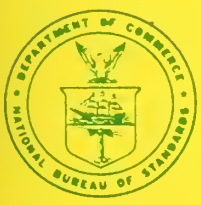
NBS/R 78-1350

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

REPORT NO. 54G



U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

NBS COLLABORATIVE REFERENCE PROGRAMS

TAPPI Paper and Board (6 times per year)

- Bursting strength
- Tearing strength
- Tensile breaking strength
- Elongation to break
- Tensile energy absorption
- Folding endurance
- Stiffness
- Air resistance
- Grammage
- Smoothness
- Surface pick strength
- K & N ink absorption
- pH
- Opacity
- Blue reflectance (brightness)
- Specular gloss, 75°
- Thickness
- 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
- Retroreflectivity

Rubber (4 times per year)

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

ASTM Textiles (3 times per year)

- Flammability (FF3-71 and FF5-74)

ASTM Cement (2 times per year)

- Chemical (11 chemical components)
- Physical (8 characteristics)

AASHTO Bituminous

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

Collaborative Reference Programs
B360 Polymer Building
National Bureau of Standards
Washington, D.C. 20234

Rev. 4/77

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

Report No. 54G

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Collaborative Testing Services, Inc.

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Office of Testing Laboratory Evaluation Technology
Office of Engineering Standards
National Engineering Laboratory

NBSIR 78-1350

U. S. DEPARTMENT OF COMMERCE
National Bureau of Standards

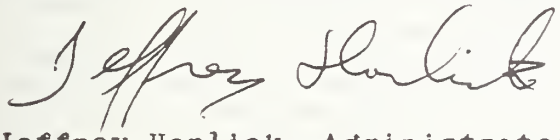
INTRØDUCTIØN

Reports 54S and 54G comprise the last set of reports for the 77-78 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.

Please note that some changes have been made in the computer-generated plots. These changes should aid participants in familiarizing themselves with the International System of Units (SI) as it applies to TAPPI test methods. Wherever possible, Grand Means in SI units have been added at the top of the plots, and scales in SI units have been added to the axes allowing the reader to compare means and variability in common units and SI units for the same data. Øn all plots, sample codes and unit of test have been shifted to new positions.

Notes and comments fo individual laboratories and "Best Values" applicable to a particular method are given following Table 1 for each method. See page 4 of this report for an explanation of "Best Values". Please do not confuse these best values with provisional values included with the samples to detect serious discrepancies at the time of test. NBS results, identified as L502 in the optical tests are included in some of the tables.

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



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

September 22, 1978

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.

TABLE OF CONTENTS

Analyses In This Report

Analyses In The S Report

TABLE OF CONVERSION FACTORS TO METRIC (SI) UNITS

Physical Quantity	To Convert From	To	Multiply by
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	$ft\text{-}lb/ft^2$	J/m^2	14.59
	$in.\text{-}lb/in.^2$	J/m^2	175.1
	$kg\text{-}m/m^2$	J/m^2	9.807
Bending stiffness	g·cm	μN·m	98.07
Flat-crush strength (Concora)	lb	N	4.448
Ring-crush (TAPPI)	lb	N	4.448
(ISO)	lb/6.00 in.	kN/m	0.0292
Thickness	mil	μm	25.40

KEY TO TABLES AND GRAPHS

MEAN - The average of individual TEST DETERMINATIONS. The number of TEST DETERMINATIONS in the mean is given in the upper right corner of the first table (TEST D.) and again at the bottom of this table.

GRAND MEAN - (GR. MEAN) The average of the individual laboratory MEANS, excluding laboratories flagged (see column F) with an X, #, or +. The GRAND MEAN is given in US customary units and, where applicable, in SI metric units.

SD OF MEANS - (SD MEANS) The standard deviation of the laboratory MEANS about the GRAND MEAN; an index of the among-laboratory precision.

DEV - The deviation or difference of the laboratory MEAN from the GRAND MEAN.

N. DEV - The normal deviate or ratio of the DEV to the SD OF MEANS; an indication of the degree of divergence of the laboratory MEAN from the GRAND MEAN. A N. DEV of more than 2 or less than -2 may indicate that the participant is not following the procedure considered standard for this analysis.

SDR - The standard deviation of repeated measurements; that is, of individual test determinations about their MEAN.

AVERAGE SDR - The average of the individual laboratory SDR's; an index of the within-laboratory precision of repeated measurements.

R. SDR - The relative standard deviation of repeated measurements; that is, the ratio of the SDR to the AVERAGE SDR; an indication of the ability of a participant to repeat his measurements relative to the average ability. The greater the number of TEST DETERMINATIONS the closer the R. SDR should be to unity. If R. SDR is outside the limits given below, the participant may not be following the procedure considered standard for this analysis:

No. of test Determinations	Lower limit for R. SDR	Upper limit for R. SDR
3	0.09	2.58
5	0.27	2.06
8	0.40	1.77
10	0.46	1.67
15	0.56	1.53
20	0.61	1.45
25	0.65	1.39

VAR - Code for instrument type or variation in condition, see second table.

F - Flag, with following meaning:

+ - Excluded from grand means because VAR non-standard for this analysis.

- Excluded because data were not understood or because of a non-coded variation reported by the laboratory. (See NOTES following Table 1 for each method).

M - Excluded because data for one sample are missing.

X - Excluded because plotted point would fall outside of the 99% error ellipse, (see below for explanation of Graph).

* - Included in grand means but plotted point falls outside of the 95% error ellipse. The participants should take this as a warning to reexamine his testing procedure.

S - Included in grand mean but only after omission of one or more 'wild' values; that is, test determinations more than 3 times AVERAGE SDR from the laboratory's MEAN. Not more than 20% of the test determination may be excluded in this manner without rejecting the laboratory.

O - Included in grand mean and inside 95% error ellipse.

COORDINATES - Distances along major and minor axes of error ellipse. If special additive or concurrent model of the measuring process applies to this method, the distance along the minor axis represents the random error within a laboratory while that along the major axis also includes a systematic laboratory component of error.

95% ELLIPSE - Lengths of the major and minor axes of the ellipse and the angle that the major axis makes with the horizontal axis.

AVG R. SDR - Average of the R. SDR for the two samples; an indication of the laboratory's precision of repeated measurements.

Graph - For each laboratory the MEAN for the second sample is plotted against the MEAN for the first sample, with each point representing a laboratory. The horizontal and vertical lines are the GRAND MEANS. The dashed line is drawn at 45°. The solid sloping line, which may or may not lie close to the 45° line, is along the major axis of the error ellipse. The ellipse is drawn so that, on the average, it will include 95% of the points representing the laboratories.

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

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

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

Summary - (At end of report) — In addition to several quantities already defined above, the summary shows the following values for each test method:

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

REPL TAPPI - The number of replicate test determinations in a test result required by the applicable TAPPI Standard or assumed here if there is no TAPPI Standard. This quantity is needed in the computation of TAPPI repeatability and reproducibility from the SD OF MEANS and the AVER SDR. See TAPPI Standard T1206 for definitions and computations.

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

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

Best values - Given at the end of Table 1 for each method for which sufficient information is available. These best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries. All participants using equipment that is standard for the analysis should be able to achieve results within the plus-minus (±) limits, when these are shown along with the best values.

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

LAB CODE	SAMPLE J47 PRINTING 106 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE E73 HEAT SET OFFSET BOOK 76 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L107	29.5	-.5	-.47	1.3	.87	17.6	.1	.08	1.7	1.11	40D	o	L107
L121	29.7	-.3	-.32	1.4	.97	18.7	1.2	1.06	1.6	1.04	40D	o	L121
L122	30.3	.2	.23	1.5	1.06	17.6	.1	.12	1.0	.64	40D	o	L122
L123	29.6	-.4	-.42	1.3	.89	16.8	-.7	-.65	1.5	1.02	40D	o	L123
L124G	27.7	-2.3	-2.17	1.6	1.10	15.8	-1.7	-1.55	1.6	1.07	40D	o	L124G
L125	30.9	.8	.81	1.7	1.18	16.9	-.6	-.55	1.1	.75	40D	o	L125
L127	29.8	-.2	-.20	1.4	.94	17.3	-.2	-.21	1.1	.75	40D	o	L127
L128	30.8	.8	.73	1.5	1.01	19.5	2.0	1.78	1.1	.71	40D	o	L128
L141	30.7	.7	.64	1.5	1.02	17.9	.4	.32	1.8	1.21	40D	o	L141
L148	30.8	.8	.73	1.3	.88	18.7	1.1	1.03	1.7	1.13	40D	o	L148
L153	29.6	-.4	-.41	2.2	1.48	15.6	-1.9	-1.74	1.0	.68	40D	o	L153
L158	28.7	-1.3	-1.27	2.2	1.47	18.3	.8	.71	1.3	.83	40D	o	L158
L159	31.3	1.3	1.22	2.6	1.74	18.3	.7	.67	1.6	1.03	40D	o	L159
L163	30.7	.7	.63	1.2	.79	19.8	2.3	2.06	1.7	1.09	40D	o	L163
L166	31.5	1.5	1.41	1.8	1.25	16.4	-1.1	-1.02	1.9	1.25	40D	o	L166
L174	30.6	.6	.54	1.8	1.21	16.4	-1.1	-1.01	1.8	1.19	40D	o	L174
L176	34.4	4.4	4.15	1.3	.86	19.6	2.1	1.90	2.3	1.54	40D	*	L176
L182G	28.8	-1.2	-1.17	1.8	1.19	16.8	-.7	-.64	1.9	1.23	40D	o	L182G
L190C	30.8	.8	.73	1.5	1.06	18.9	1.3	1.21	2.2	1.43	40D	o	L190C
L190R	29.2	-.8	-.79	1.1	.77	17.3	-.2	-.15	1.7	1.10	40D	o	L190R
L223	31.8	1.8	1.73	1.2	.83	18.3	.8	.74	.9	.60	40D	o	L223
L224	29.0	-1.0	-.96	1.5	1.05	15.4	-2.1	-1.85	2.5	1.66	40D	o	L224
L230G	30.7	.7	.64	1.1	.72	17.3	-.2	-.19	1.3	.83	40D	o	L230G
L238A	30.5	.5	.45	2.0	1.37	17.4	-.1	-.10	.8	.53	40D	o	L238A
L241	27.6	-2.4	-2.31	1.4	.97	16.1	-1.4	-1.26	1.4	.96	40D	o	L241
L243G	28.8	-1.2	-1.17	1.1	.77	17.6	.1	.10	1.7	1.11	40D	o	L243G
L259	27.4	-2.7	-2.54	2.4	1.61	18.0	.5	.43	1.6	1.08	40D	*	L259
L261	29.7	-.3	-.31	1.8	1.20	17.0	-.5	-.43	1.0	.67	40D	o	L261
L262G	29.9	-.1	-.10	1.2	.80	18.0	.5	.46	.8	.54	40D	o	L262G
L265	29.8	-.3	-.26	1.3	.87	17.1	-.4	-.32	1.9	1.27	40D	o	L265
L278	30.9	.8	.81	1.1	.72	17.5	.0	.03	1.8	1.17	40D	o	L278
L285	31.4	1.3	1.27	1.0	.69	17.7	.2	.14	2.0	1.31	40D	o	L285
L301	29.1	-.9	-.90	2.3	1.54	17.3	-.2	-.16	1.6	1.08	40D	o	L301
L308	31.9	1.9	1.78	1.2	.82	18.2	.7	.64	1.4	.96	40D	o	L308
L312	29.7	-.3	-.32	2.0	1.37	17.1	-.4	-.37	1.2	.79	40D	o	L312
L321	30.6	.6	.54	2.7	1.82	15.2	-2.3	-2.07	2.1	1.42	40D	o	L321
L324	29.2	-.8	-.76	1.4	.95	17.9	.3	.31	1.4	.96	40D	o	L324
L326	30.8	.8	.73	.9	.63	18.5	1.0	.91	1.1	.72	40D	o	L326
L328	30.0	-.0	-.01	.8	.52	17.5	.0	.02	.6	.40	40D	o	L328
L341	31.4	1.3	1.28	1.2	.79	19.2	1.6	1.48	1.2	.78	40D	o	L341
L344	29.2	-.8	-.75	1.2	.79	17.5	-.0	-.01	1.9	1.24	40D	o	L344
L376	31.2	1.2	1.15	1.5	1.03	18.8	1.3	1.20	1.9	1.25	40D	o	L376
L380	30.0	-.0	-.03	.8	.56	19.6	2.1	1.87	.8	.55	40D	o	L380
L396M	29.1	-.9	-.84	1.5	1.02	15.1	-2.4	-2.16	1.5	1.00	40D	o	L396M
L561	29.1	-.9	-.89	1.4	.93	17.4	-.1	-.10	1.4	.95	40D	o	L561
L567	29.9	-.1	-.13	1.2	.82	17.2	-.3	-.28	1.4	.93	40D	o	L567
L576	29.5	-.5	-.47	1.0	.68	17.7	.2	.21	1.6	1.06	40D	o	L576
L599	30.0	.0	.01	1.4	.97	16.8	-.7	-.59	1.8	1.22	40D	o	L599
L604	29.8	-.2	-.18	1.8	1.20	15.7	-1.8	-1.60	1.7	1.15	40D	o	L604
L616	31.1	1.0	.98	.6	.41	17.9	.4	.34	2.4	1.61	40D	o	L616
L676	31.2	1.2	1.13	1.9	1.28	18.7	1.2	1.09	1.6	1.04	40D	o	L676

GR. MEAN = 30.0 GURLEY UNITS — GRAND MEAN = 17.5 GURLEY UNITS — TEST DETERMINATIONS = 10
SD MEANS = 1.1 GURLEY UNITS — SD OF MEANS = 1.1 GURLEY UNITS — 50 LABS IN GRAND MEANS
AVERAGE SDR = 1.5 GURLEY UNITS — AVERAGE SDR = 1.5 GURLEY UNITS

L115	27.4	-2.6	-2.50	1.2	.80	15.6	-1.9	-1.71	1.5	1.00	40U	*	L115
L236	30.5	.5	.49	1.5	1.01	18.2	.7	.65	1.5	1.00	40E	*	L236
L291	30.2	.2	.16	1.5	1.06	19.1	1.6	1.42	2.1	1.41	40U	*	L291
L484	28.5	-1.6	-1.48	1.0	.65	16.7	-.8	-.75	1.1	.74	40H	*	L484

TOTAL NUMBER OF LABORATORIES REPORTING = 55

Best values: J47 29.5 ± 1.8 Gurley units
E73 17.5 ± 1.9 Gurley units

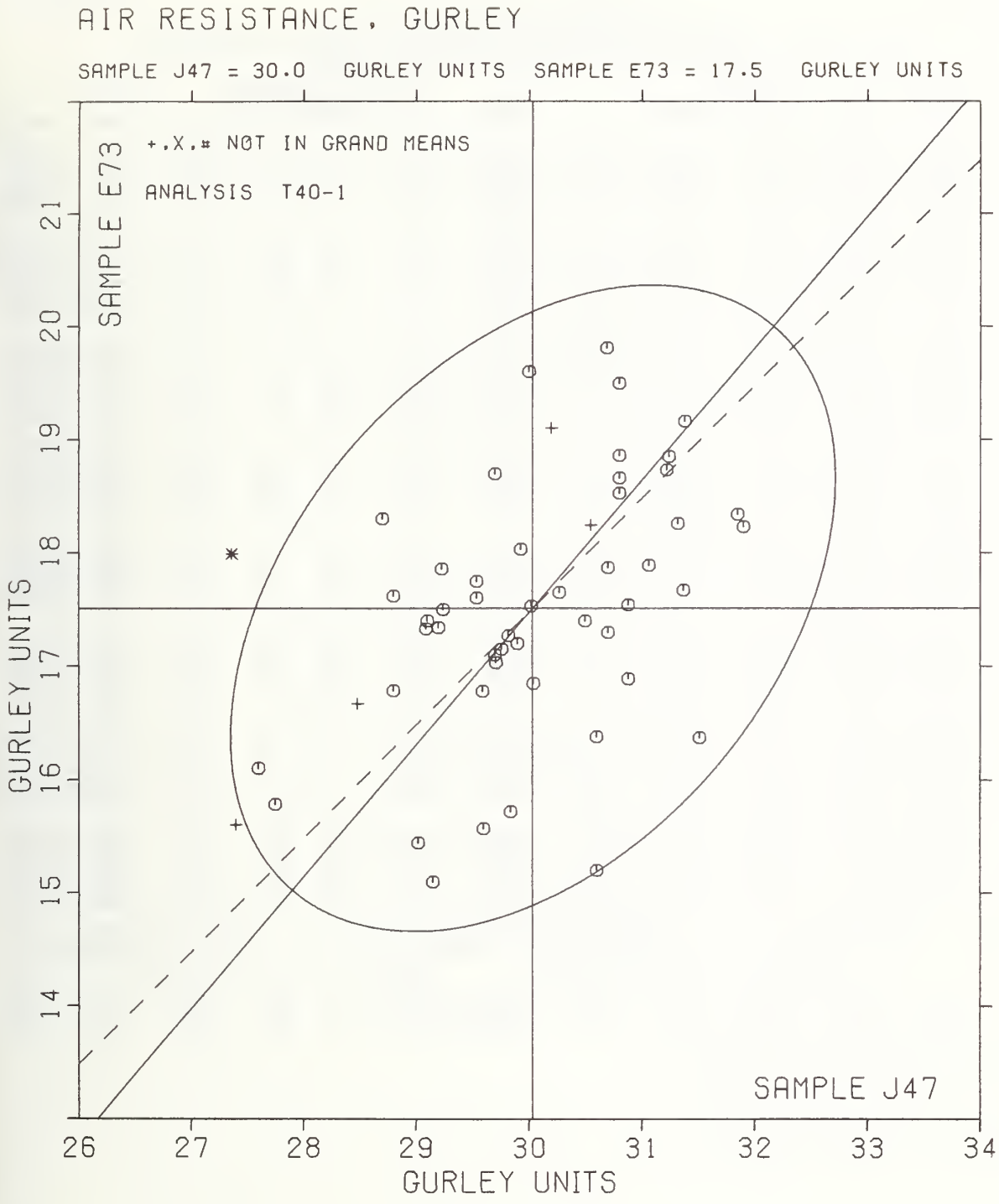
The following laboratories were omitted from the grand means because of extreme test results: 176

ANALYSIS T40-1 TABLE 2

AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)

TAPPI STANDARD T460 OS-75, AIR RESISTANCE OF PAPER

LAB CODE	P	MEANS J47	MEANS E73	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L259	*	27.4	18.0	-1.4	2.3	1.34	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L115	*	27.4	15.6	-3.2	.8	.90	40U	AIR RESISTANCE, SHEFFIELD IN GURLEY UNITS
L241	O	27.6	16.1	-2.7	.9	.97	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L124G	O	27.7	15.8	-2.8	.6	1.08	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L484	*	28.5	16.7	-1.6	.6	.70	40H	AIR RESISTANCE, REGMED-TYPE GURLEY DENSOMETER -OIL FLOTATION
L158	O	28.7	18.3	-.3	1.5	1.15	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L243G	O	28.8	17.6	-.7	1.0	.94	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L182G	O	28.8	16.8	-1.3	.5	1.21	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L224	O	29.0	15.4	-2.2	-.6	1.35	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L301	O	29.1	17.3	-.7	.6	1.31	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L561	O	29.1	17.4	-.7	.6	.94	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L396M	O	29.1	15.1	-2.4	-.9	1.01	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L190R	O	29.2	17.3	-.7	.5	.93	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L324	O	29.2	17.9	-.3	.8	.95	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L344	O	29.2	17.5	-.5	.6	1.01	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L576	O	29.5	17.7	-.1	.5	.87	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L107	O	29.5	17.6	-.3	.4	.99	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L123	O	29.6	16.8	-.8	-.1	.96	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L153	O	29.6	15.6	-1.8	-.9	1.08	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L121	O	29.7	18.7	.7	1.0	1.00	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L312	O	29.7	17.1	-.5	-.0	1.08	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L261	O	29.7	17.0	-.6	-.1	.94	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L265	O	29.8	17.1	-.5	-.0	1.07	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L127	O	29.8	17.3	-.3	.0	.85	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L604	O	29.8	15.7	-1.5	-1.0	1.17	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L567	O	29.9	17.2	-.3	-.1	.87	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L262G	O	29.9	18.0	.3	.4	.67	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L380	O	30.0	19.6	1.6	1.4	.56	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L328	O	30.0	17.5	.0	.0	.46	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L599	O	30.0	16.8	-.5	-.4	1.09	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L291	*	30.2	19.1	1.3	.9	1.23	40U	AIR RESISTANCE, SHEFFIELD IN GURLEY UNITS
L122	O	30.3	17.6	.3	-.1	.85	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L238A	O	30.5	17.4	.2	-.4	.95	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L236	*	30.5	18.2	.9	.1	1.00	40E	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION, 20C,65%RH
L174	O	30.6	16.4	-.5	-1.2	1.20	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L321	O	30.6	15.2	-1.4	-1.9	1.62	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L163	O	30.7	19.8	2.2	1.0	.94	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L230G	O	30.7	17.3	.3	-.6	.78	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L141	O	30.7	17.9	.7	-.3	1.11	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L148	O	30.8	18.7	1.4	.2	1.00	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L128	O	30.8	19.5	2.0	.7	.86	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L326	O	30.8	18.5	1.3	.1	.67	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L190C	O	30.8	18.9	1.5	.3	1.24	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L278	O	30.9	17.5	.6	-.6	.94	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L125	O	30.9	16.9	.1	-1.0	.97	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L616	O	31.1	17.9	1.0	-.5	1.01	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L676	O	31.2	18.7	1.7	-.1	1.16	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L376	O	31.2	18.8	1.8	-.0	1.14	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L159	O	31.3	18.3	1.4	-.5	1.39	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L285	O	31.4	17.7	1.0	-.9	1.00	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L341	O	31.4	19.2	2.1	.0	.79	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L166	O	31.5	16.4	.1	-1.9	1.25	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L223	O	31.8	18.3	1.8	-.8	.71	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L308	O	31.9	18.2	1.8	-1.0	.89	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L176	#	34.4	19.6	4.5	-1.9	1.20	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
GMEANS:		30.0	17.5			1.00		
		95% ELLIPSE:		3.3	2.1	WITH GAMMA = 49 DEGREES		


AIR RESISTANCE, GURLEY
SAMPLE J47 = 30.0 GURLEY UNITS
SAMPLE E73 = 17.5 GURLEY UNITS
+.X.* NOT IN GRAND MEANS
ANALYSIS T40-1
SAMPLE E73
GURLEY UNITS
14
15
16
17
18
19
20
21
26
27
28
29
30
31
32
33
34
GURLEY UNITS
SAMPLE J47

ANALYSIS T40-2 TABLE 1

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

LAB CODE	SAMPLE J47 MEAN	PRINTING 106 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE E73 MEAN	HEAT SET OFFSET BOOK 76 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L114	110.5	4.2	.90	3.7	.92	166.8	8.9	1.25	15.2	1.38	40S	O	L114
L121	104.3	-2.0	-.43	4.1	1.04	160.8	2.9	.41	15.3	1.38	40S	O	L121
L122S	109.1	2.8	.60	5.6	1.43	156.2	-1.7	-.24	11.3	1.02	40S	O	L122S
L124S	103.1	-3.2	-.69	6.1	1.54	151.6	-6.3	-.89	14.3	1.29	40S	O	L124S
L127	108.5	2.2	.47	2.9	.74	152.2	-5.7	-.81	8.9	.80	40S	O	L127
L132	104.4	-1.9	-.41	3.8	.95	158.7	.8	.11	10.2	.92	40S	O	L132
L148	110.0	3.7	.79	3.5	.87	159.8	1.9	.26	13.9	1.25	40S	O	L148
L157	107.4	1.1	.23	2.8	.71	152.2	-5.7	-.81	12.1	1.09	40S	O	L157
L158	100.0	-6.3	-1.35	3.3	.84	151.0	-6.9	-.98	9.9	.90	40S	O	L158
L173B	104.0	-2.3	-.49	2.1	.53	158.0	.1	.01	11.4	1.02	40S	O	L173B
L190C	105.3	-1.0	-.22	4.1	1.02	156.0	-1.9	-.27	13.9	1.26	40S	O	L190C
L213	115.7	9.4	2.01	2.2	.55	165.8	7.9	1.11	7.8	.70	40S	O	L213
L223	99.6	-6.7	-1.43	3.7	.92	161.6	3.7	.52	17.6	1.59	40S	O	L223
L228	131.1	24.8	5.30	5.9	1.48	191.4	33.5	4.72	12.8	1.15	40S	#	L228
L230S	99.7	-6.6	-1.41	3.1	.78	147.2	-10.7	-1.51	14.7	1.33	40S	O	L230S
L233	105.6	-.7	-.15	4.6	1.16	155.0	-2.9	-.41	9.3	.84	40S	O	L233
L241	115.0	8.7	1.86	4.7	1.19	164.0	6.1	.86	12.2	1.10	40S	O	L241
L249	99.6	-6.7	-1.43	3.4	.87	152.8	-5.1	-.72	16.4	1.48	40S	O	L249
L255	107.7	1.4	.30	3.9	1.00	161.9	4.0	.56	11.1	1.00	40S	O	L255
L257A	110.9	4.6	.98	3.5	.89	157.5	-.4	-.06	9.7	.88	40S	O	L257A
L257B	108.2	1.9	.40	5.5	1.40	163.7	5.8	.81	9.8	.89	40S	O	L257B
L257C	110.9	4.6	.98	3.3	.84	159.3	1.4	.19	7.3	.66	40S	O	L257C
L260	109.1	2.8	.60	4.7	1.20	165.3	7.4	1.04	7.9	.72	40S	O	L260
L262S	101.5	-4.8	-1.03	3.6	.91	140.4	-17.5	-2.47	6.6	.60	40S	O	L262S
L288	113.8	7.5	1.60	6.4	1.61	169.4	11.5	1.62	10.2	.92	40S	O	L288
L301	114.1	7.8	1.67	7.0	1.77	172.1	14.2	2.00	11.5	1.04	40S	O	L301
L305	110.2	3.9	.83	3.5	.89	159.0	1.1	.15	5.2	.47	40S	O	L305
L312	101.4	-4.9	-1.05	2.4	.61	159.8	1.9	.26	6.4	.58	40S	O	L312
L318	101.8	-4.5	-.96	4.7	1.18	155.8	-2.1	-.30	11.1	1.00	40S	O	L318
L349	101.9	-4.4	-.94	3.9	.99	152.6	-5.3	-.75	9.2	.83	40S	O	L349
L352	104.7	-1.6	-.34	3.6	.90	151.9	-6.0	-.85	10.0	.90	40S	O	L352
L354	109.2	2.9	.62	4.2	1.07	151.6	-6.3	-.89	7.6	.68	40S	O	L354
L360	105.3	-1.0	-.22	2.5	.62	147.7	-10.2	-1.44	12.5	1.12	40S	O	L360
L370	102.7	-3.6	-.77	4.4	1.12	160.8	2.9	.41	8.6	.77	40S	O	L370
L390	101.3	-5.0	-1.07	5.3	1.35	152.9	-5.0	-.71	13.2	1.19	40S	O	L390
L562	293.0	186.7	39.90	17.7	4.46	338.0	180.1	25.39	29.7	2.68	40S	#	L562
L575	106.9	.6	.13	3.1	.78	169.4	11.5	1.62	15.4	1.39	40S	O	L575
L587	109.9	3.6	.77	4.6	1.15	164.3	6.4	.90	13.4	1.21	40S	O	L587
L597	108.0	1.7	.36	2.7	.68	167.5	9.6	1.35	13.6	1.22	40S	O	L597
L626	98.4	-7.9	-1.69	3.8	.97	148.6	-9.3	-1.31	6.6	.60	40S	O	L626

GR. MEAN = 106.3 SHEFF. UNITS GRAND MEAN = 157.9 SHEFF. UNITS TEST DETERMINATIONS = 10
SD MEANS = 4.7 SHEFF. UNITS SD OF MEANS = 7.1 SHEFF. UNITS 38 LABS IN GRAND MEANS
AVERAGE SDR = 4.0 SHEFF. UNITS AVERAGE SDR = 11.1 SHEFF. UNITS

L182B	413.5	307.2	65.65	19.0	4.80	727.5	569.6	80.29	41.6	3.75	40B	*	L182B
L243B	453.6	347.3	74.22	11.9	3.00	814.9	657.0	92.61	74.7	6.74	40B	*	L243B
L484	407.5	301.2	64.37	10.3	2.61	684.0	526.1	74.16	28.8	2.59	40B	*	L484

TOTAL NUMBER OF LABORATORIES REPORTING = 43

Best values: J47 107 ± 7 Sheffield units
E73 157 ± 11 Sheffield units

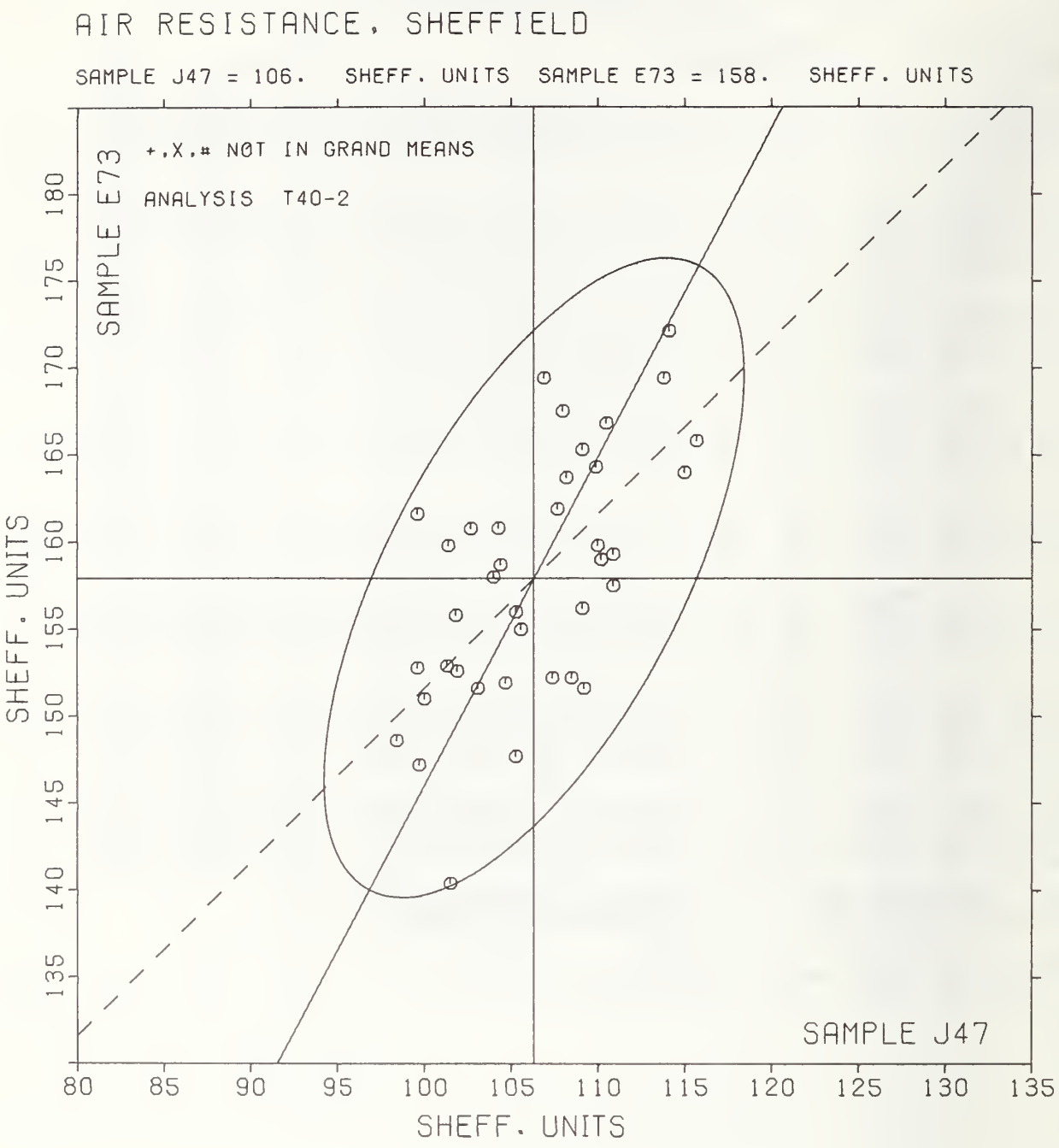
The following laboratories were omitted from the grand means because of extreme test results:
228, 562

ANALYSIS T40-2 TABLE 2

AIR RESISTANCE, SHEFFIELD UNITS (CC/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) ORIFICE

SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS J47	MEANS E73	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L626	0	98.4	148.6	-11.9	2.6	.78	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L249	0	99.6	152.8	-7.7	3.5	1.18	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L223	0	99.6	161.6	.1	7.6	1.26	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L230S	0	99.7	147.2	-12.6	.8	1.05	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L158	0	100.0	151.0	-9.1	2.3	.87	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L390	0	101.3	152.9	-6.8	2.1	1.27	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L312	0	101.4	159.8	-.6	5.2	.59	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L262S	0	101.5	140.4	-17.7	-4.0	.75	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L318	0	101.8	155.8	-4.0	3.0	1.09	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L349	0	101.9	152.6	-6.8	1.4	.91	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L370	0	102.7	160.8	.9	4.5	.95	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICH)
L124S	0	103.1	151.6	-7.1	-.1	1.42	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L173B	0	104.0	158.0	-1.0	2.1	.78	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L121	0	104.3	160.8	1.6	3.1	1.21	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L132	0	104.4	158.7	-.2	2.0	.94	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L352	0	104.7	151.9	-6.1	-1.4	.90	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L190C	0	105.3	156.0	-2.2	-.0	1.14	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L360	0	105.3	147.7	-9.5	-3.9	.87	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L233	0	105.6	155.0	-2.9	-.7	1.00	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L575	0	106.9	169.4	10.4	4.8	1.09	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L157	0	107.4	152.2	-4.5	-3.6	.90	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L255	0	107.7	161.9	4.2	.6	1.00	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L597	0	108.0	167.5	9.3	3.0	.95	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L257B	0	108.2	163.7	6.0	1.0	1.14	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L127	0	108.5	152.2	-4.0	-4.6	.77	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L260	0	109.1	165.3	7.8	1.0	.96	40S	AIR RHSISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L122S	0	109.1	156.2	-.2	-3.3	1.22	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L354	0	109.2	151.6	-4.2	-5.5	.88	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L587	0	109.9	164.3	7.3	-.2	1.18	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L148	0	110.0	159.8	3.4	-2.4	1.06	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L305	0	110.2	159.0	2.8	-2.9	.68	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICH)
L114	0	110.5	166.8	9.8	.5	1.15	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L257C	0	110.9	159.3	3.4	-3.4	.75	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L257A	0	110.9	157.5	1.8	-4.3	.88	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L288	0	113.8	169.4	13.6	-1.2	1.26	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L301	0	114.1	172.1	16.2	-.2	1.40	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETHR ORIFICE)
L241	0	115.0	164.0	9.4	-4.8	1.15	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETHR ORIFICE)
L213	0	115.7	165.8	11.4	-4.6	.62	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L228	#	131.1	191.4	41.2	-6.2	1.32	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L562	#	293.0	338.0	246.5	-80.7	3.57	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L484	*	407.5	684.0	605.9	-19.8	2.60	40B	AIR RESISTANCE, BENDTSEN, WG 150
L182B	*	413.5	727.5	647.1	-4.8	4.28	40B	AIR RESISTANCE, BENDTSEN, WG 150
L243B	*	453.6	814.9	743.1	.7	4.87	40B	AIR RESISTANCE, BENDTSEN, WG 150
GMEANS:		106.3	157.9			1.00		
95% ELLIPSE:				20.3	8.5	WITH GAMMA = 62 DEGREES		


AIR RESISTANCE, SHEFFIELD
SAMPLE J47 = 106. SHEFF. UNITS SAMPLE E73 = 158. SHEFF. UNITS
+,X,# NOT IN GRAND MEANS
ANALYSIS T40-2
SAMPLE E73
SHEFF. UNITS
135 140 145 150 155 160 165 170 175 180
SAMPLE J47
80 85 90 95 100 105 110 115 120 125 130 135
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	SAMPLE	BLEACHED BACKING 69 GRAMS PER SQUARE METER				SAMPLE	RELEASE BASE 116 GRAMS PER SQUARE METER				TEST D.= 10		
CODE	E37 MEAN	DEV	N.DEV	SDR	R.SDR	B73 MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L122	813.	59.	1.51	87.	1.11	1200.	123.	.49	340.	.82	41G	0	L122
L128	712.	-43.	-1.11	54.	.68	934.	-144.	-.58	197.	.47	41G	0	L128
L166M	759.	4.	.11	69.	.88	1423.	345.	1.39	557.	1.34	41G	0	L166M
L195	676.	-79.	-2.03	119.	1.51	872.	-206.	-.83	418.	1.01	41G	0	L195
L224	779.	25.	.64	69.	.88	1429.	351.	1.42	791.	1.91	41G	0	L224
L230	746.	-8.	-.22	91.	1.16	1348.	271.	1.09	773.	1.86	41G	0	L230
L259	17997.	17242.	444.74	1591.	20.23	26442.	25364.	102.33	9479.	22.85	41G	#	L259
L358	778.	23.	.60	62.	.79	1120.	42.	.17	470.	1.13	41G	0	L358
L396T	723.	-31.	-.81	84.	1.07	700.	-378.	-1.52	105.	.25	41G	0	L3961
L557	762.	7.	.19	69.	.88	1119.	41.	.17	463.	1.12	41G	0	L557
L558	747.	-8.	-.20	95.	1.21	1248.	170.	.69	565.	1.36	41G	0	L558
L559	813.	58.	1.50	47.	.59	763.	-315.	-1.27	157.	.38	41G	0	L559
L561	731.	-24.	-.62	79.	1.00	1036.	-42.	-.17	352.	.85	41G	0	L561
L576	771.	17.	.43	98.	1.24	818.	-259.	-1.05	206.	.50	41G	0	L576

GR. MEAN = 755. SEC/10 CC GRAND MEAN = 1078. SEC/10 CC TEST DETERMINATIONS = 10
SD MEANS = 39. SEC/10 CC SD OF MEANS = 248. SEC/10 CC 13 LABS IN GRAND MEANS
AVERAGE SDR = 79. SEC/10 CC AVERAGE SDR = 415. SEC/10 CC
TOTAL NUMBER OF LABORATORIES REPORTING = 14

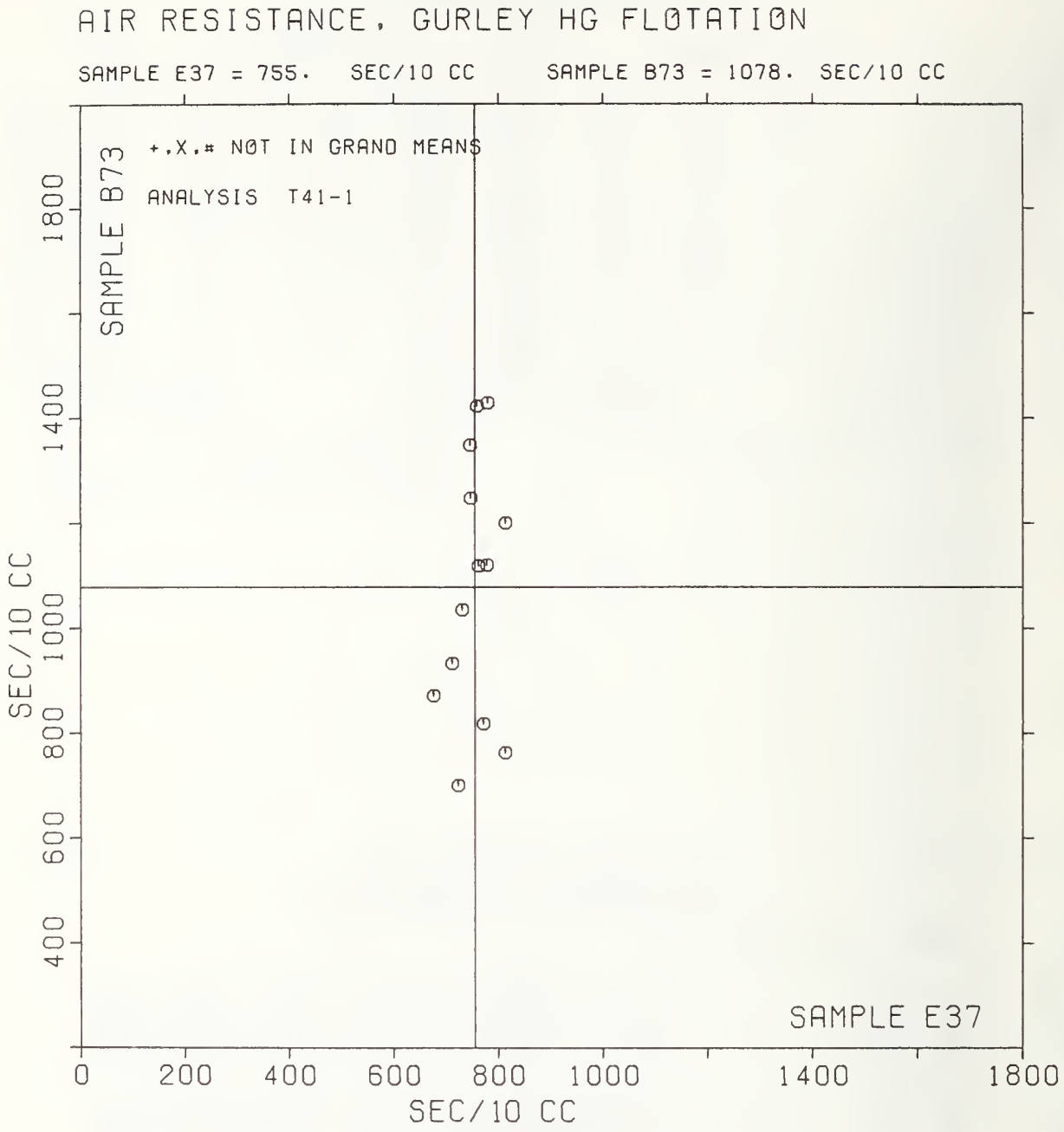
Best values: E37 760 ± 60 second per 10 c c,
B73 1100 ± 330 mercury density
(direct reading)

The values reported here are the time in seconds required for the displacement of 10 ml of air through an area of 1.0 in^2 of the specimen. The values are not converted to 100 ml of air nor to oil density.

Data from the following laboratories appear to be off by a multiplicative factor: 259

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 E37	B73	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L195	0	676.	872.	-209.	71.	1.26	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L128	0	712.	934.	-145.	37.	.58	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L396T	0	723.	700.	-379.	17.	.66	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L561	0	731.	1036.	-43.	22.	.92	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L230	0	746.	1348.	270.	19.	1.51	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L558	0	747.	1248.	170.	14.	1.29	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L166M	0	759.	1423.	345.	9.	1.11	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L557	0	762.	1119.	42.	-6.	1.00	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L576	0	771.	818.	-259.	-27.	.87	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L358	0	778.	1120.	43.	-22.	.96	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L224	0	779.	1429.	352.	-11.	1.39	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L559	0	813.	763.	-313.	-70.	.49	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L122	0	813.	1200.	125.	-54.	.97	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L259	#	17997.	26442.	26007.	-16257.	21.54	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
GMEANS:		755.	1078.			1.00		
		95% ELLIPSE:		731.	111.	WITH GAMMA = 87 DEGREES		


AIR RESISTANCE, GURLEY HG FLØTATIØN
SAMPLE E37 = 755. SEC/10 CC
SAMPLE B73 = 1078. SEC/10 CC
+.X.* NØT IN GRAND MEANS
ANALYSIS T41-1
SAMPLE B73
SAMPLE E37
SEC/10 CC
SEC/10 CC
0
200
400
600
800
1000
1400
1800

REPORT NO. 54G — TAPPI COLLABORATIVE REFERENCE PROGRAM — JUNE 1978

ANALYSIS T44-1 TABLE 1

SMOOTHNESS, PARKER PRINTSURF

LAB CODE	SAMPLE H45 MEAN	PRINTING 84 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J12 MEAN	PRINTING 149 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L122	6.80	.85	1.86	.12	1.12	5.54	.49	1.72	.23	1.01	44P	6	L122
L136	5.66	-.29	-.64	.07	.67	4.87	-.18	-.65	.16	.71	44P	6	L136
L182	6.12	.17	.38	.11	1.06	5.19	.14	.47	.28	1.20	44P	6	L182
L223	5.79	-.16	-.36	.08	.72	4.82	-.24	-.83	.23	1.00	44P	6	L223
L288	5.89	-.06	-.14	.14	1.31	5.12	.07	.23	.25	1.10	44P	6	L288
L317	6.06	.11	.23	.13	1.21	5.14	.09	.30	.24	1.05	44P	6	L317
L588	5.34	-.61	-1.34	.10	.92	4.70	-.35	-1.25	.21	.92	44P	6	L588

GR. MEAN = 5.95 MICRONS — GRAND MEAN = 5.05 MICRONS — TEST DETERMINATIONS = 10

SD MEANS = .46 MICRONS — SD OF MEANS = .28 MICRONS — 7 LABS IN GRAND MEANS

AVERAGE SDR = .10 MICRONS — AVERAGE SDR = .23 MICRONS

TOTAL NUMBER OF LABORATORIES REPORTING = 7

Best values: H45 5.9 microns
J12 5.1 microns

REPORT NO. 54G — TAPPI COLLABORATIVE REFERENCE PROGRAM — JUNE 1978

ANALYSIS T44-1 TABLE 2

SMOOTHNESS, PARKER PRINTSURF

LAB CODE	F	MEANS H45	J12	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L588	6	5.34	4.70	-.71	.02	.92	44P	SMOOTHNESS, PARKER PRINTSURF
L136	6	5.66	4.87	-.35	-.00	.69	44P	SMOOTHNESS, PARKER PRINTSURF
L223	6	5.79	4.82	-.26	-.12	.86	44P	SMOOTHNESS, PARKER PRINTSURF
L288	6	5.89	5.12	-.02	.09	1.20	44P	SMOOTHNESS, PARKER PRINTSURF
L317	6	6.06	5.14	.14	.02	1.13	44P	SMOOTHNESS, PARKER PRINTSURF
L182	6	6.12	5.19	.22	.03	1.13	44P	SMOOTHNESS, PARKER PRINTSURF
L122	6	6.80	5.54	.98	-.03	1.07	44P	SMOOTHNESS, PARKER PRINTSURF
GMEANS:		5.95	5.05			1.00		
		95% ELLIPSE:		2.00	.23	WITH GAMMA = 31 DEGREES		

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

LAB CODE	SAMPLE H45 MEAN	PRINTING 84 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J12 MEAN	PRINTING 149 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 1S VAR	F	LAB
L107	275.3	12.4	1.27	13.7	1.51	159.3	16.4	2.46	12.4	1.11	45S	O	L107
L108	257.9	-5.0	-.51	5.3	.58	154.1	11.2	1.68	10.4	.94	45S	O	L108
L114	270.7	7.8	.79	9.0	1.00	143.0	.0	.01	14.3	1.29	45S	O	L114
L115	252.3	-10.6	-1.08	8.6	.95	150.7	7.7	1.16	12.1	1.09	45S	O	L115
L121	262.0	-.9	-.09	11.6	1.28	142.5	-.5	-.08	16.9	1.52	45S	O	L121
L122	277.7	14.8	1.51	7.5	.83	138.1	-4.9	-.74	8.5	.76	45S	O	L122
L123	256.7	-6.2	-.64	9.2	1.02	138.3	-4.7	-.71	14.5	1.30	45S	O	L123
L124	210.1	-52.8	-5.39	8.5	.94	131.1	-11.8	-1.78	8.4	.76	45S	#	L124
L125	263.3	.4	.04	17.3	1.91	139.0	-4.0	-.60	11.1	.99	45S	O	L125
L126	275.0	12.1	1.23	9.6	1.06	142.0	-1.0	-.15	9.8	.88	45S	O	L126
L128	268.0	5.1	.52	8.6	.95	145.3	2.4	.36	8.3	.75	45S	O	L128
L132	272.7	9.8	1.00	11.2	1.23.	144.4	1.4	.22	13.9	1.25	45S	O	L132
L139S	258.3	-4.6	-.47	8.2	.90	156.3	13.4	2.01	10.3	.92	45S	O	L139S
L148	266.5	3.6	.36	6.1	.67	152.6	9.6	1.45	11.9	1.07	45S	O	L148
L152	253.1	-9.8	-1.00	7.0	.77	148.0	5.0	.76	11.0	.99	45S	O	L152
L153	284.1	21.2	2.17	5.6	.61	158.1	15.1	2.27	16.3	1.47	45S	*	L153
L157	272.6	9.7	.99	13.6	1.51	144.0	1.0	.16	6.8	.61	45S	O	L157
L158	252.0	-10.9	-1.11	9.8	1.08	134.3	-8.6	-1.30	11.6	1.05	45S	O	L158
L159	266.9	4.0	.40	9.0	.99	146.1	3.1	.47	12.5	1.13	45S	O	L159
L162	262.3	-.6	-.06	4.2	.46	138.7	-4.3	-.65	9.5	.86	45S	O	L162
L166	247.9	-15.0	-1.53	6.8	.75	136.7	-6.2	-.94	12.5	1.12	45S	O	L166
L167	249.7	-13.2	-1.35	14.2	1.57	148.3	5.4	.81	5.2	.47	45S	O	L167
L173B	258.3	-4.6	-.47	7.5	.83	146.7	3.7	.56	12.1	1.08	45S	O	L173B
L176S	267.3	4.4	.44	7.1	.79	142.9	-.1	-.02	13.3	1.20	45S	O	L176S
L190C	248.9	-14.0	-1.43	8.0	.88	140.1	-2.9	-.44	13.3	1.20	45S	O	L190C
L190R	246.2	-16.7	-1.70	6.6	.73	134.2	-8.8	-1.32	10.5	.94	45S	O	L190R
L195	246.7	-16.2	-1.65	7.1	.78	139.7	-3.2	-.49	15.3	1.37	45S	O	L195
L203	256.7	-6.2	-.64	10.3	1.14	138.7	-4.2	-.64	13.1	1.18	45S	O	L203
L211	249.0	-13.9	-1.42	18.0	1.99	143.2	.2	.04	11.4	1.02	45S	O	L211
L213	227.0	-35.9	-3.66	7.9	.87	131.0	-12.0	-1.80	10.4	.93	45S	X	L213
L223	258.8	-4.1	-.42	9.3	1.03	134.6	-8.4	-1.26	9.2	.83	45S	O	L223
L224	320.3	57.4	5.86	9.0	.99	155.3	12.4	1.86	10.3	.93	45S	#	L224
L228	280.7	17.8	1.82	9.0	1.00	151.5	8.5	1.28	8.9	.80	45S	O	L228
L230S	265.7	2.8	.28	9.6	1.06	145.1	2.2	.33	13.4	1.21	45S	O	L230S
L231	271.7	8.8	.90	12.0	1.32	153.5	10.6	1.59	10.3	.93	45S	O	L231
L233	261.9	-1.0	-.10	9.8	1.08	144.9	1.9	.29	8.5	.76	45S	O	L233
L241	331.7	68.8	7.02	7.9	.88	165.0	22.0	3.31	9.1	.82	45S	#	L241
L249	260.3	-2.6	-.27	7.3	.80	143.4	.4	.07	14.2	1.28	45S	O	L249
L254	265.9	3.0	.31	8.1	.90	150.2	7.2	1.09	12.2	1.10	45S	O	L254
L255	258.6	-4.3	-.44	3.4	.37	147.5	4.5	.68	11.3	1.02	45S	O	L255
L257A	261.3	-1.6	-.16	10.9	1.20	135.2	-7.8	-1.17	5.7	.51	45S	O	L257A
L257B	268.9	6.0	.61	12.6	1.39	142.5	-.5	-.08	11.1	1.00	45S	O	L257B
L257C	257.3	-5.6	-.57	9.0	1.00	140.9	-2.1	-.32	7.0	.63	45S	O	L257C
L259	280.1	17.2	1.76	10.2	1.13	152.8	9.8	1.48	12.1	1.09	45S	O	L259
L260	256.8	-6.1	-.62	7.5	.83	145.3	2.4	.36	11.9	1.07	45S	O	L260
L261	258.8	-4.1	-.42	8.3	.91	135.4	-7.6	-1.14	6.4	.58	45S	O	L261
L262	261.1	-1.8	-.19	6.2	.68	138.8	-4.2	-.63	6.1	.55	45S	O	L262
L275	269.0	6.1	.62	7.4	.81	147.0	4.0	.61	12.2	1.10	45S	O	L275
L278	265.3	2.4	.25	9.2	1.02	151.1	8.1	1.22	6.9	.62	45S	O	L278
L281	263.2	.3	.03	12.7	1.40	144.0	1.0	.16	17.0	1.53	45S	O	L281
L285	263.3	.4	.04	13.2	1.46	135.3	-7.6	-1.15	16.2	1.46	45S	O	L285
L288	267.5	4.6	.47	4.7	.52	142.5	-.5	-.08	12.2	1.10	45S	O	L288
L290	239.0	-23.9	-2.44	10.0	1.11	132.7	-10.3	-1.55	9.2	.83	45S	*	L290
L291S	272.5	9.6	.98	6.5	.72	148.5	5.5	.83	12.1	1.09	45S	O	L291S
L297	260.3	-2.6	-.26	6.1	.68	147.7	4.7	.71	12.4	1.11	45S	O	L297
L301	NO DATA REPORTED FOR SAMPLE H45					145.7	2.8	.42	12.3	1.11	45S	M	L301
L305	262.7	-.2	-.02	9.6	1.06	136.3	-6.6	-1.00	8.1	.73	45S	O	L305
L308	257.6	-5.3	-.54	9.4	1.04	141.3	-1.6	-.25	15.9	1.43	45S	O	L308
L312	274.7	11.8	1.20	6.4	.71	142.7	-.3	-.05	14.1	1.27	45S	O	L312
L317	266.1	3.2	.32	10.2	1.12	135.2	-7.8	-1.17	11.6	1.05	45S	O	L317
L318	263.7	.8	.08	10.7	1.18	137.3	-5.6	-.85	14.6	1.32	45S	O	L318
L321	254.0	-8.9	-.91	10.6	1.17	127.7	-15.3	-2.30	7.3	.66	45S	O	L321
L323	275.7	12.8	1.30	9.8	1.08	139.7	-3.3	-.50	11.4	1.03	45S	O	L323
L326	295.9	33.0	3.36	5.7	.63	140.8	-2.2	-.33	9.4	.84	46S	X	L326
L328	269.0	6.1	.62	9.1	1.01	144.3	1.4	.21	12.0	1.08	46S	O	L328

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

LAB CODE	SAMPLE H45 MEAN	PRINTING 84 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J12 MEAN	PRINTING 149 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 15 VAR	F	LAB
L341	257.7	-5.2	-.53	6.6	.72	138.1	-4.8	-.73	11.3	1.02	45S	0	L341
L342	275.7	12.8	1.30	12.4	1.37	143.6	.6	.10	9.3	.84	45S	0	L342
L349	266.2	3.3	.34	11.1	1.22	135.7	-7.2	-1.09	11.3	1.01	45S	0	L349
L352	282.3	19.4	1.98	8.1	.89	150.5	7.5	1.13	14.9	1.34	45S	0	L352
L350	259.4	-3.5	-.36	7.1	.78	136.1	-6.8	-1.03	7.2	.65	45S	0	L360
L366	260.9	-2.0	-.21	10.1	1.12	144.1	1.2	.18	14.9	1.34	45S	0	L366
L370	250.3	-12.6	-1.29	6.9	.76	136.3	-6.7	-1.01	10.6	.95	45S	0	L370
L372	260.5	-2.4	-.24	4.8	.53	156.3	13.4	2.01	8.3	.75	45S	0	L372
L376	253.3	-9.6	-.98	10.6	1.17	148.0	5.0	.76	15.1	1.36	45S	0	L376
L380	260.0	-2.9	-.30	4.2	.47	131.0	-12.0	-1.80	7.8	.71	45S	0	L380
L382	251.5	-11.4	-1.16	4.2	.46	136.1	-6.8	-1.03	10.6	.95	45S	0	L382
L390	254.3	-8.6	-.88	9.4	1.04	134.2	-8.8	-1.32	11.4	1.03	45S	0	L390
L396M	266.3	3.4	.35	9.3	1.03	140.3	-2.6	-.40	12.7	1.15	45S	0	L396M
L554	263.9	1.0	.10	9.6	1.06	144.1	1.2	.18	6.8	.62	45S	0	L554
L561	304.0	41.1	4.19	6.3	.70	150.0	7.0	1.06	6.5	.59	45S	#	L561
L575	280.2	17.3	1.76	10.7	1.18	141.7	-1.2	-.19	10.6	.95	45S	0	L575
L587	258.3	-4.6	-.47	11.4	1.26	142.0	-1.0	-.15	8.6	.78	45S	0	L587
L597	288.1	25.2	2.57	4.2	.46	146.9	3.9	.59	9.7	.87	45S	*	L597
L607	249.3	-13.6	-1.38	8.0	.88	149.5	6.5	.98	7.3	.65	45S	0	L607
L626	258.7	-4.2	-.43	10.8	1.20	136.7	-6.2	-.94	9.5	.86	45S	0	L626
GR. MEAN *	262.9 SHEFF. UNITS					GRAND MEAN *	143.0 SHEFF. UNITS				TEST DETERMINATIONS *		15
SD MEANS *	9.8 SHEFF. UNITS					SD OF MEANS *	6.7 SHEFF. UNITS				78 LABS IN GRAND MEANS		
		AVERAGE SDR *		9.1 SHEFF. UNITS			AVERAGE SDR *		11.1 SHEFF. UNITS				
L174	307.1	44.2	4.51	5.9	.65	231.1	88.1	13.24	7.8	.70	45R	*	L174

TOTAL NUMBER OF LABORATORIES REPORTING * 86

Best values: H45 265 ± 16 Sheffield units
J12 140 ± 11 Sheffield units

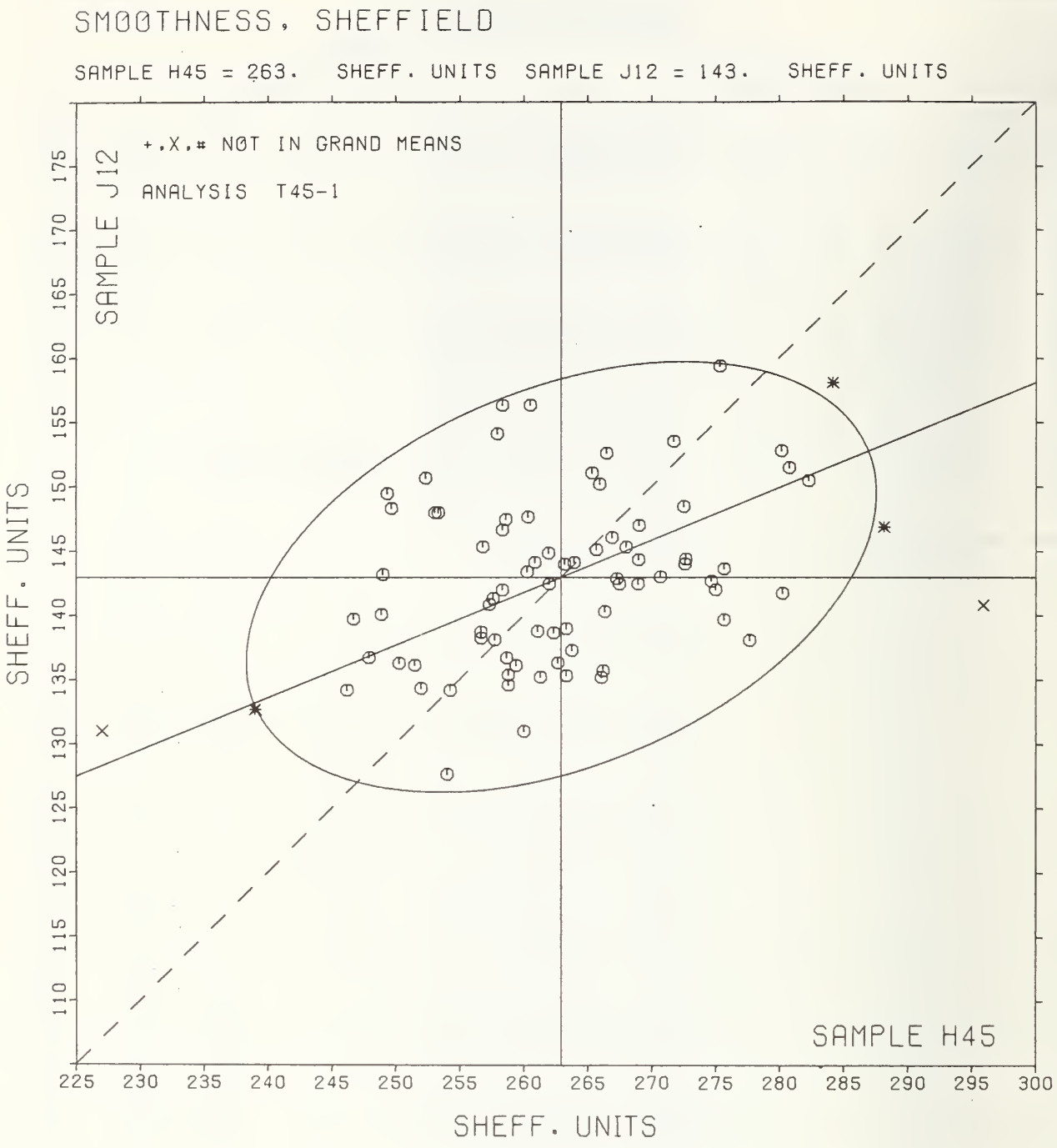
The following laboratories were omitted from the grand means because of extreme test results: 124, 224, 241, 561

ANALYSIS T45-1 TABLE 2
SMOOTHNESS, SHEFFIELD UNITS
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS H45	MEANS J12	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L301	M		145.7			1.11	45S	SMOOTHNESS, SHEFFIELD
L124	#	210.1	131.1	-53.4	9.0	.85	45S	SMOOTHNESS, SHEFFIELD
L213	X	227.0	131.0	-37.8	2.5	.90	45S	SMOOTHNESS, SHEFFIELD
L290	*	239.0	132.7	-26.0	-.5	.97	45S	SMOOTHNESS, SHEFFIELD
L190R	O	246.2	134.2	-18.8	-1.8	.84	45S	SMOOTHNESS, SHEFFIELD
L195	O	246.7	139.7	-16.2	3.1	1.08	45S	SMOOTHNESS, SHEFFIELD
L166	O	247.9	136.7	-16.2	-.1	.94	45S	SMOOTHNESS, SHEFFIELD
L190C	O	248.9	140.1	-14.0	2.6	1.04	45S	SMOOTHNESS, SHEFFIELD
L211	O	249.0	143.2	-12.8	5.5	1.51	45S	SMOOTHNESS, SHEFFIELD
L607	O	249.3	149.5	-10.1	11.1	.77	45S	SMOOTHNESS, SHEFFIELD
L167	O	249.7	148.3	-10.2	10.0	1.02	45S	SMOOTHNESS, SHEFFIELD
L370	O	250.3	136.3	-14.2	-1.4	.86	45S	SMOOTHNESS, SHEFFIELD
L382	O	251.5	136.1	-13.1	-2.0	.71	45S	SMOOTHNESS, SHEFFIELD
L158	O	252.0	134.3	-13.4	-3.9	1.06	45S	SMOOTHNESS, SHEFFIELD
L115	O	252.3	150.7	-6.9	11.1	1.02	45S	SMOOTHNESS, SHEFFIELD
L152	O	253.1	148.0	-7.2	8.4	.88	45S	SMOOTHNESS, SHEFFIELD
L376	O	253.3	148.0	-7.0	8.3	1.27	45S	SMOOTHNESS, SHEFFIELD
L321	O	254.0	127.7	-14.0	-10.8	.91	45S	SMOOTHNESS, SHEFFIELD
L390	O	254.3	134.2	-11.3	-4.8	1.03	45S	SMOOTHNESS, SHEFFIELD
L203	O	256.7	138.7	-7.4	-1.6	1.16	45S	SMOOTHNESS, SHEFFIELD
L123	O	256.7	138.3	-7.6	-2.0	1.16	45S	SMOOTHNESS, SHEFFIELD
L260	O	256.8	145.3	-4.8	4.5	.95	45S	SMOOTHNESS, SHEFFIELD
L257C	O	257.3	140.9	-6.0	.2	.81	45S	SMOOTHNESS, SHEFFIELD
L308	O	257.6	141.3	-5.5	.5	1.23	45S	SMOOTHNESS, SHEFFIELD
L341	O	257.7	138.1	-6.6	-2.5	.87	45S	SMOOTHNESS, SHEFFIELD
L108	O	257.9	154.1	-.4	12.2	.76	45S	SMOOTHNESS, SHEFFIELD
L587	O	258.3	142.0	-4.6	.8	1.02	45S	SMOOTHNESS, SHEFFIELD
L139S	O	258.3	156.3	.8	14.1	.91	45S	SMOOTHNESS, SHEFFIELD
L173B	O	258.3	146.7	-2.8	5.2	.96	45S	SMOOTHNESS, SHEFFIELD
L255	O	258.6	147.5	-2.3	5.8	.70	45S	SMOOTHNESS, SHEFFIELD
L626	O	258.7	136.7	-6.3	-4.2	1.03	45S	SMOOTHNESS, SHEFFIELD
L223	O	258.8	134.6	-7.0	-6.2	.93	45S	SMOOTHNESS, SHEFFIELD
L261	O	258.8	135.4	-6.7	-5.5	.75	45S	SMOOTHNESS, SHEFFIELD
L360	O	259.4	136.1	-5.8	-5.0	.72	45S	SMOOTHNESS, SHEFFIELD
L380	O	260.0	131.0	-7.2	-10.0	.59	45S	SMOOTHNESS, SHEFFIELD
L249	O	260.3	143.4	-2.3	1.4	1.04	45S	SMOOTHNESS, SHEFFIELD
L297	O	260.3	147.7	-.6	5.3	.89	45S	SMOOTHNESS, SHEFFIELD
L372	O	260.5	156.3	2.9	13.3	.64	45S	SMOOTHNESS, SHEFFIELD
L366	O	260.9	144.1	-1.4	1.9	1.23	45S	SMOOTHNESS, SHEFFIELD
L262	O	261.1	138.8	-3.3	-3.2	.61	45S	SMOOTHNESS, SHEFFIELD
L257A	O	261.3	135.2	-4.4	-6.6	.86	45S	SMOOTHNESS, SHEFFIELD
L233	O	261.9	144.9	-.2	2.1	.92	45S	SMOOTHNESS, SHEFFIELD
L121	O	262.0	142.5	-1.0	-.1	1.40	45S	SMOOTHNESS, SHEFFIELD
L162	O	262.3	138.7	-2.2	-3.8	.66	45S	SMOOTHNESS, SHEFFIELD
L305	O	262.7	136.3	-2.7	-6.1	.90	45S	SMOOTHNESS, SHEFFIELD
L281	O	263.2	144.0	.7	.6	1.47	45S	SMOOTHNESS, SHEFFIELD
L125	O	263.3	139.0	-1.1	-3.8	1.45	45S	SMOOTHNESS, SHEFFIELD
L285	O	263.3	135.3	-2.5	-7.2	1.46	45S	SMOOTHNESS, SHEFFIELD
L318	O	263.7	137.3	-1.4	-5.5	1.25	45S	SMOOTHNESS, SHEFFIELD
L554	O	263.9	144.1	1.4	.7	.84	45S	SMOOTHNESS, SHEFFIELD
L278	O	265.3	151.1	5.3	6.6	.82	45S	SMOOTHNESS, SHEFFIELD
L230S	O	265.7	145.1	3.4	1.0	1.14	45S	SMOOTHNESS, SHEFFIELD
L254	O	265.9	150.2	5.5	5.6	1.00	45S	SMOOTHNESS, SHEFFIELD
L317	O	266.1	135.2	-.0	-8.4	1.08	45S	SMOOTHNESS, SHEFFIELD
L349	O	266.2	135.7	.3	-7.9	1.12	45S	SMOOTHNESS, SHEFFIELD
L396M	O	266.3	140.3	2.2	-3.7	1.09	45S	SMOOTHNESS, SHEFFIELD
L148	O	266.5	152.6	6.9	7.6	.87	45S	SMOOTHNESS, SHEFFIELD
L159	O	266.9	146.1	4.8	1.4	1.06	45S	SMOOTHNESS, SHEFFIELD
L176S	O	267.3	142.9	4.0	-1.7	.99	45S	SMOOTHNESS, SHEFFIELD
L288	O	267.5	142.5	4.0	-2.2	.81	45S	SMOOTHNESS, SHEFFIELD
L128	O	268.0	145.3	5.6	.3	.85	45S	SMOOTHNESS, SHEFFIELD
L257B	O	268.9	142.5	5.4	-2.7	1.20	45S	SMOOTHNESS, SHEFFIELD
L275	O	269.0	147.0	7.2	1.4	.96	45S	SMOOTHNESS, SHEFFIELD
L328	O	269.0	144.3	6.2	-1.0	1.04	45S	SMOOTHNESS, SHEFFIELD
L114	O	270.7	143.0	7.2	-2.9	1.14	45S	SMOOTHNESS, SHEFFIELD

ANALYSIS T45-1 TABLE 2
SMOOTHNESS, SHEFFIELD UNITS
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS H45	MEANS J12	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L231	O	271.7	153.5	12.2	6.4	1.13	45S	SMOOTHNESS, SHEFFIELD
L291S	O	272.5	148.5	10.9	1.5	.90	45S	SMOOTHNESS, SHEFFIELD
L157	O	272.6	144.0	9.4	-2.7	1.06	45S	SMOOTHNESS, SHEFFIELD
L132	O	272.7	144.4	9.6	-2.4	1.24	45S	SMOOTHNESS, SHEFFIELD
L312	O	274.7	142.7	10.8	-4.7	.99	45S	SMOOTHNESS, SHEFFIELD
L126	O	275.0	142.0	10.8	-5.5	.97	45S	SMOOTHNESS, SHEFFIELD
L107	O	275.3	159.3	17.7	10.5	1.31	45S	SMOOTHNESS, SHEFFIELD
L342	O	275.7	143.6	12.1	-4.2	1.11	45S	SMOOTHNESS, SHEFFIELD
L323	O	275.7	139.7	10.6	-7.9	1.05	45S	SMOOTHNESS, SHEFFIELD
L122	O	277.7	138.1	11.8	-10.1	.80	45S	SMOOTHNESS, SHEFFIELD
L259	O	280.1	152.8	19.7	2.6	1.11	45S	SMOOTHNESS, SHEFFIELD
L575	O	280.2	141.7	15.5	-7.7	1.06	45S	SMOOTHNESS, SHEFFIELD
L228	O	280.7	151.5	19.7	1.1	.90	45S	SMOOTHNESS, SHEFFIELD
L352	O	282.3	150.5	20.8	-.4	1.12	45S	SMOOTHNESS, SHEFFIELD
L153	*	284.1	158.1	25.4	6.0	1.04	45S	SMOOTHNESS, SHEFFIELD
L597	*	288.1	146.9	24.8	-5.9	.67	45S	SMOOTHNESS, SHEFFIELD
L326	X	295.9	140.8	29.7	-14.5	.73	45S	SMOOTHNESS, SHEFFIELD
L561	#	304.0	150.0	40.7	-9.0	.64	45S	SMOOTHNESS, SHEFFIELD
L174	*	307.1	231.1	74.3	64.8	.67	45R	SMOOTHNESS, SHEFFIELD, NON-STANDARD INSTRUMENT
L224	#	320.3	155.3	57.8	-10.3	.96	45S	SMOOTHNESS, SHEFFIELD
L241	#	331.7	165.0	72.0	-5.6	.85	45S	SMOOTHNESS, SHEFFIELD
GMEANS:		262.9	143.0			1.00		
		95% ELLIPSE:		25.9	14.6	WITH GAMMA = 22 DEGREES		


SMOOTHNESS, SHEFFIELD
SAMPLE H45 = 263. SHEFF. UNITS SAMPLE J12 = 143. SHEFF. UNITS
+,X,* NOT IN GRAND MEANS
ANALYSIS T45-1
SAMPLE J12
SHEFF. UNITS
110 115 120 125 130 135 140 145 150 155 160 165 170 175
SAMPLE H45
225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300
SHEFF. UNITS

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

LAB CODE	SAMPLE H45 MEAN	PRINTING 84 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J12 MEAN	PRINTING 149 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 15 VAR	P	LAB
L139B	16.27	1.06	.84	.59	.74	32.53	-.24	-.11	4.27	.98	45K	O	L139B
L162	6.44	-8.76	-6.93	.47	.59	26.73	-6.04	-2.68	3.35	.77	45K	#	L162
L176	12.63	-2.58	-2.04	.48	.60	23.55	-9.22	-4.09	2.34	.54	45K	#	L176
L182K	13.25	-1.95	-1.54	.61	.76	29.69	-3.08	-1.37	3.56	.82	45K	O	L182K
L190C	15.43	.23	.18	.81	1.01	34.60	1.82	.81	5.36	1.23	45K	O	L190C
L230B	14.47	-.74	-.58	.92	1.14	35.47	2.69	1.19	3.81	.88	45K	O	L230B
L243K	14.96	-.24	-.19	.55	.69	31.67	-1.11	-.49	4.48	1.03	45K	O	L243K
L291K	17.17	1.97	1.56	1.31	1.63	34.87	2.09	.93	5.14	1.18	45K	O	L291K
L581	14.87	-.34	-.27	.83	1.04	30.60	-2.18	-.97	3.81	.88	45K	O	L581
GR. MEAN * 15.20 BEKK SECONDS						GRAND MEAN * 32.78 BEKK SECONDS					TEST DETERMINATIONS * 15		
SD MEANS * 1.26 BEKK SECONDS						SD OF MEANS * 2.25 BEKK SECONDS					7 LABS IN GRAND MEANS		
AVERAGE SDR * .80 BEKK SECONDS						AVERAGE SDR * 4.35 BEKK SECONDS							
L182G	35.50	20.30	16.06	2.51	3.12	104.17	71.39	31.68	11.50	2.64	43H	*	L182G
L250M	16.57	1.37	1.08	.83	1.04	30.93	-1.84	-.82	2.58	.59	45L	*	L250M
L251	14.13	-1.07	-.85	.77	.95	26.97	-5.81	-2.58	2.83	.65	45L	*	L251
L388	40.67	25.46	20.15	4.89	6.08	202.94	170.16	75.52	26.14	6.01	45H	*	L388

TOTAL NUMBER OF LABORATORIES REPORTING * 13

Best values: H45 15 Bekk seconds
J12 31 Bekk seconds

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

Data from the following laboratories appear to be off by a multiplicative factor: 162

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

LAB CODE	P	MEANS H45	J12	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L162	#	6.44	26.73	-8.77	6.04	.68	45K	SMOOTHNESS, BEKK
L176	#	12.63	23.55	-9.53	-.88	.57	45K	SMOOTHNESS, BEKK
L182K	O	13.25	29.69	-3.57	.72	.79	45K	SMOOTHNESS, BEKK
L251	*	14.13	26.97	-5.81	-1.07	.80	45L	SMOOTHNESS, BEKK, 20 C, 65% RH
L230B	O	14.47	35.47	2.25	1.65	1.01	45K	SMOOTHNESS, BEKK
L581	O	14.87	30.60	-2.15	-.46	.96	45K	SMOOTHNESS, BEKK
L243K	O	14.96	31.67	-1.12	-.17	.86	45K	SMOOTHNESS, BEKK
L190C	O	15.43	34.60	1.79	.43	1.12	45K	SMOOTHNESS, BEKK
L139B	O	16.27	32.53	.15	-1.08	.86	45K	SMOOTHNESS, BEKK
L250M	*	16.57	30.93	-1.23	-1.94	.82	45L	SMOOTHNESS, BEKK, 20 C, 65% RH
L291K	O	17.17	34.87	2.66	-1.10	1.41	45K	SMOOTHNESS, BEKK
L182G	*	35.50	104.17	73.94	6.46	2.88	45H	SMOOTHNESS, GURLEY OIL FLOTATION
L388	*	40.67	202.94	168.08	36.81	6.05	45H	SMOOTHNESS, GURLEY OIL FLOTATION
GMEANS:		15.20	32.78			1.00		
95% ELLIPSE:				8.87	3.74	WITH GAMMA * 69 DEGREES		

REPORT NO. 54G TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1978
ANALYSIS T47-1 TABLE 1
SMOOTHNESS, BENDTSEN

LAB CODE	SAMPLE H45 MEAN	PRINTING 84 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J12 MEAN	PRINTING 149 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L176	458.	-2.	-.02	9.	.22	175.	-0.	-.02	9.	.39	47B	O	L176
L182B	577.	117.	.98	69.	1.66	189.	14.	.93	26.	1.08	47B	O	L182B
L236	449.	-11.	-.09	26.	.63	184.	9.	.59	23.	.95	47B	O	L236
L243B	464.	4.	.03	60.	1.45	166.	-9.	-.64	20.	.85	47B	O	L243B
L244	220.	-240.	-2.00	16.	.37	156.	-20.	-1.36	23.	.96	47B	O	L244
L248	417.	-43.	-.36	37.	.88	165.	-11.	-.75	24.	1.01	47B	O	L248
L280	621.	161.	1.34	83.	1.98	201.	25.	1.69	40.	1.67	47B	O	L280
L333	379.	-81.	-.67	38.	.91	162.	-14.	-.93	32.	1.35	47B	O	L333
L484	555.	95.	.79	37.	.88	183.	7.	.49	18.	.74	47B	O	L484

GR. MEAN = 460. ML/MIN GRAND MEAN = 176. ML/MIN TEST DETERMINATIONS = 10
SD MEANS = 120. ML/MIN SD OF MEANS = 15. ML/MIN 9 LABS IN GRAND MEANS
AVERAGE SDR = 42. ML/MIN AVERAGE SDR = 24. ML/MIN
TOTAL NUMBER OF LABORATORIES REPORTING = 9

Best values: H45 460 milliliter per minute
J12 175 milliliter per minute

REPORT NO. 54G TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1978
ANALYSIS T47-1 TABLE 2
SMOOTHNESS, BENDTSEN

LAB CODE	F	MEANS H45	J12	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L244	O	220.	156.	-241.	6.	.67	47B	SMOOTHNESS, BENDTSEN, WG 150
L333	O	379.	162.	-82.	-5.	1.13	47B	SMOOTHNESS, BENDTSEN, WG 150
L248	O	417.	165.	-44.	-6.	.95	47B	SMOOTHNESS, BENDTSEN, WG 150
L236	O	449.	184.	-10.	10.	.79	47B	SMOOTHNESS, BENDTSEN, WG 150
L176	O	458.	175.	-2.	-0.	.30	47B	SMOOTHNESS, BENDTSEN, WG 150
L243B	O	464.	166.	3.	-10.	1.15	47B	SMOOTHNESS, BENDTSEN, WG 150
L484	O	555.	183.	95.	-3.	.81	47B	SMOOTHNESS, BENDTSEN, WG 150
L182B	O	577.	189.	118.	1.	1.37	47B	SMOOTHNESS, BENDTSEN, WG 150
L280	O	621.	201.	163.	7.	1.82	47B	SMOOTHNESS, BENDTSEN, WG 150
GMEANS:		460.	176.			1.00		
		95% ELLIPSE:		397.	22.	WITH GAMMA = 6 DEGREES		

REPORT NO. 54G TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1978

ANALYSIS T56-1 TABLE 1

K & N INK ABSORPTION

LAB CODE	SAMPLE B80 MEAN	COATED OFFSET BOOK 75 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE E50 MEAN	OFFSET PRINTING 96 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 4 VAR	F	LAB
L126	22.32	-.87	-.29	.82	1.23	59.55	-4.54	-.99	.62	1.88	56K	Ø	L126
L182	23.05	-.15	-.05	.79	1.20	64.20	.11	.02	.16	.49	56K	Ø	L182
L213	14.62	-8.57	-2.81	.13	.19	45.72	-18.37	-3.99	2.65	7.99	56K	#	L213
L278	28.37	5.18	1.70	.49	.74	68.50	4.41	.96	.08	.25	56K	Ø	L278
L291	20.00	-3.20	-1.05	.91	1.38	65.15	1.06	.23	.06	.17	56K	Ø	L291
L339	24.75	1.55	.51	.50	.75	69.25	5.16	1.12	.29	.87	56K	Ø	L339
L388	20.67	-2.52	-.83	.46	.70	57.90	-6.19	-1.34	.77	2.33	56K	Ø	L388
L616	54.50	31.30	10.26	1.00	1.51	100.00	35.91	7.79	.00	.00	56K	#	L616

GR. MEAN = 23.20 K & N UNITS GRAND MEAN = 64.09 K & N UNITS TEST DETERMINATIONS = 4

SD MEANS = 3.05 K & N UNITS SD OF MEANS = 4.61 K & N UNITS 6 LABS IN GRAND MEANS

AVERAGE SDR = .66 K & N UNITS AVERAGE SDR = .33 K & N UNITS

TOTAL NUMBER OF LABORATORIES REPORTING = 8

Best values: B80 23 K & N units
E50 65 K & N units

The following laboratories were omitted from the grand means because of extreme test results: 213, 616

REPORT NO. 54G TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1978

ANALYSIS T56-1 TABLE 2

K & N INK ABSORPTION

LAB CODE	F	MEANS B80	E50	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L213	#	14.62	45.72	-20.22	-1.35	4.09	56K	INK ABSORPTION, K&N INK TEST
L291	Ø	20.00	65.15	-.61	3.31	.77	56K	INK ABSORPTION, K&N INK TEST
L388	Ø	20.67	57.90	-6.64	-.78	1.52	56K	INK ABSORPTION, K&N INK TEST
L126	Ø	22.32	59.55	-4.40	-1.43	1.56	56K	INK ABSORPTION, K&N INK TEST
L182	Ø	23.05	64.20	.02	.18	.84	56K	INK ABSORPTION, K&N INK TEST
L339	Ø	24.75	69.25	5.27	1.13	.81	56K	INK ABSORPTION, K&N INK TEST
L278	Ø	28.37	68.50	6.36	-2.41	.49	56K	INK ABSORPTION, K&N INK TEST
L616	#	54.50	100.00	46.55	-10.11	.75	56K	INK ABSORPTION, K&N INK TEST
GMEANS:		23.20	64.09			1.00		
95% ELLIPSE:				21.41	8.48	WITH GAMMA = 61 DEGREES		

REPORT NO. 54G — TAPPI COLLABORATIVE REFERENCE PROGRAM — JUNE 1978

ANALYSIS T57-1 TABLE 1
HYDROGEN ION CONCENTRATION (PH), COLD
TAPPI STANDARD T509 OS-77

LAB CODE	SAMPLE J77 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J14 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 5 VAR	F	LAB
L174C	7.74	.43	1.23	.09	.96	7.78	.47	1.17	.04	.81	57F	0	L174C
L182C	7.20	-.11	-.30	.11	1.14	6.95	-.36	-.91	.04	.64	57D	0	L182C
L251C	7.38	.08	.22	.03	.34	7.40	.09	.23	.03	.48	57P	0	L251C
L328	7.66	.35	1.00	.15	1.63	7.78	.47	1.17	.04	.81	57M	0	L328
L356	6.87	-.43	-1.23	.07	.75	6.93	-.39	-.97	.09	1.62	57V	0	L356
L484A	6.98	-.33	-.92	.11	1.18	7.04	-.27	-.68	.09	1.63	57Y	0	L484A

GR. MEAN = 7.31 PH UNITS — GRAND MEAN = 7.31 PH UNITS — TEST DETERMINATIONS = 5
SD MEANS = .35 PH UNITS — SD OF MEANS = .40 PH UNITS — 6 LABS IN GRAND MEANS
AVERAGE SDR = .09 PH UNITS — AVERAGE SDR = .05 PH UNITS
TOTAL NUMBER OF LABORATORIES REPORTING = 6

Best values: J77 7.3 pH units
J14 7.3 pH units

REPORT NO. 54G — TAPPI COLLABORATIVE REFERENCE PROGRAM — JUNE 1978

ANALYSIS T57-1 TABLE 2
HYDROGEN ION CONCENTRATION (PH), COLD
TAPPI STANDARD T509 OS-77

LAB CODE	F	MEANS J77	J14	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L356	0	6.87	6.93	-.58	.07	1.19	57V	PH, COLD, BECKMAN EXPANDOMATIC
L484A	0	6.98	7.04	-.42	.06	1.40	57Y	PH, COLD, BECKMAN MODEL H2
L182C	0	7.20	6.95	-.34	-.16	.89	57D	PH, COLD, RADIOMETER TYPE PH M 28
L251C	0	7.38	7.40	.12	.00	.41	57P	PH, COLD, RADIOMETER TYPE PH M64
L328	0	7.66	7.78	.58	.04	1.22	57M	PH, COLD, BECKMAN ZEROMATIC
L174C	0	7.74	7.78	.64	-.02	.89	57F	PH, COLD, FISHER ACCUMET MODEL 220
GMEANS:		7.31	7.31			1.00		
		95% ELLIPSE:		2.20	.36	WITH GAMMA = 48 DEGREES		

REPORT NO. 54G

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

JUNE 1978

LAB CODE	SAMPLE J77 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J14 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 5 VAR	F	LAB
L128	7.620	-.128	-1.01	.084	1.58	7.840	.084	1.26	.055	.82	57L	O	L128
L162	7.752	.004	.03	.084	1.58	7.766	.010	.14	.113	1.69	57C	O	L162
L174H	7.920	.172	1.36	.045	.84	7.680	-.076	-1.15	.045	.67	57G	O	L174H
L182H	7.700	-.048	-.38	.000	.00	7.740	-.016	-.25	.055	.82	57E	O	L182H
L334	8.631	.883	6.96	.148	2.79	8.763	1.006	15.18	.062	.92	57C	#	L334
L484B	7.440	-.308	-2.43	.152	2.86	7.360	-.396	-5.98	.089	1.34	57Z	#	L484B

GR. MEAN = 7.748 PH UNITS — GRAND MEAN = 7.756 PH UNITS — TEST DETERMINATIONS = 5
SD MEANS = .127 PH UNITS — SD OF MEANS = .066 PH UNITS — 4 LABS IN GRAND MEANS
AVERAGE SDR = .053 PH UNITS — AVERAGE SDR = .067 PH UNITS
TOTAL NUMBER OF LABORATORIES REPORTING = 6

Best values: J77 7.8 pH units
J14 7.8 pH units

The following laboratories were omitted from the grand means because of extreme test results: 334, 484B

REPORT NO. 54G

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

JUNE 1978

LAB CODE	F	MEANS J77	J14	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L484B	#	7.440	7.360	-.100	-.492	2.10	57Z	PH, HOT, BECKMAN MODEL H2
L128	O	7.620	7.840	-.152	.018	1.20	57L	PH, HOT, L*N
L182H	O	7.700	7.740	-.036	-.036	.41	57E	PH, HOT, RADIOMETER TYPE PH M 28
L162	O	7.752	7.766	-.001	.010	1.64	57C	PH, HOT, CORNING MODEL 12 RESEARCH METER
L174H	O	7.920	7.680	.188	.008	.76	57G	PH, HOT, FISHER ACCUMET MODEL 220
L334	#	8.631	8.763	.345	1.294	1.85	57C	PH, HOT, CORNING MODEL 12 RESEARCH METER
GMEANS:		7.748	7.756			1.00		
95% ELLIPSE:				1.072	.186	WITH GAMMA *=26 DEGREES		

ANALYSIS T60-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT

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

LAB CODE	SAMPLE E40 MEAN	COATED DULL 117 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J57 MEAN	PRINTING 94 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 10 VAR	F	LAB
L105	96.48	.32	1.04	.14	.66	93.56	.82	1.51	.25	.69	60H	O	L105
L108	96.08	-.08	-.24	.06	.30	92.73	-.01	-.03	.19	.53	60B	O	L108
L115	96.07	-.09	-.28	.40	1.88	93.08	.34	.62	.39	1.04	60B	O	L115
L118	96.36	.20	.65	.13	.60	93.22	.48	.88	.25	.68	60B	O	L118
L121	95.93	-.23	-.72	.18	.87	92.45	-.29	-.54	.51	1.37	60B	O	L121
L122	92.31	-3.85	-12.31	.15	.72	86.31	-6.43	-11.92	.26	.71	60D	#	L122
L123	96.20	.04	.14	.16	.74	92.64	-.10	-.19	.34	.93	60W	O	L123
L124	95.62	-.54	-1.72	.47	2.21	92.12	-.62	-1.16	.36	.98	60B	O	L124
L125	96.13	-.03	-.08	.22	1.05	92.80	.06	.10	.32	.85	60H	O	L125
L131	95.89	-.27	-.85	.22	1.06	92.06	-.68	-1.27	.17	.46	60R	O	L131
L132	95.83	-.33	-1.04	.08	.39	92.60	-.14	-.27	.53	1.42	60B	O	L132
L136	95.91	-.25	-.79	.10	.47	92.41	-.33	-.62	.32	.88	60H	O	L136
L139	96.08	-.08	-.24	.16	.77	92.90	.16	.29	.38	1.03	60B	O	L139
L148H	96.29	.13	.43	.15	.72	92.32	-.42	-.79	.38	1.02	60H	*	L148H
L152	96.34	.18	.59	.16	.78	93.06	.32	.58	.41	1.10	60B	O	L152
L153	96.45	.29	.94	.37	1.75	93.05	.31	.57	.44	1.18	60B	O	L153
L157	96.60	.44	1.42	.32	1.50	93.40	.66	1.21	.57	1.53	60B	O	L157
L158	96.49	.33	1.07	.16	.76	93.44	.70	1.29	.42	1.15	60D	O	L158
L159	96.34	.18	.59	.13	.60	92.76	.02	.03	.34	.91	60R	O	L159
L162	96.49	.33	1.07	.12	.57	93.30	.56	1.03	.47	1.27	60W	O	L162
L166	95.73	-.43	-1.36	.13	.59	92.11	-.63	-1.17	.44	1.18	60B	O	L166
L173A	96.47	.31	1.00	.12	.55	93.58	.84	1.55	.26	.70	60B	O	L173A
L182	95.85	-.31	-.98	.41	1.95	92.15	-.59	-1.10	.24	.65	60B	O	L182
L190C	96.29	.13	.43	.15	.72	93.05	.31	.57	.27	.73	60B	O	L190C
L190R	96.24	.08	.27	.14	.68	92.73	-.01	-.03	.21	.56	60B	O	L190R
L206	96.19	.03	.11	.12	.57	92.76	.02	.03	.23	.61	60B	O	L206
L210B	96.17	.01	.04	.08	.39	92.76	.02	.03	.31	.84	60B	O	L210B
L210D	96.20	.04	.14	.12	.55	92.72	-.02	-.04	.36	.99	60D	O	L210D
L211S	96.02	-.14	-.44	.23	1.09	92.94	.20	.36	.41	1.10	60R	O	L211S
L213	95.93	-.23	-.72	.09	.45	92.44	-.30	-.56	.39	1.05	60B	O	L213
L223B	96.52	.36	1.16	.11	.54	93.28	.54	.99	.31	.83	60B	O	L223B
L225	96.05	-.11	-.34	.33	1.57	92.44	-.30	-.56	.64	1.73	60B	O	L225
L228	96.07	-.09	-.28	.16	.74	92.69	-.05	-.10	.21	.56	60H	O	L228
L230	96.26	.10	.33	.13	.64	92.53	-.21	-.40	.43	1.16	60B	O	L230
L233B	95.50	-.66	-2.10	.71	3.35	92.20	-.54	-1.01	.71	1.93	60B	*	L233B
L236B	95.46	-.70	-2.23	.41	1.94	91.40	-1.34	-2.49	.00	.00	60B	O	L236B
L238A	95.50	-.66	-2.10	.09	.45	91.62	-1.12	-2.08	.35	.93	60R	O	L238A
L241	96.03	-.13	-.40	.22	1.02	93.00	.26	.47	.32	.86	60B	O	L241
L243	96.19	.03	.11	.15	.72	92.62	-.12	-.23	.42	1.15	60B	O	L243
L254	96.60	.44	1.42	.17	.80	93.62	.88	1.62	1.01	2.73	60H	O	L254
L255	95.99	-.17	-.53	.13	.61	92.92	.18	.33	.41	1.11	60B	O	L255
L259	96.22	.06	.20	.19	.91	93.12	.38	.70	.38	1.03	60B	O	L259
L261	96.70	.54	1.74	.42	2.00	93.17	.43	.79	.25	.67	60B	O	L261
L262	95.85	-.31	-.98	.23	1.08	91.98	-.76	-1.42	.15	.42	60B	O	L262
L275	96.04	-.12	-.37	.13	.64	92.23	-.51	-.95	.19	.53	60R	O	L275
L278	96.52	.36	1.16	.18	.83	93.38	.64	1.18	.28	.76	60B	O	L278
L281	96.32	.16	.52	.13	.62	93.06	.32	.58	.21	.57	60D	O	L281
L285B	95.86	-.30	-.95	.26	1.23	92.24	-.50	-.93	.44	1.20	60B	O	L285B
L285R	96.03	-.13	-.40	.20	.95	91.95	-.79	-1.47	.30	.81	60R	O	L285R
L288	96.09	-.07	-.21	.03	.15	92.76	.02	.03	.38	1.02	60D	O	L288
L301	95.95	-.21	-.66	.10	.46	92.21	-.53	-.99	.35	.95	60B	O	L301
L305	96.08	-.08	-.24	.14	.66	92.60	-.14	-.27	.16	.42	60R	O	L305
L308	96.33	.17	.56	.25	1.18	93.19	.45	.83	.38	1.01	60H	O	L308
L315	96.11	-.05	-.15	.14	.69	92.50	-.24	-.45	.27	.74	60D	O	L315
L317	96.24	.08	.27	.22	1.03	92.69	-.05	-.10	.73	1.96	60B	O	L317
L318	96.30	.14	.46	.26	1.22	93.15	.41	.75	.24	.65	60B	O	L318
L323	97.04	.88	2.82	.35	1.66	93.85	1.11	2.05	.58	1.56	60W	*	L323
L326	96.51	.35	1.13	.54	2.56	93.07	.33	.60	.58	1.58	60B	O	L326
L328	95.90	-.26	-.82	.32	1.50	92.40	-.34	-.64	.70	1.89	60B	O	L328
L333	96.65	.49	1.58	.78	3.71	93.70	.96	1.77	.95	2.56	60B	O	L333
L339	96.25	.09	.30	.35	1.67	93.10	.36	.66	.52	1.40	60B	O	L339
L341	95.72	-.44	-1.40	.22	1.04	91.74	-1.00	-1.86	.41	1.10	60R	O	L341
L349	96.43	.27	.88	.09	.45	93.24	.50	.92	.07	.19	60D	O	L349
L352	95.98	-.18	-.56	.09	.44	92.40	-.34	-.64	.27	.74	60R	O	L352
L354	95.90	-.26	-.82	.32	1.50	92.20	-.54	-1.01	.63	1.71	60B	O	L354

ANALYSIS T60-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT

TAPPI STANDARD T425 OS-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B4L TYPE

LAB CODE	SAMPLE E40 MEAN	COATED DULL 117 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J57 MEAN	PRINTING 94 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.- 10 VAR	F	LAB
L366	95.44	-.72	-2.29	.50	2.35	92.84	.10	.18	.45	1.22	60B	X	L366
L390	96.40	.24	.78	.52	2.45	93.30	.56	1.03	.48	1.31	60B	O	L390
L523	96.01	-.15	-.47	.07	.35	92.42	-.32	-.60	.27	.74	60R	O	L523
L543	95.81	-.35	-1.11	.12	.57	92.05	-.69	-1.29	.26	.71	60D	O	L543
L561	94.80	-1.36	-4.34	.42	2.00	92.20	-.54	-1.01	.42	1.14	60B	X	L561
L581	96.15	-.01	-.02	.14	.64	92.67	-.07	-.14	.33	.90	60B	O	L581
L587	96.36	.20	.65	.17	.81	93.04	.30	.55	.22	.60	60B	O	L587
L592	95.97	-.19	-.60	.13	.63	91.99	-.75	-1.40	.23	.62	60W	O	L592
L594	95.78	-.38	-1.20	.14	.66	92.66	-.08	-.16	.26	.71	60D	O	L594
L597	96.00	-.16	-.50	.47	2.23	92.30	-.44	-.82	.48	1.31	60B	O	L597
L599	96.20	.04	.14	.35	1.66	93.15	.41	.75	.63	1.69	60B	O	L599
L608	97.03	.87	2.80	.14	.67	94.10	1.36	2.51	.26	.71	60D	*	L608
GR. MEAN - 96.16 PERCENT						GRAND MEAN - 92.74 PERCENT					TEST DETERMINATIONS - 10		
SD MEANS - .31 PERCENT						SD OF MEANS - .54 PERCENT					74 LABS IN GRAND MEANS		
		AVERAGE SDR - .21 PERCENT					AVERAGE SDR - .37 PERCENT						
L224	95.65	-.51	-1.62	.41	1.95	91.40	-1.34	-2.49	.32	.85	60P	*	L224
L236E	96.73	.57	1.84	.11	.50	93.33	.59	1.08	.21	.56	60E	*	L236E
L249	96.34	.18	.59	.07	.33	92.49	-.25	-.47	.35	.94	60P	*	L249
L256	96.24	.09	.28	.12	.55	92.01	-.74	-1.36	.27	.73	60N	*	L256
L260	96.50	.34	1.10	.41	1.93	92.60	-.14	-.27	.32	.85	60P	*	L260
L309	95.23	-.93	-2.96	.16	.74	91.57	-1.17	-2.17	.36	.97	60A	*	L309
L312	95.85	-.31	-.98	.24	1.14	91.85	-.89	-1.66	.24	.65	60P	*	L312
L314	96.53	.37	1.20	.13	.63	93.34	.60	1.10	.47	1.28	60T	*	L314
L380	96.00	-.16	-.50	.00	.00	92.00	-.74	-1.38	.00	.00	60P	*	L380
L388	95.60	-.56	-1.78	.32	1.50	91.45	-1.29	-2.40	.50	1.34	60P	*	L388

TOTAL NUMBER OF LABORATORIES REPORTING - 87

Best values: E40 96.2 $\pm$ 0.5 percent
J57 92.7 $\pm$ 0.9 percent

The following laboratories were omitted from the grand means because of extreme test results: 122

ANALYSIS T60-1 TABLE 2

OPACITY (89% REFLECTANCE BACKING) IN PERCENT

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

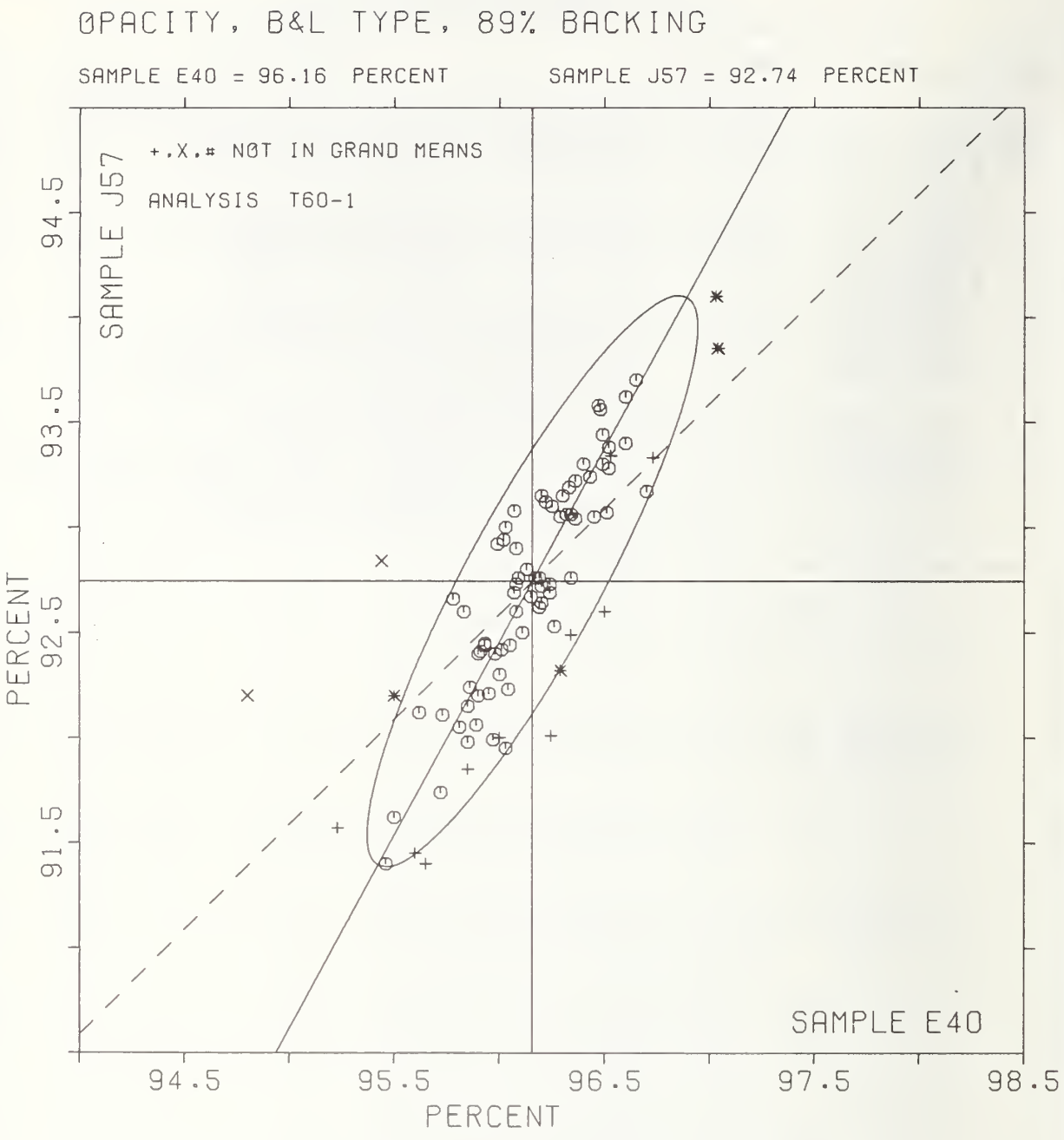
LAB CODE	F	MEANS E40	J57	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L122	#	92.31	86.31	-7.49	.31	.72	60D	OPACITY (WHITE BACKING), DIANO/BNL
L561	X	94.80	92.20	-1.13	.93	1.57	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L309	*	95.23	91.57	-1.47	.25	.86	60A	OPACITY (WHITE BACKING), ZEISS ELREPHO, FILTER 4,86% BACKING
L366	X	95.44	92.84	-.26	.68	1.79	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L236B	O	95.46	91.40	-1.51	-.03	.97	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L238A	O	95.50	91.62	-1.30	.04	.69	60R	OPACITY (WHITE BACKING), TEWING-ALBERT (FORMERLY SRL)
L233B	*	95.50	92.20	-.79	.32	2.64	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L388	*	95.60	91.45	-1.40	-.13	1.42	60P	OPACITY (WHITE BACKING), PHOTOVOLT
L124	O	95.62	92.12	-.80	.17	1.59	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L224	*	95.65	91.40	-1.42	-.20	1.40	60P	OPACITY (WHITE BACKING), PHOTOVOLT
L341	O	95.72	91.74	-1.09	-.10	1.07	60R	OPACITY (WHITE BACKING), TEWING-ALBERT (FORMERLY SRL)
L166	O	95.73	92.11	-.76	.07	.89	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L594	O	95.78	92.66	-.25	.29	.69	60D	OPACITY (WHITE BACKING), DIANO/BNL
L543	O	95.81	92.05	-.78	-.03	.64	60D	OPACITY (WHITE BACKING), DIANO/BNL
L132	O	95.83	92.60	-.28	.22	.91	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L312	*	95.85	91.85	-.93	-.16	.90	60P	OPACITY (WHITE BACKING), PHOTOVOLT
L262	O	95.85	91.98	-.82	-.10	.75	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L182	O	95.85	92.15	-.67	-.01	1.30	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L285B	O	95.86	92.24	-.58	.02	1.21	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L131	O	95.89	92.06	-.73	-.09	.76	60R	OPACITY (WHITE BACKING), TEWING-ALBERT (FORMERLY SRL)
L354	O	95.90	92.20	-.60	-.03	1.60	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L328	O	95.90	92.40	-.42	.06	1.69	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L136	O	95.91	92.41	-.41	.06	.67	60H	OPACITY (WHITE BACKING), HUYGEN
L121	O	95.93	92.45	-.37	.06	1.12	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L213	O	95.93	92.44	-.38	.05	.75	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L301	O	95.95	92.21	-.57	-.07	.70	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L592	O	95.97	91.99	-.75	-.20	.63	60W	OPACITY (WHITE BACKING), HUYGEN,DIGITAL
L352	O	95.98	92.40	-.39	-.01	.59	60R	OPACITY (WHITE BACKING), TEWING-ALBERT (FORMERLY SRL)
L255	O	95.99	92.92	.08	.23	.86	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L380	*	96.00	92.00	-.73	-.22	.00	60P	OPACITY (WHITE BACKING), PHOTOVOLT
L597	O	96.00	92.30	-.46	-.07	1.77	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L523	O	96.01	92.42	-.35	-.03	.55	60R	OPACITY (WHITE BACKING), TEWING-ALBERT (FORMERLY SRL)
L211S	O	96.02	92.94	.11	.21	1.10	60R	OPACITY (WHITE BACKING), TEWING-ALBERT (FORMERLY SRL)
L285R	O	96.03	91.95	-.76	-.27	.88	60R	OPACITY (WHITE BACKING), TEWING-ALBERT (FORMERLY SRL)
L241	O	96.03	93.00	.16	.23	.94	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L275	O	96.04	92.23	-.51	-.14	.58	60R	OPACITY (WHITE BACKING), TEWING-ALBERT (FORMERLY SRL)
L225	O	96.05	92.44	-.32	-.05	1.65	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L115	O	96.07	93.08	.25	.24	1.46	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L228	O	96.07	92.69	-.09	.05	.65	60H	OPACITY (WHITE BACKING), HUYGEN
L139	O	96.08	92.90	.10	.14	.90	60B	OPACITY (WHITH BACKING), BAUSCH + LOMB
L10B	O	96.08	92.73	-.05	.06	.41	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L305	O	96.08	92.60	-.16	-.00	.54	60R	OPACITY (WHITE BACKING), TEWING-ALBERT (FORMERLY SRL)
L288	O	96.09	92.76	-.02	.07	.59	60D	OPACITY (WHITE BACKING), DIANO/BNL
L315	O	96.11	92.50	-.24	-.08	.71	60D	OPACITY (WHITH BACKING), DIANO/BNL
L125	O	96.13	92.80	.04	.05	.95	60H	OPACITY (WHITE BACKING), HUYGEN
L581	O	96.15	92.67	-.07	-.03	.77	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L210B	O	96.17	92.76	.02	-.00	.61	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L243	O	96.19	92.62	-.09	-.09	.93	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L206	O	96.19	92.76	.03	-.02	.59	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L123	O	96.20	92.64	-.07	-.09	.83	60W	OPACITY (WHITE BACKING), HUYGHN,DIGITAL
L210D	O	96.20	92.72	-.00	-.05	.77	60D	OPACITY (WHITE BACKING), DIANO/BNL
L599	O	96.20	93.15	.38	.16	1.67	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L259	O	96.22	93.12	.36	.12	.97	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L190R	O	96.24	92.73	.03	-.08	.62	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L317	O	96.24	92.69	-.01	-.10	1.50	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L256	*	96.24	92.01	-.60	-.43	.64	60N	OPACITY (WHITH BACKING), HUNTER
L339	O	96.25	93.10	.36	.09	1.53	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L230	O	96.26	92.53	-.14	-.19	.90	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L19CC	O	96.29	93.05	.33	.03	.73	60B	OPACITY (WHITH BACKING), BAUSCH + LOMB
L148H	*	96.29	92.32	-.31	-.32	.87	60H	OPACITY (WHITE BACKING), HUYGEN
L318	O	96.30	93.15	.43	.07	.94	60B	OPACITY (WHITH BACKING), BAUSCH + LOMB
L281	O	96.32	93.06	.36	.01	.60	60D	OPACITY (WHITE BACKING), DIANO/BNL
L308	O	96.33	93.19	.47	.06	1.10	60H	OPACITY (WHITE BACKING), HUYGEN
L249	*	96.34	92.49	-.14	-.28	.64	60P	OPACITY (WHITE BACKING), PHOTOVOLT
L152	O	96.34	93.06	.37	-.01	.94	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB

ANALYSIS T60-1 TABLE 2

OPACITY (89% REFLECTANCE BACKING) IN PERCENT

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

LAB CODE	F	MEANS E40	MEANS J57	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L159	O	96.34	92.76	.10	-.15	.76	60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L587	O	96.36	93.04	.36	-.04	.71	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L118	O	96.36	93.22	.52	.05	.64	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L390	O	96.40	93.30	.60	.05	1.88	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L349	O	96.43	93.24	.57	-.00	.32	60D	OPACITY (WHITE BACKING), DIANO/BNL
L153	O	96.45	93.05	.41	-.11	1.47	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L173A	O	96.47	93.58	.88	.12	.62	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L105	O	96.48	93.56	.87	.11	.68	60H	OPACITY (WHITE BACKING), HUYGEN
L162	O	96.49	93.30	.65	-.03	.92	60W	OPACITY (WHITE BACKING), HUYGEN,DIGITAL
L158	O	96.49	93.44	.77	.04	.95	60D	OPACITY (WHITE BACKING), DIANO/BNL
L260	*	96.50	92.60	.04	-.37	1.39	60P	OPACITY (WHITE BACKING), PHOTOVOLT
L326	O	96.51	93.07	.46	-.16	2.07	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L278	O	96.52	93.38	.73	-.02	.80	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L223B	O	96.52	93.28	.64	-.06	.69	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L314	*	96.53	93.34	.70	-.04	.95	60T	OPACITY (WHITE BACKING), SMALL SPHERE COLOR EYE
L157	O	96.60	93.40	.79	-.08	1.52	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L254	O	96.60	93.62	.98	.03	1.77	60H	OPACITY (WHITE BACKING), HUYGEN
L333	O	96.65	93.70	1.08	.02	3.14	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L261	O	96.70	93.17	.63	-.27	1.34	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L236E	*	96.73	93.33	.79	-.22	.53	60E	OPACITY (WHITE BACKING), ZEISS ELREPHO, FMY=C(10) FILTER
L608	*	97.03	94.10	1.61	-.12	.69	60D	OPACITY (WHITE BACKING), DIANO/BNL
L323	*	97.04	93.85	1.39	-.25	1.61	60W	OPACITY (WHITE BACKING), HUYGEN,DIGITAL
GMEANS:		96.16	92.74			1.00		
		95% ELLIPSE:		1.54	.32	WITH GAMMA = 61 DEGREES		


0PACITY, B&L TYPE, 89% BACKING
SAMPLE E40 = 96.16 PERCENT
SAMPLE J57 = 92.74 PERCENT
+.X.# N0T IN GRAND MEANS
ANALYSIS T60-1
SAMPLE J57
PERCENT
94.5
93.5
92.5
91.5
SAMPLE E40
94.5
95.5
96.5
97.5
98.5
PERCENT

REPORT NO. 540 TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1978

ANALYSIS T60-2 TABLE 1

OPACITY (PAPER BACKING) IN PERCENT

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

LAB	SAMPLE E40	COATED DULL 117 GRAMS PER SQUARE METER				SAMPLE J57	PRINTING 94 GRAMS PER SQUARE METER				TEST D.= 10		
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L115	95.99	-.08	-.51	.34	1.40	93.07	.10	.29	.29	.99	60C	O	L115
L118	96.24	.17	1.12	.13	.52	93.38	.41	1.21	.21	.72	60C	O	L118
L190C	96.06	-.01	-.06	.14	.59	92.66	-.31	-.92	.45	1.52	60C	O	L190C
L190R	96.21	.14	.92	.13	.53	93.32	.35	1.03	.16	.54	60C	O	L190R
L236B	96.10	.03	.21	.32	1.31	92.60	-.37	-1.10	.39	1.30	60C	O	L236B
L243	96.10	.03	.21	.49	2.04	93.15	.18	.53	.36	1.22	60C	O	L243
L543	95.78	-.29	-1.88	.15	.61	92.62	-.35	-1.04	.21	.70	60V	O	L543

GR. MEAN = 96.07 PERCENT GRAND MEAN = 92.97 PERCENT TEST DETERMINATIONS = 10

SD MEANS = .15 PERCENT SD OF MEANS = .34 PERCENT 7 LABS IN GRAND MEANS

AVERAGE SDR = .24 PERCENT AVERAGE SDR = .30 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 7

Best values: E40 96.1 percent
J57 93.0 percent

REPORT NO. 540 TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1978

ANALYSIS T60-2 TABLE 2

OPACITY (PAPER BACKING) IN PERCENT

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

LAB		MEANS		COORDINATES		AVG			
CODE	F	E40	J57	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS	
L543	O	95.78	92.62	-.43	.16	.66	60V	OPACITY (PAPER BACKING),	DIANO/BNL
L115	O	95.99	93.07	.07	.11	1.19	60C	OPACITY (PAPER BACKING),	BAUSCH + LOMB
L190C	O	96.06	92.66	-.30	-.09	1.05	60C	OPACITY (PAPER BACKING),	BAUSCH + LOMB
L243	O	96.10	93.15	.18	.03	1.63	60C	OPACITY (PAPER BACKING),	BAUSCH + LOMB
L236B	O	96.10	92.60	-.34	-.15	1.31	60C	OPACITY (PAPER BACKING),	BAUSCH + LOMB
L190R	O	96.21	93.32	.38	-.02	.54	60C	OPACITY (PAPER BACKING),	BAUSCH + LOMB
L118	O	96.24	93.38	.44	-.03	.62	60C	OPACITY (PAPER BACKING),	BAUSCH + LOMB
GMEANS:		96.07	92.97			1.00			
95% ELLIPSE:				1.33	.40	WITH GAMMA = 71 DEGREES			

REPORT NO. 54G — TAPPI COLLABORATIVE REFERENCE PROGRAM — JUNE 1978

ANALYSIS T60-3 TABLE 1

OPACITY (PAPER BACKING) IN PERCENT

TAPPI SUGGESTED METHOD T519 OS-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	SAMPLE E40 MEAN	COATED DULL 117 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J57 MEAN	PRINTING 94 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.- 10 VAR	F	LAB
L182E	96.68	-.01	-.14	.08	.78	93.73	.18	1.03	.19	1.06	60J	O	L182E
L233P	96.75	.06	.55	.10	.97	93.54	-.01	-.05	.15	.82	60F	O	L233F
L244	96.52	-.17	-1.72	.11	1.13	93.24	-.31	-1.75	.19	1.04	60F	O	L244
L250T	96.74	.05	.45	.12	1.17	93.66	.11	.63	.24	1.29	60J	O	L250T
L251	96.69	-.00	-.02	.11	1.07	93.43	-.12	-.69	.22	1.22	60F	O	L251
L360	96.58	-.11	-1.13	.12	1.22	93.43	-.12	-.67	.21	1.15	60F	O	L360
L446	96.76	.07	.67	.08	.79	93.60	.05	.28	.10	.54	60J	O	L446
L575	96.83	.14	1.34	.09	.87	93.76	.22	1.22	.16	.88	60J	O	L575
GR. MEAN - 96.69 PERCENT						GRAND MEAN - 93.55 PERCENT					TEST DETERMINATIONS - 10		
SD MEANS - .10 PERCENT						SD OF MEANS - .18 PERCENT					8 LABS IN GRAND MEANS		
AVERAGE SDR - .10 PERCENT						AVERAGE SDR - .18 PERCENT							
L176	82.87	-13.82	-136.08	.21	2.05	83.73	-9.82	-55.59	.05	.26	60Z	*	L176
L626	96.77	.08	.74	.19	1.94	92.97	-.58	-3.28	.14	.77	60Q	*	L626

TOTAL NUMBER OF LABORATORIES REPORTING - 10

Best values: E40 96.7 percent
J57 93.6 percent

REPORT NO. 54G — TAPPI COLLABORATIVE REFERENCE PROGRAM — JUNE 1978

ANALYSIS T60-3 TABLE 2

OPACITY (PAPER BACKING) IN PERCENT

TAPPI SUGGESTED METHOD T519 OS-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	F	MEANS E40	J57	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L176	*	82.87	83.73	-15.06	7.80	1.15	60Z	OPACITY (PAPER BACKING), MARTIN SWEETS
L244	O	96.52	93.24	-.35	.01	1.08	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP
L360	O	96.58	93.43	-.16	.05	1.19	60P	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP
L182E	O	96.68	93.73	.15	.10	.92	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER
L251	O	96.69	93.43	-.11	-.05	1.14	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP
L250T	O	96.74	93.66	.12	.01	1.23	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER
L233F	O	96.75	93.54	.02	-.05	.89	60P	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP
L446	O	96.76	93.60	.08	-.04	.66	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER
L626	*	96.77	92.97	-.48	-.33	1.35	60Q	OPACITY (PAPER BACKING), PHOTOVOLT
L575	O	96.83	93.76	.25	-.02	.88	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER
GMEANS:		96.69	93.55			1.00		
95% ELLIPSE:				.68	.18	WITH GAMMA - 62 DEGREES		

ANALYSIS T65-1 TABLE 1

DIRECTIONAL BLUE REFLECTANCE IN PERCENT

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

LAB CODE	SAMPLE J37 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J35 MEAN	PRINTING 94 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 8 VAR	F	LAB
L108	75.59	-.20	-.48	.04	.22	84.07	.10	.22	.18	1.30	65M	O	L108
L122	76.06	.27	.65	.16	1.01	83.81	-.16	-.37	.08	.59	65N	O	L122
L132	75.76	-.03	-.07	.09	.58	83.66	-.31	-.71	.09	.65	65N	O	L132
L158	76.22	.43	1.03	.32	1.99	84.40	.42	.95	.33	2.37	65N	O	L158
L176A	72.72	-3.07	-7.30	.13	.81	79.66	-4.31	-9.72	.27	1.90	65A	#	L176A
L190C	75.06	-.73	-1.73	.12	.75	83.95	-.03	-.06	.08	.54	65A	O	L190C
L210M	76.04	.25	.59	.12	.75	83.81	-.16	-.37	.11	.80	65M	O	L210M
L210N	75.55	-.24	-.57	.12	.76	85.09	1.11	2.50	3.56	25.29	65N	*	L210N
L211	75.34	-.45	-1.08	.16	1.01	82.84	-1.14	-2.57	.40	2.84	65N	O	L211
L225	76.56	.77	1.84	.27	1.69	84.14	.16	.36	.18	1.31	65N	O	L225
L243	75.24	-.55	-1.32	.11	.67	83.59	-.39	-.88	.04	.25	65A	O	L243
L259	75.64	-.15	-.36	.17	1.07	83.91	-.06	-.15	.12	.89	65M	O	L259
L275	75.61	-.18	-.42	.16	.98	83.74	-.24	-.54	.07	.53	65M	O	L275
L285	76.14	.35	.83	.17	1.07	84.65	.67	1.51	.23	1.61	65N	O	L285
L288	75.54	-.25	-.60	.18	1.12	83.84	-.14	-.32	.07	.53	65N	O	L288
L308	75.91	.12	.29	.11	.71	84.29	.31	.70	.10	.70	65N	O	L308
L315	75.60	-.19	-.45	.35	2.24	83.94	-.04	-.09	.07	.53	65N	O	L315
L317	75.29	-.50	-1.20	.22	1.41	83.86	-.11	-.26	.12	.84	65M	O	L317
L523	76.31	.52	1.24	.10	.63	84.11	.14	.30	.06	.46	65N	O	L523
L543	76.47	.68	1.63	.07	.45	83.81	-.16	-.37	.19	1.34	65M	O	L543
L565	75.87	.08	.20	.10	.65	84.04	.06	.14	.13	.92	65A	O	L565
L598	76.69	.90	2.14	.35	2.20	86.02	2.05	4.61	.38	2.70	65M	#	L598
GR. MEAN = 75.79 PERCENT						GRAND MEAN = 83.98 PERCENT					TEST DETERMINATIONS = 8		
SD MEANS = .42 PERCENT						SD OF MEANS = .44 PERCENT					20 LABS IN GRAND MEANS		
		AVERAGE SDR = .16 PERCENT					AVERAGE SDR = .14 PERCENT						
L105	75.77	-.02	-.04	.18	1.16	84.65	.67	1.51	.05	.38	65T	*	L105
L176I	75.91	.12	.29	.16	.98	84.99	1.01	2.27	.06	.46	65I	*	L176I
L213	76.06	.27	.65	.11	.67	84.62	.65	1.46	.07	.50	65T	*	L213
L223	76.87	1.08	2.58	.18	1.11	85.89	1.91	4.30	.10	.70	65G	*	L223
L241	76.54	.75	1.79	.20	1.26	85.52	1.55	3.49	.10	.74	65I	*	L241
L249	77.12	1.33	3.18	.09	.56	84.22	.25	.56	.09	.63	65P	*	L249
L256	75.74	-.05	-.13	.21	1.31	83.94	-.04	-.09	.11	.75	65H	*	L256
L260	76.14	.35	.83	.13	.82	84.19	.21	.47	.12	.89	65P	*	L260
L278	78.12	2.33	5.56	.23	1.46	86.12	2.15	4.84	.23	1.64	65P	*	L278
L301	76.40	.61	1.45	.18	1.12	84.37	.40	.90	.09	.63	65G	*	L301
L312	78.00	2.21	5.26	.27	1.69	84.37	.40	.90	.44	3.15	65P	*	L312
L321	78.81	3.02	7.19	.26	1.64	86.81	2.84	6.39	.59	4.22	65P	*	L321
L328	76.95	1.16	2.76	.09	.59	83.85	-.13	-.29	.11	.76	65P	*	L328
L339	76.37	.58	1.39	.23	1.46	83.12	-.85	-1.92	.19	1.34	65P	*	L339
L380	78.87	3.08	7.34	.35	2.24	84.62	.65	1.46	.52	3.68	65P	*	L380
L388	75.50	-.29	-.69	.00	.00	83.75	-.23	-.51	.27	1.90	65P	*	L388
L562	81.00	5.21	12.40	.00	.00	86.00	2.02	4.56	.00	.00	65P	*	L562
L587	76.07	.28	.68	.10	.65	84.66	.69	1.54	.13	.92	65I	*	L587
L591	74.96	-.83	-1.98	.17	1.05	84.13	.15	.34	.10	.73	65H	*	L591
L626	77.97	2.18	5.20	.05	.29	86.12	2.15	4.84	.07	.50	65P	*	L626

TOTAL NUMBER OF LABORATORIES REPORTING = 42

Best values: J37 75.6 $\pm$ 0.8 percent
J35 83.8 $\pm$ 0.9 percent

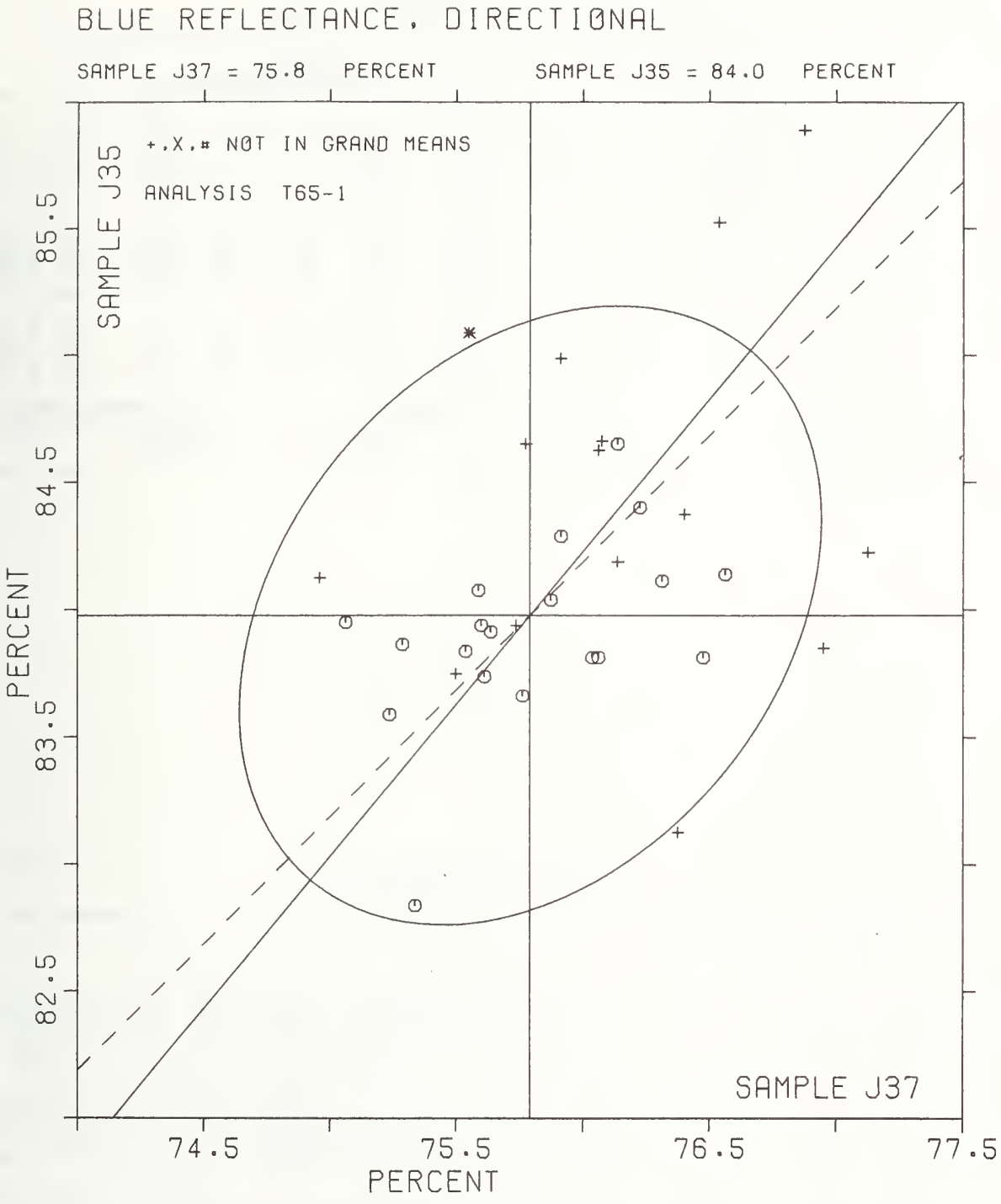
The following laboratories were omitted from the grand means because of extreme test results: 176A, 598

ANALYSIS T65-1 TABLE 2

DIRECTIONAL BLUE REFLECTANCE IN PERCENT

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

LAB CODE	F	MEANS J37	MEANS J35	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L176A	#	72.72	79.66	-5.28	-.41	1.35	65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT),S-2
L591	*	74.96	84.13	-.42	.73	.89	65H	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L190C	O	75.06	83.95	-.49	.54	.64	65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT),S-2
L243	O	75.24	83.59	-.65	.17	.46	65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT),S-2
L317	O	75.29	83.86	-.41	.31	1.13	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L211	O	75.34	82.84	-1.17	-.38	1.92	65N	BLUE REFLECTANCE (DIRECTIONAL), DIANO/MARTIN SWEETS, S-4
L388	*	75.50	83.75	-.36	.08	.95	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L288	O	75.54	83.84	-.27	.10	.82	65N	BLUE REFLECTANCE (DIRECTIONAL), DIANO/MARTIN SWEETS, S-4
L210N	*	75.55	85.09	.70	.90	13.02	65N	BLUE REFLECTANCE (DIRECTIONAL), DIANO/MARTIN SWEETS, S-4
L108	O	75.59	84.07	-.06	.22	.76	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L315	O	75.60	83.94	-.15	.12	1.39	65N	BLUE REFLECTANCE (DIRECTIONAL), DIANO/MARTIN SWEETS, S-4
L275	O	75.61	83.74	-.30	-.02	.76	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L259	O	75.64	83.91	-.15	.08	.98	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L256	*	75.74	83.94	-.06	.02	1.03	65H	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L132	O	75.76	83.66	-.26	-.18	.61	65N	BLUE REFLECTANCE (DIRECTIONAL), DIANO/MARTIN SWEETS, S-4
L105	*	75.77	84.65	.51	.44	.77	65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M
L565	O	75.87	84.04	.10	-.03	.79	65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT),S-2
L176I	*	75.91	84.99	.85	.55	.72	65I	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
L308	O	75.91	84.29	.32	.11	.71	65N	BLUE REFLECTANCE (DIRECTIONAL), DIANO/MARTIN SWEETS, S-4
L210M	O	76.04	83.81	.03	-.30	.78	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L122	O	76.06	83.81	.05	-.31	.80	65N	BLUE REFLECTANCE (DIRECTIONAL), DIANO/MARTIN SWEETS, S-4
L213	*	76.06	84.62	.67	.21	.59	65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M
L587	*	76.07	84.66	.71	.22	.79	65I	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
L260	*	76.14	84.19	.38	-.13	.85	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L285	O	76.14	84.65	.74	.16	1.34	65N	BLUE REFLECTANCE (DIRECTIONAL), DIANO/MARTIN SWEETS, S-4
L158	O	76.22	84.40	.60	-.06	2.18	65N	BLUE REFLECTANCE (DIRECTIONAL), DIANO/MARTIN SWEETS, S-4
L523	O	76.31	84.11	.44	-.31	.54	65N	BLUE REFLECTANCE (DIRECTIONAL), DIANO/MARTIN SWEETS, S-4
L339	*	76.37	83.12	-.28	-.99	1.40	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L301	*	76.40	84.37	.70	-.21	.88	65G	BLUE REFLECTANCE (DIRECTIONAL), GARDNER
L543	O	76.47	83.81	.31	-.63	.89	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L241	*	76.54	85.52	1.67	.42	1.00	65I	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
L225	O	76.56	84.14	.62	-.49	1.50	65N	BLUE REFLECTANCE (DIRECTIONAL), DIANO/MARTIN SWEETS, S-4
L598	#	76.69	86.02	2.15	.62	2.45	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L223	*	76.87	85.89	2.16	.39	.91	65G	BLUE REFLECTANCE (DIRECTIONAL), GARDNER
L328	*	76.95	83.85	.65	-.97	.67	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L249	*	77.12	84.22	1.05	-.87	.59	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L626	*	77.97	86.12	3.05	-.30	.40	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L312	*	78.00	84.37	1.72	-1.44	2.42	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L278	*	78.12	86.12	3.14	-.42	1.55	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L321	*	78.81	86.81	4.11	-.50	2.93	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L380	*	78.87	84.62	2.47	-1.95	2.96	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L562	*	81.00	86.00	4.89	-2.70	.00	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
GMEANS:		75.79	83.98			1.00		
		95% ELLIPSE:		1.36	.98	WITH GAMMA = 50 DEGREES		


BLUE REFLECTANCE, DIRECTIONAL
SAMPLE J37 = 75.8 PERCENT
SAMPLE J35 = 84.0 PERCENT
+,X,* NOT IN GRAND MEANS
ANALYSIS T65-1
SAMPLE J35
PERCENT
85.5
84.5
83.5
82.5
SAMPLE J37
74.5
75.5
76.5
77.5
PERCENT

REPORT NO. 54G TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1978

ANALYSIS T65-2 TABLE 1

DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)

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

LAB CODE	SAMPLE J37 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J35 MEAN	PRINTING 94 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L121	75.19	-.24	-.82	.30	2.05	84.40	-.03	-.22	.08	.90	65K	O	L121
L136	75.88	.45	1.53	.12	.80	84.68	.25	1.75	.17	1.87	65P	O	L136
L170	75.10	-.33	-1.12	.05	.36	84.20	-.23	-1.61	.00	.00	65B	O	L170
L182	75.45	.02	.06	.19	1.26	84.46	.03	.20	.11	1.15	65P	O	L182
L210K	76.70	1.27	4.32	.16	1.09	85.41	.98	6.94	.07	.76	65K	#	L210K
L236	75.18	-.25	-.87	.11	.73	84.41	-.02	-.13	.07	.76	65K	O	L236
L250T	75.79	.36	1.22	.11	.73	84.48	.05	.38	.17	1.83	65F	O	L250T
L280	75.77	.34	1.17	.18	1.21	84.48	.05	.36	.11	1.23	65Q	O	L280
L325	76.42	.99	3.38	.15	1.01	85.61	1.18	8.33	.13	1.40	65P	#	L325
L349	76.06	.63	2.17	.14	.93	85.45	1.02	7.21	.05	.56	65K	#	L349
L362	74.46	-.97	-3.30	.12	.85	83.36	-1.07	-7.56	.07	.76	65K	#	L362
L446	75.17	-.26	-.88	.14	.95	84.28	-.15	-1.05	.10	1.03	65P	O	L446
L575	75.49	.07	.22	.12	.81	84.32	-.11	-.79	.04	.40	65F	O	L575
L636	75.28	-.15	-.52	.16	1.10	84.58	.16	1.11	.08	.81	65K	O	L636
GR. MEAN = 75.43 PERCENT						GRAND MEAN = 84.43 PERCENT					TEST DETERMINATIONS = 8		
SD MEANS = .29 PERCENT						SD OF MEANS = .14 PERCENT					10 LABS IN GRAND MEANS		
AVERAGE SDR = .15 PERCENT						AVERAGE SDR = .09 PERCENT							
L289	75.41	-.02	-.05	.08	.57	84.35	-.08	-.55	.05	.58	65O	*	L289

TOTAL NUMBER OF LABORATORIES REPORTING = 15

Best values: J37 75.4 percent
J35 84.4 percent

The following laboratories were omitted from the grand means because of extreme test results: 210K, 325, 349, 362

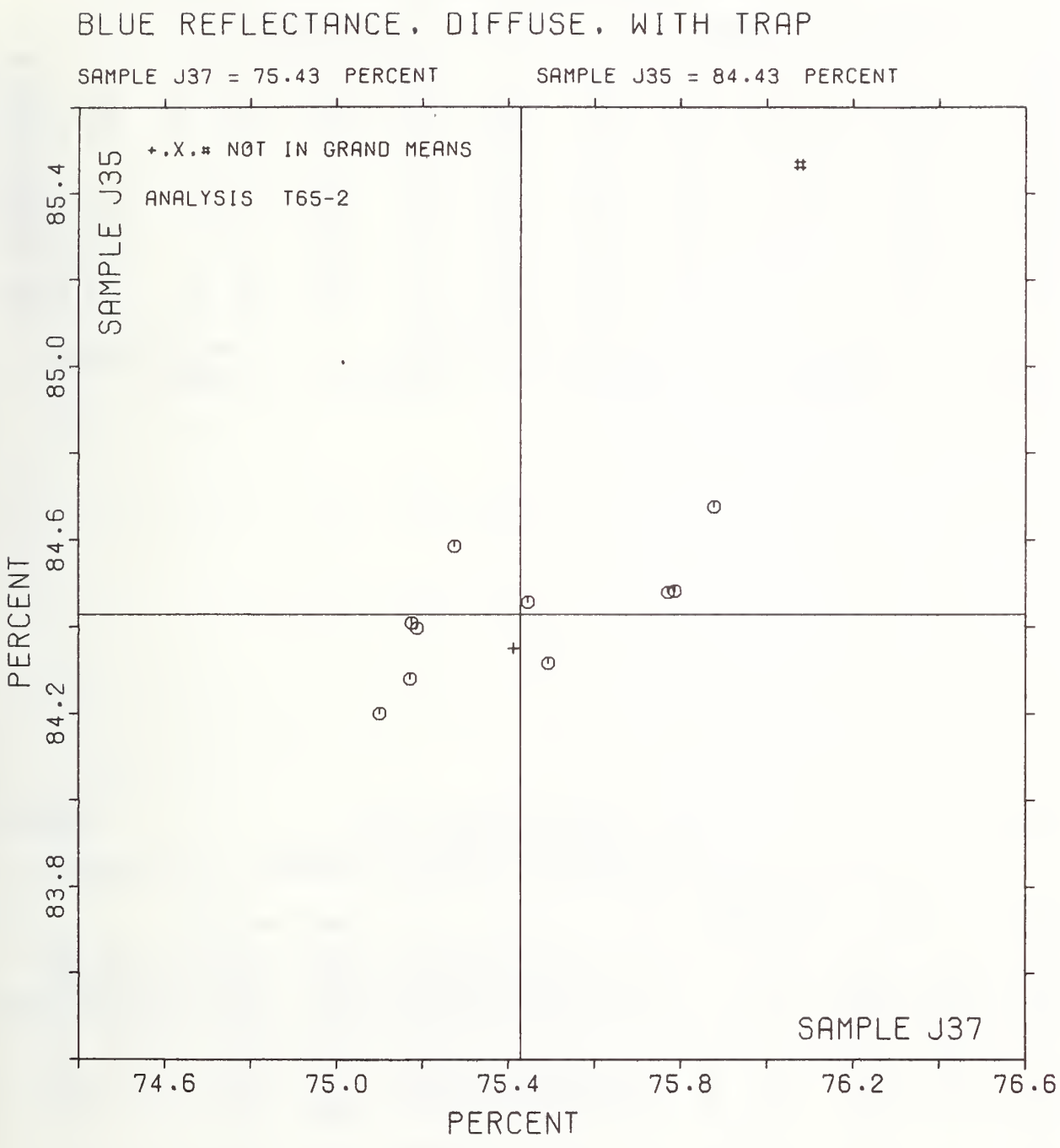
REPORT NO. 54G TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1978

ANALYSIS T65-2 TABLE 2

DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)

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

LAB CODE	P	MEANS J37	J35	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L362	#	74.46	83.36	-1.27	-.68	.81	65K	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE
L170	O	75.10	84.20	-.39	-.10	.18	65B	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NBS ABSOLUTE BASE
L446	O	75.17	84.28	-.29	-.05	.99	65F	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE
L236	O	75.18	84.41	-.24	.07	.75	65K	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE
L121	O	75.19	84.40	-.24	.05	1.47	65K	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE
L636	O	75.28	84.58	-.09	.20	.96	65K	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE
L289	*	75.41	84.35	-.04	-.07	.57	65O	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, SPECIFIC CALIBRATION
L182	O	75.45	84.46	.03	.02	1.21	65P	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE
L575	O	75.49	84.32	.02	-.13	.60	65F	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE
L280	O	75.77	84.48	.34	-.07	1.22	65Q	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, ZEISS ABSOLUTE BASE
L250T	O	75.79	84.48	.36	-.07	1.28	65P	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE
L136	O	75.88	84.68	.51	.08	1.34	65F	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE
L349	#	76.06	85.45	.94	.75	.74	65K	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE
L325	#	76.42	85.61	1.33	.78	1.20	65P	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE
L210K	#	76.70	85.41	1.52	.50	.93	65K	DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE
GMEANS:		75.43	84.43			1.00		
95% ELLIPSE:				.98	.32	WITH GAMMA = 19 DEGREES		


BLUE REFLECTANCE, DIFFUSE, WITH TRAP
SAMPLE J37 = 75.43 PERCENT
SAMPLE J35 = 84.43 PERCENT
+.X.# NOT IN GRAND MEANS
ANALYSIS T65-2
SAMPLE J35
SAMPLE J37
PERCENT
PERCENT
85.4
85.0
84.6
84.2
83.8
74.6
75.0
75.4
75.8
76.2
76.6

REPORT NO. 54G TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1978

ANALYSIS T65-3 TABLE 1

DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)

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

LAB CODE	SAMPLE J37 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J35 MEAN	PRINTING 94 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 8 VAR	F	LAB
L115	74.97	-1.61	-4.33	.13	1.18	82.64	-1.64	-5.01	.06	1.10	65E	#	L115
L152	76.49	-.09	-.24	.13	1.15	82.90	-1.37	-4.21	.05	.92	65E	#	L152
L157	76.56	-.03	-.07	.10	.89	83.90	-.38	-1.16	.05	.92	65E	O	L157
L161	77.02	.43	1.17	.11	1.01	84.37	.09	.29	.05	.86	65E	O	L161
L173A	76.68	.10	.26	.14	1.22	84.66	.38	1.17	.04	.61	65E	O	L173A
L194	75.80	-.79	-2.12	.05	.42	83.65	-.63	-1.92	.00	.00	65E	O	L194
L238A	76.87	.28	.76	.08	.68	84.27	-.00	-.01	.07	1.22	65E	O	L238A
L244	76.85	.26	.70	.11	1.04	84.72	.44	1.35	.08	1.31	65D	O	L244
L251	76.52	-.06	-.17	.09	.83	84.10	-.18	-.55	.05	.92	65E	O	L251
L255	78.16	1.57	4.23	.16	1.48	86.04	1.77	5.41	.05	.91	65D	#	L255
L360	76.92	.33	.90	.21	1.86	84.47	.20	.60	.10	1.78	65E	O	L360
L384	76.41	-.17	-.46	.16	1.40	84.29	.01	.04	.06	1.11	65S	O	L384
L565	76.22	-.36	-.97	.07	.64	84.34	.06	.19	.07	1.28	65W	O	L565

GR. MEAN = 76.58 PERCENT GRAND MEAN = 84.28 PERCENT TEST DETERMINATIONS = 8

SD MEANS = .37 PERCENT SD OF MEANS = .33 PERCENT 10 LABS IN GRAND MEANS

AVERAGE SDR = .11 PERCENT AVERAGE SDR = .06 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 13

Best values: J37 76.5 percent
J35 84.3 percent

The following laboratories were omitted from the grand means because of extreme test results: 115, 152, 255

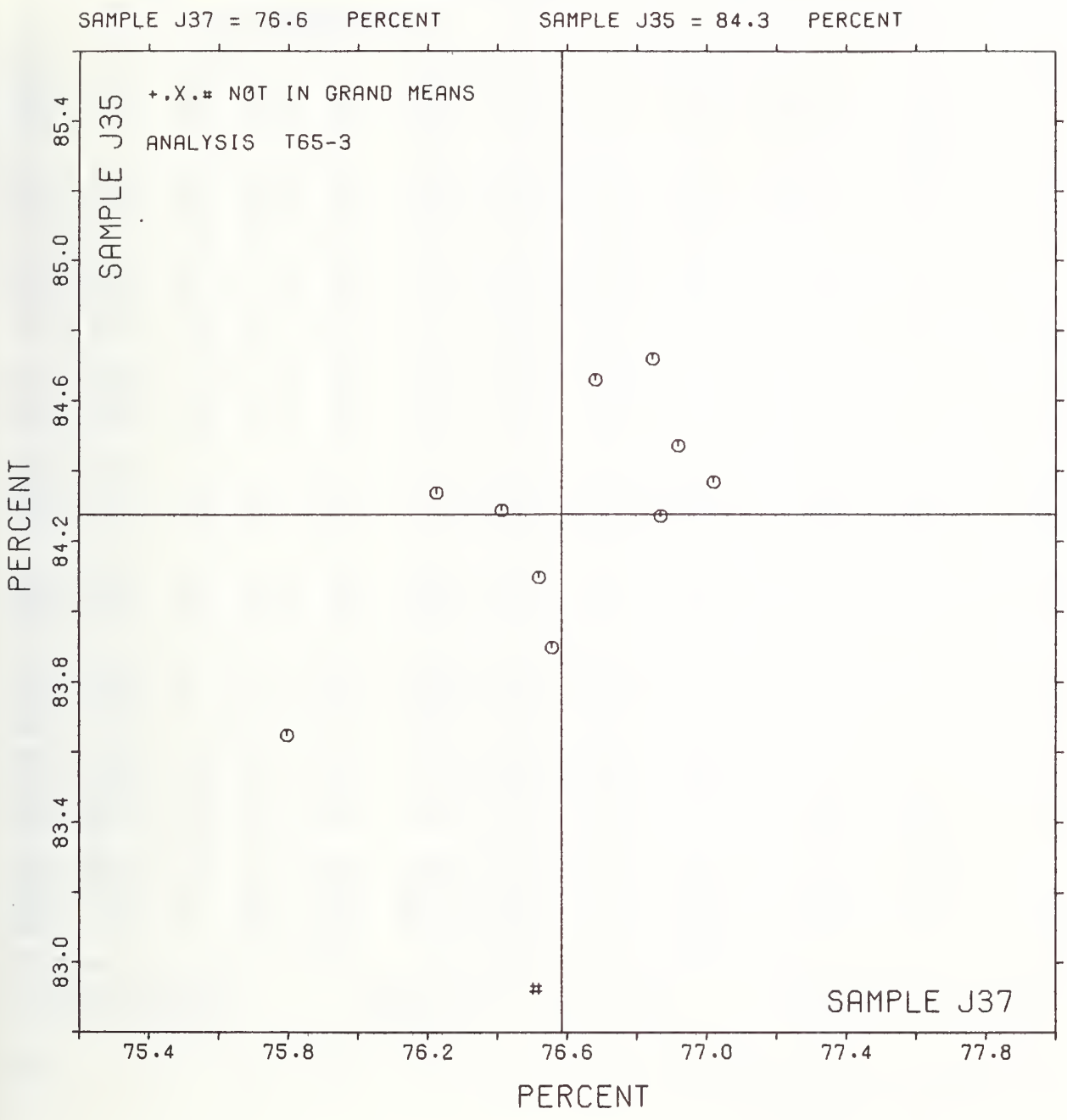
REPORT NO. 54G TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1978

ANALYSIS T65-3 TABLE 2

DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)

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

LAB CODE	F	MEANS J37	J35	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L115	#	74.97	82.64	-2.28	-.23	1.14	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L194	O	75.80	83.65	-1.01	.02	.21	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L565	O	76.22	84.34	-.24	.28	.96	65W	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, NBS MGO BASE
L384	O	76.41	84.29	-.12	.12	1.25	65S	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, ABSOLUTE-UNKNOWN BASE
L152	#	76.49	82.90	-.95	-1.00	1.04	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L251	O	76.52	84.10	-.16	-.10	.88	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L157	O	76.56	83.90	-.26	-.27	.91	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L173A	O	76.68	84.66	.32	.23	.91	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L244	O	76.85	84.72	.48	.17	1.17	65D	DIFFUSE REFLECTANCH, ELREPHO, NO TRAP, NRC-PTB ABSOLUTE
L238A	O	76.87	84.27	.22	-.18	.95	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L360	O	76.92	84.47	.38	-.06	1.82	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L161	O	77.02	84.37	.39	-.21	.94	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L255	#	78.16	86.04	2.34	.36	1.19	65D	DIFFUSE REFLECTANCH, ELREPHO, NO TRAP, NRC-PTB ABSOLUTE
GMEANS:		76.58	84.28			1.00		
95% ELLIPSE:				1.44	.62	WITH GAMMA = 39 DEGREES		


BLUE REFLECTANCE, DIFFUSE, NØ TRAP
SAMPLE J37 = 76.6 PERCENT
SAMPLE J35 = 84.3 PERCENT
+.X.# NØT IN GRAND MEANS
ANALYSIS T65-3
SAMPLE J35
SAMPLE J37
PERCENT
PERCENT
85.4
85.0
84.6
84.2
83.8
83.4
83.0
75.4
75.8
76.2
76.6
77.0
77.4
77.8

ANALYSIS T75-1 TABLE 1

SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS

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

LAB CODE	SAMPLE E58 MEAN	CAST COATED 211 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J20 MEAN	PRINTING 149 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L108	85.31	.99	.93	.27	.56	48.53	.85	.44	1.20	.87	75H	O	L108
L121	83.21	-1.11	-1.04	.27	.57	46.71	-.97	-.50	.97	.70	75H	O	L121
L122	83.24	-1.08	-1.01	.40	.83	46.50	-1.18	-.61	1.99	1.43	75H	O	L122
L128	84.00	-.32	-.30	.47	.98	48.70	1.02	.53	1.25	.90	75G	O	L128
L136	84.10	-.22	-.21	.23	.47	50.16	2.48	1.29	.93	.67	75G	O	L136
L153	84.40	.08	.07	.77	1.61	50.20	2.52	1.31	1.16	.84	75G	O	L153
L162	86.39	2.07	1.93	.26	.54	52.19	4.51	2.34	1.20	.87	75G	O	L162
L166	88.40	4.08	3.81	1.35	2.81	51.50	3.82	1.98	1.08	.78	75B	X	L166
L173A	86.10	1.78	1.66	.32	.66	46.90	-.78	-.41	1.60	1.15	75G	O	L173A
L182	84.67	.35	.33	.49	1.02	45.84	-1.84	-.96	1.86	1.34	75H	O	L182
L189	86.10	1.78	1.66	.74	1.54	50.50	2.82	1.46	.94	.68	75P	O	L189
L190R	83.43	-.89	-.83	.39	.80	47.82	.14	.07	1.21	.87	75G	O	L190R
L206	84.14	-.18	-.17	.29	.61	47.37	-.31	-.16	1.82	1.31	75H	O	L206
L210	85.81	1.49	1.39	.40	.84	48.69	1.01	.52	1.94	1.40	75H	O	L210
L211	83.48	-.84	-.78	.27	.55	48.43	.75	.39	1.60	1.16	75H	O	L211
L213	83.88	-.44	-.41	.29	.61	47.20	-.48	-.25	1.83	1.32	75H	O	L213
L223	84.94	.62	.58	.31	.64	47.18	-.50	-.26	1.29	.93	75H	O	L223
L224	82.92	-1.40	-1.31	.32	.66	43.50	-4.18	-2.17	1.58	1.14	75H	O	L224
L230	84.90	.58	.54	.32	.66	47.10	-.58	-.30	1.85	1.34	75H	O	L230
L243	84.30	-.02	-.02	.48	1.01	47.00	-.68	-.35	1.49	1.07	75B	O	L243
L251	83.15	-1.17	-1.09	.88	1.84	44.65	-3.03	-1.57	1.58	1.14	75G	O	L251
L253P	84.54	.22	.21	.30	.62	47.97	.29	.15	1.10	.80	75G	O	L253P
L255	84.60	.28	.26	.52	1.07	48.30	.62	.32	1.42	1.02	75H	O	L255
L256	84.08	-.24	-.22	.36	.76	47.40	-.28	-.15	1.83	1.32	75H	O	L256
L259	83.54	-.78	-.73	.34	.71	47.53	-.15	-.08	1.37	.99	75H	O	L259
L262	85.20	.88	.82	.42	.88	50.50	2.82	1.46	.97	.70	75K	O	L262
L278	84.41	.09	.08	.24	.50	49.88	2.20	1.14	1.57	1.13	75G	O	L278
L279	83.10	-1.22	-1.14	.32	.66	46.30	-1.38	-.72	1.16	.84	75G	O	L279
L291	83.27	-1.05	-.98	.21	.44	44.33	-3.35	-1.74	1.24	.89	75H	O	L291
L301	83.83	-.49	-.46	.44	.91	47.03	-.65	-.34	1.39	1.00	75H	O	L301
L315	85.00	.68	.64	.94	1.96	45.40	-2.28	-1.18	1.43	1.03	75G	O	L315
L317	86.25	1.93	1.80	.50	1.04	46.26	-1.42	-.74	1.14	.83	75H	O	L317
L321	96.65	12.33	11.52	3.24	6.75	54.10	6.42	3.33	.84	.61	75G	#	L321
L323	83.71	-.61	-.57	.40	.84	46.64	-1.04	-.54	1.16	.84	75H	O	L323
L328	88.43	4.11	3.84	.36	.75	47.46	-.22	-.12	1.96	1.41	75H	X	L328
L339	86.30	1.98	1.85	2.00	4.17	50.65	2.97	1.54	1.00	.72	75P	O	L339
L349	85.84	1.52	1.42	.58	1.20	48.52	.64	.33	1.57	1.13	75H	O	L349
L388	82.90	-1.42	-1.33	1.31	2.72	50.05	2.37	1.23	1.61	1.16	75P	O	L388
L396	83.40	-.92	-.86	.52	1.07	48.80	1.12	.58	1.48	1.06	75G	O	L396
L456	83.93	-.39	-.36	.22	.45	46.89	-.79	-.41	1.43	1.03	75H	O	L456
L483	79.33	-4.99	-4.66	1.83	3.82	45.23	-2.45	-1.27	1.87	1.35	75H	X	L483
L574	81.90	-2.42	-2.26	.57	1.18	45.50	-2.18	-1.13	.85	.61	75G	O	L574
L583	84.44	.12	.11	.36	.76	47.02	-.66	-.34	.64	.46	75H	O	L583
L587	84.80	.48	.45	.63	1.32	50.70	3.02	1.57	1.49	1.08	75H	O	L587
L592	83.73	-.59	-.55	.33	.69	45.08	-2.60	-1.35	1.35	.98	75H	O	L592
L643	84.19	-.13	-.12	.50	1.04	46.92	-.76	-.40	1.74	1.26	75H	O	L643

GR. MEAN = 84.32 GLOSS UNITS — GRAND MEAN = 47.68 GLOSS UNITS — TEST DETERMINATIONS = 10

SD MEANS = 1.07 GLOSS UNITS — SD OF MEANS = 1.93 GLOSS UNITS — 42 LABS IN GRAND MEANS

AVERAGE SDR = .48 GLOSS UNITS — AVERAGE SDR = 1.39 GLOSS UNITS

L250	87.70	3.38	3.16	.95	1.97	47.70	.02	.01	.67	.49	75Q	*	L250
L288	83.13	-1.19	-1.11	.07	.14	47.29	-.39	-.20	1.36	.98	75I	*	L288

TOTAL NUMBER OF LABORATORIES REPORTING = 48

Best values: E58 84 ± 1 gloss units
J20 47 ± 3 gloss units

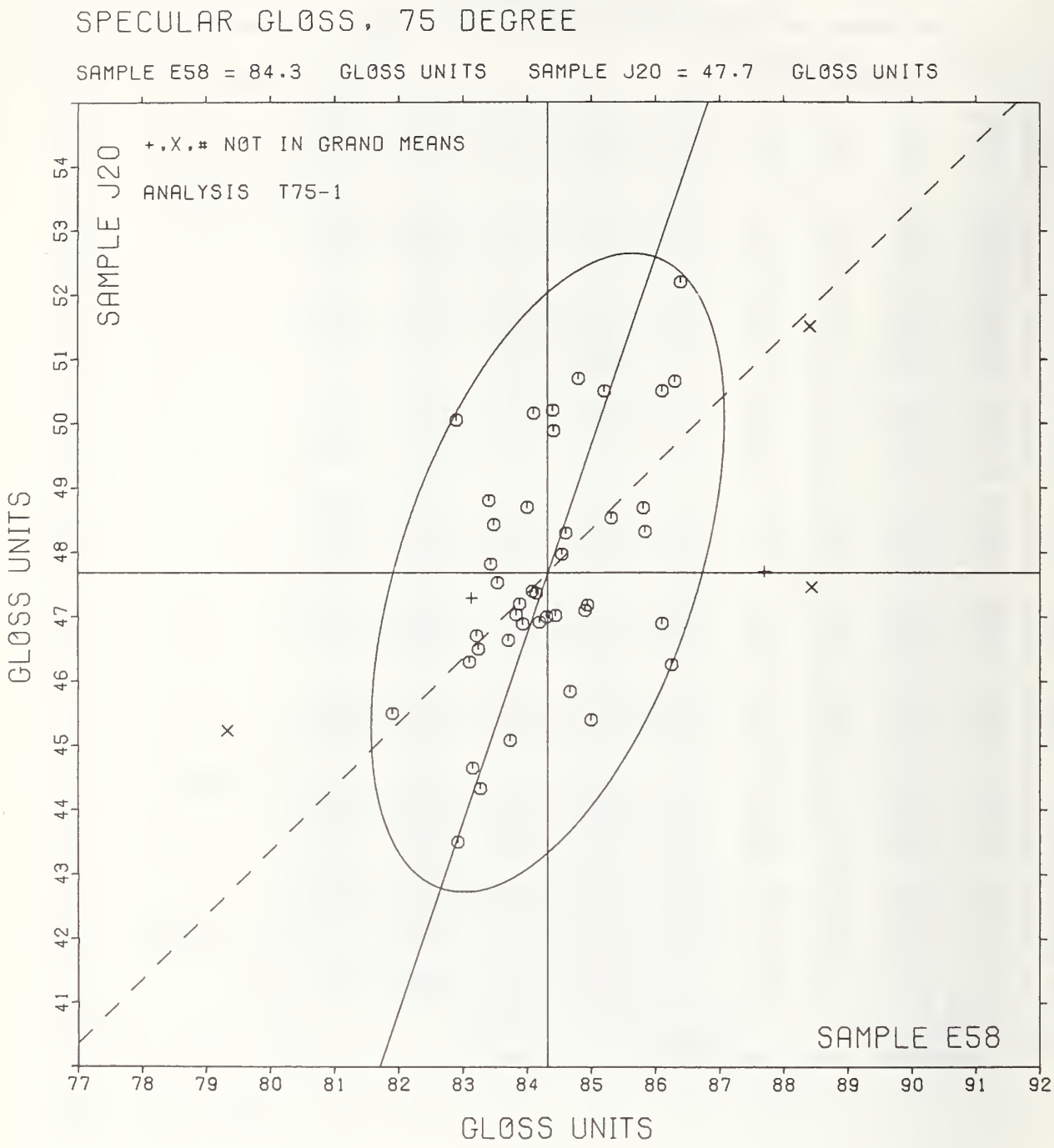
The following laboratories were omitted from the grand means because of extreme test results: 321

ANALYSIS T75-1 TABLE 2

SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS

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

LAB CODE	P	MEANS E58	MEANS J20	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L483	X	79.33	45.23	-3.93	3.93	2.58	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L574	O	81.90	45.50	-2.85	1.58	.90	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L388	O	82.90	50.05	1.78	2.11	1.94	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L224	O	82.92	43.50	-4.41	-.03	.90	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L279	O	83.10	46.30	-1.70	.71	.75	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L288	*	83.13	47.29	-.76	1.00	.56	75I	SPECULAR GLOSS (75 DEGREE), HUNTER, 20 C, 65% RH
L251	O	83.15	44.65	-3.25	.13	1.49	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L121	O	83.21	46.71	-1.28	.74	.63	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L122	O	83.24	46.50	-1.47	.64	1.13	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L291	O	83.27	44.33	-3.51	-.09	.67	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L396	O	83.40	48.80	.76	1.23	1.07	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L190R	O	83.43	47.82	-.16	.89	.84	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L211	O	83.48	48.43	.44	1.04	.85	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L259	O	83.54	47.55	-.40	.69	.85	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L323	O	83.71	46.64	-1.18	.24	.84	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L592	O	83.73	45.08	-2.65	-.28	.84	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L301	O	83.83	47.03	-.78	.25	.96	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L213	O	83.88	47.20	-.60	.26	.96	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L456	O	83.93	46.89	-.88	.11	.74	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L128	O	84.00	48.70	.86	.63	.94	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L256	O	84.08	47.40	-.34	.14	1.04	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L136	O	84.10	50.16	2.27	1.01	.57	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L206	O	84.14	47.37	-.35	.07	.96	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L643	O	84.19	46.92	-.76	-.12	1.15	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L243	O	84.30	47.00	-.65	-.20	1.04	75B	SPECULAR GLOSS (75 DEGREE), BAUSCH * LOMB
L153	O	84.40	50.20	2.41	.74	1.22	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L278	O	84.41	49.88	2.11	.62	.82	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L583	O	84.44	47.02	-.59	-.33	.61	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L253P	O	84.54	47.97	.34	-.12	.71	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L255	O	84.60	48.30	.68	-.07	1.05	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L182	O	84.67	45.84	-1.63	-.93	1.18	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L587	O	84.80	50.70	3.01	.52	1.20	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L230	O	84.90	47.10	-.36	-.74	1.00	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L223	O	84.94	47.18	-.27	-.75	.78	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L315	O	85.00	45.40	-1.94	-1.38	1.50	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L262	O	85.20	50.50	2.95	.08	.79	75K	SPECULAR GLOSS (75 DEGREE), GAERTNER (K-C TYPE)
L108	O	85.31	48.53	1.12	-.66	.71	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L210	O	85.81	48.69	1.44	-1.08	1.12	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L349	O	85.84	48.32	1.10	-1.23	1.17	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L173A	O	86.10	46.90	-.16	-1.94	.90	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L189	O	86.10	50.50	3.24	-.77	1.11	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L317	O	86.25	46.26	-.72	-2.29	.93	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L339	O	86.30	50.65	3.45	-.91	2.45	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L162	O	86.39	52.19	4.94	-.50	.70	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L250	*	87.70	47.70	1.11	-3.19	1.23	75Q	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT, 20 C, 65% RH
L166	X	88.40	51.50	4.93	-2.63	1.79	75B	SPECULAR GLOSS (75 DEGREE), BAUSCH * LOMB
L328	X	88.43	47.46	1.12	-3.96	1.08	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L321	#	96.65	54.10	10.06	-9.60	3.68	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
GMEANS:		84.32	47.68			1.00		
		95% ELLIPSE:		5.18	2.31	WITH GAMMA * 71 DEGREES		


SPECULAR GLOSS, 75 DEGREE
SAMPLE E58 = 84.3 GLOSS UNITS SAMPLE J20 = 47.7 GLOSS UNITS
+,X,# NOT IN GRAND MEANS
ANALYSIS T75-1
SAMPLE J20
GLOSS UNITS
SAMPLE E58
GLOSS UNITS
41 42 43 44 45 46 47 48 49 50 51 52 53 54
77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92

ANALYSIS T90-1 TABLE 1
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI STANDARD T411 OS-76

LAB CODE	SAMPLE J63 MEAN	PRINTING 102 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE B28 MEAN	BAG 83 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L105	5.283	.005	.06	.038	.73	5.503	-.003	-.03	.113	1.12	90Q	O	L105
L118	5.292	.014	.17	.037	.71	5.623	.117	1.03	.059	.59	90V	O	L118
L122	5.235	-.043	-.50	.035	.68	5.565	.059	.52	.194	1.92	90V	O	L122
L123F	5.445	.167	1.96	.055	1.06	5.610	.104	.91	.122	1.21	90F	O	L123F
L125	5.302	.024	.28	.036	.70	5.618	.112	.98	.072	.71	90T	O	L125
L128	5.220	-.058	-.68	.023	.45	5.430	-.076	-.67	.088	.87	90T	O	L128
L131	5.410	.132	1.55	.032	.61	5.690	.184	1.62	.088	.87	90T	O	L131
L139	5.320	.042	.50	.048	.93	5.530	.024	.21	.134	1.32	90T	O	L139
L141	5.108	-.170	-2.00	.336	6.48	5.344	-.162	-1.43	.095	.94	90T	O	L141
L153	5.353	.075	.88	.051	.99	5.447	-.059	-.52	.101	1.00	90T	O	L153
L158	5.330	.052	.61	.035	.67	5.640	.134	1.18	.077	.77	90T	O	L158
L159	5.309	.031	.37	.047	.91	5.491	-.015	-.14	.079	.78	90T	O	L159
L162	5.258	-.020	-.23	.041	.79	5.509	.003	.02	.068	.67	90D	O	L162
L166	5.288	.010	.12	.030	.57	5.529	.023	.20	.119	1.18	90T	O	L166
L173B	5.410	.132	1.55	.032	.61	5.630	.124	1.09	.116	1.15	90F	O	L173B
L174	5.320	.042	.50	.063	1.22	5.520	.014	.12	.140	1.38	90T	O	L174
L182	5.232	-.046	-.53	.055	1.06	5.378	-.128	-1.13	.104	1.03	90L	O	L182
L190C	5.240	-.038	-.44	.052	1.00	5.420	-.086	-.76	.103	1.02	90T	O	L190C
L203A	5.250	-.028	-.33	.071	1.36	5.700	.194	1.71	.189	1.86	90T	*	L203A
L203C	5.340	.062	.73	.052	1.00	5.540	.034	.30	.117	1.16	90T	O	L203C
L213	5.330	.052	.61	.048	.93	5.570	.064	.56	.082	.81	90T	O	L213
L223	5.354	.076	.89	.035	.68	5.684	.178	1.57	.078	.77	90V	O	L223
L228	5.330	.052	.61	.048	.93	5.500	-.006	-.06	.163	1.61	90T	O	L228
L233	5.300	.022	.26	.044	.85	5.401	-.105	-.93	.109	1.08	90Q	O	L233
L238A	5.284	.006	.07	.044	.85	5.570	.064	.56	.078	.78	90T	O	L238A
L241	5.165	-.113	-1.33	.058	1.12	5.400	-.106	-.94	.158	1.56	90T	O	L241
L249	5.300	.022	.26	.050	.96	5.499	-.007	-.07	.101	1.00	90T	O	L249
L259	5.324	.046	.54	.041	.78	5.525	.019	.16	.129	1.27	90T	O	L259
L260	5.279	.001	.01	.022	.42	5.503	-.003	-.03	.100	.99	90T	O	L260
L261	5.395	.117	1.38	.064	1.24	5.570	.064	.56	.106	1.05	90T	O	L261
L262	5.265	-.013	-.15	.053	1.02	5.540	.034	.30	.070	.69	90T	O	L262
L285	5.170	-.108	-1.27	.067	1.30	5.380	-.126	-1.12	.123	1.22	90T	O	L285
L291	5.395	.117	1.38	.044	.84	5.665	.159	1.40	.075	.74	90T	O	L291
L297	5.270	-.008	-.09	.026	.50	5.585	.079	.69	.106	1.04	90T	O	L297
L305	5.175	-.103	-1.21	.082	1.59	5.180	-.326	-2.88	.193	1.91	90T	*	L305
L309	5.240	-.038	-.44	.052	1.00	5.440	-.066	-.59	.117	1.16	90T	O	L309
L318	5.210	-.068	-.80	.066	1.27	5.495	-.011	-.10	.172	1.70	90T	O	L318
L323	5.187	-.091	-1.07	.043	.82	5.474	-.032	-.29	.058	.58	90T	O	L323
L324	5.300	.022	.26	.053	1.02	5.520	.014	.12	.116	1.15	90T	O	L324
L326	5.425	.147	1.73	.049	.94	5.545	.039	.34	.086	.85	90T	O	L326
L328	5.280	.002	.03	.063	1.22	5.530	.024	.21	.116	1.15	90T	O	L328
L331	5.303	.025	.30	.046	.88	5.463	-.043	-.38	.137	1.35	90T	O	L331
L339	5.200	-.078	-.91	.047	.91	5.580	.074	.65	.079	.78	90T	O	L339
L341	5.378	.100	1.18	.024	.46	5.696	.190	1.67	.108	1.07	90T	O	L341
L352	5.332	.054	.64	.030	.58	5.602	.096	.84	.147	1.45	90Q	O	L352
L356	5.163	-.115	-1.35	.029	.55	5.418	-.088	-.78	.077	.77	90T	O	L356
L358	5.273	-.005	-.06	.059	1.13	5.497	-.009	-.08	.074	.73	90T	O	L358
L372	5.280	.002	.03	.042	.81	5.450	-.056	-.50	.071	.70	90T	O	L372
L376	5.220	-.058	-.68	.042	.81	5.480	-.026	-.23	.079	.78	90T	O	L376
L380	5.260	-.018	-.21	.039	.76	5.520	.014	.12	.103	1.02	90T	O	L380
L382	5.390	.112	1.32	.032	.61	5.640	.134	1.18	.097	.96	90T	O	L382
L390	5.170	-.108	-1.27	.116	2.24	5.280	-.226	-2.00	.092	.91	90T	O	L390
L556	5.060	-.218	-2.56	.024	.46	5.254	-.252	-2.23	.103	1.02	90T	*	L556
L557	5.265	-.013	-.15	.063	1.21	5.365	-.141	-1.25	.118	1.17	90T	O	L557
L558	5.330	.052	.61	.048	.93	5.750	.244	2.15	.097	.96	90T	*	L558
L559	5.318	.040	.47	.042	.81	5.535	.029	.25	.068	.67	90T	O	L559
L560	5.300	.022	.26	.067	1.29	5.450	-.056	-.50	.071	.70	90T	O	L560
L561	5.260	-.018	-.21	.084	1.63	5.450	-.056	-.50	.127	1.25	90T	O	L561
L567	5.376	.098	1.15	.048	.92	5.563	.057	.50	.053	.52	90V	O	L567
L574	5.154	-.124	-1.45	.049	.95	5.432	-.074	-.66	.105	1.04	90V	O	L574
L575	5.199	-.079	-.93	.047	.92	5.367	-.139	-1.23	.086	.85	90T	O	L575
L581	5.365	.087	1.02	.034	.65	5.600	.094	.83	.058	.57	90T	O	L581
L587	5.250	-.028	-.33	.053	1.02	5.440	-.066	-.59	.084	.83	90T	O	L587
L626	5.012	-.266	-3.12	.048	.93	5.288	-.218	-1.93	.090	.89	90T	*	L626

GR. MEAN = 5.278 MILS — GRAND MEAN = 5.506 MILS — TEST DETERMINATIONS = 10
SD MEANS = .085 MILS — SD OF MEANS = .113 MILS — 64 LABS IN GRAND MEANS
AVERAGE SDR = .052 MILS — AVERAGE SDR = .101 MILS
GR. MEAN =134.06 MICROMETER — GRAND MEAN =139.86 MICROMETER

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

LAB CODE	SAMPLE J63 PRINTING 102 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE B28 BAG 83 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L185	5.347	.069	.81	.078	1.51	5.332	-.174	-1.54	.048	.48	90B	*	L185
L203B	5.070	-.208	-2.44	.106	2.04	5.200	-.306	-2.70	.211	2.08	90C	*	L203B
L243	5.325	.047	.55	.049	.94	5.495	-.011	-.10	.130	1.29	90S	*	L243
L251	5.193	-.085	-1.00	.031	.60	5.358	-.148	-1.31	.053	.52	90W	*	L251
L322	5.170	-.108	-1.27	.149	2.88	5.550	.044	.38	.242	2.39	90U	*	L322
L330	5.380	.102	1.20	.132	2.54	5.770	.264	2.33	.206	2.03	90U	*	L330
L344	5.390	.112	1.32	.057	1.10	5.640	.134	1.18	.151	1.49	90U	*	L344
L396M	5.090	-.188	-2.21	.057	1.10	4.800	-.706	-6.23	.105	1.04	90S	*	L396M
L484	5.283	.006	.07	.045	.86	5.394	-.113	-1.00	.072	.71	90E	*	L484
L562	5.295	.017	.20	.069	1.32	5.410	-.096	-.85	.081	.80	90C	*	L562
L576	5.249	-.029	-.34	.058	1.12	4.878	-.628	-5.55	.071	.70	90C	*	L576
L616	5.000	-.278	-3.26	.000	.00	5.130	-.376	-3.32	.164	1.62	90C	*	L616

TOTAL NUMBER OF LABORATORIES REPORTING = 76

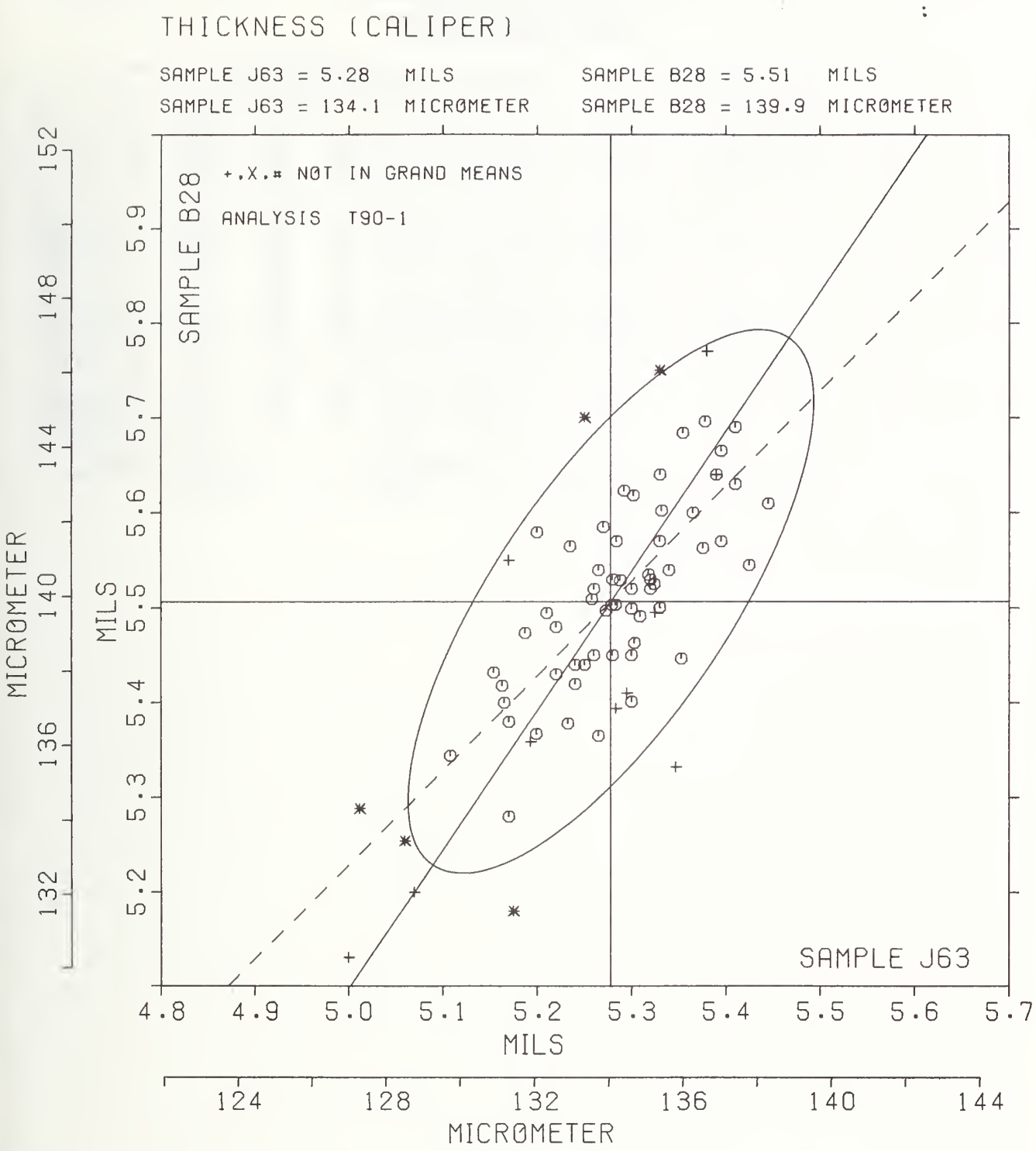
Best values: J63 5.28 ± 0.13 mils
B28 5.50 ± 0.19 mils

ANALYSIS T90-1 TABLE 2
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI STANDARD T411 OS-76

LAB CODE	P	MEANS J63	MEANS B28	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L616	*	5.000	5.130	-.468	.018	.81	90C	THICKNESS (CALIPER), CADY, HAND DRIVEN
L626	*	5.012	5.288	-.330	.097	.91	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L556	*	5.060	5.254	-.331	.038	.74	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L203B	*	5.070	5.200	-.370	-.000	2.06	90C	THICKNESS (CALIPER), CADY, HAND DRIVEN
L396M	*	5.090	4.800	-.690	-.242	1.07	90S	THICKNESS (CALIPER), SCHOPPER, HAND DRIVEN
L141	O	5.108	5.344	-.230	.049	3.71	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L574	O	5.154	5.432	-.131	.061	1.00	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED
L356	O	5.163	5.418	-.138	.045	.66	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L241	O	5.165	5.400	-.151	.033	1.34	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L322	*	5.170	5.550	-.025	.114	2.64	90U	THICKNESS (CALIPER), TMI, HAND DRIVEN
L390	O	5.170	5.280	-.248	-.038	1.57	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L285	O	5.170	5.380	-.165	.018	1.26	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L305	*	5.175	5.180	-.328	-.098	1.75	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L323	O	5.187	5.474	-.078	.057	.70	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L251	*	5.193	5.358	-.170	-.013	.56	90W	THICKNESS (CALIPER), L * W, MOTOR DRIVEN, 20 C, 65% RH
L575	O	5.199	5.367	-.160	-.013	.88	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L339	O	5.200	5.580	.017	.106	.84	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L318	O	5.210	5.495	-.048	.050	1.49	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L376	O	5.220	5.480	-.054	.033	.80	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L128	O	5.220	5.430	-.096	.005	.66	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L182	O	5.232	5.378	-.132	-.035	1.04	90L	THICKNESS (CALIPER), L * W, MOTOR DRIVEN
L122	O	5.235	5.565	.024	.068	1.30	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED
L190C	O	5.240	5.420	-.093	-.017	1.01	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L309	O	5.240	5.440	-.076	-.006	1.08	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L576	*	5.249	4.878	-.536	-.329	.91	90C	THICKNESS (CALIPER), CADY, HAND DRIVEN
L587	O	5.250	5.440	-.071	-.014	.93	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L203A	*	5.250	5.700	.144	.132	1.61	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L162	O	5.258	5.509	-.009	.018	.73	90D	THICKNESS (CALIPER), CADY, MOTOR DRIVEN
L561	O	5.260	5.450	-.057	-.017	1.44	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L380	O	5.260	5.520	.001	.022	.89	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L557	O	5.265	5.365	-.124	-.069	1.19	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L262	O	5.265	5.540	.021	.029	.86	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L297	O	5.270	5.585	.061	.051	.77	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L358	O	5.273	5.497	-.011	-.001	.93	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L260	O	5.279	5.503	-.002	-.003	.71	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L372	O	5.280	5.450	-.045	-.034	.76	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L328	O	5.280	5.530	.021	.011	1.18	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L105	O	5.283	5.503	.000	-.006	.92	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L484	*	5.283	5.394	-.090	-.068	.79	90E	THICKNESS (CALIPER), SCHOPPER, HAND DRIVEN
L238A	O	5.284	5.570	.056	.031	.81	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L166	O	5.288	5.529	.024	.004	.88	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L118	O	5.292	5.623	.104	.054	.65	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED
L562	*	5.295	5.410	-.070	-.068	1.06	90C	THICKNESS (CALIPER), CADY, HAND DRIVEN
L249	O	5.300	5.499	.006	-.023	.98	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L324	O	5.300	5.520	.024	-.011	1.08	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L560	O	5.300	5.450	-.034	-.050	.99	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L233	O	5.300	5.401	-.075	-.078	.96	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L125	O	5.302	5.618	.106	.043	.71	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L331	O	5.303	5.463	-.022	-.045	1.12	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L159	O	5.309	5.491	.005	-.034	.84	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L559	O	5.318	5.535	.046	-.017	.74	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L174	O	5.320	5.520	.035	-.027	1.30	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L139	O	5.320	5.530	.043	-.022	1.13	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L259	O	5.324	5.525	.041	-.028	1.03	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L243	*	5.325	5.495	.017	-.045	1.11	90S	THICKNESS (CALIPER), SCHOPPER, HAND DRIVEN
L228	O	5.330	5.500	.024	-.047	1.27	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L213	O	5.330	5.570	.082	-.007	.87	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L558	*	5.330	5.750	.231	.094	.95	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L158	O	5.330	5.640	.140	.032	.72	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L352	O	5.332	5.602	.109	.009	1.02	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L203C	O	5.340	5.540	.063	-.033	1.08	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L185	*	5.347	5.332	-.105	-.155	.99	90B	THICKNESS (CALIPER), ANTHOR, HAND DRIVEN
L153	O	5.353	5.447	-.007	-.096	.99	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L223	O	5.354	5.684	.190	.037	.72	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED
L581	O	5.365	5.600	.126	-.020	.61	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN

ANALYSIS T90-1 TABLE 2
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI STANDARD T411 OS-76

LAB CODE	F	MEANS J63	MEANS B28	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L567	O	5.376	5.563	.102	-.049	.72	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED
L341	O	5.378	5.696	.213	.024	.76	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L330	*	5.380	5.770	.275	.064	2.29	90U	THICKNESS (CALIPER), TMI, HAND DRIVEN
L382	O	5.390	5.640	.174	-.018	.78	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L344	*	5.390	5.640	.174	-.018	1.29	90U	THICKNESS (CALIPER), TMI, HAND DRIVEN
L261	O	5.395	5.570	.118	-.061	1.14	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L291	O	5.395	5.665	.197	-.008	.79	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L173B	O	5.410	5.630	.176	-.040	.88	90F	THICKNESS (CALIPER), FEDERAL, MOTOR DRIVEN
L131	O	5.410	5.690	.226	-.006	.74	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L326	O	5.425	5.545	.115	-.100	.90	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L123F	O	5.445	5.610	.180	-.080	1.13	90F	THICKNESS (CALIPER), FEDERAL, MOTOR DRIVEN
GMEANS:		5.278	5.506			1.00		
		95% ELLIPSE:		.336	.125	WITH GAMMA = 55 DEGREES		


THICKNESS (CALIPER)
SAMPLE J63 = 5.28 MILS
SAMPLE J63 = 134.1 MICROMETER
SAMPLE B28 = 5.51 MILS
SAMPLE B28 = 139.9 MICROMETER
+.X.* NOT IN GRAND MEANS
ANALYSIS T90-1
SAMPLE B28
MILS
MICROMETER
SAMPLE J63
4.8 4.9 5.0 5.1 5.2 5.3 5.4 5.5 5.6 5.7
MILS
124 128 132 136 140 144
MICROMETER

ANALYSIS T95-1 TABLE 1
GRAMMAGE (MASS PER UNIT AREA)
TAPPI STANDARD T410 OS-68

LAB CODE	SAMPLE D28 MEAN	KRAFT 96 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE D29 MEAN	KRAFT 123 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L121	96.13	.38	.57	.85	1.16	124.30	-.06	-.09	.54	.94	95B	ó	L121
L162	6.25	-89.50	-132.56	.00	.00	8.25	-116.11	-191.06	.00	.00	95K	#	L162
L213	95.61	-.14	-.20	.68	.93	124.10	-.26	-.42	.80	1.40	95F	ó	L213
L233	107.04	11.29	16.73	.35	.48	139.81	15.45	25.43	.58	1.01	95T	#	L233
L249	96.04	.29	.44	.55	.74	125.00	.64	1.06	.00	.00	95I	ó	L249
L280	95.82	.07	.11	.55	.74	124.78	.42	.70	.87	1.51	95T	ó	L280
L297	94.63	-1.11	-1.65	.29	.39	123.67	-.69	-1.14	.58	1.00	95C	ó	L297
L305	96.79	1.04	1.55	.75	1.02	124.96	.60	.99	.63	1.10	95T	ó	L305
L339	96.34	.59	.88	.30	.40	124.80	.44	.73	.00	.00	95T	ó	L339
L344	96.04	.30	.44	.32	.43	125.03	.68	1.11	.29	.50	95T	ó	L344
L557	96.30	.55	.81	1.11	1.52	96.23	-28.12	-46.28	.99	1.71	95A	#	L557
L558	94.92	-.83	-1.23	.79	1.07	123.59	-.77	-1.26	.94	1.64	95A	ó	L558
L559	95.07	-.68	-1.00	.33	.45	123.23	-1.13	-1.85	.61	1.05	95D	ó	L559
L560	93.27	-2.48	-3.67	.82	1.12	120.94	-3.42	-5.62	.41	.72	95A	#	L560
L561	95.78	.03	.05	1.57	2.14	125.00	.64	1.06	1.14	1.98	95T	ó	L561
L597	96.60	.85	1.26	1.29	1.76	124.40	.04	.07	.00	.00	95C	ó	L597
L616	95.92	.18	.26	.82	1.11	124.38	.02	.04	.83	1.44	95T	ó	L616
L626	94.75	-1.00	-1.48	1.21	1.64	123.75	-.61	-1.00	.83	1.44	95E	ó	L626

GR. MEAN = 95.75 G/SQ.METER GRAND MEAN =124.36 G/SQ.METER TEST DETERMINATIONS = 10
SD MEANS = .68 G/SQ.METER SD OF MEANS = .61 G/SQ.METER 14 LABS IN GRAND MEANS
AVERAGE SDR = .73 G/SQ.METER AVERAGE SDR = .58 G/SQ.METER
TOTAL NUMBER OF LABORATORIES REPORTING = 18

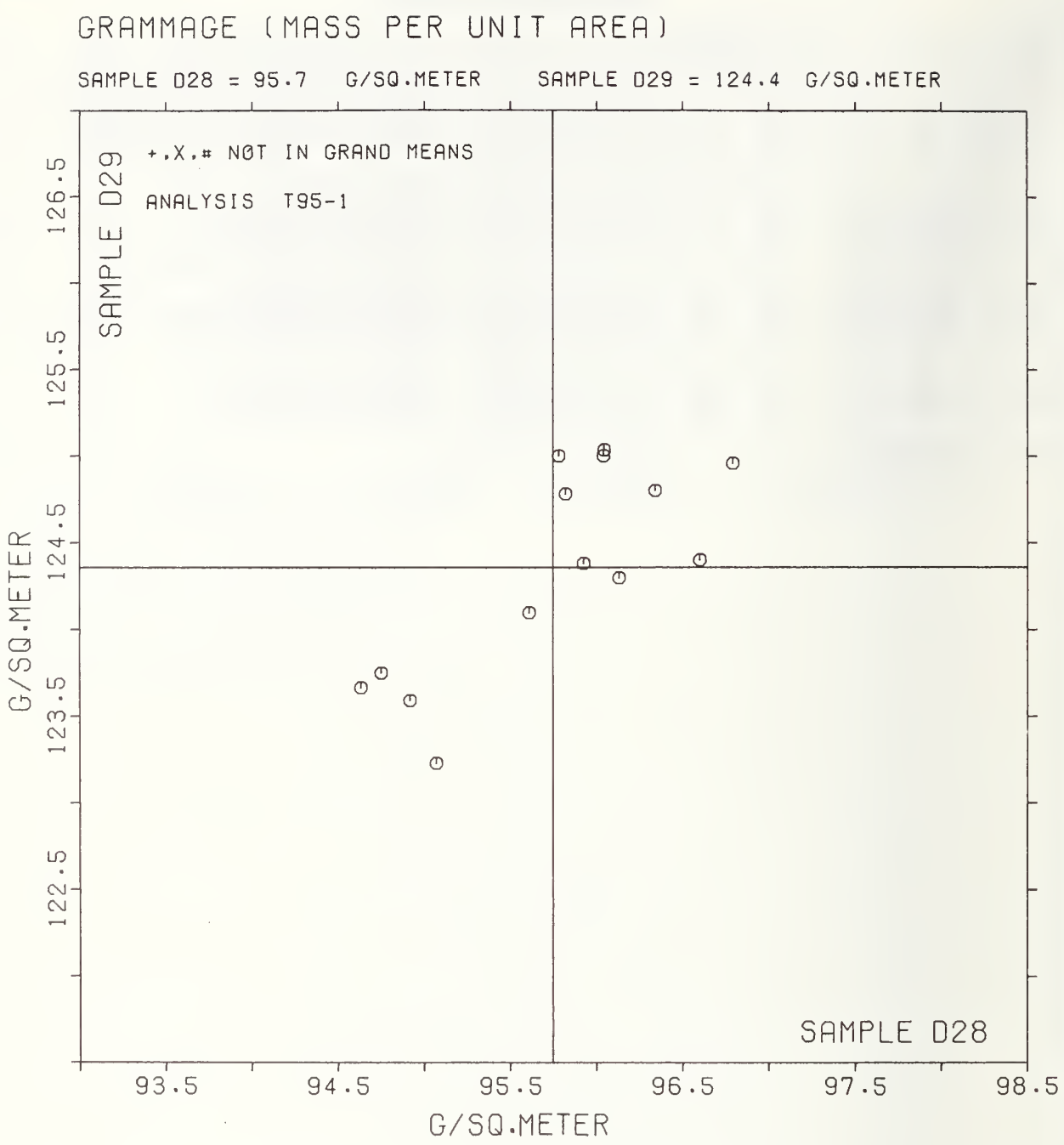
Best values: D28 95.9 ± 1.2 grams per square meter
D29 124.4 ± 0.9 grams per square meter

The following laboratories were omitted from the grand means because of extreme test results: 233, 557, 560

Data from the following laboratories appear to be off by a multiplicative factor: 162

ANALYSIS T95-1 TABLE 2
GRAMMAGE (MASS PER UNIT AREA)
TAPPI STANDARD T410 OS-68

LAB CODE	F	MEANS D28	MEANS D29	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L162	#	6.25	8.25	-143.79	-28.53	.00	95K	BASIS WEIGHT (GRAMMAGE), WEIGHED AS RECEIVED
L560	#	93.27	120.94	-4.11	-.94	.92	95A	BASIS WEIGHT (GRAMMAGE), CHANDLER + PRICE PAPER CUTTER
L297	O	94.63	123.67	-1.29	.21	.70	95C	BASIS WEIGHT (GRAMMAGE), CUTTING BOARD
L626	O	94.75	123.75	-1.15	.20	1.54	95E	BASIS WEIGHT (GRAMMAGE), GUILLOTINE TYPE CUTTER
L558	O	94.92	123.59	-1.13	-.03	1.35	95A	BASIS WEIGHT (GRAMMAGE), CHANDLER + PRICE PAPER CUTTER
L559	O	95.07	123.23	-1.25	-.40	.75	95D	BASIS WEIGHT (GRAMMAGE), DIE CUT
L213	O	95.61	124.10	-.27	-.10	1.16	95F	BASIS WEIGHT (GRAMMAGE), FOUR-SQUARE CUTTER
L561	O	95.78	125.00	.45	.46	2.06	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L280	O	95.82	124.78	.33	.27	1.13	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L616	O	95.92	124.38	.15	-.10	1.27	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L249	O	96.04	125.00	.64	.29	.37	95I	BASIS WEIGHT (GRAMMAGE), INGENTO PAPER CUTTER
L344	O	96.04	125.03	.67	.31	.47	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L121	O	96.13	124.30	.25	-.30	1.05	95B	BASIS WEIGHT (GRAMMAGE), CONCORA CUTTER
L557	#	96.30	96.23	-18.09	-21.54	1.61	95A	BASIS WEIGHT (GRAMMAGE), CHANDLER + PRICE PAPER CUTTER
L339	O	96.34	124.80	.74	-.06	.20	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L597	O	96.60	124.40	.67	-.53	.88	95C	BASIS WEIGHT (GRAMMAGE), CUTTING BOARD
L305	O	96.79	124.96	1.18	-.23	1.06	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L233	#	107.04	139.81	18.67	4.20	.75	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
GMEANS:		95.75	124.36			1.00		
		95% ELLIPSE:		2.49	.87	WITH GAMMA = 41 DEGREES		


GRAMMAGE (MASS PER UNIT AREA)
SAMPLE D28 = 95.7 G/SQ.METER
SAMPLE D29 = 124.4 G/SQ.METER
+.X.# NOT IN GRAND MEANS
ANALYSIS T95-1
SAMPLE D29
SAMPLE D28
G/SQ.METER
G/SQ.METER
126.5
125.5
124.5
123.5
122.5
93.5
94.5
95.5
96.5
97.5
98.5

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	J47	30.0	1.1	1.5	10	50	55	10	1.3	2.9
T40-1 GURLEY UNITS	B73	17.5	1.1	1.5					1.3	3.1
AIR RESISTANCE, SHEFFIELD	J47	106.3	4.7	4.0	10	38	43	10	3.5	13.0
T40-2 SHEFF. UNITS	B73	157.9	7.1	11.1					9.7	19.6
AIR RESISTANCE, GURLEY HG PLOTATION	E37	755.	39.	79.	10	13	14	10	69.	107.
T41-1 SEC/10 CC	B73	1078.	248.	415.					363.	687.
SMOOTHNESS, PARKER PRINTSURF	H45	5.95	.46	.10	10	7	7	10	.09	1.27
T44-1 MICRONS	J12	5.05	.28	.23					.20	.79
SMOOTHNESS, SHEFFIELD	H45	262.9	9.8	9.1	15	78	86	10	7.9	27.5
T45-1 SHEFF. UNITS	J12	143.0	6.7	11.1					9.7	19.3
SMOOTHNESS, BEKK	H45	15.20	1.26	.80	15	7	13	10	.70	3.52
T45-2 BEKK SECONDS	J12	32.78	2.25	4.35					3.81	6.62
SMOOTHNESS, BENDTSEN	H45	460.	120.	42.	10	9	9	10	37.	332.
T47-1 ML/MIN	J12	176.	15.	24.					21.	41.
K & N INK ABSORPTION	B80	23.20	3.05	.66	4	6	8	4	.92	8.46
T56-1 K & N UNITS	E50	64.09	4.61	.33					.46	12.76
PH, COLD	J77	7.31	.35	.09	5	6	6	2	.18	.99
T57-1 PH UNITS	J14	7.31	.40	.05					.11	1.11
PH, HOT	J77	7.748	.127	.053	5	4	6	2	.104	.361
T57-2 PH UNITS	J14	7.756	.066	.067					.131	.210
OPACITY, B&L TYPE, 89% BACKING	E40	96.16	.31	.21	10	74	87	5	.26	.89
T60-1 PERCENT	J57	92.74	.54	.37					.46	1.53
OPACITY, B&L TYPE, PAPER BACKING	E40	96.07	.15	.24	10	7	7	5	.30	.47
T60-2 PERCENT	J57	92.97	.34	.30					.37	.97
OPACITY, ELREPHO TYPE, PAPER BACKING	E40	96.69	.10	.10	10	8	10	5	.12	.29
T60-3 PERCENT	J57	93.55	.18	.18					.23	.51
BLUE REFLECTANCE, DIRECTIONAL	J37	75.79	.42	.16	8	20	42	6	.18	1.17
T65-1 PERCENT	J35	83.98	.44	.14					.16	1.23
BLUE REFLECTANCE, DIFFUSE, WITH TRAP	J37	75.43	.29	.15	8	10	15	6	.17	.82
T65-2 PERCENT	J35	84.43	.14	.09					.10	.40
BLUE REFLECTANCE, DIFFUSE, NO TRAP	J37	76.58	.37	.11	8	10	13	6	.13	1.03
T65-3 PERCENT	J35	84.28	.33	.06					.07	.91
SPECULAR GLOSS, 75 DEGREE	E58	84.32	1.07	.48	10	42	48	5	.60	2.99
T75-1 GLOSS UNITS	J20	47.68	1.93	1.39					1.72	5.47
THICKNESS (CALIPER)	J63	5.278	.085	.052	10	64	76	10	.045	.236
T90-1 MILS	B28	5.506	.113	.101					.089	.314
GRAMMAGE (MASS PER UNIT AREA)	D28	95.75	.68	.73	10	14	18	3	1.17	2.11
T95-1 G/SQ.METER	D29	124.36	.61	.58					.92	1.85

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Collaborative Reference Programs provide participating laboratories with the means for checking periodically the level and uniformity of their testing in comparison with that of other participating laboratories. An important by-product of the programs is the provision of realistic pictures of the state of the testing art. This is one of the periodic reports showing averages for each participant, within and between laboratory variability, and other information for participants and standards committees.

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