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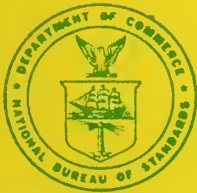


TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

NBSIR 80-1821

COLLABORATIVE REFERENCE PROGRAM
FOR PAPER

REPORT NO. 61G



U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

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80-1821
1980

NBS COLLABORATIVE REFERENCE PROGRAMS

TAPPI Paper and Board (6 times per year)

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

FKBG-API Containerboard (48 times per year)

Mullen burst of linerboard
Concora test of medium

MCCA Color and Appearance (4 times per year)

Gloss at 60°
Color and color difference

CTS Rubber (4 times per year)

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

ASTM Cement (2 times per year)

Chemical (11 chemical components)
Physical (15 characteristics)

AASHTO Bituminous

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

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

SEP 19 1980

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM
FOR PAPER

Report No. 61G

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National Engineering Laboratory

NBSIR 80-1821

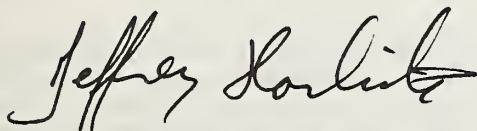
U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

INTRODUCTION

Reports 61S and 61G comprise the first set of reports for the 79-80 program year. Participants in tests which involve strength properties of paper will receive only the S report; those in tests which measure other properties will receive only the G report.

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

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



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

February 1, 1980

TAPPI-NBS COLLABORATIVE REFERENCE PROGRAM

BACKGROUND AND PURPOSE

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

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

HOW THE PROGRAM WORKS

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

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

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

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

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

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

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

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

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TABLE OF CONVERSION FACTORS TO METRIC (SI) UNITS

<u>Physical Quantity</u>	<u>To Convert From</u>	<u>To</u>	<u>Multiply by</u>
Bursting strength	psi	kPa	6.895
	kg/cm 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 D₀) and again at the bottom of this table.
- GRAND MEAN - (GR₀ 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.
- N₀ 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 N₀ 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.
- R₀ 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 or her measurements relative to the average ability. The greater the number of TEST DETERMINATIONS the closer the R₀ SDR should be to unity. If R₀ SDR is outside the limits given below, the participant may not be following the procedure considered standard for this analysis:

No. of test determinations -----	Lower limit for R ₀ SDR -----	Upper limit for R ₀ SDR -----
3	0.09	2.58
4	0.18	2.25
5	0.26	2.06
8	0.40	1.77
10	0.46	1.67
15	0.56	1.53
20	0.61	1.45
25	0.65	1.39

- VAR - Code for instrument type or variation in condition, see second table.
- F - Flag, with following meaning:
- θ - Included in grand mean and inside 95% error ellipse.
 - * - Included in grand means but plotted point falls outside of the 95% error ellipse. The participant should take this as a warning to reexamine his or her testing procedure.
 - X - Excluded because plotted point would fall outside of the 99% error ellipse, (see page 2 for explanation of Graph).
 - # - Excluded because data were not understood or because of a non-coded variation reported by the laboratory. (See the notes following Table 1 for each method).
 - + - Excluded from grand means because VAR was non-standard for the analysis.
 - M - Excluded because data for one sample are missing.
 - S - Included in grand mean but only after omission of one or more 'wild' values; that is test determinations more than 3 times AVERAGE SDR from the laboratory's MEAN. Not more than 20% of the test determination may be excluded in this manner without rejecting the laboratory.
- Best values - Given at the end of table 1 for each method for which sufficient information is available. These best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of standards and other recognized reference laboratories in this and other countries. All participants using equipment that is standard for the analysis should be able to achieve results within the plus-minus (+/-) limits, when these are shown along with the best values.
- COORDINATES - Distances along major and minor axes of error ellipse. If special additive or concurrent model of the measuring process applies to this method, the distance along the minor axis represents the random error within a laboratory while that along the major axis also includes a systematic laboratory component of error.
- 95% ELLIPSE - Lengths of the major and minor axes of the ellipse and the angle that the major axis makes with the horizontal axis.
- AVG R₀ SDR - Average of the R₀ 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 degrees. The solid sloping line, which may or may not lie close to the 45 degree line, is along the major axis of the error ellipse. The ellipse is drawn so that, on the average, it will include 95% of the points representing the laboratories.

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

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

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

SUMMARY -
(At end of report)

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

REPL CRP -

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

PEPL TAPPI -

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

ANALYSIS T40-1 TABLE 1
AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)
TAPPI OFFICIAL TEST METHOD T400 65-75, AIR RESISTANCE OF PAPER

LAB CODE	SAMPLE A21 90 GRAMS PER SQUARE METER KRAFT ENVELOPE					SAMPLE A22 103 GRAMS PER SQUARE METER PRINTING					TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAP	F	LAB
L106	20.2	-1.07	-1.02	3.7	1.033	44.4	-1.00	-0.40	3.5	1.12	4CD	0	L106
L107	23.1	1.02	0.70	3.0	1.15	45.2	-0.2	-0.09	3.4	1.08	4CD	0	L107
L121	21.0	-0.7	-0.44	2.5	0.85	45.3	-2.0	-0.83	2.9	0.92	4CD	0	L121
L123	23.8	1.09	1.17	2.9	1.03	45.6	-0.4	-0.16	4.8	1.53	40D	0	L123
L124G	19.0	-2.07	-1.04	3.0	1.07	41.9	-3.5	-1.34	2.0	0.63	4CD	0	L124G
L125	23.4	1.00	0.90	2.3	0.84	44.7	-0.7	-0.28	2.3	0.74	40D	0	L125
L128	23.1	1.02	0.70	1.7	0.82	46.5	1.1	0.40	3.0	1.04	40D	0	L128
L141	23.1	1.02	0.72	2.0	0.96	47.4	2.0	0.75	3.4	1.09	40D	0	L141
L148	22.4	0.0	0.00	3.0	1.18	47.7	2.3	0.87	3.0	0.96	40D	0	L148
L153	21.1	-0.3	-0.47	2.7	0.85	44.0	-1.4	-0.55	3.7	1.18	40D	0	L153
L159	19.4	-2.00	-1.49	3.0	1.07	46.5	3.1	1.17	1.6	0.51	40D	*	L159
L163	20.4	-1.00	-0.80	3.0	1.05	47.0	1.5	0.59	2.0	0.64	40D	0	L163
L166	24.8	2.09	1.70	3.4	1.21	49.3	3.9	1.49	4.2	1.35	40D	0	L166
L174	21.9	0.0	0.00	3.0	1.10	45.6	0.4	0.15	3.9	1.27	40D	0	L174
L176	22.3	0.4	0.20	2.0	0.91	45.3	3.8	1.47	6.9	2.20	4CD	0	L176
L182G	21.8	-0.1	-0.00	1.7	0.59	41.9	-3.5	-1.35	1.2	0.38	40D	0	L182G
L183	22.7	0.8	0.40	4.4	1.09	49.0	3.6	1.36	4.2	1.33	40D	0	L183
L190C	25.1	3.02	1.70	2.0	0.90	45.8	0.4	0.14	1.5	0.47	4CD	0	L190C
L190K	21.7	-0.2	-0.10	3.0	1.09	42.5	-3.0	-1.13	1.9	0.61	40D	0	L190K
L203	23.0	1.4	0.84	3.1	1.10	49.8	4.3	1.66	3.9	1.25	4CD	0	L203
L212	19.9	-1.9	-1.17	4.0	1.71	44.2	-1.2	-0.47	4.2	1.34	40D	0	L212
L219	21.5	-0.4	-0.20	2.0	0.75	45.3	-2.1	-0.82	2.5	0.79	4CD	0	L219
L223	23.0	1.1	0.80	3.0	1.13	48.1	2.7	1.02	3.3	1.07	4CD	0	L223
L228	23.8	1.09	1.14	2.0	0.70	49.2	3.8	1.44	1.6	0.50	40D	0	L228
L230G	22.6	0.7	0.40	2.0	1.00	47.9	2.5	0.94	4.3	1.36	4CD	0	L230G
L241	17.7	-4.0	-2.00	2.0	0.81	40.2	-5.2	-1.99	1.7	0.53	40D	*	L241
L242	22.7	0.8	0.40	2.9	1.02	44.1	-1.3	-0.51	3.2	1.02	40D	0	L242
L254	19.8	-2.00	-1.20	1.8	0.80	40.9	1.5	0.56	3.1	1.01	40D	0	L254
L259	21.2	-0.0	-0.00	2.0	0.84	42.9	-2.5	-0.97	3.1	1.00	40D	0	L259
L261	21.0	-0.0	-0.00	2.1	0.70	45.7	0.2	0.08	3.9	1.26	4CD	0	L261
L262G	23.4	1.6	0.94	1.4	0.51	46.3	0.8	0.32	2.8	0.91	40D	0	L262G
L265	21.4	-0.5	-0.31	1.0	0.80	45.6	0.4	0.14	2.7	0.87	40D	0	L265
L278	22.6	1.0	0.80	4.0	1.02	45.6	0.2	0.07	2.5	0.80	40D	0	L278
L285	23.3	1.4	0.84	2.4	0.84	46.6	1.4	0.52	2.8	0.88	40D	0	L285
L301	21.8	-0.1	-0.04	2.0	0.94	47.7	2.3	0.88	3.2	1.03	40D	0	L301
L308	21.1	-0.3	-0.47	2.0	0.92	46.6	1.4	0.52	3.6	1.17	40D	0	L308
L313	19.3	-2.00	-1.00	2.0	0.93	40.2	0.8	0.29	1.8	0.56	40D	0	L313
L320	20.6	-1.0	-0.70	2.0	0.89	55.4	-7.0	-2.69	3.0	0.95	40D	*	L320
L324	23.2	1.3	0.78	3.0	1.20	47.1	1.6	0.62	3.8	1.20	40D	0	L324
L326	22.4	0.5	0.24	3.0	1.17	40.4	1.0	0.37	3.7	1.17	40D	0	L326
L328	20.4	-1.00	-0.80	3.0	1.07	44.0	-1.4	-0.53	4.4	1.41	40D	0	L328
L337	21.0	-0.9	-0.50	1.0	0.80	45.3	-2.1	-0.80	2.3	0.74	4CD	0	L337
L339	18.1	-3.0	-2.07	2.0	0.99	56.7	-6.8	-2.59	2.4	0.78	40D	*	L339
L344	21.7	-0.2	-0.11	1.4	0.51	42.4	-3.0	-1.15	2.6	0.82	40D	0	L344
L348	23.6	1.7	1.04	3.0	1.04	47.9	2.5	0.94	2.7	0.87	40D	0	L348
L376	23.8	1.9	1.14	4.0	1.43	47.5	2.0	0.78	2.9	0.91	40D	0	L376
L380	20.9	-1.0	-0.50	2.0	0.83	42.2	-3.2	-1.24	2.2	0.71	40D	0	L380
L388	20.4	-1.00	-0.80	4.4	1.50	48.2	2.6	1.05	2.3	0.74	40D	0	L388
L396M	23.6	3.7	2.20	4.0	1.00	49.3	3.8	1.47	4.5	1.44	4CD	0	L396M
L484	19.4	-2.00	-1.00	2.0	0.80	42.7	-2.8	-1.06	3.5	1.11	4CD	0	L484
L567	22.0	0.1	0.00	2.4	0.80	44.9	-0.6	-0.21	3.3	1.07	4CD	0	L567
L576	21.6	-0.5	-0.10	2.0	1.02	43.5	-1.9	-0.73	2.4	0.77	4CD	0	L576
L585	21.7	-0.2	-0.10	1.9	0.89	44.5	-0.9	-0.35	3.2	1.02	40D	0	L585
L597	23.3	1.4	0.80	4.0	1.00	46.0	0.6	0.21	3.8	1.22	40D	0	L597
L616	21.9	0.0	0.00	0.9	0.31	46.2	0.8	0.29	1.1	0.36	40D	0	L616
L636	20.0	-1.9	-1.10	1.0	0.80	42.6	-2.8	-1.08	2.4	0.78	4CD	0	L636
L651	15.6	-6.0	-3.00	2.0	0.80	39.0	-6.4	-2.46	2.7	0.87	4CD	X	L651
L676	22.1	0.2	0.10	2.0	1.02	48.0	2.6	0.98	2.8	0.91	40D	0	L676
L697	24.0	2.0	1.00	2.0	0.90	45.7	-1.7	-0.65	5.2	1.65	4CD	0	L697
L715	23.0	1.1	0.80	2.1	0.74	46.6	1.2	0.45	2.3	0.73	40D	0	L715

GR₀ MEAN = 21.9 GURLEY UNITS GRAND MEAN = 45.4 GURLEY UNITS TEST DETERMINATIONS = 10
SD MEANS = 1.7 GURLEY UNITS SD OF MEANS = 2.6 GURLEY UNITS 59 LABS IN GRAND MEANS
AVERAGE SDR = 2.0 GURLEY UNITS AVERAGE SDR = 3.1 GURLEY UNITS

L115 21.6 -0.3 -0.17 1.0 0.80 46.0 -5.4 -2.08 1.6 0.50 40U * L115
L291 25.5 3.0 2.10 2.0 0.88 46.3 2.9 1.09 3.2 1.04 40U * L291

TOTAL NUMBER OF LABORATORIES REPORTING = 62

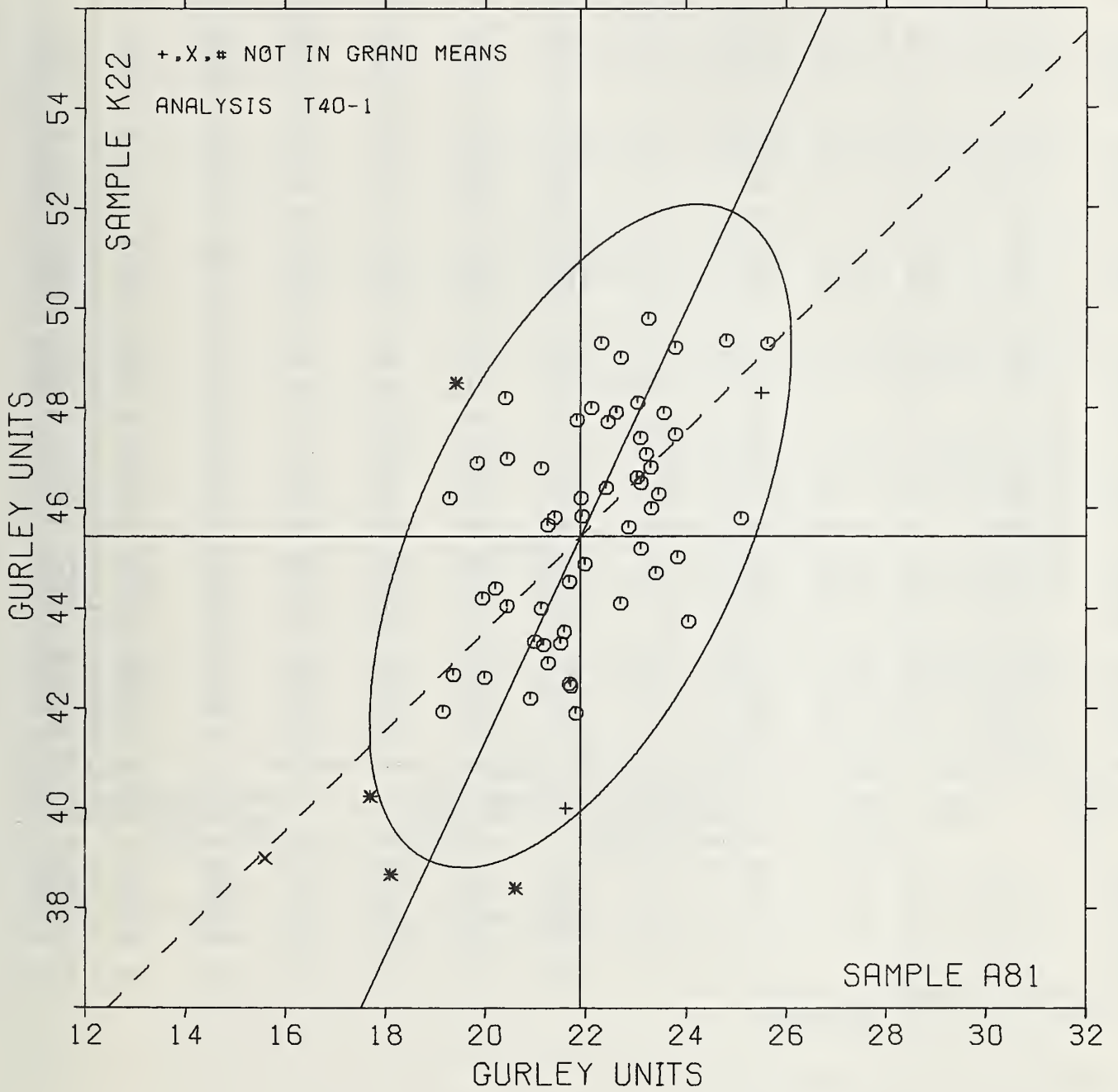
Best values: A81 22.0 ± 2.4 Gurley units
K22 45.3 ± 3.9 Gurley units

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY--TEST INSTRUMENT--CONDITIONS
		A81	K22	MAJOR	MINOR	ROUNDER	VAR	
L651	X	15.0	39.0	-8.0	3.0	0.5	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L241	*	17.7	40.2	-0.5	1.0	0.7	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L339	*	18.1	38.7	-7.7	0.6	0.8	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L124G	#	19.2	41.9	-4.3	1.0	0.5	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L313	@	19.3	46.2	-0.4	2.7	0.74	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L484	@	19.4	42.7	-3.0	1.1	0.5	40.0	AIR RESISTANCE, REGMED-TYPE GURLEY DENSOMETER - OIL FLOTATION
L159	*	19.4	48.5	1.7	3.5	0.79	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L254	@	19.8	46.9	0.5	2.5	0.63	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L212	@	19.9	48.2	-1.3	1.2	1.02	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L636	@	20.0	42.6	-3.4	0.5	0.70	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L106	@	20.2	44.4	-1.7	1.1	1.02	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L388	@	20.4	48.2	1.9	2.5	1.15	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L163	@	20.4	47.0	0.5	2.0	0.5	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L328	@	20.4	44.0	-1.3	0.7	1.09	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L320	*	20.0	38.4	-0.9	-1.8	0.52	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L380	@	20.9	42.2	-3.4	-0.5	0.77	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L337	@	21.0	43.3	-2.3	-0.1	0.5	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L308	@	21.1	46.8	0.9	1.3	1.04	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L153	@	21.1	44.0	-1.0	0.1	1.06	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L121	@	21.2	43.3	-2.3	-0.3	0.6	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L261	@	21.2	45.7	-0.1	0.7	1.01	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L259	@	21.2	42.9	-2.0	-0.5	0.92	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L265	@	21.4	45.8	0.1	0.6	0.76	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L219	@	21.5	43.3	-2.1	-0.6	0.78	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L576	@	21.6	43.5	-1.9	-0.5	0.99	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L115	*	21.6	40.0	-5.1	-2.0	0.3	40.0	AIR RESISTANCE, SHEFFIELD IN GURLEY UNITS
L190R	@	21.7	42.5	-2.8	-1.0	0.5	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L585	@	21.7	44.5	-0.9	-0.2	0.5	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L344	@	21.7	42.4	-2.8	-1.1	0.7	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L182G	@	21.8	41.9	-3.2	-1.4	0.49	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L301	@	21.8	47.7	2.1	1.0	0.99	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L616	@	21.9	46.2	0.7	0.3	0.54	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L174	@	21.9	45.8	0.4	0.1	1.01	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L567	@	22.0	44.9	-0.3	-0.3	0.6	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L676	@	22.1	48.0	2.4	0.9	0.5	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L176	@	22.3	49.3	3.7	1.2	1.35	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L326	@	22.4	46.4	1.1	-0.1	1.17	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L148	@	22.4	47.7	2.3	0.5	1.07	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L230G	@	22.6	47.9	2.3	0.4	1.18	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L242	@	22.7	44.1	-0.9	-1.3	1.02	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L183	@	22.7	49.0	3.0	0.8	1.40	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L278	@	22.8	45.6	0.6	-0.8	1.01	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L715	@	23.0	46.6	1.5	-0.5	0.73	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L223	@	23.0	48.1	2.9	0.1	1.10	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L141	@	23.1	47.4	2.3	-0.3	1.04	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L107	@	23.1	45.2	0.3	-1.2	1.11	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L128	@	23.1	46.5	1.5	-0.7	0.3	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L324	@	23.2	47.1	2.0	-0.5	1.02	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L203	@	23.2	49.8	4.5	0.6	1.16	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L285	@	23.3	46.8	1.0	-0.7	0.0	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L597	@	23.3	46.0	1.1	-1.0	1.49	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L125	@	23.4	44.7	-0.4	-1.7	0.79	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L262G	@	23.4	46.3	1.6	-1.1	0.71	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L348	@	23.6	47.9	2.9	-0.5	1.11	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L376	@	23.8	47.5	2.6	-0.9	1.17	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L228	@	23.8	49.2	4.2	-0.1	0.5	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L123	@	23.8	45.0	0.4	-1.9	1.06	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L697	@	24.0	43.7	-0.6	-2.7	1.07	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L166	@	24.8	49.3	4.5	-1.0	1.02	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L190C	@	25.1	45.8	1.7	-2.8	0.9	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L291	*	25.5	48.3	4.1	-2.1	0.9	40.0	AIR RESISTANCE, SHEFFIELD IN GURLEY UNITS
L396M	@	25.6	49.3	5.1	-1.8	1.04	40.0	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
GMEANS:		21.9	45.4			1.00		
95% ELLIPSE:				7.2	3.2			WALL GAMMA = 65 DEGREES

AIR RESISTANCE, GURLEY

SAMPLE A81 = 21.9 GURLEY UNITS SAMPLE K22 = 45.4 GURLEY UNITS



AIR RESISTANCE, SHEFFIELD UNITS (CC/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) ORIFICE
TAPPI USUFL TEST METHOD ON S24, POROSITY BY RESISTANCE TO AIRFLOW

LAB CODE	A81 ENVELOPE 90 GRAMS PER SQUARE METER					SAMPLE K22 MEAN	PRINTING 103 GRAMS PER SQUARE METER				TEST D ₀ = 10		
	MEAN	DEV	No DEV	SDR	% SDR		DEV	No DEV	SDR	R ₀ SDR	VAR	F	LAB
L114	137.8	3.0	0.00	8.9	0.05	66.5	7.4	0.97	3.6	0.71	40S	θ	L114
L121	154.0	19.8	1.00	12.0	0.92	92.5	13.4	1.76	4.9	0.96	40S	θ	L121
L122S	142.4	8.2	0.01	14.0	1.13	99.3	20.2	2.66	12.6	2.50	40S	*	L122S
L124S	138.3	4.1	0.44	10.4	1.26	78.8	7.3	0.94	2.6	0.52	40S	θ	L124S
L132	131.2	-3.0	-0.29	10.0	1.23	74.3	-4.8	-0.64	3.7	0.72	40S	θ	L132
L148	143.4	9.2	0.91	10.0	1.10	60.8	1.7	0.22	3.6	0.72	40S	θ	L148
L150	144.7	10.5	1.04	21.0	1.06	76.8	-2.3	-0.31	6.7	1.33	40S	θ	L150
L157	120.5	-13.1	-1.00	9.0	0.74	75.5	-3.6	-0.48	5.0	0.99	40S	θ	L157
L158	132.5	-1.7	-0.17	12.3	0.95	77.5	-1.6	-0.21	5.9	1.17	40S	θ	L158
L190C	137.5	3.3	0.33	18.9	1.46	63.0	3.9	0.51	4.2	0.84	40S	θ	L190C
L213	130.1	1.9	0.19	17.0	1.36	74.5	-4.6	-0.61	3.1	0.61	40S	θ	L213
L223	132.1	-2.1	-0.21	20.0	1.59	70.2	-8.9	-1.18	4.0	0.80	40S	θ	L223
L230S	154.9	20.7	2.00	18.0	1.39	127.3	48.2	6.35	4.6	0.91	40S	#	L230S
L233	119.9	-14.3	-1.41	9.0	0.74	74.7	-4.4	-0.58	3.6	0.71	40S	θ	L233
L241	140.3	6.1	0.61	18.0	1.42	86.9	9.8	1.29	6.1	1.20	40S	θ	L241
L249	127.8	-6.4	-0.64	8.0	0.82	70.9	-2.2	-0.29	4.3	0.84	40S	θ	L249
L260	131.1	-3.1	-0.31	15.8	1.22	78.5	0.6	0.08	5.2	1.03	40S	θ	L260
L262S	130.4	-3.0	-0.30	3.8	0.30	79.3	0.2	0.02	4.1	0.82	40S	θ	L262S
L288	142.7	8.5	0.85	14.9	1.15	67.0	7.9	1.04	7.3	1.46	40S	θ	L288
L301	143.5	9.3	0.93	14.2	1.10	65.5	6.4	0.84	13.4	2.66	40S	θ	L301
L315	117.5	-16.7	-1.60	13.2	1.02	61.5	-17.6	-2.32	4.7	0.94	40S	θ	L315
L318	117.6	-16.0	-1.60	8.2	0.83	75.3	-3.8	-0.50	4.2	0.84	40S	θ	L318
L352	144.5	10.3	1.03	13.7	1.06	61.7	2.6	0.34	4.5	0.89	40S	θ	L352
L354	134.8	0.6	0.06	12.0	0.92	78.3	0.8	0.11	6.3	1.24	40S	θ	L354
L360	135.1	0.9	0.09	14.3	1.10	75.5	-3.6	-0.48	3.8	0.75	40S	θ	L360
L390	134.0	0.2	0.02	11.0	0.85	77.5	-1.6	-0.21	6.8	1.34	40S	θ	L390
L562	156.0	21.8	2.18	11.0	0.90	56.0	18.9	2.49	6.4	1.27	40S	θ	L562
L575	147.6	13.4	1.34	13.2	1.02	78.8	0.3	0.04	5.1	1.01	40S	θ	L575
L585	122.5	-11.7	-1.10	5.9	0.45	78.0	-1.1	-0.15	3.5	0.69	40S	θ	L585
L597	135.4	1.2	0.12	20.9	1.01	73.3	-5.8	-0.77	4.8	0.95	40S	θ	L597
L600	129.1	-5.1	-0.51	8.4	0.49	72.5	-6.2	-0.82	5.1	1.02	40S	θ	L600
L626	114.4	-19.8	-1.98	7.7	0.60	73.3	-5.8	-0.77	3.9	0.76	40S	θ	L626
L684	131.9	-2.3	-0.23	14.0	1.13	74.7	-4.4	-0.58	4.7	0.92	40S	θ	L684
L687	132.9	-1.3	-0.13	13.0	1.00	78.1	-1.0	-0.14	4.8	0.95	40S	θ	L687
L698	122.4	-11.8	-1.18	8.3	0.64	73.6	-6.1	-0.81	6.9	1.36	40S	θ	L698
L704	133.0	-1.2	-0.12	10.2	1.25	NO DATA REPORTED FOR SAMPLE K22					40S	N	L704

GRAND MEAN = 134.2 SHEFF. UNITS GRAND MEAN = 79.1 SHEFF. UNITS TEST DETERMINATIONS = 10
SD MEANS = 10.1 SHEFF. UNITS SD OF MEANS = 7.6 SHEFF. UNITS 34 LABS IN GRAND MEANS
AVERAGE SDR = 13.0 SHEFF. UNITS AVERAGE SDR = 5.0 SHEFF. UNITS

L182B	580.0	445.8	44.58	63.2	4.08	278.0	198.9	26.23	14.2	2.81	40B	*	L182B
L280	328.7	154.0	15.40	24.0	1.89	129.0	49.9	6.58	9.3	1.85	40B	*	L280
L312	121.2	-13.0	-1.30	0.2	0.46	61.7	2.6	0.34	4.3	0.86	40T	*	L312
L333	608.8	474.6	47.46	99.5	7.68	254.0	174.9	23.06	12.4	2.46	40B	*	L333
L484	575.0	440.8	44.08	63.0	4.90	275.0	195.9	25.83	25.5	5.05	40B	*	L484

L587 124.5 -9.7 -0.97 5.0 0.38 60.0 6.9 0.91 5.2 1.02 40T * L587
TOTAL NUMBER OF LABORATORIES REPORTING = 42

Best values: A81 134 ± 15 Sheffield units
K22 78 ± 15 Sheffield units

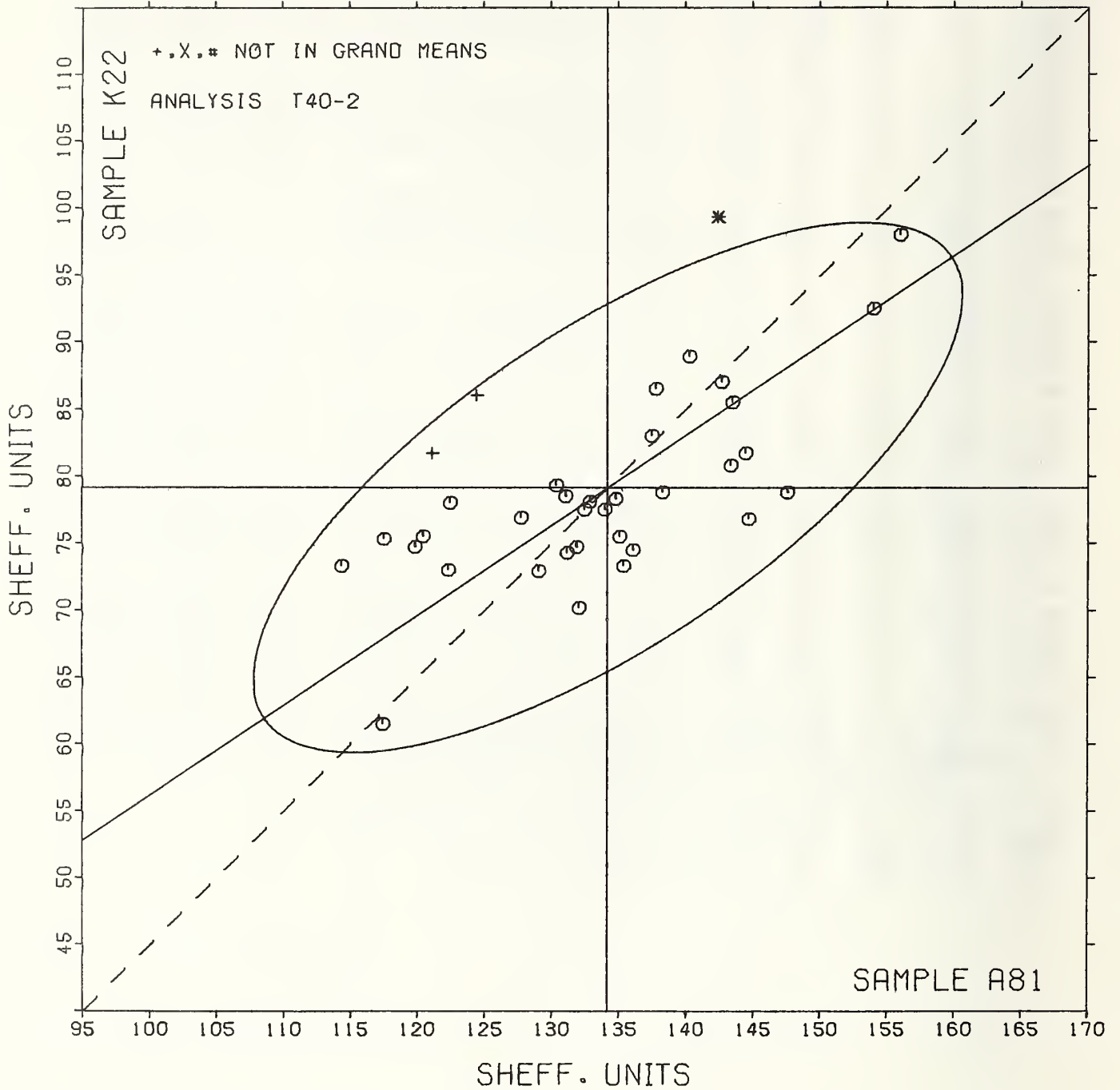
The following laboratories were omitted from the grand means because of extreme test results: 230S.

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS		
		A81	K22	MAJOR	MINOR	NO.	VAL.			
L626	Ø	114.4	73.3	-19.7	0.2	0.05	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L315	Ø	117.0	61.5	-23.7	-0.3	0.06	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L318	Ø	117.0	75.3	-15.9	0.1	0.73	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L233	Ø	119.9	74.7	-14.3	4.3	0.72	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L157	Ø	120.5	75.5	-13.4	4.0	0.07	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L312	*	121.2	81.7	-9.0	9.4	0.07	40T	AIR RESISTANCE,	SHEFFIELD	(3 INCH DIAMETER ORIFICE)
L698	Ø	122.4	73.0	-13.2	1.5	1.00	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L585	Ø	122.5	78.0	-10.0	0.0	0.57	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L587	*	124.0	86.0	-4.2	11.1	0.70	40T	AIR RESISTANCE,	SHEFFIELD	(3 INCH DIAMETER ORIFICE)
L245	Ø	127.0	76.9	-0.0	1.7	0.73	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L600	Ø	129.1	72.9	-7.7	-2.3	0.70	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L262S	Ø	130.4	79.3	-3.0	2.2	0.00	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L260	Ø	131.1	78.5	-2.9	1.2	1.12	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L132	Ø	131.2	74.3	-3.2	0.3	0.98	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L684	Ø	131.9	74.7	-4.4	-2.4	1.00	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L223	Ø	132.1	70.2	-0.7	-0.3	1.20	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L158	Ø	132.5	77.5	-2.3	-0.4	1.00	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L687	Ø	132.9	78.1	-1.0	-0.1	0.57	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L704	M	133.0				1.25	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L350	Ø	134.0	77.5	-1.1	-1.3	1.09	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L354	Ø	134.8	78.3	0.1	-1.0	1.05	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L360	Ø	135.1	75.5	-1.3	-3.5	0.93	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L597	Ø	135.4	73.3	-2.2	-0.5	1.26	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L213	Ø	136.1	74.5	-1.0	-4.9	0.90	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L190C	Ø	137.5	83.0	4.9	1.4	1.15	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L114	Ø	137.8	86.5	7.1	4.1	0.70	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L124S	Ø	138.3	78.8	3.2	-2.0	0.09	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L241	Ø	140.3	88.9	10.0	4.7	1.01	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L122S	*	142.4	99.3	18.1	12.2	1.01	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L288	Ø	142.7	87.0	11.0	1.8	1.00	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L148	Ø	143.4	80.8	8.0	-3.8	0.94	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L301	Ø	143.5	85.5	11.3	0.1	1.00	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L352	Ø	144.5	81.7	10.0	-3.0	0.57	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L150	Ø	144.7	76.8	7.4	-7.8	1.00	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L575	Ø	147.6	78.8	11.0	-7.8	1.02	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L121	Ø	154.0	92.5	20.9	0.0	0.94	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L230S	#	154.9	127.3	44.1	28.4	1.15	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L562	Ø	156.0	98.0	28.0	3.5	1.08	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L280	*	328.7	129.0	189.3	-07.1	1.07	40S	AIR RESISTANCE,	HENDTSEN,	WG 150
L484	*	575.0	275.0	475.1	-03.3	4.07	40S	AIR RESISTANCE,	HENDTSEN,	WG 150
L182B	*	580.0	278.0	401.0	-03.6	3.04	40S	AIR RESISTANCE,	HENDTSEN,	WG 150
L333	*	600.8	254.0	491.0	-119.0	0.07	40S	AIR RESISTANCE,	HENDTSEN,	WG 150
GMEANS:		134.2	79.1			1.00				
		95% ELLIPSE:		30.8	11.7			W/IN GAMMA = 33 DEGREES		

AIR RESISTANCE, SHEFFIELD

SAMPLE A81 = 134. SHEFF. UNITS SAMPLE K22 = 79. SHEFF. UNITS



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

LAB CODE	SAMPLE D06 MEAN	RELEASE PAPER M.F.O.				SAMPLE G11 MEAN	M.F.O. RELEASE PAPER				TEST D ₀ = 10		
		112 GRAMS PER SQUARE METER	DEV	N ₀ DEV	SDR		R ₀ SDR	70 GRAMS PER SQUARE METER	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR
L128	160	-4	-0.01	10	0.02	268	-2	-0.06	51	0.62	41G	0	L128
L134	175	11	0.01	23	1.046	323	53	1.27	102	1.23	41G	0	L134
L166M	191	27	2.00	27	1.008	299	29	0.69	120	1.46	41G	0	L166M
L195	154	-10	-0.70	10	0.02	176	-95	-2.29	45	0.55	41G	0	L195
L224	174	10	0.77	29	1.083	313	43	1.03	66	0.80	41G	0	L224
L230	19388	19224	1480.27	2104	131.83	25972	25701	621.26	6154	74.40	41G	#	L230
L259	147	-18	-1.00	9	0.08	239	-31	-0.76	62	0.75	41G	0	L259
L312	162	-2	-0.10	13	0.80	268	-2	-0.06	73	0.88	41G	0	L312
L358	149	-15	-1.10	10	1.02	266	-5	-0.12	87	1.05	41G	0	L358
L557	167	3	0.23	10	0.03	299	29	0.69	87	1.05	41G	0	L557
L574	152	-12	-0.33	9	0.50	230	-40	-0.97	99	1.20	41G	0	L574
L576	172	7	0.07	19	1.10	301	30	0.73	85	1.03	41G	0	L576
L618	2688	2524	195.00	590	02.04	3438	3167	76.56	1075	13.00	41G	#	L618
L697	168	4	0.27	17	1.04	264	-7	-0.16	114	1.38	41G	0	L697

GR₀ MEAN = 164 SEC/10 CC GRAND MEAN = 2710 SEC/10 CC TEST DETERMINATIONS = 10
 SD MEANS = 13 SEC/10 CC SD OF MEANS = 410 SEC/10 CC 12 LABS IN GRAND MEANS
 AVERAGE SDR = 100 SEC/10 CC AVERAGE SDR = 830 SEC/10 CC
 TOTAL NUMBER OF LABORATORIES PARTICIPATING = 14

Best values: D06 165 ± 20 seconds per 10 cc
 G11 270 ± 180 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.

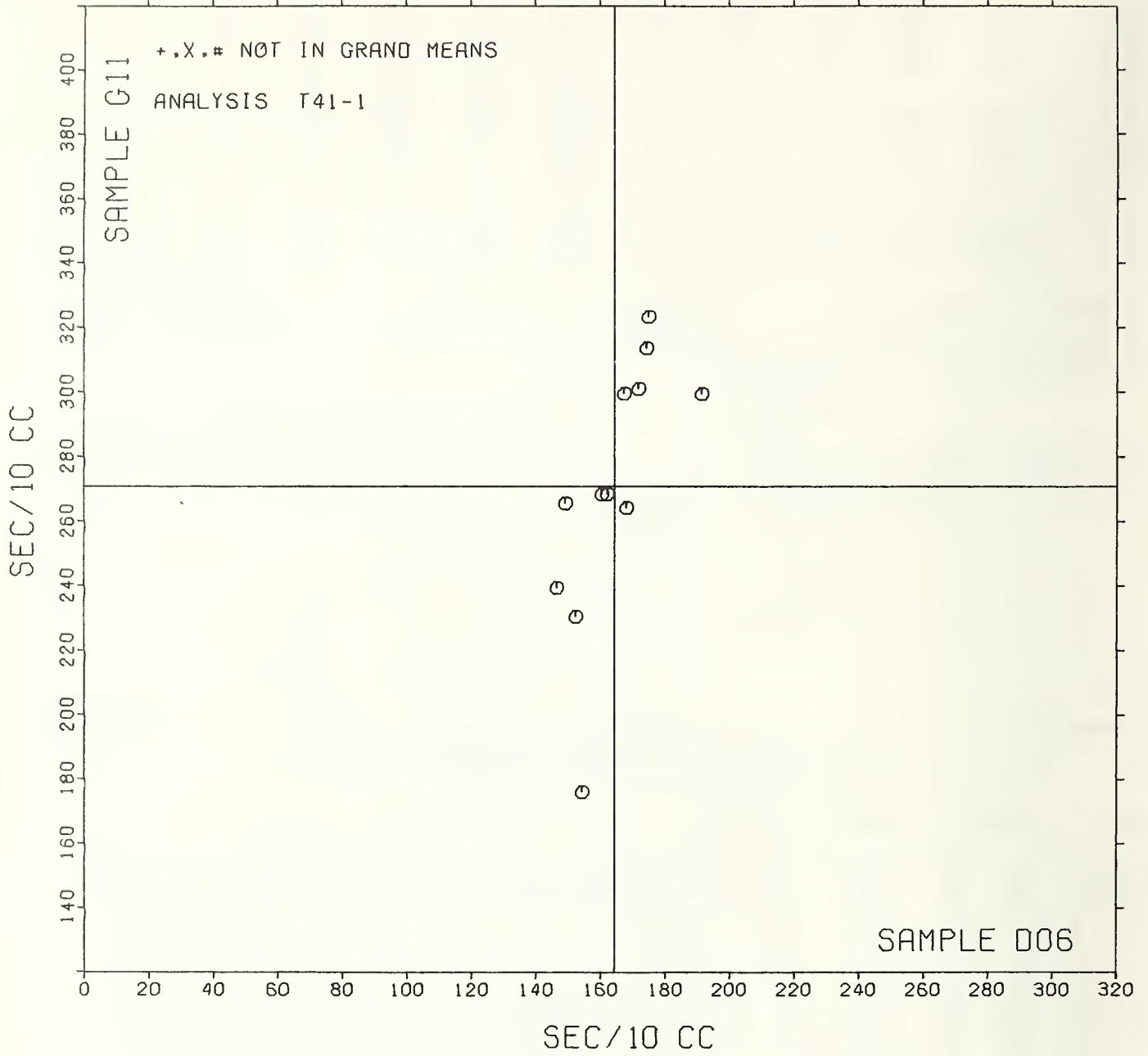
Data from the following laboratories appear to be off by a multiplicative factor: 230, 618.

TAPPI COLLABORATIVE REFERENCE PROGRAM
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	PROP	TEST INSTRUMENT	CONDITIONS
		D06	G11	ΔX	ΔY				
L259	0	147	239	-30	10	0.00	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L358	0	149	266	-8	14	1.004	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L574	0	152	230	-42	3	0.08	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L195	0	154	176	-95	-11	0.00	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L128	0	160	268	-3	3	0.02	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L312	0	162	268	-3	2	0.04	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L557	0	167	299	29	4	0.04	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L697	0	168	264	-0	-5	1.021	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L576	0	172	301	31	-0	1.010	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L224	0	174	313	44	-0	1.031	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L134	0	175	323	54	2	1.000	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L166M	0	191	299	34	-20	1.007	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L618	#	2688	3438	3053	-1749	37.002	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
L230	#	19388	25972	29350	-12970	100.012	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION	
GMEANS:		164	271			1.000			
		55% ELLIPSE:		127	27	WITH GAMMA = 77 DEGREES			

AIR RESISTANCE, GURLEY HG FLOTATION

SAMPLE D06 = 164. SEC/10 CC SAMPLE G11 = 271. SEC/10 CC



LAB CODE	SAMPLE J74		PRINTING 76 GRAMS PER SQUARE METER			SAMPLE K46		PRINTING 60 GRAMS PER SQUARE METER			TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L122	4.96	0.60	1.44	0.17	1.11	5.35	0.77	1.59	0.12	0.74	44P	0	L122
L136	4.05	-0.31	-0.75	0.20	1.25	5.44	-0.15	-0.31	0.13	0.80	44P	0	L136
L182	4.31	-0.06	-0.15	0.15	0.98	5.49	-0.10	-0.20	0.16	0.99	44P	0	L182
L288	4.81	0.45	1.00	0.20	1.31	6.05	0.46	0.96	0.38	2.40	44P	0	L288
L317	4.32	-0.04	-0.11	0.12	0.79	5.27	-0.32	-0.66	0.13	0.85	44P	0	L317
L588	3.75	-0.61	-1.47	0.18	1.14	4.91	-0.68	-1.41	0.12	0.76	44P	0	L588
L669	4.34	-0.02	-0.05	0.07	0.42	5.60	0.01	0.03	0.07	0.45	44P	0	L669
GR. MEAN =		4.36 MICRONS			GRAND MEAN =		5.59 MICRONS			TEST DETERMINATIONS = 10			
SD MEANS =		0.42 MICRONS			SD OF MEANS =		0.48 MICRONS			7 LABS IN GRAND MEANS			
		AVERAGE SDR = 0.10 MICRONS					AVERAGE SDR = 0.16 MICRONS						
TOTAL NUMBER OF LABORATORIES REPORTING = 7													
Best values: J74 4.3 microns													
K46 5.5 microns													

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY	TEST INSTRUMENT	CONDITIONS
		J74	K46	MAJOR	MINOR	R ₀ SDR	VAR			
L588	0	3.75	4.91	-0.91	0.02	0.95	44P	SMOOTHNESS,	PARKER	PRINTSURF
L136	0	4.05	5.44	-0.32	0.14	1.03	44P	SMOOTHNESS,	PARKER	PRINTSURF
L182	0	4.31	5.49	-0.11	-0.02	0.96	44P	SMOOTHNESS,	PARKER	PRINTSURF
L317	0	4.32	5.27	-0.27	-0.17	0.82	44P	SMOOTHNESS,	PARKER	PRINTSURF
L669	0	4.34	5.60	-0.00	0.02	0.44	44P	SMOOTHNESS,	PARKER	PRINTSURF
L288	0	4.81	6.05	0.04	-0.04	1.05	44P	SMOOTHNESS,	PARKER	PRINTSURF
L122	0	4.96	6.35	0.37	0.05	0.93	44P	SMOOTHNESS,	PARKER	PRINTSURF
GMEANS:		4.36	5.59			1.00				
		95% ELLIPSE:		2.35	0.36	Width GAMMA = 49 DEGREES				

ANALYSIS TAP-1 TABLE 1
SMOOTHNESS, SHEFFIELD UNITS
TAPPI USEFUL TEST METHOD UM 518, SMOOTHNESS OF PAPER (SHEFFIELD)

LAB CODE	SAMPLE J74 MEAN	PRINTING 76 GRAMS PER SQUARE METER				SAMPLE 440 MEAN	PRINTING 60 GRAMS PER SQUARE METER				TEST D ₀ = 15		
		DEV	N ₀ SDR	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAF	F	LAB
L107	130.3	49.5	8.57	10.6	2.11	214.7	47.2	5.97	16.8	1.81	45S	#	L107
L108	78.6	-2.3	-0.41	3.0	0.70	164.0	-3.4	-0.43	3.9	0.42	45S	θ	L108
L114	82.6	1.7	0.1	3.9	0.70	170.8	3.4	0.43	8.9	0.96	45S	θ	L114
L115	87.0	6.1	1.11	3.2	0.62	163.7	-3.8	-0.48	5.2	0.55	45S	θ	L115
L121	85.3	4.5	0.1	4.5	0.94	165.0	-2.4	-0.31	3.8	0.41	45S	θ	L121
L122	30.9	0.1	0.1	4.9	0.90	102.3	-5.2	-0.65	6.2	0.67	45S	θ	L122
L123	94.7	3.9	0.7	7.2	1.42	188.7	1.3	0.16	10.5	1.13	45S	θ	L123
L124	85.3	4.4	0.0	5.9	1.15	165.4	-2.0	-0.26	9.4	1.01	45S	θ	L124
L125	78.7	-2.2	-0.40	5.0	1.14	166.0	-1.4	-0.18	6.9	0.74	45S	θ	L125
L126	87.6	6.7	1.22	4.4	0.86	171.1	3.6	0.46	7.3	0.78	45S	θ	L126
L128	85.5	4.7	0.0	4.5	0.85	165.8	-1.6	-0.21	11.0	1.18	45S	θ	L128
L132	80.9	0.1	0.4	10.6	2.68	175.1	7.7	0.97	8.1	0.87	45S	θ	L132
L134	78.0	-2.9	-0.2	4.1	0.81	157.3	-10.1	-1.28	4.2	0.45	45S	θ	L134
L139S	88.1	7.3	1.32	5.0	1.18	174.0	6.6	0.83	7.6	0.81	45S	θ	L139S
L148	83.0	7.1	1.29	4.9	0.95	177.9	10.4	1.32	12.0	1.28	45S	θ	L148
L150	75.8	-5.1	-0.32	4.0	0.90	174.5	7.1	0.90	10.5	1.13	45S	θ	L150
L152	91.9	11.0	2.01	3.0	0.71	165.3	17.8	2.26	10.7	1.15	45S	θ	L152
L153	103.5	22.0	4.10	3.4	0.7	190.3	22.8	2.89	17.7	1.90	45S	X	L153
L157	77.5	-3.4	-0.62	6.9	1.35	171.5	4.0	0.51	10.3	1.10	45S	θ	L157
L158	73.3	-7.5	-1.07	5.2	1.03	160.0	-7.4	-0.94	9.3	0.99	45S	θ	L158
L159	70.9	-4.0	-0.75	4.5	0.85	166.3	0.8	0.11	7.0	0.75	45S	θ	L159
L162	80.5	-0.3	-0.06	5.4	1.05	162.3	-5.2	-0.65	5.0	0.54	45S	θ	L162
L166	30.3	-0.5	-0.10	4.5	0.85	151.7	-15.7	-1.99	9.8	1.05	45S	θ	L166
L167	91.7	0.0	0.14	3.1	0.61	168.0	-1.4	-0.18	4.7	0.50	45S	θ	L167
L183S	77.5	-3.4	-0.62	4.0	0.79	164.2	-3.2	-0.41	10.8	1.16	45S	θ	L183S
L190C	85.0	4.1	0.73	5.3	1.05	173.3	5.9	0.75	10.8	1.16	45S	θ	L190C
L190R	71.1	-9.8	-1.70	4.0	0.90	161.9	-5.5	-0.70	7.9	0.85	45S	θ	L190R
L195	77.5	-3.3	-0.61	5.0	1.17	162.1	-5.4	-0.68	9.3	0.99	45S	θ	L195
L203	78.6	-2.3	-0.41	4.0	0.79	166.4	-1.0	-0.13	12.1	1.29	45S	θ	L203
L206	83.3	2.5	0.45	4.9	0.95	175.2	5.8	0.73	11.4	1.22	45S	θ	L206
L211	79.9	-0.9	-0.17	5.0	0.90	176.7	3.2	0.41	12.2	1.31	45S	θ	L211
L213	73.5	-7.4	-1.34	10.4	2.05	151.7	-15.8	-1.99	9.9	1.07	45S	θ	L213
L219	96.1	15.2	2.70	4.0	0.90	171.6	4.2	0.53	11.5	1.23	45S	*	L219
L223	75.1	-5.8	-1.05	6.0	1.18	162.6	-4.8	-0.61	10.3	1.11	45S	θ	L223
L224	83.5	2.7	0.45	3.9	0.77	164.5	-3.0	-0.38	7.8	0.83	45S	θ	L224
L226B	74.5	-6.3	-1.15	4.0	0.79	158.3	-9.2	-1.16	6.6	0.71	45S	θ	L226B
L228	91.7	0.8	0.15	4.0	0.95	173.6	6.2	0.78	8.5	0.91	45S	θ	L228
L230S	89.9	9.0	1.65	5.4	1.06	167.1	19.6	2.48	13.0	1.39	45S	*	L230S
L231	77.9	-2.9	-0.55	5.0	1.10	168.5	1.0	0.13	12.7	1.36	45S	θ	L231
L233	74.8	-6.1	-1.10	6.4	1.27	163.4	-4.0	-0.51	8.9	0.95	45S	θ	L233
L237	78.9	-1.9	-0.35	3.5	0.74	174.7	7.2	0.91	6.4	0.69	45S	θ	L237
L241	83.7	2.9	0.52	4.0	0.90	153.3	-14.1	-1.78	8.8	0.94	45S	θ	L241
L249	78.1	-2.7	-0.50	5.5	1.04	167.3	-0.2	-0.02	9.0	0.96	45S	θ	L249
L254	79.4	-1.5	-0.27	3.9	0.76	170.8	3.4	0.43	8.2	0.87	45S	θ	L254
L259	89.9	9.1	1.64	7.4	1.40	160.2	18.8	2.37	9.3	1.00	45S	θ	L259
L260	80.1	-0.7	-0.15	4.0	0.79	171.6	4.2	0.53	6.7	0.72	45S	θ	L260
L261	75.3	-5.9	-1.02	5.0	1.18	160.7	-0.8	-0.10	12.6	1.35	45S	θ	L261
L262	34.6	3.7	0.0	4.1	0.61	161.6	-5.8	-0.74	12.7	1.36	45S	θ	L262
L275	74.9	-6.0	-1.05	2.4	0.46	164.6	-2.6	-0.33	9.5	1.02	45S	θ	L275
L277	80.1	6.3	1.14	8.1	1.58	190.3	22.9	2.90	6.3	0.68	45S	*	L277
L278	95.5	14.7	2.60	7.5	1.40	195.3	27.8	3.52	8.2	0.88	45S	X	L278
L281	75.0	-5.9	-1.00	2.9	0.58	169.7	2.3	0.29	9.8	1.05	45S	θ	L281
L285	73.3	-7.6	-1.30	4.0	0.95	157.3	-10.2	-1.29	9.8	1.05	45S	θ	L285
L288	73.5	-7.3	-1.35	5.9	1.15	229.7	62.2	7.87	14.8	1.59	45S	#	L288
L290	80.5	-0.4	-0.07	2.7	0.53	157.0	-10.4	-1.32	8.7	0.93	45S	θ	L290
L291S	83.5	2.7	0.40	4.1	0.81	166.8	-0.6	-0.08	11.9	1.27	45S	θ	L291S
L301	83.5	2.7	0.40	6.7	1.32	166.1	0.6	0.08	9.0	0.97	45S	θ	L301
L305	79.1	-1.7	-0.32	5.2	1.22	160.3	-7.1	-0.90	9.8	1.05	45S	θ	L305
L308	79.5	-1.4	-0.25	4.0	0.91	162.4	-5.0	-0.64	7.5	0.81	45S	θ	L308
L312	88.0	7.1	1.29	6.2	1.22	161.4	-6.0	-0.76	6.3	0.67	45S	θ	L312
L317	77.1	-3.8	-0.67	4.0	0.90	159.9	-7.5	-0.95	16.1	1.72	45S	θ	L317
L318	73.7	-7.2	-1.35	6.7	1.31	165.8	-3.6	-0.46	8.5	0.91	45S	θ	L318
L323	91.3	10.5	1.95	5.5	1.08	170.6	8.6	1.08	10.2	1.09	45S	θ	L323
L326	84.3	3.5	0.6	3.5	0.88	158.6	-10.6	-1.35	8.0	0.86	45S	θ	L326
L328	70.3	-4.0	-0.64	3.7	0.72	169.7	2.3	0.29	10.4	1.12	45S	θ	L328

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

LAB CODE	SAMPLE J74		PRINTING 76 GRAMS PER SQUARE METER				SAMPLE K46		PRINTING 60 GRAMS PER SQUARE METER				TEST D ₀ = 15		
	MEAN	DEV	No. DEV	SDR	4.0 SDR	MEAN	DEV	No. DEV	SDR	R ₀ SDR	VAP	F	LAB		
L348	82.2	1.3	0.24	5.0	0.98	170.9	3.4	0.43	11.3	1.21	45S	Ø	L348		
L349	77.0	-3.3	-0.39	0.0	1.34	171.2	3.8	0.48	10.4	1.12	45S	Ø	L349		
L352	85.9	5.1	0.92	7.0	1.38	173.1	5.7	0.72	12.2	1.31	45S	Ø	L352		
L360	75.5	-5.4	-0.30	5.1	1.00	168.9	1.4	0.18	11.0	1.18	45S	Ø	L360		
L366	63.6	-11.3	-2.04	5.9	1.15	140.0	-21.4	-2.71	10.3	1.10	45S	*	L366		
L376	94.3	13.5	2.44	4.0	0.94	170.9	9.5	1.20	9.9	1.06	45S	Ø	L376		
L380	79.5	-1.3	-0.24	3.0	0.70	169.3	1.9	0.24	9.8	1.05	45S	Ø	L380		
L382	75.5	-5.4	-0.30	4.3	0.64	164.7	-2.8	-0.35	4.9	0.52	45S	Ø	L382		
L390	83.0	2.1	0.33	4.0	0.89	168.3	0.9	0.11	7.5	0.80	45S	Ø	L390		
L562	80.4	-0.3	-0.03	6.3	1.03	174.1	6.6	0.84	6.6	0.70	45S	Ø	L562		
L567	73.8	-2.1	-0.30	4.7	0.93	164.5	-3.0	-0.38	7.5	0.80	45S	Ø	L567		
L571	100.7	25.0	4.00	7.0	1.47	207.3	39.9	5.05	13.9	1.49	45S	#	L571		
L575	83.3	2.4	0.43	7.0	1.38	165.7	-1.8	-0.22	8.5	0.92	45S	Ø	L575		
L585	73.7	-7.2	-1.31	4.0	0.94	170.3	8.9	1.13	18.0	1.93	45S	Ø	L585		
L587	82.3	1.5	0.27	5.9	1.17	169.3	1.9	0.24	10.8	1.16	45S	Ø	L587		
L597	75.9	-5.0	-0.31	4.7	0.93	167.7	0.2	0.03	15.2	1.63	45S	Ø	L597		
L600	82.1	1.3	0.24	4.4	0.86	166.7	-0.8	-0.10	7.4	0.79	45S	Ø	L600		
L604	70.5	-4.4	-0.60	5.9	1.10	164.3	-3.1	-0.39	13.5	1.44	45S	Ø	L604		
L626	75.1	-5.8	-1.03	4.7	0.91	167.5	0.1	0.01	9.8	1.05	45S	Ø	L626		
L636	92.1	11.2	2.03	1.9	0.38	170.0	2.6	0.32	7.5	0.81	45S	Ø	L636		
L651	86.5	5.7	1.03	4.3	0.85	147.8	-19.6	-2.48	6.9	0.74	45S	X	L651		
L670	84.6	3.7	0.60	5.0	1.10	183.1	15.7	1.99	15.5	1.66	45S	Ø	L670		
L698	77.3	-3.0	-0.30	5.0	1.02	155.1	-12.4	-1.56	9.9	1.07	45S	Ø	L698		
L704	79.3	-1.5	-0.20	6.8	1.33	NO DATA REPORTED FOR SAMPLE K46					45S	M	L704		

GR. MEAN = 80.9 SHEFF. UNITS GRAND MEAN = 167.4 SHEFF. UNITS TEST DETERMINATIONS = 15
SD MEANS = 5.5 SHEFF. UNITS SD OF MEANS = 7.9 SHEFF. UNITS 82 LABS IN GRAND MEANS
AVERAGE SDR = 5.1 SHEFF. UNITS AVERAGE SDR = 9.3 SHEFF. UNITS
TOTAL NUMBER OF LABORATORIES REPORTING = 69
Best values: J74 80 ± 9 Sheffield units
K46 167 ± 12 Sheffield units

The following laboratories were omitted from the grand means because of extreme test results: 107, 288, 571.

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

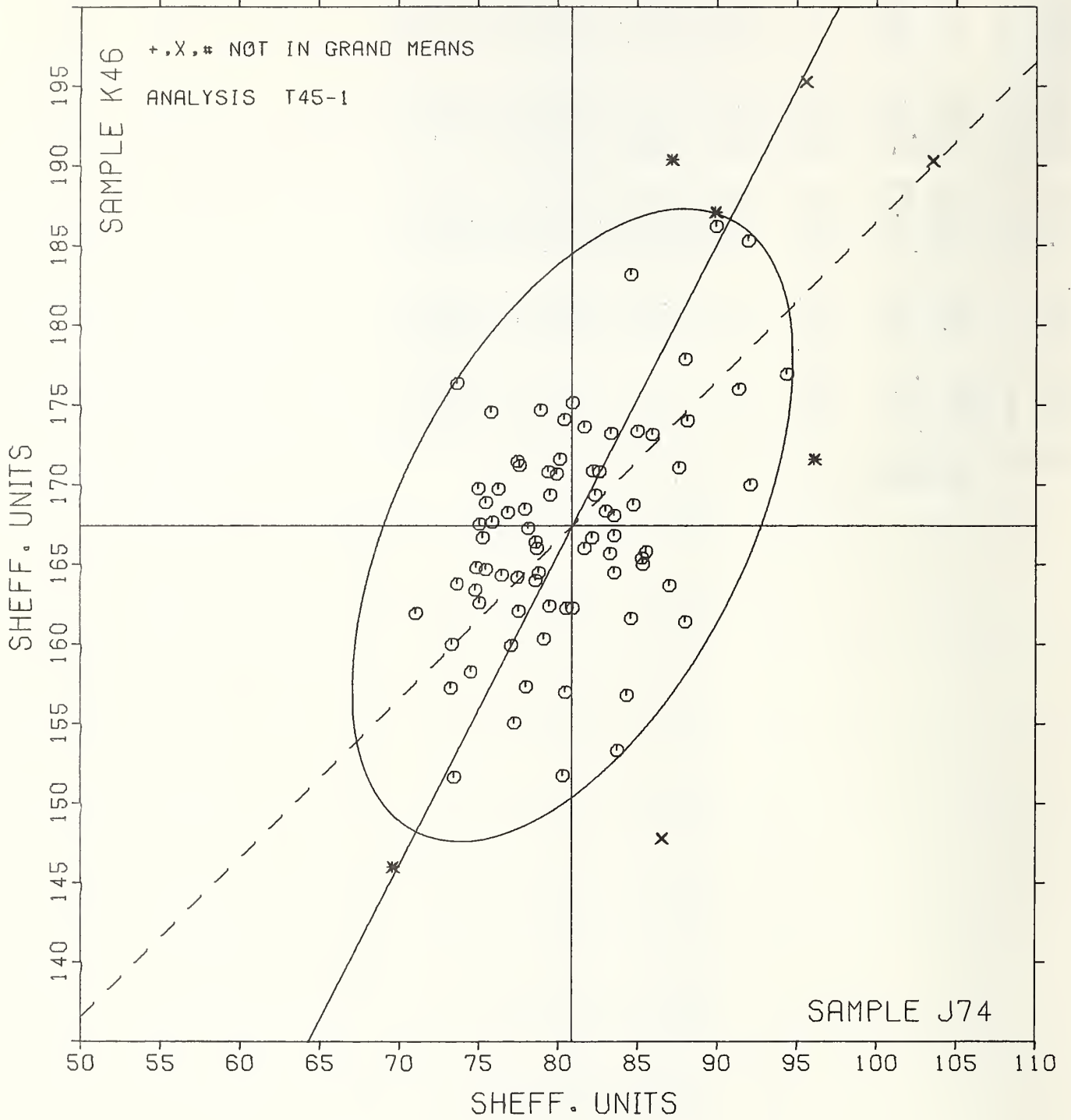
LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J74	K46	MAJOR	MINOR	COOR	VAR			
L366	#	69.6	146.0	-24.2	0.3	1.13	45.5	SMOOTHNESS,	SHEFFIELD	
L190R	Ø	71.1	161.9	-9.4	0.2	0.88	45.5	SMOOTHNESS,	SHEFFIELD	
L285	Ø	73.3	157.3	-12.5	2.1	1.00	45.5	SMOOTHNESS,	SHEFFIELD	
L158	Ø	73.3	160.0	-10.1	3.3	1.01	45.5	SMOOTHNESS,	SHEFFIELD	
L213	Ø	73.5	151.7	-17.4	-0.0	1.00	45.5	SMOOTHNESS,	SHEFFIELD	
L288	#	73.5	229.7	22.0	34.9	1.07	45.5	SMOOTHNESS,	SHEFFIELD	
L585	Ø	73.7	176.3	4.0	10.5	1.04	45.5	SMOOTHNESS,	SHEFFIELD	
L318	Ø	73.7	163.8	-6.5	4.8	1.11	45.5	SMOOTHNESS,	SHEFFIELD	
L226B	#	74.5	158.3	-11.0	1.5	0.75	45.5	SMOOTHNESS,	SHEFFIELD	
L233	Ø	74.8	163.4	-6.4	3.0	1.11	45.5	SMOOTHNESS,	SHEFFIELD	
L275	Ø	74.9	164.8	-5.1	4.1	0.74	45.5	SMOOTHNESS,	SHEFFIELD	
L281	Ø	75.0	169.7	-0.0	0.3	0.81	45.5	SMOOTHNESS,	SHEFFIELD	
L626	Ø	75.1	167.5	-2.0	5.2	0.55	45.5	SMOOTHNESS,	SHEFFIELD	
L223	Ø	75.1	162.6	-7.0	3.0	1.14	45.5	SMOOTHNESS,	SHEFFIELD	
L261	Ø	75.3	166.7	-3.2	4.6	1.02	45.5	SMOOTHNESS,	SHEFFIELD	
L382	Ø	75.5	164.7	-4.9	3.0	0.88	45.5	SMOOTHNESS,	SHEFFIELD	
L360	Ø	75.5	168.5	-1.2	3.5	1.09	45.5	SMOOTHNESS,	SHEFFIELD	
L150	Ø	75.8	174.5	4.0	7.0	1.01	45.5	SMOOTHNESS,	SHEFFIELD	
L597	Ø	75.9	167.7	-2.1	4.0	1.02	45.5	SMOOTHNESS,	SHEFFIELD	
L328	Ø	76.3	169.7	-0.1	5.1	0.2	45.5	SMOOTHNESS,	SHEFFIELD	
L604	Ø	76.5	164.3	-4.8	2.5	1.00	45.5	SMOOTHNESS,	SHEFFIELD	
L159	Ø	76.9	168.3	-1.1	3.9	0.80	45.5	SMOOTHNESS,	SHEFFIELD	
L317	Ø	77.1	159.5	-8.4	-0.0	1.01	45.5	SMOOTHNESS,	SHEFFIELD	
L698	Ø	77.3	155.1	-12.7	-2.4	1.04	45.5	SMOOTHNESS,	SHEFFIELD	
L157	Ø	77.5	171.5	2.0	4.9	1.02	45.5	SMOOTHNESS,	SHEFFIELD	
L183S	Ø	77.5	164.2	-4.4	1.6	0.97	45.5	SMOOTHNESS,	SHEFFIELD	
L195	Ø	77.5	162.1	-6.3	0.5	1.08	45.5	SMOOTHNESS,	SHEFFIELD	
L349	Ø	77.6	171.2	1.9	4.6	1.02	45.5	SMOOTHNESS,	SHEFFIELD	
L231	Ø	77.9	168.5	-0.4	3.1	1.02	45.5	SMOOTHNESS,	SHEFFIELD	
L134	Ø	78.0	157.3	-10.3	-2.1	0.3	45.5	SMOOTHNESS,	SHEFFIELD	
L249	Ø	78.1	167.3	-1.4	2.4	1.00	45.5	SMOOTHNESS,	SHEFFIELD	
L108	Ø	78.6	164.0	-4.1	0.5	0.90	45.5	SMOOTHNESS,	SHEFFIELD	
L203	Ø	78.8	166.4	-2.0	1.5	1.04	45.5	SMOOTHNESS,	SHEFFIELD	
L125	Ø	78.7	166.0	-2.3	1.3	0.94	45.5	SMOOTHNESS,	SHEFFIELD	
L567	#	78.8	164.5	-3.0	0.5	0.87	45.5	SMOOTHNESS,	SHEFFIELD	
L237	Ø	78.9	174.7	0.0	5.0	0.71	45.5	SMOOTHNESS,	SHEFFIELD	
L305	Ø	79.1	160.3	-7.1	-1.7	1.13	45.5	SMOOTHNESS,	SHEFFIELD	
L704	M	79.3				1.03	45.5	SMOOTHNESS,	SHEFFIELD	
L254	Ø	79.4	170.8	2.3	2.8	0.82	45.5	SMOOTHNESS,	SHEFFIELD	
L308	Ø	79.5	162.4	-5.1	-1.0	0.80	45.5	SMOOTHNESS,	SHEFFIELD	
L380	Ø	79.5	169.3	1.1	2.1	0.91	45.5	SMOOTHNESS,	SHEFFIELD	
L211	Ø	79.9	170.7	2.4	2.3	1.14	45.5	SMOOTHNESS,	SHEFFIELD	
L260	Ø	80.1	171.6	3.4	2.0	0.75	45.5	SMOOTHNESS,	SHEFFIELD	
L166	Ø	80.3	151.7	-14.2	-0.7	0.95	45.5	SMOOTHNESS,	SHEFFIELD	
L562	Ø	80.4	174.1	5.7	3.4	1.10	45.5	SMOOTHNESS,	SHEFFIELD	
L290	#	80.5	157.0	-9.5	-4.4	0.73	45.5	SMOOTHNESS,	SHEFFIELD	
L162	Ø	80.5	162.3	-4.8	-2.1	0.80	45.5	SMOOTHNESS,	SHEFFIELD	
L122	Ø	80.9	162.3	-4.0	-2.4	0.81	45.5	SMOOTHNESS,	SHEFFIELD	
L132	Ø	80.9	175.1	0.9	3.0	1.07	45.5	SMOOTHNESS,	SHEFFIELD	
L167	Ø	81.7	166.0	-0.9	-1.4	0.80	45.5	SMOOTHNESS,	SHEFFIELD	
L228	Ø	81.7	173.6	5.8	2.1	0.93	45.5	SMOOTHNESS,	SHEFFIELD	
L600	Ø	82.1	166.7	-0.1	-1.5	0.82	45.5	SMOOTHNESS,	SHEFFIELD	
L348	Ø	82.2	170.9	3.7	0.4	1.09	45.5	SMOOTHNESS,	SHEFFIELD	
L587	Ø	82.3	169.3	2.4	-0.4	1.10	45.5	SMOOTHNESS,	SHEFFIELD	
L114	Ø	82.6	170.8	3.0	-0.0	0.80	45.5	SMOOTHNESS,	SHEFFIELD	
L390	Ø	83.0	168.3	1.0	-1.5	0.85	45.5	SMOOTHNESS,	SHEFFIELD	
L575	Ø	83.3	165.7	-0.5	-2.9	1.15	45.5	SMOOTHNESS,	SHEFFIELD	
L206	Ø	83.3	173.2	0.5	0.4	1.09	45.5	SMOOTHNESS,	SHEFFIELD	
L301	Ø	83.5	168.1	1.0	-2.1	1.14	45.5	SMOOTHNESS,	SHEFFIELD	
L224	#	83.5	164.5	-1.4	-3.7	0.80	45.5	SMOOTHNESS,	SHEFFIELD	
L291S	Ø	83.5	166.8	0.0	-2.7	1.04	45.5	SMOOTHNESS,	SHEFFIELD	
L241	Ø	83.7	153.3	-11.2	-9.0	0.92	45.5	SMOOTHNESS,	SHEFFIELD	
L326	#	84.3	156.8	-7.9	-7.9	0.77	45.5	SMOOTHNESS,	SHEFFIELD	
L670	Ø	84.6	183.1	15.7	3.8	1.38	45.5	SMOOTHNESS,	SHEFFIELD	
L262	Ø	84.6	161.6	-3.5	-0.0	1.09	45.5	SMOOTHNESS,	SHEFFIELD	

TAPPI USEFUL TEST METHOD UM 516, SMOOTHNESS OF PAPER (SHEFFIELD)

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERLY---	TEST INSTRUMENT---	CONDITIONS
		J74	K46	MAJOR	MINOR	ROUNDER	VAR			
L123	Ø	84.7	168.7	2.9	-2.8	1.27	455	SMOOTHNESS,	SHEFFIELD	
L190C	Ø	85.0	173.3	7.1	-1.0	1.10	455	SMOOTHNESS,	SHEFFIELD	
L124	Ø	85.3	165.4	.2	-4.8	1.08	455	SMOOTHNESS,	SHEFFIELD	
L121	Ø	85.3	165.0	-.1	-5.1	.07	455	SMOOTHNESS,	SHEFFIELD	
L128	Ø	85.5	165.8	.7	-4.9	1.01	455	SMOOTHNESS,	SHEFFIELD	
L352	Ø	85.9	173.1	7.4	-1.9	1.34	455	SMOOTHNESS,	SHEFFIELD	
L651	X	86.5	147.8	-14.9	-14.0	.79	455	SMOOTHNESS,	SHEFFIELD	
L115	Ø	87.0	163.7	-.0	-7.2	.59	455	SMOOTHNESS,	SHEFFIELD	
L277	*	87.1	190.3	23.2	4.9	1.13	455	SMOOTHNESS,	SHEFFIELD	
L126	Ø	87.6	171.1	6.5	-4.3	.82	455	SMOOTHNESS,	SHEFFIELD	
L148	Ø	88.0	177.9	12.5	-1.0	1.12	455	SMOOTHNESS,	SHEFFIELD	
L312	Ø	88.0	161.4	-2.1	-9.1	.55	455	SMOOTHNESS,	SHEFFIELD	
L139S	Ø	88.1	174.0	9.2	-5.5	1.00	455	SMOOTHNESS,	SHEFFIELD	
L230S	*	89.9	187.1	21.0	.9	1.23	455	SMOOTHNESS,	SHEFFIELD	
L259	Ø	89.9	186.2	20.8	.5	1.23	455	SMOOTHNESS,	SHEFFIELD	
L323	Ø	91.3	176.0	12.4	-5.4	1.39	455	SMOOTHNESS,	SHEFFIELD	
L152	Ø	91.9	185.3	20.9	-1.7	.53	455	SMOOTHNESS,	SHEFFIELD	
L636	Ø	92.1	170.0	7.4	-8.8	.60	455	SMOOTHNESS,	SHEFFIELD	
L376	Ø	94.3	176.9	14.0	-7.0	1.00	455	SMOOTHNESS,	SHEFFIELD	
L278	X	95.5	195.3	31.5	-.4	1.17	455	SMOOTHNESS,	SHEFFIELD	
L219	*	96.1	171.6	10.0	-11.6	1.00	455	SMOOTHNESS,	SHEFFIELD	
L153	X	103.5	190.3	39.0	-9.7	1.28	455	SMOOTHNESS,	SHEFFIELD	
L571	#	106.7	207.3	47.5	-4.8	1.48	455	SMOOTHNESS,	SHEFFIELD	
L107	#	130.5	214.7	64.0	-22.5	1.90	455	SMOOTHNESS,	SHEFFIELD	
GMEANS:		86.9	167.4			1.00				
95% ELLIPSE:				21.6	10.9			With GAMMA = 62 DEGREES		

SMOOTHNESS, SHEFFIELD

SAMPLE J74 = 81. SHEFF. UNITS SAMPLE K46 = 167. SHEFF. UNITS



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

LAB CODE	SAMPLE J74 MEAN	PRINTING 76 GRAMS PER SQUARE METER				SAMPLE K46 MEAN	PRINTING 60 GRAMS PER SQUARE METER				TEST D ₀ = 15		
		DEV	N ₀ DEV	SDR	K ₀ SDR		DEV	N ₀ DEV	SDR	K ₀ SDR	VAR	F	LAB
L139B	85.2	1.5	0.40	0.00	0.74	25.9	2.8	1.24	3.2	1.11	45K	Ø	L139B
L162	88.4	4.7	1.25	11.0	1.44	26.6	-0.5	-0.22	3.7	1.30	45K	Ø	L162
L182K	65.3	-18.4	-4.00	5.1	0.66	26.6	-0.5	-0.23	2.3	0.80	45K	#	L182K
L190C	81.1	-2.0	-0.60	7.8	1.03	26.7	-0.4	-0.17	3.6	1.26	45K	Ø	L190C
L230B	78.5	-5.2	-1.57	4.0	0.59	23.4	-3.7	-1.67	2.0	0.69	45K	Ø	L230B
L291K	88.4	4.7	1.24	13.9	1.62	27.8	0.7	0.32	3.3	1.18	45K	Ø	L291K
L564	85.5	1.6	0.47	9.3	0.83	26.7	1.6	0.73	2.7	0.93	45K	Ø	L564
L581	79.7	-4.0	-1.07	5.7	0.75	24.7	-2.4	-1.10	1.4	0.51	45K	Ø	L581
L697	82.7	-0.9	-0.25	6.2	0.81	29.0	1.9	0.86	2.9	1.02	45K	Ø	L697

GR. MEAN = 83.7 BEKK SECONDS GRAND MEAN = 27.1 BEKK SECONDS TEST DETERMINATIONS = 15
SD MEANS = 3.8 BEKK SECONDS SD OF MEANS = 2.2 BEKK SECONDS 8 LABS IN GRAND MEANS
AVERAGE SDR = 7.0 BEKK SECONDS AVERAGE SDR = 2.8 BEKK SECONDS

L250M	65.3	-18.4	-4.00	4.0	0.56	25.2	-1.9	-0.86	2.4	0.83	45L	*	L250M
L251	74.2	-9.0	-2.51	8.4	1.10	23.5	-3.6	-1.62	1.5	0.54	45L	*	L251

TOTAL NUMBER OF LABORATORIES PARTICIPATING = 11
Best values: J74 84 Bekk seconds
K46 27 Bekk seconds

The following laboratories were omitted from the grand means because of extreme test results: 182K.

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		J74	K46	MAJOR	MINOR	K ₀ SDR	VAR	
L250M	*	65.3	25.2	-17.0	0.7	0.5	4.5L	SMOOTHNESS, BEKK, 20 C, 65% RH
L182K	#	65.3	26.6	-17.0	7.0	0.7	4.5L	SMOOTHNESS, BEKK
L251	*	74.2	23.5	-10.1	0.0	0.2	4.5L	SMOOTHNESS, BEKK, 20 C, 65% RH
L230B	Ø	78.5	23.4	-6.2	-1.3	0.4	4.5L	SMOOTHNESS, BEKK
L581	Ø	79.7	24.7	-4.7	-0.6	0.3	4.5L	SMOOTHNESS, BEKK
L190C	Ø	81.1	26.7	-2.0	0.7	1.1	4.5L	SMOOTHNESS, BEKK
L697	Ø	82.7	29.0	-0.1	2.1	0.2	4.5L	SMOOTHNESS, BEKK
L139B	Ø	85.2	29.9	2.0	1.9	0.2	4.5L	SMOOTHNESS, BEKK
L564	Ø	85.5	28.7	2.0	0.8	0.8	4.5L	SMOOTHNESS, BEKK
L291K	Ø	88.4	27.8	4.0	-1.3	1.0	4.5L	SMOOTHNESS, BEKK
L162	Ø	88.4	26.6	4.1	-2.4	1.0	4.5L	SMOOTHNESS, BEKK

GMEANS: 63.7 27.1 1.00
95% ELLIPSE: 14.1 0.6 WITH GAMMA = 23 DEGREES

TAPPI USEFUL TEST METHOD UM 553, PRINTING INK METHOD AND BRITISH STANDARD 4574-70

LAB CODE	SAMPLE B80 MEAN	COATED OFFSET BOOK 75 GRAMS PER SQUARE METER				SAMPLE B92 MEAN	COATED HEAT SET OFFSET 76 GRAMS PER SQUARE METER				TEST D ₀ = 4		
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L126	24.7	.0	.024	1.1	1.37	23.1	-.7	-.24	.7	.91	56K	Ø	L126
L149	21.7	-2.2	-.72	.3	.04	21.7	-2.1	-.67	1.3	1.67	56K	Ø	L149
L182	25.4	1.5	.40	.8	.98	25.1	1.3	.43	.2	.25	56K	Ø	L182
L277	26.5	2.5	.89	.0	.74	26.0	2.2	.71	.8	1.08	56K	Ø	L277
L291	19.0	-5.0	-1.01	1.3	1.05	18.3	-5.5	-1.81	.6	.80	56K	Ø	L291
L333	21.5	-2.5	-.80	1.0	1.29	23.7	-.1	-.02	.5	.66	56K	Ø	L333
L337	22.3	-1.7	-.54	1.1	1.39	21.1	-2.7	-.88	1.3	1.70	56K	Ø	L337
L339	30.2	6.3	2.00	.3	.64	29.6	5.8	1.89	.7	.99	56K	Ø	L339
L616	23.7	-.2	-.00	.3	.64	24.7	.9	.30	.5	.66	56K	Ø	L616
L643	24.7	.8	.24	.3	.64	24.7	.9	.30	1.0	1.27	56K	Ø	L643

GR₀ MEAN = 24.0 K & N UNITS GRAND MEAN = 23.8 K & N UNITS TEST DETERMINATIONS = 4
SD MEANS = 3.1 K & N UNITS SD OF MEANS = 3.1 K & N UNITS 10 LABS IN GRAND MEANS
AVERAGE SDR = .00 K & N UNITS AVERAGE SDR = .08 K & N UNITS
TOTAL NUMBER OF LABORATORIES PARTICIPATING = 10
Best values: B80 25 K & N units
 B92 23 K & N units

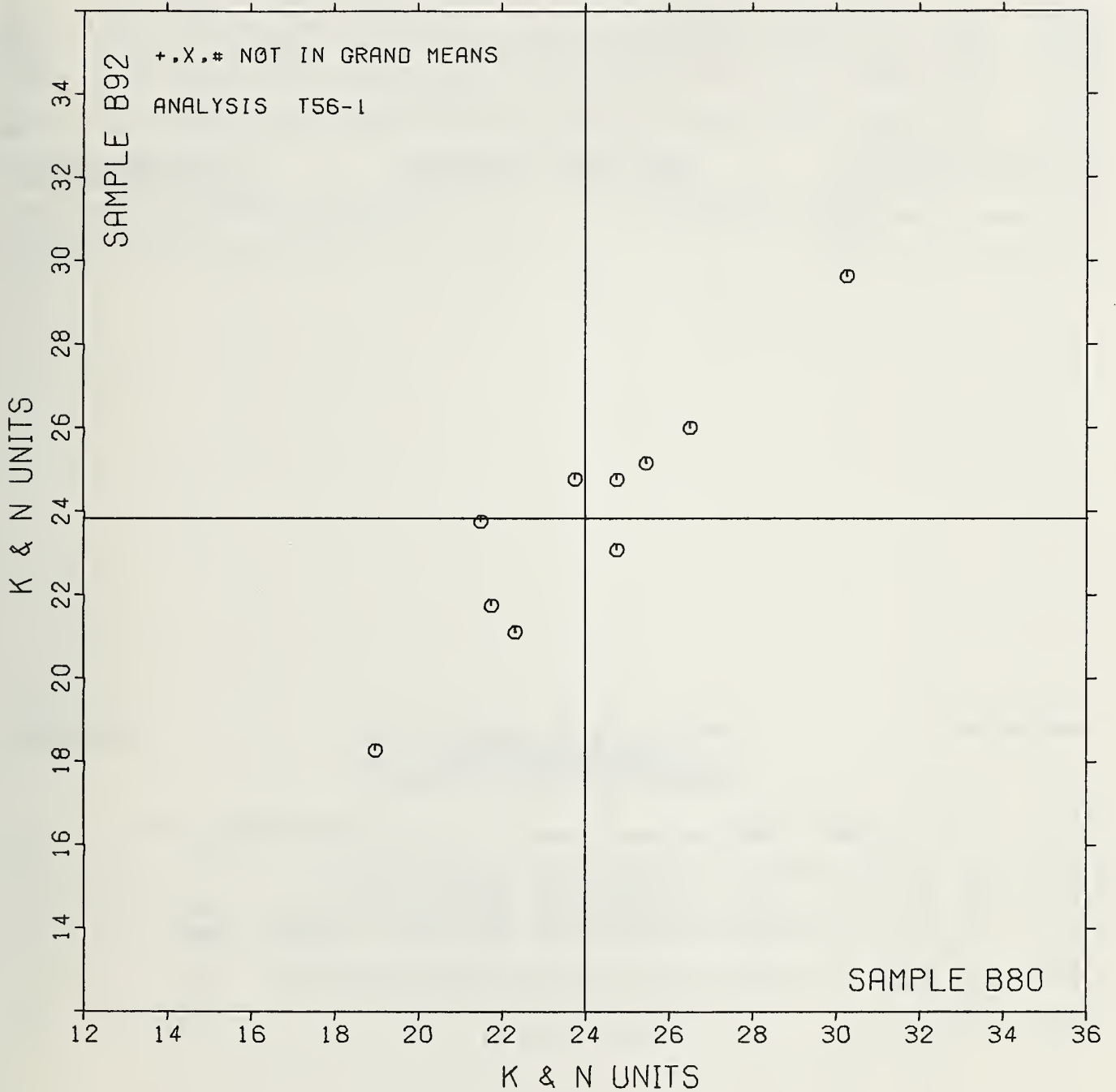
TAPPI USEFUL TEST METHOD UM 553, PRINTING INK METHOD AND BRITISH STANDARD 4574-70

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		B80	B92	MAJOR	MINOR	K ₀ SDR	VAR			
L291	Ø	19.0	18.3	-7.5	-.4	1.23	56K	INK ABSORPTION,	K&N	INK TEST
L333	Ø	21.5	23.7	-1.0	1.7	.97	56K	INK ABSORPTION,	K&N	INK TEST
L149	Ø	21.7	21.7	-3.1	.1	1.15	56K	INK ABSORPTION,	K&N	INK TEST
L337	Ø	22.3	21.1	-3.1	-.8	1.34	56K	INK ABSORPTION,	K&N	INK TEST
L616	Ø	23.7	24.7	.3	.8	.63	56K	INK ABSORPTION,	K&N	INK TEST
L126	Ø	24.7	23.1	.0	-1.1	1.14	56K	INK ABSORPTION,	K&N	INK TEST
L643	Ø	24.7	24.7	1.2	.1	.90	56K	INK ABSORPTION,	K&N	INK TEST
L182	Ø	25.4	25.1	2.0	-.1	.62	56K	INK ABSORPTION,	K&N	INK TEST
L277	Ø	26.5	26.0	3.3	-.2	.91	56K	INK ABSORPTION,	K&N	INK TEST
L339	Ø	30.2	29.6	8.5	-.2	.62	56K	INK ABSORPTION,	K&N	INK TEST
GMEANS:		24.0	23.8			1.00				
		95% ELLIPSE:		13.7	2.5	WITH GAMMA = 44 DEGREES				

K & N INK ABSORPTION

SAMPLE B80 = 24.0 K & N UNITS

SAMPLE B92 = 23.8 K & N UNITS



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T57-2 TABLE 1
HYDROGEN ION CONCENTRATION (PH), HOT
TAPPI OFFICIAL TEST METHOD T435 OS-77

LAB CODE	SAMPLE A59		REPRODUCTION 78 GRAMS PER SQUARE METER				SAMPLE J78		PRINTING 89 GRAMS PER SQUARE METER				TEST D ₀ = 5		
	MEAN	DEV	N ₀ DEV	SDR	Δ ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB		
L128	4.960	-.222	-.000	0.000	1.001	7.580	-.125	-.77	0.045	0.70	57L	0	L128		
L162	4.926	-.250	-1.000	0.022	0.40	NO DATA REPORTED FOR SAMPLE J78							57C	M	L162
L174H	5.542	0.359	1.000	0.028	0.51	7.896	0.191	1.17	0.021	0.33	57G	0	L174H		
L182H	5.188	0.000	0.000	0.040	0.84	7.784	0.079	0.49	0.100	1.57	57E	0	L182H		
L334	5.142	-.040	-.100	0.188	3.45	8.818	1.113	6.84	0.144	2.25	57C	#	L334		
L484B	5.040	-.142	-.000	0.089	1.000	7.560	-.145	-.89	0.089	1.40	57Z	0	L484B		
GR. MEAN = 5.182 PH UNITS			GRAND MEAN = 7.705 PH UNITS				TEST DETERMINATIONS = 5								
SD MEANS = 0.258 PH UNITS			SD OF MEANS = 0.103 PH UNITS				4 LABS IN GRAND MEANS								
AVERAGE SDR = 0.004 PH UNITS			AVERAGE SDR = 0.064 PH UNITS				TOTAL NUMBER OF LABORATORIES REPORTING = 0								

The following laboratories were omitted from the grand means because of extreme test results: 334.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T57-2 TABLE 2
HYDROGEN ION CONCENTRATION (PH), HOT
TAPPI OFFICIAL TEST METHOD T435 OS-77

LAB CODE	F	MEANS		COORDINATES		AVG Δ ₀ SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		A59	J78	MAJOR	MINOR			
L162	M	4.926				0.40		57C PH, HOT, CORNING MODEL 12 RESEARCH METER
L128	0	4.960	7.580	-.200	0.010	0.05		57L PH, HOT, L+N
L484B	0	5.040	7.560	-.197	-.0049	1.002		57Z PH, HOT, BECKMAN MODEL H2
L334	#	5.142	8.818	0.547	0.970	2.000		57C PH, HOT, CORNING MODEL 12 RESEARCH METER
L182H	0	5.188	7.784	0.040	0.004	1.020		57E PH, HOT, RADICMETER TYPE PH M 28
L174H	0	5.542	7.896	0.400	-.0025	0.42		57G PH, HOT, FISHER ACCUMET MODEL 220
GMEANS:		5.182	7.705			1.000		
		95% ELLIPSE:		2.284	0.375	WITH GRAMS = 31 DEGREES		

OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS
TAPPI OFFICIAL TEST METHOD T425 G3-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE G01	HIGH BRIGHTNESS PRINTING 116 GRAMS PER SQUARE METER				SAMPLE E05 MEAN	BOND 79 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	N ₀ DEV	SDR	K ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L105	56.20	.32	.34	.14	.62	89.84	.12	.28	.48	1.36	60H	⊕ L105	
L108	55.55	-.33	-.30	.31	1.37	89.89	.17	.40	.82	2.30	60B	⊕ L108	
L115	56.29	.41	1.20	.11	.48	90.16	.44	1.03	.29	.81	60B	⊕ L115	
L118	55.82	-.00	-.10	.14	.61	89.75	.03	.07	.16	.47	60B	⊕ L118	
L122	56.24	.30	1.00	.13	.59	89.94	.22	.52	.46	1.30	60D	⊕ L122	
L123	56.00	.12	.30	.23	1.01	89.21	-.51	-1.20	.63	1.78	60W	⊕ L123	
L124	56.26	.38	1.11	.08	2.96	89.72	.00	.00	.61	1.73	60B	⊕ L124	
L125	55.79	-.09	-.27	.30	1.57	89.59	-.13	-.30	.35	.99	60H	⊕ L125	
L132	55.48	-.40	-1.10	.20	.99	89.12	-.60	-1.41	.26	.74	60B	⊕ L132	
L136	55.69	-.19	-.30	.11	.48	89.39	-.33	-.77	.20	.57	60H	⊕ L136	
L139	55.70	-.10	-.30	.29	1.26	89.61	-.11	-.26	.27	.77	60B	⊕ L139	
L148H	55.82	-.00	-.10	.20	1.03	89.35	-.37	-.87	.36	1.01	60H	⊕ L148H	
L152	56.05	.17	.49	.08	.37	90.40	.68	1.60	.24	.69	60B	⊕ L152	
L157	56.45	.57	1.07	.37	1.02	90.25	.53	1.24	.26	.74	60B	⊕ L157	
L158	55.72	-.10	-.40	.10	.71	89.55	-.17	-.40	.44	1.25	60D	⊕ L158	
L162	56.08	.20	.30	.17	.74	90.04	.32	.75	.27	.77	60W	⊕ L162	
L166	55.23	-.60	-1.32	.15	.65	88.99	-.73	-1.71	.37	1.05	60B	⊕ L166	
L172	55.95	.07	.20	.08	.37	89.46	-.26	-.61	.39	1.10	60B	⊕ L172	
L190C	55.40	-.43	-1.42	.10	.80	89.14	-.58	-1.36	.39	1.10	60B	⊕ L190C	
L190R	55.62	-.20	-.77	.17	.74	89.10	-.62	-1.45	.27	.78	60B	⊕ L190R	
L206	55.82	-.00	-.10	.19	.62	89.83	.11	.26	.29	.83	60B	⊕ L206	
L210B	56.20	.32	.34	.19	.60	90.33	.61	1.43	.25	.70	60B	⊕ L210B	
L210D	55.96	.03	.20	.18	.63	89.96	.24	.56	.25	.69	60D	⊕ L210D	
L211S	55.95	.07	.20	.10	.69	89.85	.13	.31	.24	.68	60R	⊕ L211S	
L212	56.51	.63	1.00	.62	2.73	90.34	.62	1.46	.81	2.28	60B	⊕ L212	
L213	56.19	.31	.34	.20	1.12	90.30	.58	1.36	.80	2.26	60B	⊕ L213	
L223B	56.09	.21	.34	.10	.67	90.23	.51	1.20	.28	.79	60B	⊕ L223B	
L225	50.43	.55	1.01	.49	2.17	89.92	.20	.47	.48	1.36	60B	⊕ L225	
L226B	57.30	1.42	4.17	.23	.99	89.62	-.10	-.23	.34	.96	60B	X L226B	
L228	55.49	-.39	-1.10	.19	.81	88.73	-.99	-2.32	.35	.99	60H	⊕ L228	
L230	55.49	-.39	-1.10	.32	1.39	89.17	-.55	-1.29	.30	.85	60B	⊕ L230	
L241	56.18	.30	.30	.24	1.07	89.98	.26	.61	.41	1.16	60B	⊕ L241	
L254	55.75	-.13	-.39	.20	1.08	89.44	-.28	-.66	.39	1.09	60H	⊕ L254	
L259	55.93	.05	.14	.14	.62	89.92	.20	.47	.27	.76	60B	⊕ L259	
L262	56.09	.21	.61	.17	.70	90.20	.48	1.13	.23	.65	60R	⊕ L262	
L275	56.16	.28	.32	.22	.95	89.67	-.05	-.12	.34	.95	60R	⊕ L275	
L278	55.76	-.12	-.30	.24	1.00	89.75	.03	.07	.31	.88	60B	⊕ L278	
L285D	55.17	-.71	-2.09	.21	.90	88.94	-.78	-1.83	.36	1.01	60D	⊕ L285D	
L285R	55.18	-.70	-2.00	.19	.85	84.91	-4.81	-11.29	5.29	14.92	60R	# L285R	
L288	56.35	.47	1.00	.21	.93	90.62	.30	.70	.29	.82	60D	⊕ L288	
L301	55.84	-.04	-.12	.14	.60	89.74	.02	.05	.42	1.19	60B	⊕ L301	
L305	55.92	.04	.11	.20	1.11	90.06	.34	.80	.12	.33	60F	⊕ L305	
L308	56.06	.18	.32	.10	.59	90.39	.67	1.57	.33	.94	60H	⊕ L308	
L317	55.61	-.27	-.30	.24	1.00	89.68	-.04	-.09	.21	.61	60B	⊕ L317	
L323	56.43	.50	1.01	.20	1.24	90.55	.83	1.95	.41	1.16	60W	⊕ L323	
L339	55.60	-.20	-.30	.00	2.08	89.85	.13	.31	.41	1.16	60B	⊕ L339	
L341	55.33	-.55	-1.00	.23	.99	89.30	-.36	-.84	.12	.33	60R	⊕ L341	
L348	55.28	-.60	-1.77	.21	.92	89.16	-.54	-1.27	.23	.65	60D	⊕ L348	
L349	55.85	-.03	-.09	.10	.60	89.76	.04	.09	.18	.52	60D	⊕ L349	
L354	54.99	-.89	-2.00	.30	1.31	90.40	.68	1.60	1.93	5.43	60B	X L354	
L366	54.80	-1.00	-.30	.42	1.85	88.60	-.92	-2.16	.42	1.19	60L	# L366	
L390	56.13	.20	.70	.20	1.20	90.30	.58	1.36	.30	.94	60D	⊕ L390	
L523	53.84	-.04	-.12	.10	.59	89.23	-.49	-1.15	.24	.68	60F	⊕ L523	
L567	55.95	.07	.20	.10	.61	89.83	.11	.26	.37	1.03	60D	⊕ L567	
L571	56.15	.27	.79	.24	1.04	89.83	.11	.26	.47	1.32	60D	⊕ L571	
L573	56.02	.14	.41	.23	1.03	90.05	.33	.78	.26	.74	60H	⊕ L573	
L581	55.91	.03	.30	.21	.91	89.67	.15	.35	.44	1.25	60B	⊕ L581	
L587	53.67	-.01	-.00	.10	.59	90.02	.30	.70	.35	.98	60B	⊕ L587	
L592	55.85	-.00	-.09	.24	1.04	89.40	-.26	-.61	.36	1.01	60W	⊕ L592	
L594	55.98	.10	.29	.10	.77	90.04	.32	.75	.55	1.54	60D	⊕ L594	
L597	55.05	-.83	-2.00	.10	.69	88.15	-1.57	-3.68	.47	1.34	60B	# L597	
L608	55.44	-.44	-1.00	.20	.88	89.96	.24	.56	.29	.81	60D	# L608	
L636	56.27	.39	1.14	.21	.92	89.42	-.30	-.70	.28	.80	60F	# L636	
L673R	56.05	.17	.49	.00	.37	89.65	-.07	-.16	.18	.50	60B	⊕ L673R	
L673T	55.89	.01	.30	.17	.73	89.52	-.20	-.47	.28	.78	60B	⊕ L673T	

OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS
TAPPI OFFICIAL TEST METHOD T425 05-75, OPACITY OF PAPER (15 DEG/DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE G01 MEAN	HIGH BRIGHTNESS PRINTING 116 GRAMS PER SQUARE METER				SAMPLE E85 MEAN	BOND 79 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAP	F	LAB
L692	95.84	-0.04	-0.12	0.37	1.03	89.42	-0.30	-0.70	0.38	1.08	60D	0	L692
L698	95.78	-0.10	-0.30	0.23	1.01	89.29	-0.43	-1.01	0.46	1.39	60D	0	L698
L712	97.05	1.17	0.44	0.28	1.24	90.26	0.48	1.13	0.59	1.65	60E	X	L712
GR. MEAN = 95.86 PERCENT		GRAND MEAN = 69.72 PERCENT				TEST DETERMINATIONS = 10							
SD MEANS = 0.34 PERCENT		SD OF MEANS = 0.43 PERCENT				63 LABS IN GRAND MEANS							
AVERAGE SDR = 0.23 PERCENT		AVERAGE SDR = 0.35 PERCENT											
L219	97.00	1.12	0.29	0.00	0.00	82.00	-7.72	-18.12	0.00	0.00	60E	*	L219
L224	95.81	-0.07	-0.21	0.33	1.44	89.39	-0.33	-0.77	0.25	0.70	60F	*	L224
L249	95.60	-0.20	-0.03	0.20	1.15	80.83	-0.89	-2.09	0.53	1.50	60P	*	L249
L256	95.52	-0.30	-1.00	0.21	0.94	80.57	-1.15	-2.70	0.21	0.58	60N	*	L256
L277	95.20	-0.68	-2.01	0.42	1.80	80.00	-1.12	-2.63	0.52	1.46	60P	*	L277
L312	95.00	-0.68	-2.09	0.00	0.00	80.10	-1.62	-3.80	0.21	0.59	60P	*	L312
L380	95.30	-0.58	-1.71	0.35	1.03	80.40	-1.32	-3.10	0.52	1.46	60P	*	L380
L564	95.60	-0.20	-0.03	0.22	2.20	89.00	-0.72	-1.69	0.00	0.00	60P	*	L564
L685B	95.96	0.03	0.20	0.00	0.37	89.59	-0.13	-0.30	0.31	0.87	60P	*	L685B
L687	96.65	0.77	0.20	0.41	1.80	89.70	-0.02	-0.05	0.42	1.19	60P	*	L687
L704	95.00	-0.23	-2.09	0.24	1.03	NO DATA REPORTED FOR SAMPLE E85				60P	*	L704	
TOTAL NUMBER OF LABORATORIES REPORTING = 79													
Best values: G01 95.9 ± 0.6 percent													
E85 89.7 ± 0.7 percent													

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

OPACITY (80% REFLECTANCE BACKING) IN PERCENT - PRIMARILY PINE PAPERS
TAPPI OFFICIAL TEST METHOD T425 G3-70, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG	PROPERTY	TEST INSTRUMENT	CONDITIONS
		G01	B85	MAJOR	MINOR				
L366	*	94.80	88.80	-1.08	0.32	1.02	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L354	X	94.99	90.40	0.02	1.12	0.37	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L704	*	95.00				1.03	000	OPACITY (WHITE BACKING)	82 T0 95%, PHOTOVOLT
L312	*	95.00	88.10	-1.83	-0.25	0.30	000	OPACITY (WHITE BACKING)	82 T0 95%, PHOTOVOLT
L597	#	95.05	88.15	-1.70	-0.20	1.01	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L285D	@	95.17	88.94	-1.00	0.11	0.95	000	OPACITY (WHITE BACKING)	82 T0 95%, BNL-2
L285F	#	95.18	84.91	-4.29	-2.49	7.08	000	OPACITY (WHITE BACKING)	82 T0 95%, THWING-ALBERT (WAS SRL)
L277	*	95.20	88.60	-1.01	-0.12	1.00	000	OPACITY (WHITE BACKING)	82 T0 95%, PHOTOVOLT
L166	@	95.23	88.95	-0.97	0.09	0.85	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L348	@	95.23	89.18	-0.79	0.10	0.78	000	OPACITY (WHITE BACKING)	82 T0 95%, BNL-2
L380	*	95.30	88.40	-1.41	-0.32	1.49	000	OPACITY (WHITE BACKING)	82 T0 95%, PHOTOVOLT
L341	@	95.33	89.36	-0.62	0.23	0.66	000	OPACITY (WHITE BACKING)	82 T0 95%, THWING-ALBERT (WAS SRL)
L190C	@	95.40	89.14	-0.75	0.04	0.95	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L608	*	95.44	89.96	-0.07	0.00	0.80	000	OPACITY (WHITE BACKING)	82 T0 95%, BNL-2
L132	@	95.48	89.12	-0.72	-0.03	0.60	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L230	@	95.49	89.17	-0.07	-0.01	1.12	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L228	@	95.49	88.73	-1.03	-0.27	0.90	000	OPACITY (WHITE BACKING)	82 T0 95%, HUYGEN
L256	*	95.52	88.57	-1.14	-0.39	0.70	000	OPACITY (WHITE BACKING)	82 T0 95%, HUNTER
L108	@	95.55	89.89	-0.00	0.37	1.04	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L564	*	95.60	89.00	-0.70	-0.20	1.15	000	OPACITY (WHITE BACKING)	82 T0 95%, PHOTOVOLT
L249	*	95.60	88.83	-0.88	-0.30	1.02	000	OPACITY (WHITE BACKING)	82 T0 95%, PHOTOVOLT
L339	@	95.60	89.85	-0.00	0.30	0.92	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L317	@	95.61	89.68	-0.15	0.20	0.83	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L190R	@	95.62	89.10	-0.65	-0.16	0.76	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L136	@	95.69	89.39	-0.38	-0.04	0.53	000	OPACITY (WHITE BACKING)	82 T0 95%, HUYGEN
L139	@	95.70	89.61	-0.20	0.08	1.01	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L158	@	95.72	89.55	-0.23	0.03	0.98	000	OPACITY (WHITE BACKING)	82 T0 95%, BNL-2
L254	@	95.75	89.44	-0.30	-0.06	1.08	000	OPACITY (WHITE BACKING)	82 T0 95%, HUYGEN
L278	@	95.76	89.75	-0.00	0.12	0.97	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L698	@	95.78	89.29	-0.41	-0.17	1.15	000	OPACITY (WHITE BACKING)	82 T0 95%, BNL-2
L125	@	95.79	89.59	-0.10	-0.00	1.26	000	OPACITY (WHITE BACKING)	82 T0 95%, HUYGEN
L224	*	95.81	89.39	-0.31	-0.14	1.07	000	OPACITY (WHITE BACKING)	82 T0 95%, PHOTOVOLT
L118	@	95.82	89.75	-0.01	0.07	0.94	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L206	@	95.82	89.83	0.00	0.12	0.83	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L148H	@	95.82	89.35	-0.33	-0.17	1.02	000	OPACITY (WHITE BACKING)	82 T0 95%, HUYGEN
L692	@	95.84	89.42	-0.27	-0.14	1.00	000	OPACITY (WHITE BACKING)	82 T0 95%, BNL-2
L523	@	95.84	89.23	-0.42	-0.20	0.83	000	OPACITY (WHITE BACKING)	82 T0 95%, THWING-ALBERT (WAS SRL)
L301	@	95.84	89.74	-0.01	0.05	0.91	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L592	@	95.85	89.40	-0.20	-0.10	1.02	000	OPACITY (WHITE BACKING)	82 T0 95%, HUYGEN, DIGITAL
L349	@	95.85	89.76	0.01	0.05	0.89	000	OPACITY (WHITE BACKING)	82 T0 95%, BNL-2
L587	@	95.87	90.02	0.23	0.19	0.78	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L673T	@	95.89	89.52	-0.10	-0.13	0.70	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L581	@	95.91	89.87	0.14	0.07	1.08	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L305	@	95.92	90.06	0.30	0.17	0.72	000	OPACITY (WHITE BACKING)	82 T0 95%, THWING-ALBERT (WAS SRL)
L259	@	95.93	89.92	0.19	0.08	0.89	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L211S	@	95.95	89.85	0.10	0.02	0.89	000	OPACITY (WHITE BACKING)	82 T0 95%, THWING-ALBERT (WAS SRL)
L567	@	95.95	89.83	0.13	0.01	0.92	000	OPACITY (WHITE BACKING)	82 T0 95%, BNL-2
L172	@	95.95	89.46	-0.17	-0.21	0.73	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L685B	*	95.96	89.59	-0.00	-0.14	0.82	000	OPACITY (WHITE BACKING)	82 T0 95%, PHOTOVOLT
L210D	@	95.90	89.96	0.24	0.08	0.80	000	OPACITY (WHITE BACKING)	82 T0 95%, BNL-2
L594	@	95.98	90.04	0.2	0.11	1.10	000	OPACITY (WHITE BACKING)	82 T0 95%, BNL-2
L123	@	96.00	89.21	-0.34	-0.40	1.40	000	OPACITY (WHITE BACKING)	82 T0 95%, HUYGEN, DIGITAL
L573	@	96.02	90.05	0.30	0.08	0.89	000	OPACITY (WHITE BACKING)	82 T0 95%, HUYGEN
L152	@	96.05	90.40	0.00	0.27	0.80	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L673R	@	96.05	89.65	0.04	-0.18	0.44	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L308	@	96.06	90.39	0.00	0.25	0.77	000	OPACITY (WHITE BACKING)	82 T0 95%, HUYGEN
L162	@	96.08	90.04	0.08	0.03	0.70	000	OPACITY (WHITE BACKING)	82 T0 95%, HUYGEN, DIGITAL
L223B	@	96.09	90.23	0.03	0.14	0.73	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L262	@	96.09	90.20	0.01	0.12	0.70	000	OPACITY (WHITE BACKING)	82 T0 95%, THWING-ALBERT (WAS SRL)
L390	@	96.13	90.30	0.01	0.14	1.02	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L571	@	96.15	89.83	0.20	-0.15	1.10	000	OPACITY (WHITE BACKING)	82 T0 95%, BNL-2
L275	@	96.16	89.67	0.13	-0.25	0.90	000	OPACITY (WHITE BACKING)	82 T0 95%, THWING-ALBERT (WAS SRL)
L241	@	96.18	89.98	0.09	-0.19	1.12	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L213	@	96.19	90.30	0.00	0.10	1.00	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB
L210B	@	96.20	90.33	0.08	0.11	0.70	000	OPACITY (WHITE BACKING)	82 T0 95%, BAUSCH * LOMB

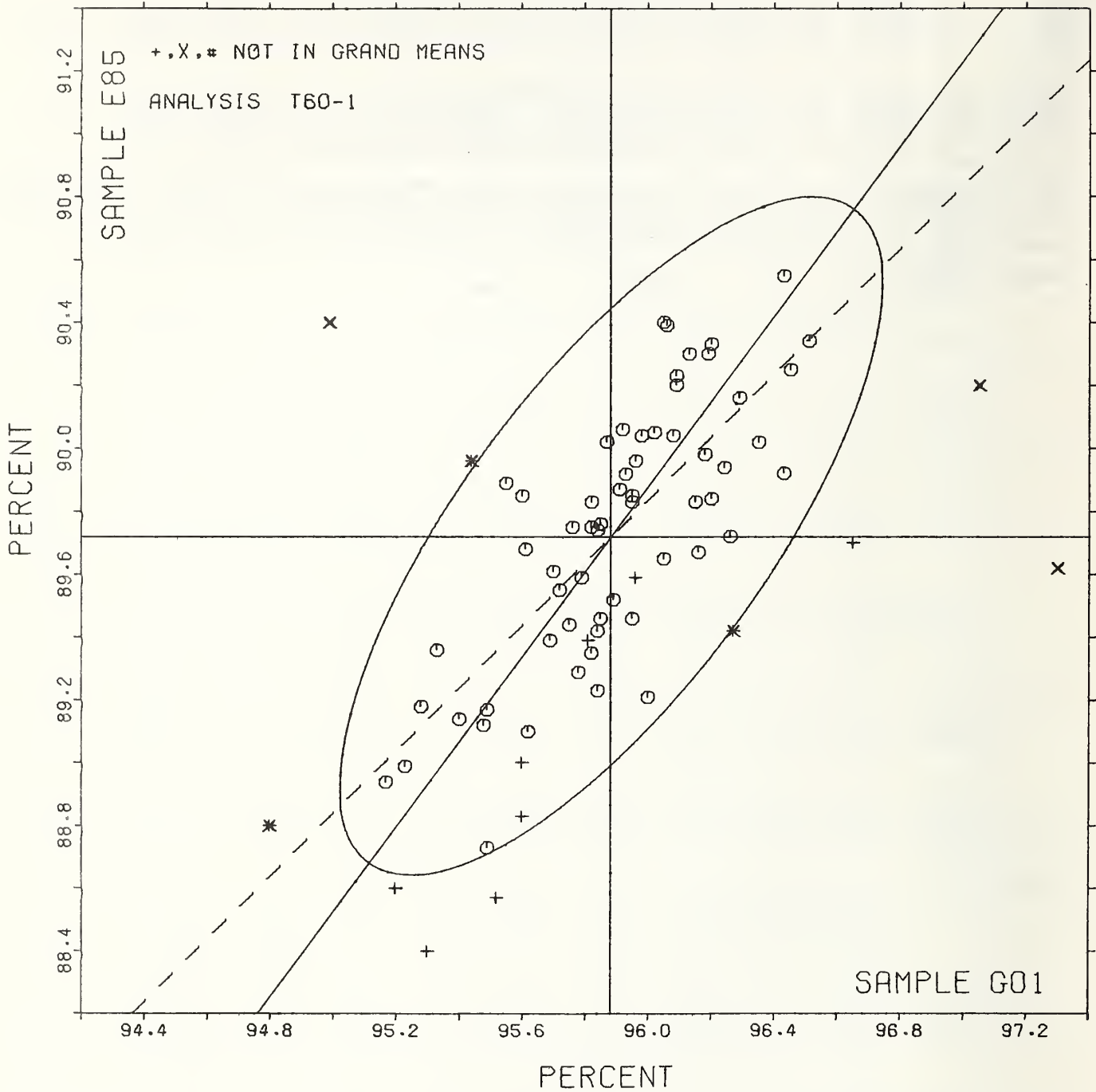
OPACITY (BY REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS
TAPPI OFFICIAL TEST METHOD T425 03-75, OPACITY OF PAPER (15 DEG/DIFFUSE, ILLUMINANT A) - E&L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG S.D.	VAL	PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		G01	E85	MAJOR	MINOR					
L105	0	56.20	89.84	0.29	-0.18	0.99	001	OPACITY (WHITE BACKING)	82 T0	95%, HUYGEN
L122	0	56.24	89.94	0.39	-0.16	0.95	000	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L124	0	56.26	89.72	0.22	-0.30	2.04	000	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L636	*	56.27	89.42	-0.01	-0.49	0.06	000	OPACITY (WHITE BACKING)	82 T0	95%, THWING-ALBERT (WAS SRL)
L115	0	56.29	90.16	0.00	-0.07	0.05	000	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L288	0	56.35	90.02	0.52	-0.20	0.67	000	OPACITY (WHITE BACKING)	82 T0	95%, BNL-2
L323	0	56.43	90.55	0.99	0.05	1.20	000	OPACITY (WHITE BACKING)	82 T0	95%, HUYGEN, DIGITAL
L225	0	56.43	89.92	0.49	-0.32	1.70	000	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L157	0	56.45	90.25	0.70	-0.14	1.18	000	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L212	0	56.51	90.34	0.87	-0.14	2.01	000	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L687	*	56.65	89.70	0.44	-0.63	1.50	000	OPACITY (WHITE BACKING)	82 T0	95%, PHOTOVELT
L219	*	57.00	82.00	-0.35	-0.48	0.00	000	OPACITY (WHITE BACKING)	82 T0	95%, Z. ELREPHO, FMY-C(10) FILTER
L712	X	57.05	90.20	1.00	-0.65	1.43	000	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
L226B	X	57.30	89.62	0.70	-1.20	0.97	000	OPACITY (WHITE BACKING)	82 T0	95%, BAUSCH * LOMB
GMEANS:		55.88	89.72			1.00				
		55% ELLIPSE:		1.29	0.48	WITH GAMMA = 53 DEGREES				

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

SAMPLE G01 = 95.9 PERCENT

SAMPLE E85 = 89.7 PERCENT



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

LAB CODE	SAMPLE G01 MEAN	HIGH BRIGHTNESS PRINTING 116 GRAMS PER SQUARE METER				SAMPLE L65 MEAN	BOND 79 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	N ₀ DEV	SDX	K ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L182E	94.33	-0.09	-0.30	0.13	0.66	92.20	0.15	0.59	0.27	1.12	60J	0	L182E
L219	94.40	-0.02	-0.09	0.52	2.53	92.30	0.25	0.99	0.48	2.02	6CF	0	L219
L242	94.48	0.00	0.25	0.14	0.68	91.90	-0.15	-0.61	0.20	0.84	60J	0	L242
L244	94.21	-0.21	-0.09	0.20	1.27	91.76	-0.29	-1.17	0.13	0.57	60F	0	L244
L250T	94.21	-0.21	-0.39	0.21	1.04	91.96	-0.09	-0.37	0.31	1.30	60J	0	L250T
L251	96.86	2.44	10.34	0.14	0.70	94.56	2.50	10.04	0.18	0.77	60F	#	L251
L309	94.07	-0.35	-1.00	0.18	0.90	91.53	-0.52	-2.10	0.25	1.03	60J	0	L309
L313	94.67	0.25	1.00	0.22	1.06	92.37	0.32	1.27	0.14	0.59	60J	0	L313
L360	94.06	-0.36	-1.33	0.13	0.74	91.63	-0.22	-0.89	0.19	0.79	60F	0	L360
L446	94.49	0.07	0.31	0.14	0.09	92.10	0.05	0.19	0.25	1.06	60J	0	L446
L484	94.60	0.18	0.70	0.10	0.80	92.31	0.26	1.03	0.22	0.94	60F	0	L484
L575	94.45	0.07	0.30	0.17	0.81	91.99	-0.06	-0.25	0.22	0.94	60J	0	L575
L598	94.45	0.03	0.13	0.18	0.87	91.97	-0.08	-0.33	0.17	0.71	60J	0	L598
L678	94.93	0.51	2.10	0.21	1.01	92.36	0.31	1.23	0.34	1.41	60J	0	L678
L685A	94.49	0.07	0.30	0.19	0.94	92.16	0.11	0.43	0.16	0.69	60F	0	L685A

GR₀ MEAN = 94.42 PERCENT GRAND MEAN = 92.05 PERCENT TEST DETERMINATIONS = 10
 SD MEANS = 0.24 PERCENT SD OF MEANS = 0.25 PERCENT 14 LABS IN GRAND MEANS
 AVERAGE SDX = 0.20 PERCENT AVERAGE SDR = 0.24 PERCENT

L118	93.63	-0.79	-3.33	0.23	1.13	91.49	-0.56	-2.26	0.42	1.77	60C	*	L118
L190C	93.92	-0.50	-2.14	0.30	2.74	91.74	-0.31	-1.25	0.48	2.03	60C	*	L190C
L190R	93.74	-0.68	-2.00	0.22	1.09	91.65	-0.40	-1.62	0.39	1.64	60C	*	L190R
L626	94.00	-0.42	-1.70	0.00	0.60	91.10	-0.95	-3.82	0.21	0.88	60Q	*	L626

TOTAL NUMBER OF LABORATORIES REPORTING = 19
 Best values: G01 94.4 ± 0.4 percent
 E85 92.0 ± 0.4 percent

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

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

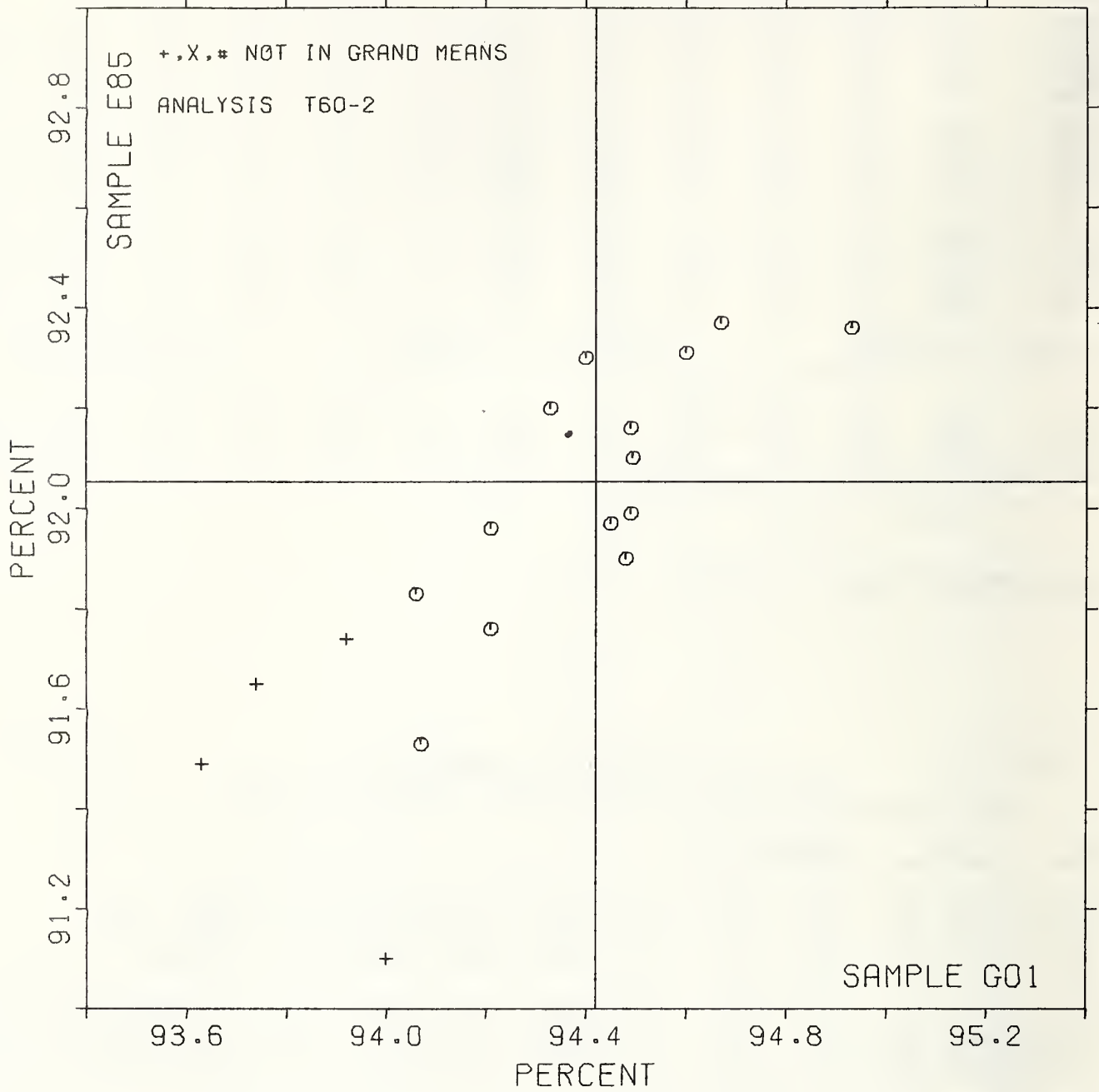
LAB CODE	F	MEANS		COORDINATES		AVG K ₀ SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS				
		G01	E85	MAJOR	MINOR			PROPERTY	TEST INSTRUMENT	CONDITIONS		
L118	*	93.63	91.49	-0.90	0.19	1.43	0.00	OPACITY (PAPER BACKING)	82 T0	95%	BAUSCH * LOMB	
L190R	*	93.74	91.65	-0.70	0.22	1.37	0.00	OPACITY (PAPER BACKING)	82 T0	95%	BAUSCH * LOMB	
L190C	*	93.92	91.74	-0.57	0.15	2.38	0.00	OPACITY (PAPER BACKING)	82 T0	95%	BAUSCH * LOMB	
L626	*	94.00	91.10	-0.98	-0.34	0.44	0.00	OPACITY (PAPER BACKING)	82 T0	95%	PHOTOVOLT	
L360	0	94.06	91.83	-0.41	0.11	0.70	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10)N0 TRAP	
L309	0	94.07	91.53	-0.02	-0.10	0.96	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10) FILTER	
L244	0	94.21	91.76	-0.30	-0.05	0.92	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10)N0 TRAP	
L250T	0	94.21	91.96	-0.21	0.09	1.17	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10) FILTER	
L182E	0	94.33	92.20	0.05	0.17	0.09	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10) FILTER	
L219	0	94.40	92.30	0.17	0.18	2.28	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10)N0 TRAP	
L598	0	94.45	91.97	-0.34	-0.08	0.79	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10) FILTER	
L242	0	94.48	91.90	-0.07	-0.15	0.70	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10) FILTER	
L575	0	94.49	91.99	0.00	-0.09	0.00	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10) FILTER	
L685A	0	94.49	92.16	0.13	0.32	0.81	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10)N0 TFAP	
L446	0	94.49	92.10	0.09	-0.02	0.88	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10) FILTER	
L484	0	94.60	92.31	0.31	0.04	0.07	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10)N0 TRAP	
L313	0	94.67	92.37	0.40	0.03	0.03	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10) FILTER	
L678	0	94.93	92.36	0.07	-0.16	1.21	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10) FILTER	
L251	#	96.86	94.56	3.00	-0.08	0.74	0.00	OPACITY (PAPER BACKING)	82 T0	95%	Z ₀ ELREPH0,FMY-C(10)N0 TRAP	

GMEANS: 94.42 92.05 1.00
 95% ELLIPSE: 0.94 0.32 W₄₄₈ GAMMA = 47 DEGREES

OPACITY, ELREPHO, PAPER BACKING, FINE P

SAMPLE G01 = 94.42 PERCENT

SAMPLE E85 = 92.05 PERCENT



OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY NEWS, DIRECTORY, AND CATALOG
TAPPI OFFICIAL TEST METHOD T425 65-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE Z03 MEAN	NEWSPRINT				SAMPLE G13 MEAN	15 LB. BOND				TEST D ₀ = 10		
		58 GRAMS PER SQUARE METER DEV	NO. OF LINES	SDR	K ₂ SDR		56 GRAMS PER SQUARE METER DEV	NO. OF LINES	SDR	R ₀ SDR	VAR	F	LAB
L121	53.76	.23	.44	.35	.75	81.17	-.67	-1.07	.92	1.26	61B	Ø	L121
L122	53.90	.37	.71	.28	.63	81.66	-.78	-1.25	.94	1.29	61D	Ø	L122
L150	53.45	-.08	-.10	.70	1.72	79.80	-2.04	-3.26	.71	.98	61B	#	L150
L155	54.11	.58	1.12	.30	.61	81.03	-.81	-1.29	.59	.81	61R	Ø	L159
L210B	53.99	.40	.89	.42	.94	82.01	.17	.27	.85	1.17	61B	Ø	L210B
L210D	53.64	.11	.21	.35	.75	81.68	-.16	-.26	.93	1.28	61D	Ø	L210D
L261	54.09	.50	1.00	.44	1.00	82.95	1.11	1.77	.96	1.32	61B	Ø	L261
L281	53.68	.15	.29	.63	1.43	82.39	.55	.87	.57	.79	61D	Ø	L281
L315	53.59	.00	.11	.00	1.30	81.73	-.11	-.18	.28	.38	61D	Ø	L315
L317	53.76	.23	.44	.43	.97	81.84	-.00	-.00	.91	1.25	61B	Ø	L317
L318	52.90	-.63	-1.22	.61	1.39	81.85	.01	.01	.78	1.08	61B	Ø	L318
L333	53.10	-.43	-.00	.40	1.04	81.26	-.58	-.93	1.00	1.37	61B	Ø	L333
L352	52.25	-1.28	-2.48	.27	.61	81.50	-.34	-.54	.50	.69	61R	Ø	L352
L595	53.20	-.33	-.04	.63	1.43	82.75	.91	1.45	.35	.49	61B	Ø	L599
L713	53.47	-.06	-.12	.39	.69	82.56	.72	1.15	.61	.84	61R	Ø	L713

GR. MEAN = 93.53 PERCENT GRAND MEAN = 81.84 PERCENT TEST DETERMINATIONS = 10
SD MEANS = .52 PERCENT SD OF MEANS = .63 PERCENT 14 LABS IN GRAND MEANS
AVERAGE SDR = .44 PERCENT AVERAGE SDR = .73 PERCENT

L260 53.55 .02 .04 .44 .99 82.40 -1.44 -2.30 .39 .54 61P * L260
TOTAL NUMBER OF LABORATORIES REPORTING = 10

Best values: Z03 93.6 ± 1.1 percent
G13 81.7 ± 1.1 percent

The following laboratories were omitted from the grand means because of extreme test results: 150.

OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY NEWS, DIRECTORY, AND CATALOG
TAPPI OFFICIAL TEST METHOD T425 65-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

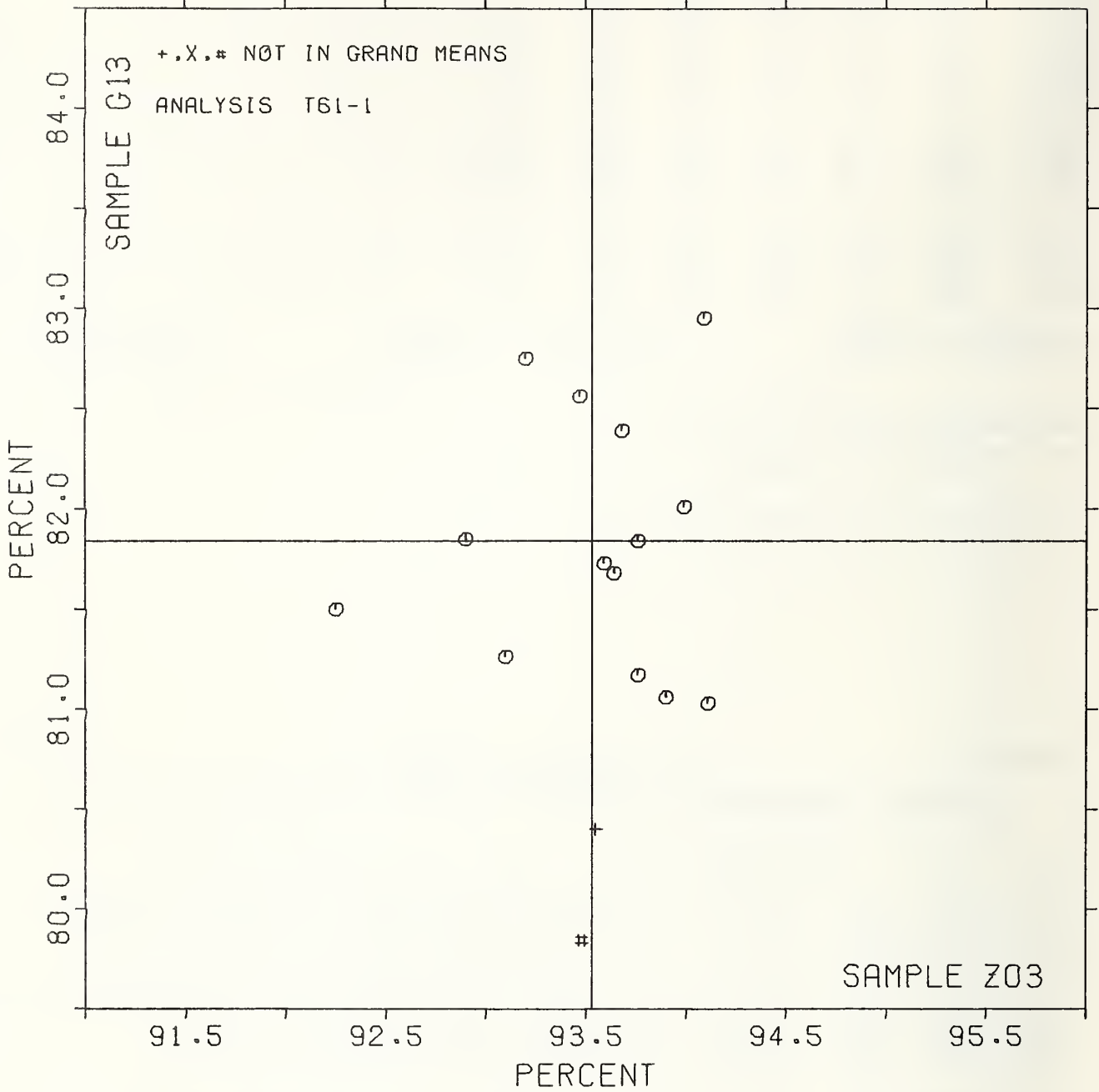
LAB CODE	F	MEANS		COORDINATES		AVG R ₀ SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		Z03	G13	MAJOR	MINOR		
L352	Ø	92.25	81.50	-.48	1.24	.65	61R OPACITY (WHITE BACKING)70 TO 90%, THWING-ALBERT (WAS SPL)
L318	Ø	52.90	81.85	-.00	.63	1.29	61B OPACITY (WHITE BACKING)70 TO 90%, BAUSCH * LOMB
L333	Ø	53.10	81.26	-.62	.37	1.04	61B OPACITY (WHITE BACKING)70 TO 50%, BAUSCH * LOMB
L599	Ø	53.20	82.75	.87	.43	.96	61B OPACITY (WHITE BACKING)70 TO 90%, BAUSCH * LOMB
L150	#	53.45	79.80	-2.04	-.14	1.00	61B OPACITY (WHITE BACKING)70 TO 50%, BAUSCH * LOMB
L713	Ø	53.47	82.56	.71	.14	.88	61R OPACITY (WHITE BACKING)70 TO 90%, THWING-ALBERT (WAS SRL)
L260	*	53.55	82.40	-1.44	-.17	.77	61P OPACITY (WHITE BACKING)70 TO 90%, PHOTOVOLT
L315	Ø	53.59	81.73	-.11	-.07	.67	61D OPACITY (WHITE BACKING)70 TO 90%, BNL-2
L210D	Ø	53.64	81.68	-.15	-.13	1.01	61D OPACITY (WHITE BACKING)70 TO 50%, BNL-2
L281	Ø	53.68	82.39	.55	-.09	1.11	61D OPACITY (WHITE BACKING)70 TO 90%, BNL-2
L317	Ø	53.76	81.84	.92	-.23	1.11	61B OPACITY (WHITE BACKING)70 TO 90%, BAUSCH * LOMB
L121	Ø	53.76	81.17	-.67	-.30	1.01	61B OPACITY (WHITE BACKING)70 TO 90%, BAUSCH * LOMB
L122	Ø	53.90	81.66	-.78	-.45	.90	61D OPACITY (WHITE BACKING)70 TO 50%, BNL-2
L210B	Ø	53.99	82.01	.17	-.44	1.06	61B OPACITY (WHITE BACKING)70 TO 50%, BAUSCH * LOMB
L261	Ø	54.09	82.95	1.11	-.44	1.10	61B OPACITY (WHITE BACKING)70 TO 90%, BAUSCH * LOMB
L159	Ø	54.11	81.03	-.81	-.66	.61	61R OPACITY (WHITE BACKING)70 TO 90%, THWING-ALBERT (WAS SPL)

GMEANS: 93.53 81.84 1.00
95% ELLIPSE: 1.82 1.50 WIDTH GAMMA = 83 DEGREES

OPACITY, B&L, 89% BACKING, NEWS

SAMPLE Z03 = 93.5 PERCENT

SAMPLE G13 = 81.8 PERCENT



OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY NEWS, DIRECTORY, AND CATALOG
TAPPI OFFICIAL TEST METHOD T519 05-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	NEWSPRINT					15 LB. BOND					TEST D. = 10		
	203	58 GRAMS PER SQUARE METER				213	56 GRAMS PER SQUARE METER				VAP	F	LAB
	MEAN	DEV	N. DEV	SDR	% SDR	MEAN	DEV	N. DEV	SDP	% SDR			
L150	96.91	-0.04	-0.70	0.22	1.07	82.23	0.21	0.71	0.63	1.26	61J	4	L150
L233F	96.99	0.04	0.70	0.20	0.93	81.81	-0.21	-0.71	0.37	0.74	61F	4	L233F
GR. MEAN = 96.95 PERCENT					GRAND MEAN = 82.02 PERCENT					TEST DETERMINATIONS = 10			
SD MEANS = 0.06 PERCENT					SD OF MEANS = 0.30 PERCENT					2 LABS IN GRAND MEANS			
AVERAGE SDR = 0.21 PERCENT					AVERAGE SDR = 0.50 PERCENT								
L153	93.90	-3.15	-00.69	0.48	2.29	79.70	-2.32	-7.82	0.59	1.17	61C	0	L153
TOTAL NUMBER OF LABORATORIES REPORTING = 3													

OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY NEWS, DIRECTORY, AND CATALOG
TAPPI OFFICIAL TEST METHOD T519 05-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
	F	203	G13	MAJOR	MINOR	% SDR			
L153	0	93.80	79.70	1.70	-3.52	1.75	01C	OPACITY (PAPER BACKING)70 TO 90%, BAUSCH + LOMB	
L150	4	96.91	82.23	-0.21	0.00	1.16	61J	OPACITY (PAPER BACKING)70 TO 90%, Z. ELREPHO, FMY-C(10) FILTER	
L233F	4	96.99	81.81	0.21	0.00	0.64	61F	OPACITY (PAPER BACKING)70 TO 90%, Z. ELREPHO, FMY-C(10) NO TRAP	
GMEANS:		96.95	82.02			1.00			
		95% ELLIPSE:		0.00	0.00	WITH GAMMA = -79 DEGREES			

OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY TRACING, VELLUM, LIGHTWEIGHT SHEETS
TAPPI OFFICIAL TEST METHOD T519 05-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	GASOLINE					M.F. SULFITE					TEST D. = 10			
	205	47 GRAMS PER SQUARE METER				207	36 GRAMS PER SQUARE METER				VAP	F	LAB	
	MEAN	DEV	N. DEV	SDR	% SDR	MEAN	DEV	N. DEV	SDR	% SDR				
L313		74.70			0.10		01.06			0.30		62J	4	L313
GR. MEAN = 74.70 PERCENT					GRAND MEAN = 01.06 PERCENT					TEST DETERMINATIONS = 10				
SD MEANS = PERCENT					SD OF MEANS = PERCENT					1 LAB IN GRAND MEANS				
AVERAGE SDR = 0.18 PERCENT					AVERAGE SDR = 0.30 PERCENT									
TOTAL NUMBER OF LABORATORIES REPORTING = 1														

OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY TRACING, VELLUM, LIGHTWEIGHT SHEETS
TAPPI OFFICIAL TEST METHOD T519 05-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
	F	205	207	MAJOR	MINOR	% SDR			
L313	4	74.70	61.06			1.00	62J	OPACITY (PAPER BACKING)45 TO 70%, Z. ELREPHO, FMY-C(10) FILTER	
GMEANS:		74.70	61.06			1.00			

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

LAB CODE	SAMPLE J98 MEAN	PRINTING 89 GRAMS PER SQUARE METER				L47 MEAN	RELEASE BASE 82 GRAMS PER SQUARE METER				TEST D ₀ = 8		
		DEV	N ₀ DEV	SDX	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L108	76.07	.14	.022	.13	.92	67.14	.88	.88	.23	.69	65M	Ø	L108
L115	76.30	.30	.000	.11	.77	66.15	-.10	-.10	.21	.65	65N	Ø	L115
L122	76.11	.17	.029	.08	.60	65.54	-.72	-.72	.23	.69	65N	Ø	L122
L132	76.31	.37	.02	.10	.71	65.17	-1.08	-1.08	.37	1.13	65N	Ø	L132
L158	77.09	1.13	1.00	.08	.60	66.11	-.14	-.14	.20	.59	65N	Ø	L158
L172	73.71	-.23	-.00	.12	.90	65.61	-.64	-.64	.15	.44	65A	Ø	L172
L176A	74.39	-1.55	-2.00	.14	.98	65.70	-.55	-.55	.45	1.36	65A	Ø	L176A
L190C	75.51	-.43	-.71	.00	.60	65.00	-1.25	-1.25	.27	.83	65A	Ø	L190C
L210M	75.26	-.62	-1.02	.15	1.09	65.42	-.83	-.83	.36	1.08	65M	Ø	L210M
L210N	76.09	.15	.024	.11	.61	65.89	-.37	-.37	.46	1.39	65N	Ø	L210N
L211	76.44	.50	.02	.09	.66	66.60	.35	.35	.39	1.17	65N	Ø	L211
L225	77.19	1.20	2.00	.27	1.94	66.59	.33	.33	.22	.68	65N	Ø	L225
L275	75.42	-.51	-.00	.21	1.53	65.85	-.40	-.40	.42	1.28	65M	Ø	L275
L285	75.35	-.59	-.00	.18	1.28	65.10	-1.15	-1.15	.30	.90	65N	Ø	L285
L288	76.04	.10	.00	.18	1.27	66.15	-.10	-.10	.42	1.29	65N	Ø	L288
L308	76.25	.31	.02	.11	.77	65.04	-1.22	-1.22	.29	.89	65N	Ø	L308
L315	76.07	.14	.022	.20	1.64	66.99	.73	.73	.55	1.67	65N	Ø	L315
L317	75.91	-.63	-.00	.12	.90	65.65	-.60	-.60	.39	1.18	65M	Ø	L317
L523	75.20	-.74	-1.02	.11	.77	65.36	-.89	-.89	.27	.82	65N	Ø	L523
L543	76.41	.47	.70	.24	1.74	67.05	.80	.80	.25	.76	65M	Ø	L543
L565	73.62	-.31	-.02	.07	.51	66.30	.05	.05	.26	.79	65A	Ø	L565
L598	76.14	.20	.03	.14	1.02	67.09	.83	.83	.36	1.09	65N	Ø	L598
L636A	76.00	.00	.10	.19	1.39	66.01	1.76	1.76	.29	.89	65M	Ø	L636A
L636B	75.81	-.13	-.02	.15	1.05	67.41	1.16	1.16	.48	1.44	65M	Ø	L636B
L636C	76.72	.79	1.00	.13	.92	68.22	1.97	1.97	.24	.74	65M	Ø	L636C
L643	75.69	-.25	-.02	.15	1.05	65.06	1.81	1.81	.59	1.80	65N	Ø	L643
L673R	75.00	-.94	-1.00	.08	.50	64.64	-1.62	-1.61	.23	.70	65N	Ø	L673R
L692	76.19	.25	.02	.11	.81	67.26	1.01	1.01	.35	1.07	65N	Ø	L692
GR ₀ MEAN = 75.94 PERCENT													
SD MEANS = .60 PERCENT													
AVERAGE SDX = .14 PERCENT													
GRAND MEAN = 66.25 PERCENT													
SD OF MEANS = 1.00 PERCENT													
AVERAGE SDR = .33 PERCENT													
TEST DETERMINATIONS = 8													
28 LABS IN GRAND MEANS													
L105	75.99	.05	.00	.10	1.30	65.82	-.43	-.43	.12	.35	65T	+	L105
L213	76.39	.40	.74	.05	.60	66.51	.26	.26	.20	.59	65T	+	L213
L219	77.87	1.94	3.00	.30	2.00	66.81	2.56	2.56	.37	1.13	65P	+	L219
L223	77.17	1.24	2.00	.13	.92	67.99	1.73	1.73	.17	.52	65G	+	L223
L224	75.49	.55	.02	.20	1.41	66.94	.68	.68	.21	.65	65H	+	L224
L241	76.14	.20	.03	.22	1.09	65.37	-.88	-.88	.30	.91	65I	+	L241
L249	77.39	1.40	2.00	.14	.98	66.30	2.05	2.04	.12	.36	65P	+	L249
L256	75.30	-.64	-1.00	.19	1.34	64.66	-1.59	-1.59	.49	1.48	65H	+	L256
L259	75.84	-.10	-.07	.25	1.61	65.26	-.99	-.99	.38	1.16	65H	+	L259
L260	76.24	.30	.02	.16	1.27	66.84	.58	.58	.17	.51	65F	+	L260
L277	81.19	5.20	3.00	.20	1.67	77.94	11.68	11.67	1.40	4.24	65P	+	L277
L278	78.20	2.20	3.00	.00	.00	70.06	3.81	3.80	.05	.16	65P	+	L278
L301	76.60	.66	1.00	.21	1.49	66.14	-.12	-.12	.27	.82	65G	+	L301
L312	79.00	3.00	3.00	.00	.00	70.75	4.50	4.49	.27	.81	65P	+	L312
L328	73.04	2.10	3.00	.30	2.18	69.05	2.80	2.79	.14	.43	65P	+	L328
L380	78.00	2.00	3.00	.00	.00	72.25	6.00	5.99	.27	.81	65P	+	L380
L442	75.44	-.50	-.00	.07	.54	65.44	-.82	-.82	.32	.96	65T	+	L442
L456	75.39	-.55	-.02	.20	1.40	67.65	1.40	1.39	.25	.76	65P	+	L456
L562	80.00	4.00	6.72	.00	.00	74.00	7.75	7.74	.00	.00	65P	+	L562
L564	78.62	2.69	4.00	.02	3.73	70.12	3.87	3.87	.35	1.07	65P	+	L564
L587	77.06	1.12	1.00	.12	.60	66.64	.38	.38	.42	1.28	65I	+	L587
L617	77.75	1.81	3.00	.11	.77	68.72	2.47	2.47	.27	.82	65G	+	L617
L626	77.99	2.05	3.00	.04	.25	65.11	2.86	2.85	.32	.96	65P	+	L626
L684	75.35	-.59	-.00	.09	.67	72.55	6.30	6.29	.39	1.19	65H	+	L684
L695	73.00	2.06	3.00	.00	.00	69.00	2.75	2.74	.00	.00	65P	+	L695
L698	76.04	.10	.10	.12	.80	64.64	-1.42	-1.41	.21	.65	65I	+	L698
L704	77.67	1.94	3.00	.25	1.67	NO DATA REPORTED FOR SAMPLE B47					65P	+	L704
L711	76.94	1.00	1.00	.10	1.27	67.50	1.25	1.24	.38	1.15	65P	+	L711

TOTAL NUMBER OF LABORATORIES REPORTING = 50

Best values: J98 76.0 ± 1.0 percent
B47 66.1 ± 1.8 percent

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY	TEST INSTRUMENT	CONDITIONS
		JS8	B47	MAJOR	MINOR	MAJOR	VAR			
L176A	Ø	74.39	66.70	-1.03	1.29	1.17	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L673R	Ø	75.00	64.64	-1.63	0.37	0.02	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L523	Ø	75.20	65.36	-1.00	0.41	0.00	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L210M	Ø	75.26	65.42	-1.00	0.37	1.00	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L256	*	75.30	64.66	-1.71	0.09	1.41	65H	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L684	*	75.35	72.55	0.77	2.09	0.93	65A	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L285	Ø	75.35	65.10	-1.24	0.19	1.09	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L456	*	75.39	67.65	1.14	0.97	1.11	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L275	Ø	75.42	65.85	-0.33	0.36	1.40	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L442	*	75.44	65.44	-0.94	0.21	0.70	65T	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
L190C	Ø	75.51	65.00	-1.32	-0.00	0.71	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L565	Ø	75.62	66.30	-0.90	0.31	0.65	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L643	Ø	75.69	68.06	1.03	0.82	1.42	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L172	Ø	75.71	65.61	-0.00	0.01	0.07	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L636B	Ø	75.81	67.41	1.00	0.49	1.25	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L259	*	75.84	65.26	-0.97	-0.22	1.48	65H	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L317	Ø	75.91	65.65	-0.38	-0.17	1.04	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L105	*	75.99	65.82	-0.39	-0.18	0.03	65T	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
L636A	Ø	76.00	68.01	1.00	0.51	1.14	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L698	*	76.04	64.84	-1.31	-0.50	0.70	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2A	
L288	Ø	76.04	66.15	-0.07	-0.13	1.26	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L108	Ø	76.07	67.14	0.88	0.10	0.81	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L315	Ø	76.07	66.99	0.74	0.11	1.07	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L210N	Ø	76.09	65.89	-0.30	-0.26	1.10	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L122	Ø	76.11	65.54	-0.62	-0.40	0.04	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L598	Ø	76.14	67.09	0.80	0.08	1.05	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L241	*	76.14	65.37	-0.77	-0.47	1.25	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2A	
L692	Ø	76.19	67.26	1.03	0.09	0.94	65M	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L260	*	76.24	66.84	0.30	-0.09	0.09	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L308	Ø	76.25	65.04	-1.00	-0.09	0.03	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L115	Ø	76.30	66.15	0.02	-0.37	0.71	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L132	Ø	76.31	65.17	-0.90	-0.70	0.92	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L213	*	76.39	66.51	0.39	-0.34	0.00	65T	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
L543	Ø	76.41	67.05	0.91	-0.19	1.25	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L211	Ø	76.44	66.60	0.49	-0.30	0.51	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L224	*	76.49	66.94	0.82	-0.30	1.03	65H	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L301	*	76.60	66.14	0.10	-0.06	1.10	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L636C	Ø	76.72	68.22	2.12	-0.11	0.03	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L711	*	76.94	67.50	1.00	-0.34	1.21	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L587	*	77.06	66.64	0.73	-0.94	1.47	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2A	
L158	Ø	77.09	66.11	0.24	-1.13	0.00	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L223	*	77.17	67.99	2.04	-0.01	0.72	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L225	Ø	77.19	66.59	0.72	-1.07	1.03	65N	BLUE REFLECTANCE (DIRECTIONAL),	TECHNIDYNE/DIANG/MO S ₀ , S-4	
L249	*	77.39	68.30	2.40	-0.71	0.07	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L617	*	77.75	68.72	2.92	-0.91	0.00	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L704	*	77.87				1.07	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L219	*	77.87	68.81	3.05	-1.00	1.04	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L626	*	77.99	69.11	3.37	-1.01	0.01	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L380	*	78.00	72.25	6.34	-0.01	0.40	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L695	*	78.00	69.00	3.20	-1.06	0.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L328	*	78.04	69.05	3.32	-1.08	1.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L278	*	78.20	70.06	4.33	-0.91	0.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L564	*	78.62	70.12	4.33	-1.29	2.40	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L312	*	79.00	70.75	3.24	-1.44	0.40	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L562	*	80.00	74.00	6.04	-1.34	0.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L277	*	81.19	77.94	12.70	-1.19	3.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
GMEANS:		75.94	66.25			1.00				
		95% ELLIPSE:		2.70	1.40	WITH GAMMA = 71 DEGREES				

DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)
TAPPI SUGGESTED METHOD T225 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	SAMPLE J98 MEAN	PAINTING 89 GRAMS PER SQUARE METER				SAMPLE B47 MEAN	RELEASE BASE 82 GRAMS PER SQUARE METER				TEST D ₀ = 8		
		DEV	NO. DEV	SDR	R ₀ SDR		DEV	NO. DEV	SDR	R ₀ SDR	VAR	F	LAB
L121	76.04	.43	.00	.12	1.08	66.52	2.05	2.61	.12	.58	65K	#	L121
L136	76.39	.70	1.024	.12	1.09	66.58	.51	.65	.25	1.20	65F	Ø	L136
L150	74.83	-.81	-1.033	.12	1.10	66.30	-1.17	-1.49	.15	.71	65Q	Ø	L150
L170	75.54	-.10	-.17	.03	.47	66.29	-.18	-.23	.30	1.47	65B	Ø	L170
L182	75.80	.10	.27	.03	.43	66.41	-.06	-.07	.14	.66	65F	Ø	L182
L210K	76.18	.54	.00	.09	.84	67.40	.93	1.19	.28	1.35	65K	Ø	L210K
L242	75.13	-.51	-.04	.14	1.25	66.14	-.32	-.41	.21	1.04	65F	Ø	L242
L250T	75.61	-.03	-.03	.10	.91	66.41	-.06	-.07	.14	.66	65F	Ø	L250T
L280	75.82	.18	.33	.22	1.96	66.62	.15	.20	.18	.87	65Q	Ø	L280
L313	76.15	.51	.84	.10	.94	67.18	.71	.91	.14	.66	65K	Ø	L313
L325	76.96	1.32	2.10	.07	.03	66.37	1.90	2.42	.26	1.27	65F	Ø	L325
L349	74.50	-1.14	-1.00	.12	1.06	66.01	-1.45	-1.85	.15	.73	65K	Ø	L349
L446	75.26	-.38	-.00	.09	.80	66.02	-.44	-.57	.17	.84	65F	Ø	L446
L573	75.84	.20	.33	.10	1.43	66.36	-.11	-.14	.25	1.19	65F	Ø	L573
L575	75.56	-.08	-.13	.12	1.09	66.42	-.04	-.06	.35	1.67	65F	Ø	L575
L598	75.35	-.29	-.41	.09	.61	66.10	-.36	-.46	.13	.63	65K	Ø	L598
L680	75.30	-.34	-.30	.13	1.17	66.44	-.02	-.03	.22	1.06	65K	Ø	L680

GR. MEAN = 75.64 PERCENT GRAND MEAN = 66.47 PERCENT TEST DETERMINATIONS = 8
SD MEANS = .61 PERCENT OF MEANS = .79 PERCENT 16 LABS IN GRAND MEANS
AVERAGE SDR = .11 PERCENT AVERAGE SDR = .21 PERCENT

L289 76.02 .39 .04 .12 1.00 66.76 .30 .38 .19 .93 65Ø * L289
TOTAL NUMBER OF LABORATORIES PARTICIPATING = 18
Best values: J98 75.6 ± 1.1 percent
 B47 66.5 ± 1.2 percent

The following laboratories were omitted from the grand means because of extreme test results: L21.

DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)
TAPPI SUGGESTED METHOD T225 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

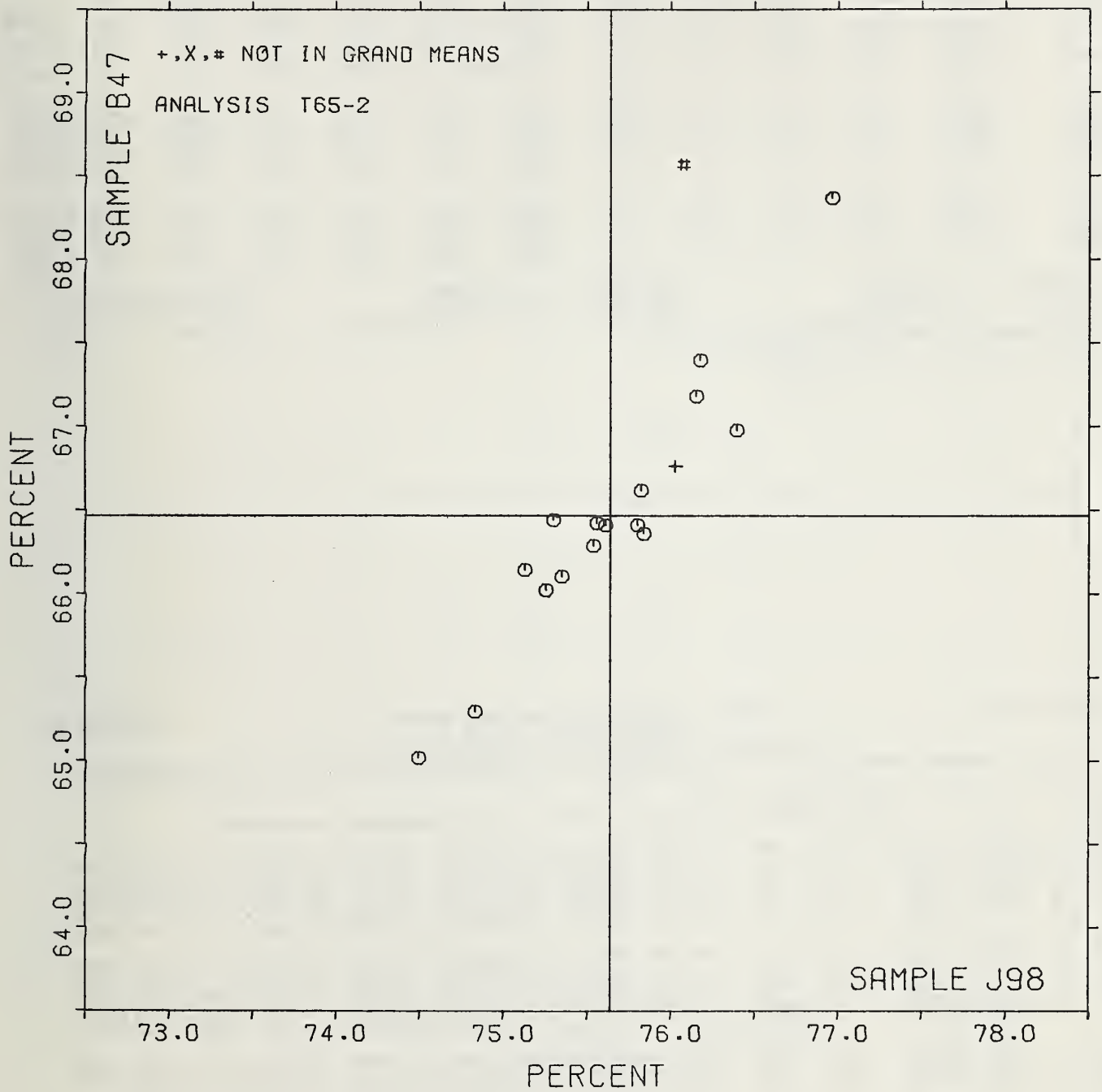
LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J98	B47	MAJOR	MINOR	R ₀ SDR	VAR			
L349	Ø	74.50	66.01	-1.84	.02	.90	.65K	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, MØØ (ZEISS) BASE
L150	Ø	74.83	66.30	-1.42	-.07	.91	.65Q	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, ZEISS ABSOLUTE BASE
L242	Ø	75.13	66.14	-.30	.21	1.14	.65F	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, NRC-PTB ABSOLUTE BASE
L446	Ø	75.26	66.02	-.39	.03	.62	.65F	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, NRC-PTB ABSOLUTE BASE
L680	Ø	75.30	66.44	-.23	.25	1.11	.65K	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, MØØ (ZEISS) BASE
L598	Ø	75.35	66.10	-.40	.01	.72	.65K	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, MØØ (ZEISS) BASE
L170	Ø	75.54	66.29	-.20	-.03	.97	.65B	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, NES ABSOLUTE BASE
L575	Ø	75.84	66.42	-.08	.04	1.08	.65F	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, NRC-PTB ABSOLUTE BASE
L250T	Ø	75.61	66.41	-.00	-.01	.79	.65F	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, NRC-PTB ABSOLUTE BASE
L182	Ø	75.80	66.41	.03	-.16	.94	.65F	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, NRC-PTB ABSOLUTE BASE
L280	Ø	75.82	66.62	.23	-.03	1.41	.65Q	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, ZEISS ABSOLUTE BASE
L573	Ø	75.84	66.36	.04	-.22	1.31	.65F	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, NRC-PTB ABSOLUTE BASE
L289	*	76.02	66.76	.47	-.13	.99	.65Ø	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, SPECIFIC CALIBRATION
L121	#	76.04	66.52	1.87	.93	.63	.65A	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, MØØ (ZEISS) BASE
L313	Ø	76.15	67.18	.00	.03	.60	.65A	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, MØØ (ZEISS) BASE
L210K	Ø	76.18	67.40	1.07	.14	1.10	.65A	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, MØØ (ZEISS) BASE
L136	Ø	76.39	66.58	.07	-.29	1.14	.65F	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, NRC-PTB ABSOLUTE BASE
L325	Ø	76.96	68.37	2.32	.10	.96	.65F	DIFFUSE REFLECTANCE,	ELREPHØ,	GLØ TRAP, NRC-PTB ABSOLUTE BASE

GMEANS: 75.64 66.47 1.00
 55% ELLIPSE: 2.70 .41 WITH GAMMA = 52 DEGREES

BLUE REFLECTANCE, DIFFUSE, WITH TRAP

SAMPLE J98 = 75.6 PERCENT

SAMPLE B47 = 66.5 PERCENT



DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)
TAPPI SUGGESTED METHOD T625 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	SAMPLE J98		PAINTING 89 GRAMS PER SQUARE METER				SAMPLE B47		RELEASE BASE 82 GRAMS PER SQUARE METER				TEST D ₀ = 8		
	MEAN	DEV	N ₀ DEV	SDX	%SDX	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB		
L152	76.20	-0.40	-0.53	0.09	1.02	67.76	-0.35	-0.53	0.21	1.09	65E	8	L152		
L157	76.92	0.20	0.34	0.09	1.00	68.37	0.26	0.39	0.26	1.37	65E	8	L157		
L161	77.06	0.40	0.53	0.09	0.99	69.47	1.36	2.05	0.20	1.04	65E	8	L161		
L194	76.41	-0.25	-0.33	0.11	1.22	67.76	-0.35	-0.53	0.17	0.89	65E	8	L194		
L219	77.17	0.51	1.07	0.09	1.00	66.52	0.41	0.62	0.12	0.61	65E	8	L219		
L241	76.91	0.25	0.32	0.13	1.73	67.52	-0.59	-0.88	0.15	0.78	65E	8	L241		
L244	76.97	0.31	0.00	0.17	1.98	63.43	0.32	0.48	0.32	1.68	65D	8	L244		
L251	76.81	0.15	0.31	0.03	0.59	68.05	-0.06	-0.69	0.21	1.09	65E	8	L251		
L309	77.19	0.53	1.11	0.09	1.03	68.76	0.65	0.98	0.14	0.72	65J	8	L309		
L360	77.06	0.40	0.53	0.14	1.50	66.82	0.71	1.07	0.29	1.51	65E	8	L360		
L384	76.65	-0.01	-0.32	0.05	0.02	66.00	-0.11	-0.16	0.13	0.69	65S	8	L384		
L484	75.77	-0.89	-1.00	0.03	0.01	68.91	-1.20	-1.80	0.22	1.14	65E	8	L484		
L565	75.90	-0.70	-1.04	0.00	0.00	67.60	-0.51	-0.76	0.19	0.98	65W	8	L565		
L685	76.25	-0.41	-0.03	0.03	0.53	67.55	-0.56	-0.84	0.08	0.40	65E	8	L685		

GR₀ MEAN = 76.66 PERCENT GRAND MEAN = 66.11 PERCENT TEST DETERMINATIONS = 8
 SD MEANS = 0.47 PERCENT SD OF MEANS = 0.06 PERCENT 14 LABS IN GRAND MEANS
 AVERAGE SDX = 0.09 PERCENT AVERAGE SDR = 0.19 PERCENT
 TOTAL NUMBERS OF LABORATORIES REPORTING = 14
 Best values: J98 76.7 ± 0.8 percent
 B47 68.1 ± 1.2 percent

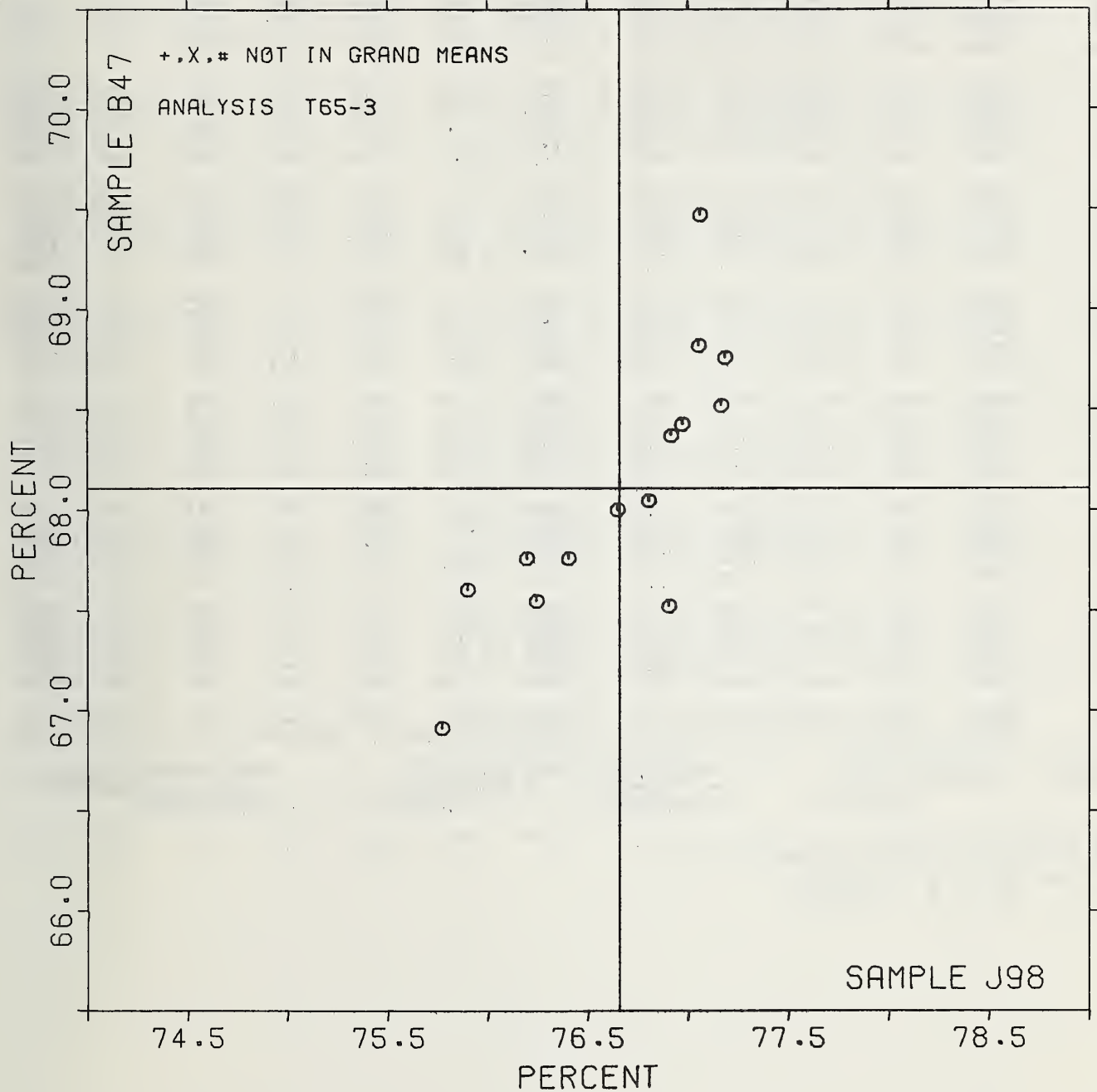
DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)
TAPPI SUGGESTED METHOD T625 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	F	MEANS		COORDINATES		AVJ	K ₀ SDX	VAR	PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J98	B47	MAJUX	MINOX						
L484	8	75.77	66.91	-1.49	0.08	0.08	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) BASE
L565	8	75.90	67.60	-0.84	0.35	0.49	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) BASE
L152	8	76.20	67.76	-0.33	0.19	1.00	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) BASE
L685	8	76.25	67.55	-0.70	0.04	0.40	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) BASE
L194	8	76.41	67.76	-0.43	0.02	1.00	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) BASE
L384	8	76.65	68.00	-0.10	-0.05	0.05	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, ABSOLUTE-UNKNOWN BASE
L251	8	76.81	68.05	0.03	-0.10	0.04	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) BASE
L241	8	76.91	67.52	-0.33	-0.33	1.02	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) BASE
L157	8	76.92	68.37	0.30	-0.07	1.22	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) BASE
L244	8	76.97	68.43	0.44	-0.08	1.03	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) ABSOLUTE
L360	8	77.06	68.82	0.81	0.06	1.50	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) BASE
L161	8	77.06	69.47	1.36	0.42	1.02	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) BASE
L219	8	77.17	68.52	0.02	-0.20	0.04	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) BASE
L305	8	77.19	68.76	0.43	-0.08	0.08	0.58	0.58	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP, N00 (ZEISS) ABSOLUTE
GMEANS:		76.66	68.11			1.00					
		95% ELLIPSE:		2.27	0.08	WEIGHT GAMMA = 50 DEGREES					

BLUE REFLECTANCE, DIFFUSE, NO TRAP

SAMPLE J98 = 76.7 PERCENT

SAMPLE B47 = 68.1 PERCENT



SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - HIGH RANGE
TAPPI OFFICIAL TEST METHOD T-400 G-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

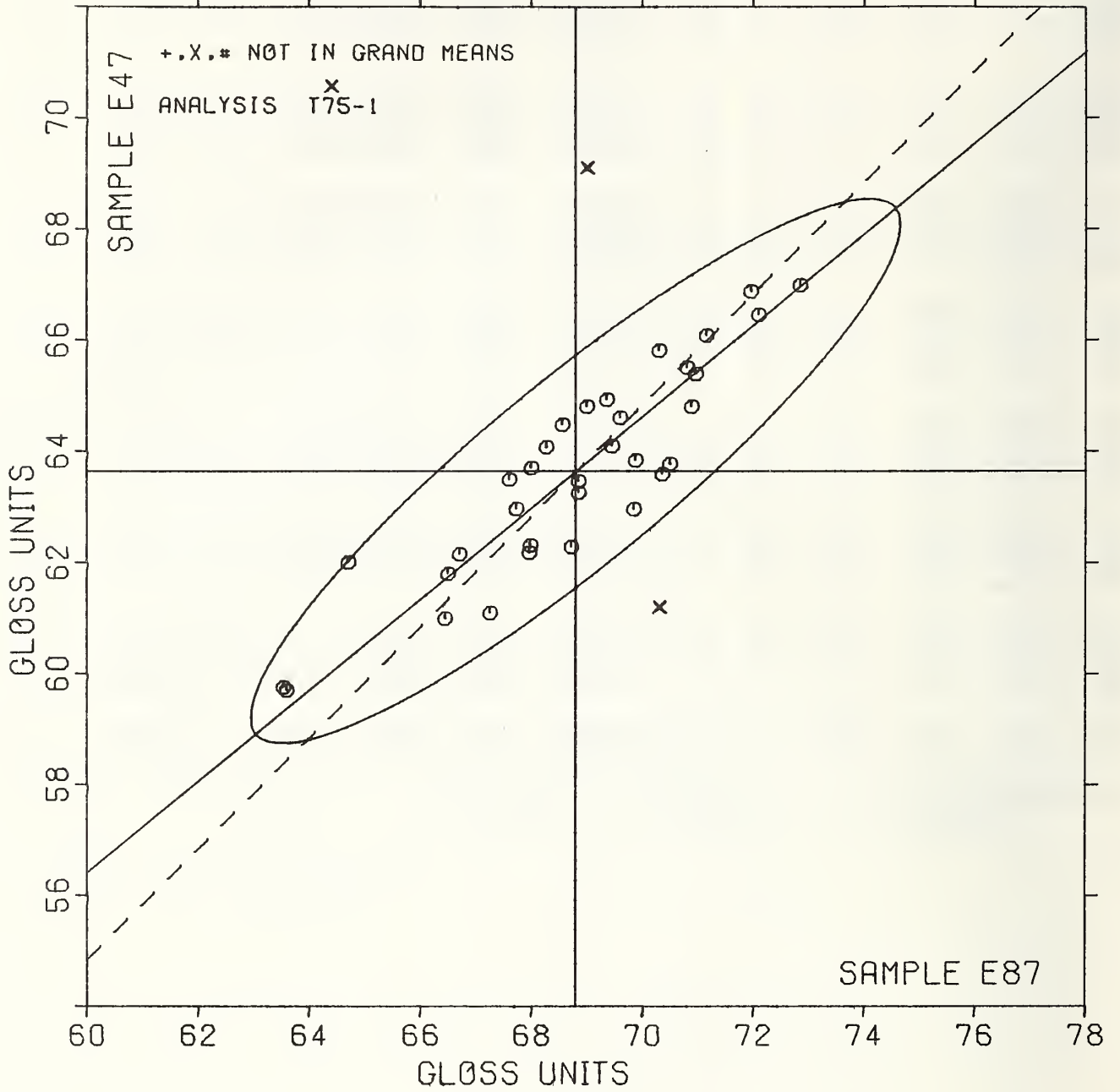
LAB CODE	SAMPLE E87 MEAN	OFFSET ENAMEL COATING 117 GRAMS PER SQUARE METER				SAMPLE E47 MEAN	COATED GLOSS 91 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L108	67.7	-1.1	-.34	.4	.23	63.0	-.7	-.36	.6	.39	75H	Ø	L108
L121	68.0	-.8	-.30	1.7	.93	62.3	-1.3	-.71	1.4	.87	75H	Ø	L121
L122	69.4	.7	-.29	2.1	1.19	64.1	.5	.24	1.2	.73	75H	Ø	L122
L132	71.9	3.2	1.01	1.4	.76	66.9	3.2	1.72	1.3	.82	75G	Ø	L132
L172	63.5	-5.3	-2.03	2.3	1.28	59.7	-3.9	-2.08	1.8	1.10	75H	Ø	L172
L189	69.0	.2	.00	1.0	.67	64.8	1.2	.62	1.5	.94	75P	Ø	L189
L190C	67.3	-1.0	-.00	1.0	.96	61.1	-2.5	-1.36	2.7	1.61	75G	Ø	L190C
L190R	70.5	1.7	.70	1.4	.78	63.8	.1	.07	1.8	1.12	75G	Ø	L190R
L206	69.4	.0	-.20	2.4	1.32	64.9	1.3	.68	1.6	.98	75H	Ø	L206
L210	72.8	4.0	1.04	1.0	.87	67.0	3.3	1.78	1.7	1.02	75H	Ø	L210
L211	68.3	-.0	-.23	2.0	1.40	64.1	.4	.23	2.0	1.21	75H	Ø	L211
L230	69.6	.8	.30	2.0	1.27	64.0	1.0	.51	2.0	1.18	75H	Ø	L230
L251	68.8	.1	.02	2.3	1.30	63.2	-.4	-.21	1.9	1.17	75G	Ø	L251
L256	72.1	3.3	1.07	1.0	.68	66.4	2.8	1.50	1.7	1.06	75H	Ø	L256
L262	69.0	.2	.00	1.7	.90	64.1	5.5	2.91	1.2	.72	75K	X	L262
L277A	69.8	1.0	.47	1.0	.91	63.6	-.7	-.36	1.9	1.16	75H	Ø	L277A
L277B	68.6	-.2	-.10	1.9	1.05	64.5	.8	.44	1.4	.82	75H	Ø	L277B
L278	60.7	-2.1	-.93	1.0	.82	62.1	-1.5	-.79	1.4	.87	75G	Ø	L278
L279	60.5	-2.3	-1.02	1.4	.70	61.8	-1.8	-.98	2.1	1.27	75G	Ø	L279
L291	71.1	2.4	1.00	1.0	.90	66.1	2.4	1.30	2.2	1.31	75H	Ø	L291
L301	64.4	-4.4	-1.00	1.0	.74	70.6	6.9	3.70	1.5	.88	75H	X	L301
L317	70.8	2.0	.80	1.0	.82	65.5	1.9	.99	1.3	.77	75H	Ø	L317
L323	69.9	1.1	.40	1.0	.92	63.8	.2	.10	1.3	.81	75H	Ø	L323
L349	68.7	-.1	-.03	2.0	1.39	62.3	-1.4	-.73	1.9	1.13	75H	Ø	L349
L388	63.6	-5.2	-2.02	1.0	.68	59.7	-3.9	-2.10	2.0	1.20	75P	Ø	L388
L483	70.3	1.0	.00	.8	.45	63.6	-.0	-.03	2.3	1.42	75H	Ø	L483
L564	70.3	1.0	.07	1.9	1.09	61.2	-2.4	-1.30	.4	.25	75P	X	L564
L573	68.0	-.8	-.30	2.0	1.28	63.7	.1	.03	1.7	1.03	75G	Ø	L573
L574	60.4	-2.3	-1.00	3.0	1.84	61.6	-2.6	-1.41	1.5	.91	75G	Ø	L574
L587	70.3	1.0	.07	2.0	1.12	65.8	2.2	1.15	1.2	.74	75H	Ø	L587
L592	71.0	2.2	.77	1.0	1.01	65.4	1.8	.93	1.4	.87	75H	Ø	L592
L598	64.7	-4.1	-1.00	1.0	.51	62.0	-1.6	-.87	.9	.52	75H	Ø	L598
L643	70.9	2.1	.80	1.0	.90	64.8	1.2	.62	1.8	1.09	75H	Ø	L643
L668	67.6	-1.2	-.30	1.8	1.00	63.5	-.1	-.08	1.9	1.15	75G	Ø	L668
L670	68.8	.1	.02	1.0	.73	63.5	-.2	-.10	1.6	.98	75H	Ø	L670
L697	68.0	-.8	-.37	1.0	.80	62.2	-1.5	-.78	1.2	.74	75H	Ø	L697
L704	71.0	2.2	.80	2.7	1.49	NO DATA REPORTED FOR SAMPLE E47					75P	X	L704
GR. MEAN = 68.8 GLOSS UNITS		GRAND MEAN = 63.6 GLOSS UNITS				TEST DETERMINATIONS = 10							
SD MEANS = 2.2 GLOSS UNITS		SD OF MEANS = 1.9 GLOSS UNITS				33 LABS IN GRAND MEANS							
		AVERAGE SDR = 1.0 GLOSS UNITS				AVERAGE SDR = 1.7 GLOSS UNITS							
L250	61.2	-7.0	-3.00	1.0	.90	53.7	-9.9	-5.30	1.8	1.07	75Q	Ø	L250
TOTAL NUMBER OF LABORATORIES PARTICIPATING = 38													
Best values: E87 69 ± 4 gloss units													
E47 64 ± 3 gloss units													

SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - HIGH RANGE
TAPPI OFFICIAL TEST METHOD T480 Q3-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		E67	E47	MAJOR	MINOR	COORD	VAR			
L250	*	61.2	53.7	-12.2	-2.9	0.99	75G	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, PHOTOVOLT, 20C, 65%RH
L172	Ø	63.5	59.7	-0.5	0.3	1.019	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L388	Ø	63.6	59.7	-0.5	0.3	1.064	75P	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, PHOTOVOLT
L3C1	X	64.4	70.6	1.0	0.1	0.01	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L598	Ø	64.7	62.0	-4.2	1.3	0.72	75D	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, BAUSCH + LOMB
L574	Ø	66.4	61.0	-3.5	-0.6	1.037	75G	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L275	Ø	66.5	61.6	-2.9	0.0	1.001	75G	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L278	Ø	66.7	62.1	-2.0	0.2	0.04	75G	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L190C	Ø	67.3	61.1	-2.8	-1.0	1.030	75G	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L668	Ø	67.6	63.5	-1.0	0.0	1.008	75G	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L108	Ø	67.7	63.0	-1.5	0.2	0.01	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L657	Ø	68.0	62.2	-1.0	-0.6	0.00	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L121	Ø	68.0	62.3	-1.5	-0.5	0.90	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L573	Ø	68.0	63.7	-0.0	0.6	1.030	75G	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L211	Ø	68.3	64.1	-0.1	0.7	1.031	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L277B	Ø	68.6	64.5	0.3	0.8	0.93	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L349	Ø	68.7	62.3	-0.9	-1.0	1.020	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L670	Ø	68.8	63.5	-0.1	-0.2	0.00	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L251	Ø	68.8	63.2	-0.2	-0.3	1.024	75G	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L189	Ø	69.0	64.8	0.3	0.8	0.90	75P	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, PHOTOVOLT
L262	X	69.0	69.1	3.0	4.1	0.04	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GAERTNER (K-C TYPE)
L206	Ø	69.4	64.9	1.0	0.6	1.015	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L122	Ø	69.4	64.1	0.0	-0.1	0.96	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L230	Ø	69.6	64.6	1.0	0.2	1.022	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L277A	Ø	69.8	63.0	0.4	-1.0	1.004	75D	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L323	Ø	69.9	63.8	1.0	-0.5	0.06	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L587	Ø	70.3	65.8	2.0	0.7	0.93	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L564	X	70.3	61.2	-0.4	-2.8	0.07	75P	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, PHOTOVOLT
L483	Ø	70.3	63.6	1.0	-1.0	0.94	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L190R	Ø	70.5	63.8	1.0	-1.0	0.95	75G	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L317	Ø	70.8	65.5	2.7	0.2	0.00	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L643	Ø	70.9	64.8	2.3	-0.4	1.000	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L592	Ø	71.0	65.4	2.0	-0.0	0.94	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L704	M	71.0				1.049	75P	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, PHOTOVOLT
L291	Ø	71.1	66.1	3.4	0.4	1.011	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L132	Ø	71.9	66.9	4.0	0.5	0.75	75G	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L256	Ø	72.1	66.4	4.0	0.1	1.002	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L210	Ø	72.3	67.0	5.2	0.0	0.94	75H	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
GMEANS:		68.8	63.6			1.000				
		95% ELLIPSE:		7.4	1.0	WIND GAMMA = 39 DEGREES				

SPECULAR GLOSS, 75 DEGREE-HIGH RANGE

SAMPLE E87 = 68.8 GLOSS UNITS SAMPLE E47 = 63.6 GLOSS UNITS



ANALYSIS T76-1 TABLE 1
 SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - LOW RANGE
 TAPPI OFFICIAL TEST METHOD T480 G5-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	SAMPLE G05 MEAN	MACHINE COATED DULL 116 GRAMS PER SQUARE METER				SAMPLE E78 MEAN	PRINTING 116 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L122	36.74	-1.18	-0.03	.93	.77	5.47	-0.54	-0.94	.28	.95	76H	Ø	L122
L128	36.60	-1.92	-1.00	.94	.78	6.20	.19	.33	.42	1.42	76G	Ø	L128
L134	37.30	-0.62	-0.33	1.00	.87	6.00	-0.01	-0.02	.47	1.59	76H	Ø	L134
L136	40.98	3.00	1.00	1.00	.88	6.98	.97	1.69	.36	1.20	76G	Ø	L136
L149	34.30	-3.62	-1.90	1.49	1.23	6.00	-0.01	-0.02	.00	.00	76G	Ø	L149
L153	40.45	2.53	1.00	.80	.86	4.90	-1.11	-1.94	.32	1.07	76G	*	L153
L162	40.83	2.91	1.37	1.13	.93	7.40	1.39	2.42	.39	1.33	76G	Ø	L162
L182	38.05	.13	.07	1.47	1.22	5.79	-0.22	-0.38	.28	.95	76H	Ø	L182
L210	39.72	1.80	.97	.90	.78	6.34	.33	.58	.29	.98	76H	Ø	L210
L213	38.07	.15	.03	1.01	1.33	5.68	-0.33	-0.58	.28	.95	76H	Ø	L213
L223	36.90	-1.02	-0.33	1.38	1.14	5.78	-0.23	-0.40	.30	1.01	76H	Ø	L223
L226	37.51	-0.41	-0.22	1.30	1.07	5.91	-0.10	-0.17	.27	.90	76H	Ø	L226
L259	38.30	.38	.21	.89	.74	6.11	.10	.17	.19	.64	76H	Ø	L259
L288	35.87	-2.00	-1.10	.82	.86	5.63	-0.38	-0.66	.29	.97	76H	Ø	L288
L317	37.70	-0.22	-0.12	1.70	1.41	5.90	-0.11	-0.19	.32	1.07	76H	Ø	L317
L328	38.62	.70	.38	.88	.73	10.27	4.26	7.43	.31	1.04	76H	#	L328
L456	37.96	.04	.02	1.42	1.17	6.07	.06	.10	.31	1.04	76H	Ø	L456
L713	38.32	.40	.22	.88	.48	9.33	3.32	5.79	.52	1.75	76H	#	L713

GR. MEAN = 37.92 GLOSS UNITS GRAND MEAN = 6.01 GLOSS UNITS TEST DETERMINATIONS = 10
 SD MEANS = 1.86 GLOSS UNITS SD OF MEANS = .57 GLOSS UNITS 16 LABS IN GRAND MEANS
 AVERAGE SDR = 1.21 GLOSS UNITS AVERAGE SDR = .30 GLOSS UNITS

L250 36.30 -1.62 -0.87 .87 .58 6.10 .09 .16 .21 .71 76Q * L250
 TOTAL NUMBER OF LABORATORIES REPORTING = 19
 Best values: G05 38 ± 3 gloss units
 E78 6 ± 1 gloss units

The following laboratories were omitted from the grand means because of extreme test results: 328, 713.

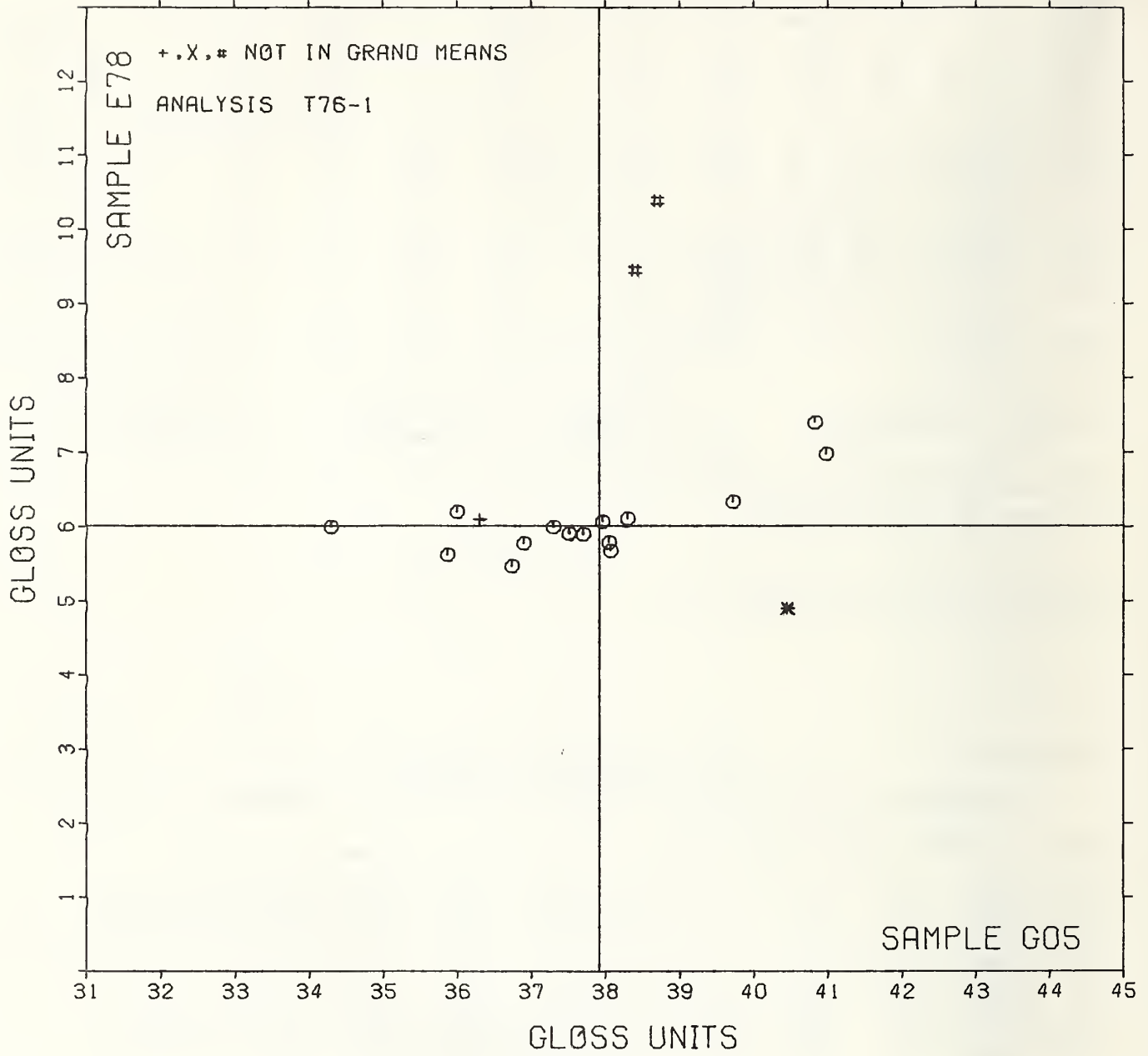
ANALYSIS T76-1 TABLE 2
 SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - LOW RANGE
 TAPPI OFFICIAL TEST METHOD T480 G5-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	F	MEANS G05	E78	COORDINATES		AVG R ₀ SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS					
				MAJOR	MINOR		PROPERTY	TEST INSTRUMENT	CONDITIONS	PROPERTY	TEST INSTRUMENT	CONDITIONS
L149	Ø	34.30	6.00	-3.59	.45	.02	76G	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, GARDNER				
L288	Ø	35.87	5.63	-2.08	.11	.02	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L128	Ø	36.00	6.20	-1.38	.43	1.10	76G	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, GARDNER				
L250	*	36.30	6.10	-1.39	.30	.03	76G	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, PHOTOVOLT, 20C, 65%RH				
L122	Ø	36.74	5.47	-1.24	.38	.00	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L223	Ø	36.90	5.78	-1.04	.10	1.08	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L134	Ø	37.30	6.00	-0.61	.07	1.03	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L226	Ø	37.51	5.91	-0.42	.05	.39	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L317	Ø	37.70	5.90	-0.23	.08	1.04	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L456	Ø	37.96	6.07	.03	.03	1.11	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L182	Ø	38.05	5.79	.10	.24	1.00	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L213	Ø	38.07	5.68	.11	.35	1.14	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L259	Ø	38.30	6.11	.39	.05	.49	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L713	#	38.32	9.33	.03	.24	1.12	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L328	#	38.62	10.27	1.24	.13	.08	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L210	Ø	39.72	6.34	1.03	.10	.88	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER				
L153	*	40.45	4.90	2.37	-1.43	.00	76G	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, GARDNER				
L162	Ø	40.83	7.40	3.07	1.00	1.13	76G	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, GARDNER				
L136	Ø	40.98	6.98	3.10	.57	1.04	76G	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, GARDNER				

GMEANS: 37.92 6.01 1.00
 95% ELLIPSE: 5.29 1.49 WITH GAMMA = 7 DEGREES

SPECULAR GLOSS, 75 DEGREE-LOW RANGE

SAMPLE G05 = 37.9 GLOSS UNITS SAMPLe E78 = 6.0 GLOSS UNITS



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

LAB CODE	SAMPLE J82 MEAN	PRINTING 73 GRAMS PER SQUARE METER				SAMPLE J22 MEAN	PRINTING 89 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L105	2.732	.032	.44	.027	.68	3.046	.028	.35	.029	.52	90T	8	L105
L118	2.705	.005	.07	.032	.81	3.028	.010	.13	.024	.43	90Q	8	L118
L122	2.727	.027	.07	.045	1.15	3.034	.016	.20	.088	1.57	90V	8	L122
L123F	2.675	.175	2.42	.020	.67	3.195	.177	2.19	.112	1.99	90F	8	L123F
L125	2.656	-.044	-.01	.052	1.31	3.025	.007	.09	.056	1.01	90T	8	L125
L128	2.691	-.009	-.12	.031	.80	2.990	-.028	-.34	.037	.65	90T	8	L128
L141	2.626	.074	-1.02	.025	.83	2.954	-.064	-.78	.064	1.14	90I	8	L141
L153	2.830	.130	1.00	.045	1.69	3.153	.135	1.67	.063	1.13	90T	8	L153
L158	2.630	-.070	-.97	.048	1.22	2.990	-.028	-.34	.057	1.01	90T	8	L158
L159	2.720	.020	.20	.025	.63	3.072	.054	.67	.064	1.14	90T	8	L159
L162	2.557	-.143	-1.05	.052	.81	2.899	-.119	-1.46	.029	.51	90V	8	L162
L166	2.703	.003	.00	.042	1.05	2.960	-.058	-.71	.058	1.03	90T	8	L166
L172	2.681	-.019	-.20	.052	1.30	3.006	-.012	-.14	.044	.79	90T	8	L172
L174	2.600	-.100	-1.05	.047	1.19	2.980	-.038	-.46	.063	1.13	90T	8	L174
L182	2.715	.015	.20	.050	1.52	3.002	-.015	-.19	.098	1.75	90L	8	L182
L183	2.652	-.048	-.00	.029	.74	2.971	-.047	-.57	.034	.61	90T	8	L183
L190C	2.700	-.003	-.00	.057	1.09	2.910	-.108	-1.33	.074	1.32	90T	*	L190C
L203A	2.630	-.070	-.97	.045	1.22	2.910	-.108	-1.33	.110	1.96	90T	8	L203A
L203C	2.805	.105	1.00	.057	.95	3.050	.032	.40	.088	1.57	90T	8	L203C
L212	2.690	-.010	-.14	.040	1.10	3.050	.032	.40	.047	.84	90T	8	L212
L213	2.680	-.020	-.20	.042	1.07	2.950	-.068	-.83	.053	.94	90T	8	L213
L223	2.648	-.052	-.72	.052	.80	2.904	-.054	-.66	.030	.53	90V	8	L223
L228	2.700	-.000	-.00	.052	2.07	2.990	-.028	-.34	.099	1.77	90T	8	L228
L233	2.797	.097	1.00	.051	1.28	3.124	.106	1.31	.042	.75	90Q	8	L233
L241	2.780	.080	1.11	.071	1.81	3.095	.077	.96	.044	.78	90T	8	L241
L242P	2.742	.042	.50	.035	.84	3.073	.056	.69	.037	.66	90P	8	L242P
L249	2.671	-.029	-.40	.040	1.23	3.030	.012	.15	.047	.84	90P	8	L249
L259	2.682	-.018	-.20	.025	.58	2.967	-.051	-.62	.014	.25	90T	8	L259
L260	2.751	.051	.71	.050	1.27	3.093	.075	.93	.032	.56	90Q	8	L260
L260	2.744	.044	.64	.019	.48	3.022	.004	.06	.035	.62	90T	8	L260
L261	2.722	.022	.50	.047	1.20	3.034	.016	.20	.038	.67	90T	8	L261
L262	2.670	-.030	-.41	.020	.65	2.975	-.043	-.52	.042	.76	90T	8	L262
L291	2.801	.101	1.00	.025	.83	3.156	.138	1.71	.043	.77	90T	8	L291
L305	2.700	-.000	-.00	.041	1.03	3.000	.042	.52	.070	1.25	90T	8	L305
L309	2.650	-.050	-.60	.053	1.33	2.990	-.028	-.34	.057	1.01	90T	8	L309
L315	2.670	-.030	-.41	.057	1.71	3.090	.072	.89	.057	1.01	90T	8	L315
L318	2.615	-.085	-1.10	.024	.81	2.875	-.143	-1.76	.092	1.64	90T	8	L318
L320	2.590	-.110	-1.05	.021	.53	2.640	-.178	-2.19	.039	.70	90T	8	L320
L323	2.805	.105	1.00	.051	1.28	3.159	.141	1.74	.069	1.23	90T	8	L323
L324	2.720	.020	.20	.035	.89	3.055	.037	.46	.050	.89	90T	8	L324
L326	2.748	.048	.50	.034	.86	3.051	.033	.41	.043	.76	90T	8	L326
L328	2.711	.011	.10	.039	1.00	3.021	.003	.04	.077	1.38	90T	8	L328
L333	2.645	-.055	-.60	.045	1.08	2.951	-.067	-.82	.044	.79	90V	8	L333
L339	2.698	-.002	-.05	.041	1.05	2.990	-.028	-.34	.058	1.04	90T	8	L339
L341	2.806	.106	1.00	.040	1.02	3.128	.110	1.36	.020	.35	90T	8	L341
L352	2.743	.043	.50	.021	.55	3.036	.018	.23	.045	.79	90Q	8	L352
L356	2.649	-.051	-.71	.023	.59	2.930	-.088	-1.08	.039	.69	90T	8	L356
L358	2.665	-.035	-.40	.071	1.80	2.982	-.036	-.44	.039	.69	90T	8	L358
L376	2.560	-.140	-1.00	.032	.80	2.920	-.098	-1.20	.048	.86	90T	8	L376
L380	2.786	.086	1.10	.025	.58	2.965	-.053	-.65	.041	.73	90T	X	L380
L382	2.863	.163	2.00	.029	.75	3.142	.124	1.53	.054	.96	90T	8	L382
L390	2.640	-.060	-.60	.032	.80	2.965	-.053	-.65	.047	.85	90T	8	L390
L442	2.837	.137	1.00	.022	.56	3.148	.130	1.61	.032	.58	90V	8	L442
L556	2.718	.018	.20	.029	.74	3.117	.059	1.23	.042	.75	90T	8	L556
L557	2.715	.015	.21	.047	1.20	2.945	-.073	-.89	.080	1.42	90T	8	L557
L567	2.717	.017	.24	.057	.94	3.057	.039	.49	.039	.70	90V	8	L567
L571	2.670	-.030	-.41	.048	1.22	2.960	-.058	-.71	.070	1.25	90V	8	L571
L574	2.545	-.155	-2.10	.042	1.06	2.651	-.167	-2.05	.031	.56	90V	8	L574
L575	2.662	-.038	-.40	.030	.90	2.987	-.031	-.38	.036	.64	90T	8	L575
L576	2.701	.001	.01	.051	.80	3.103	.085	1.05	.286	5.11	90T	8	L576
L581	2.755	.055	.70	.028	.72	3.115	.097	1.20	.063	1.12	90T	8	L581
L587	2.640	-.060	-.60	.052	1.31	3.010	-.008	-.09	.032	.56	90T	8	L587
L626	2.589	-.111	-1.05	.040	1.17	2.867	-.151	-1.86	.050	.90	90T	8	L626
L704	2.585	-.115	-1.05	.053	1.59	NO DATA REPORTED FOR SAMPLE J22					90T	M	L704
L713	2.760	.060	.60	.032	.80	3.060	.042	.52	.046	.82	90T	8	L713

GR. MEAN = 2.700 MILS
SD MEANS = .072 MILS

GRAND MEAN = 3.018 MILS
SD OF MEANS = .081 MILS

TEST DETERMINATIONS = 10
63 LABS IN GRAND MEANS

GR. MEAN = 68.58 MICROMETER

AVERAGE SDR = .039 MILS

AVERAGE SDR = .056 MILS

GRAND MEAN = 70.64 MICROMETER

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

LAB CODE	SAMPLE J82		PRINTING 73 GRAMS PER SQUARE METER			SAMPLE J22		PRINTING 89 GRAMS PER SQUARE METER			TEST D ₀ - 1C		
	MEAN	DEV	NO. DEV	SD _x	R ₀ SDR	MEAN	DEV	NO. DEV	FDR	R ₀ SDR	VAR	F	LAB
L106	2.780	0.080	1.11	0.003	1.00	2.990	-0.028	-0.34	0.032	0.56	90C	*	L106
L108	2.895	0.195	2.70	0.010	0.49	3.005	-0.013	-0.15	0.060	1.07	90C	*	L108
L185	2.780	0.080	1.11	0.042	1.07	3.140	0.122	1.51	0.070	1.25	90B	*	L185
L203B	2.520	-0.180	-2.45	0.003	1.00	2.880	-0.138	-1.69	0.079	1.41	90C	*	L203B
L251	2.075	-0.025	-0.34	0.012	0.32	2.979	-0.039	-0.48	0.028	0.49	90W	*	L251
L285	2.848	0.148	2.03	0.008	2.23	3.128	0.110	1.36	0.041	0.74	90X	*	L285
L342	2.809	-0.091	-1.20	0.030	0.90	2.901	-0.117	-1.44	0.047	0.83	90U	*	L342
L344	2.840	-0.060	-0.03	0.070	1.77	2.970	-0.048	-0.59	0.048	0.86	90U	*	L344
L484	2.724	0.024	0.34	0.041	1.03	2.984	-0.033	-0.41	0.041	0.73	90E	*	L484
L563	2.760	0.060	0.03	0.022	1.31	3.050	0.032	0.40	0.085	1.52	90U	*	L563
L616	2.644	-0.056	-0.77	0.033	0.89	3.024	0.006	0.08	0.066	1.18	90C	*	L616
L684	2.760	0.060	0.03	0.022	1.31	3.030	0.012	0.15	0.067	1.20	90U	*	L684
TOTAL NUMBER OF LABORATORIES REPORTING * 77													

Best values: J82 2.70 ± 0.11 mils
 J22 3.02 ± 0.15 mils

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---	CONDITIONS
		J82	J22	MAJOR	MINOR	ROSSER	VAR		
L203B	*	2.520	2.880	-0.222	0.045	1.050	90C	THICKNESS (CALIPER),	CADY, HAND DRIVEN
L574	Ø	2.545	2.851	-0.227	0.007	0.61	90V	THICKNESS (CALIPER),	TMI, METER DRIVEN, DIGITIZED
L162	Ø	2.557	2.859	-0.183	0.030	0.66	90V	THICKNESS (CALIPER),	TMI, METER DRIVEN, DIGITIZED
L376	Ø	2.560	2.920	-0.160	0.041	0.63	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L704	M	2.585				1.009	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L626	Ø	2.589	2.867	-0.160	-0.016	1.013	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L320	Ø	2.590	2.840	-0.200	-0.034	0.62	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L174	Ø	2.600	2.980	-0.094	0.051	1.010	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L342	*	2.609	2.901	-0.148	-0.008	0.67	90U	THICKNESS (CALIPER),	TMI, HAND DRIVEN
L318	Ø	2.615	2.875	-0.160	-0.030	1.013	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L141	Ø	2.620	2.954	-0.097	0.014	0.69	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L158	Ø	2.630	2.990	-0.067	0.035	1.012	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L203A	Ø	2.630	2.910	-0.127	-0.018	1.009	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L390	Ø	2.640	2.965	-0.079	0.011	0.62	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L344	*	2.640	2.970	-0.075	0.014	1.002	90U	THICKNESS (CALIPER),	TMI, HAND DRIVEN
L587	Ø	2.640	3.010	-0.040	0.040	0.64	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L616	*	2.644	3.024	-0.002	0.040	1.003	90C	THICKNESS (CALIPER),	CADY, HAND DRIVEN
L333	Ø	2.645	2.951	-0.086	-0.002	0.63	90V	THICKNESS (CALIPER),	TMI, METER DRIVEN, DIGITIZED
L223	Ø	2.648	2.964	-0.070	0.004	0.66	90V	THICKNESS (CALIPER),	TMI, METER DRIVEN, DIGITIZED
L356	Ø	2.649	2.930	-0.099	-0.019	0.64	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L309	Ø	2.650	2.990	-0.004	0.019	1.017	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L183	Ø	2.652	2.971	-0.067	0.005	0.68	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L125	Ø	2.650	3.025	-0.023	0.038	1.016	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L575	Ø	2.660	2.987	-0.040	0.008	0.60	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L358	Ø	2.665	2.982	-0.000	0.003	1.000	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L262	Ø	2.670	2.975	-0.002	-0.005	0.71	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L571	Ø	2.670	2.960	-0.000	-0.015	1.004	90V	THICKNESS (CALIPER),	TMI, METER DRIVEN, DIGITIZED
L315	Ø	2.670	3.090	0.030	0.070	1.000	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L242P	Ø	2.671	3.030	-0.010	0.030	1.003	90P	THICKNESS (CALIPER),	MESSNER, METER DRIVEN, ISO R534
L251	*	2.675	2.979	-0.040	-0.007	0.40	90W	THICKNESS (CALIPER),	L * W, METER DRIVEN, 20 C, 65% RH
L213	Ø	2.680	2.950	-0.004	-0.029	1.000	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L172	Ø	2.681	3.006	-0.021	0.007	1.000	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L249	Ø	2.682	2.967	-0.000	-0.020	0.42	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L212	Ø	2.690	3.050	0.010	0.029	1.000	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L128	Ø	2.691	2.990	-0.027	-0.011	0.72	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L339	Ø	2.698	2.990	-0.022	-0.017	1.004	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L305	Ø	2.700	3.060	0.032	0.028	1.014	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L190C	*	2.700	2.910	-0.001	-0.071	1.000	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L228	Ø	2.700	2.990	-0.021	-0.018	1.002	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L576	Ø	2.701	3.103	0.000	0.050	2.000	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L166	Ø	2.703	2.960	-0.041	-0.040	1.004	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L118	Ø	2.705	3.028	0.011	0.003	0.62	90Q	THICKNESS (CALIPER),	EMVECO, METER DRIVEN
L328	Ø	2.711	3.021	0.010	-0.006	1.019	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L182	Ø	2.715	3.002	-0.002	-0.021	1.003	90L	THICKNESS (CALIPER),	L * W, METER DRIVEN
L557	Ø	2.715	2.945	-0.045	-0.059	1.001	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L567	Ø	2.717	3.057	0.041	0.013	0.62	90V	THICKNESS (CALIPER),	TMI, METER DRIVEN, DIGITIZED
L556	Ø	2.718	3.117	0.007	0.052	0.70	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L324	Ø	2.720	3.055	0.041	0.010	0.69	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L159	Ø	2.720	3.072	0.004	0.021	0.69	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L261	Ø	2.722	3.034	0.027	-0.006	0.64	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L484	*	2.724	2.984	-0.009	-0.040	0.68	90L	THICKNESS (CALIPER),	SCHÖPPER, HAND DRIVEN
L122	Ø	2.727	3.034	0.030	-0.009	1.000	90V	THICKNESS (CALIPER),	TMI, METER DRIVEN, DIGITIZED
L105	Ø	2.732	3.046	0.043	-0.000	0.60	90Q	THICKNESS (CALIPER),	EMVECO, METER DRIVEN
L242Ø	Ø	2.742	3.073	0.070	0.005	0.70	90U	THICKNESS (CALIPER),	MESSNER, METER DRIVEN, BS3983
L352	Ø	2.743	3.036	0.042	-0.020	0.66	90Q	THICKNESS (CALIPER),	EMVECO, METER DRIVEN
L260	Ø	2.744	3.022	0.002	-0.030	0.60	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L326	Ø	2.748	3.051	0.057	-0.014	0.61	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L259	Ø	2.751	3.093	0.090	0.011	0.62	90Q	THICKNESS (CALIPER),	EMVECO, METER DRIVEN
L581	Ø	2.755	3.115	0.110	0.023	0.62	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L684	*	2.760	3.030	0.049	-0.037	1.000	90U	THICKNESS (CALIPER),	TMI, HAND DRIVEN
L563	*	2.760	3.050	0.004	-0.024	1.001	90U	THICKNESS (CALIPER),	TMI, HAND DRIVEN
L713	Ø	2.760	3.060	0.071	-0.017	0.61	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L241	Ø	2.780	3.095	0.111	-0.009	1.000	90T	THICKNESS (CALIPER),	TMI, METER DRIVEN
L185	*	2.780	3.140	0.140	0.020	1.010	90B	THICKNESS (CALIPER),	AMTHER, HAND DRIVEN
L106	*	2.780	2.990	0.002	-0.078	1.008	90C	THICKNESS (CALIPER),	CADY, HAND DRIVEN

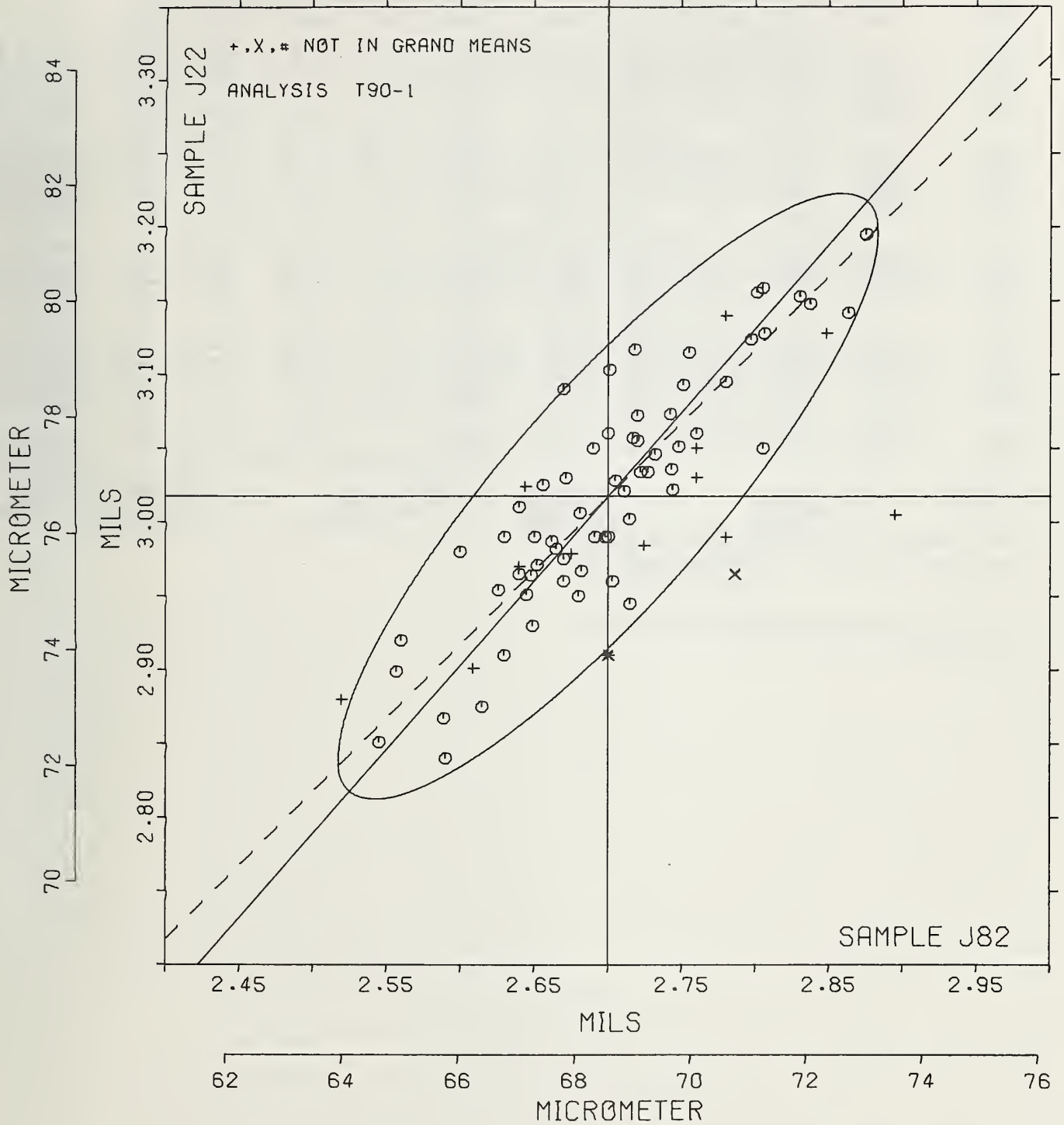
TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T90-1 TABLE 2
 THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
 TAPPI OFFICIAL TEST METHOD T411 08-76

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J82	J22	MAJOR	MINOR	MAJOR	VAR			
L380	X	2.780	3.965	.017	-.099	.005	90T	THICKNESS (CALIPER), TMI,		MOTOR DRIVEN
L233	Ø	2.797	3.124	.144	-.003	1.001	90Q	THICKNESS (CALIPER), EMVECO,		MOTOR DRIVEN
L291	Ø	2.801	3.156	.171	.015	.70	90T	THICKNESS (CALIPER), TMI,		MOTOR DRIVEN
L203C	Ø	2.805	3.050	.094	-.058	1.025	90T	THICKNESS (CALIPER), TMI,		MOTOR DRIVEN
L323	Ø	2.805	3.159	.170	.014	1.025	90T	THICKNESS (CALIPER), TMI,		MOTOR DRIVEN
L341	Ø	2.806	3.128	.153	-.007	.69	90T	THICKNESS (CALIPER), TMI,		MOTOR DRIVEN
L153	Ø	2.830	3.153	.165	-.009	1.011	90T	THICKNESS (CALIPER), TMI,		MOTOR DRIVEN
L442	Ø	2.837	3.148	.166	-.017	.67	90V	THICKNESS (CALIPER), TMI,		MOTOR DRIVEN, DIGITIZED
L285	*	2.848	3.128	.131	-.039	1.048	90X	THICKNESS (CALIPER): GIVE INSTR. MAKE MODEL,	()	MOTOR, () HAND
L382	Ø	2.863	3.142	.201	-.041	.65	90I	THICKNESS (CALIPER), TMI,		MOTOR DRIVEN
L123F	Ø	2.875	3.195	.249	-.015	1.033	90F	THICKNESS (CALIPER), FEDERAL,		MOTOR DRIVEN
L108	*	2.895	3.005	.119	-.155	.73	90C	THICKNESS (CALIPER), CARY,		HAND DRIVEN
GMEANS:		2.700	3.018			1.000				
		95% ELLIPSE:		.200	.071	WITH GAMMA = 48 DEGREES				

THICKNESS (CALIPER)

SAMPLE J82 = 2.70 MILS
SAMPLE J82 = 68.6 MICROMETER

SAMPLE J22 = 3.02 MILS
SAMPLE J22 = 76.6 MICROMETER



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

LAB CODE	SAMPLE D37 MEAN	MASS BOND				SAMPLE D36 MEAN	COATED OFFSET BOOK				TEST D ₀ = 10		
		61 GRAMS PER SQUARE METER	NO. DEV	SDR	% SDR		75 GRAMS PER SQUARE METER	DEV	NO. DEV	SDR	R ₀ SDR	VAR	F
L121	62.03	1.17	1.01	0.37	0.53	77.91	0.92	1.50	0.56	1.30	95B	Ø	L121
L162	60.59	-0.27	-0.41	1.87	2.73	77.70	0.71	1.16	0.60	0.00	95K	Ø	L162
L213	60.62	-0.23	-0.30	1.00	1.55	76.71	-0.27	-0.44	0.27	0.64	95F	Ø	L213
L233	60.77	-0.09	-0.14	0.73	1.06	77.00	0.01	0.02	0.86	2.00	95T	Ø	L233
L244	59.75	-1.11	-1.74	1.20	1.76	76.40	-0.59	-0.95	0.89	2.08	95T	Ø	L244
L249	61.90	1.04	1.01	1.17	1.71	77.02	0.03	0.06	0.17	0.39	95I	Ø	L249
L280	60.38	-0.48	-0.73	0.29	0.42	77.52	0.53	0.87	0.34	0.80	95T	Ø	L280
L285	59.97	-0.89	-1.37	0.21	0.30	76.20	-0.79	-1.27	0.30	0.70	95I	Ø	L285
L305	60.45	-0.41	-0.03	0.37	0.54	77.11	0.12	0.20	0.31	0.72	95T	Ø	L305
L339	61.30	0.44	0.00	0.42	0.62	77.05	0.06	0.10	0.37	0.86	95T	Ø	L339
L344	61.31	0.45	0.09	0.13	0.19	78.12	1.14	1.85	0.28	0.64	95T	Ø	L344
L442	61.38	0.52	0.01	0.53	0.77	77.49	0.50	0.82	0.26	0.60	95K	Ø	L442
L557	61.57	0.71	1.00	1.40	2.04	76.94	-0.04	-0.07	0.60	1.41	95D	Ø	L557
L564	61.00	0.14	0.22	0.82	1.19	77.40	0.41	0.67	0.84	1.96	95E	Ø	L564
L567	61.56	0.70	1.00	1.03	1.51	77.36	0.37	0.61	0.41	0.96	95E	Ø	L567
L571	60.27	-0.59	-0.90	0.38	0.56	76.01	-0.98	-1.58	0.56	1.31	95P	Ø	L571
L574	60.46	-0.39	-0.00	0.33	0.48	76.80	-0.18	-0.30	0.39	0.91	95D	Ø	L574
L597	60.91	0.03	0.00	0.39	0.57	75.91	-1.07	-1.74	0.51	1.20	95C	Ø	L597
L604	36.19	-24.60	-38.00	0.32	0.46	45.95	-31.04	-50.31	0.28	0.64	95T	#	L604
L616	59.97	-0.89	-1.37	0.30	0.55	76.30	-0.68	-1.11	0.36	0.83	95T	Ø	L616
L626	60.95	0.09	0.14	0.02	0.91	76.74	-0.25	-0.40	0.30	0.70	95E	Ø	L626
L704	61.04	0.18	0.20	0.31	0.45	NO DATA REPORTED FOR SAMPLE D36				0.70	95T	M	L704

GR₀ MEAN = 60.86 G/SQ.METER GRAND MEAN = 76.59 G/SQ.METER TEST DETERMINATIONS = 10
SD MEANS = 0.65 G/SQ.METER SD OF MEANS = 0.62 G/SQ.METER 20 LABS IN GRAND MEANS
AVERAGE SDR = 0.60 G/SQ.METER AVERAGE SDR = 0.43 G/SQ.METER

TOTAL NUMBER OF LABORATORIES REPORTING = 22

Best values: D37 60.9 ± 1.1 grams per square meter
D36 77.0 ± 1.0 grams per square meter

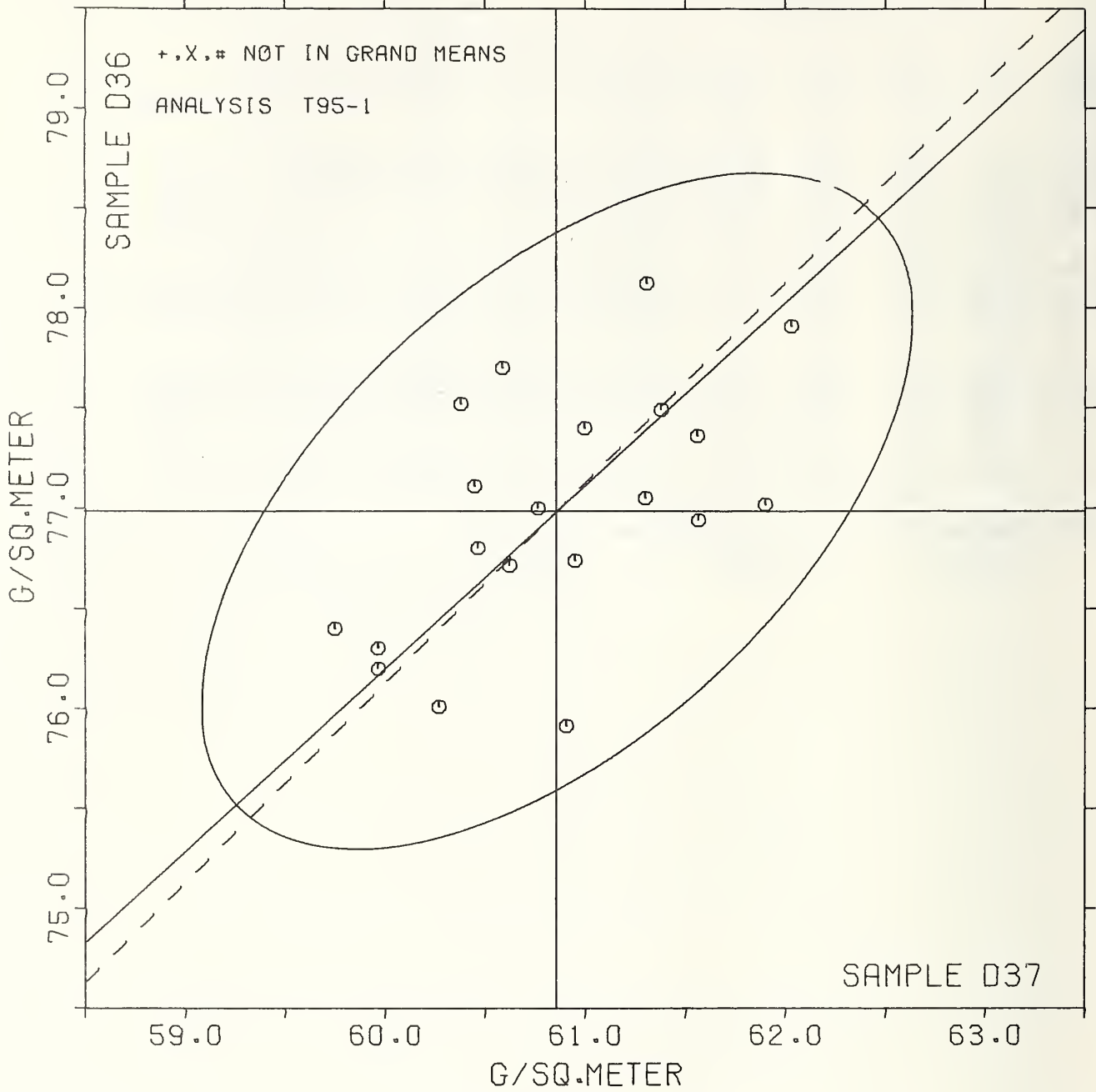
Data from the following laboratories appear to be off by a multiplicative factor: 604.

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		D37	D36	MAJOR	MINOR	% SOL	VAR	
L604	#	36.19	45.95	-39.14	-0.26	0.55	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L244	#	59.75	76.40	-1.21	0.31	1.92	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L616	#	55.97	76.30	-1.12	0.10	0.07	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L285	#	55.97	76.20	-1.17	0.02	0.50	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L571	#	60.27	76.01	-1.09	-0.32	0.93	95P	BASIS WEIGHT (GRAMMAGE), PRODUCTION REAM CUTTER
L280	#	60.38	77.52	0.41	0.72	0.01	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L305	#	60.45	77.11	-0.22	0.37	0.03	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L574	#	60.40	76.80	-0.41	0.13	0.70	95D	BASIS WEIGHT (GRAMMAGE), DIE CUT
L162	#	60.59	77.70	0.29	0.71	1.00	95A	BASIS WEIGHT (GRAMMAGE), WEIGHED AS RECEIVED
L213	#	60.62	76.71	-0.30	-0.04	1.09	95P	BASIS WEIGHT (GRAMMAGE), FOUR-SQUARE CUTTER
L233	#	60.77	77.00	-0.06	0.07	1.00	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L597	#	60.91	75.91	-0.09	-0.02	0.08	95C	BASIS WEIGHT (GRAMMAGE), CUTTING BOARD
L626	#	60.95	76.74	-0.10	-0.24	0.00	95E	BASIS WEIGHT (GRAMMAGE), GUILLIOTINE TYPE CUTTER
L564	#	61.00	77.40	0.39	0.21	1.08	95E	BASIS WEIGHT (GRAMMAGE), GUILLIOTINE TYPE CUTTER
L704	#	61.04				0.45	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L339	#	61.30	77.05	0.37	-0.25	0.74	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L344	#	61.31	78.12	1.10	0.54	0.42	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L442	#	61.38	77.49	0.73	0.02	0.05	95A	BASIS WEIGHT (GRAMMAGE), WEIGHED AS RECEIVED
L567	#	61.56	77.36	0.77	-0.20	1.00	95E	BASIS WEIGHT (GRAMMAGE), GUILLIOTINE TYPE CUTTER
L557	#	61.57	76.94	0.49	-0.51	1.07	95D	BASIS WEIGHT (GRAMMAGE), DIE CUT
L249	#	61.90	77.02	0.79	-0.68	1.05	95I	BASIS WEIGHT (GRAMMAGE), INGENT® PAPER CUTTER
L121	#	62.04	77.91	1.49	-0.11	0.52	95B	BASIS WEIGHT (GRAMMAGE), CENCEPA CUTTER
GMEANS:		60.88	76.99			1.00		
		95% ELLIPSE:		2.17	1.14	WALL GAMMA = 42 DEGREES		

GRAMMAGE (MASS PER UNIT AREA)

SAMPLE D37 = 60.9 G/SQ.METER

SAMPLE D36 = 77.0 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	A01	21.9	1.7	2.8	10	59	62	10	2.5	4.6
	K22	45.4	2.6	3.1					2.7	7.2
AIR RESISTANCE, SHEFFIELD T40-2 SHEFF. UNITS	A01	134.2	10.1	13.0	10	34	42	10	11.4	28.1
	K22	75.1	7.6	5.0					4.4	21.0
AIR RESISTANCE, GURLEY HQ FLUTATION T41-1 SEC/10 CC	D06	164.	13.	16.	10	12	14	10	14.	36.
	G11	271.	41.	83.					72.	115.
SMOOTHNESS, PARKER PRINISUMF T44-1 MICRONS	J74	4.36	.42	.16	10	7	7	10	.14	1.16
	K46	5.59	.45	.16					.14	1.34
SMOOTHNESS, SHEFFIELD T45-1 SHEFF. UNITS	J74	80.9	5.5	5.1	15	82	89	10	4.5	15.5
	K46	167.4	7.5	9.3					8.2	22.4
SMOOTHNESS, BEKK T45-2 BEKK SECONDS	J74	83.7	3.8	7.6	15	8	11	5	9.5	13.6
	K46	27.1	2.2	2.8					3.5	6.8
SMOOTHNESS, BENDTSEN T47-1 ML/MIN	J74	96.6	9.5	8.4	10	8	8	10	7.4	27.3
	K46	223.9	15.7	23.4					20.5	43.6
MOISTURE T53-1 PERCENT	G09	5.92	.52	.08	10	9	10	2	.15	.91
	G10	6.17	.48	.08					.15	1.35
K & N INK ABSORPTION T56-1 K & N UNITS	B80	24.0	3.1	.8	4	10	10	2	1.5	8.7
	B92	23.8	3.1	.8					1.5	8.6
PH, COLD T57-1 PH UNITS	A99	5.729	.114	.045	5	7	7	2	.089	.322
	J75	7.200	.351	.081					.158	1.089
PH, HOT T57-2 PH UNITS	A99	5.182	.256	.054	5	4	6	2	.106	.718
	J75	7.705	.153	.064					.125	.461
OPACITY, B&L, 89% BACKING, FINE P. T60-1 PERCENT	G01	95.88	.34	.23	10	63	79	5	.28	.96
	E85	89.72	.43	.35					.44	1.22
OPACITY, ELREPHO, PAPER BACKING, FINE P T60-2 PERCENT	G01	94.42	.24	.20	10	14	19	5	.25	.68
	E85	92.05	.25	.24					.30	.72
OPACITY, B&L, 89% BACKING, NEWS T61-1 PERCENT	Z03	53.53	.52	.44	10	14	16	5	.55	1.48
	G13	81.84	.63	.73					.90	1.85
OPACITY, B&L, 89% BACKING, TRACING T62-1 PERCENT	Z03	68.98	.44	.59	10	6	7	5	.73	2.65
	Z07	59.17	.82	.73					.90	2.35
OPACITY, ELREPHO, PAPER BACKING, NEWS T61-2 PERCENT	Z03	90.95	.06	.21	10	2	3	5		
	G13	82.02	.30	.50						
OPACITY, ELREPHO, PAPER BACKING, TRACING T62-2 PERCENT	Z03	74.70		.18	10	1	1	5		
	Z07	81.06		.30						
BLUE REFLECTANCE, DIRECTIONAL T65-1 PERCENT	J98	75.94	.60	.14	8	28	56	5	.17	1.68
	B47	66.25	1.00	.33					.41	2.78
BLUE REFLECTANCE, DIFFUSE, WITH TRAP T65-2 PERCENT	J98	75.64	.61	.11	8	16	18	5	.14	1.69
	B47	66.47	.75	.21					.26	2.18
BLUE REFLECTANCE, DIFFUSE, NO TRAP T65-3 PERCENT	J98	70.66	.47	.09	8	14	14	5	.11	1.31
	B47	68.11	.66	.19					.23	1.85
SPECULAR GLOSS, 75 DEGREE-HIGH RANGE T75-1 GLOSS UNITS	E67	68.8	2.2	1.8	10	33	38	5	2.2	6.4
	E47	63.6	1.9	1.7					2.0	5.4
SPECULAR GLOSS, 75 DEGREE-LOW RANGE T76-1 GLOSS UNITS	G05	37.92	1.66	1.21	10	16	19	5	1.50	5.25
	E78	6.01	.57	.30					.37	1.61
THICKNESS (CALIPER) T90-1 MILS	J82	2.700	.072	.039	10	63	77	10	.035	.200
	J22	3.018	.081	.056					.049	.225
GRAMMAGE (MASS PER UNIT AREA) T95-1 G/SQ.METER	D37	60.86	.65	.68	10	20	22	3	1.09	2.02
	D36	76.59	.62	.43					.69	1.80

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