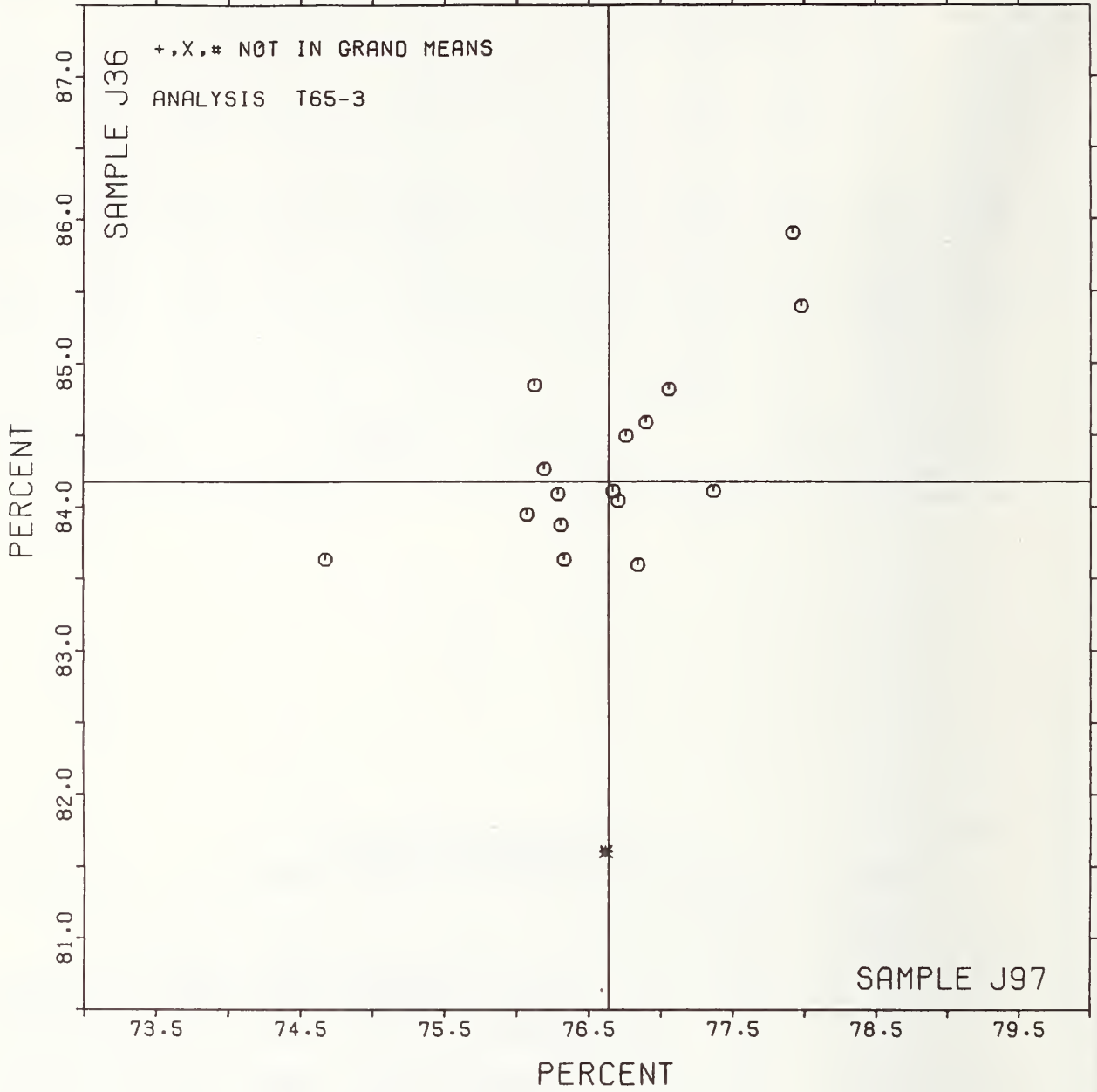
SAMPLE J36 = 84.5 PERCENT



BLUE REFLECTANCE, DIFFUSE, NO TRAP

SAMPLE J97 = 76.6 PERCENT

SAMPLE J36 = 84.2 PERCENT



ANALYSIS T75-1 TABLE 1
 SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS
 TAPPI STANDARD T480 6S-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAH CODE	PRINTING					COATED OFFSET					TEST D. = 10		
	J24 MEAN	103 GLAMS DEV	PEF N.DEV	SQUARE METER SDR	R. SDR	E87 MEAN	117 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R. SDR	VAR	F	LAH
L108	67.9	1.5	.99	1.3	1.29	70.8	2.4	1.25	1.4	.66	75H	Ø	L108
L121	65.1	-1.3	-.85	1.0	.97	68.1	-.2	-.13	1.6	.75	75H	Ø	L121
L122	65.6	-.8	-.52	1.0	.98	68.1	-.3	-.16	1.6	.74	75H	Ø	L122
L128	64.5	-1.9	-1.27	.7	.68	67.2	-1.2	-.62	1.9	.88	75G	Ø	L128
L134	66.5	.1	.07	.7	.68	69.1	.7	.37	1.6	.75	75H	Ø	L134
L136	70.9	4.5	3.02	.8	.73	73.5	5.1	2.69	1.3	.63	75G	*	L136
L153	68.5	2.2	1.44	1.2	1.19	70.5	2.2	1.13	1.0	.48	75G	Ø	L153
L162	69.1	2.7	1.83	.8	.72	72.4	4.0	2.10	1.6	.75	75G	Ø	L162
L173A	65.2	-1.2	-.79	.8	.81	69.2	.8	.41	1.8	.84	75G	*	L173A
L182	67.1	.7	.45	.9	.83	69.2	.8	.40	1.1	.52	75H	Ø	L182
L189	66.5	.2	.10	1.0	.97	67.8	-.6	-.31	3.0	1.43	75P	Ø	L189
L190C	62.9	-3.5	-2.36	.7	.68	64.1	-4.3	-2.24	1.4	.66	75G	Ø	L190C
L190R	66.1	-.3	-.21	.9	.87	68.4	.0	.02	1.1	.54	75G	Ø	L190R
L206	66.0	-.4	-.24	1.1	1.04	68.5	.1	.04	1.5	.69	75H	Ø	L206
L210	69.8	3.4	2.31	1.1	1.07	72.5	4.1	2.13	1.4	.66	75H	Ø	L210
L211	66.9	.5	.34	1.5	1.42	69.4	1.1	.55	1.4	.67	75H	Ø	L211
L212	66.1	-.3	-.20	2.8	2.66	67.7	-.7	-.36	3.3	1.57	75P	Ø	L212
L213	66.8	.4	.24	1.3	1.30	69.7	1.3	.67	1.2	.58	75H	Ø	L213
L223	67.5	1.1	.73	.9	.84	69.1	.8	.39	1.3	.63	75H	Ø	L223
L230	66.7	.3	.22	.7	.71	68.1	-.2	-.13	1.1	.53	75H	Ø	L230
L243	67.1	.7	.47	.9	.84	70.3	1.9	.99	2.1	.97	75B	Ø	L243
L255	67.2	.8	.54	1.5	1.42	68.8	.4	.21	1.8	.85	75G	Ø	L255
L256	66.7	.3	.18	.9	.84	67.9	-.5	-.24	1.1	.53	75H	Ø	L256
L259	65.5	-.5	-.63	.7	.65	67.9	-.5	-.25	3.0	1.39	75H	Ø	L259
L262	65.7	-.7	-.46	1.1	1.02	67.2	-1.1	-.60	2.7	1.28	75K	Ø	L262
L274	66.8	.4	.27	.4	.41	65.8	-2.6	-1.35	.8	.37	75P	X	L274
L278	68.7	2.3	1.55	.9	.86	70.7	2.3	1.20	1.4	.64	75G	Ø	L278
L279	64.3	-2.1	-1.40	.9	.91	65.4	-3.0	-1.56	2.7	1.28	75G	Ø	L279
L291	67.0	.6	.39	.6	.55	68.8	.4	.19	2.6	1.23	75H	Ø	L291
L301	66.0	-.4	-.28	.9	.84	68.4	-.0	-.01	2.5	1.19	75H	Ø	L301
L315	66.0	-.4	-.26	1.2	1.11	68.7	.3	.16	2.5	1.17	75G	Ø	L315
L317	68.0	1.6	1.07	.9	.91	71.7	3.3	1.73	2.9	1.35	75H	Ø	L317
L321	67.2	.8	.54	.6	.61	67.9	-.5	-.26	1.9	.90	75G	Ø	L321
L323	66.0	-.4	-.28	1.7	1.65	66.6	-1.8	-.93	2.6	1.20	75H	Ø	L323
L328	65.6	-.8	-.51	.9	.87	66.3	-2.1	-1.10	2.7	1.28	75H	Ø	L328
L339	67.3	.9	.61	3.6	3.49	63.2	-5.2	-2.71	3.9	1.84	75P	X	L339
L349	65.8	-.6	-.38	1.0	.93	66.6	-1.8	-.96	2.1	.98	75H	Ø	L349
L372	65.6	-.8	-.53	.7	.63	67.4	-.9	-.49	2.4	1.14	75H	Ø	L372
L388	61.0	-5.3	-3.58	1.4	1.31	62.4	-6.0	-3.13	1.5	.69	75P	X	L388
L396	65.4	-1.0	-.67	.5	.50	67.8	-.6	-.31	2.5	1.17	75G	Ø	L396
L456	65.6	-.8	-.52	.8	.79	67.6	-.8	-.43	2.7	1.26	75H	Ø	L456
L483	64.9	-1.5	-1.01	.8	.80	66.3	-2.1	-1.08	2.5	1.16	75H	Ø	L483
L564	66.2	-.2	-.13	3.0	2.93	67.9	-.5	-.26	2.2	1.03	75P	Ø	L564
L573	64.1	-2.3	-1.54	1.3	1.24	64.9	-3.5	-1.82	2.8	1.32	75G	Ø	L573
L574	63.9	-2.5	-1.67	.7	.71	64.5	-3.9	-2.03	2.2	1.04	75G	Ø	L574
L583	67.0	.6	.41	.8	.76	68.7	.3	.18	3.1	1.44	75H	Ø	L583
L587	67.3	.9	.61	1.1	1.02	69.6	1.2	.63	2.0	.92	75H	Ø	L587
L592	65.6	-.8	-.50	1.0	.98	68.7	.3	.14	2.4	1.14	75H	Ø	L592
L598	65.3	-1.1	-.71	1.0	.98	67.4	-1.0	-.50	3.5	1.65	75H	Ø	L598
L643	66.6	.2	.12	.8	.79	66.6	-1.8	-.93	3.3	1.54	75H	Ø	L643
L668	65.6	-.7	-.50	1.2	1.18	68.2	-.2	-.12	3.4	1.62	75G	Ø	L668
L670	68.3	1.9	1.25	1.2	1.15	69.7	1.3	.70	2.7	1.28	75H	Ø	L670
L688	65.7	-.7	-.48	.6	.61	67.5	-.9	-.46	1.3	.59	75G	Ø	L688

GR. MEAN = 66.4 GLOSS UNITS GRAND MEAN = 68.4 GLOSS UNITS TEST DETERMINATIONS = 10
 SD MEANS = 1.5 GLOSS UNITS SD OF MEANS = 1.9 GLOSS UNITS 50 LAHS IN GRAND MEANS
 AVERAGE SDR = 1.0 GLOSS UNITS AVERAGE SDR = 2.1 GLOSS UNITS

L250	63.0	-3.4	-2.27	2.6	2.49	66.8	-1.6	-.83	2.1	.99	75Q	*	L250
L288	66.8	.4	.25	1.0	.98	68.1	-.3	-.14	2.5	1.16	75I	*	L288

TOTAL NUMBER OF LABORATORIES REPORTING = 55
 Best values: J24 66 + 2 gloss units
 E87 68 + 3 gloss units

ANALYSIS 175-1 TABLE 2

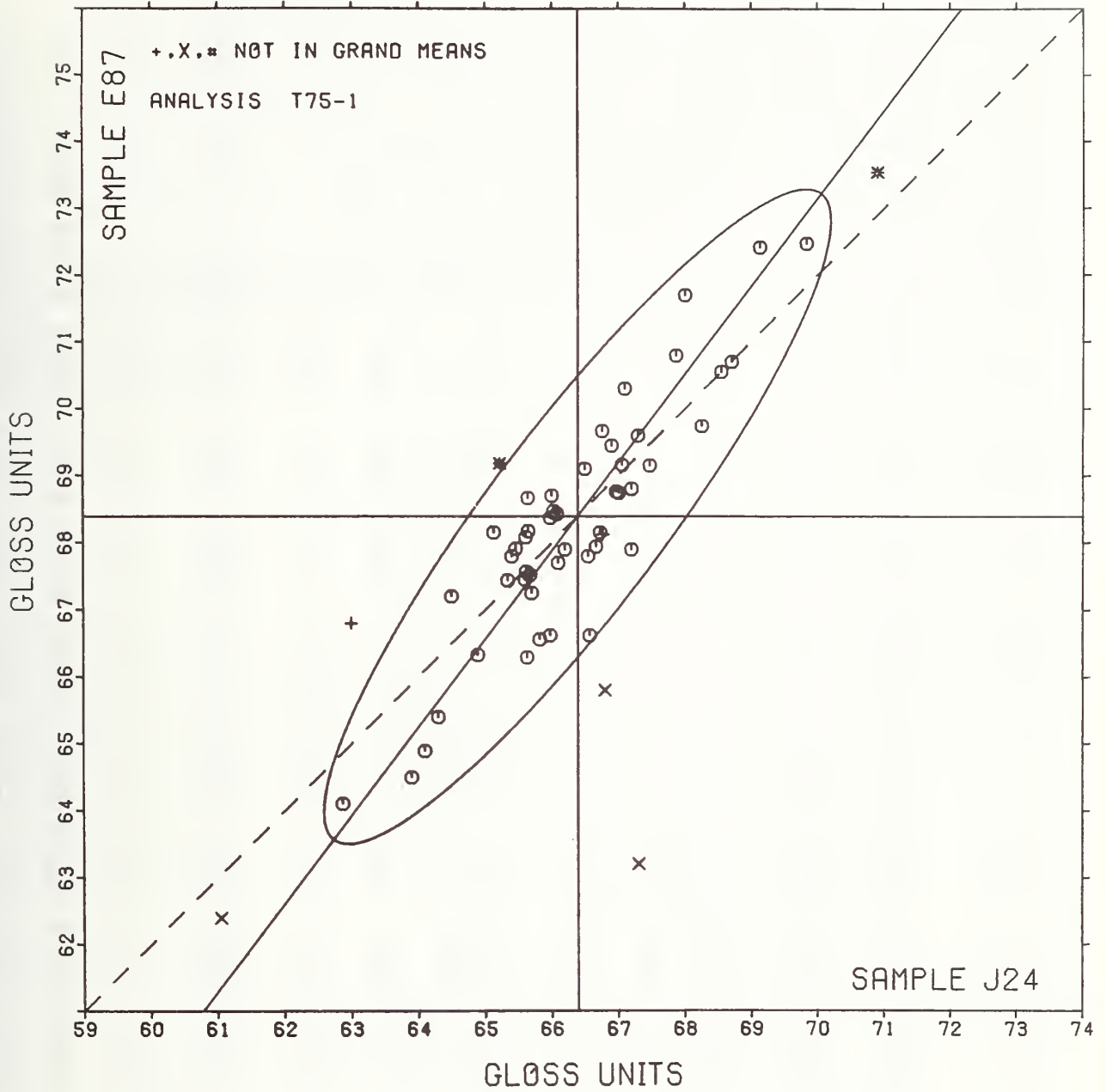
SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS

TAPPI STANDARD T480 6S-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J24	E87	MAJOR	MINOR	R.SDR	VAR			
L388	X	61.0	62.4	-8.0	.6	1.00	75P	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT	
L190C	Ø	62.9	64.1	-5.5	.2	.67	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L250	*	63.0	66.8	-3.3	1.7	1.74	75Q	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT, 20 C, 65% RH	
L574	Ø	63.9	64.5	-4.6	-0.4	.88	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L573	Ø	64.1	64.9	-4.2	-0.3	1.28	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L279	Ø	64.3	65.4	-3.7	-0.1	1.09	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L128	Ø	64.5	67.2	-2.1	.8	.78	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L483	Ø	64.9	66.3	-2.6	-0.1	.98	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L121	Ø	65.1	68.1	-1.0	.9	.86	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L173A	*	65.2	69.2	-0.1	1.4	.83	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L598	Ø	65.3	67.4	-1.4	.3	1.32	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L396	Ø	65.4	67.8	-1.1	.4	.83	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L259	Ø	65.5	67.9	-1.0	.5	1.02	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L372	Ø	65.6	67.4	-1.2	.1	.89	75H	SPECULAR GLOSS (75 DEGREE),	BAUSCH + LOMB	
L122	Ø	65.6	68.1	-0.7	.4	.86	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L456	Ø	65.6	67.6	-1.1	.1	1.03	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L328	Ø	65.6	66.3	-2.1	-0.7	1.08	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L592	Ø	65.6	68.7	-0.2	.8	1.06	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L668	Ø	65.6	68.2	-0.6	.5	1.40	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L688	Ø	65.7	67.5	-1.1	.0	.60	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L262	Ø	65.7	67.2	-1.3	-0.1	1.15	75K	SPECULAR GLOSS (75 DEGREE),	GABRTNER (K-C TYPE)	
L349	Ø	65.8	66.6	-1.8	-0.7	.95	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L323	Ø	66.0	66.6	-1.7	-0.7	1.43	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L301	Ø	66.0	68.4	-0.3	.3	1.01	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L315	Ø	66.0	68.7	.0	.5	1.14	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L206	Ø	66.0	68.5	-0.2	.3	.86	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L190R	Ø	66.1	68.4	-0.2	.3	.70	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L212	Ø	66.1	67.7	-0.7	-0.2	2.12	75P	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT	
L564	Ø	66.2	67.9	-0.5	-0.1	1.98	75P	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT	
L134	Ø	66.5	69.1	.6	.3	.72	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L189	Ø	66.5	67.8	-0.4	-0.5	1.20	75P	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT	
L643	Ø	66.6	66.6	-1.3	-1.2	1.16	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L256	Ø	66.7	67.9	-0.2	-0.5	.68	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L230	Ø	66.7	68.1	.0	-0.4	.62	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L213	Ø	66.8	69.7	1.2	.5	.94	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L288	*	66.8	68.1	.0	-0.5	1.07	75I	SPECULAR GLOSS (75 DEGREE),	HUNTER, 20 C, 65% RH	
L274	X	66.8	65.8	-1.8	-1.9	.39	75P	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT	
L211	Ø	66.9	69.4	1.1	.2	1.04	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L291	Ø	67.0	68.8	.6	-0.2	.85	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L583	Ø	67.0	68.7	.6	-0.3	1.10	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L182	Ø	67.1	69.2	1.0	-0.1	.67	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L243	Ø	67.1	70.3	1.9	.6	.91	75H	SPECULAR GLOSS (75 DEGREE),	HAUSCH + LOMB	
L321	Ø	67.2	67.9	.1	-0.9	.75	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L255	Ø	67.2	68.8	.8	-0.4	1.14	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L339	X	67.3	63.2	-3.6	-3.9	2.66	75P	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT	
L587	Ø	67.3	69.6	1.5	.0	.97	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L223	Ø	67.5	69.1	1.3	-0.4	.74	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L108	Ø	67.9	70.8	2.8	.3	.98	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L317	Ø	68.0	71.7	3.6	.7	1.13	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L670	Ø	68.3	69.7	2.2	-0.7	1.21	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L153	Ø	68.5	70.5	3.0	-0.4	.83	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L278	Ø	68.7	70.7	3.2	-0.4	.75	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L162	Ø	69.1	72.4	4.9	.3	.74	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L210	Ø	69.8	72.5	5.3	-0.3	.86	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L136	*	70.9	73.5	6.8	-0.5	.68	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
GMEANS:		66.4	68.4			1.00				
		95% BILIPSE:		6.1	1.3			WITH GAMMA = 52 DEGREES		

SPECULAR GLOSS, 75 DEGREE

SAMPLE J24 = 66.4 GLOSS UNITS SAMPLE E87 = 68.4 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 J81		PRINTING 73 GRAMS PER SQUARE METER				SAMPLE J64		PRINTING 85 GRAMS PER SQUARE METER				TEST D. = 10		
	MEAN	DEV	N. DEV	SDR	R. SDR	MEAN	DEV	N. DEV	SDR	R. SDR	VAR	F	LAB		
L100	2.791	.082	1.22	.024	.56	5.428	.182	1.93	.049	1.07	90V	0	L100		
L105	2.756	.047	.70	.028	.64	5.271	.025	.26	.031	.67	90Q	0	L105		
L122	2.789	.080	1.19	.037	.86	5.377	.131	1.39	.053	1.16	90V	0	L122		
L123F	2.860	.151	2.25	.046	1.06	5.365	.119	1.26	.071	1.56	90F	0	L123F		
L125	2.714	.008	.08	.049	1.13	5.280	.034	.36	.051	1.12	90T	0	L125		
L128	2.731	.022	.33	.022	.52	5.268	.022	.23	.039	.86	90T	0	L128		
L141	2.760	.051	.76	.032	.73	5.270	.024	.25	.035	.77	90T	0	L141		
L153	2.865	.156	2.32	.047	1.10	5.314	.068	.72	.051	1.12	90T	*	L153		
L158	2.700	-.009	-.13	.024	.55	5.300	.054	.57	.024	.52	90T	0	L158		
L162	2.680	-.029	-.43	.063	1.46	5.250	.004	.04	.053	1.16	90D	0	L162		
L166	2.741	.032	.48	.028	.64	5.222	-.024	-.26	.033	.73	90T	0	L166		
L173B	2.730	.021	.32	.048	1.12	5.330	.084	.89	.048	1.06	90F	0	L173B		
L174	2.590	-.119	-1.77	.088	2.03	5.130	-.116	-1.24	.082	1.81	90T	0	L174		
L182	2.644	-.065	-.97	.054	1.25	5.209	-.038	-.40	.052	1.14	90L	0	L182		
L183	2.739	.030	.45	.061	1.40	5.281	.035	.37	.019	.42	90T	0	L183		
L190C	2.610	-.095	-1.47	.039	.91	5.145	-.101	-1.08	.064	1.41	90T	0	L190C		
L203A	2.630	-.075	-1.17	.059	1.36	5.170	-.076	-.81	.067	1.48	90T	0	L203A		
L203C	2.680	-.029	-.43	.063	1.46	5.155	-.091	-.97	.037	.81	90T	0	L203C		
L212	2.750	.041	.61	.041	.94	5.380	.134	1.42	.048	1.06	90T	0	L212		
L213	2.680	-.025	-.43	.140	3.23	5.260	.014	.14	.052	1.13	90T	0	L213		
L223	2.686	-.023	-.34	.035	.82	5.280	.034	.36	.031	.69	90V	0	L223		
L228	2.720	.011	.17	.092	2.13	5.280	.034	.36	.063	1.39	90T	0	L228		
L238A	2.676	-.033	-.49	.023	.53	5.244	-.002	-.03	.040	.87	90T	0	L238A		
L241	2.835	.126	1.88	.034	.78	5.300	.054	.57	.053	1.16	90T	0	L241		
L249	2.736	.027	.40	.027	.63	5.232	-.014	-.15	.044	.96	90T	0	L249		
L259	2.663	-.046	-.68	.042	.98	5.244	-.002	-.03	.034	.74	90T	0	L259		
L260	2.698	-.011	-.16	.023	.53	5.234	-.012	-.13	.037	.82	90T	0	L260		
L261	2.727	.018	.27	.029	.66	5.305	.059	.62	.035	.76	90T	0	L261		
L262	2.695	-.014	-.21	.037	.85	5.190	-.056	-.60	.039	.87	90T	0	L262		
L274D	2.710	.001	.02	.088	2.03	5.230	-.016	-.17	.067	1.48	90D	0	L274D		
L285	2.656	-.053	-.79	.053	1.22	5.012	-.234	-2.49	.083	1.83	90T	*	L285		
L291	2.690	-.019	-.28	.032	.73	5.175	-.071	-.76	.026	.58	90T	0	L291		
L309	2.650	-.059	-.87	.053	1.22	5.200	-.046	-.49	.000	.00	90T	0	L309		
L318	2.625	-.084	-1.25	.042	.98	5.165	-.081	-.87	.047	1.04	90T	0	L318		
L320	.003	-2.706	-40.25	.000	.00	.005	-5.241	-55.78	.000	.00	90T	#	L320		
L323	2.604	-.105	-1.56	.028	.66	5.102	-.144	-1.54	.040	.87	90T	0	L323		
L324	2.680	-.025	-.43	.035	.81	5.160	-.086	-.92	.039	.87	90T	0	L324		
L326	2.715	.006	.09	.024	.56	5.300	.054	.57	.033	.73	90T	0	L326		
L328	2.723	.014	.21	.028	.65	5.259	.013	.13	.033	.73	90T	0	L328		
L331	2.718	.009	.14	.069	1.61	5.152	-.094	-1.00	.055	1.21	90T	0	L331		
L339	2.695	-.014	-.21	.055	1.27	5.165	-.081	-.87	.058	1.27	90T	0	L339		
L352	2.723	.014	.21	.044	1.02	5.270	.024	.25	.066	1.45	90Q	0	L352		
L356	2.703	-.006	-.09	.028	.64	5.276	.030	.31	.048	1.05	90T	0	L356		
L358	2.696	-.013	-.19	.028	.64	5.285	.039	.41	.035	.76	90T	0	L358		
L380	2.800	.091	1.36	.000	.00	5.250	.004	.04	.053	1.16	90T	0	L380		
L382	2.780	.071	1.06	.042	.98	5.360	.114	1.21	.052	1.13	90T	0	L382		
L390	2.754	.045	.67	.025	.58	5.338	.092	.97	.029	.64	90T	0	L390		
L442	2.829	.120	1.79	.034	.80	5.441	.195	2.07	.055	1.20	90V	0	L442		
L556	2.788	.079	1.18	.018	.42	5.286	.040	.42	.029	.64	90T	0	L556		
L557	2.660	-.045	-.73	.052	1.19	5.190	-.056	-.60	.032	.69	90T	0	L557		
L567	2.640	-.069	-1.02	.052	1.19	5.290	.044	.46	.110	2.42	90V	0	L567		
L574	2.623	-.086	-1.28	.055	1.26	5.029	-.217	-2.31	.040	.88	90V	0	L574		
L575	2.690	-.019	-.28	.020	.46	5.214	-.032	-.35	.053	1.16	90T	0	L575		
L581	2.845	.136	2.03	.037	.85	5.440	.194	2.06	.046	1.01	90T	0	L581		
L585	2.700	-.009	-.13	.047	1.09	5.300	.054	.57	.047	1.04	90T	0	L585		
L587	2.610	-.099	-1.47	.074	1.71	5.250	.004	.04	.053	1.16	90T	0	L587		
L626	2.610	-.099	-1.47	.032	.73	4.988	-.258	-2.75	.039	.86	90T	0	L626		
L679	2.610	-.099	-1.47	.039	.91	5.205	-.041	-.44	.028	.62	90T	0	L679		

GR. MEAN = 2.709 MILS
SD MEANS = .067 MILS

GRAND MEAN = 5.246 MILS
SD OF MEANS = .094 MILS

TEST DETERMINATIONS = 10
57 LABS IN GRAND MEANS

AVERAGE SDR = .043 MILS

AVERAGE SDR = .046 MILS

GR. MEAN = 68.80 MICROMETER

GRAND MEAN = 133.26 MICROMETER

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

DECEMBER 1978

LAB CODE	SAMPLE J81 MEAN	PRINTING 73 GRAMS PER SQUARE METER				SAMPLE J64 MEAN	PRINTING 85 GRAMS PER SQUARE METER				TEST D. ° 10		
		DEV	N. DEV	SDR	R. SDR		DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L185	2.650	-.059	-.87	.038	.88	5.190	-.056	-.60	.025	.56	90B	*	L185
L203B	2.370	-.339	-5.04	.095	2.19	5.020	-.226	-2.41	.042	.93	90C	*	L203B
L2426	2.671	-.037	-.56	.017	.38	5.244	-.002	-.02	.043	.95	906	*	L2426
L242P	2.801	.093	1.38	.034	.80	5.410	.163	1.74	.046	1.00	90P	*	L242P
L243	2.708	-.601	-.01	.021	.50	5.172	-.074	-.79	.027	.59	90S	*	L243
L274C	2.710	.001	.02	.074	1.71	5.270	.024	.25	.067	1.48	90C	*	L274C
L344	2.850	.141	2.10	.053	1.22	5.330	.084	.89	.082	1.81	90U	*	L344
L484	2.665	-.043	-.65	.037	.86	5.138	-.109	-1.16	.033	.73	90E	*	L484
L563	2.750	.041	.61	.053	1.22	5.270	.024	.25	.048	1.06	90U	*	L563
L564	2.640	-.069	-1.02	.052	1.19	5.200	-.046	-.49	.067	1.46	90Y	*	L564
L576	2.625	-.084	-1.25	.054	1.25	5.260	.014	.14	.176	3.87	90C	*	L576
L616	2.488	-.221	-3.28	.041	.96	5.128	-.118	-1.26	.077	1.70	90C	*	L616
L684	2.713	.004	.06	.042	.98	5.290	.044	.46	.052	1.14	90U	*	L684
TOTAL NUMBER OF LABORATORIES REPORTING • 71													

Best values: J81 2.70 ± 0.10 mils
J64 5.26 ± 0.16 mils

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

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS 190-1 TABLE 2
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI STANDARD T411 09-76

LAB CODE	F	MEANS		COORDINATES		AVG R.S.DH	VAR	PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J81	J64	MAJOR	MINOR					
L320	#	.003	.005	-5.873	-.545	.00	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L203B	*	2.370	5.020	-.373	.163	1.56	90C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN
L616	*	2.488	5.128	-.219	.122	1.33	90C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN
L174	*	2.590	5.130	-.162	.037	1.92	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L323	0	2.604	5.102	-.178	.010	.76	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L679	0	2.610	5.205	-.088	.061	.77	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L190C	0	2.610	5.145	-.139	.029	1.16	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L626	*	2.610	4.988	-.271	-.056	.80	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L587	0	2.610	5.250	-.050	.085	1.43	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L574	0	2.623	5.029	-.229	-.045	1.07	90V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L576	*	2.625	5.260	-.034	.078	2.56	90C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN
L318	0	2.625	5.165	-.114	.027	1.01	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L203A	0	2.630	5.170	-.107	.025	1.42	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L564	*	2.640	5.200	-.076	.033	1.33	90V	THICKNESS (CALIPER),	WEAF,	HAND DRIVEN
L567	0	2.640	5.250	-.000	.081	1.81	90V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L182	0	2.644	5.209	-.067	.034	1.19	90L	THICKNESS (CALIPER),	L * W,	MOTOR DRIVEN
L185	*	2.650	5.190	-.079	.019	.72	90B	THICKNESS (CALIPER),	AMTHOR,	HAND DRIVEN
L309	0	2.650	5.200	-.071	.025	.61	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L285	*	2.656	5.012	-.226	-.081	1.53	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L557	0	2.660	5.190	-.074	.011	.94	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L259	0	2.663	5.244	-.027	.037	.86	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L484	*	2.665	5.138	-.115	-.022	.80	90B	THICKNESS (CALIPER),	SCHOPPER,	HAND DRIVEN
L2420	*	2.671	5.244	-.022	.030	.67	900	THICKNESS (CALIPER),	MESSMER,	MOTOR DRIVEN, BS3983
L238A	0	2.676	5.244	-.020	.026	.70	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L162	0	2.680	5.250	-.013	.026	1.31	90D	THICKNESS (CALIPER),	CADY,	MOTOR DRIVEN
L213	0	2.680	5.260	-.004	.032	2.18	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L324	0	2.680	5.160	-.088	-.022	.84	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L203C	0	2.680	5.155	-.093	-.025	1.14	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L223	0	2.686	5.280	.016	.037	.75	90V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L575	0	2.690	5.214	-.037	-.002	.81	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L291	0	2.690	5.175	-.070	-.023	.66	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L262	0	2.695	5.190	-.055	-.019	.86	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L339	0	2.695	5.165	-.076	-.032	1.27	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L358	0	2.696	5.285	.026	.032	.70	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L260	0	2.698	5.234	-.016	.002	.68	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L158	0	2.700	5.300	.040	.036	.53	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L585	0	2.700	5.300	.040	.036	1.06	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L356	0	2.703	5.276	.022	.021	.84	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L243	*	2.708	5.172	-.063	-.039	.55	90S	THICKNESS (CALIPER),	SCHOPPER,	HAND DRIVEN
L274C	*	2.710	5.270	.020	.012	1.59	90C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN
L274D	0	2.710	5.230	-.013	-.010	1.75	90D	THICKNESS (CALIPER),	CADY,	MOTOR DRIVEN
L684	*	2.713	5.290	.039	.020	1.06	90V	THICKNESS (CALIPER),	TMI,	HAND DRIVEN
L125	0	2.714	5.280	.031	.014	1.13	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L326	0	2.715	5.300	.048	.024	.65	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L331	0	2.718	5.182	-.075	-.059	1.41	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L228	0	2.720	5.280	.034	.009	1.76	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L352	0	2.723	5.270	.028	.001	1.23	90Q	THICKNESS (CALIPER),	EMVECO,	MOTOR DRIVEN
L328	0	2.723	5.259	.018	-.005	.69	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L261	0	2.727	5.305	.059	.016	.71	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L173B	0	2.730	5.330	.082	.027	1.09	90P	THICKNESS (CALIPER),	FEDERAL,	MOTOR DRIVEN
L128	0	2.731	5.268	.030	-.007	.69	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L249	0	2.736	5.232	.003	-.031	.80	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L183	0	2.739	5.281	.045	-.007	.91	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L166	0	2.741	5.222	-.003	-.040	.69	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L563	*	2.750	5.270	.042	-.022	1.14	90U	THICKNESS (CALIPER),	TMI,	HAND DRIVEN
L212	0	2.750	5.380	.135	.037	1.00	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L390	0	2.754	5.338	.101	.011	.61	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L105	0	2.756	5.271	.046	-.027	.66	90Q	THICKNESS (CALIPER),	EMVECO,	MOTOR DRIVEN
L141	0	2.760	5.270	.047	-.030	.75	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L382	0	2.780	5.360	.134	.001	1.05	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L556	0	2.788	5.286	.076	-.045	.53	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L122	0	2.789	5.377	.153	.003	1.01	90V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L100	0	2.791	5.428	.197	.029	.82	90V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L380	0	2.800	5.250	.052	-.075	.58	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L242P	*	2.801	5.410	.187	.010	.90	90P	THICKNESS (CALIPER),	MESSMER,	MOTOR DRIVEN, IS6 R534

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J81	J64	MAJOR	MINOR	R.SDR	VAR			
L442	0	2.829	5.441	.229	.004	1.00	90V	THICKNESS (CALIPER).	TMI.	MOTOR DRIVEN, DIGITIZED
L241	0	2.835	5.300	.113	-.077	.97	90T	THICKNESS (CALIPER).	TMI.	MOTOR DRIVEN
L581	0	2.845	5.440	.236	-.010	.93	90T	THICKNESS (CALIPER).	TMI.	MOTOR DRIVEN
L344	*	2.850	5.330	.146	-.074	1.51	90U	THICKNESS (CALIPER).	TMI.	HAND DRIVEN
L123F	0	2.860	5.365	.181	-.063	1.31	90F	THICKNESS (CALIPER).	FEDERAL.	MOTOR DRIVEN
L153	*	2.865	5.314	.141	-.095	1.11	90T	THICKNESS (CALIPER).	TMI.	MOTOR DRIVEN
GMEANS:		2.709	5.246			1.00				
		95% ELLIPSE:		.276	.100	WITH GAMMA = 57 DEGREES				

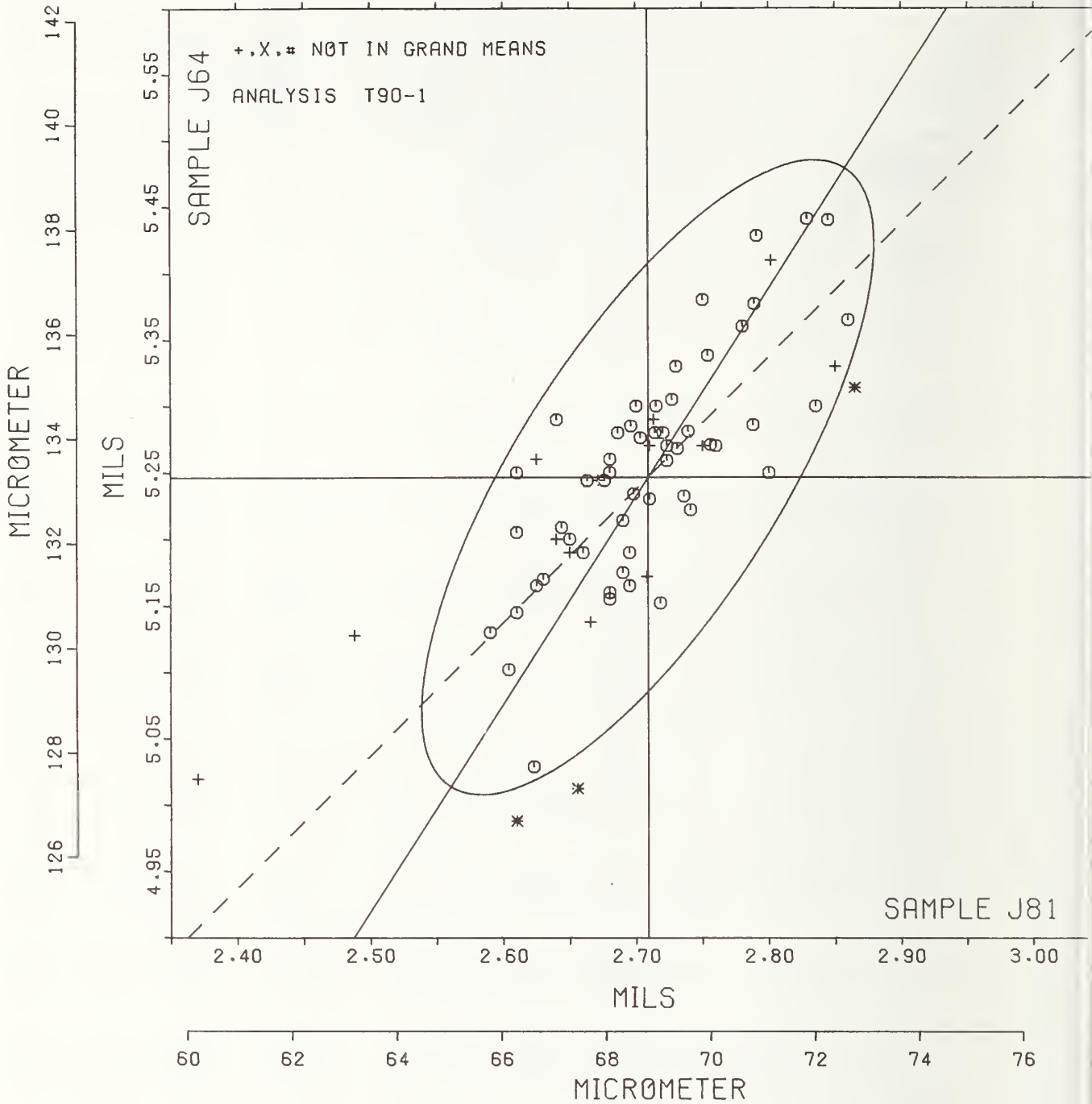
THICKNESS (CALIPER)

SAMPLE J81 = 2.71 MILS

SAMPLE J64 = 5.25 MILS

SAMPLE J81 = 68.8 MICRØMETER

SAMPLE J64 = 133.3 MICRØMETER



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

LAB CODE	SAMPLE D31 MEAN	COATED BOND 74 GRAMS PER SQUARE METER				R _s SDR	SAMPLE D32 MEAN	BOND 79 GRAMS PER SQUARE METER				TEST D _s = 10		
		DEV	N _s DEV	SDR	R _s SDR			DEV	N _s DEV	SDR	R _s SDR	VAR	F	LAB
L100	76.46	.68	1.06	.60	1.40		78.96	-.03	-.03	.27	.76	95C	Ø	L100
L121	75.68	-.10	-.15	.31	.73		77.96	-1.03	-1.27	.41	1.15	95B	Ø	L121
L162	75.20	-.58	-.91	.00	.00		79.00	.01	.02	.00	.00	95K	Ø	L162
L213	76.32	.53	.84	.73	1.69		79.47	.48	.60	.69	1.92	95F	Ø	L213
L249	76.03	.25	.39	.70	1.64		78.93	-.06	-.07	.21	.57	95I	Ø	L249
L274	75.80	.02	.03	.42	.98		79.30	.31	.39	.48	1.35	95B	Ø	L274
L280	75.71	-.07	-.11	.52	1.21		79.36	.37	.46	.45	1.24	95T	Ø	L280
L339	75.80	.02	.03	1.05	2.44		81.50	2.51	3.10	.63	1.76	95T	#	L339
L342	76.17	.39	.61	.81	1.89		80.13	1.15	1.41	.48	1.34	95C	Ø	L342
L344	76.09	.31	.48	.15	.36		79.65	.66	.81	.50	1.40	95T	Ø	L344
L442	76.12	.34	.53	.30	.70		79.73	.74	.92	.21	.57	95K	Ø	L442
L484	95.80	20.02	31.29	.56	1.31		98.83	19.84	24.46	.23	.64	95H	#	L484
L559	74.98	-.80	-1.25	.18	.42		77.37	-1.62	-1.99	.25	.70	95K	Ø	L559
L564	78.30	2.52	3.94	.67	1.57		81.40	2.41	2.97	.52	1.44	95E	#	L564
L567	7.57	-68.21	-106.60	.07	.17		7.88	-71.11	-87.65	.04	.10	95E	#	L567
L574	75.43	-.35	-.55	.40	.93		78.12	-.87	-1.07	.58	1.63	95D	Ø	L574
L597	74.28	-1.50	-2.35	.38	.88		78.10	-.89	-1.09	.00	.00	95C	Ø	L597
L688	76.66	.88	1.38	.50	1.17		79.74	.75	.93	.49	1.38	95T	Ø	L688

GR. MEAN = 75.78 G/SQ.METER GRAND MEAN = 78.99 G/SQ.METER TEST DETERMINATIONS = 10
SD MEANS = .64 G/SQ.METER SD OF MEANS = .81 G/SQ.METER 14 LABS IN GRAND MEANS
AVERAGE SDR = .43 G/SQ.METER AVERAGE SDR = .36 G/SQ.METER
TOTAL NUMBER OF LABORATORIES REPORTING = 18

Best values: D31 75.9 ± 0.9 grams per square meter
D32 79.1 ± 1.2 grams per square meter

The following laboratories were omitted from the grand means because of extreme test results: 339, 484, 564, 567.

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

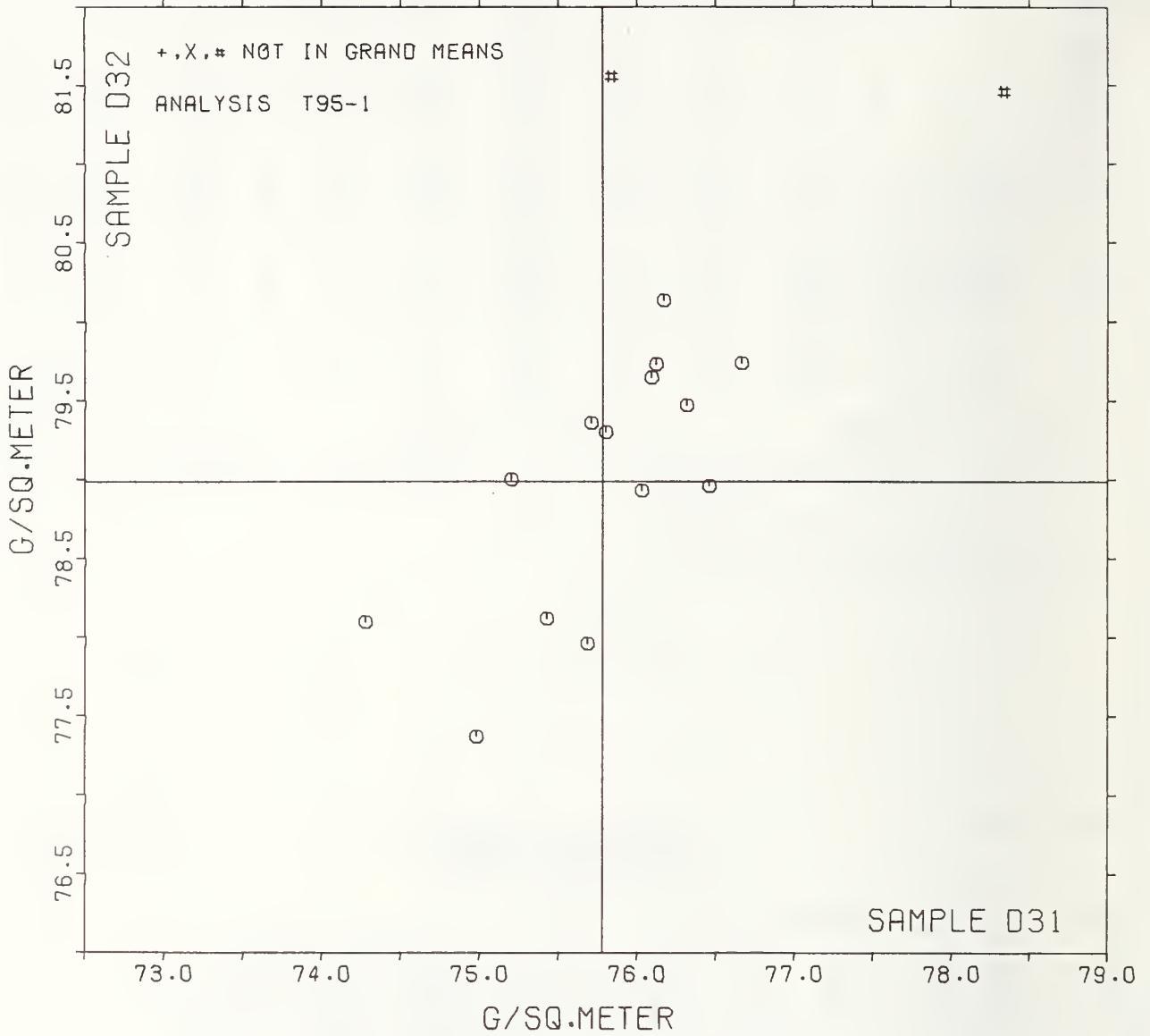
LAB CODE	F	MEANS		COORDINATES		AVG R _s SDR	VAR	PROPERTY---	TBST INSTRUMENT---	CONDITIONS
		D31	D32	MAJOR	MINOR					
L567	#	7.57	7.88	-97.55	13.92	.14	95E	BASIS WEIGHT (GRAMMAGE),	GUILLOTINE TYPE CUTTER	
L597	Ø	74.28	78.10	-1.60	.70	.44	95C	BASIS WEIGHT (GRAMMAGE),	CUTTING BOARD	
L559	Ø	74.98	77.37	-1.78	-.29	.56	95K	BASIS WEIGHT (GRAMMAGE),	WEIGHED AS RECEIVED	
L162	Ø	75.20	79.00	-.33	.48	.00	95K	BASIS WEIGHT (GRAMMAGE),	WEIGHED AS RECEIVED	
L574	Ø	75.43	78.12	-.91	-.22	1.28	95D	BASIS WEIGHT (GRAMMAGE),	DIE CUT	
L121	Ø	75.68	77.96	-.89	-.52	.94	95B	BASIS WEIGHT (GRAMMAGE),	CONCORA CUTTER	
L280	Ø	75.71	79.36	.26	.28	1.23	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L274	Ø	75.80	79.30	.26	.17	1.16	95B	BASIS WEIGHT (GRAMMAGE),	CONCORA CUTTER	
L339	#	75.80	81.50	2.05	1.45	2.10	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L249	Ø	76.03	78.93	.10	-.24	1.10	95I	BASIS WEIGHT (GRAMMAGE),	INGENT® PAPER CUTTER	
L344	Ø	76.09	79.65	.72	.13	.88	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L442	Ø	76.12	79.73	.80	.16	.64	95K	BASIS WEIGHT (GRAMMAGE),	WEIGHED AS RECEIVED	
L342	Ø	76.17	80.13	1.16	.35	1.61	95C	BASIS WEIGHT (GRAMMAGE),	CUTTING BOARD	
L213	Ø	76.32	79.47	.70	-.15	1.81	95F	BASIS WEIGHT (GRAMMAGE),	FOUR-SQUARE CUTTER	
L100	Ø	76.46	78.96	.37	-.57	1.08	95C	BASIS WEIGHT (GRAMMAGE),	CUTTING BOARD	
L688	Ø	76.66	79.74	1.13	-.28	1.27	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L564	#	78.30	81.40	3.43	-.64	1.51	95E	BASIS WEIGHT (GRAMMAGE),	GUILLOTINE TYPE CUTTER	
L484	#	95.80	98.83	27.79	-4.69	.98	95B	BASIS WEIGHT (GRAMMAGE),	SQUARE AND BLADE	

GMEANS: 75.78 78.99 1.00
95% ELLIPSE: 2.79 1.10 WIDE GAMMA = 54 DEGREES

GRAMMAGE (MASS PER UNIT AREA)

SAMPLE D31 = 75.8 G/SQ.METER

SAMPLE D32 = 79.0 G/SQ.METER



SUMMARY TABLE

TEST METHOD	SAMPLE CODE	GRAND MEAN	SD OF MEAN	AVER SDR	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
AIR RESISTANCE, GURLEY T40-1 GURLEY UNITS	J48	31.2	1.1	1.6	10	52	59	10	1.4	3.0
	K21	50.8	2.4	4.6					4.0	6.7
AIR RESISTANCE, SHEFFIELD T40-2 SHEFF. UNITS	J48	105.0	5.0	4.3	10	39	45	10	3.8	13.9
	K21	72.4	7.0	6.2					5.4	19.3
AIR RESISTANCE, GURLEY BG FLOTATION T41-1 SEC/10 CC	E37	783.	30.	84.	10	13	14	10	74.	82.
	E69	662.	39.	86.					75.	108.
SMOOTHNESS, PARKER PRINISURP T44-1 MICRONS	J73	4.49	.36	.13	10	10	10	10	.12	.99
	K45	5.46	.50	.13					.12	1.38
SMOOTHNESS, SHEFFIELD T45-1 SHEFF. UNITS	J73	85.8	6.4	5.0	15	83	89	10	4.4	17.8
	K45	160.7	7.3	8.4					7.4	20.7
SMOOTHNESS, BEKK T45-2 BEKK SECONDS	J73	71.1	3.8	5.4	15	9	12	10	4.8	10.8
	K45	28.0	1.7	2.6					2.3	4.9
SMOOTHNESS, BENDTSEN T47-1 ML/MIN	J73	98.5	9.3	8.7	10	9	11	10	7.6	25.7
	K45	199.7	7.6	17.7					15.5	21.1
K & N INK ABSORPTION T56-1 K & N UNITS	B80	24.8	3.0	1.1	4	8	11	4	1.6	8.2
	E48	26.3	4.2	.8					1.1	11.6
PH, COLD T57-1 PH UNITS	J62	5.61	.60	.11	5	7	7	2	.21	1.66
	J78	7.42	.50	.08					.15	1.38
PH, HOT T57-2 PH UNITS	J62	5.046	.586	.052	5	5	5	2	.103	1.625
	J78	7.740	.153	.048					.094	.430
OPACITY, B&L TYPE, 89% BACKING T60-1 PERCENT	J58	92.85	.48	.33	10	71	86	5	.40	1.35
	E86	89.77	.62	.37					.46	1.74
OPACITY, B&L TYPE, PAPER BACKING T60-2 PERCENT	J58	92.67	.92	.34	10	6	6	5	.42	2.57
	E86	91.22	1.17	.35					.43	3.26
OPACITY, ELREPB0 TYPE, PAPER BACKING T60-3 PERCENT	J58	93.61	.18	.19	10	15	17	5	.24	.53
	E86	92.05	.21	.22					.27	.61
BLUE REFLECTANCE, DIRECTIONAL T65-1 PERCENT	J97	75.74	.38	.18	8	21	45	6	.20	1.06
	J36	83.91	.52	.12					.14	1.44
BLUE REFLECTANCE, DIFFUSE, WITH TRAP T65-2 PERCENT	J97	75.62	.61	.12	8	18	19	6	.14	1.69
	J36	84.50	.56	.08					.09	1.54
BLUE REFLECTANCE, DIFFUSE, NO TRAP T65-3 PERCENT	J97	76.63	.76	.11	8	17	17	6	.12	2.10
	J36	84.17	.91	.10					.11	2.53
SPECULAR GLOSS, 75 DEGREE T75-1 GLOSS UNITS	J24	66.4	1.5	1.0	10	50	55	5	1.3	4.2
	E87	68.4	1.9	2.1					2.6	5.6
THICKNESS (CALIPER) T90-1 MILS	J81	2.709	.067	.043	10	57	71	10	.038	.186
	J64	5.246	.094	.046					.040	.260
GRAMMAGE (MASS PER UNIT AREA) T95-1 G/SQ.METER	D31	75.78	.64	.43	10	14	18	3	.69	1.86
	D32	78.99	.81	.36					.57	2.30

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