

NBS 112

78-1329



TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM
FOR PAPER

REPORT NO. 50G



U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

NBS COLLABORATIVE REFERENCE PROGRAMS

TAPPI Paper and Board (6 times per year)

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

FKBG-API Containerboard (48 times per year)

Mullen burst of linerboard
Concora test of medium

MCCA Color and Appearance (4 times per year)

Gloss at 60°
Color and color difference
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

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

**COLLABORATIVE REFERENCE PROGRAM
FOR PAPER**

Report No. 50G

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U. S. DEPARTMENT OF COMMERCE
National Bureau of Standards

NBSIR 78-1329

INTRODUCTION

Reports 50S and 50G comprise the second 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. On all plots, sample codes and unit of test have been shifted to new positions.

Notes and comments for 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 Edwin B. Randall, Robert G. Powell, or Jeffrey Horlick on 301/921-2946.

Edwin B. Randall, Jr., Administrator
TAPPI Collaborative Reference Program
Laboratory Evaluation Technology Section

February 10, 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.

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TABLE OF CONVERSION FACTORS TO METRIC (SI) UNITS

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

KEY TO TABLES AND GRAPHS

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

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

- VAR - Code for instrument type or variation in condition, see second table.
- F - Flag, with following meaning:
- + - Excluded from grand means because VAR non-standard for this analysis.
- # - Excluded because data were not understood or because of a non-coded variation reported by the laboratory. (See NOTES following Table 1 for each method).
- M - Excluded because data for one sample are missing.
- X - Excluded because plotted point would fall outside of the 99% error ellipse, (see below for explanation of Graph).
- * - Included in grand means but plotted point falls outside of the 95% error ellipse. The participants should take this as a warning to reexamine his testing procedure.
- S - Included in grand mean but only after omission of one or more 'wild' values; that is, test determinations more than 3 times AVERAGE SDR from the laboratory's MEAN. Not more than 20% of the test determination may be excluded in this manner without rejecting the laboratory.
- O - Included in grand mean and inside 95% error ellipse.
- COORDINATES - Distances along major and minor axes of error ellipse. If special additive or concurrent model of the measuring process applies to this method, the distance along the minor axis represents the random error within a laboratory while that along the major axis also includes a systematic laboratory component of error.

95% ELLIPSE -

Lengths of the major and minor axes of the ellipse and the angle that the major axis makes with the horizontal axis.

AVG R. SDR -

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

Graph -

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

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

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

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

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

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.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T40-1 TABLE 1
AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)
TAPPI STANDARD T460 68-75, AIR RESISTANCE OF PAPER

LAB CODE	SAMPLE H37 PRINTING					SAMPLE H27 PRINTING					TEST D. = 10		
	MEAN	106 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	MEAN	108 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	18.8	-.2	-.19	1.9	1.16	26.9	-1.7	-1.02	1.6	.99	40D	0	L100
L107	16.2	-2.8	-2.66	1.4	.89	23.9	-4.8	-2.92	2.0	1.30	40D	*	L107
L121	18.4	-.7	-.62	2.0	1.21	30.2	1.6	.97	2.0	1.31	40D	*	L121
L122	19.2	.1	.10	2.0	1.22	28.3	-.3	-.21	1.0	.65	40D	0	L122
L123	20.0	1.0	.92	2.5	1.57	29.1	.5	.28	1.4	.92	40D	0	L123
L124G	18.7	-.4	-.37	1.9	1.17	27.4	-1.2	-.77	1.8	1.14	40D	0	L124G
L125	20.0	1.0	.93	2.4	1.49	28.8	.2	.12	1.8	1.16	40D	0	L125
L127	17.1	-2.0	-1.85	.4	.26	26.4	-2.2	-1.34	1.2	.77	40D	0	L127
L128	19.3	.2	.23	1.7	1.06	30.0	1.4	.85	1.8	1.13	40D	0	L128
L141	19.6	.5	.52	1.2	.71	29.9	1.3	.79	1.8	1.15	40D	0	L141
L148	16.9	.8	.77	1.9	1.18	30.7	2.1	1.27	1.9	1.20	40D	0	L148
L153	20.3	1.2	1.14	2.2	1.36	30.0	1.4	.88	1.4	.92	40D	0	L153
L158	17.5	-1.6	-1.47	1.3	.79	26.0	-2.6	-1.61	1.2	.74	40D	0	L158
L159	20.7	1.7	1.58	2.3	1.41	30.6	2.0	1.24	1.9	1.22	40D	0	L159
L163	19.7	.6	.58	1.6	1.00	28.3	-.3	-.17	1.5	.96	40D	0	L163
L166	16.0	-.0	-.00	1.4	.89	30.3	1.7	1.04	1.6	1.02	40D	0	L166
L174	19.2	.1	.12	2.5	1.55	29.7	1.1	.65	1.7	1.10	40D	0	L174
L176	21.8	2.7	2.61	3.7	2.30	34.8	6.2	3.83	5.2	3.30	40D	X	L176
L182G	18.4	-.7	-.63	1.5	.95	27.8	-.8	-.50	1.4	.89	40D	0	L182G
L183	20.1	1.0	.97	1.4	.85	30.0	1.4	.85	1.5	.95	40D	0	L183
L190C	19.1	.1	.06	2.1	1.28	29.1	.5	.30	1.4	.88	40D	0	L190C
L190R	18.9	-.2	-.15	1.5	.91	28.0	-.6	-.38	1.7	1.09	40D	0	L190R
L212	18.2	-.9	-.84	1.7	1.07	27.9	-.7	-.46	1.3	.84	40D	0	L212
L223	20.1	1.1	1.01	1.6	1.01	31.0	2.4	1.46	2.0	1.28	40D	0	L223
L224	18.1	-1.0	-.90	1.4	.90	28.6	-.0	-.01	2.3	1.50	40D	0	L224
L230G	19.0	-.1	-.05	1.2	.77	28.1	-.5	-.32	1.4	.88	40D	0	L230G
L232	19.5	.5	.44	2.7	1.68	29.3	.7	.42	1.4	.91	40D	0	L232
L238A	19.8	.8	.72	1.5	.95	29.9	1.3	.79	2.8	1.82	40D	0	L238A
L241	18.1	-1.0	-.90	1.1	.68	26.4	-2.2	-1.36	1.0	.62	40D	0	L241
L242	18.9	-.1	-.12	.5	.56	29.8	1.2	.73	1.6	.99	40D	0	L242
L243G	19.0	-.1	-.09	.9	.54	28.1	-.5	-.32	1.1	.71	40D	0	L243G
L259	17.3	-1.8	-1.68	1.6	1.00	26.8	-1.8	-1.11	1.9	1.25	40D	0	L259
L261	19.2	.2	.17	1.6	1.00	29.3	.7	.41	1.5	.93	40D	0	L261
L262G	19.8	.7	.71	1.3	.80	27.3	-1.3	-.80	.9	.57	40D	0	L262G
L265	20.1	1.0	.99	1.8	1.12	28.4	-.2	-.15	.9	.57	40D	0	L265
L274	19.1	.0	.01	.9	.57	29.8	1.2	.73	1.4	.90	40D	0	L274
L278	19.8	.7	.69	1.6	.96	29.2	.6	.38	1.9	1.21	40D	0	L278
L285	15.0	-4.1	-3.87	1.0	.65	19.5	-9.1	-5.57	.7	.48	40D	*	L285
L301	21.8	2.7	2.61	2.1	1.33	32.4	3.8	2.32	1.6	1.05	40D	*	L301
L308	17.8	-1.3	-1.19	1.8	1.14	27.7	-.9	-.56	1.2	.74	40D	0	L308
L312	17.9	-1.2	-1.09	1.3	.80	26.9	-1.7	-1.06	1.0	.64	40D	0	L312
L321	18.8	-.3	-.24	1.4	.87	28.8	.2	.11	1.4	.89	40D	0	L321
L324	17.0	-2.1	-1.95	.9	.56	24.8	-3.8	-2.36	3.3	2.09	40D	0	L324
L326	19.8	.7	.67	1.9	1.18	29.6	1.0	.60	1.3	.86	40D	0	L326
L328	18.8	-.2	-.21	.9	.54	29.3	.7	.44	1.2	.76	40D	0	L328
L341	19.9	.9	.82	2.0	1.24	30.2	1.6	.98	1.4	.97	40D	0	L341
L344	18.8	-.3	-.24	1.2	.73	27.8	-.9	-.53	1.4	.90	40D	0	L344
L376	17.0	-2.0	-1.91	1.6	.99	26.3	-2.3	-1.39	1.7	1.11	40D	0	L376
L378	21.1	2.0	1.93	1.8	1.10	31.2	2.6	1.59	1.2	.80	40D	0	L378
L380	19.2	.1	.14	.4	.26	25.7	1.1	.66	.5	.31	40D	0	L380
L392	18.5	-.6	-.56	2.2	1.36	28.1	-.5	-.30	2.1	1.32	40D	0	L392
L396M	19.2	.2	.16	1.2	.77	29.3	.7	.42	.8	.53	40D	0	L396M
L561	19.0	-.1	-.05	2.0	1.24	28.4	-.2	-.13	1.8	1.17	40D	0	L561
L567	19.6	.5	.51	1.8	1.10	27.0	-1.6	-.98	3.2	2.04	40D	0	L567
L576	19.1	.0	.01	2.6	1.61	27.4	-1.2	-.75	1.9	1.19	40D	0	L576
L599	19.5	.5	.47	1.8	1.11	29.0	.4	.23	1.5	.93	40D	0	L599

GR. MEAN = 15.1 GURLEY UNITS GRAND MEAN = 28.6 GURLEY UNITS TEST DETERMINATIONS = 10
SD MEANS = 1.1 GURLEY UNITS SD OF MEANS = 1.6 GURLEY UNITS 54 LABS IN GRAND MEANS
AVERAGE SDR = 1.6 GURLEY UNITS AVERAGE SDR = 1.6 GURLEY UNITS

L115	17.7	-1.4	-1.28	.8	.51	20.3	-8.3	-5.11	.5	.31	40U	*	L115
L236	20.5	1.4	1.36	1.3	.80	30.4	1.8	1.09	1.8	1.16	40E	*	L236
L291	20.8	1.7	1.66	2.0	1.27	30.6	2.0	1.22	1.2	.75	40U	*	L291
L484	15.8	-3.2	-3.08	1.6	1.00	23.9	-4.7	-2.91	.9	.57	40H	*	L484

TOTAL NUMBER OF LABORATORIES REPORTING = 60

Best Values: H37 19.1 ± 1.9 Gurley units
H27 28.5 ± 2.1 Gurley units

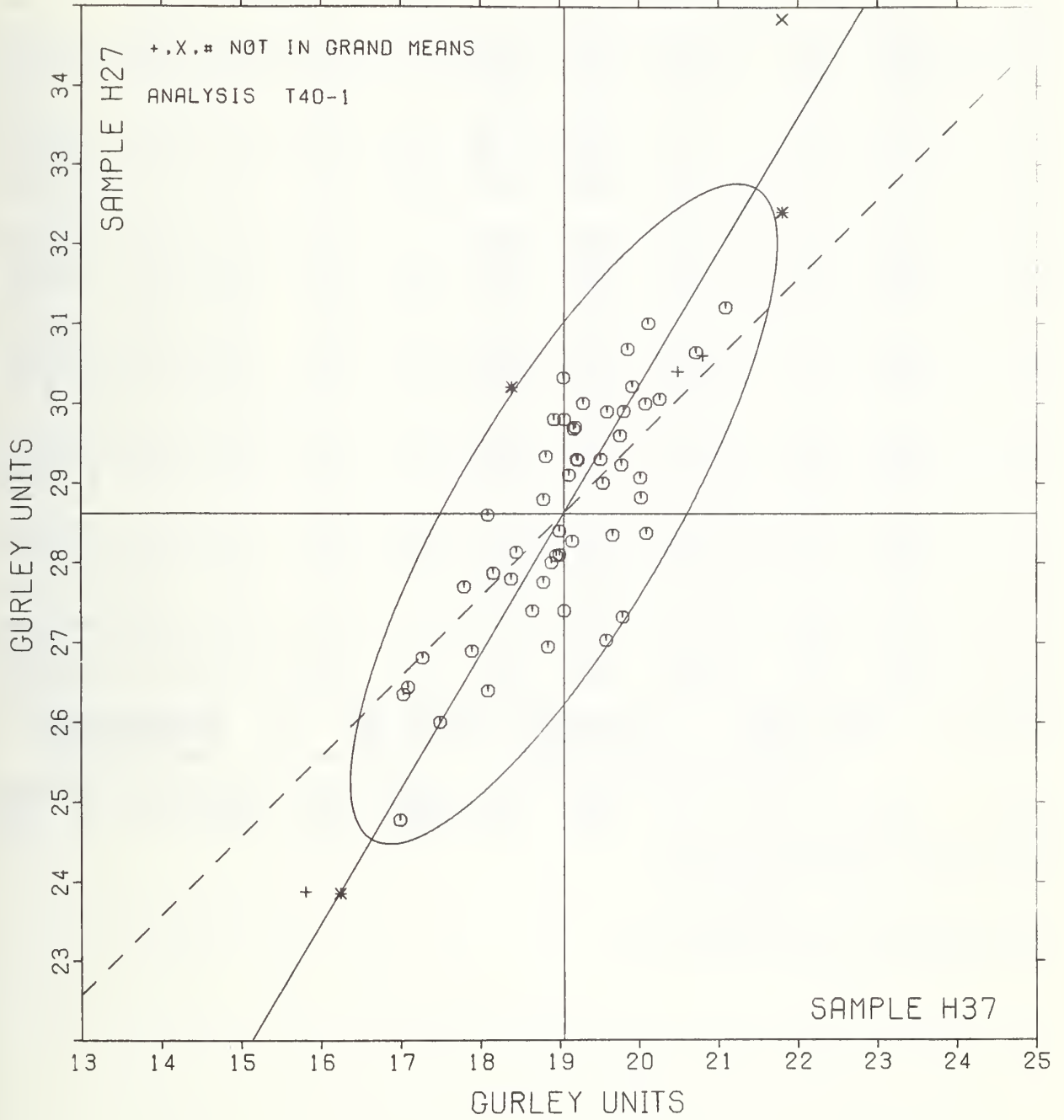
The following laboratories were omitted from the grand means because of extreme test results: 285.

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		H37	H27	MAJOR	MINOR	E.S.D.F	VAR			
L285	#	15.0	19.5	-9.9	-1.1	.56	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L484	*	15.8	23.9	-5.7	.4	.78	40H	AIR RESISTANCE,	REGMED-TYPE GURLEY DENSOMETER -	OIL FLOTATION
L107	*	16.2	23.9	-5.5	.0	1.10	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L324	Ø	17.0	24.8	-4.4	-.2	1.32	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L376	Ø	17.0	26.3	-3.0	.6	1.05	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L127	Ø	17.1	26.4	-2.9	.6	.51	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L259	Ø	17.3	26.8	-2.5	.6	1.12	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L158	Ø	17.5	26.0	-3.0	.0	.76	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L115	*	17.7	20.3	-7.8	-3.1	.41	40V	AIR RESISTANCE,	SHEFFIELD IN GURLEY UNITS	
L308	Ø	17.8	27.7	-1.4	.6	.94	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L312	Ø	17.9	26.9	-2.1	.1	.72	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L241	Ø	18.1	26.4	-2.4	-.3	.65	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L224	Ø	18.1	28.6	-.5	.8	1.20	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L212	Ø	18.2	27.9	-1.1	.4	.96	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L182G	Ø	18.4	27.8	-1.0	.2	.92	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L121	*	18.4	30.2	1.0	1.4	1.26	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L392	Ø	18.5	28.1	-.7	.3	1.34	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L124G	Ø	18.7	27.4	-1.2	-.3	1.15	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L344	Ø	18.8	27.8	-.9	-.2	.81	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L321	Ø	18.8	28.8	.0	.3	.88	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L328	Ø	18.8	25.3	.5	.6	.65	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L100	Ø	18.8	26.9	-1.5	-.7	1.08	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L190R	Ø	18.9	28.0	-.6	-.2	1.00	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L242	Ø	18.9	29.2	1.0	.7	.77	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L242G	Ø	19.0	28.1	-.5	-.2	.62	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L561	Ø	19.0	28.4	-.2	-.1	1.21	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L230G	Ø	19.0	28.1	-.5	-.2	.82	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L166	Ø	19.0	30.3	1.5	.9	.96	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L576	Ø	19.1	27.4	-1.0	-.6	1.40	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L274	Ø	19.1	29.8	1.0	.6	.73	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
I190C	Ø	19.1	29.1	.4	.2	1.08	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L122	Ø	19.2	28.3	-.2	-.3	.53	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L174	Ø	19.2	29.7	1.0	.4	1.32	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L380	Ø	19.2	29.7	1.0	.4	.29	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L356M	Ø	19.2	29.3	.7	.2	.65	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L261	Ø	19.2	29.3	.7	.2	.96	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L128	Ø	19.3	30.0	1.3	.5	1.09	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L232	Ø	19.5	29.3	.8	-.1	1.29	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L559	Ø	19.5	29.0	.6	-.2	1.02	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L567	Ø	19.6	27.0	-1.1	-1.3	1.57	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L141	Ø	19.6	29.9	1.4	.2	.93	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L163	Ø	19.7	28.3	.1	-.7	.58	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L326	Ø	19.8	29.6	1.2	-.1	1.02	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L278	Ø	19.8	29.2	.9	-.3	1.09	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L262G	Ø	19.8	27.3	-.7	-1.3	.69	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L238A	Ø	19.8	29.9	1.5	.0	1.38	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L148	Ø	19.9	30.7	2.2	.4	1.19	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L341	Ø	19.9	30.2	1.8	.1	1.06	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L123	Ø	20.0	29.1	.9	-.6	1.24	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L125	Ø	20.0	28.8	.7	-.7	1.32	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L183	Ø	20.1	30.0	1.7	-.2	.90	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L265	Ø	20.1	28.4	.3	-1.0	.84	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L223	Ø	20.1	31.0	2.6	.3	1.14	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L153	Ø	20.3	30.0	1.8	-.3	1.14	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L236	*	20.5	30.4	2.3	-.3	.58	40E	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION, 20C, 65%RR
L159	Ø	20.7	30.6	2.6	-.4	1.32	40E	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L291	*	20.8	30.6	2.6	-.5	1.01	40V	AIR RESISTANCE,	SHEFFIELD IN GURLEY UNITS	
L378	Ø	21.1	31.2	3.3	-.4	.95	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L176	X	21.8	24.8	6.8	.8	2.80	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
L301	*	21.8	32.4	4.7	-.4	1.19	40D	AIR RESISTANCE,	GURLEY DENSOMETER -	OIL FLOTATION
GMEANS:		19.1	28.6			1.00				
		95% ELLIPSE:		4.7	1.4	WITH GAMMA = 56 DEGREES				

AIR RESISTANCE, GURLEY

SAMPLE H37 = 19.1 GURLEY UNITS SAMPLE H27 = 28.6 GURLEY UNITS



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	PRINTING H37 106 GRAMS PER SQUARE METER					PRINTING H27 108 GRAMS PER SQUARE METER					TEST D. = 10		
	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L114	153.8	3.6	.50	10.5	1.04	111.6	3.1	.63	3.9	.92	40S	Ø	L114
L121	148.5	-1.7	-.23	8.5	.84	106.7	-1.8	-.35	3.1	.74	40S	Ø	L121
L122S	151.2	1.0	.14	9.9	.98	108.6	.1	.03	3.6	.84	40S	Ø	L122S
L124S	147.4	-2.8	-.37	11.4	1.13	109.8	1.3	.27	4.3	1.02	40S	Ø	L124S
L127	159.7	8.5	1.16	8.2	.81	115.7	7.2	1.45	5.4	1.26	40S	Ø	L127
L132	139.8	-10.4	-1.41	9.4	.54	100.7	-7.8	-1.56	5.0	1.17	40S	Ø	L132
L148	149.7	-.5	-.06	7.5	.79	110.0	1.5	.31	3.1	.73	40S	Ø	L148
L150	154.5	4.3	.59	11.7	1.16	110.0	1.5	.31	5.8	1.36	40S	Ø	L150
L157	121.1	-29.1	-3.55	8.3	.82	91.1	-17.4	-3.48	3.0	.71	40S	#	L157
L158	151.5	1.3	.18	8.8	.88	115.0	6.5	1.31	4.1	.96	40S	Ø	L158
L173B	163.0	12.8	1.75	14.8	1.46	120.0	11.5	2.31	4.1	.96	40S	Ø	L173B
L150C	147.8	-2.4	-.32	10.6	1.05	108.6	.1	.03	3.5	.82	40S	Ø	L150C
L213	148.7	-1.5	-.20	9.3	.92	105.9	-2.6	-.51	4.2	.95	40S	Ø	L213
L223	146.5	-3.3	-.44	12.9	1.28	102.3	-6.2	-1.23	3.6	.85	40S	Ø	L223
L228	165.5	15.7	2.14	13.8	1.37	112.7	4.2	.85	4.4	1.05	40S	Ø	L228
L230S	138.0	-12.2	-1.65	10.1	1.00	103.4	-5.1	-1.01	4.1	.97	40S	Ø	L230S
L241	157.2	7.0	.56	8.6	.85	118.0	9.5	1.91	5.2	1.23	40S	Ø	L241
L249	149.8	-.4	-.05	10.1	1.00	105.4	-3.1	-.61	5.6	1.33	40S	Ø	L249
L255	157.0	6.8	.93	10.2	1.01	112.6	4.1	.93	3.8	.90	40S	Ø	L255
L257A	155.1	4.5	.67	10.2	1.01	106.5	-2.0	-.39	5.1	1.19	40S	Ø	L257A
L257B	141.8	-8.4	-1.14	10.3	1.02	99.4	-9.1	-1.82	4.6	1.08	40S	Ø	L257B
L257C	157.8	7.6	1.04	8.5	.88	106.3	-2.2	-.43	3.5	.82	40S	Ø	L257C
L260	153.2	3.0	.41	7.0	.70	110.2	1.7	.35	2.7	.63	40S	Ø	L260
L262S	156.6	6.4	.88	5.6	.56	105.3	.8	.17	4.9	1.15	40S	Ø	L262S
L288	151.5	1.7	.24	6.6	.65	115.8	7.3	1.47	5.5	1.30	40S	Ø	L288
L305	145.8	-.4	-.05	12.3	1.22	110.7	2.2	.45	2.9	.69	40S	Ø	L305
L312	135.1	-15.1	-2.05	7.5	.74	102.2	-6.3	-1.25	2.1	.51	40S	Ø	L312
L318	145.7	-4.5	-.61	12.5	1.24	103.5	-5.0	-.95	4.5	1.06	40S	Ø	L318
L349	133.6	-16.6	-2.25	9.6	.95	100.3	-8.2	-1.64	6.1	1.45	40S	Ø	L349
L354	149.6	-.6	-.08	15.4	1.53	109.2	.7	.15	2.8	.65	40S	Ø	L354
L360	151.0	.8	.12	8.6	.85	108.1	-.4	-.07	3.4	.80	40S	Ø	L360
L370	138.7	-11.5	-1.56	6.8	.68	104.2	-4.3	-.85	3.5	.82	40S	Ø	L370
L390	153.5	3.7	.51	13.1	1.30	109.6	1.1	.23	4.9	1.16	40S	Ø	L390
L575	152.5	2.3	.32	13.7	1.36	108.8	.3	.07	6.3	1.47	40S	Ø	L575
L587	149.5	-.7	-.09	8.0	.79	106.5	-2.0	-.39	4.7	1.12	40S	Ø	L587

GR. MEAN = 150.2 SHEFF. UNITS GRAND MEAN = 108.5 SHEFF. UNITS TEST DETERMINATIONS = 10
 SD MEANS = 7.3 SHEFF. UNITS SD OF MEANS = 5.0 SHEFF. UNITS 34 LABS IN GRAND MEANS
 AVERAGE SDR = 10.1 SHEFF. UNITS AVERAGE SDR = 4.3 SHEFF. UNITS

L182B	660.0	505.8	65.40	45.5	4.56	428.5	320.0	64.15	18.0	4.22	40B	*	L182B
L243B	694.6	544.4	74.11	31.5	3.13	441.0	332.5	66.65	18.1	4.26	40B	*	L243B
L484	532.0	381.8	51.98	10.3	1.02	412.0	303.5	60.84	13.2	3.10	40B	*	L484
L562	385.0	238.8	32.51	43.6	4.33	355.0	256.5	51.42	18.6	4.36	40Q	*	L562

TOTAL NUMBER OF LABORATORIES REPORTING = 35

Best Values: H37 150 ± 13 Sheffield units
 H27 108 ± 8 Sheffield units

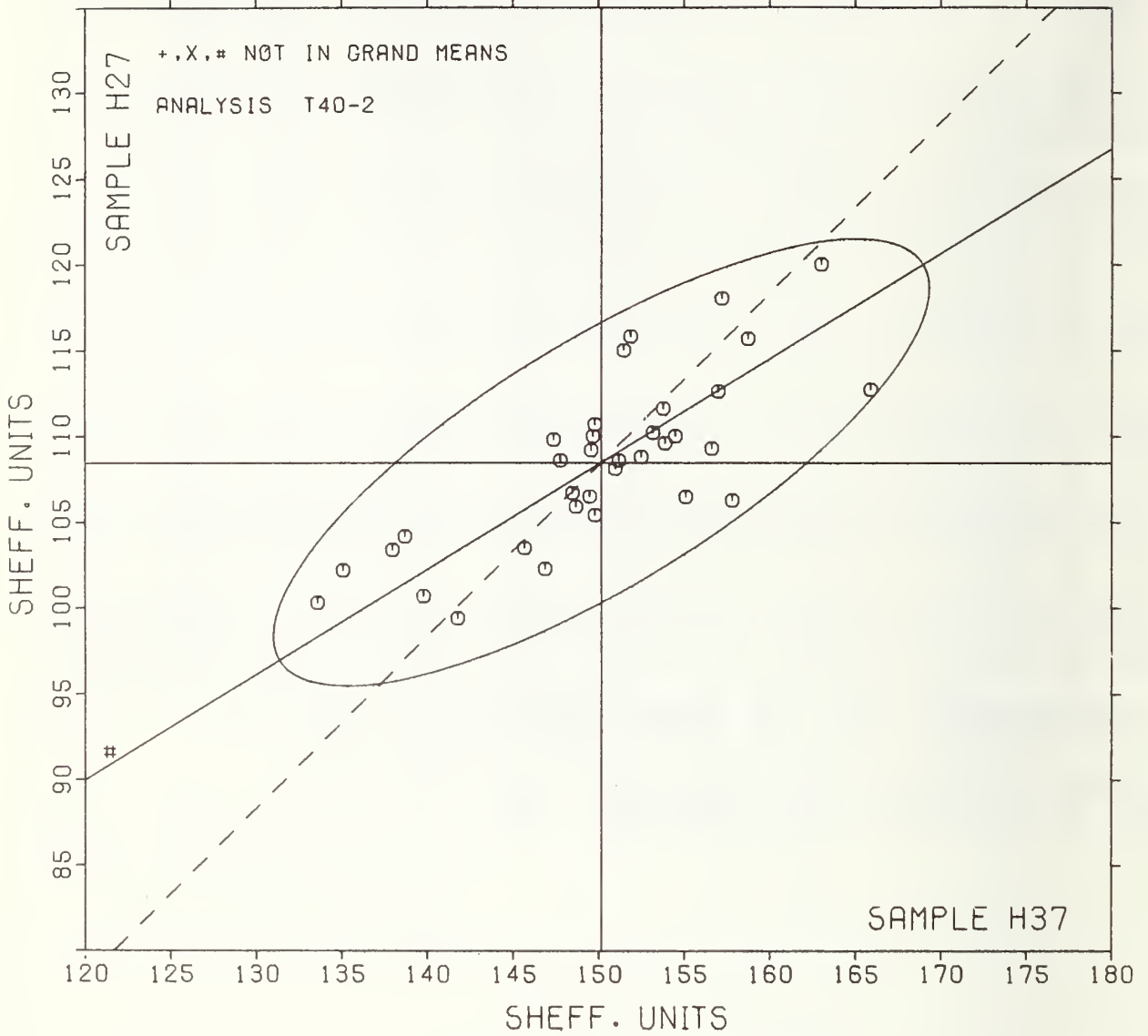
The following laboratories were omitted from the grand means because of extreme test results: 157.

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

LAB CODE	P	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		H37	H27	MAJOR	MINOR	S.D.R	VAR			
L157	#	121.1	91.1	-33.8	.4	.77	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L349	Ø	133.6	100.3	-18.4	1.7	1.20	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L312	Ø	135.1	102.2	-16.1	2.5	.62	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L230S	Ø	138.0	103.4	-13.0	2.0	.99	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L370	Ø	138.7	104.2	-12.0	2.4	.75	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L132	Ø	136.8	100.7	-12.9	-1.2	1.05	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L257H	Ø	141.8	99.4	-11.9	-3.4	1.05	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L31H	Ø	145.7	103.5	-6.4	-1.9	1.15	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L223	Ø	146.9	102.3	-6.0	-3.6	1.07	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L124S	Ø	147.4	105.8	-1.6	2.6	1.08	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L190C	Ø	147.8	108.6	-1.9	1.4	.94	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L121	Ø	148.5	106.7	-2.3	-6	.79	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L213	Ø	148.7	105.9	-2.6	-1.4	.96	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L5H7	Ø	149.5	106.5	-1.6	-1.3	.95	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L354	Ø	149.6	109.2	-1.1	.9	1.09	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L14H	Ø	149.7	110.0	.4	1.6	.76	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L305	Ø	149.8	110.7	.9	2.1	.96	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L249	Ø	149.8	105.4	-1.9	-2.4	1.16	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L360	Ø	151.0	108.1	.5	-.7	.82	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L122S	Ø	151.2	108.6	1.0	-.4	.51	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L15H	Ø	151.5	115.0	4.6	4.5	.92	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L28H	Ø	151.9	115.8	5.3	5.3	.58	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L575	Ø	152.5	108.8	2.2	-.9	1.41	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L260	Ø	153.2	110.2	3.5	-.1	.67	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L114	Ø	153.8	111.6	4.8	.8	.98	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L390	Ø	153.9	109.6	3.8	-1.0	1.23	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L150	Ø	154.5	110.0	4.5	-1.0	1.26	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L257A	Ø	155.1	106.5	3.2	-4.3	1.10	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L262S	Ø	156.6	109.3	5.9	-2.7	.85	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L255	Ø	157.0	112.6	8.0	-.0	.96	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L241	Ø	157.2	118.0	11.0	4.5	1.04	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L257C	Ø	157.8	106.3	5.4	-5.8	.85	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L127	Ø	158.7	115.7	11.1	1.7	1.03	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L173B	Ø	162.0	120.0	17.0	3.1	1.21	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L22H	Ø	165.9	112.7	15.6	-4.6	1.21	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L562	*	386.0	365.0	337.7	93.9	4.35	40Q	AIR RESISTANCE,	SHEFFIELD	(3/4 IN. ORIFICE, 10 LBS PRESSURE)
L484	*	532.0	412.0	484.2	59.2	2.06	40H	AIR RESISTANCE,	BENDTSEN,	WG 150
L1H2B	*	660.0	428.5	601.9	6.4	4.39	40B	AIR RESISTANCE,	BENDTSEN,	WG 150
L243H	*	694.6	441.0	638.0	-1.1	3.69	40H	AIR RESISTANCE,	BENDTSEN,	WG 150
GMEANS:		150.2	108.5			1.00				
		95% ELLIPSE:		22.0	7.1	WITH GAMMA = 31 DEGREES				

AIR RESISTANCE, SHEFFIELD

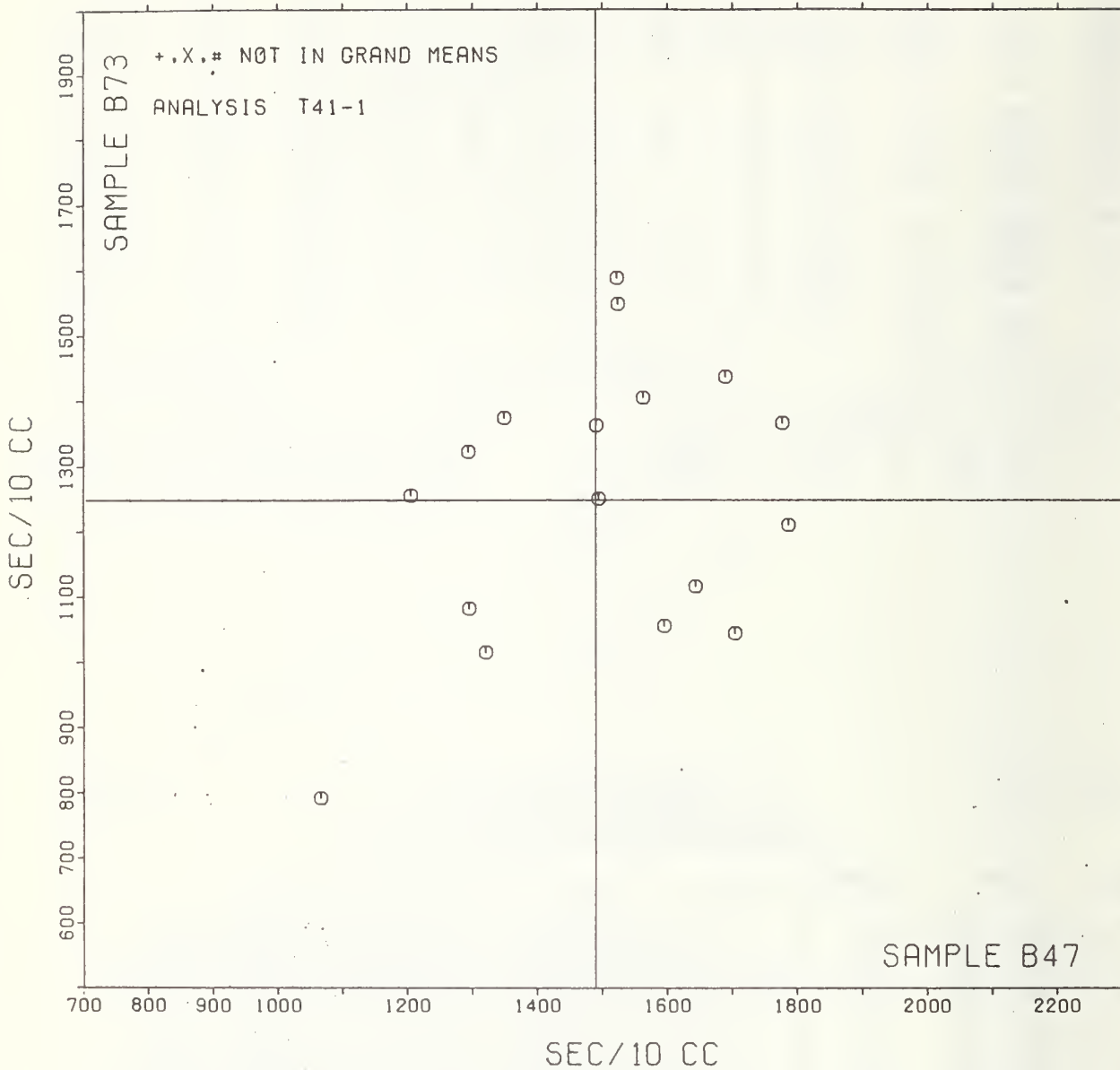
SAMPLE H37 = 150. SHEFF. UNITS SAMPLE H27 = 108. SHEFF. UNITS



AIR RESISTANCE, GURLEY HG FLOTATION

SAMPLE B47 = 1489. SEC/10 CC

SAMPLE B73 = 1249. SEC/10 CC



LAB CODES	SAMPLE H44 84 GRAMS PER SQUARE METER PRINTING					SAMPLE J11 102 GRAMS PER SQUARE METER PRINTING					TEST D. = 10			
	MEAN	DFV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	P	LAH	
L122	5.68	-.01	-.03	.08	.75	4.94	.13	.67	.23	1.34	44P	Ø	L122	
L182	5.78	.10	.42	.10	1.00	5.00	.18	.96	.15	.88	44P	Ø	L182	
L183	5.66	-.03	-.12	.13	1.26	4.57	-.25	-1.30	.13	.79	44P	Ø	L183	
L223	5.76	.07	.30	.10	1.05	4.86	.04	.20	.17	1.01	44P	Ø	L223	
L288	6.07	.38	1.66	.13	1.34	5.04	.22	1.17	.16	.95	44P	Ø	L288	
L317	5.54	-.15	-.64	.10	.97	4.68	-.14	-.72	.18	1.07	44P	Ø	L317	
L588	5.32	-.37	-1.60	.06	.63	4.63	-.19	-.59	.16	.96	44P	Ø	L588	
GR. MEAN =		5.69 MICRONS					GRAND MEAN =		4.82 MICRONS			TEST DETERMINATIONS =		
SD MEANS =		.23 MICRONS					SD OF MEANS =		.19 MICRONS			7 LABS IN GRAND MEANS		
		AVERAGE SER = .10 MICRONS							AVERAGE SDR =			.17 MICRONS		
TOTAL NUMBER OF LABORATORIES REPORTING = 7														
Best Values: H44 5.6 microns														
J11 4.9 microns														

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		B44	J11	MAJOR	MINOR	E.SDE	VAR			
L588	Ø	5.32	4.63	-.41	.08	.80	44P	SMOOTHNESS,	PARKER PRINTSURF	
L317	Ø	5.54	4.68	-.20	-.02	1.02	44P	SMOOTHNESS,	PARKER PRINTSURF	
L183	Ø	5.66	4.57	-.17	-.18	1.03	44P	SMOOTHNESS,	PARKER PRINTSURF	
L122	Ø	5.68	4.54	.07	.11	1.04	44P	SMOOTHNESS,	PARKER PRINTSURF	
L223	Ø	5.76	4.86	.08	-.01	1.03	44P	SMOOTHNESS,	PARKER PRINTSURF	
L182	Ø	5.78	5.00	.15	.08	.94	44P	SMOOTHNESS,	PARKER PRINTSURF	
L288	Ø	6.07	5.04	.44	-.06	1.14	44P	SMOOTHNESS,	PARKER PRINTSURF	
GMEANS:		5.69	4.82			1.00				
		95% ELLIPSE:		1.05	.37	WITH GAMMA = 37 DEGREES				

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

LAB CODE	SAMPLE H44 MEAN	PRINTING 84 GRAMS PER SQUARE METER				SAMPLE J11 MEAN	PRINTING 102 GRAMS PER SQUARE METER				TEST D. = 15		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	277.3	17.2	1.72	11.2	1.20	143.9	6.2	.59	10.0	.94	45S	Ø	L100
L107	279.3	19.2	1.92	8.8	.95	146.2	8.6	1.37	12.6	1.18	45S	Ø	L107
L108	247.8	-12.4	-1.24	6.5	.70	129.2	-8.6	-1.38	12.8	1.20	45S	Ø	L108
L114	261.7	1.5	.15	9.6	1.03	134.9	-2.9	-.47	14.9	1.39	45S	Ø	L114
L115	240.0	-20.1	-2.02	6.3	.68	129.7	-8.1	-1.30	9.3	.88	45S	Ø	L115
L121	266.3	6.2	.62	9.9	1.07	139.3	1.6	.25	10.8	1.02	45S	Ø	L121
L122	262.2	2.1	.21	9.7	1.05	141.9	4.1	.65	13.9	1.30	45S	Ø	L122
L123	252.3	-7.8	-.78	14.9	1.60	132.0	-5.8	-.93	15.0	1.41	45S	Ø	L123
L124	235.2	-24.9	-2.50	6.0	.65	135.4	-2.4	-.38	11.0	1.03	45S	*	L124
L125	249.0	-11.1	-1.11	8.7	.94	136.7	-1.1	-.18	9.2	.86	45S	Ø	L125
L126	276.4	16.3	1.63	7.9	.85	143.0	5.2	.84	11.1	1.04	45S	Ø	L126
L128	258.0	-2.1	-.21	8.2	.88	131.3	-6.4	-1.03	8.8	.82	45S	Ø	L128
L132	261.1	.9	.09	10.9	1.18	133.3	-4.5	-.72	9.9	.93	45S	Ø	L132
L134	269.3	9.2	.92	8.0	.86	137.7	-1	-.02	9.0	.85	45S	Ø	L134
L139S	267.7	7.5	.75	11.0	1.19	146.0	8.2	1.22	9.7	.91	45S	Ø	L139S
L148	268.5	8.4	.84	13.6	1.47	143.7	6.0	.95	11.1	1.04	45S	Ø	L148
L150	272.0	11.9	1.19	11.0	1.19	136.3	-1.4	-.23	11.3	1.06	45S	Ø	L150
L152	255.6	-4.5	-.45	7.6	.82	142.5	4.8	.76	10.8	1.01	45S	Ø	L152
L153	277.4	17.3	1.73	11.7	1.26	144.2	6.4	1.03	6.8	.63	45S	Ø	L153
L157	260.2	.1	.01	11.4	1.23	106.2	-31.6	-5.06	6.6	.62	45S	X	L157
L158	252.7	-7.5	-.75	13.5	1.45	139.3	1.6	.25	10.3	.97	45S	Ø	L158
L159	258.7	-1.5	-.15	7.4	.80	143.7	5.9	.94	14.3	1.34	45S	Ø	L159
L162	274.0	13.9	1.39	8.5	.92	143.0	5.2	.84	10.3	.97	45S	Ø	L162
L166	254.1	-6.0	-.60	7.3	.79	133.3	-4.5	-.72	9.2	.86	45S	Ø	L166
L167	253.0	-7.1	-.71	5.9	.64	135.7	-2.1	-.34	8.2	.77	45S	Ø	L167
L173B	251.3	-8.8	-.88	10.8	1.16	131.0	-6.8	-1.09	5.7	.54	45S	Ø	L173B
L176S	263.6	3.5	.35	9.8	1.05	138.7	1.0	.15	11.4	1.07	45S	Ø	L176S
L183S	266.1	5.9	.59	11.8	1.27	143.9	6.2	.99	9.4	.89	45S	Ø	L183S
L190C	254.9	-5.2	-.52	5.1	.65	139.5	1.8	.28	8.4	.78	45S	Ø	L190C
L190R	266.8	6.7	.67	8.5	.92	146.2	8.4	1.35	21.9	2.05	45S	Ø	L190R
L195	250.9	-9.3	-.93	10.5	1.13	129.7	-8.0	-1.29	9.4	.88	45S	Ø	L195
L203	251.0	-9.1	-.91	11.7	1.26	133.7	-4.1	-.66	10.9	1.03	45S	Ø	L203
L211	247.7	-12.4	-1.24	9.4	1.01	133.9	-3.8	-.62	11.5	1.08	45S	Ø	L211
L213	240.2	-19.9	-2.00	15.4	1.66	123.7	-14.1	-2.26	12.1	1.13	45S	Ø	L213
L223	253.1	-7.1	-.71	11.1	1.20	132.9	-4.8	-.78	15.2	1.42	45S	Ø	L223
L224	264.0	3.9	.39	14.5	1.57	141.8	4.0	.64	9.6	.90	45S	Ø	L224
L226B	270.7	10.5	1.05	20.2	2.18	142.3	4.5	.72	12.6	1.18	45S	Ø	L226B
L228	242.1	-18.1	-1.81	9.8	1.06	132.8	-5.0	-.80	11.1	1.04	45S	Ø	L228
L230S	260.3	.2	.02	9.2	.99	144.9	7.1	1.14	12.7	1.19	45S	Ø	L230S
L231	264.7	4.5	.45	9.3	1.00	148.5	10.7	1.71	9.6	.90	45S	Ø	L231
L232S	269.0	8.9	.89	7.6	.82	141.3	3.6	.57	15.2	1.42	45S	Ø	L232S
L241	267.9	7.8	.78	7.9	.85	149.3	11.6	1.85	10.5	.98	45S	Ø	L241
L249	263.7	3.6	.36	11.5	1.24	145.2	7.4	1.19	11.3	1.06	45S	Ø	L249
L254	251.1	-9.0	-.90	9.1	.98	138.4	.6	.10	11.0	1.03	45S	Ø	L254
L255	255.5	-4.7	-.47	6.2	.67	132.9	-4.8	-.78	10.2	.96	45S	Ø	L255
L257A	258.8	-1.3	-.13	7.2	.78	129.8	-8.0	-1.28	9.6	.90	45S	Ø	L257A
L257B	267.5	7.4	.74	12.5	1.35	134.5	-3.3	-.53	8.2	.77	45S	Ø	L257B
L257C	260.7	.6	.06	10.5	1.13	139.8	2.0	.32	11.5	1.08	45S	Ø	L257C
L259	274.8	14.7	1.47	7.8	.84	143.7	5.9	.94	12.7	1.28	45S	Ø	L259
L260	261.5	1.3	.13	4.6	.50	135.8	-2.0	-.32	6.3	.59	45S	Ø	L260
L261	260.5	.3	.03	6.2	.67	133.0	-4.8	-.77	13.6	1.28	45S	Ø	L261
L262	264.9	4.8	.48	7.3	.78	148.9	11.2	1.79	6.6	.62	45S	Ø	L262
L275	270.7	10.5	1.05	8.4	.91	133.3	-4.4	-.71	9.9	.93	45S	Ø	L275
L277	272.3	12.2	1.22	7.4	.80	140.5	2.8	.44	9.9	.93	45S	Ø	L277
L278	262.3	2.2	.22	8.2	.89	144.2	6.4	1.03	6.8	.63	45S	Ø	L278
L281	261.9	1.7	.17	10.6	1.14	137.2	-.5	-.08	15.1	1.42	45S	Ø	L281
L285	244.3	-15.8	-1.58	16.5	1.78	139.3	1.6	.25	9.4	.88	45S	Ø	L285
L288	266.2	6.1	.61	10.4	1.12	136.3	-1.5	-.24	12.0	1.13	45S	Ø	L288
L290	245.9	-14.3	-1.43	5.0	.53	133.4	-4.4	-.70	8.5	.79	45S	Ø	L290
L291S	276.0	15.9	1.59	9.6	1.04	150.5	12.8	2.04	9.5	.89	45S	Ø	L291S
L297	250.3	-9.8	-.98	14.2	1.53	136.3	-1.4	-.23	9.3	.88	45S	Ø	L297
L301	255.9	-4.2	-.42	9.3	1.01	136.4	-1.4	-.22	11.0	1.03	45S	Ø	L301
L305	256.7	-3.5	-.35	8.0	.86	120.7	-7.1	-1.14	6.8	.64	45S	Ø	L305
L308	251.9	-8.3	-.83	10.9	1.18	133.2	-4.6	-.73	10.0	.93	45S	Ø	L308
L312	277.8	17.7	1.77	4.6	.49	131.3	-6.4	-1.03	7.2	.67	45S	*	L312

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS 146-1 TABLE 1
SMOOTHNESS, SHEFFIELD UNITS
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE H44 MEAN	PRINTING 84 GRAMS PER SQUARE METER				SAMPLE J11 MEAN	PRINTING 102 GRAMS PER SQUARE METER				TEST D. = 15		
		LEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L317	263.2	3.7	.37	8.3	.89	139.6	1.8	.29	14.3	1.34	455	Ø	L317
L318	272.3	12.1	1.21	8.9	.96	139.6	1.8	.29	9.7	.91	455	Ø	L318
L321	254.7	-8.8	-.88	6.1	.66	123.3	-14.4	-2.31	4.1	.39	455	Ø	L321
L323	242.0	-18.1	-1.82	6.8	.73	138.7	.9	.14	6.4	.60	455	Ø	L323
L326	244.1	-16.0	-1.60	5.7	.62	130.5	-7.3	-1.17	5.4	.51	455	Ø	L326
L328	260.6	.5	.05	5.0	.54	139.3	1.5	.24	11.4	1.07	455	Ø	L328
L341	259.1	-1.1	-.11	9.0	.97	136.7	-1.0	-.17	11.9	1.11	455	Ø	L341
L342	272.0	11.9	1.19	7.0	.76	149.7	11.9	1.90	15.2	1.42	455	Ø	L342
L349	254.5	-5.7	-.57	15.2	1.64	128.2	-9.6	-1.63	9.9	.93	455	Ø	L349
L360	260.7	.6	.06	6.9	.75	131.7	-6.0	-.97	10.1	.95	455	Ø	L360
L366	263.3	3.1	.31	6.5	.70	133.3	-4.4	-.71	10.4	.97	455	Ø	L366
L370	256.6	-3.5	-.35	8.4	.91	134.4	-3.4	-.54	6.3	.59	455	Ø	L370
L372	254.5	-5.6	-.56	10.7	1.16	126.1	-11.6	-1.87	9.2	.87	455	Ø	L372
L376	252.5	-7.7	-.77	8.8	.95	144.7	6.9	1.10	12.0	1.13	455	Ø	L376
L378	249.2	-10.5	-1.09	10.1	1.09	134.0	-3.8	-.61	13.5	1.26	455	Ø	L378
L380	258.7	-1.5	-.15	4.0	.43	129.1	-8.7	-1.40	6.7	.63	455	Ø	L380
L382	266.3	6.1	.61	7.4	.80	130.7	-7.1	-1.14	6.8	.64	455	Ø	L382
L390	267.5	7.4	.74	7.6	.82	138.5	.7	.11	13.8	1.29	455	Ø	L390
L396M	260.7	.5	.05	6.2	.67	141.7	3.9	.62	13.0	1.22	455	Ø	L396M
L561	255.3	-4.8	-.48	7.2	.78	146.7	8.9	1.42	14.4	1.35	455	Ø	L561
L571	262.0	1.9	.19	12.1	1.30	148.3	10.6	1.69	9.8	.92	455	Ø	L571
L575	280.6	20.5	2.05	8.6	.93	141.3	3.6	.57	14.3	1.34	455	Ø	L575
L587	256.7	-3.5	-.35	8.2	.88	139.7	1.9	.30	10.4	.98	455	Ø	L587

GR. MEAN = 260.1 SHEFF. UNITS GRAND MEAN = 137.8 SHEFF. UNITS TEST DETERMINATIONS = 15
SD MEANS = 10.0 SHEFF. UNITS SD OF MEANS = 6.2 SHEFF. UNITS 87 LABS IN GRAND MEANS
AVERAGE SDR = 5.3 SHEFF. UNITS AVERAGE SDR = 10.7 SHEFF. UNITS

L174 311.3 51.2 5.12 5.9 .64 236.7 98.9 15.84 7.4 .69 455 + L174
TOTAL NUMBER OF LABORATORIES REPORTING = 89

Best Values: H44 260 + 17 Sheffield units
J11 140 + 10 Sheffield units

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

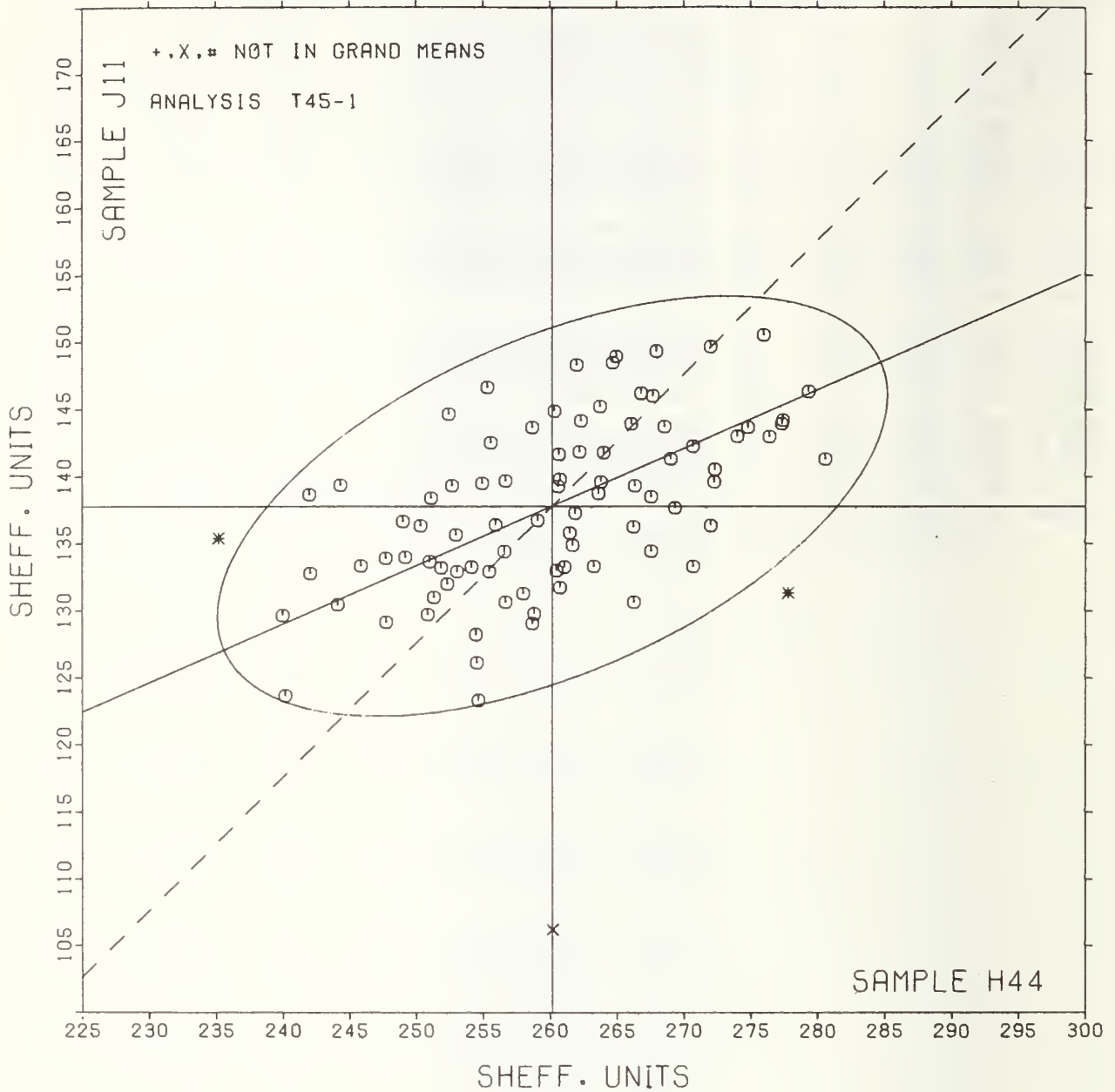
LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY	TEST INSTRUMENT	CONDITIONS
		H44	J11	MAJOR	MINOR	R.SDR	VAR			
L124	*	235.2	135.4	-23.8	7.8	.84	455	SMOOTHNESS,	SHEFFIELD	
L115	0	240.0	129.7	-21.7	.6	.78	455	SMOOTHNESS,	SHEFFIELD	
L213	0	240.2	123.7	-23.9	-5.0	1.40	455	SMOOTHNESS,	SHEFFIELD	
L323	0	242.0	136.7	-16.3	8.1	.67	455	SMOOTHNESS,	SHEFFIELD	
L228	0	242.1	132.8	-18.6	2.7	1.05	455	SMOOTHNESS,	SHEFFIELD	
L326	0	244.1	130.5	-17.6	-.3	.56	455	SMOOTHNESS,	SHEFFIELD	
L285	0	244.3	129.3	-13.5	7.8	1.33	455	SMOOTHNESS,	SHEFFIELD	
L250	0	245.9	133.4	-14.8	1.7	.66	455	SMOOTHNESS,	SHEFFIELD	
L211	0	247.7	123.9	-12.9	1.4	1.04	455	SMOOTHNESS,	SHEFFIELD	
L108	0	247.8	125.2	-14.2	-2.9	.95	455	SMOOTHNESS,	SHEFFIELD	
L125	0	249.0	126.7	-10.7	3.4	.90	455	SMOOTHNESS,	SHEFFIELD	
L178	0	249.2	134.0	-11.5	.9	1.18	455	SMOOTHNESS,	SHEFFIELD	
L297	0	250.3	136.3	-9.6	2.6	1.21	455	SMOOTHNESS,	SHEFFIELD	
L195	0	250.9	129.7	-11.7	-3.7	1.00	455	SMOOTHNESS,	SHEFFIELD	
L203	0	251.0	133.7	-10.0	-.1	1.14	455	SMOOTHNESS,	SHEFFIELD	
L254	0	251.1	138.4	-8.0	4.2	1.01	455	SMOOTHNESS,	SHEFFIELD	
L173B	0	251.3	121.0	-10.8	-2.7	.85	455	SMOOTHNESS,	SHEFFIELD	
L308	0	251.9	135.2	-9.4	-.9	1.06	455	SMOOTHNESS,	SHEFFIELD	
L123	0	252.3	132.0	-9.5	-2.2	1.51	455	SMOOTHNESS,	SHEFFIELD	
L376	0	252.5	144.7	-4.3	5.4	1.04	455	SMOOTHNESS,	SHEFFIELD	
L158	0	252.7	135.3	-6.2	4.4	1.21	455	SMOOTHNESS,	SHEFFIELD	
L167	0	253.0	135.7	-7.4	.9	.70	455	SMOOTHNESS,	SHEFFIELD	
L223	0	253.1	132.9	-8.4	-1.6	1.31	455	SMOOTHNESS,	SHEFFIELD	
L166	0	254.1	133.3	-7.3	-1.7	.82	455	SMOOTHNESS,	SHEFFIELD	
L345	0	254.5	128.2	-9.0	-6.5	1.29	455	SMOOTHNESS,	SHEFFIELD	
L372	0	254.5	126.1	-9.5	-8.4	1.01	455	SMOOTHNESS,	SHEFFIELD	
L321	0	254.7	123.3	-10.8	-11.0	.52	455	SMOOTHNESS,	SHEFFIELD	
L190C	0	254.9	139.5	-4.1	3.7	.72	455	SMOOTHNESS,	SHEFFIELD	
L561	0	255.3	146.7	-.9	10.1	1.06	455	SMOOTHNESS,	SHEFFIELD	
L255	0	255.5	132.9	-6.2	-2.6	.81	455	SMOOTHNESS,	SHEFFIELD	
L152	0	255.6	142.5	-2.3	6.2	.92	455	SMOOTHNESS,	SHEFFIELD	
L301	0	255.9	136.4	-4.4	.4	1.02	455	SMOOTHNESS,	SHEFFIELD	
L370	0	256.6	134.4	-4.6	-1.7	.75	455	SMOOTHNESS,	SHEFFIELD	
L587	0	256.7	139.7	-2.4	2.1	.93	455	SMOOTHNESS,	SHEFFIELD	
L305	0	256.7	130.7	-6.0	-5.1	.75	455	SMOOTHNESS,	SHEFFIELD	
L128	0	258.0	131.3	-4.5	-5.0	.85	455	SMOOTHNESS,	SHEFFIELD	
L380	0	258.7	129.1	-4.6	-7.4	.53	455	SMOOTHNESS,	SHEFFIELD	
L159	0	258.7	143.7	1.0	6.0	1.07	455	SMOOTHNESS,	SHEFFIELD	
L257A	0	258.8	129.8	-4.4	-6.8	.84	455	SMOOTHNESS,	SHEFFIELD	
L341	0	259.1	136.7	-1.4	-.5	1.04	455	SMOOTHNESS,	SHEFFIELD	
L157	X	260.2	106.2	-12.6	-29.0	.52	455	SMOOTHNESS,	SHEFFIELD	
L230S	0	260.3	144.5	3.0	6.4	1.09	455	SMOOTHNESS,	SHEFFIELD	
L261	0	260.5	132.0	-1.6	-4.5	.97	455	SMOOTHNESS,	SHEFFIELD	
L328	0	260.6	139.3	1.0	1.2	.80	455	SMOOTHNESS,	SHEFFIELD	
L396M	0	260.7	141.7	2.0	3.4	.55	455	SMOOTHNESS,	SHEFFIELD	
L360	0	260.7	131.7	-1.5	-5.2	.85	455	SMOOTHNESS,	SHEFFIELD	
L257C	0	260.7	139.6	1.2	1.6	1.11	455	SMOOTHNESS,	SHEFFIELD	
L132	0	261.1	133.3	-1.0	-4.5	1.05	455	SMOOTHNESS,	SHEFFIELD	
L260	0	261.5	135.8	.4	-2.3	.55	455	SMOOTHNESS,	SHEFFIELD	
L114	0	261.7	134.9	.2	-3.3	1.21	455	SMOOTHNESS,	SHEFFIELD	
L281	0	261.9	137.3	1.4	-1.2	1.28	455	SMOOTHNESS,	SHEFFIELD	
L571	0	262.0	148.3	5.9	8.9	1.11	455	SMOOTHNESS,	SHEFFIELD	
L122	0	262.2	141.9	3.5	2.9	1.17	455	SMOOTHNESS,	SHEFFIELD	
L278	0	262.3	144.2	4.6	5.0	.76	455	SMOOTHNESS,	SHEFFIELD	
L366	0	263.3	133.3	1.1	-5.3	.84	455	SMOOTHNESS,	SHEFFIELD	
L176S	0	263.6	138.7	3.5	-.5	1.06	455	SMOOTHNESS,	SHEFFIELD	
L245	0	263.7	145.2	6.3	5.4	1.15	455	SMOOTHNESS,	SHEFFIELD	
L317	0	263.8	139.6	4.1	.2	1.12	455	SMOOTHNESS,	SHEFFIELD	
L224	0	264.0	141.8	5.1	2.1	1.24	455	SMOOTHNESS,	SHEFFIELD	
L231	0	264.7	148.5	8.4	8.0	.95	455	SMOOTHNESS,	SHEFFIELD	
L262	0	264.9	148.9	8.9	8.3	.70	455	SMOOTHNESS,	SHEFFIELD	
L183S	0	266.1	143.9	7.9	3.3	1.08	455	SMOOTHNESS,	SHEFFIELD	
L288	0	266.2	136.3	4.5	-3.8	1.13	455	SMOOTHNESS,	SHEFFIELD	
L382	0	266.3	130.7	2.8	-9.0	.72	455	SMOOTHNESS,	SHEFFIELD	
L121	0	266.3	139.3	6.3	-1.1	1.04	455	SMOOTHNESS,	SHEFFIELD	

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		H44	J11	MAJOR	MINOR	E.SDE	VAR			
L190R	Ø	266.8	146.2	9.5	5.1	1.49	45S	SMOOTHNESS,	SHEFFIELD	
L257B	Ø	267.5	134.5	5.4	-6.0	1.06	45S	SMOOTHNESS,	SHEFFIELD	
L390	Ø	267.5	138.5	7.0	-2.3	1.06	45S	SMOOTHNESS,	SHEFFIELD	
L135S	Ø	267.7	146.0	10.2	4.5	1.05	45S	SMOOTHNESS,	SHEFFIELD	
L241	Ø	267.9	149.3	11.8	7.5	.92	45S	SMOOTHNESS,	SHEFFIELD	
L148	Ø	268.5	143.7	10.1	2.1	1.26	45S	SMOOTHNESS,	SHEFFIELD	
L232S	Ø	265.0	141.3	9.5	-.3	1.12	45S	SMOOTHNESS,	SHEFFIELD	
L134	Ø	269.3	137.7	8.4	-3.8	.86	45S	SMOOTHNESS,	SHEFFIELD	
L275	Ø	270.7	133.3	7.9	-8.3	.92	45S	SMOOTHNESS,	SHEFFIELD	
L226B	Ø	270.7	142.3	11.4	-.1	1.68	45S	SMOOTHNESS,	SHEFFIELD	
L342	Ø	272.0	149.7	15.6	6.1	1.09	45S	SMOOTHNESS,	SHEFFIELD	
L150	Ø	272.0	136.3	10.3	-6.1	1.12	45S	SMOOTHNESS,	SHEFFIELD	
L318	Ø	272.3	135.6	11.8	-3.2	.94	45S	SMOOTHNESS,	SHEFFIELD	
L277	Ø	272.3	140.5	12.3	-2.4	.87	45S	SMOOTHNESS,	SHEFFIELD	
L162	Ø	274.0	145.0	14.8	-.8	.54	45S	SMOOTHNESS,	SHEFFIELD	
L259	Ø	274.8	143.7	15.2	-.5	1.06	45S	SMOOTHNESS,	SHEFFIELD	
L291S	Ø	276.0	150.5	19.6	5.3	.97	45S	SMOOTHNESS,	SHEFFIELD	
L126	Ø	276.4	143.0	17.0	-1.7	.95	45S	SMOOTHNESS,	SHEFFIELD	
L100	Ø	277.3	143.9	18.2	-1.2	1.07	45S	SMOOTHNESS,	SHEFFIELD	
L153	Ø	277.4	144.2	18.4	-1.0	.95	45S	SMOOTHNESS,	SHEFFIELD	
L312	*	277.8	131.3	13.6	-13.0	.58	45S	SMOOTHNESS,	SHEFFIELD	
L107	Ø	279.3	146.3	21.0	.2	1.07	45S	SMOOTHNESS,	SHEFFIELD	
L575	Ø	280.6	141.3	20.2	-4.9	1.13	45S	SMOOTHNESS,	SHEFFIELD	
L174	*	311.3	236.7	86.5	70.1	.66	45R	SMOOTHNESS,	SHEFFIELD,	NON-STANDARD INSTRUMENT
GMEANS:		260.1	137.8			1.00				
		95% ELLIPSE:		26.8	12.4			WITH GAMMA = 23 DEGREES		

SMOOTHNESS, SHEFFIELD

SAMPLE H44 = 260. SHEFF. UNITS SAMPLE J11 = 138. SHEFF. UNITS



ANALYSIS 746-2 TABLE 1

SMOOTHNESS, BEKK SECONDS

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

LAB CODE	SAMPLE H44 MEAN	PRINTING				SAMPLE J11 MEAN	PRINTING				TEST D. * 15		
		64 GRAMS PER SQUARE METER	N.DEV	SDR	R.SDR		102 GRAMS PER SQUARE METER	N.DEV	SDR	R.SDR	VAR	F	LAB
L139B	13.30	1.51	.55	.65	.90	36.27	4.25	1.35	5.11	1.35	45K	0	L139B
L162	13.13	-.65	-.43	.52	.72	30.17	-1.85	-.60	4.39	1.16	45K	0	L162
L176	6.18	-7.61	-4.59	.43	.60	26.25	-5.77	-1.83	1.60	.42	45K	#	L176
L182K	13.35	-.40	-.26	.74	1.03	30.13	-1.89	-.60	3.44	.91	45K	0	L182K
L190C	10.77	-3.02	-1.58	.77	1.08	29.97	-2.05	-.65	4.08	1.08	45K	0	L190C
L230B	14.40	.61	.40	.67	.88	32.60	.59	.18	3.56	.94	45K	0	L230B
L232B	12.85	-.85	-.59	1.40	1.45	26.73	-5.25	-1.68	1.94	.51	45K	0	L232B
L243K	15.77	1.59	1.30	.60	.84	33.47	1.45	.46	4.44	1.18	45K	0	L243K
L251	14.40	.61	.40	.60	.87	31.47	-.55	-.18	4.05	1.08	45K	0	L251
L274	14.00	.21	.14	.71	.59	18.69	-13.33	-4.23	1.48	.39	45K	#	L274
L291K	12.60	-1.19	-.78	.50	.69	37.44	5.42	1.72	3.25	.87	45K	0	L291K
L581	15.20	1.41	.53	.77	1.08	32.00	-.02	-.01	3.42	.91	45K	0	L581
GR. MEAN = 13.75 BEKK SECONDS		GRAND MEAN = 32.02 BEKK SECONDS				TEST DETERMINATIONS * 15							
SD MEANS = 1.52 BEKK SECONDS		SD OF MEANS = 3.15 BEKK SECONDS				10 LABS IN GRAND MEANS							
AVERAGE SDR =		.72 BEKK SECONDS				AVERAGE SDR = 3.78 BEKK SECONDS							
L182G	33.83	20.05	13.16	.58	1.37	53.33	61.31	19.45	7.23	1.91	45H	*	L182G
L250M	11.05	-2.65	-1.77	.45	.69	24.28	-7.74	-2.45	2.95	.78	45L	*	L250M
L388	156.27	142.48	53.50	12.16	16.51	694.05	662.07	210.03	97.91	25.53	45H	*	L388
TOTAL NUMBER OF LABORATORIES REPORTING = 15													
Best Values: H44 14 Bekk seconds													
J11 31 Bekk seconds													

The following laboratories were omitted from the grand means because of extreme test results: 176, 274.

ANALYSIS 145-2 TABLE 2

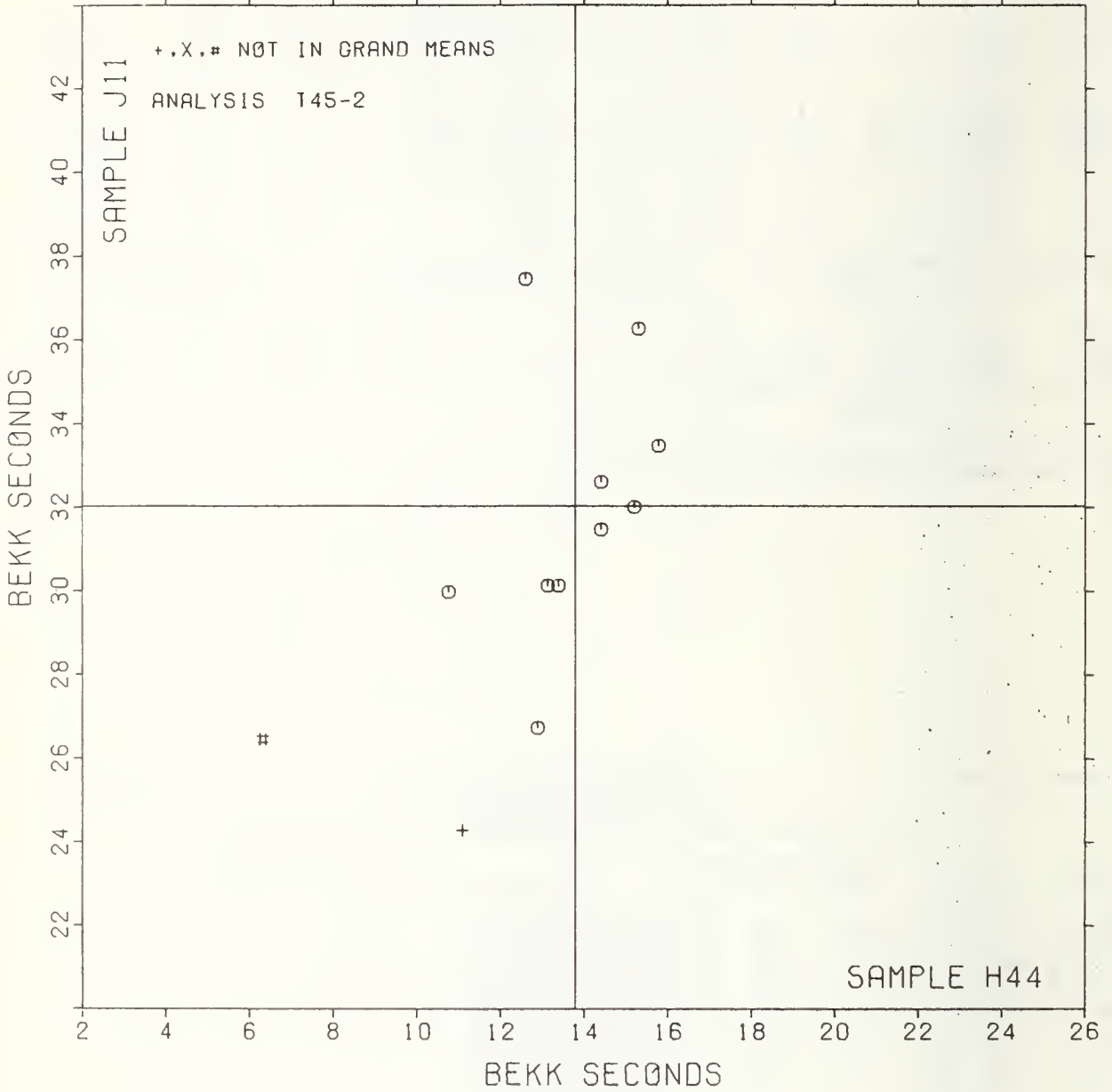
SMOOTHNESS, BEKK SECONDS

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

LAB CODE	P	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS				
		H44	J11	MAJOR	MINOR	F.SDR	VAR					
L176	#	6.18	26.25	-7.27	6.15	.51	45K	SMOOTHNESS, BEKK				
L190C	0	10.77	29.97	-2.65	2.51	1.08	45K	SMOOTHNESS, BEKK				
L250M	*	11.05	24.28	-8.14	.57	.73	45L	SMOOTHNESS, BEKK, 20 C, 65% RH				
L291K	0	12.60	37.44	5.04	2.32	.78	45K	SMOOTHNESS, BEKK				
L232B	0	12.89	26.73	-5.36	-.26	1.23	45K	SMOOTHNESS, BEKK				
L162	0	13.13	30.13	-1.58	.23	.54	45K	SMOOTHNESS, BEKK				
L182K	0	13.35	30.13	-1.53	-.01	.57	45K	SMOOTHNESS, BEKK				
L274	#	14.00	18.69	-12.57	-3.06	.65	45K	SMOOTHNESS, BEKK				
L251	0	14.40	31.47	-.41	-.72	.56	45K	SMOOTHNESS, BEKK				
L230B	0	14.40	32.60	.70	-.48	.51	45K	SMOOTHNESS, BEKK				
L581	0	15.20	32.00	.28	-1.35	.55	45K	SMOOTHNESS, BEKK				
L139B	0	15.30	36.27	4.47	-.57	1.13	45K	SMOOTHNESS, BEKK				
L243K	0	15.77	33.47	1.84	-1.63	1.01	45K	SMOOTHNESS, BEKK				
L182G	*	33.83	93.33	64.18	-6.46	1.64	45H	SMOOTHNESS, GURLEY OIL FLOTATION				
L388	*	156.27	694.05	677.23	2.45	21.42	45H	SMOOTHNESS, GURLEY OIL FLOTATION				
GMEANS:		13.79	32.02			1.00						
		95% ELLIPSE:		10.18	4.41	WITH GAMMA = 77 DEGREES						

SMOOTHNESS, BEKK

SAMPLE H44 = 13.8 BEKK SECONDS SAMPLE J11 = 32.0 BEKK SECONDS



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T57-1 TABLE 1
HYDROGEN ION CONCENTRATION (PH), COLD
TAPPI STANDARD T509 6S-77

LAB CODE	SAMPLE E47 MEAN	COATED GLOSS 105 GRAMS PER SQUARE METER				SAMPLE J13 MEAN	PRINTING 89 GRAMS PER SQUARE METER				TEST D. = 5		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L174C	8.920	.807	3.09	.027	.31	8.190	.916	5.29	.042	.71	57F	#	L174C
L182C	7.840	-.273	-1.04	.230	2.64	7.090	-.184	-1.06	.055	.93	57D	Ø	L182C
L251C	8.444	.331	1.27	.025	.33	7.552	.278	1.61	.040	.67	57P	Ø	L251C
L274	8.250	.137	.53	.071	.81	7.300	.026	.15	.071	1.20	57V	Ø	L274
L328	8.160	.047	.18	.065	.75	7.180	-.094	-.54	.084	1.42	57M	Ø	L328
L356	8.222	.105	.42	.073	.84	7.380	.106	.61	.049	.84	57V	Ø	L356
L484A	7.760	-.353	-1.35	.055	.63	7.140	-.134	-.77	.055	.93	57Y	Ø	L484A
GR. MEAN = 8.113 PH UNITS		AVERAGE SDR = .087 PH UNITS				GRAND MEAN = 7.274 PH UNITS				TEST DETERMINATIONS = 5			
SD MEANS = .261 PH UNITS						SD OF MEANS = .173 PH UNITS				6 LABS IN GRAND MEANS			
						AVERAGE SDR = .059 PH UNITS							
L442	8.848	.735	2.81	.050	.57	7.976	.703	4.06	.038	.65	57Q	+	L442
TOTAL NUMBER OF LABORATORIES REPORTING = 8													

Best Values: E47 8.2 pH units
J13 7.3 pH units

The following laboratories were omitted from the grand means because of extreme test results: L74C.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T57-1 TABLE 2
HYDROGEN ION CONCENTRATION (PH), COLD
TAPPI STANDARD T509 6S-77

LAB CODE	F	MEANS		COORDINATES		AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS				
		E47	J13	MAJOR	MINOR			PROPERTY	TEST INSTRUMENT	CONDITIONS		
L484A	Ø	7.760	7.140	-.370	.075	.78	57Y	PH, COLD, BECKMAN MODEL B2				
L182C	Ø	7.840	7.090	-.325	-.010	1.79	57D	PH, COLD, RADIOMETER TYPE PH M 28				
L328	Ø	8.160	7.180	-.010	-.104	1.08	57M	PH, COLD, BECKMAN ZEROMATIC				
L356	Ø	8.222	7.380	.145	.032	.84	57V	PH, COLD, BECKMAN EXPANDOMATIC				
L274	Ø	8.250	7.300	.130	-.051	1.01	57V	PH, COLD, BECKMAN EXPANDOMATIC				
L251C	Ø	8.444	7.552	.425	.059	.50	57P	PH, COLD, RADIOMETER TYPE PH M64				
L442	+	8.848	7.976	.957	.203	.61	57Q	PH, HOT, W.G.PYE				
L174C	#	8.920	8.190	1.172	.345	.51	57F	PH, COLD, FISHER ACCUMET MODEL 220				
GMEANS:		8.113	7.274			1.00						
		55% ELLIPSE:		1.274	.287	WITH GAMMA = 32 DEGREES						

ANALYSIS T60-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT
 TAPPI STANDARD T425 6S-7E, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	COATED DULL					PRINTING					TEST D. = 10		
	E40 MEAN	117 GRAMS DEV	PEE N.DEV	SQUARE METER SDR	R.SDR	B25 MEAN	77 GRAMS DEV	PER SQUARE METER N.DEV	SDR	R.SDR	VAR	F	LAB
L105	96.00	-.12	-.41	.16	.78	93.57	-1.09	-2.85	.22	.87	60W	X	L105
L108	96.54	.42	1.45	.12	.56	94.97	.31	-.82	.14	.56	60B	Ø	L108
L115	96.27	.15	.52	.16	.75	94.62	-.04	-.10	.12	.48	60B	Ø	L115
L121	96.05	-.07	-.24	.08	.40	94.61	-.05	-.12	.20	.77	60B	Ø	L121
L122	96.03	-.09	-.31	.13	.64	94.47	-.19	-.49	.16	.62	60D	Ø	L122
L123	96.09	-.03	-.10	.12	.57	94.37	-.29	-.75	.35	1.36	60W	Ø	L123
L124	95.78	-.34	-1.18	.14	.67	94.04	-.62	-1.62	.35	1.39	60B	Ø	L124
L125	95.72	-.40	-1.38	.13	.63	93.13	-1.53	-4.00	.31	1.22	60R	#	L125
L131	96.10	-.02	-.07	.32	1.51	94.10	-.56	-1.46	.32	1.24	60R	Ø	L131
L132	96.02	-.10	-.35	.14	.67	94.41	-.25	-.65	.24	.95	60B	Ø	L132
L134	96.39	.27	.94	.30	1.43	94.53	-.13	-.33	.12	.46	60R	Ø	L134
L139	96.09	-.03	-.10	.13	.61	94.54	-.12	-.31	.19	.75	60B	Ø	L139
L148H	95.86	-.26	-.90	.31	1.46	93.80	-.86	-2.24	.23	.89	60B	*	L148H
L150	96.20	.08	.28	.42	2.01	95.20	.54	1.42	.42	1.66	60B	Ø	L150
L152	95.65	-.47	-1.63	.24	1.15	94.45	-.21	-.54	.44	1.72	60B	Ø	L152
L153	95.70	-.42	-1.45	.26	1.27	94.40	-.26	-.67	.32	1.24	60B	Ø	L153
L157	96.35	.23	.80	.34	1.61	95.05	.39	1.03	.16	.62	60B	Ø	L157
L158	95.50	-.62	-2.15	.13	.64	94.01	-.65	-1.69	.18	.70	60D	Ø	L158
L159	96.43	.31	1.07	.09	.45	95.03	.37	.97	.08	.32	60R	Ø	L159
L162	96.50	.38	1.32	.18	.84	95.00	.34	.90	.17	.67	60W	Ø	L162
L166	95.48	-.64	-2.21	.13	.63	93.96	-.70	-1.83	.26	1.02	60B	Ø	L166
L173A	96.07	-.05	-.17	.12	.55	94.73	.07	.19	.29	1.13	60B	Ø	L173A
L182	95.95	-.17	-.59	.16	.75	95.20	.54	1.42	.35	1.37	60B	*	L182
L183	96.48	.36	1.25	.27	1.31	95.19	.53	1.39	.15	.60	60R	Ø	L183
L190C	96.41	.25	1.00	.07	.35	94.93	.27	.71	.25	1.00	60B	Ø	L190C
L190R	96.07	-.05	-.17	.16	.75	94.67	.01	.03	.24	.93	60B	Ø	L190R
L206	96.30	.18	.62	.14	.67	94.87	.21	.56	.24	.93	60B	Ø	L206
L210B	96.10	-.02	-.07	.11	.50	94.65	-.01	-.02	.16	.65	60B	Ø	L210B
L211S	95.86	-.26	-.90	.13	.64	94.17	-.49	-1.28	.22	.87	60R	Ø	L211S
L212	96.10	-.02	-.07	.21	1.00	94.80	.14	.37	.35	1.37	60B	Ø	L212
L213	96.00	-.12	-.41	.12	.59	94.60	-.06	-.15	.23	.91	60R	Ø	L213
L223B	96.20	.08	.28	.15	.71	94.95	.29	.76	.22	.87	60B	Ø	L223B
L225	96.13	.01	.04	.42	1.98	94.10	-.56	-1.46	.43	1.68	60R	Ø	L225
L226B	96.53	.41	1.42	.32	1.52	95.07	.41	1.08	.24	.95	60R	Ø	L226B
L228	95.84	-.28	-.97	.18	.85	94.57	-.09	-.23	.19	.77	60H	Ø	L228
L230	96.21	.09	.31	.13	.61	94.76	.10	.27	.16	.65	60B	Ø	L230
L236B	95.95	-.17	-.59	.45	2.16	94.41	-.25	-.65	.58	2.27	60B	Ø	L236B
L238A	95.61	-.51	-1.76	.10	.47	94.02	-.64	-1.67	.18	.71	60P	Ø	L238A
L241	95.89	-.23	-.80	.28	1.32	94.62	-.04	-.10	.56	2.18	60B	Ø	L241
L243	96.31	.19	.66	.12	.57	94.92	.26	.69	.22	.87	60B	Ø	L243
L254	96.30	.18	.62	.09	.45	94.72	.06	.16	.19	.74	60R	Ø	L254
L255	96.07	-.05	-.17	.39	1.84	94.56	-.10	-.26	.17	.67	60B	Ø	L255
L259	96.42	.30	1.04	.21	1.00	94.84	.18	.48	.24	.95	60R	Ø	L259
L261	96.77	.65	2.25	.28	1.33	95.30	.64	1.68	.28	1.10	60B	Ø	L261
L262	96.15	.03	.10	.23	1.11	94.67	.01	.03	.13	.49	60R	Ø	L262
L275	96.26	.14	.49	.16	.78	94.89	.23	.61	.11	.43	60R	Ø	L275
L278	95.68	-.44	-1.52	.20	.97	85.53	-9.13	-23.88	.14	.56	60B	#	L278
L281	96.90	.78	2.70	.19	.90	95.77	1.11	2.91	.28	1.11	60D	*	L281
L285B	95.90	-.22	-.76	.16	.78	94.30	-.36	-.94	.42	1.66	60B	Ø	L285B
L285R	96.52	.40	1.39	.28	1.34	94.35	-.31	-.81	.20	.79	60R	*	L285R
L288	95.92	-.20	-.69	.48	2.30	94.47	-.19	-.49	.29	1.16	60D	Ø	L288
L301	96.02	-.10	-.35	.12	.59	94.69	.03	.08	.25	.99	60B	Ø	L301
L305	96.18	.06	.21	.14	.67	94.77	.11	.29	.18	.65	60R	Ø	L305
L308	96.34	.22	.76	.18	.85	94.95	.29	.76	.17	.67	60H	Ø	L308
L315	96.11	-.01	-.03	.09	.42	94.71	.05	.14	.22	.88	60D	Ø	L315
L317	95.84	-.28	-.97	.31	1.46	95.02	.36	.95	.46	1.79	60B	*	L317
L318	95.90	-.22	-.76	.46	2.19	94.45	-.21	-.54	.55	2.16	60B	Ø	L318
L323	96.98	.86	2.97	.13	.62	95.37	.71	1.86	.26	1.02	60W	*	L323
L326	94.85	-1.27	-4.39	.21	1.01	93.27	-1.39	-3.63	.28	1.08	60B	X	L326
L328	96.14	.02	.07	.30	1.41	95.00	.34	.90	.00	.00	60B	Ø	L328
L333	96.08	-.04	-.14	.15	.74	94.83	.17	.45	.16	.62	60B	Ø	L333
L339	96.20	.08	.28	.42	2.01	95.30	.64	1.68	.48	1.90	60B	Ø	L339
L341	95.69	-.43	-1.49	.22	1.04	94.03	-.63	-1.64	.31	1.20	60R	Ø	L341
L349	96.12	.00	.00	.27	1.31	94.95	-.31	-.81	.44	1.71	60D	Ø	L349
L366	95.96	-.16	-.55	.67	3.17	94.56	-.10	-.26	.46	1.81	60B	Ø	L366

ANALYSIS T60-1 TABLE 1
OPACITY (89% REFLECTANCE BACKING) IN PERCENT

TAPPI STANDARD T425 G5-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE E40 MEAN	COATED DULL 117 GRAMS PER SQUARE METER				SAMPLE H29 MEAN	PRINTING 77 GRAMS PER SQUARE METER				TEST D. = 10		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L378	96.13	.01	.04	.36	1.70	94.97	.31	.82	.18	.69	60D	6	L378
L390	96.19	.07	.24	.25	1.18	94.76	.10	.27	.43	1.69	60B	6	L390
L502D	95.72	-.40	-1.38	.09	.45	94.11	-.54	-1.42	.18	.71	60D	6	L502D
L502B	96.20	.08	.28	.12	.55	94.72	.06	.16	.18	.69	60B	6	L502B
L502R	96.29	.17	.59	.10	.47	94.97	.31	.82	.13	.53	60R	6	L502R
L523	96.04	-.08	-.28	.12	.56	94.65	-.01	-.02	.13	.50	60R	6	L523
L543	95.81	-.31	-1.07	.14	.65	94.18	-.48	-1.25	.21	.85	60D	6	L543
L561	95.80	-.32	-1.11	.35	1.67	94.15	-.51	-1.33	.47	1.86	60B	6	L561
L573	96.39	.27	.94	.13	.61	95.10	.44	1.16	.14	.56	60B	6	L573
L581	96.27	.15	.52	.12	.55	94.78	.12	.32	.18	.69	60B	6	L581
L587	96.10	-.02	-.07	.15	.71	94.64	-.02	-.05	.23	.91	60B	6	L587
L594	95.91	-.21	-.73	.17	.79	94.45	-.21	-.54	.20	.79	60D	6	L594
L597	84.20	-11.92	-41.26	.92	4.38	49.70	-44.96	-117.63	.48	1.90	60B	#	L597
L599	96.20	.08	.28	.26	1.23	94.50	-.16	-.41	.47	1.95	60B	6	L599

GR. MEAN = 96.12 PERCENT GRAND MEAN = 94.66 PERCENT TEST DETERMINATIONS = 10
SD MEANS = .29 PERCENT SD OF MEANS = .38 PERCENT 74 LABS IN GRAND MEANS
AVERAGE SDR = .21 PERCENT AVERAGE SDR = .25 PERCENT

L100	96.13	.01	.04	.12	.55	95.14	.48	1.26	.18	.72	60E	*	L100
L224	96.21	.09	.31	.20	.56	94.81	.15	.40	.16	.63	60P	*	L224
L232	96.00	-.12	-.41	.00	.00	95.10	.44	1.16	.21	.83	60P	*	L232
L236E	96.09	-.03	-.10	.26	1.22	94.79	.13	.35	.17	.65	60E	*	L236E
L249	95.86	-.26	-.90	.12	.56	94.61	-.05	-.12	.17	.68	60P	*	L249
L256	95.87	-.25	-.86	.09	.45	94.40	-.26	-.67	.28	1.11	60N	*	L256
L260	96.10	-.02	-.07	.09	.45	94.89	.23	.61	.13	.51	60P	*	L260
L274P	95.85	-.27	-.93	.41	1.96	94.60	-.06	-.15	.81	3.18	60P	*	L274P
L309	95.13	-.99	-3.43	.14	.68	94.68	.02	.06	.12	.48	60A	*	L309
L312	95.75	-.37	-1.28	.26	1.26	94.30	-.36	-.94	.35	1.37	60P	*	L312
L380	96.00	-.12	-.41	.00	.00	94.00	-.66	-1.72	.00	.00	60P	*	L380
L388	95.60	-.52	-1.80	.32	1.51	94.60	-.06	-.15	.21	.83	60P	*	L388

TOTAL NUMBER OF LABORATORIES REPORTING = 91

Best Values: E40 96.1 ± 0.5 percent
H29 94.6 ± 0.6 percent

The following laboratories were omitted from the grand means because of extreme test results: 125, 278, 597.

OPACITY (89% REFLECTANCE BACKING) IN PERCENT
TAPPI STANDARD T425 6S-7S, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	F	MEANS E40	H29	COORDINATES MAJOR	MINOR	AVG R.S.D. VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L597	#	84.20	49.70	-43.73	-15.84	3.14 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L326	X	94.85	93.27	-1.86	.25	1.05 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L309	*	95.13	94.68	-.55	.83	.52 60A	OPACITY (WHITE BACKING), ZEISS ELREPHO, FILTER 4, 86% BACKING
L166	Ø	95.48	93.96	-.94	.13	.82 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L158	Ø	95.50	94.01	-.89	.14	.67 60D	OPACITY (WHITE BACKING), DIANØ/BNL
L388	*	95.60	94.60	-.34	.39	1.17 60P	OPACITY (WHITE BACKING), PHOTØVOLT
L238A	Ø	95.61	94.02	-.81	.06	.59 60B	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L152	Ø	95.65	94.45	-.44	.27	1.44 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L278	#	95.68	85.53	-7.75	-4.84	.77 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L341	Ø	95.69	94.03	-.76	-.00	1.12 60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L153	Ø	95.70	94.40	-.45	.20	1.24 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L502D	Ø	95.72	94.11	-.67	.02	.58 60D	OPACITY (WHITE BACKING), DIANØ/BNL
L125	#	95.72	93.13	-1.48	-.54	.92 60H	OPACITY (WHITE BACKING), BUYGEN
L312	*	95.75	94.30	-.50	.10	1.31 60P	OPACITY (WHITE BACKING), PHOTØVOLT
L124	Ø	95.78	94.04	-.70	-.07	1.03 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L561	Ø	95.80	94.15	-.60	-.03	1.76 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L543	Ø	95.81	94.18	-.57	-.02	.75 60D	OPACITY (WHITE BACKING), DIANØ/BNL
L317	*	95.84	95.02	.14	.44	1.63 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L228	Ø	95.84	94.57	-.23	.18	.81 60B	OPACITY (WHITE BACKING), HUYGEN
L274P	*	95.85	94.60	-.20	.19	2.57 60P	OPACITY (WHITE BACKING), PHOTØVOLT
L148H	*	95.86	93.80	-.85	-.28	1.17 60H	OPACITY (WHITE BACKING), HUYGEN
L249	*	95.86	94.61	-.19	.19	.62 60P	OPACITY (WHITE BACKING), PHOTØVOLT
L211S	Ø	95.86	94.17	-.55	-.06	.76 60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L256	*	95.87	94.40	-.35	.06	.78 60N	OPACITY (WHITE BACKING), HUNTR
L241	Ø	95.89	94.62	-.16	.17	1.75 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L318	Ø	95.90	94.45	-.30	.06	2.18 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L285B	Ø	95.90	94.30	-.42	-.02	1.22 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L594	Ø	95.91	94.45	-.29	.05	.79 60D	OPACITY (WHITE BACKING), DIANØ/BNL
L288	Ø	95.92	94.47	-.27	.06	1.73 60D	OPACITY (WHITE BACKING), DIANØ/BNL
L236P	Ø	95.95	94.41	-.30	-.00	2.21 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L182	*	95.95	95.20	.35	.45	1.06 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L365	Ø	95.96	94.56	-.17	.08	2.49 60H	OPACITY (WHITE BACKING), BAUSCH * LOMB
L105	X	96.00	93.57	-.96	-.52	.82 60W	OPACITY (WHITE BACKING), HUYGEN, DIGITAL
L213	Ø	96.00	94.50	-.12	.07	.75 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L380	*	96.00	94.00	-.61	-.28	.00 60P	OPACITY (WHITE BACKING), PHOTØVOLT
L232	*	96.00	95.10	.30	.35	.41 60P	OPACITY (WHITE BACKING), PHOTØVOLT
L132	Ø	96.02	94.41	-.26	-.06	.81 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L301	Ø	96.02	94.69	-.03	.10	.79 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L122	Ø	96.03	94.47	-.21	-.03	.63 60D	OPACITY (WHITE BACKING), DIANØ/BNL
L523	Ø	96.04	94.65	-.05	.06	.53 60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L121	Ø	96.05	94.61	-.08	.03	.59 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L255	Ø	96.07	94.56	-.11	-.01	1.26 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L173A	Ø	96.07	94.73	.03	.08	.84 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L190R	Ø	96.07	94.67	-.02	.05	.84 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L323	Ø	96.08	94.83	.12	.12	.62 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L123	Ø	96.06	94.37	-.25	-.14	.57 60W	OPACITY (WHITE BACKING), HUYGEN, DIGITAL
L236E	*	96.06	94.79	.09	.10	.94 60E	OPACITY (WHITE BACKING), ZEISS ELREPHO, FMY-C(10) FILTER
L139	Ø	96.09	94.54	-.11	-.04	.68 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L260	*	96.10	94.89	.18	.15	.48 60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP
L131	Ø	96.10	94.10	-.47	-.20	1.37 60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L210H	Ø	96.10	94.61	-.02	.01	.52 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L537	Ø	96.10	94.64	-.02	.01	.81 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L212	Ø	96.10	94.80	.11	.10	1.19 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L715	Ø	96.11	94.71	.04	.04	.65 60D	OPACITY (WHITE BACKING), DIANØ/BNL
L349	Ø	96.12	94.75	-.25	-.18	1.51 60D	OPACITY (WHITE BACKING), DIANØ/BNL
L100	*	96.13	95.14	.40	.27	.64 60E	OPACITY (WHITE BACKING), ZEISS ELREPHO, FMY-C(10) FILTER
L225	Ø	96.13	94.10	-.45	-.33	1.83 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L378	Ø	96.13	94.97	.26	.17	1.20 60D	OPACITY (WHITE BACKING), DIANØ/BNL
L328	Ø	96.14	95.00	.29	.18	.70 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L262	Ø	96.15	94.67	.03	-.02	.80 60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L305	Ø	96.18	94.77	.13	.01	.69 60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L390	Ø	96.19	94.76	.12	.00	1.43 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L599	Ø	96.20	94.50	-.08	-.16	1.54 60B	OPACITY (WHITE BACKING), BAUSCH * LOMB
L502B	Ø	96.20	94.72	.10	-.03	.62 60H	OPACITY (WHITE BACKING), BAUSCH * LOMB
L223B	Ø	96.20	94.95	.29	.10	.79 60H	OPACITY (WHITE BACKING), BAUSCH * LOMB

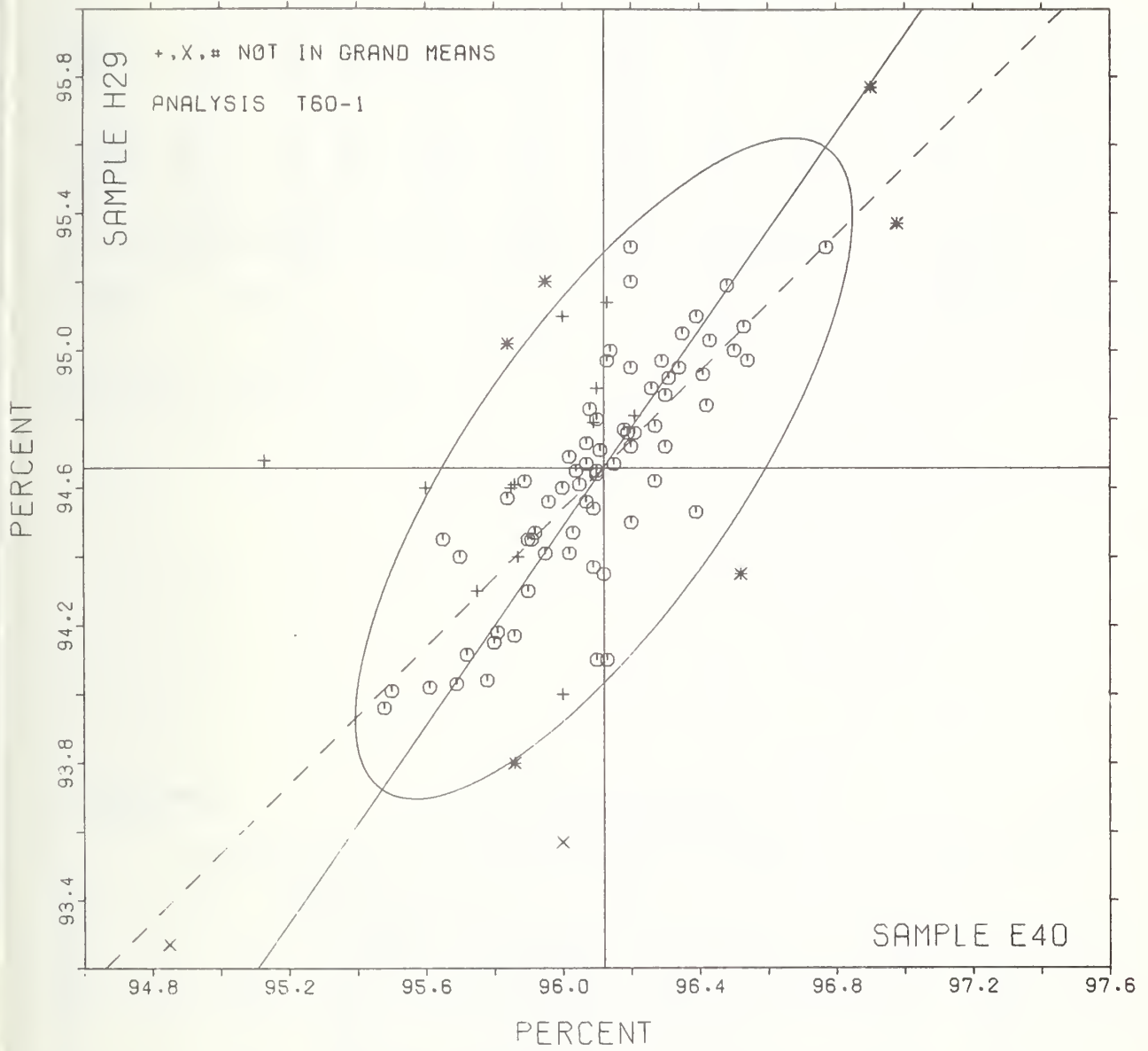
OPACITY (89% REFLECTANCE BACKING) IN PERCENT
TAPPI STANDARD T425 G8-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		E40	R29	MAJ6E	MIN6R	R.SDR	VAR	
L150	Ø	96.20	95.20	.49	.24	1.83	60B	OPACITY (WHITE BACKING), BAUSCB * L6MB
L339	Ø	96.20	95.30	.57	.30	1.95	60B	OPACITY (WHITE BACKING), BAUSCB * L6MB
L230	Ø	96.21	94.76	.14	-.02	.63	60B	OPACITY (WHITE BACKING), BAUSCB * L6MB
L224	*	96.21	94.81	.18	.01	.80	60P	OPACITY (WHITE BACKING), PHOTOVOLT
L275	Ø	96.26	94.85	.27	.02	.61	60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L115	Ø	96.27	94.62	.05	-.15	.61	60B	OPACITY (WHITE BACKING), BAUSCH * L6MB
L581	Ø	96.27	94.78	.15	-.05	.62	60B	OPACITY (WHITE BACKING), BAUSCB * L6MB
L502R	Ø	96.29	94.97	.35	.04	.50	60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L206	Ø	96.30	94.87	.28	-.03	.80	60B	OPACITY (WHITE BACKING), BAUSCB * L6MB
L254	Ø	96.30	94.72	.15	-.11	.55	60B	OPACITY (WHITE BACKING), BUYGEN
L243	Ø	96.31	94.92	.32	-.01	.72	60B	OPACITY (WHITE BACKING), BAUSCH * L6MB
L308	Ø	96.34	94.95	.37	-.01	.76	60B	OPACITY (WHITE BACKING), BUYGEN
L157	Ø	96.35	95.05	.45	.03	1.11	60B	OPACITY (WHITE BACKING), BAUSCB * L6MB
L134	Ø	96.35	94.53	.05	-.29	.94	60B	OPACITY (WHITE BACKING), BAUSCH * L6MB
L573	Ø	96.39	95.10	.52	.03	.58	60B	OPACITY (WHITE BACKING), BUYGEN
L190C	Ø	96.41	94.93	.39	-.08	.68	60B	OPACITY (WHITE BACKING), BAUSCH * L6MB
L259	Ø	96.42	94.84	.32	-.14	.97	60B	OPACITY (WHITE BACKING), BAUSCB * L6MB
L159	Ø	96.43	95.03	.48	-.04	.39	60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L183	Ø	96.48	95.19	.64	.01	.95	60B	OPACITY (WHITE BACKING), BAUSCB * L6MB
L162	Ø	96.50	95.00	.50	-.12	.75	60W	OPACITY (WHITE BACKING), HUYGEN, DIGITAL
L285R	*	96.52	94.35	-.02	-.50	1.07	60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L226R	Ø	96.53	95.07	.57	-.10	1.23	60B	OPACITY (WHITE BACKING), BAUSCB * L6MB
L108	Ø	96.54	94.97	.50	-.17	.56	60B	OPACITY (WHITE BACKING), BAUSCB * L6MB
L261	Ø	96.77	95.30	.90	-.17	1.21	60B	OPACITY (WHITE BACKING), BAUSCB * L6MB
L281	*	96.90	95.77	1.36	-.01	1.01	60D	OPACITY (WHITE BACKING), DIANE/BNL
L337	*	96.98	95.37	1.07	-.30	.82	60W	OPACITY (WHITE BACKING), HUYGEN, DIGITAL
MEANS:		96.12	94.66			1.00		
		95% ELLIPSE:		1.14	.40	WITH GAMMA = 55 DEGREES		

OPACITY, B&L TYPE, 89% BACKING

SAMPLE E40 = 96.12 PERCENT

SAMPLE H29 = 94.66 PERCENT



OPACITY (PAPER BACKING) IN PERCENT
TAPPI SUGGESTED METHOD T519 SU-70, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	SAMPLE E40 MEAN	COATED DULL 117 GS/MS PER SQUARE METER				SAMPLE B29 MEAN	PRINTING 77 GRAMS PER SQUARE METER				TEST D. = 10		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	96.74	-.00	-.02	.13	1.22	96.73	.07	.40	.14	1.32	60J	0	L100
L150	96.66	-.08	-.53	.05	.51	96.57	-.10	-.57	.09	.81	60J	0	L150
L182E	96.80	.06	.39	.23	2.18	96.65	-.01	-.07	.11	1.01	60J	0	L182E
242	96.86	.12	.80	.13	1.22	96.88	.22	1.28	.09	.86	60J	0	L242
L244	96.44	-.30	-2.06	.07	.64	96.28	-.38	-2.22	.11	1.03	60F	0	L244
L250T	96.71	-.03	-.22	.14	1.32	96.53	-.13	-.78	.13	1.17	60J	0	L250T
L251	96.69	-.05	-.33	.08	.74	96.68	.02	.09	.12	1.11	60F	0	L251
L360	96.60	-.14	-.97	.12	1.20	96.67	.01	.05	.13	1.17	60F	0	L360
L446	96.68	-.06	-.40	.04	.43	96.58	-.08	-.50	.11	1.02	60J	0	L446
L484	97.00	.26	1.75	.09	.87	96.55	.29	1.69	.09	.86	60F	0	L484
L502	96.84	.10	.68	.09	.86	96.70	.04	.22	.07	.61	60J	0	L502
L575	96.88	.14	.53	.08	.80	96.73	.07	.41	.11	1.00	60J	0	L575
GR. MEAN = 96.74 PERCENT		GRAND MEAN = 96.66 PERCENT				TEST DETERMINATIONS = 10							
SD MEANS = .15 PERCENT		SD OF MEANS = .17 PERCENT				12 LABS IN GRAND MEANS							
AVERAGE SDR = .10 PERCENT		AVERAGE SDR = .11 PERCENT											
L176	83.62	-13.12	-89.39	.16	1.56	73.40	-23.26	-137.15	.39	3.60	60Z	0	L176
TOTAL NUMBER OF LABORATORIES REPORTING = 13													
Best Values: E40 96.8 ± 0.2 percent													
H29 96.7 ± 0.3 percent													

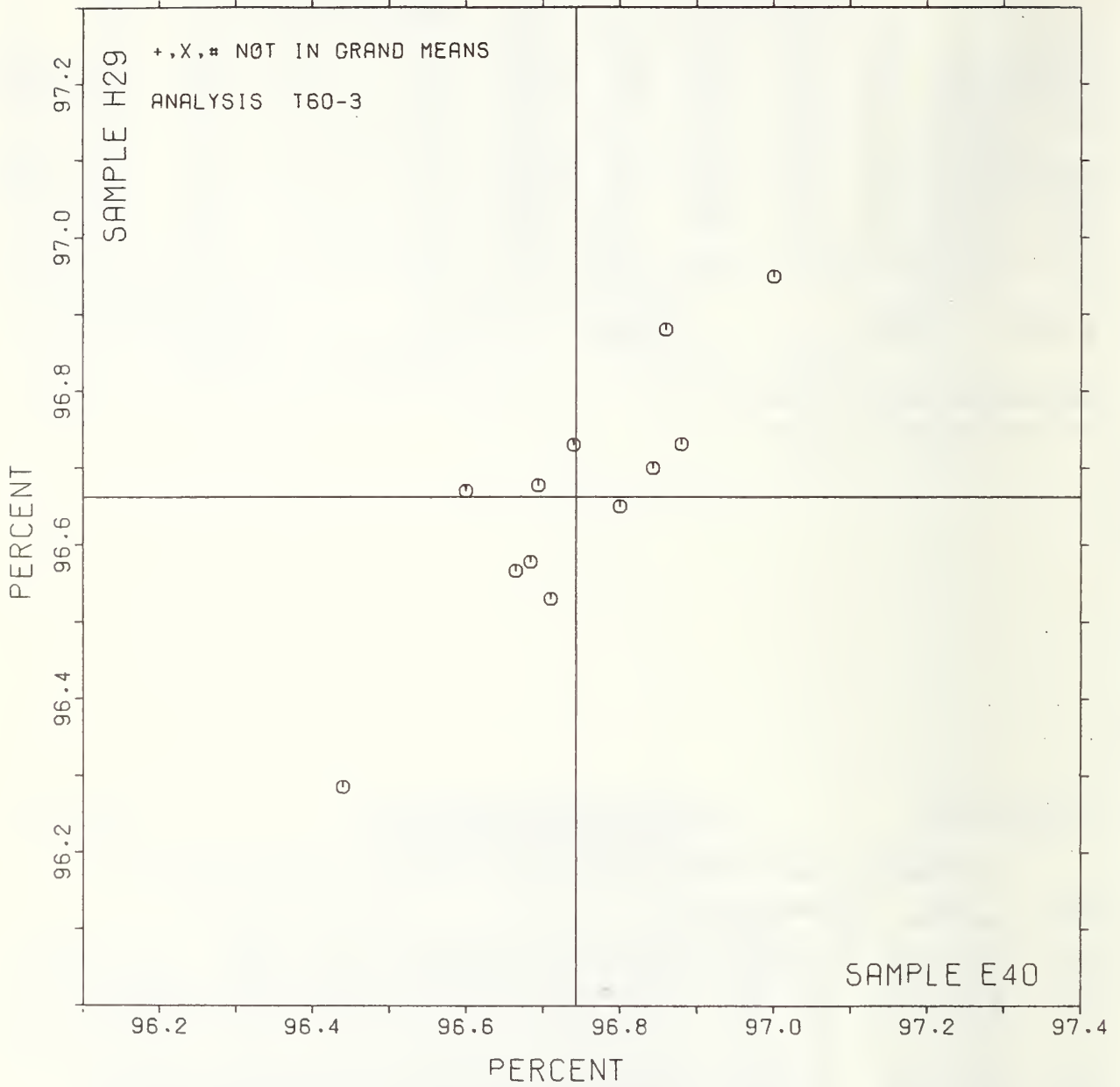
OPACITY (PAPER BACKING) IN PERCENT
TAPPI SUGGESTED METHOD T519 SU-70, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	P	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		E40	B29	MAJOR	MINOR	E.SDR	VAR	
L176	*	83.62	73.40	-26.23	-5.04	2.58	60Z	OPACITY (PAPER BACKING), MARTIN SWEETS
L244	0	96.44	96.28	-.48	-.01	.83	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP
L360	0	96.60	96.67	-.09	.11	1.19	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP
L150	0	96.66	96.57	-.12	-.00	.66	60J	OPACITY (PAPER BACKING), Z.ELREPHO, FMY-C, GLOSS TRAP
L446	0	96.68	96.58	-.10	-.01	.73	60J	OPACITY (PAPER BACKING), Z.ELREPHO, FMY-C, GLOSS TRAP
L251	0	96.69	96.68	-.02	.05	.92	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP
L250T	0	96.71	96.53	-.12	-.06	1.25	60J	OPACITY (PAPER BACKING), Z.ELREPHO, FMY-C, GLOSS TRAP
L100	0	96.74	96.73	.05	.05	1.27	60J	OPACITY (PAPER BACKING), Z.ELREPHO, FMY-C, GLOSS TRAP
L182E	0	96.80	96.65	.03	-.05	1.60	60J	OPACITY (PAPER BACKING), Z.ELREPHO, FMY-C, GLOSS TRAP
L502	0	96.84	96.70	.09	-.05	.74	60J	OPACITY (PAPER BACKING), Z.ELREPHO, FMY-C, GLOSS TRAP
L242	0	96.86	96.88	.24	.05	1.04	60J	OPACITY (PAPER BACKING), Z.ELREPHO, FMY-C, GLOSS TRAP
L575	0	96.88	96.73	.14	-.06	.90	60J	OPACITY (PAPER BACKING), Z.ELREPHO, FMY-C, GLOSS TRAP
L484	0	97.00	96.55	.38	-.01	.88	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP
GMEANS:		96.74	96.66			1.00		
95% ELLIPSE:				.65	.16	WITH GAMMA = 49 DEGREES		

OPACITY, ELREPHO TYPE, PAPER BACKING

SAMPLE E40 = 96.74 PERCENT

SAMPLE H29 = 96.66 PERCENT



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

LAB CODE	SAMPLE E41 151 GRAMS PER SQUARE METER COATED GLASS					SAMPLE J33 73 GRAMS PER SQUARE METER PRINTING					TEST D. = 8		
	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L108	82.61	-.18	-.79	.38	1.13	68.20	-.01	-.03	.11	.66	65M	Ø	L108
L122	82.54	-.26	-1.11	.57	1.70	68.00	-.21	-.66	.16	.99	65N	Ø	L122
L132	83.06	.27	1.14	.24	.71	68.35	.14	.44	.14	.87	65N	Ø	L132
L158	82.66	-.12	-.58	.18	.53	68.60	.29	.91	.17	1.04	65N	Ø	L158
L176A	82.49	-.31	-1.33	.29	.85	68.77	.57	1.78	.10	.64	65A	Ø	L176A
L190C	82.76	-.03	-.15	.17	.50	67.89	-.32	-1.01	.10	.61	65A	Ø	L190C
L210M	82.97	.18	.76	.50	1.50	68.41	.20	.64	.16	.96	65N	Ø	L210M
L210N	82.61	-.16	-.79	.35	1.04	68.36	.15	.48	.13	.80	65N	Ø	L210N
L211	83.04	.24	1.03	.17	.50	68.52	.32	.99	.20	1.22	65N	Ø	L211
L213	NO DATA REPORTED FOR SAMPLE E41					68.01	-.20	-.62	.17	1.07	65T	M	L213
L225	83.05	.25	1.09	.49	1.46	68.30	.09	.29	.17	1.04	65N	Ø	L225
L243	82.65	-.15	-.63	.46	1.36	68.02	-.18	-.58	.15	.92	65A	Ø	L243
L259	82.85	.09	.39	1.98	5.90	66.99	-1.22	-3.84	3.33	20.57	65M	#	L259
L275	82.56	-.23	-1.00	.38	1.13	68.19	-.02	-.07	.11	.69	65M	Ø	L275
L288	82.56	.17	.71	.28	.84	68.45	.24	.76	.12	.74	65N	Ø	L288
L308	83.26	.47	2.00	.25	.75	68.59	.38	1.19	.16	.96	65N	Ø	L308
L315	83.11	.32	1.35	.27	.81	67.59	-.22	-.70	.18	1.12	65N	Ø	L315
L317	82.61	-.18	-.79	.36	1.06	68.01	-.20	-.62	.18	1.12	65M	Ø	L317
L502	82.87	.07	.32	.30	.89	68.32	.12	.36	.13	.82	65A	Ø	L502
L523	82.56	-.23	-1.00	.32	.96	68.06	-.15	-.46	.23	1.40	65N	Ø	L523
L565	82.91	.12	.50	.24	.72	67.37	-.83	-2.63	.18	1.08	65A	*	L565
L598	82.62	-.17	-.74	.42	1.27	67.86	-.35	-1.09	.39	2.40	65M	Ø	L598
GR. MEAN = 82.80 PERCENT			GRAND MEAN = 68.21 PERCENT			TEST DETERMINATIONS = 8							
SD MEANS = .23 PERCENT			SD OF MEANS = .32 PERCENT			20 LABS IN GRAND MEANS							
AVERAGE SDR = .33 PERCENT			AVERAGE SDR = .16 PERCENT										
L105	83.30	.50	2.16	.24	.73	67.07	-1.13	-3.57	.12	.72	65T	*	L105
L176I	82.34	-.46	-1.97	.37	1.09	67.86	-.35	-1.09	.14	.87	65I	*	L176I
L223	82.02	-.77	-3.31	.16	.47	67.97	-.23	-.74	.18	1.08	65G	*	L223
L224	82.85	.05	.23	.19	.58	68.54	.73	2.29	.07	.46	65H	*	L224
L232	83.12	.33	1.41	.35	1.06	68.37	.17	.52	.23	1.43	65P	*	L232
L241	83.41	.62	2.64	.40	1.20	69.15	.94	2.96	.23	1.44	65I	*	L241
L249	82.34	-.46	-1.97	.41	1.24	68.25	.04	.13	.09	.57	65P	*	L249
L256	82.69	-.11	-.47	.36	1.08	68.15	-.06	-.19	.25	1.55	65B	*	L256
L260	82.84	.04	.18	.16	.48	68.34	.13	.40	.05	.32	65P	*	L260
L278	85.44	2.64	11.33	.42	1.25	71.12	2.92	9.17	.44	2.73	65P	*	L278
L301	82.80	.00	.01	.30	.90	67.75	-.46	-1.45	.14	.87	65G	*	L301
L305	81.32	-1.47	-6.31	.72	2.16	67.76	-.45	-1.41	.12	.73	65T	*	L305
L312	84.12	1.33	5.70	.23	.69	71.37	3.17	9.96	.35	2.18	65P	*	L312
L321	84.00	1.20	5.16	.00	.00	69.00	.79	2.49	.00	.00	65P	*	L321
L328	84.34	1.54	6.61	.38	1.13	70.29	2.08	6.54	.22	1.34	65P	*	L328
L339	86.06	3.27	14.01	.18	.53	69.44	1.23	3.86	.32	1.98	65P	*	L339
L380	83.75	.95	4.09	.38	1.13	71.37	3.17	9.96	.35	2.18	65P	*	L380
L388	82.69	-.11	-.47	.26	.77	67.87	-.33	-1.05	.23	1.43	65P	*	L388
L442	83.29	.45	2.11	.32	.95	67.44	-.77	-2.43	.21	1.27	65I	*	L442
L543	84.01	1.22	5.22	.18	.54	68.19	-.02	-.07	.08	.51	65H	*	L543
L562	84.94	2.14	5.18	.56	1.68	72.65	4.48	14.09	.26	1.60	65P	*	L562
L587	82.41	-.38	-1.65	.34	1.03	68.09	-.12	-.38	.15	.90	65I	*	L587
L591	84.21	1.42	6.08	.31	.93	66.82	-1.39	-4.37	.15	.92	65H	*	L591

TOTAL NUMBER OF LABORATORIES REPORTING = 45

Best Values: E41 82.7 ± 0.4 percent
J33 68.1 ± 0.6 percent

The following laboratories were omitted from the grand means because of extreme test results: 259.

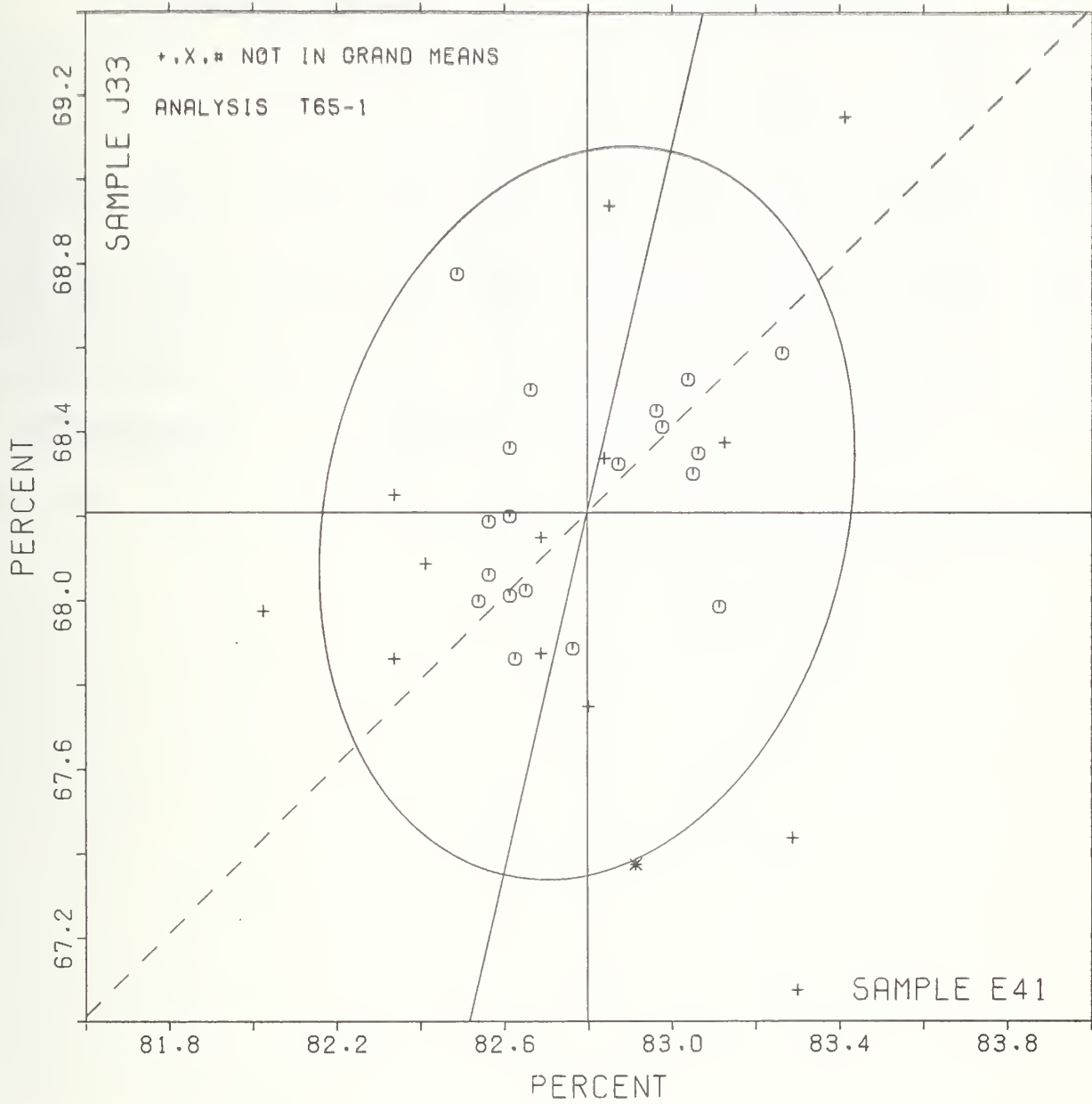
DIRECTIONAL BLUE REFLECTANCE IN PERCENT
TAPPI STANDARD T452 GS-77, 'BRIGHTNESS'; MARTIN SWEETS (ACBT & GE) IS STANDARD FOR TBIS ANALYSIS

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST	INSTRUMENT---	CONDITIONS
		E41	J33	MAJOR	MINOR	R.SDR	VAR			
L213	M		68.01			1.07	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
L305	*	81.32	67.76	-.77	1.33	1.45	65T	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
L223	*	82.02	67.97	-.40	.70	.78	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L249	*	82.34	68.25	-.06	.46	.90	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L1761	*	82.34	67.86	-.44	.37	.98	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2A	
L587	*	82.41	68.05	-.21	.35	.96	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2A	
L176A	0	82.49	68.77	-.48	.43	.75	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L122	0	82.54	68.00	-.26	.21	1.34	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S-4	
L523	0	82.56	68.06	-.20	.19	1.18	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S-4	
L275	0	82.56	68.15	-.07	.22	.91	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L210N	0	82.61	68.36	.11	.21	.92	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S-4	
L317	0	82.61	68.01	-.23	.13	1.09	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L108	0	82.61	68.20	-.05	.18	.90	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L598	0	82.62	67.66	-.38	.09	1.83	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L243	0	82.65	68.02	-.21	.10	1.14	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L158	0	82.66	68.50	.25	.20	.79	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S-4	
L388	*	82.65	67.87	-.35	.03	1.10	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L256	*	82.69	68.15	-.08	.09	1.31	65H	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L150C	0	82.76	67.85	-.32	-.04	.56	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L301	*	82.80	67.75	-.45	-.11	.89	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L260	*	82.84	68.34	.13	-.01	.40	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L224	*	82.85	68.54	.72	.11	.52	65B	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L502	0	82.87	68.32	.13	-.05	.86	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L259	#	82.89	66.95	-1.17	-.37	13.24	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L565	*	82.91	67.37	-.75	-.30	.90	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S-2	
L288	0	82.96	68.45	.27	-.11	.79	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S-4	
L210M	0	82.97	68.41	.24	-.13	1.23	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S-1	
L211	0	83.04	68.52	.36	-.16	.86	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S-4	
L225	0	83.05	68.30	.15	-.23	1.25	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S-4	
L132	0	83.06	68.35	.20	-.23	.79	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S-4	
L315	0	83.11	67.95	-.14	-.36	.96	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S-4	
L232	*	83.12	68.37	.24	-.28	1.24	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L308	0	83.26	68.55	.47	-.37	.85	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S-4	
L442	*	83.29	67.44	-.64	-.65	1.11	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2A	
L105	*	83.30	67.07	-.95	-.75	.73	65T	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
L241	*	83.41	69.15	1.06	-.39	1.32	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2A	
L380	*	83.75	71.37	3.30	-.21	1.66	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L321	*	84.00	69.00	1.04	-.59	.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L543	*	84.01	68.15	.25	-1.15	.53	65B	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L312	*	84.12	71.37	3.38	-.58	1.44	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLI	
L591	*	84.21	66.62	-1.03	-1.69	.92	65B	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L328	*	84.34	70.25	2.37	-1.03	1.23	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L562	*	84.54	72.65	4.85	-1.07	1.64	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLI	
L278	*	85.44	71.12	3.44	-1.91	1.59	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L339	*	86.06	69.44	1.94	-2.90	1.25	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLI	
GMEANS:		82.80	68.21			1.00				
		95% ELLIPSE:		.88	.62	WITH GAMMA = 76 DEGREES				

BLUE REFLECTANCE, DIRECTIONAL

SAMPLE E41 = 82.80 PERCENT

SAMPLE J33 = 68.21 PERCENT



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 E41 151 GRAMS PER SQUARE METER COATED GLOSS					SAMPLE J33 73 GRAMS PER SQUARE METER PRINTING					TEST D. 8		
	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	82.17	.45	.67	.32	1.18	67.47	-.34	-.54	.05	.47	65F	0	L100
L121	81.24	-.48	-.72	.36	1.32	67.59	-.22	-.35	.13	1.15	65K	0	L121
L150	81.46	-.26	-.39	.27	.99	67.14	-.67	-1.07	.17	1.49	65Q	0	L150
L170	80.84	-.89	-1.33	.11	.39	67.55	.14	.22	.08	.68	65B	0	L170
L182	81.68	-.05	-.07	.17	.61	67.56	.15	.24	.10	.94	65F	0	L182
L210K	82.29	.57	.86	.19	.69	68.93	1.12	1.78	.11	.95	65K	0	L210K
L236	81.27	-.45	-.68	.50	1.85	67.32	-.50	-.79	.09	.83	65K	0	L236
L242	81.33	-.39	-.58	.19	.69	67.22	-.59	-.95	.10	.90	65F	0	L242
L250T	82.54	.81	1.22	.25	.91	68.61	.80	1.27	.12	1.08	65F	0	L250T
L280	82.02	.30	.45	.33	1.22	67.80	-.01	-.02	.11	.96	65Q	0	L280
L325	83.26	1.53	2.30	.23	.84	68.95	1.14	1.81	.14	1.28	65F	0	L325
L349	81.03	-.69	-1.04	.36	1.32	67.03	-.78	-1.25	.13	1.17	65K	0	L349
L362	81.23	-.49	-.74	.33	1.23	67.72	-.10	-.15	.18	1.59	65K	0	L362
L446	81.55	-.17	-.26	.16	.60	67.62	-.19	-.30	.09	.84	65F	0	L446
L502A	81.21	-.51	-.77	.25	.92	66.97	-.84	-1.34	.10	.88	65B	0	L502A
L573	82.70	.98	1.47	.33	1.22	68.47	.66	1.05	.07	.64	65F	0	L573
L575	81.46	-.26	-.39	.28	1.04	68.07	.25	.40	.13	1.16	65F	0	L575

GR. MEAN = 81.72 PERCENT GRAND MEAN = 67.81 PERCENT TEST DETERMINATIONS = 8
 SD MEANS = .67 PERCENT SD OF MEANS = .63 PERCENT 17 LABS IN GRAND MEANS
 AVERAGE SDR = .27 PERCENT AVERAGE SDR = .11 PERCENT

L502B	81.94	.22	.33	.34	1.26	67.48	-.33	-.53	.09	.80	65L	0	L502B
L502C	82.01	.29	.43	.24	.89	66.74	-1.07	-1.71	.47	4.21	65Y	0	L502C

TOTAL NUMBER OF LABORATORIES REPORTING = 19

Best Values: E41 81.6 ± 1.6 percent
 J33 67.8 ± 0.9 percent

ANALYSIS T69-2 TABLE 2
DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)

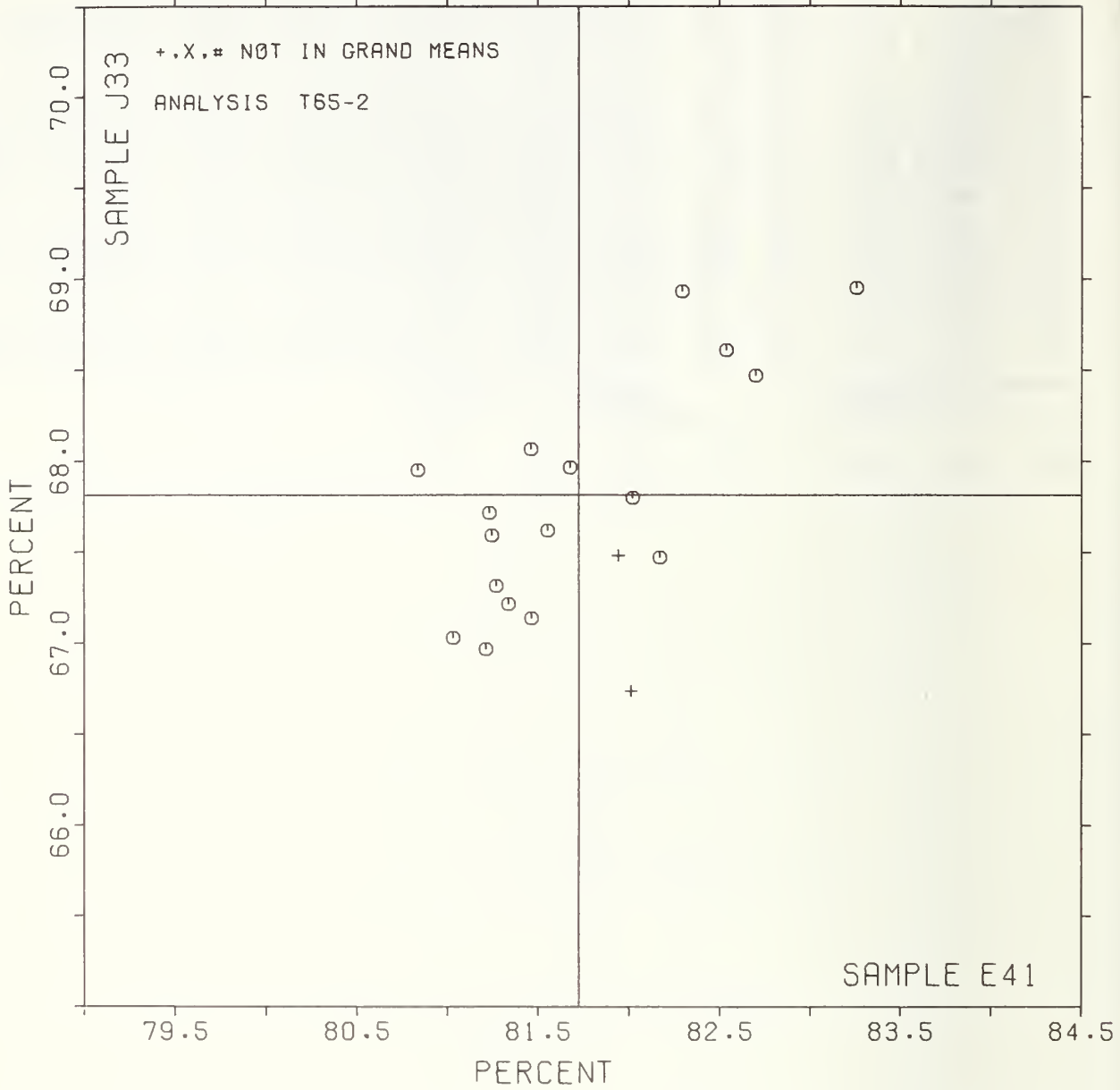
TAPPI SUGGESTED METHOD T626 80-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	P	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		R41	J33	MAJOR	MINOR	E.SDR	VAR	
L170	Ø	80.84	67.95	-.56	.70	.83	65B	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, NBS ABSOLUTE BASE
L349	Ø	81.03	67.03	-1.04	-.11	1.24	65K	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, MØØ (ZEISS) BASE
L502A	Ø	81.21	66.97	-.95	-.27	.90	65B	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, NBS ABSOLUTE BASE
L362	Ø	81.23	67.72	-.43	.26	1.41	65K	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, MØØ (ZEISS) BASE
L121	Ø	81.24	67.55	-.50	.16	1.23	65K	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, MØØ (ZEISS) BASE
L236	Ø	81.27	67.32	-.67	-.06	1.34	65K	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, MØØ (ZEISS) BASE
L242	Ø	81.33	67.22	-.65	-.17	.79	65P	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, NRC-PTB ABSOLUTE BASE
L575	Ø	81.46	68.07	-.02	.36	1.10	65F	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, NRC-PTB ABSOLUTE BASE
L150	Ø	81.46	67.14	-.65	-.32	1.24	65Q	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, ZEISS ABSOLUTE BASE
L446	Ø	81.55	67.62	-.25	-.02	.72	65F	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, NRC-PTB ABSOLUTE BASE
L182	Ø	81.68	67.56	.07	.14	.77	65F	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, NRC-PTB ABSOLUTE BASE
L502B	*	81.94	67.48	-.06	-.39	1.03	65L	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, NBS ABSOLUTE, FNZA
L502C	*	82.01	66.74	-.52	-.98	2.55	65Y	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, NBS ABSOLUTE, FNZC
L280	Ø	82.02	67.80	.21	-.21	1.09	65Q	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, ZEISS ABSOLUTE BASE
L100	Ø	82.17	67.47	.10	-.55	.83	65F	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, NRC-PTB ABSOLUTE BASE
L210K	Ø	82.29	68.93	1.18	.43	.82	65K	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, MØØ (ZEISS) BASE
L250T	Ø	82.54	68.61	1.14	.03	.59	65F	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, NRC-PTB ABSOLUTE BASE
L573	Ø	82.70	68.47	1.16	-.18	.93	65F	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, NRC-PTB ABSOLUTE BASE
L325	Ø	83.26	68.55	1.90	-.21	1.06	65F	DIPFUSE REFLECTANCE, ELREPBØ, GL.TRAP, NRC-PTB ABSOLUTE BASE
GMEANS:		81.72	67.81			1.00		
		55% ELLIPSE:		2.41	.88	WITH GAMMA = 42 DEGREES		

BLUE REFLECTANCE, DIFFUSE, WITH TRAP

SAMPLE E41 = 81.7 PERCENT

SAMPLE J33 = 67.8 PERCENT



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 E41 MEAN	COATED GLOSS				SAMPLE J33		PRINTING				TEST D. # 8		
		151 G/MS DEV	151 G/MS N.DEV	PER SQUARE METER SDR	PER SQUARE METER R.SDR	73 GRAMS MEAN	73 GRAMS DEV	PER SQUARE METER N.DEV	PER SQUARE METER SDR	PER SQUARE METER R.SDR	VAR	F	LAB	
L115	80.67	-1.23	-1.62	.08	.38	67.47	-1.19	-1.47	.09	.73	65E	0	L115	
L152	81.23	-.67	-.88	.17	.80	68.18	-.48	-.59	.12	1.02	65E	0	L152	
L157	81.43	-.47	-.62	.27	1.24	68.57	-.09	-.11	.10	.85	65E	0	L157	
L161	82.38	.48	.64	.20	.90	69.82	1.16	1.44	.08	.69	65E	0	L161	
L173A	82.10	.20	.27	.25	1.14	70.16	1.50	1.87	.15	1.22	65E	0	L173A	
L238A	81.72	-.18	-.24	.27	1.22	69.07	.41	.51	.09	.73	65E	0	L238A	
L244	81.69	-.21	-.28	.21	.96	68.09	-.56	-.70	.11	.87	65D	0	L244	
L251	81.98	.08	.10	.18	.84	68.33	-.33	-.41	.12	.97	65E	0	L251	
L255	85.30	3.40	4.48	.21	.98	71.39	2.73	3.40	.13	1.09	65D	#	L255	
L285	83.62	1.72	2.27	.22	1.03	69.12	.46	.57	.14	1.14	65E	0	L285	
L360	82.58	.68	.89	.36	1.65	69.08	.42	.52	.20	1.67	65E	0	L360	
L484	78.19	-3.71	-4.88	.10	.47	67.93	-.73	-.91	.10	.85	65E	#	L484	
L502D	82.08	.18	.24	.24	1.12	68.15	-.51	-.63	.08	.66	65W	0	L502D	
L565	81.31	-.59	-.77	.16	.71	67.86	-.80	-.99	.18	1.45	65W	0	L565	

GR. MEAN = 81.90 PERCENT GRAND MEAN = 68.66 PERCENT TEST DETERMINATIONS = 8
 SD MEANS = .76 PERCENT SD OF MEANS = .81 PERCENT 12 LABS IN GRAND MEANS
 AVERAGE SDR = .22 PERCENT AVERAGE SDR = .12 PERCENT
 TOTAL NUMBER OF LABORATORIES REPORTING = 14

Best Values: E41 82.0 ± 1.0 percent
 J33 68.4 ± 1.3 percent

The following laboratories were omitted from the grand means because of extreme test results: 255, 484.

DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)
TAPPI SUGGESTED METHOD T525 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

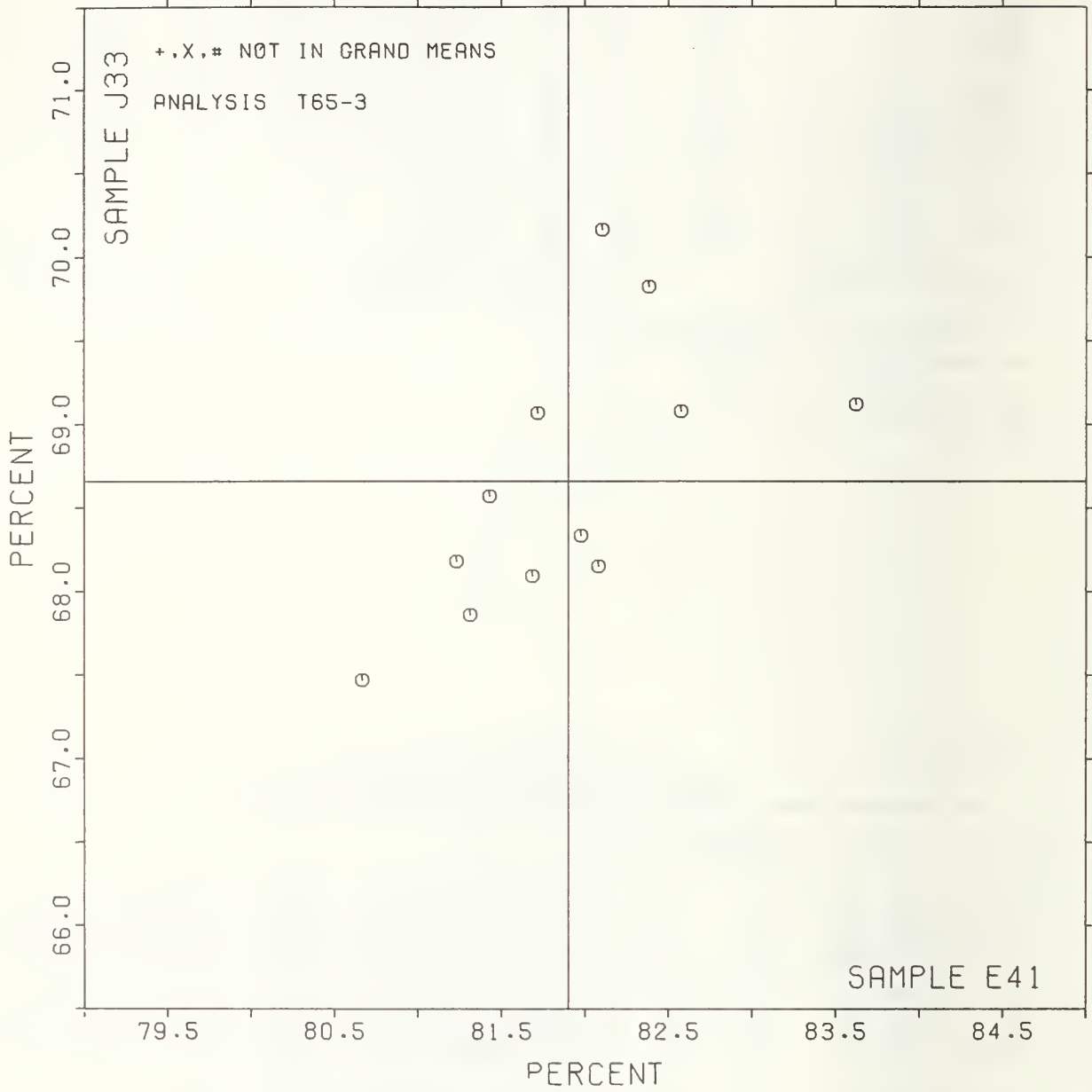
LAB CODE	F	MEANS		COORDINATES		AVG E.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS				
		E41	J33	MAJOR	MINOR			PROPERTY	TEST INSTRUMENT	CONDITIONS		
L484	#	78.19	67.93	-3.04	2.25	.66	65E	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	M00 (ZEISS) BASE	
L115	0	80.67	67.47	-1.71	.11	.55	65E	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	M00 (ZEISS) BASE	
L152	0	81.23	68.18	-.80	.17	.51	65E	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	M00 (ZEISS) BASE	
L565	0	81.31	67.86	-.98	-.10	1.08	65W	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	N8S M00 BASE	
L157	0	81.43	68.57	-.38	.29	1.04	65E	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	M00 (ZEISS) BASE	
L244	0	81.69	68.09	-.56	-.22	.92	65D	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	NFC-PT8 ABSOLUTE	
L238A	0	81.72	69.07	.18	.41	.97	65E	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	M00 (ZEISS) BASE	
L251	0	81.98	68.33	-.15	-.28	.91	65E	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	M00 (ZEISS) BASE	
L502D	0	82.08	68.15	-.25	-.48	.89	65W	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	N8S M00 BASE	
L173A	0	82.10	70.16	1.25	.86	1.18	65E	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	M00 (ZEISS) BASE	
L161	0	82.38	69.82	1.19	.42	.80	65E	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	M00 (ZEISS) BASE	
L360	0	82.58	69.08	.77	-.22	1.66	65E	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	M00 (ZEISS) BASE	
L285	0	83.62	69.12	1.50	-.57	1.08	65E	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	M00 (ZEISS) BASE	
L255	#	85.30	71.39	4.31	-.68	1.04	65D	DIFFUSE REFLECTANCE,	ELREPH0,	NO TRAP,	NFC-PT8 ABSOLUTE	

GMFANS: 81.90 68.66 1.00
 95% ELLIPSE: 2.59 1.45 WITH GAMMA = 47 DEGREES

BLUE REFLECTANCE, DIFFUSE, NO TRAP

SAMPLE E41 = 81.9 PERCENT

SAMPLE J33 = 68.7 PERCENT



ANALYSIS 175-1 TABLE 1
 SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS
 TAPPI STANDARD 1480 CS-72, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	SAMPLE E57 MEAN	CAST COATED				R.SDR	SAMPLE J19 MEAN	PRINTING				TEST D. = 10		
		211 GRAMS PER SQUARE	DEV	N.DEV	SDR			149 GRAMS PER SQUARE	DEV	N.DEV	SDR	R.SDR	VAR	F
L108	83.5	-.8	-.57	1.2	1.02	49.4	.7	.33	1.0	.79	75B	Ø	L108	
L121	83.9	-.5	-.34	.9	.73	49.5	.9	.40	.8	.60	75H	Ø	L121	
L122	83.3	-1.1	-.77	1.0	.87	47.2	-1.4	-.64	.8	.63	75H	Ø	L122	
L128	82.2	-2.2	-1.52	.9	.77	48.3	-.3	-.15	.9	.72	75G	Ø	L128	
L134	84.1	-.3	-.19	.9	.74	42.4	-6.2	-2.62	1.3	.98	75H	*	L134	
L149	83.9	-.5	-.32	1.3	1.08	49.2	.6	.26	1.1	.86	75G	Ø	L149	
L153	86.5	2.2	1.55	1.1	.92	52.0	3.4	1.54	1.1	.84	75G	Ø	L153	
L162	86.0	1.6	1.15	1.0	.86	53.1	4.4	2.01	1.4	1.03	75G	Ø	L162	
L166	86.5	2.1	1.51	1.4	1.14	51.1	2.5	1.11	1.2	.90	75B	Ø	L166	
L173A	86.5	2.1	1.51	1.2	.99	46.4	-2.2	-1.01	1.3	.95	75G	Ø	L173A	
L182	84.7	.4	.26	1.2	.99	48.0	-.6	-.26	1.4	1.02	75H	Ø	L182	
L189	84.6	.3	.21	1.2	.97	50.1	1.5	.66	1.5	1.11	75P	Ø	L189	
L190C	85.9	1.6	1.10	1.1	.95	46.7	-1.9	-.87	1.4	1.05	75G	Ø	L190C	
L190R	82.9	-1.4	-1.01	1.0	.88	48.0	-.6	-.27	1.5	1.14	75G	Ø	L190R	
L206	83.3	-1.0	-.72	1.1	.93	47.7	-1.0	-.43	1.1	.85	75H	Ø	L206	
L210	86.2	1.9	1.33	1.2	1.02	50.8	2.1	.97	1.3	.95	75H	Ø	L210	
L211	83.3	-1.1	-.76	1.1	.95	43.8	-4.8	-2.17	.7	.55	75H	Ø	L211	
L212	87.8	3.5	2.46	1.6	1.36	51.5	2.9	1.29	.9	.69	75P	Ø	L212	
L213	84.9	.6	.39	1.2	.97	49.9	1.3	.57	1.3	1.02	75H	Ø	L213	
L223	84.2	-.2	-.13	1.4	1.20	48.8	.1	.06	1.0	.73	75H	Ø	L223	
L224	84.1	-.2	-.15	1.2	1.01	46.0	-2.6	-1.17	1.4	1.07	75H	Ø	L224	
L230	85.0	.6	.45	.7	.60	45.9	-2.7	-1.23	1.2	.88	75H	Ø	L230	
L243	84.2	-.2	-.11	1.3	1.11	48.0	-.6	-.29	1.6	1.18	75H	Ø	L243	
L251	82.6	-1.8	-1.24	1.0	.84	48.0	-.6	-.26	1.3	.98	75G	Ø	L251	
L255	83.9	-.4	-.30	.3	.21	51.1	2.5	1.13	1.6	1.21	75H	Ø	L255	
L256	83.8	-.5	-.36	1.3	1.09	48.5	-.1	-.04	1.1	.83	75H	Ø	L256	
L259	85.5	1.2	.82	1.1	.91	50.9	2.3	1.04	1.1	.82	75H	Ø	L259	
L262	83.6	-.8	-.53	1.0	.81	49.7	1.1	.48	.9	.72	75K	Ø	L262	
L274	84.7	.3	.24	.8	.69	45.7	1.1	.48	.5	.36	75P	Ø	L274	
L278	87.4	3.1	2.17	1.4	1.15	52.5	3.9	1.77	1.7	1.29	75G	Ø	L278	
L279	83.6	-.8	-.53	.7	.59	46.7	-1.9	-.87	1.6	1.24	75G	Ø	L279	
L291	83.8	-.5	-.38	1.5	1.30	47.1	-1.5	-.67	1.5	1.10	75H	Ø	L291	
L301	84.5	.2	.11	1.4	1.20	49.2	.6	.27	1.7	1.26	75H	Ø	L301	
L317	85.4	1.0	.74	1.3	1.07	48.0	-.6	-.29	.8	.62	75H	Ø	L317	
L321	86.3	1.9	1.37	1.3	1.05	51.0	2.4	1.07	1.2	.94	75G	Ø	L321	
L323	81.9	-2.5	-1.75	1.4	1.19	46.0	-2.6	-1.19	1.9	1.41	75H	Ø	L323	
L328	91.4	7.1	4.97	.2	.17	47.1	-1.5	-.67	.9	.67	75H	X	L328	
L339	81.6	-2.7	-1.91	3.2	2.66	49.8	1.2	.55	2.6	1.97	75P	Ø	L339	
L349	85.0	.7	.47	1.2	1.02	49.3	.7	.31	1.8	1.34	75H	Ø	L349	
L388	83.2	-1.1	-.78	1.2	1.02	50.2	1.6	.71	1.1	.84	75P	Ø	L388	
L396	83.6	-.8	-.56	3.1	2.58	55.1	5.5	2.93	2.5	1.86	75G	X	L396	
L456	84.5	.1	.09	1.1	.96	47.7	-1.0	-.43	1.4	1.06	75H	Ø	L456	
L483	82.7	-1.6	-1.15	.9	.80	46.3	-2.3	-1.04	1.8	1.33	75H	Ø	L483	
L502G	83.5	-.8	-.60	1.2	.98	49.6	1.0	.44	1.7	1.30	75G	Ø	L502G	
L502H	84.3	-.0	-.03	1.1	.92	50.5	1.8	.83	1.5	1.11	75H	Ø	L502H	
L573	82.3	-2.1	-1.45	1.3	1.05	45.5	-3.1	-1.41	1.8	1.39	75G	Ø	L573	
L583	84.5	.2	.11	1.4	1.15	47.8	-.9	-.39	1.1	.82	75H	Ø	L583	
L587	84.9	.5	.38	1.2	1.01	50.0	1.4	.62	1.6	1.23	75H	Ø	L587	
L592	83.2	-1.2	-.82	1.2	.98	46.4	-2.2	-.99	1.7	1.29	75G	Ø	L592	

GR. MEAN = 84.4 GLOSS UNITS GRAND MEAN = 48.6 GLOSS UNITS TEST DETERMINATIONS = 10
 SD MEANS = 1.4 GLOSS UNITS SD OF MEANS = 2.2 GLOSS UNITS 47 LABS IN GRAND MEANS
 AVERAGE SDR = 1.2 GLOSS UNITS AVERAGE SDR = 1.3 GLOSS UNITS

L250 88.0 3.6 2.57 1.1 .91 47.9 -.7 -.33 .5 .35 75Q * L250
 L288 84.1 -.3 -.21 1.0 .85 48.1 -.5 -.22 1.5 1.13 75I * L288
 TOTAL NUMBER OF LABORATORIES REPORTING = 51

Best Values: E57 84 ± 2 gloss units
 J19 48 ± 3 gloss units

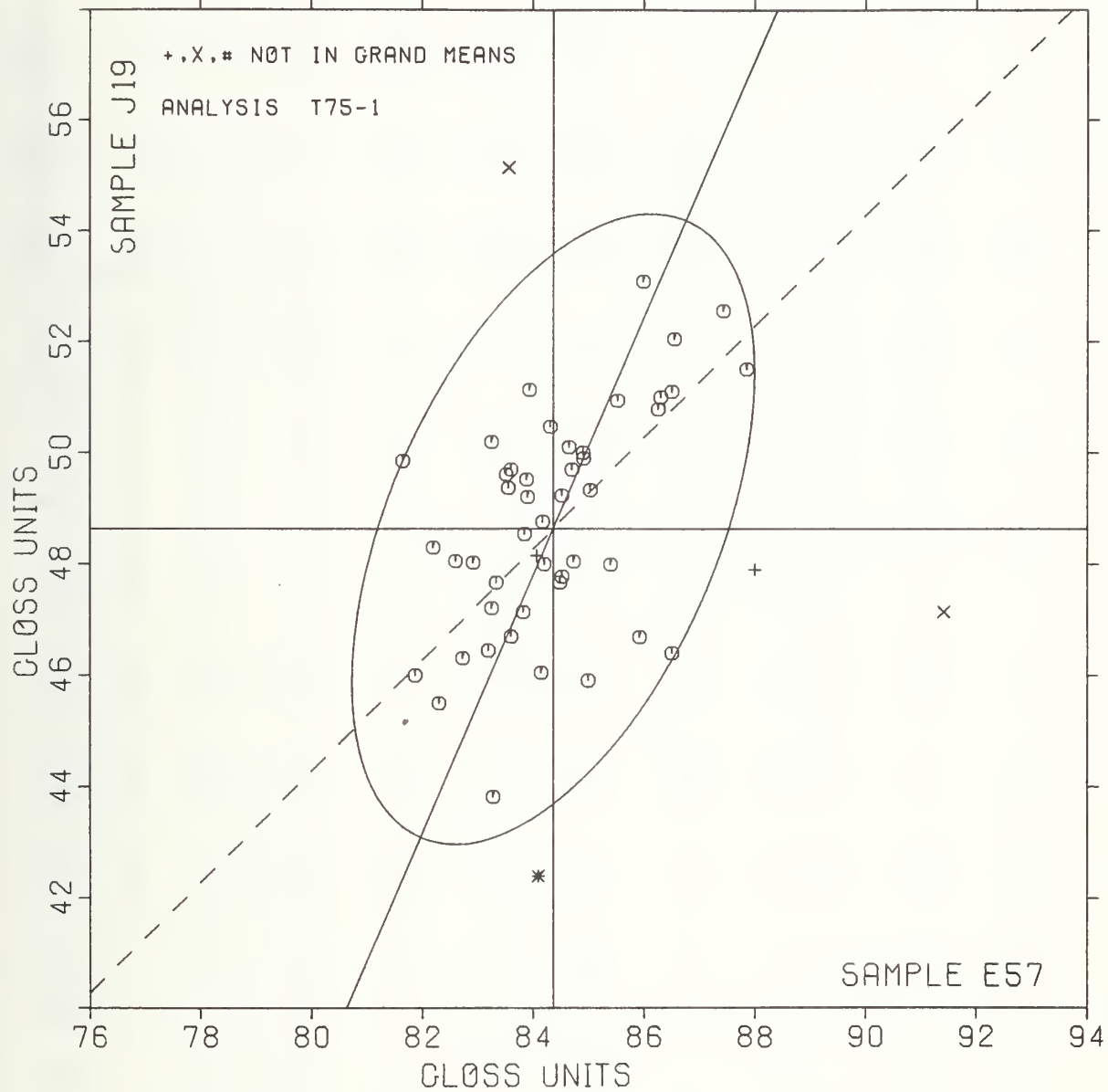
TAPPI STANDARD T480 CS-72, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		E57	J19	MAJOR	MINOR	S.D.E	VAR			
L339	Ø	81.6	49.8	.0	3.0	2.32	75P	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT	
L323	Ø	81.9	46.0	-3.4	1.2	1.30	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L128	Ø	82.2	48.3	-1.2	1.8	.75	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L573	Ø	82.3	48.5	-3.7	.6	1.22	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L251	Ø	82.6	48.0	-1.2	1.4	.91	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L483	Ø	82.7	46.3	-2.8	.6	1.06	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L190R	Ø	82.9	48.0	-1.1	1.1	1.01	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L592	Ø	83.2	46.4	-2.5	.2	1.13	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L388	Ø	83.2	50.2	1.0	1.6	.93	75P	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT	
L122	Ø	83.3	47.2	-1.7	.4	.75	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L211	Ø	83.3	43.8	-4.8	-.9	.75	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L206	Ø	83.3	47.7	-1.3	.6	.89	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L502G	Ø	83.5	49.6	.6	1.2	1.14	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L108	Ø	83.5	49.4	.4	1.0	.91	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L396	X	83.6	55.1	5.6	3.3	2.22	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L279	Ø	83.6	46.7	-2.1	-.1	.91	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L262	Ø	83.6	49.7	.7	1.1	.77	75K	SPECULAR GLOSS (75 DEGREE),	GAERTNER (K-C TYPE)	
L291	Ø	83.8	47.1	-1.6	-.1	1.20	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L256	Ø	83.8	48.5	-.3	.4	.96	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L121	Ø	83.9	49.5	.6	.8	.66	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L149	Ø	83.9	49.2	.3	.6	.97	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L255	Ø	83.9	51.1	2.1	1.4	.71	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L288	*	84.1	48.1	-.6	.1	.99	75I	SPECULAR GLOSS (75 DEGREE),	HUNTER, 20 C, 65% RH	
L134	*	84.1	42.4	-5.8	-2.2	.86	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L224	Ø	84.1	46.0	-2.5	-.8	1.04	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L223	Ø	84.2	48.8	.0	.2	.97	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L243	Ø	84.2	48.0	-.6	-.1	1.14	75B	SPECULAR GLOSS (75 DEGREE),	HAUSCH * LOWE	
L502H	Ø	84.3	50.5	1.7	.8	1.01	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L456	Ø	84.5	47.7	-.8	-.5	1.01	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L583	Ø	84.5	47.8	-.7	-.5	.99	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L301	Ø	84.5	49.2	.6	.1	1.23	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L189	Ø	84.6	50.1	1.5	.3	1.04	75P	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT	
L274	Ø	84.7	49.7	1.1	.1	.63	75P	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT	
L182	Ø	84.7	48.0	-.4	-.6	1.00	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L587	Ø	84.9	50.0	1.5	.0	1.12	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L213	Ø	84.9	49.9	1.4	-.0	.99	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L230	Ø	85.0	45.5	-2.2	-1.7	.74	75H	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L349	Ø	85.0	49.3	.9	-.3	1.18	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L317	Ø	85.4	48.0	-.2	-1.2	.84	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L259	Ø	85.5	50.9	2.6	-.2	.87	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L190C	Ø	85.9	46.7	-1.2	-2.2	1.00	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L162	Ø	86.0	53.1	4.7	.3	.95	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L210	Ø	86.2	50.8	2.7	-.5	.99	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
L321	Ø	86.3	51.0	2.9	-.8	1.00	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L166	Ø	86.5	51.1	3.1	-1.0	1.02	75B	SPECULAR GLOSS (75 DEGREE),	HAUSCH * LOWE	
L173A	Ø	86.5	46.4	-1.2	-2.9	.97	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L153	Ø	86.5	52.0	4.0	-.7	.88	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L278	Ø	87.4	52.5	4.8	-1.3	1.22	75G	SPECULAR GLOSS (75 DEGREE),	GARDNER	
L212	Ø	87.8	51.5	4.0	-2.1	1.03	75P	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT	
L250	*	88.0	47.9	.8	-3.6	.63	75Q	SPECULAR GLOSS (75 DEGREE),	PHOTOVOLT, 20 C, 65% RH	
L328	X	91.4	47.1	1.4	-7.1	.42	75B	SPECULAR GLOSS (75 DEGREE),	HUNTER	
GMANS:		84.4	48.6			1.00				
		95% ELLIPSE:		6.0	3.0			WITH GAMMA = 66 DEGREES		

SPECULAR GLOSS, 75 DEGREE

SAMPLE E57 = 84.4 GLOSS UNITS

SAMPLE J19 = 48.6 GLOSS UNITS



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 1
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI STANDARD T411 6S-76

LAB CODE	SAMPLE #12 MEAN	PRINTING 89 GRAMS PER SQUARE METER				SAMPLE #28 MEAN	BAG 83 GRAMS PER SQUARE METER				TEST D.* 10		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	2.667	-.021	-.26	.068	1.05	5.469	-.022	-.18	.078	.78	90V	Ø	L100
L105	2.776	-.112	-1.38	.051	.79	5.362	-.129	-1.07	.058	.58	90T	Ø	L105
L122	2.945	.057	.70	.084	1.30	5.507	.016	.14	.161	1.61	90V	Ø	L122
L123F	3.060	.172	2.12	.074	1.13	5.710	.219	1.82	.133	1.33	90F	Ø	L123F
L125	2.930	.042	.52	.082	1.27	5.450	-.041	-.34	.118	1.18	90T	Ø	L125
L128	2.850	.002	.03	.074	1.13	5.410	-.081	-.67	.074	.74	90T	Ø	L128
L131	2.970	.082	1.01	.082	1.27	5.590	.099	.83	.202	2.03	90T	Ø	L131
L139	3.000	.112	1.38	.053	.81	5.645	.154	1.28	.080	.80	90T	Ø	L139
L141	2.908	.020	.25	.081	1.25	5.345	-.146	-1.21	.114	1.14	90T	Ø	L141
L158	2.850	-.038	-.47	.058	.89	5.670	.179	1.49	.082	.82	90T	Ø	L158
L155	2.930	.042	.52	.095	1.46	5.490	-.001	-.01	.099	.99	90T	Ø	L155
L162	2.839	-.049	-.60	.062	.95	5.415	-.076	-.63	.050	.50	90D	Ø	L162
L166	2.810	-.078	-.96	.117	1.80	5.290	-.201	-1.67	.129	1.29	90T	Ø	L166
L173B	2.940	.052	.64	.052	.79	5.590	.099	.83	.074	.74	90F	Ø	L173B
L174	2.680	-.208	-2.56	.063	.97	5.240	-.251	-2.09	.158	1.58	90T	*	L174
L182	2.868	-.019	-.24	.064	.98	5.362	-.128	-1.07	.034	.35	90L	Ø	L182
L183	2.901	.013	.16	.107	1.65	5.388	-.103	-.86	.054	.94	90T	Ø	L183
L190C	2.850	-.038	-.47	.053	.81	5.440	-.051	-.42	.070	.70	90T	Ø	L190C
L203A	2.910	.022	.27	.074	1.13	5.500	.009	.08	.185	1.89	90T	Ø	L203A
L203C	2.850	-.038	-.47	.071	1.09	5.530	.039	.23	.095	.95	90T	Ø	L203C
L212	2.930	.042	.52	.061	.93	5.536	.045	.38	.097	.97	90T	Ø	L212
L213	3.010	.122	1.51	.057	.87	5.540	.049	.41	.135	1.35	90T	Ø	L213
L223	2.894	.006	.08	.072	1.10	5.614	.123	1.03	.140	1.40	90V	Ø	L223
L228	2.900	.012	.15	.082	1.26	5.550	.059	.49	.108	1.08	90T	Ø	L228
L238A	2.963	.075	.93	.065	1.00	5.638	.147	1.23	.070	.70	90T	Ø	L238A
L241	2.915	.027	.33	.067	1.03	5.455	-.036	-.30	.130	1.30	90T	Ø	L241
L249	2.844	-.044	-.54	.041	.63	5.468	-.023	-.19	.092	.92	90T	Ø	L249
L251	2.766	-.122	-1.50	.052	.80	5.146	-.345	-2.87	.056	.56	90L	*	L251
L259	2.966	.078	.96	.060	.92	5.689	.198	1.65	.097	.97	90T	Ø	L259
L260	2.856	.008	.10	.046	.71	5.520	.029	.24	.117	1.17	90T	Ø	L260
L261	3.010	.122	1.51	.057	.87	5.600	.109	.91	.085	.85	90T	Ø	L261
L262	2.920	.032	.40	.079	1.21	5.420	-.071	-.59	.079	.79	90T	Ø	L262
L285	2.730	-.158	-1.94	.095	1.46	4.720	-.771	-6.42	.159	1.99	90T	#	L285
L291	2.850	.002	.03	.052	.79	5.478	-.013	-.11	.087	.87	90T	Ø	L291
L297	2.865	-.023	-.28	.047	.73	5.545	.054	.45	.072	.72	90T	Ø	L297
L305	2.870	-.018	-.22	.059	.90	5.450	-.041	-.34	.129	1.29	90T	Ø	L305
L309	2.750	-.098	-1.20	.074	1.13	5.410	-.081	-.67	.110	1.10	90T	Ø	L309
L318	2.785	-.103	-1.27	.082	1.26	5.460	-.031	-.26	.158	1.58	90T	Ø	L318
L323	2.790	-.098	-1.20	.059	1.53	5.490	-.001	-.01	.110	1.10	90T	Ø	L323
L324	2.998	.110	1.36	.050	.77	5.507	.016	.14	.106	1.06	90T	Ø	L324
L326	3.040	.152	1.87	.061	.95	5.550	.059	.49	.105	1.05	90T	Ø	L326
L328	2.870	-.018	-.22	.067	1.04	5.300	-.191	-1.59	.163	1.63	90T	Ø	L328
L331	2.908	.020	.25	.051	.78	5.344	-.147	-1.22	.106	1.06	90T	Ø	L331
L339	2.840	-.048	-.59	.070	1.08	5.390	-.101	-.84	.217	2.17	90T	Ø	L339
L341	2.974	.086	1.06	.055	.94	5.748	.257	2.14	.078	.78	90T	Ø	L341
L356	2.883	-.005	-.06	.046	.70	5.415	-.076	-.63	.109	1.09	90T	Ø	L356
L358	2.697	-.191	-2.35	.033	.51	5.329	-.162	-1.35	.088	.88	90T	Ø	L358
L372	2.895	.007	.09	.056	.86	5.551	.060	.50	.072	.72	90T	Ø	L372
L376	2.860	-.028	-.34	.052	.79	5.550	.059	.49	.088	.88	90T	Ø	L376
L378	2.840	-.048	-.59	.135	2.08	5.460	-.031	-.26	.097	.97	90T	Ø	L378
L380	2.870	-.018	-.22	.048	.74	5.500	.009	.08	.047	.47	90T	Ø	L380
L382	3.019	.131	1.62	.058	.89	5.679	.168	1.57	.114	1.14	90T	Ø	L382
L390	2.864	-.024	-.29	.051	.95	5.429	-.062	-.51	.078	.78	90T	Ø	L390
L442	2.976	.088	1.09	.066	.86	5.681	.190	1.58	.100	1.00	90T	Ø	L442
L556	2.710	-.178	-2.19	.057	.87	5.325	-.166	-1.38	.086	.86	90T	Ø	L556
L557	2.787	-.101	-1.24	.056	.86	5.492	.001	.01	.089	.89	90T	Ø	L557
L558	2.930	.042	.52	.048	.74	5.650	.159	1.33	.071	.71	90T	Ø	L558
L559	2.880	-.008	-.10	.048	.73	5.559	.068	.57	.077	.77	90T	Ø	L559
L560	2.766	-.120	-1.48	.061	.94	5.544	.053	.44	.043	.43	90T	Ø	L560
L561	2.889	.001	.01	.059	.90	5.471	-.020	-.16	.087	.87	90T	Ø	L561
L567	2.943	.055	.68	.050	.77	5.539	.048	.40	.098	.98	90V	Ø	L567
L575	2.888	.000	.00	.052	.80	5.419	-.072	-.60	.053	.93	90T	Ø	L575
L581	2.995	.107	1.32	.069	1.05	5.645	.154	1.28	.065	.65	90T	Ø	L581
L587	2.830	-.058	-.71	.067	1.04	5.430	-.061	-.51	.067	.68	90T	Ø	L587

GR. MFAN = 2.888 MILS

SD MEANS = .081 MILS

AVERAGE SDR = .065 MILS

GR. MFAN = 73.35 MICROMETER

GRAND MEAN = 5.491 MILS

SD OF MEANS = .120 MILS

GRAND MEAN = 135.47 MICROMETER

TEST DETERMINATIONS = 10

63 LABS IN GRAND MEANS

AVERAGE SDR = .100 MILS

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

NOVEMBER 1977

LAB CODE	SAMPLE B12 MEAN	FRONTING 85 GRAMS PER SQUARE METER				SAMPLE B28 MEAN	BAG 83 GRAMS PER SQUARE METER				TEST D. 10		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L185	2.858	-.030	-.37	.040	.62	5.248	-.243	-2.02	.065	.65	90B	*	L185
L203B	2.750	-.098	-1.20	.228	3.51	5.260	-.231	-1.92	.303	3.03	90C	*	L203B
L242C	2.884	-.004	-.05	.055	.85	5.429	-.061	-.51	.092	.93	90D	*	L242C
L242P	2.939	.051	.63	.067	1.04	5.453	-.038	-.31	.140	1.40	90P	*	L242P
L243	2.675	.087	1.07	.072	1.10	5.475	-.016	-.13	.103	1.03	90S	*	L243
L274C	2.920	.032	.40	.103	1.59	5.400	-.091	-.76	.133	1.33	90C	*	L274C
L322	2.930	.042	.52	.116	1.78	5.730	.239	1.99	.206	2.06	90U	*	L322
L330	2.940	.052	.64	.052	.79	5.350	-.141	-1.17	.178	1.78	90U	*	L330
L344	2.720	-.168	-2.07	.079	1.21	5.340	-.151	-1.26	.070	.70	90U	*	L344
L366M	2.830	-.058	-.71	.048	.74	5.015	-.476	-3.96	.111	1.11	90S	*	L366M
L484	2.947	.059	.73	.041	.62	5.402	-.085	-.74	.102	1.02	90E	*	L484
L562	3.060	.172	2.12	.070	1.08	5.430	-.061	-.51	.177	1.77	90C	*	L562
L576	2.920	-.068	-.84	.106	1.63	5.018	-.473	-3.94	.071	.71	90C	*	L576

TOTAL NUMBER OF LABORATORIES REPORTING = 77

Best Values: H12 2.89 ± 0.12 mils
B28 5.50 ± 0.19 mils

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

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS 190-1 TABLE 2
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI STANDARD T411 6S-76

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		H12	H28	MAJOR	MINOR	R.SDR	VAR			
L174	*	2.680	5.240	-.321	.056	1.28	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L358	Ø	2.697	5.329	-.235	.066	.70	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L556	Ø	2.710	5.325	-.232	.072	.87	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L344	*	2.720	5.340	-.214	.071	.96	90U	THICKNESS (CALIPER),	TMI,	HAND DRIVEN
L285	#	2.730	4.720	-.748	-.244	1.72	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L251	*	2.766	5.146	-.360	-.065	.68	901	THICKNESS (CALIPER),	L * W,	MOTOR DRIVEN
L560	Ø	2.768	5.544	-.013	.130	.65	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L105	Ø	2.775	5.362	-.167	.033	.68	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L318	Ø	2.785	5.460	-.078	.074	1.42	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L557	Ø	2.787	5.452	-.049	.088	.87	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L203H	*	2.790	5.260	-.249	-.029	3.27	50C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN
L323	Ø	2.790	5.490	-.045	.085	1.31	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L309	Ø	2.790	5.410	-.115	.045	1.12	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L166	Ø	2.810	5.250	-.213	-.032	1.55	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L576	*	2.820	5.018	-.444	-.175	1.17	90C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN
L396M	*	2.830	5.015	-.442	-.185	.92	50S	THICKNESS (CALIPER),	SCHÖPPER,	HAND DRIVEN
L587	Ø	2.830	5.430	-.081	.020	.86	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L162	Ø	2.839	5.415	-.050	.005	.72	90D	THICKNESS (CALIPER),	CADY,	MOTOR DRIVEN
L378	Ø	2.840	5.460	-.050	.026	1.52	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L339	Ø	2.840	5.350	-.111	-.008	1.62	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L249	Ø	2.844	5.468	-.041	.027	.78	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L158	Ø	2.850	5.670	.137	.122	.86	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L203C	Ø	2.850	5.530	.015	.052	1.02	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L190C	Ø	2.850	5.440	-.063	.008	.75	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L185	*	2.858	5.248	-.226	-.054	.64	90B	THICKNESS (CALIPER),	AMTHER,	HAND DRIVEN
L376	Ø	2.860	5.550	.038	.053	.84	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L390	Ø	2.864	5.425	-.065	-.010	.86	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L297	Ø	2.865	5.545	.036	.047	.73	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L100	Ø	2.867	5.465	-.025	.007	.91	50V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L182	Ø	2.868	5.362	-.121	-.047	.66	50L	THICKNESS (CALIPER),	L * W,	MOTOR DRIVEN
L380	Ø	2.870	5.500	-.001	.020	.61	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L328	Ø	2.870	5.300	-.175	-.079	1.34	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L305	Ø	2.870	5.450	-.044	-.005	1.10	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L559	Ø	2.880	5.559	.055	.041	.75	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L356	Ø	2.883	5.415	-.068	-.033	.90	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L242Ø	*	2.884	5.429	-.055	-.027	.85	90Ø	THICKNESS (CALIPER),	MESSMER,	MOTOR DRIVEN, HS3983
L575	Ø	2.888	5.419	-.062	-.036	.86	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L561	Ø	2.889	5.471	-.017	-.011	.85	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L291	Ø	2.890	5.478	-.010	-.008	.83	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L128	Ø	2.890	5.410	-.069	-.042	.54	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L223	Ø	2.894	5.614	.110	.056	1.25	50V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L372	Ø	2.895	5.551	.056	.024	.75	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L260	Ø	2.896	5.520	.025	.007	.94	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L228	Ø	2.900	5.550	.057	.019	1.17	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L183	Ø	2.901	5.388	-.083	-.062	1.29	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L331	Ø	2.908	5.344	-.118	-.090	.52	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L141	Ø	2.908	5.345	-.117	-.090	1.19	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L203A	Ø	2.910	5.500	.019	-.015	1.51	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L241	Ø	2.915	5.455	-.018	-.041	1.16	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L274C	*	2.920	5.400	-.063	-.073	1.46	50C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN
L262	Ø	2.920	5.420	-.046	-.063	1.00	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L212	Ø	2.930	5.536	.060	-.014	.55	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L322	*	2.930	5.730	.229	.082	1.92	50U	THICKNESS (CALIPER),	TMI,	HAND DRIVEN
L125	Ø	2.930	5.450	-.015	-.057	1.22	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L159	Ø	2.930	5.450	.020	-.037	1.23	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L558	Ø	2.930	5.650	.155	.042	.72	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L242P	*	2.939	5.453	-.007	-.063	1.22	90P	THICKNESS (CALIPER),	MESSMER,	MOTOR DRIVEN, ISO R534
L330	*	2.940	5.350	-.096	-.115	1.29	90U	THICKNESS (CALIPER),	TMI,	HAND DRIVEN
L173B	Ø	2.940	5.590	.112	.004	.77	50P	THICKNESS (CALIPER),	FEDERAL,	MOTOR DRIVEN
L567	Ø	2.943	5.535	.069	-.024	.88	90V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L122	Ø	2.945	5.507	.042	-.042	1.45	50V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L484	*	2.947	5.402	-.048	-.095	.82	90E	THICKNESS (CALIPER),	SCHÖPPER,	HAND DRIVEN
L238A	Ø	2.963	5.638	.165	.008	.85	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L259	Ø	2.966	5.685	.211	.030	.95	501	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L131	Ø	2.970	5.550	.127	-.022	1.65	901	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		B12	B28	MAJOR	MINOR	R.SDR	VAR	
L341	Ø	2.574	5.748	.266	.052	.81	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L243	*	2.575	5.475	.029	-.084	1.07	90S	THICKNESS (CALIPER), SCHÖPPER, HAND DRIVEN
L442	Ø	2.576	5.681	.209	-.018	.93	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L581	Ø	2.595	5.645	.187	-.017	.87	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L324	Ø	2.598	5.507	.069	-.088	.92	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L170	Ø	3.000	5.645	.190	-.021	.80	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L261	Ø	3.010	5.600	.155	-.052	.86	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L213	Ø	3.010	5.540	.103	-.082	1.11	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L382	Ø	3.019	5.679	.228	-.021	1.02	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L326	Ø	3.040	5.550	.127	-.103	1.00	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L123F	Ø	3.060	5.710	.276	-.041	1.23	90F	THICKNESS (CALIPER), FEDERAL, MOTOR DRIVEN
I562	*	3.060	5.430	.032	-.180	1.42	90C	THICKNESS (CALIPER), CADY, HAND DRIVEN
MEANS:		2.898	5.491			1.00		
		55% ELLIPSE:		.341	.134	WITH GAMMA = 60 DEGREES		

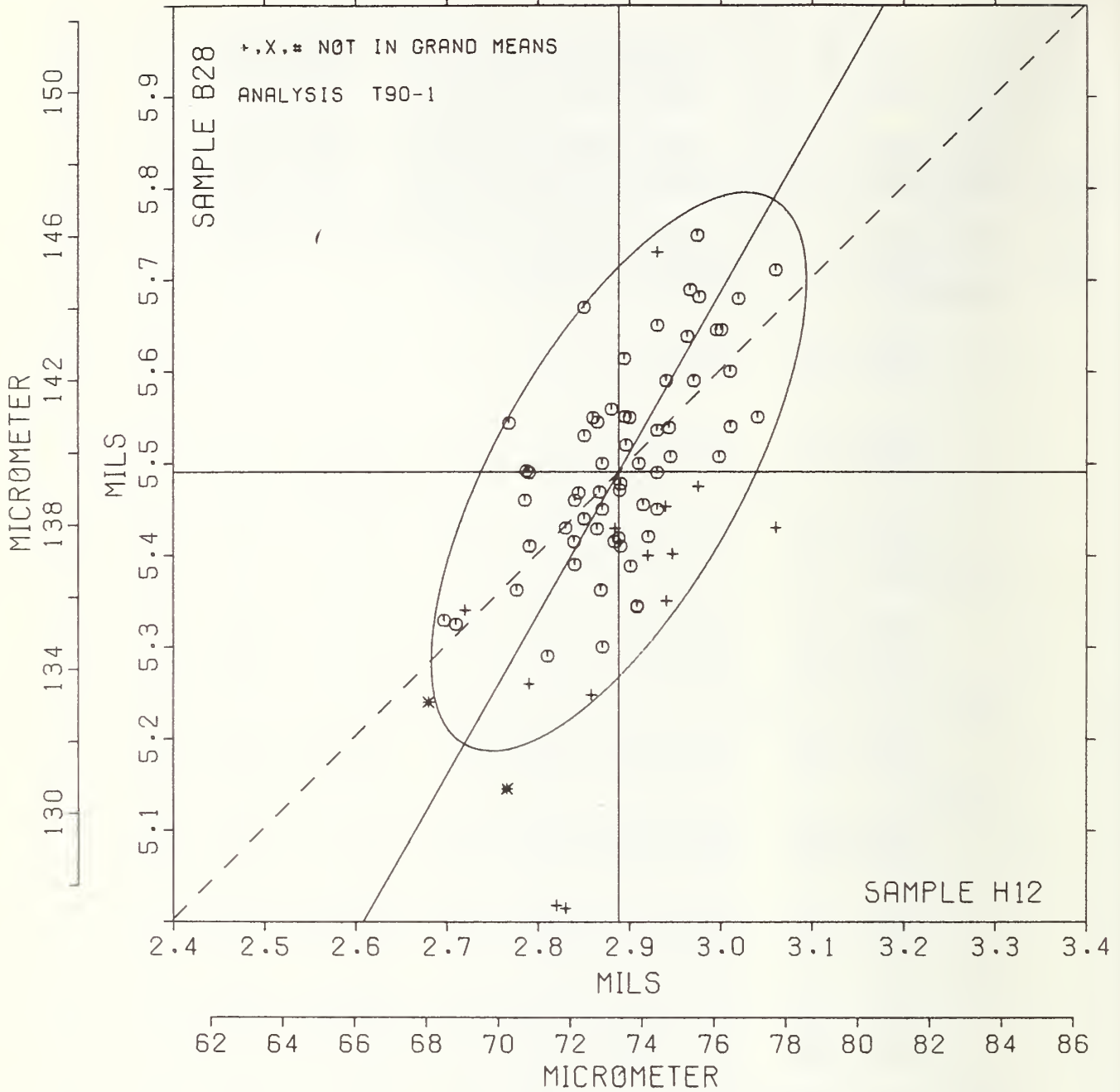
THICKNESS (CALIPER)

SAMPLE H12 = 2.89 MILS

SAMPLE B28 = 5.49 MILS

SAMPLE H12 = 73.4 MICROMETER

SAMPLE B28 = 139.5 MICROMETER



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS 195-1 TABLE 1
GRAMMAGE (MASS PER UNIT AREA)
TAPPI STANDARD 1410 68-68

LAB CODE	SAMPLE D24 MEAN	BROWN KRAFT 76 GRAMS PER SQUARE METER				SAMPLE D25 MEAN	PRINTING 93 GRAMS PER SQUARE METER				TEST D. = 10		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	74.75	-.07	-.15	.47	1.00	93.60	.64	.92	.53	.90	95C	Ø	L100
L121	74.43	-.39	-.81	.63	1.38	92.76	-.21	-.30	.87	1.50	95B	Ø	L121
L162	73.94	-.88	-1.82	.45	.95	91.72	-1.24	-1.79	.57	.98	98K	Ø	L162
L213	74.96	.14	.28	.67	1.21	92.82	-.14	-.20	.70	1.19	95F	Ø	L213
L249	76.16	.34	.69	.35	.75	93.52	.56	.80	.73	1.25	95I	Ø	L249
L274	75.40	.58	1.19	.70	1.49	92.50	-.46	-.67	.53	.90	95B	Ø	L274
L280	75.24	.42	.86	.21	.45	93.85	.89	1.28	.73	1.24	95T	Ø	L280
L297	74.67	-.16	-.32	.06	.12	93.23	.27	.39	.32	.55	95C	Ø	L297
L305	75.45	.67	1.37	.91	1.95	93.27	.30	.44	1.12	1.92	95T	Ø	L305
L339	74.24	-.58	-1.20	.15	.41	93.26	.30	.43	.17	.29	95I	Ø	L339
L344	75.36	.56	1.16	.29	.61	93.43	.47	.67	.29	.48	95T	Ø	L344
L378	74.74	-.68	-.17	.67	1.43	91.57	-.99	-1.43	.69	1.18	95E	Ø	L378
L392	75.05	.23	.47	.69	1.46	94.00	1.04	1.49	.00	.00	95T	Ø	L392
L442	75.04	.22	.45	.35	.76	93.13	.17	.24	.40	.69	95K	Ø	L442
L557	50.94	16.12	33.19	4.54	5.71	78.40	-14.56	-20.95	.51	.88	95A	#	L557
L558	73.98	-.84	-1.74	.60	1.28	91.95	-1.01	-1.46	.82	1.41	95A	Ø	L558
L559	15.31	-59.51	-122.55	.17	.37	19.79	-73.17	-105.32	.24	.41	95A	#	L559
L560	74.65	-.13	-.27	.36	.77	92.39	-.57	-.82	.89	1.53	95A	Ø	L560
L561	76.96	2.14	4.40	1.48	3.15	95.26	2.30	3.31	1.19	2.05	95T	#	L561
L597	70.63	-4.15	-8.63	2.62	5.61	85.93	-3.03	-4.36	2.71	4.64	95C	#	L597

GR. MEAN = 74.82 G/SC.METER

SD MEANS = .45 G/SC.METER

AVERAGE SDR = .47 G/SQ.METER

TOTAL NUMBER OF LABORATORIES REPORTING = 20

Best Values: D24 74.9 ± 0.7 grams per square meter

D25 93.0 ± 1.0 grams per square meter

GRAND MEAN = 92.56 G/SQ.METER

SD OF MEANS = .65 G/SQ.METER

AVERAGE SDR = .58 G/SQ.METER

TEST DETERMINATIONS = 10

16 LABS IN GRAND MEANS

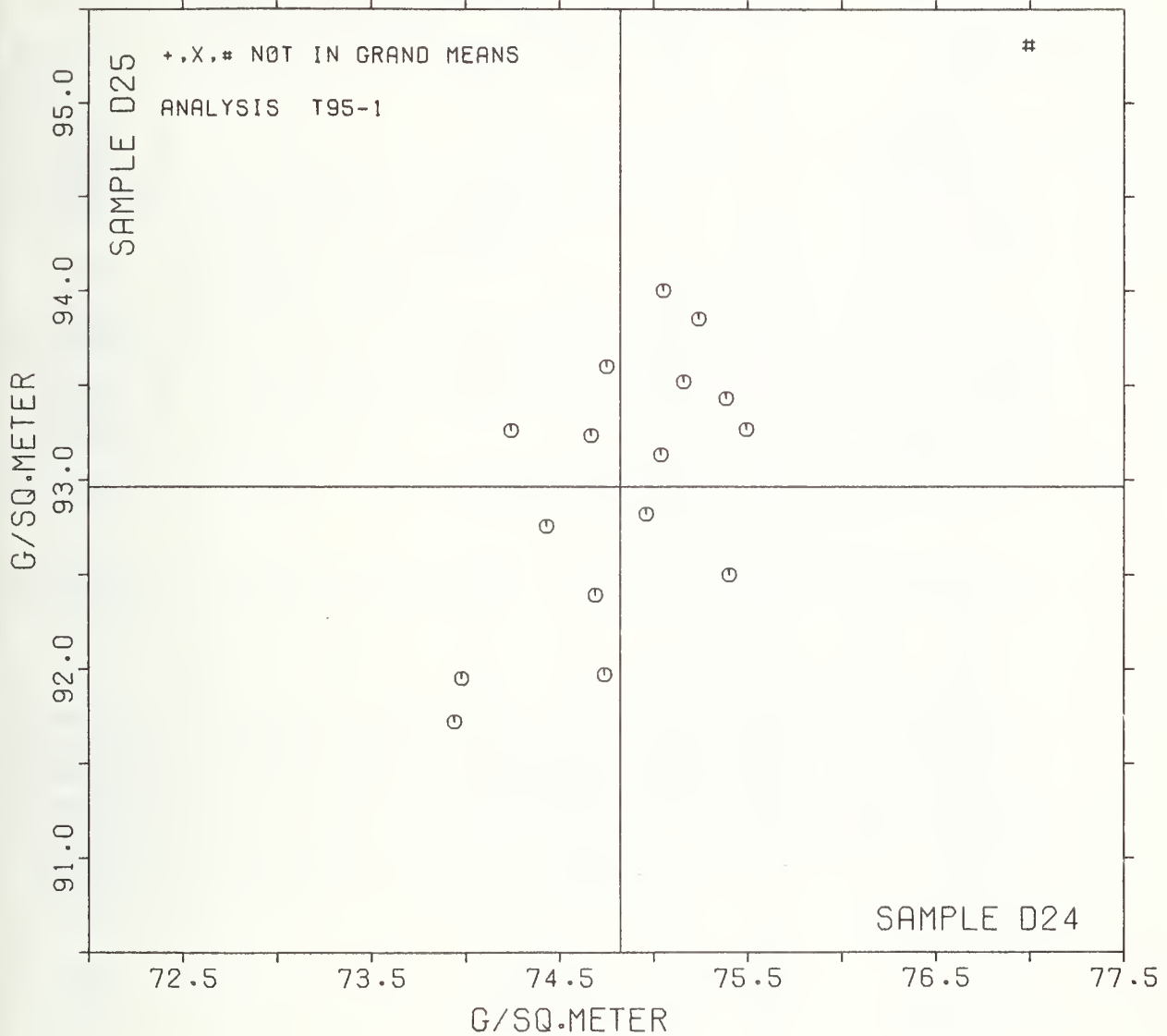
The following laboratories were omitted from the grand means because of extreme test results: 557, 559, 561, 597.

LAB CODE	P	MEANS		COORDINATES		AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS		
		D24	D25	MAJOR	MINOR			PROPERTY	TEST INSTRUMENT	CONDITIONS
L559	#	15.31	19.75	-52.82	16.76	.39	95A	BASIS WEIGHT (GRAMMAGE),	CBANDLER * PRICE PAPER CUTTER	
L597	#	70.63	89.53	-4.68	2.21	5.12	95C	BASIS WEIGHT (GRAMMAGE),	CUTTING BOARD	
L162	Ø	73.94	51.72	-1.51	.17	.96	95K	BASIS WEIGHT (GRAMMAGE),	WEIGHED AS RECEIVED	
L558	Ø	73.98	51.95	-1.29	.25	1.34	95A	BASIS WEIGHT (GRAMMAGE),	CHANDLER * PRICE PAPER CUTTER	
L339	Ø	74.24	53.26	-.02	.65	.35	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L121	Ø	74.43	52.76	-.37	.24	1.42	95B	BASIS WEIGHT (GRAMMAGE),	CCNCCBA CUTTER	
L297	Ø	74.67	93.23	.16	.27	.34	95C	BASIS WEIGHT (GRAMMAGE),	CUTTING BOARD	
L560	Ø	74.69	52.39	-.57	-.16	1.15	95A	BASIS WEIGHT (GRAMMAGE),	CBANDLER * PRICE PAPER CUTTER	
L378	Ø	74.74	51.57	-.91	-.41	1.30	95E	BASIS WEIGHT (GRAMMAGE),	GUILLETINE TYPB CUTTER	
L100	Ø	74.75	53.60	.52	.37	.95	95C	BASIS WEIGHT (GRAMMAGE),	CUTTING BOARD	
L213	Ø	74.96	52.82	-.06	-.19	1.20	95F	BASIS WEIGHT (GRAMMAGE),	POUR-SQUARE CUTTER	
L442	Ø	75.04	93.13	.25	-.11	.72	95K	BASIS WEIGHT (GRAMMAGE),	WEIGHED AS RECEIVED	
L392	Ø	75.05	54.00	1.02	.30	.73	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L249	Ø	75.16	53.52	.65	-.03	1.00	95I	BASIS WEIGHT (GRAMMAGE),	INGENTO PAPER CUTTER	
L280	Ø	75.24	93.85	.58	.06	.85	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L344	Ø	75.38	93.43	.68	-.27	.54	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L274	Ø	75.40	52.50	-.13	-.73	1.20	95B	BASIS WEIGHT (GRAMMAGE),	CCNCCBA CUTTER	
L305	Ø	75.49	93.27	.59	-.44	1.94	95I	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L561	#	76.56	55.26	3.04	-.76	2.60	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L557	#	90.54	78.40	-4.56	-21.15	5.25	95A	BASIS WEIGHT (GRAMMAGE),	CHANDLER * PRICE PAPER CUTTER	
GMEANS:		74.82	52.56			1.00				
		55% ELLIPSE:		2.18	1.01	WITH GAMMA = 61 DEGREES				

GRAMMAGE (MASS PER UNIT AREA)

SAMPLE D24 = 74.8 G/SQ.METER

SAMPLE D25 = 93.0 G/SQ.METER



SUMMARY TABLE

TEST METHOD	SAMPLE CODE	GRAND MEAN	SD OF MEAN	AVER SDR	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
AIR RESISTANCE, GURLEY T40-1 GURLEY UNITS	B37	19.1	1.1	1.6	10	54	60	10	1.4	2.9
	B27	28.6	1.6	1.6					1.4	4.5
AIR RESISTANCE, SHEFFIELD T40-2 SHEFF. UNITS	B37	150.2	7.3	10.1	10	34	39	10	8.8	20.3
	B27	108.5	5.0	4.3					3.7	13.8
AIR RESISTANCE, GURLEY HG FLETATION T41-1 SEC/10 CC	B47	1489.	206.	340.	10	17	17	10	298.	572.
	B73	1249.	209.	516.					452.	580.
SMOOTHNESS, PARKER PRINTSURF T44-1 MICRONS	B44	5.69	.23	.10	10	7	7	10	.09	.64
	J11	4.82	.19	.17					.15	.53
SMOOTHNESS, SHEFFIELD T45-1 SHEFF. UNITS	B44	260.1	10.0	9.3	15	87	89	10	8.1	28.1
	J11	137.8	6.2	10.7					9.3	18.1
SMOOTHNESS, BEKK T45-2 BEKK SECONDS	B44	13.79	1.52	.72	15	10	15	10	.63	4.24
	J11	32.02	3.15	3.78					3.31	8.94
SMOOTHNESS, BENDTSEN T47-1 ML/MIN	B44	429.	15.	36.	10	7	11	10	32.	42.
	J11	162.	5.	22.					19.	15.
K & N INK ABSORPTION T56-1 K & N UNITS	B80	24.6	3.7	.9	4	9	9	4	1.2	10.3
	E50	65.3	5.3	.5					.8	14.8
PH, COLD T57-1 PH UNITS	E47	8.113	.261	.087	5	6	8	2	.171	.736
	J13	7.274	.173	.059					.115	.488
PH, HOT T57-2 PH UNITS	E47	9.03	.26	.10	5	7	8	2	.19	.74
	J13	8.15	.47	.10					.19	1.32
OPACITY, B&L TYPE, 85% BACKING T60-1 PERCENT	E40	96.12	.29	.21	10	74	91	5	.26	.82
	B29	94.66	.38	.25					.32	1.08
OPACITY, B&L TYPE, PAPER BACKING T60-2 PERCENT	E40	96.16	.22	.15	10	8	10	5	.19	.62
	B29	95.94	.23	.15					.18	.64
OPACITY, ELREPEC TYPE, PAPER BACKING T60-3 PERCENT	E40	96.74	.15	.10	10	12	13	5	.13	.42
	B29	96.66	.17	.11					.13	.48
BLUE REFLECTANCE, DIRECTIONAL T65-1 PERCENT	E41	82.80	.23	.33	8	20	45	6	.38	.67
	J33	68.21	.32	.16					.18	.89
BLUE REFLECTANCE, DIFFUSE, WITH TEAP T65-2 PERCENT	E41	81.72	.67	.27	8	17	19	6	.31	1.85
	J33	67.81	.63	.11					.13	1.74
BLUE REFLECTANCE, DIFFUSE, NO TEAP T65-3 PERCENT	E41	81.90	.76	.22	8	12	14	6	.25	2.11
	J33	68.66	.81	.12					.14	2.23
SPECULAR GLOSS, 75 DEGREE T75-1 GLOSS UNITS	E57	84.4	1.4	1.2	10	47	51	5	1.5	4.1
	J19	48.6	2.2	1.3					1.6	6.2
THICKNESS (CALIPER) T90-1 MILS	B12	2.868	.021	.065	10	63	77	10	.057	.225
	B28	5.491	.120	.100					.088	.333
GRAMMAGE (MASS PER UNIT AREA) T95-1 G/SQ.METER	D24	74.82	.49	.47	10	16	20	3	.75	1.48
	D25	92.96	.69	.58					.93	2.08

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