

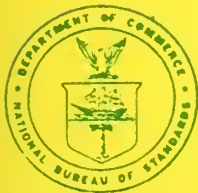
NBSIR 79-
1357



TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM
FOR PAPER

REPORT NO. 55G



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. 55G

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NBSIR 79-1357

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

INTRODUCTION

Reports 55S and 55G comprise the first set of reports for the 78-79 program year. Participants in tests which involve strength properties of paper will receive only the S report; those in tests which measure other properties will receive only the G report.

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

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



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

January 10, 1979

TAPPI-NBS COLLABORATIVE REFERENCE PROGRAM

BACKGROUND AND PURPOSE

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

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

HOW THE PROGRAM WORKS

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

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

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

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

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

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

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

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

TABLE OF CONTENTS

Analyses In This Report

PAGE

1	Introduction
11	Description of Program
iv	Metric Conversion Table
1	Key to Tables and Graphs
5	40-1 Air Resistance, Gurley Oil type
8	40-2 Air Resistance, Sheffield type
11	41-1 Air Resistance, Gurley Mercury type
13	44-1 Smoothness, Parker Printsurf
14	45-1 Smoothness, Sheffield type
19	45-2 Smoothness, Bekk type
21	47-1 Smoothness, Bendtsen type
22	56-1 K & N Ink Absorption
23	57-1 pH, Cold Extraction
24	57-2 pH, Hot Extraction
25	60-1 Opacity, White (89%) Backing
30	60-2 Opacity, Paper Backing, B & L type
31	60-3 Opacity, Paper Backing, Elrepho type
33	65-1 Blue Reflectance (Brightness), Directional
36	65-2 Blue Reflectance, Diffuse, Elrepho (Gloss Trap)
38	65-3 Blue Reflectance, Diffuse, Elrepho (No Gloss Trap)
40	75-1 Specular Gloss, 75 degree
43	90-1 Thickness (Caliper)
48	95-1 Grammage (Basis Weight)
50	Summary

Analyses In The S Report

10-1	Bursting Strength - Up to 45 psi
10-2	Bursting Strength - Up to 45 psi, Air Clamps
11-1	Bursting Strength - Up to 100 psi
15-1	Tearing Strength - Deep Cutout
17-1	Tearing Strength - No Cutout
19-1	Tensile Breaking Strength - Packaging Papers
20-1	Tensile Breaking Strength - Printing Papers, CRE
20-2	Tensile Breaking Strength - Printing Papers, Pendulum
25-1	Tensile Energy Absorption - Packaging Papers
26-1	Tensile Energy Absorption - Printing Papers
28-1	Elongation to Break - Packaging Papers
29-1	Elongation to Break - Printing Papers
30-1	Folding Endurance, MIT type
30-2	Folding Endurance, MIT type, log (base 10)
35-1	Stiffness, Gurley
36-1	Stiffness, Taber
49-1	Surface Pick Strength, IGT
50-1	Surface Pick Strength, Wax
91-1	Concora (Flat Crush)
96-1	Ring Crush

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	0.0292
Thickness	mil	μm	25.40

KEY TO TABLES AND GRAPHS

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

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

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

95% ELLIPSE -

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

AVG R. SDR -

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

Graph -

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

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

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

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

- Summary - In addition to several quantities already defined
(At end of above, the summary shows the following values for
report) each test method:
- REPL CRP - The number of replicate test determinations used
in this Collaborative Reference Program.
- REPL TAPPI - The number of replicate test determinations in a
test result required by the applicable TAPPI
Standard or assumed here if there is no TAPPI
Standard. This quantity is needed in the compu-
tation of TAPPI repeatability and reproducibility
from the SD OF MEANS and the AVER SDR. See TAPPI
Standard T1206 for definitions and computations.
- REPEAT - TAPPI repeatability, a measure of the within-
laboratory precision of a test result.
- REPROD - TAPPI reproducibility, a measure of the between-
laboratory precision of a test result.
- Best values - Given at the end of Table 1 for each method
for which sufficient information is available.
These best values are estimates based on a
careful examination of all data, both current
and past, with special attention to results
obtained by the National Bureau of Standards
and other recognized reference laboratories
in this and other countries. All participants
using equipment that is standard for the
analysis should be able to achieve results
within the plus-minus (+) limits, when these
are shown along with the best values.

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

LAB CODE	SAMPLE E73 MEAN	HEAT SET OFFSET BOOK 76 GRAMS PER SQUARE METER				SAMPLE J46 MEAN	PRINTING 86 GRAMS PER SQUARE METER				TEST D. = 10		
		DEV	N. DEV	SDR	R. SDR		DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L100	15.64	-.51	-.49	1.35	.98	11.71	-.62	-.77	.68	.73	40D	Ø	L100
L107	15.70	-.45	-.43	1.64	1.18	12.30	-.03	-.04	.95	1.02	40D	Ø	L107
L121	15.40	-.75	-.72	3.26	2.35	11.80	-.53	-.66	2.19	2.35	40D	Ø	L121
L122	15.75	-.40	-.38	1.14	.82	11.94	-.39	-.49	.71	.77	40D	Ø	L122
L123	16.20	.05	.05	2.00	1.44	12.67	.34	.42	.82	.88	40D	Ø	L123
L124G	15.73	-.42	-.40	.93	.67	12.63	.30	.37	.68	.73	40D	Ø	L124G
L125	16.19	.04	.04	.58	.42	11.67	-.66	-.82	.73	.79	40D	Ø	L125
L128	16.20	.05	.05	1.48	1.06	12.30	-.03	-.04	1.16	1.24	40D	Ø	L128
L141	15.98	-.17	-.16	.83	.59	12.79	.46	.56	.66	.71	40D	Ø	L141
L148	17.42	1.27	1.23	2.52	1.82	12.46	.13	.16	.86	.93	40D	Ø	L148
L155	15.84	-.31	-.30	1.39	1.00	11.57	-.76	-.94	1.14	1.23	40D	Ø	L155
L163	17.18	1.03	1.00	1.90	1.37	13.31	.98	1.21	.83	.90	40D	Ø	L163
L166	17.40	1.25	1.21	1.19	.86	13.62	1.29	1.59	.64	.69	40D	Ø	L166
L174	15.14	-1.01	-.97	1.40	1.01	11.75	-.57	-.71	.68	.73	40D	Ø	L174
L176	13.29	-2.86	-2.76	1.74	1.25	10.02	-2.31	-2.86	.75	.81	40D	*	L176
L182G	16.28	.13	.13	.85	.61	12.16	-.17	-.21	1.05	1.13	40D	Ø	L182G
L183	17.91	1.76	1.70	1.20	.86	13.38	1.05	1.29	1.12	1.20	40D	Ø	L183
L190C	15.91	-.24	-.23	1.39	1.00	11.84	-.49	-.61	.85	.91	40D	Ø	L190C
L190R	15.19	-.96	-.93	1.58	1.13	11.67	-.66	-.82	.86	.92	40D	Ø	L190R
L212	14.09	-2.06	-1.99	1.14	.82	10.74	-1.59	-1.97	.61	.66	40D	Ø	L212
L223	15.82	-.33	-.32	1.60	1.15	12.92	.59	.72	.81	.87	40D	Ø	L223
L224	14.72	-1.43	-1.38	2.30	1.65	11.38	-.95	-1.18	1.71	1.83	40D	Ø	L224
L230G	16.60	.45	.44	1.58	1.14	12.80	.47	.58	.79	.85	40D	Ø	L230G
L232	14.26	-1.89	-1.82	1.44	1.03	11.02	-1.31	-1.62	1.42	1.52	40D	Ø	L232
L236	16.28	.13	.13	1.00	.72	12.56	.23	.28	.91	.98	40D	Ø	L236
L238A	15.98	-.17	-.16	1.37	.98	12.91	.58	.71	1.10	1.18	40D	Ø	L238A
L242	15.13	-1.02	-.98	1.23	.89	11.92	-.41	-.51	.74	.79	40D	Ø	L242
L243G	16.47	.32	.31	1.27	.92	12.02	-.31	-.39	.78	.83	40D	Ø	L243G
L254	16.38	.23	.22	1.52	1.09	12.48	.15	.18	.65	.70	40D	Ø	L254
L259	14.37	-1.78	-1.72	1.75	1.26	10.85	-1.48	-1.83	.67	.72	40D	Ø	L259
L261	15.58	-.57	-.55	1.19	.86	12.47	.14	.17	.78	.84	40D	Ø	L261
L262G	15.69	-.46	-.44	.85	.61	12.46	.13	.16	1.12	1.20	40D	Ø	L262G
L265	15.37	-.78	-.75	.97	.70	12.46	.13	.16	.71	.76	40D	Ø	L265
L278	16.04	-.11	-.10	1.15	.83	12.34	.01	.01	.77	.83	40D	Ø	L278
L285	17.06	.91	.88	1.38	.99	14.22	1.89	2.33	.81	.87	40D	*	L285
L301	16.81	.66	.64	1.61	1.16	12.56	.23	.28	1.61	1.73	40D	Ø	L301
L308	15.83	-.32	-.31	1.74	1.26	13.17	.84	1.03	1.76	1.89	40D	Ø	L308
L320	16.10	-.05	-.05	1.45	1.04	11.20	-1.13	-1.40	.63	.68	40D	Ø	L320
L324	15.86	-.29	-.28	1.01	.73	12.31	-.02	-.03	.80	.86	40D	Ø	L324
L326	16.77	.62	.60	1.01	.73	13.04	.71	.87	.72	.77	40D	Ø	L326
L328	16.83	-.32	-.31	.99	.72	12.79	.46	.56	1.21	1.30	40D	Ø	L328
L344	15.84	-.31	-.30	1.01	.73	12.02	-.31	-.39	1.07	1.15	40D	Ø	L344
L376	17.07	.92	.89	1.58	1.14	11.97	-.36	-.45	1.01	1.09	40D	Ø	L376
L378	16.77	.62	.60	1.79	1.29	12.55	.22	.27	.81	.87	40D	Ø	L378
L380	18.00	1.85	1.79	1.05	.76	12.40	.07	.08	.70	.75	40D	*	L380
L388	8.06	-8.09	-7.81	.82	.59	6.32	-6.01	-7.43	.36	.38	40D	#	L388
L396M	17.61	1.46	1.41	.76	.55	13.26	.93	1.14	1.11	1.19	40D	Ø	L396M
L576	17.48	1.33	1.29	1.75	1.26	14.29	1.96	2.42	.55	.59	40D	Ø	L576
L585	15.48	-.67	-.65	1.64	1.18	11.75	-.58	-.72	.81	.87	40D	Ø	L585
L604	17.39	1.24	1.20	1.19	.85	12.83	.50	.61	.70	.75	40D	Ø	L604
L616	18.50	2.35	2.27	1.98	1.43	12.49	.16	.19	.97	1.04	40D	*	L616
L651	17.00	.85	.82	1.05	.76	13.00	.67	.82	1.05	1.13	40D	Ø	L651
L676	17.20	1.05	1.02	1.08	.78	12.57	.24	.29	.70	.75	40D	Ø	L676

GR. MEAN = 16.15 GURLEY UNITS GRAND MEAN = 12.33 GURLEY UNITS TEST DETERMINATIONS = 10
 SD MEANS = 1.04 GURLEY UNITS SD OF MEANS = .81 GURLEY UNITS 52 LABS IN GRAND MEANS
 AVERAGE SDR = 1.39 GURLEY UNITS AVERAGE SDR = .93 GURLEY UNITS

L291	17.00	.85	.82	1.41	1.02	12.60	.27	.33	1.17	1.26	40U	*	L291
L484	14.66	-1.49	-1.44	.99	.71	11.44	-.89	-1.10	.66	.71	40H	*	L484
L564	3.87	-12.27	-11.85	.29	.21	2.62	-9.71	-12.00	.15	.17	40K	*	L564

TOTAL NUMBER OF LABORATORIES REPORTING = 56

Best values: E73 16.0 ± 1.9 Gurley units
 J46 12.3 ± 1.3 Gurley units

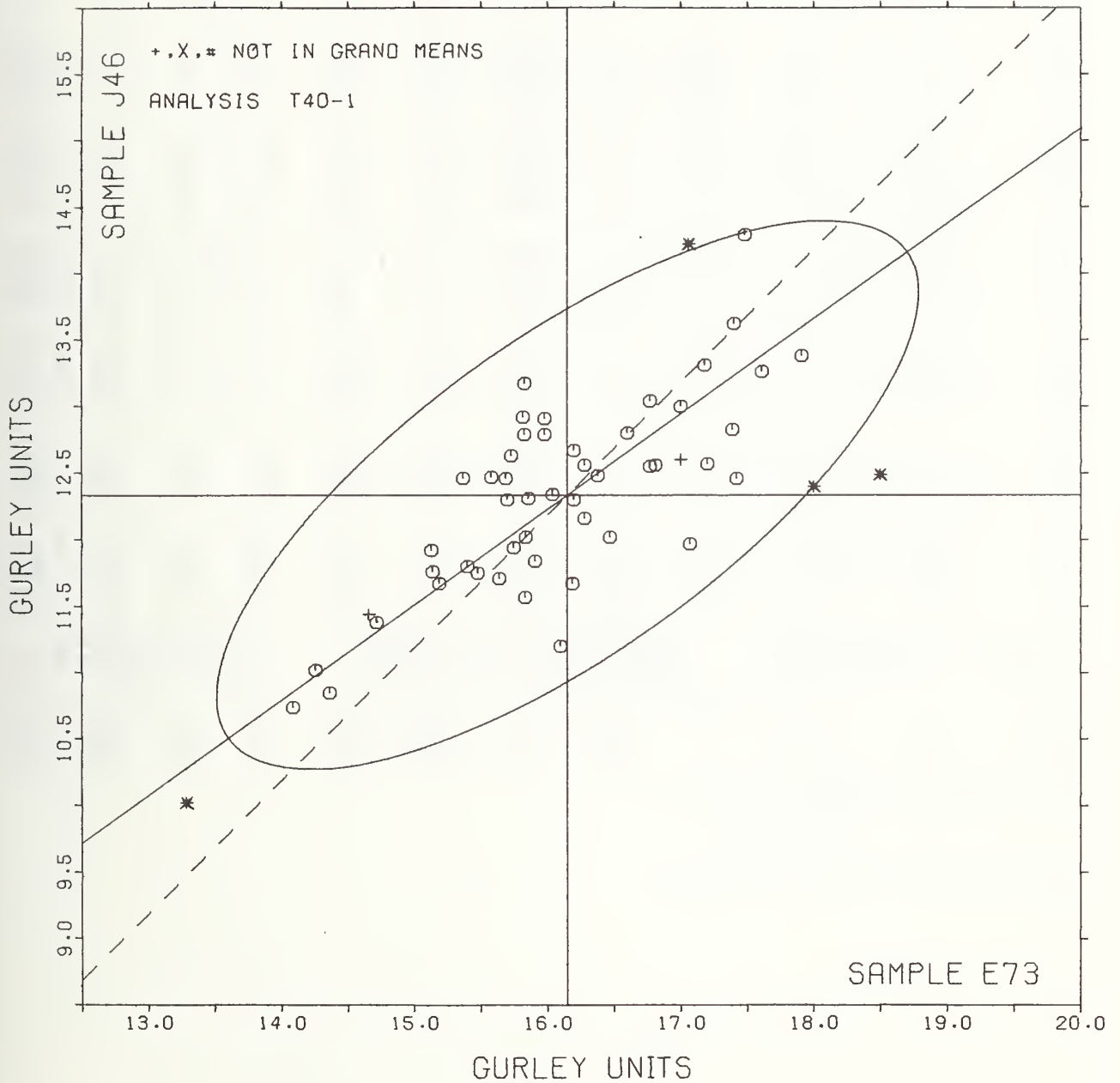
The following laboratories were omitted from the grand means because of extreme test results: 388

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

LAB CODE	F	MEANS		COORDINATES		AVG R.SDR	VAR	PROPERTY	TEST INSTRUMENT	CONDITIONS
		E73	J46	MAJOR	MINOR					
L564	*	3.87	2.62	-15.63	-.74	.19	40K	AIR RESISTANCE,	BEKK	
L388	#	8.06	6.32	-10.08	-.17	.49	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L176	*	13.29	10.02	-3.67	-.21	1.03	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L212	Ø	14.09	10.74	-2.60	-.10	.74	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L232	Ø	14.26	11.02	-2.30	.03	1.28	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L259	Ø	14.37	10.85	-2.31	-.17	.99	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L284	*	14.66	11.44	-1.73	.14	.71	40E	AIR RESISTANCE,	REGMED-TYPE GURLEY DENSOMETER	= OIL FLOTATION
L224	Ø	14.72	11.38	-1.72	.06	1.74	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L242	Ø	15.13	11.92	-1.07	.26	.84	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L174	Ø	15.14	11.76	-1.15	.12	.87	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L190R	Ø	15.19	11.67	-1.17	.02	1.03	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L265	Ø	15.37	12.46	-.56	.56	.73	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L121	Ø	15.40	11.80	-.92	.00	2.35	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L585	Ø	15.48	11.75	-.88	-.08	1.02	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L261	Ø	15.58	12.47	-.38	.44	.85	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L100	Ø	15.64	11.71	-.78	-.21	.85	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L262G	Ø	15.69	12.46	-.30	.37	.90	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L107	Ø	15.70	12.30	-.38	.23	1.10	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L124G	Ø	15.73	12.63	-.17	.48	.70	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L122	Ø	15.75	11.94	-.55	-.09	.79	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L223	Ø	15.82	12.92	.07	.67	1.01	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L308	Ø	15.83	13.17	.23	.87	1.57	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L328	Ø	15.83	12.79	.01	.56	1.01	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L344	Ø	15.84	12.02	-.43	-.07	.94	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L159	Ø	15.84	11.57	-.70	.44	1.11	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L324	Ø	15.86	12.31	-.25	.15	.79	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L190C	Ø	15.91	11.84	-.48	-.26	.96	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L141	Ø	15.98	12.79	.13	.47	.65	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L238A	Ø	15.98	12.91	.20	.57	1.08	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L278	Ø	16.04	12.34	-.08	.07	.83	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L320	Ø	16.10	11.20	-.70	-.89	.86	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L125	Ø	16.19	11.67	-.35	-.56	.60	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L123	Ø	16.20	12.67	.24	.24	1.16	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L128	Ø	16.20	12.30	.02	-.06	1.15	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L182G	Ø	16.28	12.16	.01	-.22	.87	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L236	Ø	16.28	12.56	.24	.11	.85	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L254	Ø	16.38	12.48	.27	-.02	.89	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L243G	Ø	16.47	12.02	.08	-.44	.87	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L230G	Ø	16.60	12.80	.64	.12	.99	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L378	Ø	16.77	12.55	.63	-.19	1.08	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L326	Ø	16.77	13.04	.92	.21	.75	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L301	Ø	16.81	12.56	.67	-.20	1.44	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L291	*	17.00	12.60	.85	-.28	1.14	40U	AIR RESISTANCE,	SHEPPFIELD IN GURLEY UNITS	
L651	Ø	17.00	13.00	1.08	.05	.94	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L285	*	17.06	14.22	1.84	1.00	.93	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L376	Ø	17.07	11.97	.54	-.83	1.11	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L163	Ø	17.18	13.31	1.41	.19	1.13	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L676	Ø	17.20	12.57	.99	-.42	.77	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L604	Ø	17.39	12.83	1.30	-.32	.80	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L166	Ø	17.40	13.62	1.77	.32	.77	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L148	Ø	17.42	12.46	1.11	-.64	1.37	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L576	Ø	17.48	14.29	2.22	.81	.93	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L396M	Ø	17.61	13.26	1.73	-.10	.87	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L183	Ø	17.91	13.38	2.04	-.18	1.03	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L380	*	18.00	12.40	1.54	-1.03	.75	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
L616	*	18.50	12.49	2.00	-1.24	1.23	40D	AIR RESISTANCE,	GURLEY DENSOMETER	= OIL FLOTATION
GMEANS:		16.15	12.33			1.00				
		95% ELLIPSE:		3.14	1.18			WIDE GAMMA = 35 DEGREES		

AIR RESISTANCE, GURLEY

SAMPLE E73 = 16.1 GURLEY UNITS SAMPLE J46 = 12.3 GURLEY UNITS



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

LAB CODE	HEAT SET OFFSET BOOK E73 76 GRAMS PER SQUARE METER					PRINTING J46 86 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	181.	9.	.87	10.	.83	240.	15.	1.29	9.	.78	40S	Ø	L114
L121	154.	-18.	-1.62	7.	.56	211.	-15.	-1.29	12.	1.04	40S	Ø	L121
L122S	181.	9.	.84	19.	1.52	229.	3.	.30	10.	.90	40S	Ø	L122S
L124S	167.	-5.	-.46	11.	.86	222.	-4.	-.31	15.	1.28	40S	Ø	L124S
L132	169.	-3.	-.23	12.	.95	212.	-13.	-1.16	8.	.69	40S	Ø	L132
L148	176.	4.	.39	15.	1.25	224.	-2.	-.14	10.	.89	40S	Ø	L148
L150	178.	7.	.60	15.	1.18	248.	22.	1.94	11.	.95	40S	Ø	L150
L173B	184.	13.	1.17	20.	1.57	228.	2.	.21	8.	.68	40S	Ø	L173B
L190C	184.	12.	1.12	20.	1.62	225.	-1.	-.06	14.	1.17	40S	Ø	L190C
L213	171.	-0.	-.04	17.	1.34	214.	-11.	-1.00	8.	.70	40S	Ø	L213
L223	161.	-10.	-.96	10.	.78	220.	-6.	-.53	13.	1.11	40S	Ø	L223
L228	164.	-8.	-.70	7.	.59	221.	-5.	-.41	10.	.84	40S	Ø	L228
L230S	164.	-7.	-.66	9.	.72	214.	-12.	-1.02	12.	1.02	40S	Ø	L230S
L249	179.	7.	.64	13.	1.03	220.	-6.	-.53	11.	.96	40S	Ø	L249
L255	182.	11.	.97	9.	.72	237.	11.	1.00	7.	.59	40S	Ø	L255
L257A	166.	-6.	-.54	11.	.91	228.	3.	.23	16.	1.43	40S	Ø	L257A
L257B	168.	-3.	-.31	12.	.95	234.	9.	.77	12.	1.01	40S	Ø	L257B
L257C	167.	-5.	-.46	8.	.62	228.	2.	.21	14.	1.25	40S	Ø	L257C
L260	164.	-8.	-.74	6.	.51	228.	2.	.20	10.	.87	40S	Ø	L260
L262S	164.	-8.	-.71	9.	.70	224.	-2.	-.17	7.	.61	40S	Ø	L262S
L288	198.	26.	2.40	19.	1.50	254.	28.	2.48	15.	1.32	40S	*	L288
L301	176.	4.	.39	10.	.78	226.	-0.	-.00	12.	1.04	40S	Ø	L301
L305	163.	-9.	-.78	8.	.61	211.	-14.	-1.25	8.	.72	40S	Ø	L305
L318	177.	5.	.49	18.	1.45	218.	-8.	-.71	18.	1.59	40S	Ø	L318
L352	166.	-6.	-.54	9.	.69	213.	-13.	-1.13	13.	1.15	40S	Ø	L352
L354	156.	-15.	-1.41	13.	1.03	230.	5.	.41	13.	1.11	40S	Ø	L354
L360	148.	-23.	-2.11	13.	1.02	216.	-9.	-.83	10.	.84	40S	Ø	L360
L366	167.	-5.	-.44	13.	1.04	203.	-23.	-1.99	14.	1.18	40S	Ø	L366
L370	151.	-20.	-1.87	7.	.59	266.	40.	3.53	7.	.62	40S	X	L370
L372	160.	-12.	-1.10	12.	.93	232.	6.	.57	11.	.98	40S	Ø	L372
L390	185.	14.	1.26	19.	1.54	247.	21.	1.88	9.	.82	40S	Ø	L390
L575	186.	15.	1.34	19.	1.50	231.	5.	.48	14.	1.17	40S	Ø	L575
L585	184.	13.	1.17	13.	1.07	232.	7.	.60	17.	1.49	40S	Ø	L585
L597	173.	2.	.16	14.	1.12	225.	-1.	-.06	13.	1.14	40S	Ø	L597
L600	122.	-50.	-4.54	13.	1.08	214.	-11.	-1.01	14.	1.23	40S	#	L600

GR. MEAN = 172. SHEFF. UNITS GRAND MEAN = 226. SHEFF. UNITS TEST DETERMINATIONS = 10
SD MEANS = 11. SHEFF. UNITS SD OF MEANS = 11. SHEFF. UNITS 33 LABS IN GRAND MEANS
AVERAGE SDR = 12. SHEFF. UNITS AVERAGE SDR = 12. SHEFF. UNITS

L182B	797.	626.	57.05	52.	4.19	950.	724.	63.81	87.	7.51	40B	*	L182B
L243B	862.	691.	62.57	55.	4.44	1044.	819.	72.14	45.	3.86	40B	*	L243B
L312	154.	-17.	-1.57	7.	.53	196.	-30.	-2.60	29.	2.48	40T	*	L312
L484	720.	548.	49.98	54.	4.33	935.	709.	62.49	41.	3.57	40B	*	L484
L587	165.	-6.	-.57	9.	.70	222.	-4.	-.32	12.	1.07	40T	*	L587

TOTAL NUMBER OF LABORATORIES REPORTING = 40

Best values: E73 170 ± 15 Sheffield units
J46 225 ± 21 Sheffield units

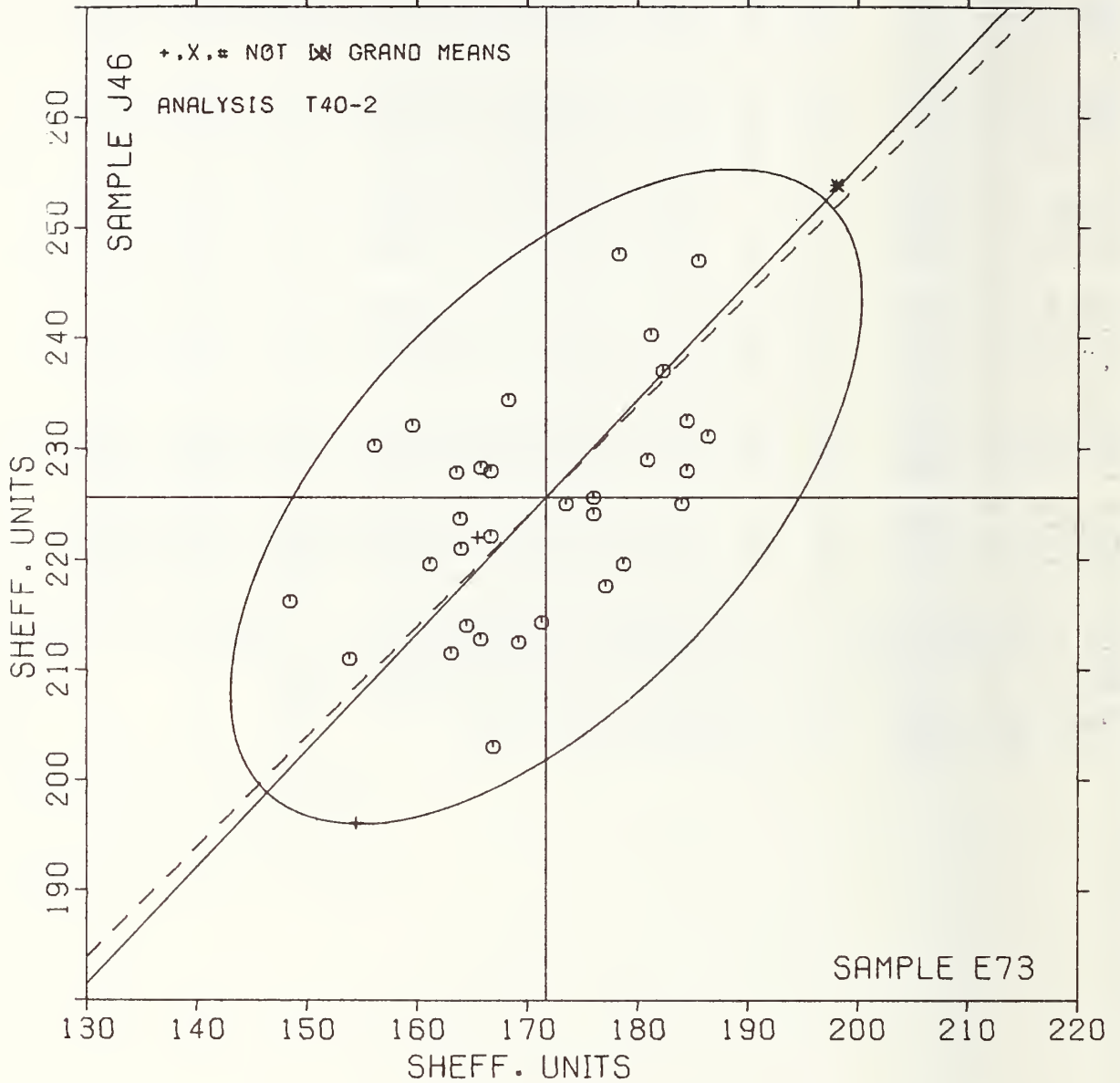
The following laboratories were omitted from the grand means because of extreme test results: 600

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY	TEST INSTRUMENT	CONDITIONS
		E73	J46	MAJOR	MINOR	R.SDR	VAR			
L6C0	#	122.	214.	-03.	28.	1.16	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L360	Ø	148.	216.	-23.	10.	.93	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L370	X	151.	266.	15.	42.	.60	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L121	Ø	154.	211.	-23.	3.	.80	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L312	*	154.	196.	-33.	-8.	1.50	40T	AIR RESISTANCE,	SHEFFIELD	(5 INCH DIAMETER ORIFICE)
L354	Ø	156.	230.	-7.	14.	1.07	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L372	Ø	160.	232.	-4.	13.	.96	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L223	Ø	161.	220.	-12.	3.	.95	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L205	Ø	163.	211.	-16.	-3.	.67	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L260	Ø	164.	228.	-4.	7.	.69	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L262S	Ø	164.	224.	-7.	4.	.66	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L238	Ø	164.	221.	-9.	2.	.72	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L230S	Ø	164.	214.	-13.	-3.	.87	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L587	*	165.	222.	-7.	2.	.88	40T	AIR RESISTANCE,	SHEFFIELD	(3 INCH DIAMETER ORIFICE)
L352	Ø	166.	213.	-13.	-5.	.92	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L257A	Ø	166.	228.	-2.	6.	1.17	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L124S	Ø	167.	222.	-6.	1.	1.07	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L257C	Ø	167.	228.	-2.	5.	.93	40S	AIR RESISTANCE,	SHEFFIELD	(5/4 INCH DIAMETER ORIFICE)
L366	Ø	167.	203.	-20.	-12.	1.11	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L257B	Ø	168.	234.	4.	8.	.98	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L132	Ø	169.	212.	-11.	-7.	.82	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L213	Ø	171.	214.	-9.	-7.	1.02	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L597	Ø	173.	225.	1.	-2.	1.13	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L301	Ø	176.	226.	3.	-3.	.91	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L148	Ø	176.	224.	2.	-4.	1.07	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L318	Ø	177.	218.	-2.	-9.	1.52	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L150	Ø	178.	248.	21.	10.	1.07	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L249	Ø	179.	220.	0.	-9.	1.00	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L122S	Ø	181.	229.	9.	-4.	1.21	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L114	Ø	181.	240.	17.	3.	.81	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L255	Ø	182.	237.	16.	0.	.65	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L190C	Ø	184.	225.	8.	-9.	1.40	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L173B	Ø	184.	228.	11.	-8.	1.13	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L585	Ø	184.	232.	14.	-5.	1.28	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L390	Ø	185.	247.	25.	5.	1.18	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L575	Ø	186.	231.	14.	-7.	1.34	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L288	*	198.	254.	39.	0.	1.41	40S	AIR RESISTANCE,	SHEFFIELD	(3/4 INCH DIAMETER ORIFICE)
L484	*	720.	935.	892.	88.	3.95	40B	AIR RESISTANCE,	BENDTSEN,	WG 150
L182B	*	797.	950.	956.	42.	5.85	40B	AIR RESISTANCE,	BENDTSEN,	WG 150
L243B	*	862.	1044.	1070.	60.	4.15	40B	AIR RESISTANCE,	BENDTSEN,	WG 150
GMEANS:		172.	226.			1.00				
		95% ELLIPSE:		37.	18.			WITH GAMMA = 46 DEGREES		

AIR RESISTANCE, SHEFFIELD

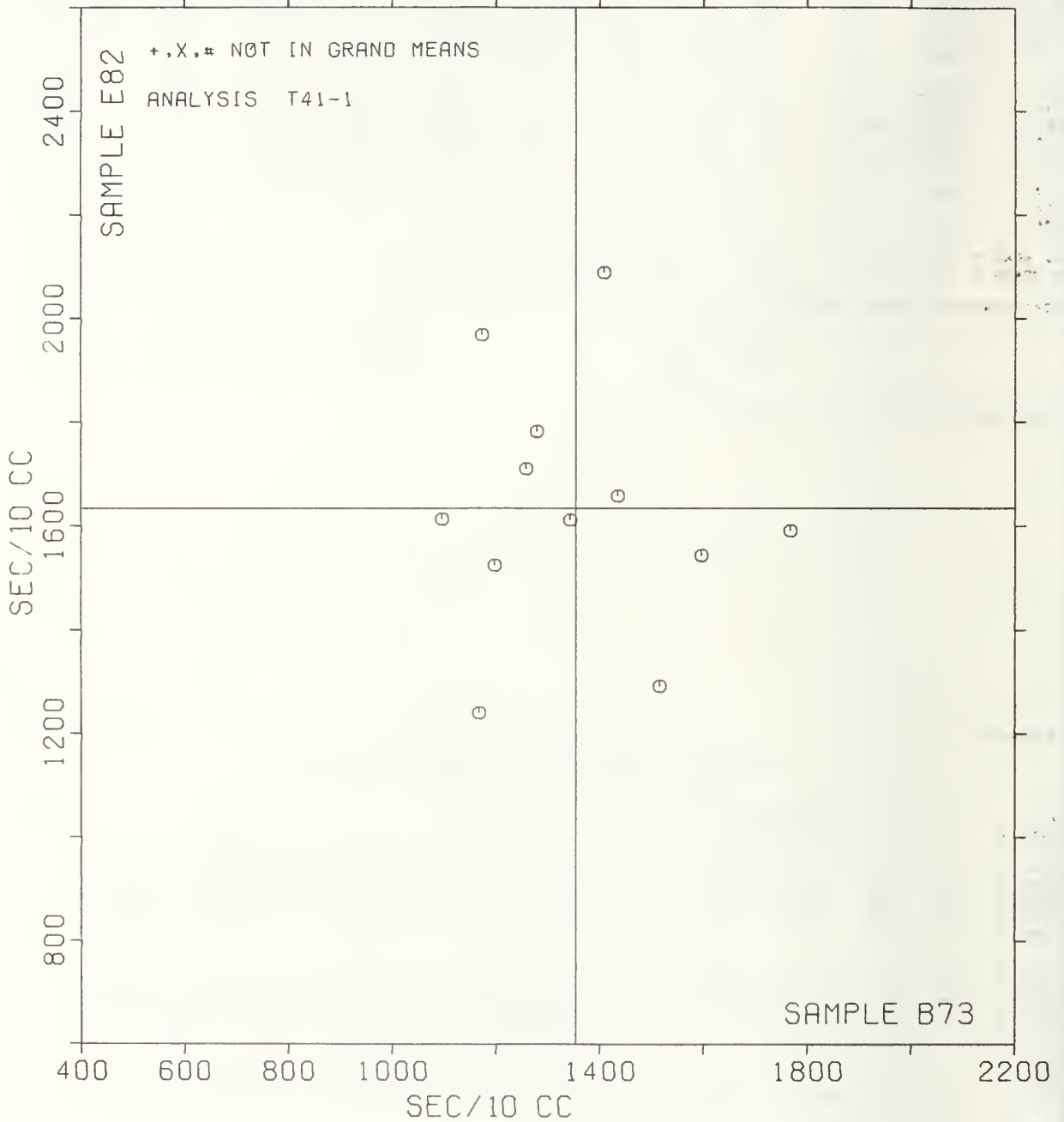
SAMPLE E73 = 172. SHEFF. UNITS SAMPLE J46 = 226. SHEFF. UNITS



AIR RESISTANCE, GURLEY HG FLOTATION

SAMPLE B73 = 1353. SEC/10 CC

SAMPLE E82 = 1635. SEC/10 CC



LAB CODE	SAMPLE J12		PRINTING 149 GRAMS PER SQUARE METER				SAMPLE J49		PRINTING 94 GRAMS PER SQUARE METER				TEST D. = 10		
	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB		
L122	5.45	.48	1.45	.31	1.66	7.03	1.03	1.89	.11	1.18	44P	0	L122		
L182	5.13	.16	.49	.18	.97	5.98	-.01	-.03	.10	1.10	44P	0	L182		
L183	4.42	-.55	-1.67	.08	.43	5.28	-.72	-1.32	.06	.68	44P	0	L183		
L223	4.98	.01	.03	.17	.92	5.85	-.15	-.28	.11	1.15	44P	0	L223		
L288	5.23	.26	.78	.19	1.06	6.13	.13	.24	.08	.88	44P	0	L288		
L317	5.05	.08	.24	.19	1.03	6.38	.38	.70	.12	1.32	44P	0	L317		
L588	4.62	-.35	-1.07	.15	.80	5.45	-.55	-1.01	.08	.91	44P	0	L588		
L669	4.89	-.08	-.25	.21	1.13	5.89	-.11	-.20	.07	.79	44P	0	L669		

GR. MEAN = 4.97 MICRONS GRAND MEAN = 6.00 MICRONS TEST DETERMINATIONS = 10
 SD MEANS = .33 MICRONS SD OF MEANS = .55 MICRONS 8 LABS IN GRAND MEANS
 AVERAGE SDR = .18 MICRONS AVERAGE SDR = .09 MICRONS
 TOTAL NUMBER OF LABORATORIES REPORTING = 8

Best values: J12 5.0 microns
 J49 6.0 microns

LAB CODE	F	MEANS		COORDINATES		AVG R.SDR	VAR	PROPERTY	TEST INSTRUMENT	CONDITIONS
		J12	J49	MAJOR	MINOR					
L183	0	4.42	5.28	-.90	.12	.55	44P	SMOOTHNESS,	PARKER PRINTSURF	
L588	0	4.62	5.45	-.65	.03	.85	44P	SMOOTHNESS,	PARKER PRINTSURF	
L669	0	4.89	5.89	-.14	.02	.56	44P	SMOOTHNESS,	PARKER PRINTSURF	
L223	0	4.98	5.85	-.13	-.09	1.04	44P	SMOOTHNESS,	PARKER PRINTSURF	
L317	0	5.05	6.38	.37	.12	1.17	44P	SMOOTHNESS,	PARKER PRINTSURF	
L182	0	5.13	5.98	.07	-.15	1.04	44P	SMOOTHNESS,	PARKER PRINTSURF	
L288	0	5.23	6.13	.24	-.16	.97	44P	SMOOTHNESS,	PARKER PRINTSURF	
L122	0	5.45	7.03	1.13	.10	1.42	44P	SMOOTHNESS,	PARKER PRINTSURF	
GMEANS:		4.97	6.00			1.00				
		95% ELLIPSE:	2.17	.40				WITH GAMMA = 59 DEGREES		

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

LAB CODE	SAMPLE J12 MEAN	PRINTING 149 GRAMS PER SQUARE METER				SAMPLE J49 MEAN	PRINTING 94 GRAMS PER SQUARE METER				TEST D. = 15		
		DEV	N. DEV	SDR	R. SDR		DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L100	152.3	10.5	1.58	11.0	1.03	287.2	13.7	1.09	5.0	.69	45S	Ø	L100
L107	168.3	26.5	3.98	14.1	1.33	294.4	20.9	1.67	8.2	1.13	45S	X	L107
L108	146.1	4.2	.63	9.3	.87	299.9	26.3	2.11	5.1	.71	45S	Ø	L108
L114	143.9	2.1	.31	10.7	1.00	273.1	0.4	-0.03	6.6	.91	45S	Ø	L114
L121	135.4	-6.4	-0.97	15.1	1.42	260.3	-13.2	-1.06	7.4	1.02	45S	Ø	L121
L122	137.3	-4.6	-0.69	16.3	1.53	276.2	2.7	.21	7.5	1.04	45S	Ø	L122
L123	136.5	-5.4	-0.81	12.4	1.16	251.0	-22.5	-1.80	11.5	1.59	45S	Ø	L123
L124	139.6	-2.2	-0.34	11.8	1.11	266.8	-6.7	-0.54	6.8	.94	45S	Ø	L124
L125	137.7	-4.2	-0.63	9.4	.89	265.7	-7.9	-0.63	11.2	1.54	45S	Ø	L125
L126	141.8	-0.0	-0.01	10.0	.94	284.0	10.5	.84	8.0	1.11	45S	Ø	L126
L128	144.6	2.8	.41	11.1	1.05	274.3	.8	.06	7.3	1.00	45S	Ø	L128
L132	146.8	5.0	.74	8.1	.76	282.7	9.1	.73	6.2	.86	45S	Ø	L132
L134	134.7	-7.2	-1.08	6.7	.63	280.7	7.1	.57	8.8	1.22	45S	Ø	L134
L139S	156.1	14.2	2.14	15.1	1.42	285.7	12.1	.97	4.6	.63	45S	Ø	L139S
L148	152.3	10.4	1.57	11.4	1.07	280.9	7.3	.59	6.9	.95	45S	Ø	L148
L150	147.1	5.3	.79	17.7	1.67	289.0	15.5	1.24	5.8	.80	45S	Ø	L150
L152	148.6	6.8	1.01	4.7	.44	250.8	-22.7	-1.82	5.1	.70	45S	*	L152
L159	147.5	5.7	.85	11.8	1.11	277.4	3.9	.31	3.6	.50	45S	Ø	L159
L162	142.0	.2	.02	10.7	1.00	280.7	7.2	.57	10.7	1.48	45S	Ø	L162
L166	136.9	-5.0	-0.75	9.0	.85	262.3	-11.2	-0.90	7.1	.98	45S	Ø	L166
L167	148.7	6.8	1.02	9.9	.93	265.0	-8.5	-0.68	4.2	.58	45S	Ø	L167
L173B	138.7	-3.2	-0.48	12.2	1.14	261.7	-11.9	-0.95	10.1	1.39	45S	Ø	L173B
L176S	138.9	-2.9	-0.44	11.8	1.11	294.9	21.4	1.71	3.8	.53	45S	Ø	L176S
L183S	145.5	3.7	.55	12.5	1.18	282.2	8.7	.69	6.5	.90	45S	Ø	L183S
L190C	145.3	3.5	.52	12.6	1.18	265.3	-8.2	-0.66	5.2	.71	45S	Ø	L190C
L190R	133.7	-8.2	-1.23	11.2	1.05	257.6	-15.9	-1.28	2.4	.32	45S	Ø	L190R
L195	136.8	-5.0	-0.76	11.4	1.07	258.7	-14.8	-1.19	6.9	.95	45S	Ø	L195
L203	135.7	-6.2	-0.93	13.5	1.27	266.0	-7.5	-0.60	9.3	1.28	45S	Ø	L203
L206	140.3	-1.5	-0.23	7.8	.73	271.6	-1.9	-0.16	5.2	.71	45S	Ø	L206
L211	144.7	2.8	.42	12.2	1.15	272.3	-1.2	-0.10	10.2	1.40	45S	Ø	L211
L213	127.6	-14.2	-2.14	10.1	.95	250.7	-22.9	-1.83	4.6	.64	45S	Ø	L213
L223	140.0	-1.8	-0.28	8.8	.83	256.5	-17.1	-1.37	7.8	1.08	45S	Ø	L223
L224	148.3	6.4	.96	10.9	1.02	289.7	16.1	1.29	6.4	.88	45S	Ø	L224
L226B	136.1	-5.7	-0.86	10.5	.98	268.7	-4.9	-0.39	6.7	.92	45S	Ø	L226B
L228	139.1	-2.7	-0.41	5.7	.54	281.0	7.5	.60	6.0	.83	45S	Ø	L228
L230S	144.7	2.9	.43	15.7	1.48	282.3	8.8	.70	7.5	1.03	45S	Ø	L230S
L232S	164.3	22.5	3.38	17.2	1.62	339.3	65.8	5.27	3.2	.44	45S	#	L232S
L237	141.3	-0.5	-0.08	9.2	.86	273.3	-0.2	-0.02	5.6	.77	45S	Ø	L237
L249	138.9	-2.9	-0.44	10.4	.98	288.0	14.5	1.16	9.4	1.29	45S	Ø	L249
L254	147.6	5.8	.86	11.1	1.04	270.8	-2.7	-0.22	11.9	1.64	45S	Ø	L254
L255	145.5	3.6	.54	5.9	.55	277.7	4.1	.33	5.1	.70	45S	Ø	L255
L257A	138.3	-3.6	-0.54	8.7	.82	267.6	-5.9	-0.48	10.2	1.40	45S	Ø	L257A
L257B	151.1	9.3	1.39	12.2	1.15	260.3	-13.3	-1.06	13.5	1.85	45S	Ø	L257B
L257C	150.7	8.8	1.32	9.7	.91	273.2	-0.3	-0.03	10.2	1.40	45S	Ø	L257C
L259	158.7	16.9	2.54	23.6	2.22	288.3	14.8	1.18	8.2	1.12	45S	*	L259
L260	145.3	3.4	.51	7.8	.73	258.5	-15.1	-1.21	3.4	.47	45S	Ø	L260
L261	143.3	1.5	.22	17.3	1.63	281.9	8.4	.67	9.3	1.28	45S	Ø	L261
L262	140.9	-0.9	-0.14	9.1	.86	274.3	.8	.06	9.0	1.24	45S	Ø	L262
L275	144.6	2.8	.41	10.3	.97	282.7	9.1	.73	7.0	.97	45S	Ø	L275
L278	155.7	13.8	2.08	7.5	.71	289.9	16.3	1.31	9.1	1.26	45S	Ø	L278
L281	146.7	4.9	.73	10.9	1.02	272.4	-1.1	-0.09	4.4	.61	45S	Ø	L281
L285	134.1	-7.8	-1.17	9.3	.87	261.0	-12.5	-1.00	8.3	1.15	45S	Ø	L285
L288	139.9	-2.0	-0.30	10.9	1.02	275.6	2.1	.16	10.8	1.49	45S	Ø	L288
L291S	145.9	4.0	.60	9.3	.88	292.3	18.7	1.50	5.0	.68	45S	Ø	L291S
L301	142.1	.3	.04	5.3	.50	250.9	-22.7	-1.82	6.0	.82	45S	Ø	L301
L305	141.1	-0.8	-0.12	5.4	.51	272.0	-1.5	-0.12	9.0	1.23	45S	Ø	L305
L308	140.9	-0.9	-0.14	6.1	.57	272.8	-0.7	-0.06	6.2	.86	45S	Ø	L308
L312	138.7	-3.2	-0.48	9.9	.93	284.0	10.5	.84	4.3	.59	45S	Ø	L312
L317	134.7	-7.1	-1.07	8.9	.84	281.3	7.8	.62	7.4	1.02	45S	Ø	L317
L318	136.5	-5.3	-0.80	10.4	.98	281.3	7.8	.62	7.3	1.01	45S	Ø	L318
L323	137.0	-4.8	-0.73	12.9	1.22	275.0	1.5	.12	7.8	1.07	45S	Ø	L323
L326	140.5	-1.3	-0.20	9.1	.86	307.5	34.0	2.72	4.8	.67	45S	*	L326
L328	142.8	1.0	.14	12.8	1.20	219.3	-54.3	-4.34	5.3	.73	45S	#	L328
L349	132.8	-9.0	-1.36	9.0	.85	268.9	-4.7	-0.37	7.5	1.03	45S	Ø	L349
L352	144.5	2.7	.40	11.2	1.05	279.0	5.5	.44	13.0	1.79	45S	Ø	L352

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

LAB CODE	SAMPLE J12 MEAN	PRINTING 149 GRAMS PER SQUARE METER				SAMPLE J49 MEAN	PRINTING 94 GRAMS PER SQUARE METER				TEST D. = 15		
		DEV	N. DEV	SDR	R. SDR		DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L360	134.9	-7.0	-1.05	7.1	.67	272.2	-1.3	-.11	6.1	.84	45S	Ø	L360
L366	146.1	4.3	.64	11.1	1.05	259.3	-14.2	-1.14	6.8	.93	45S	Ø	L366
L370	142.6	.8	.11	8.2	.77	280.0	6.5	.52	6.5	.90	45S	Ø	L370
L372	138.7	-3.2	-.48	8.9	.84	285.3	11.8	.94	7.7	1.07	45S	Ø	L372
L376	121.1	9.2	1.38	12.4	1.17	268.4	-5.1	-.41	10.3	1.42	45S	Ø	L376
L378	137.3	-4.5	-.68	10.3	.97	261.3	-12.3	-.98	9.6	1.33	45S	Ø	L378
L380	135.5	-6.4	-.96	9.6	.81	265.3	-8.2	-.66	5.5	.76	45S	Ø	L380
L382	142.5	.6	.09	14.0	1.32	275.6	2.1	.16	5.4	.74	45S	Ø	L382
L390	139.3	-2.5	-.38	14.4	1.35	275.3	1.8	.14	6.4	.88	45S	Ø	L390
L396M	127.2	-14.6	-2.20	9.9	.93	262.7	-10.8	-.87	6.4	.89	45S	Ø	L396M
L554	134.7	-7.1	-1.07	11.4	1.08	255.7	-17.8	-1.43	10.9	1.50	45S	Ø	L554
L575	160.5	18.7	2.81	17.4	1.64	298.4	24.9	1.99	5.5	.76	45S	*	L575
L585	127.0	-14.8	-2.23	7.0	.66	269.7	-3.9	-.31	6.7	.92	45S	Ø	L585
L587	146.0	4.2	.62	8.5	.80	264.7	-8.9	-.71	4.0	.55	45S	Ø	L587
L597	135.5	-6.3	-.95	18.7	1.76	280.1	6.6	.53	5.8	.79	45S	Ø	L597
L600	110.3	-31.5	-4.73	12.3	1.16	284.5	11.0	.88	8.4	1.16	45S	X	L600
L648	143.4	1.6	.23	13.7	1.29	280.1	6.5	.52	6.8	.94	45S	Ø	L648
L651	135.5	-6.3	-.95	5.4	.51	241.5	-32.1	-2.57	2.9	.40	45S	*	L651
L670	141.0	-.8	-.13	10.3	.97	274.7	1.1	.09	5.8	.80	45S	Ø	L670

GR. MEAN = 141.8 SHEFF. UNITS GRAND MEAN = 273.5 SHEFF. UNITS TEST DETERMINATIONS = 15
SD MEANS = 6.7 SHEFF. UNITS SD OF MEANS = 12.5 SHEFF. UNITS 80 LABS IN GRAND MEANS
AVERAGE SDR = 10.6 SHEFF. UNITS AVERAGE SDR = 7.3 SHEFF. UNITS

L174 237.7 95.9 14.40 7.0 .66 319.7 46.2 3.70 5.1 .70 45R * L174
TOTAL NUMBER OF LABORATORIES REPORTING = 85

Best values: J12 140 ± 12 Sheffield units
J49 270 ± 19 Sheffield units

The following laboratories were omitted from the grand means because of extreme test results: 232S, 328

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY===TEST	INSTRUMENT===	CONDITIONS
		J12	J49	MAJOR	MINOR	R. SDR	VAR			
L600	X	110.3	284.5	2.1	33.3	1.16	45S	SMOOTHNESS,	SHEFFIELD	
L585	Ø	127.0	269.7	-7.7	13.3	.79	45S	SMOOTHNESS,	SHEFFIELD	
L396M	Ø	127.2	262.7	-14.4	11.2	.91	45S	SMOOTHNESS,	SHEFFIELD	
L213	Ø	127.6	250.7	-25.9	7.6	.79	45S	SMOOTHNESS,	SHEFFIELD	
L349	Ø	132.8	268.9	-6.9	7.5	.94	45S	SMOOTHNESS,	SHEFFIELD	
L190R	Ø	133.7	257.6	-17.6	3.6	.69	45S	SMOOTHNESS,	SHEFFIELD	
L285	Ø	134.1	261.0	-14.2	4.1	1.01	45S	SMOOTHNESS,	SHEFFIELD	
L134	Ø	134.7	280.7	4.9	8.8	.92	45S	SMOOTHNESS,	SHEFFIELD	
L554	Ø	134.7	255.7	-19.1	2.1	1.29	45S	SMOOTHNESS,	SHEFFIELD	
L317	Ø	134.7	281.3	5.6	8.9	.93	45S	SMOOTHNESS,	SHEFFIELD	
L360	Ø	134.9	272.2	-3.2	6.4	.76	45S	SMOOTHNESS,	SHEFFIELD	
L121	Ø	135.4	260.3	-14.5	2.7	1.22	45S	SMOOTHNESS,	SHEFFIELD	
L380	Ø	135.5	265.3	-9.6	3.9	.79	45S	SMOOTHNESS,	SHEFFIELD	
L651	*	135.5	241.5	-32.6	-2.5	.45	45S	SMOOTHNESS,	SHEFFIELD	
L597	Ø	135.5	280.1	4.6	7.8	1.27	45S	SMOOTHNESS,	SHEFFIELD	
L203	Ø	135.7	266.0	-8.9	3.9	1.27	45S	SMOOTHNESS,	SHEFFIELD	
L226B	Ø	136.1	268.7	-6.2	4.2	.95	45S	SMOOTHNESS,	SHEFFIELD	
L123	Ø	136.5	251.0	-23.2	-0.9	1.38	45S	SMOOTHNESS,	SHEFFIELD	
L318	Ø	136.5	281.3	6.1	7.2	.99	45S	SMOOTHNESS,	SHEFFIELD	
L195	Ø	136.8	258.7	-15.6	.9	1.01	45S	SMOOTHNESS,	SHEFFIELD	
L166	Ø	136.9	262.3	-12.1	1.8	.91	45S	SMOOTHNESS,	SHEFFIELD	
L323	Ø	137.0	275.0	.1	5.1	1.14	45S	SMOOTHNESS,	SHEFFIELD	
L122	Ø	137.3	276.2	1.3	5.1	1.28	45S	SMOOTHNESS,	SHEFFIELD	
L378	Ø	137.3	261.3	-13.0	1.0	1.15	45S	SMOOTHNESS,	SHEFFIELD	
L125	Ø	137.7	265.7	-8.7	1.9	1.21	45S	SMOOTHNESS,	SHEFFIELD	
L257A	Ø	138.3	267.6	-6.7	1.8	1.11	45S	SMOOTHNESS,	SHEFFIELD	
L372	Ø	138.7	285.3	10.5	6.2	.95	45S	SMOOTHNESS,	SHEFFIELD	
L173B	Ø	138.7	261.7	-12.3	-1.1	1.27	45S	SMOOTHNESS,	SHEFFIELD	
L312	Ø	138.7	284.0	9.2	5.9	.76	45S	SMOOTHNESS,	SHEFFIELD	
L176S	Ø	138.9	294.9	19.8	8.6	.82	45S	SMOOTHNESS,	SHEFFIELD	
L249	Ø	138.9	288.0	13.1	6.7	1.13	45S	SMOOTHNESS,	SHEFFIELD	
L228	Ø	139.1	281.0	6.5	4.6	.68	45S	SMOOTHNESS,	SHEFFIELD	
L390	Ø	139.3	275.3	1.0	2.9	1.12	45S	SMOOTHNESS,	SHEFFIELD	
L124	Ø	139.6	266.8	-7.1	.3	1.02	45S	SMOOTHNESS,	SHEFFIELD	
L288	Ø	139.9	275.6	1.4	2.5	1.25	45S	SMOOTHNESS,	SHEFFIELD	
L223	Ø	140.0	256.5	-16.9	-2.8	.95	45S	SMOOTHNESS,	SHEFFIELD	
L206	Ø	140.3	271.6	-2.3	.9	.72	45S	SMOOTHNESS,	SHEFFIELD	
L326	*	140.5	307.5	32.4	10.4	.76	45S	SMOOTHNESS,	SHEFFIELD	
L308	Ø	140.9	272.8	-1.0	.7	.71	45S	SMOOTHNESS,	SHEFFIELD	
L262	Ø	140.9	274.3	.5	1.1	1.05	45S	SMOOTHNESS,	SHEFFIELD	
L670	Ø	141.0	274.7	.9	1.1	.89	45S	SMOOTHNESS,	SHEFFIELD	
L305	Ø	141.1	272.0	-1.7	.3	.87	45S	SMOOTHNESS,	SHEFFIELD	
L237	Ø	141.3	273.3	-0.3	.4	.81	45S	SMOOTHNESS,	SHEFFIELD	
L126	Ø	141.8	284.0	10.1	2.9	1.02	45S	SMOOTHNESS,	SHEFFIELD	
L162	Ø	142.0	280.7	6.9	1.8	1.24	45S	SMOOTHNESS,	SHEFFIELD	
L301	Ø	142.1	250.9	-21.8	-6.4	.66	45S	SMOOTHNESS,	SHEFFIELD	
L382	Ø	142.5	275.6	2.1	-0	1.03	45S	SMOOTHNESS,	SHEFFIELD	
L370	Ø	142.6	280.0	6.4	1.0	.83	45S	SMOOTHNESS,	SHEFFIELD	
L328	#	142.8	219.3	-52.0	-15.5	.97	45S	SMOOTHNESS,	SHEFFIELD	
L261	Ø	143.3	281.9	8.5	.8	1.45	45S	SMOOTHNESS,	SHEFFIELD	
L648	Ø	143.4	280.1	6.7	.3	1.12	45S	SMOOTHNESS,	SHEFFIELD	
L114	Ø	143.9	273.1	.2	-2.1	.96	45S	SMOOTHNESS,	SHEFFIELD	
L352	Ø	144.5	279.0	6.0	-1.1	1.42	45S	SMOOTHNESS,	SHEFFIELD	
L128	Ø	144.6	274.3	1.5	-2.4	1.03	45S	SMOOTHNESS,	SHEFFIELD	
L275	Ø	144.6	282.7	9.5	-0.2	.97	45S	SMOOTHNESS,	SHEFFIELD	
L211	Ø	144.7	272.3	-0.4	-3.0	1.28	45S	SMOOTHNESS,	SHEFFIELD	
L230S	Ø	144.7	282.3	9.2	-0.4	1.26	45S	SMOOTHNESS,	SHEFFIELD	
L260	Ø	145.3	258.5	-13.6	-7.4	.60	45S	SMOOTHNESS,	SHEFFIELD	
L190C	Ø	145.3	265.3	-7.0	-5.6	.95	45S	SMOOTHNESS,	SHEFFIELD	
L255	Ø	145.5	277.7	4.9	-2.4	.63	45S	SMOOTHNESS,	SHEFFIELD	
L183S	Ø	145.5	282.2	9.3	-1.2	1.04	45S	SMOOTHNESS,	SHEFFIELD	
L251S	Ø	145.9	292.3	19.1	1.2	.78	45S	SMOOTHNESS,	SHEFFIELD	
L567	Ø	146.0	264.7	-7.4	-6.4	.67	45S	SMOOTHNESS,	SHEFFIELD	
L108	Ø	146.1	299.9	26.5	3.0	.79	45S	SMOOTHNESS,	SHEFFIELD	
L366	Ø	146.1	259.3	-12.5	-8.0	.99	45S	SMOOTHNESS,	SHEFFIELD	

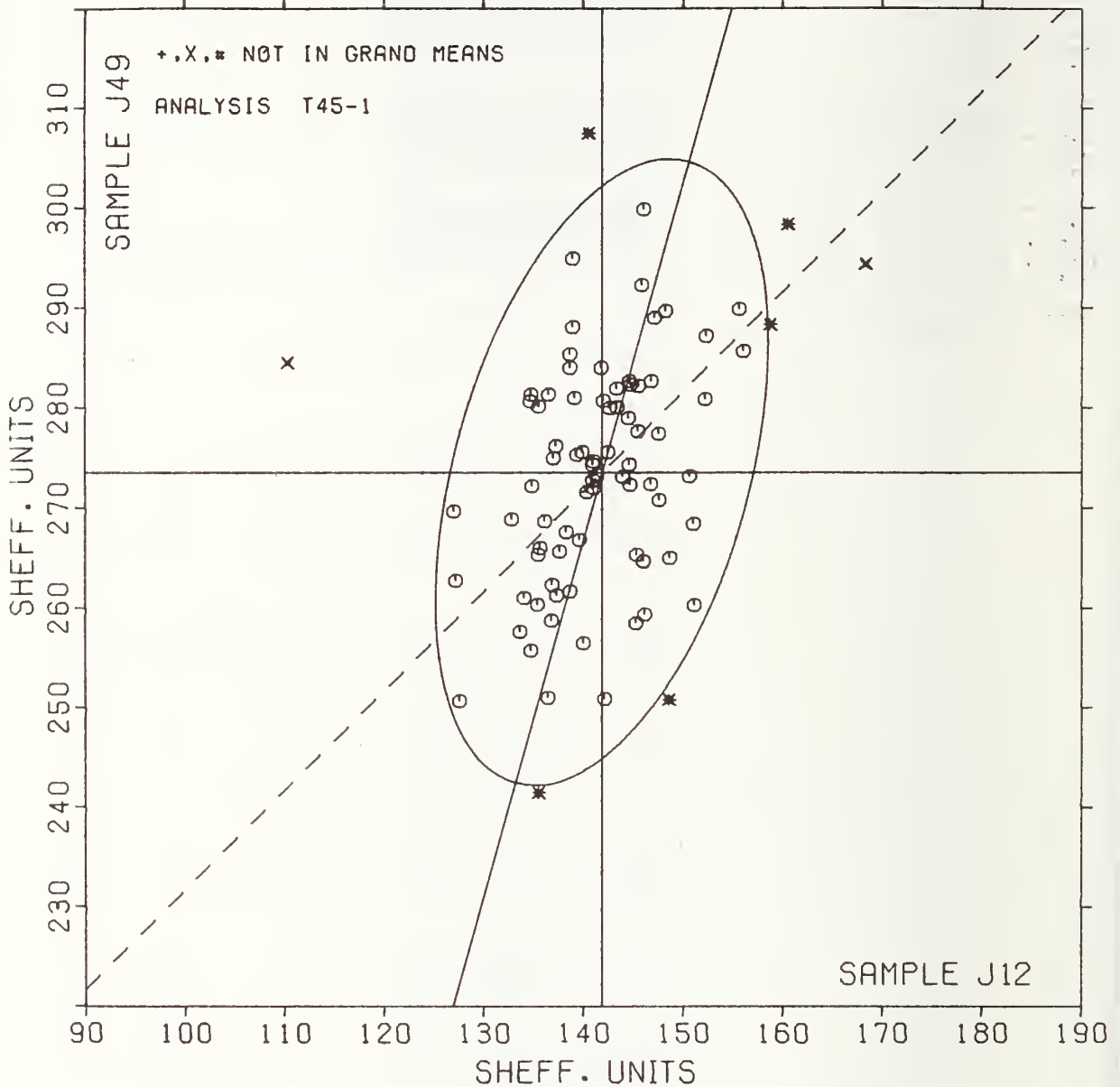
TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T45-1 TABLE 2
SMOOTHNESS, SHEFFIELD UNITS
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

SEPTEMBER 1978

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY==TEST INSTRUMENT===CONDITIONS
		J12	J49	MAJOR	MINOR	R.SDR	VAR	
L281	Ø	146.7	272.4	.2	-5.0	.82	45S	SMOOTHNESS, SHEFFIELD
L132	Ø	146.8	282.7	10.1	-2.3	.81	45S	SMOOTHNESS, SHEFFIELD
L150	Ø	147.1	289.0	16.3	-0.9	1.24	45S	SMOOTHNESS, SHEFFIELD
L159	Ø	147.5	277.4	5.2	-4.4	.80	45S	SMOOTHNESS, SHEFFIELD
L254	Ø	147.6	270.8	-1.1	-6.3	1.34	45S	SMOOTHNESS, SHEFFIELD
L214	Ø	148.3	289.7	17.3	-1.9	.95	45S	SMOOTHNESS, SHEFFIELD
L152	Ø	148.6	250.8	-20.1	-12.6	.57	45S	SMOOTHNESS, SHEFFIELD
L167	Ø	148.7	265.0	-6.4	-8.9	.76	45S	SMOOTHNESS, SHEFFIELD
L257C	Ø	150.7	273.2	2.0	-8.6	1.16	45S	SMOOTHNESS, SHEFFIELD
L376	Ø	151.1	268.4	-2.5	-10.3	1.29	45S	SMOOTHNESS, SHEFFIELD
L257B	Ø	151.1	260.3	-10.3	-12.5	1.50	45S	SMOOTHNESS, SHEFFIELD
L148	Ø	152.3	280.9	9.9	-8.1	1.01	45S	SMOOTHNESS, SHEFFIELD
L100	Ø	152.3	287.2	16.0	-6.4	.86	45S	SMOOTHNESS, SHEFFIELD
L278	Ø	155.7	289.9	19.4	-8.9	.98	45S	SMOOTHNESS, SHEFFIELD
L1396	Ø	156.1	285.7	15.5	-10.4	1.03	45S	SMOOTHNESS, SHEFFIELD
L259	*	158.7	288.3	18.8	-12.3	1.67	45S	SMOOTHNESS, SHEFFIELD
L576	*	160.5	258.4	29.0	-11.3	1.20	45S	SMOOTHNESS, SHEFFIELD
L2328	#	164.3	339.3	69.4	-4.0	1.03	45S	SMOOTHNESS, SHEFFIELD
L107	X	168.3	294.4	27.2	-19.9	1.23	45S	SMOOTHNESS, SHEFFIELD
L174	*	237.7	319.7	70.3	-79.9	.68	45R	SMOOTHNESS, SHEFFIELD, NON-STANDARD INSTRUMENT
GMFANS:		141.8	273.5			1.00		
		95% ELLIPSE:	32.3	14.8				WITH GAMMA = 74 DEGREES

SMOOTHNESS, SHEFFIELD

SAMPLE J12 = 142. SHEFF. UNITS SAMPLE J49 = 274. SHEFF. UNITS



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

LAB CODE	PRINTING					SAMPLE J49 MEAN	PRINTING					TEST D. = 15		
	J12 MEAN	149 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR		J49 MEAN	94 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L139B	32.93	2.72	1.16	2.69	.79	10.33	.45	.55	.49	.85	45K	0	L139B	
L162	29.60	-.61	-.26	2.47	.68	5.46	-4.43	-5.40	.18	.32	45K	#	L162	
L176	26.13	-4.08	-1.73	3.87	1.06	8.47	-1.42	-1.73	.36	.62	45K	0	L176	
L182K	28.09	-2.12	-.90	2.81	.77	9.24	-.64	-.78	.38	.66	45K	0	L182K	
L190C	34.60	4.39	1.86	3.44	.95	11.23	1.34	1.64	.67	1.17	45K	0	L190C	
L212	28.00	-2.21	-.94	4.17	1.15	9.35	-.54	-.65	.50	.88	45K	0	L212	
L230B	31.40	1.19	.51	3.92	1.08	9.73	-.15	-.18	.59	1.04	45K	0	L230B	
L232B	30.09	-.12	-.05	3.03	1.05	9.40	-.48	-.59	.83	1.45	45K	0	L232B	
L243K	29.80	-.41	-.17	4.51	1.24	10.65	.77	.94	.65	1.14	45K	0	L243K	
L291K	30.05	-.16	-.07	3.33	.91	9.41	-.47	-.57	.34	1.47	45K	0	L291K	
L564	31.27	1.06	.45	3.96	1.09	10.83	.95	1.16	.52	.92	45K	0	L564	
L581	29.93	-.28	-.12	3.28	.90	10.07	.18	.22	.46	.80	45K	0	L581	
GR. MEAN = 30.21 BEKK SECONDS						GRAND MEAN = 9.88 BEKK SECONDS						TEST DETERMINATIONS = 15		
SD MEANS = 2.36 BEKK SECONDS						SD OF MEANS = .82 BEKK SECONDS						11 LABS IN GRAND MEANS		
AVERAGE SDR = 3.64 BEKK SECONDS						AVERAGE SDR = .57 BEKK SECONDS								
L251	28.67	-1.54	-.65	2.35	.65	10.13	.25	.31	.45	.78	45L	*	L251	

TOTAL NUMBER OF LABORATORIES REPORTING = 13

Best values: J12 30 Bekk seconds
J49 10 Bekk seconds

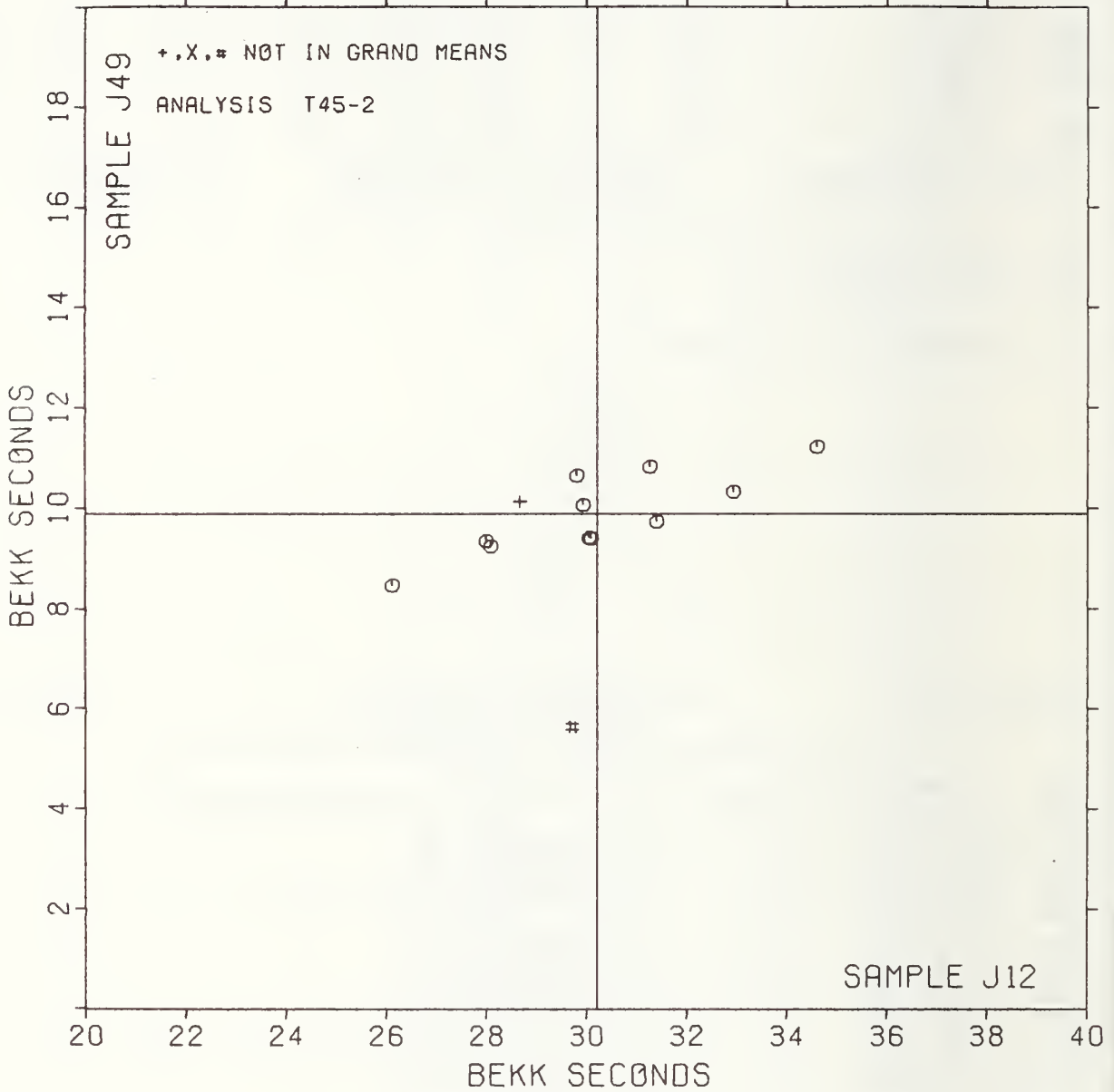
The following laboratories were omitted from the grand means because of extreme test results: 162

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY	TEST INSTRUMENT	CONDITIONS
		J12	J49	MAJOR	MINOR	R.SDR	VAR			
L176	0	26.13	8.47	-.432	-.19	.84	45K	SMOOTHNESS	BEKK	
L212	0	28.00	9.35	-2.27	.12	1.01	45K	SMOOTHNESS	BEKK	
L182K	0	28.09	9.24	-2.21	-.01	.72	45K	SMOOTHNESS	BEKK	
L251	*	28.67	10.13	-1.41	.68	.71	45L	SMOOTHNESS	BEKK	20 C, 65% RH
L162	#	29.60	5.46	-1.85	-4.07	.50	45K	SMOOTHNESS	BEKK	
L243K	0	29.80	10.65	-.17	.86	1.19	45K	SMOOTHNESS	BEKK	
L581	0	29.93	10.07	-.21	.25	.85	45K	SMOOTHNESS	BEKK	
L291K	0	30.05	9.41	-.28	-.41	1.19	45K	SMOOTHNESS	BEKK	
L232B	0	30.09	9.40	-.25	-.43	1.25	45K	SMOOTHNESS	BEKK	
L564	0	31.27	10.83	1.29	.61	1.00	45K	SMOOTHNESS	BEKK	
L230B	0	31.40	9.73	1.10	-.48	1.06	45K	SMOOTHNESS	BEKK	
L139B	0	32.93	10.33	2.74	-.35	.82	45K	SMOOTHNESS	BEKK	
L190C	0	34.60	11.23	4.59	.03	1.06	45K	SMOOTHNESS	BEKK	
GMEANS:		30.21	9.88			1.00				
		95% ELLIPSE:		7.56	1.35	WITH GAMMA = 16 DEGREES				

SMOOTHNESS, BEKK

SAMPLE J12 = 30.2 BEKK SECONDS SAMPLE J49 = 9.9 BEKK SECONDS



LAB CODE	SAMPLE E50 MEAN	OFFSET PRINTING 96 GRAMS PER SQUARE METER				R. SDR	SAMPLE H59 MEAN	PRINTING 106 GRAMS PER SQUARE METER				TEST D. # 4		
		DEV	N. DEV	SDR	R. SDR			DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L126	58.8	-4.5	-0.88	.5	.78	59.8	-3.7	-0.72	.1	.22	56K	0	L126	
L149	57.2	-6.1	-1.18	.5	.78	57.7	-5.8	-1.12	.5	1.17	56K	0	L149	
L182	63.8	.5	.09	.3	.41	63.2	-0.4	-0.07	.3	.74	56K	0	L182	
L213	70.6	7.3	1.40	1.1	1.72	71.0	7.4	1.43	.4	.83	56K	0	L213	
L291	66.6	3.2	.62	.6	.98	67.4	3.9	.74	.5	1.18	56K	0	L291	
L333	58.8	-4.6	-0.89	.5	.84	58.3	-5.3	-1.02	.8	1.92	56K	0	L333	
L339	25.6	-37.8	-7.27	.5	.75	24.4	-39.2	-7.55	.2	.58	56K	#	L339	
L554	67.7	4.4	.84	1.0	1.49	67.5	3.9	.76	.4	.95	56K	0	L554	
L616	66.0	2.6	.50	1.4	2.28	53.5	-10.1	-3.94	2.6	6.17	56K	#	L616	
GR. MEAN =		63.4 K & N UNITS				GRAND MEAN =		63.6 K & N UNITS				TEST DETERMINATIONS =		
SD MEANS =		5.2 K & N UNITS				SD OF MEANS =		5.2 K & N UNITS				7 LABS IN GRAND MEANS		
		AVERAGE SDR =						AVERAGE SDR =				.4 K & N UNITS		
L643	29.2	-34.1	-6.58	.5	.78	29.2	-34.3	-6.61	.5	1.17	560	*	L643	
L651	32.2	-31.1	-6.00	.3	.52	32.3	-31.3	-6.03	.4	.93	560	*	L651	
TOTAL NUMBER OF LABORATORIES REPORTING = 11														
Best values: E50 64 K & N units														
E59 64 K & N units														

The following laboratories were omitted from the grand means because of extreme test results: 339, 616

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY	TEST INSTRUMENT	CONDITIONS
		E50	H59	MAJOR	MINOR	R. SDR	VAR			
L339	#	25.6	24.4	-54.4	-1.0	.66	56K	INK ABSORPTION, K&N INK TEST		
L643	*	29.2	29.2	-48.4	-0.1	.97	560	INK ABSORPTION: OWN METHOD		
L651	*	32.2	32.3	-44.1	-0.1	.72	560	INK ABSORPTION: OWN METHOD		
L149	0	57.2	57.7	-8.5	.2	.97	56K	INK ABSORPTION, K&N INK TEST		
L333	0	58.8	58.3	-7.0	-0.5	1.38	56K	INK ABSORPTION, K&N INK TEST		
L126	0	58.8	59.8	-5.9	.6	.50	56K	INK ABSORPTION, K&N INK TEST		
L182	0	63.8	63.2	.1	-0.6	.57	56K	INK ABSORPTION, K&N INK TEST		
L616	#	66.0	53.5	-5.3	-9.0	4.19	56K	INK ABSORPTION, K&N INK TEST		
L291	0	66.6	67.4	5.0	.4	1.08	56K	INK ABSORPTION, K&N INK TEST		
L554	0	67.7	67.5	5.9	-0.3	1.22	56K	INK ABSORPTION, K&N INK TEST		
L213	0	70.6	71.0	10.4	.1	1.27	56K	INK ABSORPTION, K&N INK TEST		
GMEANS:		63.4	63.6			1.00				
		95% ELLIPSE:		27.3	1.7	WITH GAMMA = 44 DEGREES				

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

LAB CODE	SAMPLE J57 MEAN	PRINTING 94 GRAMS PER SQUARE METER				SAMPLE K23 MEAN	PRINTING 103 GRAMS PER SQUARE METER				TEST D. = 10		
		DEV	N. DEV	SDR	R. SDR		DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L105	93.58	.87	1.82	.39	1.14	96.10	.66	1.97	.31	1.07	60H	Ø	L105
L108	92.66	-.05	-.11	.43	1.24	95.31	-.13	-.37	.22	.78	60B	Ø	L108
L121	93.10	.39	.81	.23	.67	95.78	.34	1.02	.34	1.18	60B	Ø	L121
L122	92.70	-.01	-.03	.32	.93	95.64	.20	.60	.24	.83	60D	Ø	L122
L123	92.48	-.23	-.49	.46	1.33	95.17	-.27	-.79	.22	.78	60W	Ø	L123
L124	91.81	-.90	-1.89	.37	1.07	94.83	-.61	-1.80	.46	1.62	60B	Ø	L124
L125	92.54	-.17	-.36	.26	.76	95.27	-.17	-.49	.32	1.14	60H	Ø	L125
L131	92.20	-.51	-1.07	.42	1.22	95.00	-.44	-1.29	.00	.00	60R	Ø	L131
L132	92.46	-.25	-.53	.31	.90	95.38	-.06	-.17	.26	.92	60B	Ø	L132
L134	93.40	.69	1.44	.70	2.02	95.80	.36	1.08	.42	1.48	60R	Ø	L134
L139	92.75	.04	.08	.31	.89	95.21	-.23	-.67	.36	1.28	60B	Ø	L139
L148H	92.27	-.44	-.93	.48	1.40	94.99	-.45	-1.32	.19	.67	60H	Ø	L148H
L150	93.00	.29	.60	.47	1.36	95.45	.01	.04	.44	1.54	60B	Ø	L150
L152	93.25	.54	1.13	.25	.72	95.67	.23	.69	.16	.57	60B	Ø	L152
L158	93.10	.39	.81	.33	.94	95.77	.33	.99	.18	.64	60D	Ø	L158
L159	92.85	.14	.29	.28	.80	95.66	.22	.66	.16	.55	60R	Ø	L159
L162	93.11	.40	.83	.41	1.20	95.54	.10	.31	.27	.95	60W	Ø	L162
L166	91.46	-1.25	-2.63	.31	.89	94.64	-.80	-2.36	.39	1.38	60B	*	L166
L173A	92.58	-.13	-.28	.65	1.87	95.69	.25	.75	.31	1.09	60B	Ø	L173A
L190C	92.60	-.11	-.24	.28	.81	95.28	-.16	-.46	.34	1.19	60B	Ø	L190C
L190R	92.74	.03	.06	.31	.91	95.60	.16	.48	.21	.74	60B	Ø	L190R
L210B	92.75	.04	.08	.41	1.18	95.47	.03	.10	.19	.66	60B	Ø	L210B
L210D	92.97	.26	.54	.21	.59	95.50	.06	.19	.27	.95	60D	Ø	L210D
L211S	92.39	-.32	-.68	.26	.75	95.26	-.18	-.52	.13	.47	60R	Ø	L211S
L213	93.65	.94	1.96	.61	1.76	96.03	.59	1.76	.33	1.16	60B	Ø	L213
L223B	93.01	.30	.62	.28	.80	95.69	.25	.75	.16	.56	60B	Ø	L223B
L225	92.99	.28	.58	.42	1.21	95.67	.23	.69	.29	1.03	60B	Ø	L225
L226B	92.47	-.24	-.51	.39	1.12	95.24	-.20	-.58	.39	1.36	60B	Ø	L226B
L228	92.70	-.01	-.03	.21	.61	95.75	.31	.93	.22	.76	60H	Ø	L228
L230	93.00	.29	.60	.25	.73	95.55	.11	.34	.16	.56	60B	Ø	L230
L236B	90.96	-1.75	-3.67	.87	2.50	94.47	-.97	-2.86	.62	2.19	60B	#	L236B
L238A	91.86	-.85	-1.79	.20	.57	94.87	-.57	-1.68	.17	.60	60R	Ø	L238A
L243	92.61	-.10	-.22	.44	1.28	95.50	.06	.19	.26	.92	60B	Ø	L243
L255	92.71	-.00	-.01	.26	.76	95.63	.19	.57	.29	1.03	60B	Ø	L255
L259	93.08	.37	.77	.27	.78	95.25	-.19	-.55	.45	1.56	60B	#	L259
L261	93.18	.47	.98	.28	.82	95.97	.53	1.58	.09	.33	60B	Ø	L261
L262	94.39	1.68	3.51	.19	.54	96.72	1.28	3.80	.19	.66	60R	X	L262
L275	92.32	-.39	-.82	.19	.56	95.34	-.10	-.29	.20	.69	60R	Ø	L275
L278	93.12	.41	.85	.24	.69	95.91	.47	1.40	.46	1.61	60B	Ø	L278
L281	92.90	.19	.39	.32	.93	95.63	.19	.57	.36	1.26	60D	Ø	L281
L285B	92.21	-.50	-1.05	.40	1.15	95.29	-.15	-.43	.26	.91	60B	Ø	L285B
L285R	92.19	-.52	-1.10	.36	1.11	95.19	-.25	-.73	.34	1.20	60R	Ø	L285R
L288	91.71	-.95	-2.00	.33	.95	94.76	-.68	-2.00	.39	1.37	60D	Ø	L288
L301	92.15	.56	1.18	.23	.66	94.91	-.53	-1.56	.23	.82	60B	Ø	L301
L305	92.62	-.09	-.19	.23	.65	95.49	.05	.16	.20	.69	60R	Ø	L305
L308	93.39	.68	1.42	.39	1.12	95.57	.13	.40	.39	1.38	60H	Ø	L308
L315	92.95	.24	.50	.41	1.17	95.44	.00	.01	.28	.98	60D	Ø	L315
L317	92.73	.02	.04	.71	2.05	95.16	-.28	-.82	.51	1.79	60B	Ø	L317
L318	93.25	.54	1.13	.42	1.23	95.35	-.09	-.26	.47	1.67	60B	*	L318
L323	93.47	.76	1.59	.31	.88	95.80	.36	1.08	.24	.86	60W	Ø	L323
L326	93.45	.74	1.54	.33	.96	96.19	.75	2.23	.40	1.42	60B	Ø	L326
L328	92.00	-.71	-1.49	.00	.00	94.90	-.54	-1.59	.74	2.59	60B	Ø	L328
L339	92.30	-.41	-.87	.48	1.40	95.50	.06	.19	.53	1.85	60B	Ø	L339
L349	92.80	.09	.18	.37	1.06	95.45	.01	.04	.21	.73	60D	Ø	L349
L352	92.32	-.39	-.82	.28	.80	95.11	-.33	-.97	.20	.71	60R	Ø	L352
L354	92.20	-.51	-1.07	.42	1.22	95.00	-.44	-1.29	.00	.00	60B	Ø	L354
L378	93.66	.95	1.98	.37	1.08	95.86	.42	1.26	.20	.69	60D	Ø	L378
L390	93.08	.27	.77	.27	.78	95.67	.23	.69	.33	1.17	60B	Ø	L390
L523	92.46	-.25	-.53	.16	.46	95.43	-.01	-.02	.22	.76	60R	Ø	L523
L543	92.26	-.45	-.95	.23	.67	95.15	-.29	-.85	.25	.88	60D	Ø	L543
L573	92.69	-.02	-.05	.39	1.13	95.62	.18	.54	.25	.87	60H	Ø	L573
L581	93.11	.40	.83	.36	1.04	95.38	-.06	-.17	.18	.64	60B	Ø	L581
L587	92.84	.13	.27	.22	.64	95.67	.23	.69	.14	.50	60B	Ø	L587
L592	92.16	-.55	-1.16	.31	.89	94.84	-.60	-1.77	.27	.94	60W	Ø	L592
L594	92.33	-.38	-.80	.47	1.35	95.17	-.27	-.79	.37	1.28	60D	Ø	L594

OPACITY (89% REFLECTANCE BACKING) IN PERCENT

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

LAB CODE	SAMPLE J57 MEAN	PRINTING 94 GRAMS PER SQUARE METER				SAMPLE K23 MEAN	PRINTING 103 GRAMS PER SQUARE METER				TEST D. = 10			
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB	
L597	92.50	-.21	-.45	.53	1.55	95.56	.12	.35	.53	1.85	60B	S	L597	
L599	93.10	.39	.81	.46	1.33	95.65	.21	.63	.47	1.67	60B	Ø	L599	
L673R	92.73	.02	.04	.20	.58	95.66	.22	.66	.25	.89	60B	Ø	L673R	
GR. MEAN = 92.71 PERCENT		AVERAGE SDR = .35 PERCENT				GRAND MEAN = 95.44 PERCENT		AVERAGE SDR = .28 PERCENT				TEST DETERMINATIONS = 10		
SD MEANS = .48 PERCENT						SD OF MEANS = .34 PERCENT						66 LABS IN GRAND MEANS		
L100	92.70	-.01	-.03	.20	.58	95.62	.18	.54	.18	.64	60E	*	L100	
L224	92.33	-.38	-.80	.43	1.25	95.21	-.23	-.67	.53	1.87	60P	*	L224	
L232	92.30	-.41	-.87	.54	1.55	95.10	-.34	-1.00	.21	.74	60P	*	L232	
L249	92.67	-.04	-.09	.34	.99	95.47	.03	.10	.08	.29	60P	*	L249	
L256	91.85	-.86	-1.81	.47	1.35	95.06	-.38	-1.12	.23	.80	60N	*	L256	
L260	92.65	-.06	-.13	.24	.70	96.00	.56	1.67	.00	.00	60P	*	L260	
L312	91.80	-.91	-1.91	.42	1.22	95.00	-.44	-1.29	.00	.00	60P	*	L312	
L314	93.32	.61	1.27	.53	1.53	95.71	.27	.81	.25	.88	60T	*	L314	
L380	92.00	-.71	-1.49	.00	.00	95.00	-.44	-1.29	.00	.00	60P	*	L380	
L396	93.60	.89	1.86	.46	1.33	96.05	.61	1.82	.86	3.04	60X	*	L396	
L564	91.35	-1.36	-2.86	.41	1.19	94.45	-.99	-2.92	.44	1.54	60P	*	L564	
TOTAL NUMBER OF LABORATORIES REPORTING = 79														

Best values: J57 92.7 ± 0.8 percent
K23 95.4 ± 0.6 percent

The following laboratories were omitted from the grand means because of extreme test results: 236B

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

LAB CODES	F	MEANS		COORDINATES		AVG R.SDR	VAR	PROPERTY	TEST INSTRUMENT	CONDITIONS
		J57	K23	MAJOR	MINOR					
L236R	#	90.56	94.47	-1.99	.17	2.35	60B	OPACITY (WHITE BACKING),	BAUSCB * L0MB	
L56A	*	91.35	94.45	-1.68	-.06	1.36	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L166	*	91.46	94.64	-1.48	.03	1.13	60B	OPACITY (WHITE BACKING),	BAUSCB * L0MB	
L288	0	91.76	94.76	-1.17	-.03	1.16	60D	OPACITY (WHITE BACKING),	DIAN0/BNL	
L312	*	91.80	95.00	-1.00	.14	.61	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L124	0	91.81	94.83	-1.09	-.00	1.35	60B	OPACITY (WHITE BACKING),	BAUSCB * L0MB	
L256	*	91.85	95.06	-.93	.17	1.07	60N	OPACITY (WHITE BACKING),	BUNTER	
L238A	0	91.86	94.87	-1.02	.00	.58	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L380	*	92.00	95.00	-.84	.03	.00	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L328	0	92.00	94.90	-.89	-.05	1.30	60B	OPACITY (WHITE BACKING),	BAUSCB * L0MB	
L301	0	92.15	94.91	-.76	-.12	.74	60B	OPACITY (WHITE BACKING),	BAUSCB * L0MB	
L592	0	92.16	94.84	-.79	-.19	.91	60W	OPACITY (WHITE BACKING),	HUYGEN,DIGITAL	
L285R	0	92.19	95.19	-.57	.09	1.16	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L354	0	92.20	95.00	-.67	-.08	.61	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L131	0	92.20	95.00	-.67	-.08	.61	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L285B	0	92.21	95.29	-.50	.16	1.04	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L543	0	92.26	95.15	-.54	.01	.78	60D	OPACITY (WHITE BACKING),	DIAN0/BNL	
L148B	0	92.27	94.95	-.62	-.13	1.03	60B	OPACITY (WHITE BACKING),	BUYGEN	
L232	*	92.30	95.10	-.53	-.05	1.15	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L339	0	92.30	95.50	-.31	.28	1.62	60B	OPACITY (WHITE BACKING),	BAUSCB * L0MB	
L352	0	92.32	95.11	-.51	-.05	.76	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L275	0	92.32	95.34	-.38	.14	.62	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L224	*	92.33	95.21	-.44	.02	1.56	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L594	0	92.33	95.17	-.47	-.01	1.32	60D	OPACITY (WHITE BACKING),	DIAN0/BNL	
L211S	0	92.39	95.26	-.37	.03	.61	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L112	0	92.46	95.38	-.24	.09	.91	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L523	0	92.46	95.43	-.21	.14	.61	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L226B	0	92.47	95.24	-.31	-.03	1.24	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L123	0	92.48	95.17	-.34	-.09	1.06	60W	OPACITY (WHITE BACKING),	BUYGEN,DIGITAL	
L597	S	92.50	95.56	-.11	.22	1.70	60B	OPACITY (WHITE BACKING),	BAUSCB * L0MB	
L125	0	92.54	95.27	-.24	-.04	.95	60B	OPACITY (WHITE BACKING),	HUYGEN	
L173A	0	92.58	95.69	.03	.28	1.48	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L190C	0	92.60	95.28	-.18	-.07	1.00	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L243	0	92.61	95.50	-.05	.11	1.10	60B	OPACITY (WHITE BACKING),	BAUSCB * L0MB	
L305	0	92.62	95.49	-.05	.10	.67	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L260	*	92.65	96.00	.26	.50	.35	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L108	0	92.66	95.31	-.11	-.08	1.01	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L249	*	92.67	95.47	-.02	.05	.64	60P	OPACITY (WHITE BACKING),	PHOTOVOLT	
L573	0	92.69	95.62	.08	.17	1.00	60H	OPACITY (WHITE BACKING),	BUYGEN	
L228	0	92.70	95.75	.16	.27	.69	60H	OPACITY (WHITE BACKING),	HUYGEN	
L100	*	92.70	95.62	.09	.16	.61	60E	OPACITY (WHITE BACKING),	ZEISS ELREPB0, FMY=C(10) FILTER	
L122	0	92.70	95.64	.10	.18	.88	60D	OPACITY (WHITE BACKING),	DIAN0/BNL	
L255	0	92.71	95.63	.11	.16	.90	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L673R	0	92.73	95.66	.14	.18	.74	60B	OPACITY (WHITE BACKING),	BAUSCB * L0MB	
L317	0	92.73	95.16	-.14	-.24	1.92	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L190R	0	92.74	95.60	.11	.12	.82	60B	OPACITY (WHITE BACKING),	BAUSCB * L0MB	
L210B	0	92.75	95.47	.05	.01	.92	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L139	0	92.75	95.21	-.10	-.21	1.08	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L349	0	92.80	95.45	.08	-.04	.89	60D	OPACITY (WHITE BACKING),	DIAN0/BNL	
L587	0	92.84	95.67	.24	.12	.57	60R	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L159	0	92.85	95.66	.24	.11	.68	60R	OPACITY (WHITE BACKING),	THWING-ALBERT (FORMERLY SRL)	
L281	0	92.90	95.63	.26	.06	1.10	60D	OPACITY (WHITE BACKING),	DIAN0/BNL	
L315	0	92.95	95.44	.20	-.13	1.08	60D	OPACITY (WHITE BACKING),	DIAN0/BNL	
L210D	0	92.97	95.50	.25	-.09	.77	60D	OPACITY (WHITE BACKING),	DIAN0/BNL	
L225	0	92.99	95.67	.36	.04	1.12	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L150	0	93.00	95.45	.25	-.15	1.45	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L230	0	93.00	95.55	.30	-.07	.64	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L223B	0	93.01	95.69	.39	.05	.68	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L390	0	93.08	95.67	.43	-.01	.98	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L259	0	93.08	95.25	.20	-.36	1.17	60B	OPACITY (WHITE BACKING),	BAUSCB * L0MB	
L158	0	93.10	95.77	.51	.06	.79	60D	OPACITY (WHITE BACKING),	DIAN0/BNL	
L599	0	93.10	95.65	.44	-.04	1.50	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L121	0	93.10	95.78	.51	.07	.92	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	
L162	0	93.11	95.54	.39	-.13	1.08	60W	OPACITY (WHITE BACKING),	HUYGEN,DIGITAL	
L581	0	93.11	95.38	.50	-.27	.84	60B	OPACITY (WHITE BACKING),	BAUSCH * L0MB	

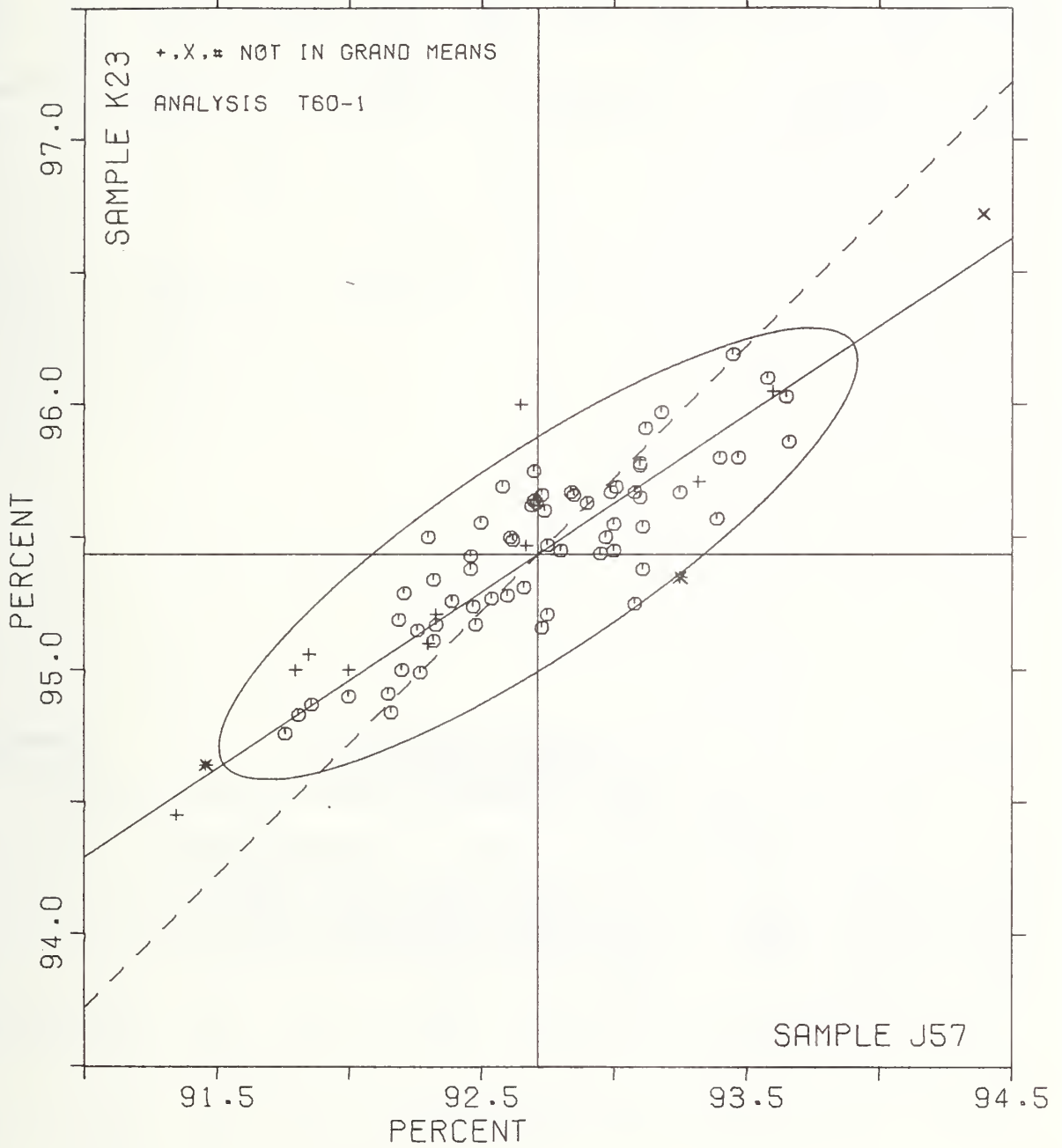
OPACITY (89% REFLECTANCE BACKING) IN PERCENT
TAPPI STANDARD T425 GS=75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) = B&L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY==TEST INSTRUMENT==CONDITIONS
		J57	K23	MAJOR	MINOR	R.SDR	VAR	
L278	Ø	93.12	95.91	.60	.17	1.15	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L261	Ø	92.18	95.97	.68	.18	.57	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L152	Ø	93.25	95.67	.58	-.10	.65	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L318	*	93.25	95.35	.40	-.37	1.45	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L314	*	93.32	95.71	.66	-.11	1.21	60T	OPACITY (WHITE BACKING), SMALL SPHERE COLOR EYE
L308	Ø	93.39	95.57	.64	-.27	1.25	60H	OPACITY (WHITE BACKING), HUYGEN
L134	Ø	93.40	95.80	.77	-.08	1.75	60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L326	Ø	93.45	96.19	1.03	.22	1.19	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L323	Ø	93.47	95.80	.83	-.12	.87	60W	OPACITY (WHITE BACKING), HUYGEN, DIGITAL
L105	Ø	93.58	96.10	1.09	.07	1.11	60H	OPACITY (WHITE BACKING), HUYGEN
L396	*	93.60	96.05	1.08	.02	2.18	60X	OPACITY: GIVE INSTR. MAKE, MODEL; ()WHITE OR ()PAPER BACKING
L213	Ø	93.65	96.03	1.11	-.03	1.46	60B	OPACITY (WHITE BACKING), BAUSCH + LOMB
L378	Ø	93.66	95.86	1.02	-.17	.88	60D	OPACITY (WHITE BACKING), DIANO/BNL
L262	X	94.39	96.72	2.11	.14	.60	60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
GMZANS:		92.71	95.44			1.00		
		95% ELLIPSE:		1.43	.37	WITH GAMMA = 33 DEGREES		

OPACITY, B&L TYPE, 89% BACKING

SAMPLE J57 = 92.7 PERCENT

SAMPLE K23 = 95.4 PERCENT



ANALYSIS T60-2 TABLE 1

OPACITY (PAPER BACKING) IN PERCENT

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

LAB CODE	SAMPLE J57 MEAN	PRINTING 94 GRAMS PER SQUARE METER				SAMPLE K23 MEAN	PRINTING 103 GRAMS PER SQUARE METER				TEST D. = 10		
		DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L190C	93.33	.26	.97	.29	.58	96.05	.33	1.25	.30	.83	60C	Ø	L190C
L190R	93.11	.04	.16	.35	.69	95.87	.15	.58	.24	.66	60C	Ø	L190R
L236B	93.23	.16	.60	1.02	2.01	95.36	-.36	-1.33	.58	1.63	60C	Ø	L236B
L243	93.04	-.03	-.10	.48	.95	95.74	.02	.09	.37	1.03	60C	Ø	L243
L543	92.62	-.45	-1.63	.39	.76	95.56	-.16	-.58	.30	.84	60V	Ø	L543

GR. MEAN = 93.07 PERCENT

GRAND MEAN = 95.72 PERCENT

TEST DETERMINATIONS = 10

SD MEANS = .27 PERCENT

SD OF MEANS = .27 PERCENT

5 LABS IN GRAND MEANS

AVERAGE SDR = .51 PERCENT

AVERAGE SDR = .36 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 5

Best values: J57 93.0 percent

K23 95.7 percent

ANALYSIS T60-2 TABLE 2

OPACITY (PAPER BACKING) IN PERCENT

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

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY==TEST INSTRUMENT==CONDITIONS
		J57	K23	MAJOR	MINOR	R.SDR	VAR	
L543	Ø	92.62	95.56	-.43	.19	.80	60V	OPACITY (PAPER BACKING), DIANO/BNL
L243	Ø	93.04	95.74	-.00	.04	.99	60C	OPACITY (PAPER BACKING), BAUSCH * LOMB
L190R	Ø	93.11	95.87	.14	.08	.68	60C	OPACITY (PAPER BACKING), BAUSCH * LOMB
L236B	Ø	93.23	95.36	-.13	-.37	1.82	60C	OPACITY (PAPER BACKING), BAUSCH * LOMB
L190C	Ø	93.33	96.05	.42	.06	.71	60C	OPACITY (PAPER BACKING), BAUSCH * LOMB
GMEANS:		93.07	95.72			1.00		
		95% ELLIPSE:		1.59	1.09	WITH GAMMA = 43 DEGREES		

ANALYSIS T60-3 TABLE 1

OPACITY (PAPER BACKING) IN PERCENT

TAPPI SUGGESTED METHOD T519 GS=78, DIFFUSE OPACITY OF PAPER = ILLUMINANT C, ELREPBØ TYPE

LAB CODE	SAMPLE J57 MEAN	PRINTING 94 GRAMS PER SQUARE METER				SAMPLE K23 MEAN	PRINTING 103 GRAMS PER SQUARE METER				TEST D. = 10		
		DEV	N. DEV	SDR	R. SDR		DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L100	93.68	.03	.25	.24	1.07	96.37	.00	.04	.21	1.10	60J	Ø	L100
L150	93.40	-.25	-1.90	.11	.49	96.26	-.10	-.99	.14	.71	60J	Ø	L150
L182E	93.61	-.04	-.28	.30	1.32	96.30	-.07	-.63	.21	1.07	60J	Ø	L182E
L236	93.53	-.12	-.89	.23	1.01	96.33	-.04	-.34	.24	1.23	60J	Ø	L236
L242	93.81	.16	1.23	.27	1.20	96.61	.24	2.31	.41	2.12	60J	Ø	L242
L244	93.75	.10	.77	.22	.99	96.31	-.06	-.53	.19	.96	60F	Ø	L244
L251	93.51	-.14	-1.02	.21	.96	96.24	-.12	-1.15	.13	.68	60P	Ø	L251
L309	91.64	-2.01	-15.14	.26	1.17	94.92	-1.45	-13.69	.10	.54	60J	#	L309
L360	93.47	-.18	-1.34	.21	.94	91.91	-4.46	-42.18	.19	.96	60F	#	L360
L446	93.68	.03	.25	.15	.65	96.41	.04	.43	.15	.91	60J	Ø	L446
L484	93.59	-.05	-.41	.40	1.76	96.41	.04	.41	.15	.76	60F	Ø	L484
L575	93.81	.16	1.23	.19	.85	96.47	.10	.98	.17	.89	60J	Ø	L575
L598	93.75	.10	.77	.16	.71	96.31	-.06	-.53	.13	.67	60J	Ø	L598

GR. MEAN = 93.65 PERCENT

GRAND MEAN = 96.37 PERCENT

TEST DETERMINATIONS = 10

SD MEANS = .13 PERCENT

SD OF MEANS = .11 PERCENT

11 LABS IN GRAND MEANS

AVERAGE SDR = .22 PERCENT

AVERAGE SDR = .19 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 13

Best values: J57 93.7 percent
K23 96.4 percent

The following laboratories were omitted from the grand means because of extreme test results: 309, 360

ANALYSIS T60-3 TABLE 2

OPACITY (PAPER BACKING) IN PERCENT

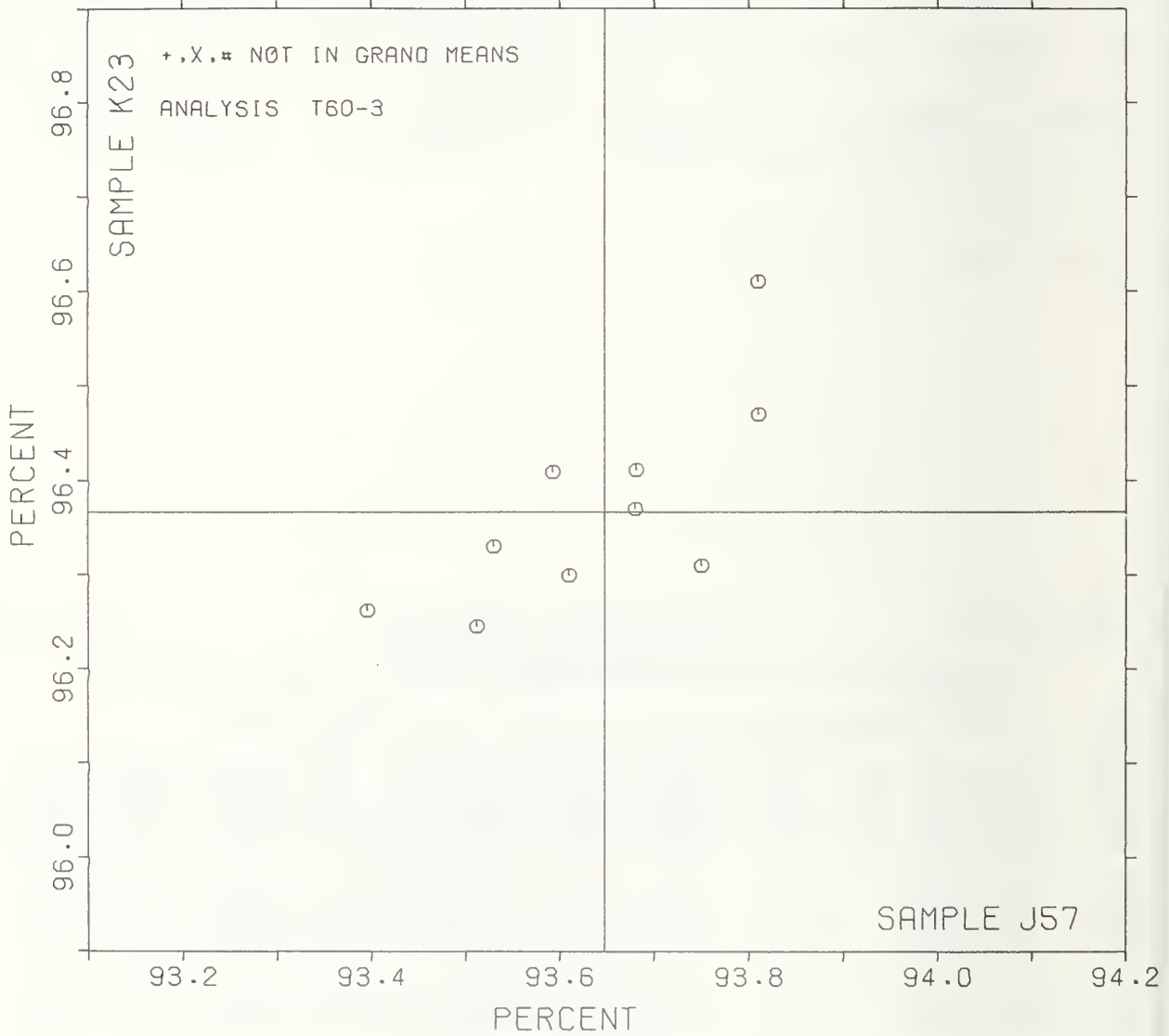
TAPPI SUGGESTED METHOD T519 GS=78, DIFFUSE OPACITY OF PAPER = ILLUMINANT C, ELREPBØ TYPE

LAB CODE	F	MEANS		COORDINATES		AVG R. SDR VAR	PROPERTY==TEST INSTRUMENT==CONDITIONS
		J57	K23	MAJOR	MINOR		
L309	#	91.64	94.92	-2.47	-.01	.86 60J	OPACITY (PAPER BACKING), ZEISS ELREPHØ, FMY=C(10) FILTER
L150	Ø	93.40	96.26	-.27	.06	.60 60J	OPACITY (PAPER BACKING), ZEISS ELREPBØ, FMY=C(10) FILTER
L360	#	93.47	91.91	-2.73	-3.52	.95 60F	OPACITY (PAPER BACKING), ZEISS ELREPHØ, FMY=C(10) NO TRAP
L251	Ø	93.51	96.24	-.18	-.02	.82 60F	OPACITY (PAPER BACKING), ZEISS ELREPHØ, FMY=C(10) NO TRAP
L236	Ø	93.53	96.33	-.12	.04	1.12 60J	OPACITY (PAPER BACKING), ZEISS ELREPHØ, FMY=C(10) FILTER
L484	Ø	93.59	96.41	-.02	.07	1.26 60F	OPACITY (PAPER BACKING), ZEISS ELREPBØ, FMY=C(10) NO TRAP
L182E	Ø	93.61	96.30	-.07	-.03	1.20 60J	OPACITY (PAPER BACKING), ZEISS ELREPHØ, FMY=C(10) FILTER
L100	Ø	93.68	96.37	.03	-.02	1.08 60J	OPACITY (PAPER BACKING), ZEISS ELREPHØ, FMY=C(10) FILTER
L446	Ø	93.68	96.41	.05	.02	.73 60J	OPACITY (PAPER BACKING), ZEISS ELREPBØ, FMY=C(10) FILTER
L598	Ø	93.75	96.31	.05	-.11	.69 60J	OPACITY (PAPER BACKING), ZEISS ELREPHØ, FMY=C(10) FILTER
L244	Ø	93.75	96.31	.05	-.11	.98 60F	OPACITY (PAPER BACKING), ZEISS ELREPHØ, FMY=C(10) NO TRAP
L242	Ø	93.81	96.61	.27	.10	1.66 60J	OPACITY (PAPER BACKING), ZEISS ELREPHØ, FMY=C(10) FILTER
L575	Ø	93.81	96.47	.19	-.01	.87 60J	OPACITY (PAPER BACKING), ZEISS ELREPHØ, FMY=C(10) FILTER
GMEANS:		93.65	96.37			1.00	
		95% ELLIPSE:		.48	.21	WITH GAMMA = 35 DEGREES	

OPACITY, ELREPHO TYPE, PAPER BACKING

SAMPLE J57 = 93.65 PERCENT

SAMPLE K23 = 96.37 PERCENT



ANALYSIS T65-1 TABLE 1

DIRECTIONAL BLUE REFLECTANCE IN PERCENT

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

LAB CODE	SAMPLE J35 94 GRAMS PER SQUARE METER PRINTING					SAMPLE E78 116 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	83.81	=.09	=.20	.12	.95	96.29	.17	.25	.14	.99	65M	0	L108
L132	83.59	=.32	=.69	.14	1.03	96.70	.59	.86	.11	.78	65N	0	L132
L158	84.00	.09	.20	.09	.70	96.66	.55	.80	.09	.67	65N	0	L158
L176A	83.60	=.31	=.66	.19	1.40	94.70	=1.41	=2.07	.14	1.03	65A	0	L176A
L190C	83.70	=.21	=.45	.11	.81	95.42	=.69	=1.01	.21	1.50	65A	0	L190C
L210M	84.70	.79	1.71	.15	1.15	96.37	.26	.38	.07	.52	65M	0	L210M
L210N	83.82	=.08	=.18	.12	.88	95.96	=.15	=.22	.09	.67	65M	0	L210N
L211	82.97	=.93	=2.01	.10	.79	94.35	=1.76	=2.58	.09	.68	65N	0	L211
L225	83.97	.07	.15	.09	.67	96.47	.36	.53	.10	.76	65N	0	L225
L243	83.46	=.44	=.96	.11	.80	95.92	=.19	=.27	.12	.85	65A	0	L243
L259	84.05	.14	.31	.09	.57	96.25	.14	.20	.11	.78	65M	0	L259
L275	83.54	=.37	=.80	.09	.70	95.87	=.24	=.35	.10	.76	65M	0	L275
L288	84.27	.37	.79	.05	.35	96.37	.26	.38	.09	.65	65N	0	L288
L308	85.14	1.23	2.65	.15	1.14	97.20	1.09	1.59	.08	.55	65M	0	L308
L315	83.72	=.18	=.39	.07	.54	96.79	.67	.99	.10	.73	65N	0	L315
L317	83.89	=.02	=.04	.06	.49	95.60	=.51	=.75	.09	.68	65M	0	L317
L523	83.89	=.02	=.04	.06	.49	96.15	.04	.05	.09	.68	65N	0	L523
L543	84.04	.13	.28	.32	2.40	96.29	.17	.25	.14	.99	65M	0	L543
L565	83.99	.08	.17	.12	.95	96.51	.40	.58	.14	.99	65A	0	L565
L598	84.42	.52	1.12	.45	3.39	95.70	=.41	=.60	.68	4.98	65M	0	L598
L673R	83.43	=.46	=.98	.11	.81	96.77	.66	.97	.10	.76	65N	0	L673R
GR. MEAN = 83.91 PERCENT GRAND MEAN = 96.11 PERCENT TEST DETERMINATIONS = 8													
SD MEANS = .46 PERCENT SD OF MEANS = .68 PERCENT 21 LABS IN GRAND MEANS													
AVERAGE SDR = .13 PERCENT AVERAGE SDR = .14 PERCENT													
L105	84.37	.47	1.01	.12	.88	97.92	1.81	2.65	.09	.65	65T	*	L105
L1761	81.22	=2.68	=5.78	.09	.67	94.14	=1.98	=2.89	.09	.67	65I	*	L1761
L213	84.65	.74	1.60	.09	.70	97.57	1.46	2.14	.41	3.00	65T	*	L213
L223	85.86	1.96	4.22	.05	.39	97.87	1.76	2.58	.05	.34	65G	*	L223
L224	85.30	1.39	3.00	.05	.41	96.70	.59	.86	.08	.55	65H	*	L224
L232	85.56	1.66	3.57	.50	3.76	97.00	.89	1.30	.00	.00	65P	*	L232
L249	84.91	1.01	2.17	.20	1.49	96.40	.29	.42	.21	1.51	65P	*	L249
L256	83.82	=.03	=.18	.07	.54	98.24	2.12	3.11	.07	.54	65H	*	L256
L260	84.12	.22	.47	.15	1.13	97.25	1.14	1.66	.08	.55	65P	*	L260
L278	84.87	.97	2.09	.13	1.01	96.47	.36	.52	.25	1.81	65P	*	L278
L301	84.35	.44	.96	.14	1.07	97.21	1.10	1.61	.08	.61	65G	*	L301
L312	85.06	1.16	2.49	.18	1.34	96.87	.76	1.11	1.19	8.69	65P	*	L312
L328	85.00	1.09	2.36	.00	.00	98.00	1.89	2.76	.00	.00	65P	*	L328
L339	83.25	=.66	=1.42	.38	2.87	97.37	1.26	1.84	.44	3.24	65P	*	L339
L380	84.00	.09	.20	.00	.00	94.00	=2.11	=3.09	.00	.00	65P	*	L380
L442	97.85	13.94	30.06	.09	.70	84.47	=11.64	=17.02	.52	3.83	65T	*	L442
L564	85.44	1.53	3.30	.50	3.76	94.62	=1.49	=2.18	1.09	8.00	65P	*	L564
L587	82.12	=1.78	=3.84	.12	.88	95.87	=.24	=.35	.07	.52	65I	*	L587
L591	84.47	.56	1.22	.04	.29	99.16	3.05	4.45	.20	1.48	65H	*	L591
L617	81.12	=2.78	=6.00	.23	1.76	92.56	=3.55	=5.19	.18	1.29	65P	*	L617

TOTAL NUMBER OF LABORATORIES REPORTING = 41

Best values: J35 83.6 ± 0.9 percent
E78 96.0 ± 0.8 percent

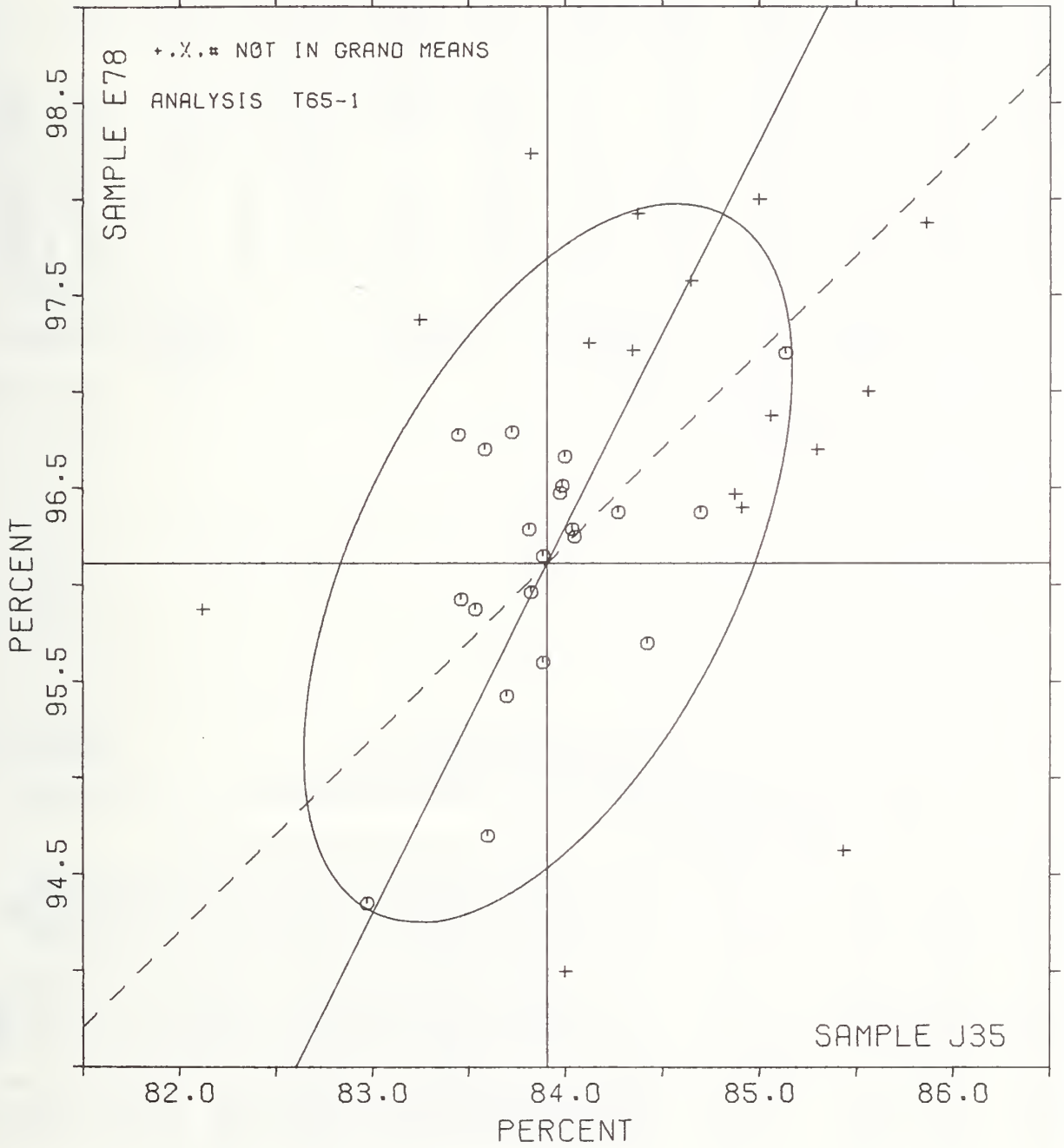
DIRECTIONAL BLUE REFLECTANCE IN PERCENT
TAPPI STANDARD T452 6S=77, 'BRIGHTNESS'; MARTIN SWEETS (ACBT & GF) IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY	TEST INSTRUMENT	CONDITIONS
		J35	E78	MAJOR	MINOR	R.SDR	VAR			
L617	*	81.12	92.56	=4.42	.90	1.52	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L176I	*	81.22	94.14	=2.97	1.52	.67	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2A	
L587	*	82.12	95.87	=1.01	1.49	.70	65I	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2A	
L211	Ø	82.97	94.35	=1.99	.05	.73	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S=4	
L339	*	83.25	97.37	.84	1.15	3.06	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L673R	Ø	83.45	96.77	.39	.70	.78	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S=4	
L243	Ø	83.46	95.92	=.37	.31	.83	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S=2	
L275	Ø	83.54	95.87	=.38	.22	.73	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S=1	
L132	Ø	83.59	96.70	.38	.55	.91	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S=4	
L176A	Ø	83.60	94.70	=1.40	=.36	1.22	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S=2	
L190C	Ø	83.70	95.42	=.71	=.12	1.16	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S=2	
L315	Ø	83.72	96.79	.52	.46	.63	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S=4	
L108	Ø	83.81	96.29	.11	.16	.97	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S=1	
L256	*	83.82	98.24	1.86	1.02	.54	65H	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L210N	Ø	83.82	95.96	=.17	.01	.78	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S=1	
L523	Ø	83.89	96.15	.02	.03	.58	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S=4	
L317	Ø	83.89	95.60	=.47	=.21	.58	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S=1	
L225	Ø	83.97	96.47	.35	.10	.72	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S=4	
L565	Ø	83.99	96.51	.39	.11	.97	65A	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (ACBT), S=2	
L158	Ø	84.00	96.66	.53	.16	.69	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S=4	
L380	*	84.00	94.00	=1.85	=1.03	.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L543	Ø	84.04	96.29	.21	=.04	1.69	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S=1	
L259	Ø	84.05	96.25	.19	=.07	.68	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S=1	
L260	*	84.12	97.25	1.11	.31	.84	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L288	Ø	84.27	96.37	.40	=.21	.50	65N	BLUE REFLECTANCE (DIRECTIONAL),	DIANO/MARTIN SWEETS, S=4	
L301	*	84.35	97.21	1.18	.09	.84	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L105	*	84.37	97.92	1.83	.39	.77	65T	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
L598	Ø	84.42	95.70	=.14	=.65	4.18	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S=1	
L591	*	84.47	99.16	2.98	.86	.88	65H	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L213	*	84.65	97.57	1.64	=.01	1.85	65T	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
L210M	Ø	84.70	96.37	.59	=.59	.83	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S=1	
L278	*	84.87	96.47	.75	=.71	1.41	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L249	*	84.91	96.40	.71	=.77	1.50	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L328	*	85.00	98.00	2.18	=.14	.00	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L312	*	85.06	96.87	1.20	=.69	5.02	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L308	Ø	85.14	97.20	1.52	=.62	.85	65M	BLUE REFLECTANCE (DIRECTIONAL),	MARTIN SWEETS (GE), S=1	
L224	*	85.30	96.70	1.15	=.98	.48	65H	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER	
L564	*	85.44	94.62	=.65	=2.03	5.88	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L232	*	85.56	97.00	1.53	=1.09	1.88	65P	BLUE REFLECTANCE (DIRECTIONAL),	PHOTOVOLT	
L223	*	85.86	97.87	2.45	=.96	.37	65G	BLUE REFLECTANCE (DIRECTIONAL),	GARDNER	
L442	*	97.85	84.47	=4.18	=17.67	2.26	65T	BLUE REFLECTANCE (DIRECTIONAL),	HUNTER D25D2M	
GMEANS:		83.91	96.11			1.00				
		95% ELLIPSE:		2.02	.99	WITH GAMMA = 63 DEGREES				

BLUE REFLECTANCE, DIRECTIONAL

SAMPLE J35 = 83.9 PERCENT

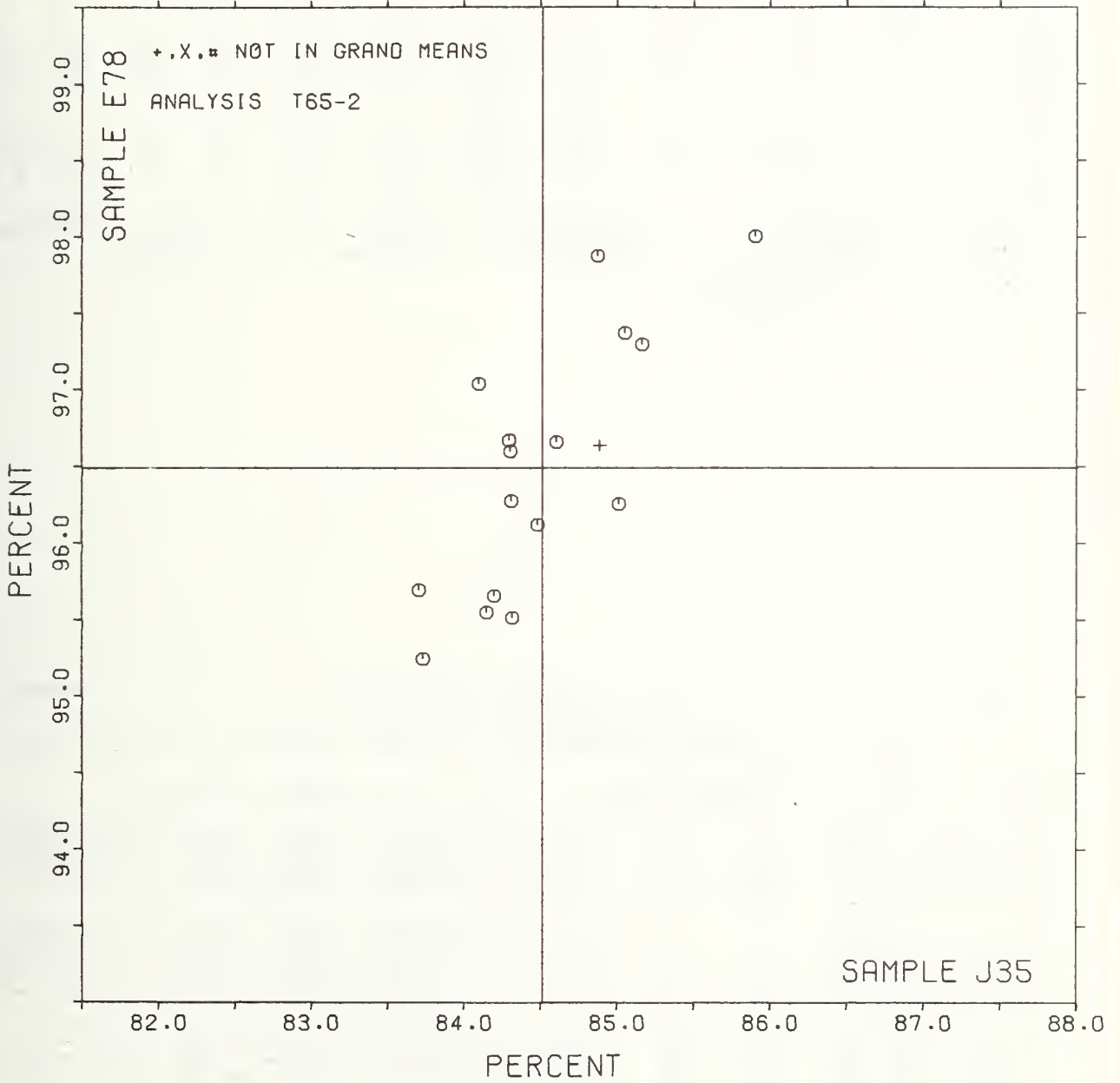
SAMPLE E78 = 96.1 PERCENT



BLUE REFLECTANCE, DIFFUSE, WITH TRAP

SAMPLE J35 = 84.5 PERCENT

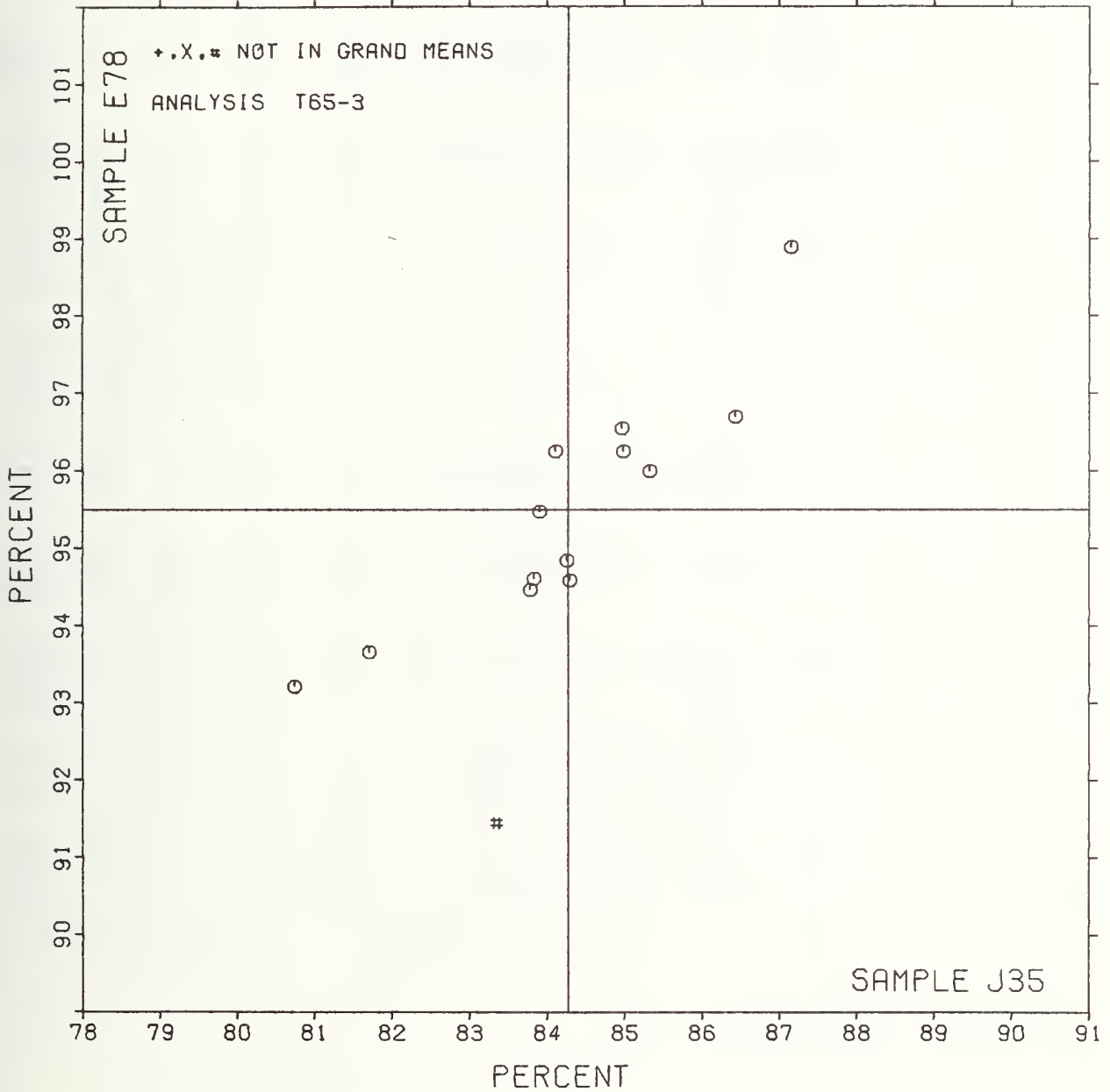
SAMPLE E78 = 96.5 PERCENT



BLUE REFLECTANCE, DIFFUSE, NO TRAP

SAMPLE J35 = 84.3 PERCENT

SAMPLE E78 = 95.5 PERCENT



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

LAB CODE	PRINTING					CAST COATED					TEST D. = 10		
	J20 MEAN	149 GRAMS DEV	PER N.DEV	SQUARE SDR	METER R. SDR	E59 MEAN	211 GRAMS DEV	PER N.DEV	SQUARE SDR	METER R. SDR	VAR	F	LAB
L108	48.55	1.02	.59	1.07	.78	86.28	1.66	.78	.15	.36	75H	Ø	L108
L121	47.99	.46	.27	2.11	1.54	83.89	-.73	-.35	.50	1.20	75H	Ø	L121
L122	47.61	.08	.05	1.05	.77	83.13	-1.49	-.70	.29	.70	75H	Ø	L122
L128	48.50	.97	.56	1.78	1.30	85.90	1.28	.60	.32	.76	75G	Ø	L128
L134	48.44	.91	.53	1.04	.76	83.63	-.99	-.47	.25	.61	75H	Ø	L134
L149	41.10	-6.43	-3.72	1.37	1.00	71.50	-13.12	-6.19	1.51	3.65	75G	#	L149
L162	52.49	4.96	2.87	1.43	1.05	86.18	1.56	.73	.30	.72	75G	*	L162
L173A	48.00	.47	.27	1.49	1.09	88.10	3.48	1.64	.32	.76	75G	Ø	L173A
L182	45.99	-1.54	-.89	1.46	1.07	84.99	.37	.17	.19	.46	75H	Ø	L182
L189	48.80	1.27	.74	.67	.49	87.85	3.23	1.52	.88	2.13	75P	Ø	L189
L190C	45.34	-2.19	-1.27	1.41	1.03	82.21	-2.41	-1.14	.25	.61	75G	Ø	L190C
L190R	49.54	2.01	1.16	1.47	1.08	83.17	-1.45	-.69	.37	.90	75G	Ø	L190R
L206	47.05	-.48	-.28	1.88	1.38	83.97	-.65	-.31	.34	.82	75H	Ø	L206
L210	48.55	1.42	.82	1.36	.99	85.87	1.25	.59	.32	.78	75H	Ø	L210
L211	46.34	-1.19	-.69	1.19	.87	83.94	-.68	-.32	.35	.85	75H	Ø	L211
L212	48.99	1.46	.85	1.20	.88	90.98	6.36	3.00	1.01	2.44	75P	*	L212
L213	48.81	1.28	.74	1.34	.98	84.28	-.34	-.16	.49	1.19	75H	Ø	L213
L223	47.69	.16	.09	1.34	.98	84.57	-.05	-.03	.24	.57	75H	Ø	L223
L224	45.60	-1.93	-1.11	1.68	1.23	83.85	-.77	-.37	.31	.75	75H	Ø	L224
L230	47.40	-.13	-.07	1.17	.86	84.10	-.52	-.25	.32	.76	75H	Ø	L230
L243	48.60	1.07	.62	1.35	.99	94.00	-.62	-.29	.47	1.14	75B	Ø	L243
L251	46.50	-1.03	-.59	1.15	.85	83.90	-.72	-.34	.32	.76	75G	Ø	L251
L255	48.50	.97	.56	.71	.52	85.50	.88	.41	.53	1.27	75G	Ø	L255
L256	47.34	-.19	-.11	1.08	.79	83.60	-1.02	-.48	.33	.80	75H	Ø	L256
L259	47.26	-.27	-.16	1.71	1.25	82.85	-1.77	-.84	.21	.51	75H	Ø	L259
L262	47.90	.37	.22	1.15	.84	81.45	-3.17	-1.50	.44	1.06	75K	Ø	L262
L278	52.01	4.48	2.59	.98	.72	86.17	1.55	.73	.47	1.14	75G	*	L278
L279	45.60	-1.93	-1.11	1.26	.93	82.30	-2.32	-1.10	.48	1.17	75G	Ø	L279
L291	46.05	-1.48	-.85	2.21	1.62	83.43	-1.19	-.56	.25	.60	75H	Ø	L291
L301	47.97	.44	.26	.76	.56	83.96	-.66	-.31	.29	.69	75H	Ø	L301
L315	47.60	.07	.04	1.71	1.25	85.50	.88	.41	.53	1.27	75G	Ø	L315
L317	47.20	-.33	-.19	1.69	1.24	86.30	1.68	.79	.67	1.63	75H	Ø	L317
L323	45.23	-2.30	-1.33	1.10	.81	83.69	-.93	-.44	.28	.68	75H	Ø	L323
L328	45.94	-1.59	-.92	1.26	.93	89.37	4.75	2.24	.25	.60	75H	*	L328
L339	50.15	2.62	1.52	1.18	.86	86.70	2.08	.98	1.32	3.18	75P	Ø	L339
L349	45.46	-2.07	-1.20	1.27	.93	85.38	.76	.36	.23	.54	75H	Ø	L349
L372	48.10	.57	.33	.77	.57	85.55	.93	.44	.50	1.20	75B	Ø	L372
L388	49.15	1.62	.94	1.06	.77	80.05	-4.57	-2.16	1.12	2.70	75P	*	L388
L396	47.40	-.13	-.07	2.17	1.59	81.60	-3.02	-1.43	1.26	3.06	75G	Ø	L396
L456	45.82	-1.71	-.99	1.09	.80	84.78	.16	.07	.19	.47	75H	Ø	L456
L483	47.36	-.17	-.10	1.72	1.26	83.16	-1.46	-.69	.17	.41	75H	Ø	L483
L564	45.95	-1.58	-.91	.90	.66	85.70	1.08	.51	1.67	4.03	75P	Ø	L564
L573	45.90	-1.63	-.94	2.73	2.00	81.00	-3.62	-1.71	.00	.00	75G	Ø	L573
L587	50.50	2.97	1.72	1.27	.93	88.80	4.18	1.97	.42	1.02	75H	Ø	L587
L592	45.06	-2.47	-1.43	.95	.69	84.38	-.24	-.12	.25	.61	75H	Ø	L592
L598	44.24	-5.29	-1.90	1.44	1.06	83.63	-.99	-.47	.29	.69	75H	Ø	L598
L643	47.86	.33	.19	1.45	1.06	84.43	-.19	-.09	.41	.99	75H	Ø	L643
L668	46.01	-1.52	-.88	1.45	1.06	85.04	.42	.20	.07	.17	75G	Ø	L668
L67C	46.61	-.92	-.53	.93	.68	82.87	-1.75	-.83	.32	.78	75H	Ø	L67C

GR. MEAN = 47.53 GLOSS UNITS GRAND MEAN = 84.62 GLOSS UNITS TEST DETERMINATIONS = 10
 SD MEANS = 1.73 GLOSS UNITS SD OF MEANS = 2.12 GLOSS UNITS 48 LABS IN GRAND MEANS
 AVERAGE SDR = 1.37 GLOSS UNITS AVERAGE SDR = .41 GLOSS UNITS

L288 46.89 -.64 -.37 1.01 .74 83.42 -1.20 -.57 .22 .53 75I * L288
 TOTAL NUMBER OF LABORATORIES REPORTING = 50

Best values: J20 47 ± 3 gloss units
 E59 85 ± 3 gloss units

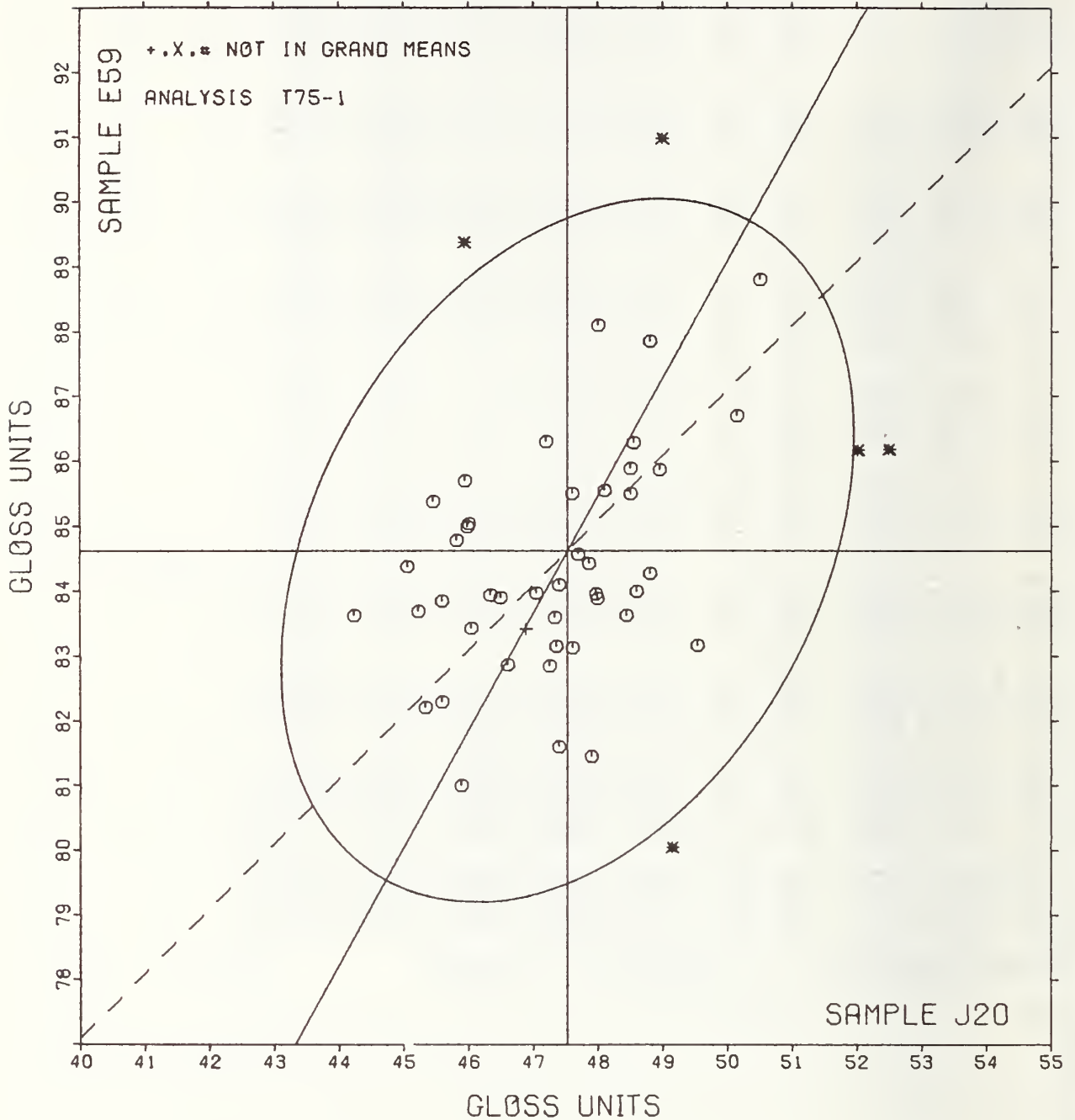
The following laboratories were omitted from the grand means because of extreme test results: 149

ANALYSIS T75-1 TABLE 2
 SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS
 TAPPI STANDARD T480 G9-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY--TEST INSTRUMENT--CONDITIONS
		J20	B59	MAJOR	MINOR	R.SDR	VAR	
L149	#	41.10	71.60	-14.00	-0.71	2.33	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L598	#	44.24	83.63	-2.46	2.40	.87	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L592	#	45.06	84.38	-1.41	2.04	.65	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L323	@	45.23	83.69	-1.93	1.56	.74	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L190C	@	45.34	82.21	-3.17	.75	.82	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L349	@	45.46	85.38	-0.34	2.18	.74	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L244	@	45.60	83.85	-1.61	1.31	.99	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L279	@	45.60	82.30	-2.97	.57	1.05	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L456	@	45.82	84.78	-0.69	1.57	.63	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L573	@	45.90	81.00	-3.96	-0.33	1.00	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L328	*	45.94	89.37	3.39	3.68	.76	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L564	@	45.95	85.70	.18	1.90	2.35	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L182	@	45.99	84.99	-0.42	1.52	.77	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L568	@	46.01	85.04	-0.37	1.53	.62	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L291	@	46.05	83.43	-1.76	.72	1.11	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L211	@	46.34	83.94	-1.17	.71	.86	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L251	@	46.50	83.90	-1.13	.55	.80	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L670	@	46.61	82.87	-1.98	-0.04	.73	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L288	*	46.89	83.42	-1.36	-0.02	.63	75I	SPECULAR GLOSS (75 DEGREE), HUNTER, 20 C, 65% RH
L206	@	47.05	83.97	-0.80	.10	1.10	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L317	@	47.20	86.30	1.31	1.10	1.43	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L259	@	47.26	82.85	-1.68	-0.62	.88	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L256	@	47.34	83.60	-0.99	-0.33	.79	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L483	@	47.36	83.16	-1.36	-0.56	.84	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L230	@	47.40	84.10	-0.52	-0.14	.81	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L396	@	47.40	81.60	-2.71	-1.35	2.32	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L315	@	47.60	85.50	.80	.36	1.26	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L122	@	47.61	83.13	-1.27	-0.79	.74	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L223	@	47.69	84.57	.03	-0.17	.77	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L643	@	47.86	84.43	-0.01	-0.38	1.03	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L262	@	47.90	81.45	-2.60	-1.86	.95	75K	SPECULAR GLOSS (75 DEGREE), GAERTNER (K-C TYPE)
L301	@	47.97	83.96	-0.37	-0.71	.63	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L121	@	47.99	82.89	-0.42	-0.76	1.37	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L173A	@	48.00	88.10	3.27	1.27	.93	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L372	@	48.10	85.55	1.09	-0.05	.89	75B	SPECULAR GLOSS (75 DEGREE), BAUSCH * LOWE
L134	@	48.44	83.63	-0.43	-1.28	.69	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L128	@	48.50	85.90	1.59	-0.23	1.03	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L255	@	48.50	85.50	1.24	-0.43	.90	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L108	@	48.55	86.28	1.94	-0.09	.57	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L243	@	48.60	84.00	-0.03	-1.24	1.06	75H	SPECULAR GLOSS (75 DEGREE), BAUSCH * LOWE
L189	@	48.80	87.85	3.44	.44	1.31	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L213	@	48.81	84.28	.32	-1.29	1.09	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L210	@	48.95	85.87	1.78	-0.64	.89	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L212	*	48.99	90.98	6.27	1.79	1.66	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L388	*	49.15	80.05	-3.22	-3.63	1.74	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L190R	@	49.54	83.17	-0.30	-2.46	.99	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L339	@	50.15	86.70	3.08	-1.29	2.02	75P	SPECULAR GLOSS (75 DEGREE), PHOTOVOLT
L587	@	50.50	88.80	5.09	-0.58	.97	75H	SPECULAR GLOSS (75 DEGREE), HUNTER
L278	*	52.01	86.17	3.52	-3.18	.93	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
L162	*	52.49	86.18	3.76	-3.59	.88	75G	SPECULAR GLOSS (75 DEGREE), GARDNER
GMEANS:		47.53	84.62			1.00		
		95% ELLIPSE:		5.81	3.90			WITH GAMMA * 61 DEGREES

SPECULAR GLOSS, 75 DEGREE

SAMPLE J20 = 47.5 GLOSS UNITS SAMPLE E59 = 84.6 GLOSS UNITS



TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T90=1 TABLE 1
 THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
 TAPPI STANDARD T411 0S-76

LAB CODE	SAMPLE B28 MEAN	BAG 83 GRAMS PER SQUARE METER				SAMPLE J65 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	5.41	-.09	-.71	.08	.73	6.27	-.10	-.93	.16	1.34	90V	0	L100
L105	5.59	.09	.70	.08	.72	6.50	.12	1.25	.10	.83	90Q	0	L105
L122	5.36	-.14	-1.14	.21	1.84	6.23	-.14	-1.33	.19	1.61	90V	0	L122
L123F	5.81	.31	2.47	.23	2.03	6.61	.24	2.30	.12	1.01	90F	0	L123F
L125	5.62	.12	.91	.24	2.10	6.39	.02	.23	.11	.91	90T	0	L125
L128	5.56	.05	.43	.07	.60	6.35	-.02	-.18	.14	1.15	90T	0	L128
L141	5.30	-.20	-1.61	.05	.45	6.25	-.12	-1.11	.09	.79	90T	0	L141
L158	5.63	.13	1.00	.09	.84	6.53	.16	1.50	.07	.58	90T	0	L158
L159	5.47	-.03	-.25	.09	.81	6.38	.01	.13	.15	1.26	90T	0	L159
L162	5.51	.00	.02	.13	1.13	6.34	-.03	-.25	.11	.91	90D	0	L162
L166	5.54	.04	.32	.05	.45	6.40	.03	.28	.10	.82	90T	0	L166
L173B	5.61	.11	.84	.16	1.41	6.52	.15	1.41	.19	1.65	90F	0	L173B
L174	5.53	.03	.21	.24	2.09	6.29	-.08	-.76	.19	1.58	90T	0	L174
L182	5.36	-.14	-1.12	.10	.89	6.32	-.05	-.48	.05	.43	90L	0	L182
L183	5.42	-.08	-.62	.13	1.13	6.23	-.14	-1.36	.16	1.35	90T	0	L183
L190C	5.32	-.18	-1.45	.10	.92	6.30	-.07	-.67	.09	.80	90T	0	L190C
L203A	5.43	-.07	-.54	.12	1.05	6.30	-.07	-.62	.22	1.91	90T	0	L203A
L203C	5.47	-.03	-.23	.14	1.22	6.41	.04	.37	.21	1.82	90T	0	L203C
L212	5.55	.05	.37	.10	.86	6.45	.08	.75	.12	1.01	90T	0	L212
L213	5.65	.15	1.16	.10	.86	6.56	.19	1.78	.10	.82	90T	0	L213
L223	5.63	.13	1.03	.09	.78	6.44	.07	.63	.10	.82	90V	0	L223
L228	5.64	.14	1.08	.20	1.73	6.49	.12	1.12	.10	.85	90T	0	L228
L238A	5.55	.05	.40	.07	.62	6.47	.10	.97	.04	.38	90T	0	L238A
L249	5.48	-.02	-.17	.08	.72	6.30	-.07	-.62	.19	1.60	90T	0	L249
L259	5.63	.13	1.02	.13	1.19	6.36	-.01	-.10	.12	1.05	90T	0	L259
L260	5.51	.00	.03	.03	.24	6.34	-.03	-.24	.10	.81	90T	0	L260
L261	5.54	.03	.27	.11	.95	6.41	.04	.38	.13	1.13	90T	0	L261
L262	5.48	-.02	-.15	.05	.42	6.28	-.09	-.85	.06	.54	90T	0	L262
L285	5.52	.02	.13	.19	1.66	6.37	-.00	-.01	.08	.70	90T	0	L285
L291	5.35	-.15	-1.19	.06	.56	6.21	-.16	-1.52	.10	.87	90T	0	L291
L305	5.35	-.15	-1.18	.06	.57	6.35	-.02	-.20	.08	.57	90T	0	L305
L309	5.25	-.25	-2.01	.12	1.05	6.17	-.20	-1.89	.05	.41	90T	0	L309
L318	5.29	-.21	-1.65	.15	1.31	6.32	-.05	-.43	.20	1.70	90T	0	L318
L320	5.28	-.22	-1.78	.11	.93	6.25	-.12	-1.16	.07	.60	90T	0	L320
L323	5.45	-.05	-.42	.10	.86	6.26	-.11	-1.04	.07	.60	90T	0	L323
L324	5.47	-.03	-.27	.15	1.33	6.36	-.01	-.11	.19	1.63	90T	0	L324
L326	5.72	.22	1.75	.11	1.01	6.47	.10	.95	.14	1.19	90T	0	L326
L328	5.50	-.00	-.03	.10	.86	6.31	-.06	-.57	.14	1.24	90T	0	L328
L331	5.46	-.05	-.37	.16	1.43	6.37	-.00	-.03	.10	.85	90T	0	L331
L339	5.34	-.16	-1.26	.17	1.49	6.40	.03	.32	.10	.86	90T	*	L339
L352	5.66	.15	1.22	.14	1.21	6.50	.13	1.22	.08	.68	90Q	0	L352
L356	5.51	.01	.07	.09	.80	6.35	-.02	-.23	.12	1.00	90T	0	L356
L358	5.43	-.07	-.55	.09	.81	6.27	-.10	-.94	.08	.66	90T	0	L358
L376	5.64	.14	1.08	.20	1.73	6.53	.16	1.50	.14	1.21	90T	0	L376
L378	5.47	-.03	-.27	.08	.70	6.20	-.17	-1.61	.11	.90	90T	0	L378
L380	5.52	.02	.13	.06	.56	6.34	-.03	-.29	.13	1.15	90T	0	L380
L442	5.76	.26	2.05	.09	.78	6.57	.20	1.86	.10	.82	90V	0	L442
L556	5.70	.20	1.56	.08	.71	6.48	.11	1.03	.05	.45	90T	0	L556
L557	5.43	-.07	-.58	.14	1.26	6.31	-.06	-.57	.17	1.48	90T	0	L557
L575	5.41	-.10	-.76	.09	.80	6.29	-.08	-.76	.14	1.23	90T	0	L575
L581	5.56	.06	.49	.07	.59	6.40	.03	.32	.13	1.09	90T	0	L581
L585	5.52	.02	.13	.06	.56	6.52	.15	1.41	.04	.36	90T	0	L585
L587	5.43	-.07	-.58	.13	1.11	6.28	-.09	-.85	.09	.78	90T	0	L587

GR. MEAN = 5.50 MILS
 SD MEANS = .13 MILS

GRAND MEAN = 6.27 MILS
 SD OF MEANS = .11 MILS

TEST DETERMINATIONS = 10
 53 LABS IN GRAND MEANS

AVERAGE SDR = .11 MILS
 GR. MEAN = 139.79 MICROMETER

AVERAGE SDR = .12 MILS
 GRAND MEAN = 161.82 MICROMETER

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

LAB CODE	SAMPLE B28 MEAN	BAG 83 GRAMS PER SQUARE METER				SAMPLE J65 MEAN	PRINTING 93 GRAMS PER SQUARE METER				TEST D. - 10		
		DEV	N. DEV	SDR	R. SDR		DEV	N. DEV	SDR	R. SDR	VAR	P	LAB
L185	5.26	-.25	-1.96	.07	.59	6.24	-.13	-1.23	.10	.86	90B	*	L185
L203B	5.26	-.24	-1.93	.25	2.18	6.13	-.24	-2.27	.12	.99	90C	*	L203B
L242B	5.46	-.04	-.31	.06	.52	6.39	.02	.23	.09	.73	90D	*	L242B
L242P	5.46	-.05	-.37	.07	.62	6.31	-.06	-.59	.14	1.21	90P	*	L242P
L243	5.34	-.16	-1.29	.16	1.40	6.19	-.18	-1.70	.08	.66	90S	*	L243
L251	5.26	-.25	-1.96	.09	.76	6.17	-.20	-1.85	.14	1.15	90W	*	L251
L344	5.76	.26	2.03	.11	.95	6.58	.21	1.97	.12	1.05	90U	*	L344
L390	5.76	.26	2.03	.10	.86	6.64	.27	2.54	.13	1.08	90C	*	L390
L396M	5.63	.15	1.00	.09	.84	6.52	.15	1.41	.09	.78	90S	*	L396M
L484	5.24	-.26	-2.07	.08	.74	6.24	-.13	-1.21	.09	.78	90E	*	L484
L563	5.20	-.30	-2.40	.26	2.29	6.00	-.37	-3.49	.00	.00	90U	*	L563
L564	5.46	-.04	-.34	.07	.62	6.37	-.00	-.01	.05	.81	90Y	*	L564
L576	5.44	-.06	-.50	.14	1.22	6.35	-.02	-.20	.09	.75	90C	*	L576
L616	5.00	-.50	-3.99	.00	.00	6.00	-.37	-3.49	.00	.00	90C	*	L616
TOTAL NUMBER OF LABORATORIES REPORTING = 67													

Best values: B28 5.50 ± 0.21 mils
 J65 6.36 ± 0.16 mils

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 2
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI STANDARD T411 6S-76

LAH CODE	F	MEANS		COORDINATES		AVG R. SDR	VAR	PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		H28	J65	MAJOR	MINOR					
L616	*	5.00	6.00	-.62	.03	.00	90C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN
L563	*	5.20	6.00	-.47	-.10	1.15	90U	THICKNESS (CALIPER),	TMI,	HAND DRIVEN
L484	*	5.24	6.24	-.28	.06	.76	50E	THICKNESS (CALIPER),	SCHÖPPER,	HAND DRIVEN
L309	Ø	5.25	6.17	-.32	.00	.73	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L251	*	5.25	6.17	-.32	.00	.96	90W	THICKNESS (CALIPER),	L * W,	MOTOR DRIVEN, 20 C, 65% RH
L185	*	5.26	6.24	-.27	.05	.72	90H	THICKNESS (CALIPER),	AMTHOR,	HAND DRIVEN
L203H	*	5.26	6.13	-.34	-.03	1.59	50C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN
L320	Ø	5.28	6.25	-.25	.05	.77	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L318	Ø	5.29	6.32	-.19	.10	1.51	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L141	Ø	5.30	6.25	-.23	.04	.62	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L190C	Ø	5.32	6.30	-.19	.06	.86	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L243	*	5.34	6.19	-.24	-.04	1.03	90S	THICKNESS (CALIPER),	SCHÖPPER,	HAND DRIVEN
L339	*	5.34	6.40	-.10	.13	1.17	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L291	Ø	5.35	6.21	-.22	-.03	.71	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L305	Ø	5.35	6.35	-.13	.08	.62	90T	THICKNESS (CALIPER),	TMI,	MOTOP DRIVEN
L122	Ø	5.36	6.23	-.20	-.02	1.73	90V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L182	Ø	5.36	6.32	-.14	.05	.66	90L	THICKNESS (CALIPER),	L * W,	MOTOR DRIVEN
L575	Ø	5.41	6.29	-.13	-.00	1.01	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L100	Ø	5.41	6.27	-.13	-.02	1.03	90V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L183	Ø	5.42	6.23	-.15	-.06	1.24	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L587	Ø	5.43	6.28	-.11	-.02	.95	50T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L557	Ø	5.43	6.31	-.10	-.00	1.37	50T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L358	Ø	5.43	6.27	-.12	-.03	.74	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L203A	Ø	5.43	6.30	-.09	-.01	1.48	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L576	*	5.44	6.35	-.06	.02	.58	90C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN
L323	Ø	5.45	6.26	-.11	-.05	.73	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L242P	*	5.46	6.31	-.08	-.02	.92	90P	THICKNESS (CALIPER),	MESSMER,	MOTOR DRIVEN, ISØ R534
L331	Ø	5.46	6.37	-.04	.03	1.14	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L564	*	5.46	6.37	-.03	.03	.71	90Y	THICKNESS (CALIPER),	WBAP,	HAND DRIVEN
L242Ø	*	5.46	6.39	-.02	.04	.62	90Ø	THICKNESS (CALIPER),	MESSMER,	MOTOR DRIVEN, HS3983
L378	Ø	5.47	6.20	-.13	-.11	.80	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L324	Ø	5.47	6.36	-.03	.01	1.48	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L159	Ø	5.47	6.38	-.02	.03	1.04	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L203C	Ø	5.47	6.41	.00	.05	1.52	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L249	Ø	5.48	6.30	-.06	-.04	1.16	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L262	Ø	5.48	6.28	-.07	-.06	.48	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L328	Ø	5.50	6.31	-.04	-.05	1.05	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L162	Ø	5.51	6.34	-.01	-.02	1.02	90D	THICKNESS (CALIPER),	CADY,	MOTOR DRIVEN
L260	Ø	5.51	6.34	-.01	-.02	.53	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L356	Ø	5.51	6.35	-.01	-.02	.90	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L285	Ø	5.52	6.37	.01	-.01	1.18	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L585	Ø	5.52	6.52	.11	.11	.46	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L380	Ø	5.52	6.34	-.01	-.03	.86	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L174	Ø	5.53	6.29	-.03	-.08	1.84	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L261	Ø	5.54	6.41	.05	.01	1.04	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L166	Ø	5.54	6.40	.05	-.00	.63	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L212	Ø	5.55	6.45	.09	.03	.93	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L238A	Ø	5.55	6.47	.10	.05	.50	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L129	Ø	5.56	6.35	.03	-.05	.87	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L581	Ø	5.56	6.40	.07	-.01	.84	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L105	Ø	5.59	6.50	.15	.05	.78	90Q	THICKNESS (CALIPER),	EMVECO,	MOTOR DRIVEN
L173B	Ø	5.61	6.52	.18	.05	1.53	50F	THICKNESS (CALIPER),	FEDERAL,	MOTOR DRIVEN
L125	Ø	5.62	6.35	.11	-.05	1.50	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L158	Ø	5.63	6.53	.20	.04	.71	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L356M	*	5.63	6.52	.19	.04	.81	90S	THICKNESS (CALIPER),	SCHÖPPER,	HAND DRIVEN
L259	Ø	5.63	6.36	.09	-.09	1.12	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L223	Ø	5.63	6.44	.14	-.03	.80	90V	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN, DIGITIZED
L228	Ø	5.64	6.49	.18	.01	1.29	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L376	Ø	5.64	6.53	.21	.04	1.47	50T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L213	Ø	5.65	6.56	.23	.06	.84	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L352	Ø	5.66	6.50	.20	-.00	.94	90T	THICKNESS (CALIPER),	EMVECO,	MOTOR DRIVEN
L556	Ø	5.70	6.48	.22	-.04	.58	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L326	Ø	5.72	6.47	.24	-.06	1.10	90T	THICKNESS (CALIPER),	TMI,	MOTOR DRIVEN
L390	*	5.76	6.64	.37	.05	.97	90C	THICKNESS (CALIPER),	CADY,	HAND DRIVEN
L344	*	5.76	6.58	.33	.00	1.00	90U	THICKNESS (CALIPER),	TMI,	HAND DRIVEN

LAB CODE	F	MEANS		COORDINATES		AVG E.S.D. VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		B28	J65	MAJOR	MINOR		
L442	0	5.76	6.57	.33	-.01	.60	90V THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED
L123F	0	5.81	6.61	.40	-.01	1.52	90F THICKNESS (CALIPER), FEDERAL, MOTOR DRIVEN
GMEANS:		5.50	6.37			1.00	
		95% ELLIPSE:		.40	.13	WITH GAMMA = 38 DEGREES	

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

LAB CODE	SAMPLE D29 MEAN	KRAFT 124 GRAMS PER SQUARE METER				SAMPLE D30 MEAN	PRINTING 92 GRAMS PER SQUARE METER				TEST D. = 10		
		DEV	N. DEV	SDR	R. SDR		DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L100	124.50	-.10	-.07	.53	.81	92.57	-.35	-.28	.65	1.07	95C	@	L100
L121	124.65	.05	.03	.45	.68	92.86	-.06	-.04	.56	.91	95B	@	L121
L162	125.21	.61	.42	1.79	2.73	94.00	1.08	.88	.00	.00	95K	@	L162
L213	122.01	-2.59	-1.78	.41	.62	89.96	-2.96	-2.39	.59	.96	95F	@	L213
L249	124.54	-.06	-.04	.66	1.00	93.47	.55	.45	1.15	1.87	95I	@	L249
L280	124.96	.36	.25	.67	1.02	92.82	-.10	-.08	.92	1.50	95T	@	L280
L305	127.03	2.43	1.67	.32	.49	94.59	1.67	1.35	.65	1.06	95T	@	L305
L339	127.12	2.52	1.73	.74	1.13	94.56	1.64	1.32	.30	.50	95T	@	L339
L342	124.73	.13	.09	.82	1.26	92.57	-.35	-.28	.96	1.57	95C	@	L342
L344	124.74	.14	.10	.22	.34	92.99	.08	.06	.48	.79	95T	@	L344
L378	7.45	-117.15	-80.30	.04	.05	5.59	-87.33	-70.50	.05	.08	95E	#	L378
L442	125.38	.78	.53	.39	.59	93.98	1.06	.86	.49	.81	95K	@	L442
L484	124.37	-.23	-.16	.63	.96	92.59	-.33	-.26	.65	1.06	95H	@	L484
L557	124.56	-.04	-.02	.89	1.36	92.69	-.22	-.18	.70	1.14	95C	@	L557
L559	121.70	-2.90	-1.99	.46	.71	90.88	-2.04	-1.64	.45	.74	95K	@	L559
L564	123.50	-1.10	-.75	.85	1.30	93.20	.28	.23	.63	1.03	95E	@	L564
L597	25.70	-98.90	-67.79	.39	.59	19.20	-73.72	-59.51	.11	.17	95C	#	L597

GR. MEAN = 124.60 G/SQ.METER GRAND MEAN = 92.92 G/SQ.METER TEST DETERMINATIONS = 10
 SD MEANS = 1.46 G/SQ.METER SD OF MEANS = 1.24 G/SQ.METER 15 LABS IN GRAND MEANS
 AVERAGE SDR = .65 G/SQ.METER AVERAGE SDR = .61 G/SQ.METER

TOTAL NUMBER OF LABORATORIES REPORTING = 17
 Best values: D29 124.5 ± 2.6 grams per square meter
 D30 92.9 ± 2.0 grams per square meter

Data from the following laboratories appear to be off by a multiplicative factor: 378,597

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

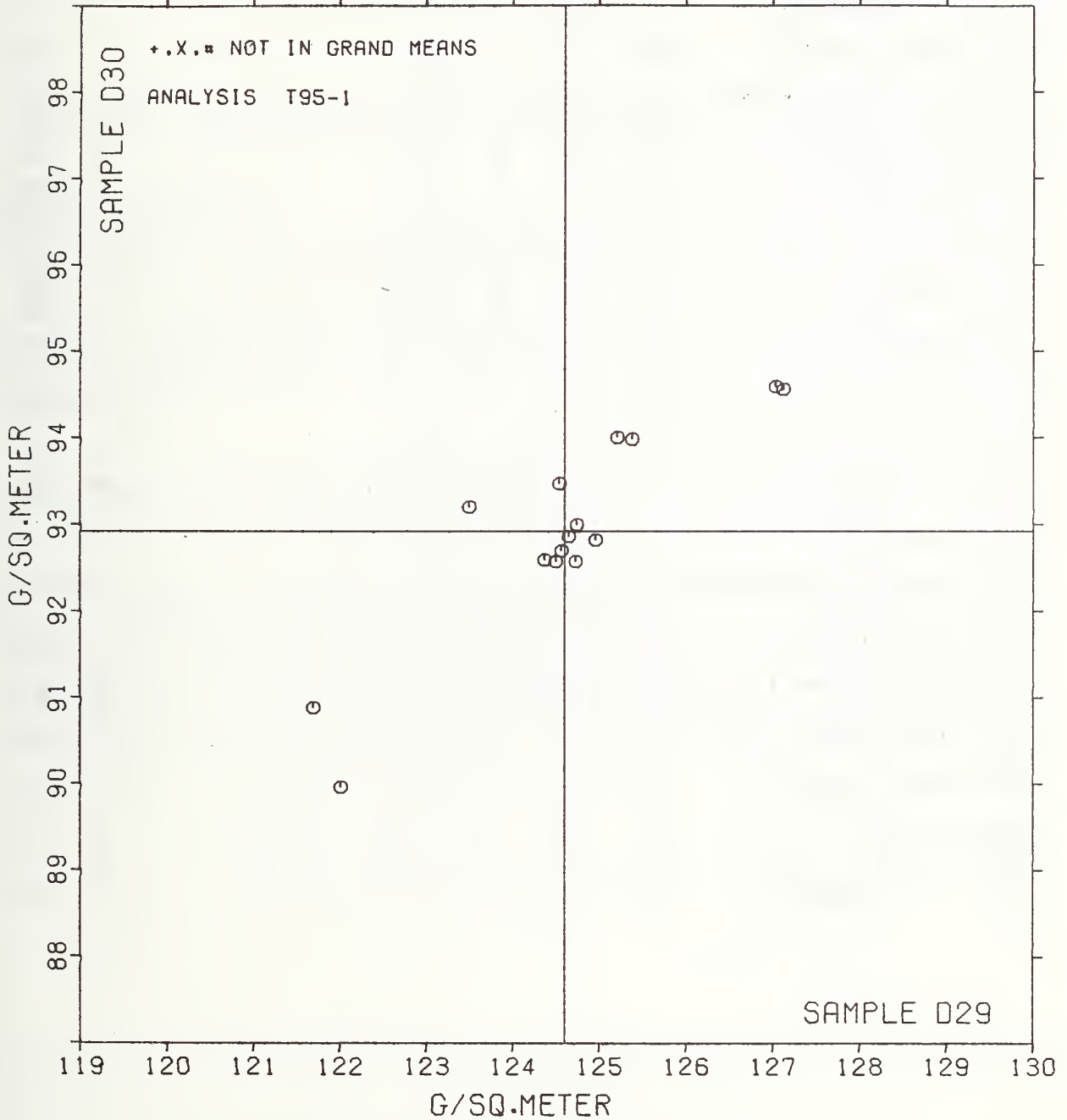
LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY	TEST INSTRUMENT	CONDITIONS
		D29	D30	MAJOR	MINOR	R. SDR	VAR			
L378	#	7.45	5.59	-145.90	8.06	.07	95E	BASIS WEIGHT (GRAMMAGE),	GUILLOTINE TYPE CUTTER	
L597	#	25.70	19.20	-123.16	6.81	.38	95C	BASIS WEIGHT (GRAMMAGE),	CUTTING BOARD	
L559	@	121.70	90.88	-3.53	.30	.72	95K	BASIS WEIGHT (GRAMMAGE),	WEIGHED AS RECEIVED	
L213	@	122.01	89.96	-3.88	-.61	.79	95F	BASIS WEIGHT (GRAMMAGE),	FOUR-SQUARE CUTTER	
L564	@	123.50	93.20	-.66	.92	1.17	95E	BASIS WEIGHT (GRAMMAGE),	GUILLOTINE TYPE CUTTER	
L484	@	124.37	92.59	-.39	-.10	1.01	95H	BASIS WEIGHT (GRAMMAGE),	SQUARE AND BLADE	
L100	@	124.50	92.57	-.30	-.20	.94	95C	BASIS WEIGHT (GRAMMAGE),	CUTTING BOARD	
L249	@	124.54	93.47	.31	.46	1.44	95I	BASIS WEIGHT (GRAMMAGE),	INGFENT PAPER CUTTER	
L557	@	124.56	92.69	-.17	-.15	1.25	95C	BASIS WEIGHT (GRAMMAGE),	CUTTING BOARD	
L121	@	124.65	92.86	.00	.07	.80	95B	BASIS WEIGHT (GRAMMAGE),	CNCORA CUTTER	
L342	@	124.73	92.57	-.12	-.35	1.41	95C	BASIS WEIGHT (GRAMMAGE),	CUTTING BOARD	
L344	@	124.74	92.99	.16	-.03	.57	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L280	@	124.96	92.82	.21	-.30	1.26	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L162	@	125.21	94.00	1.16	.44	1.37	95K	BASIS WEIGHT (GRAMMAGE),	WEIGHED AS RECEIVED	
L442	@	125.38	93.98	1.28	.32	.70	95K	BASIS WEIGHT (GRAMMAGE),	WEIGHED AS RECEIVED	
L305	@	127.03	94.59	2.94	-.27	.77	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	
L339	@	127.12	94.56	2.99	-.36	.81	95T	BASIS WEIGHT (GRAMMAGE),	TEMPLATE CUT	

GMEANS: 124.60 92.92 1.00
 95% ELLIPSE: 5.35 1.16 WHITE GAMMA = 39 DEGREES

GRAMMAGE (MASS PER UNIT AREA)

SAMPLE D29 = 124.6 G/SQ.METER

SAMPLE D30 = 92.9 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	E73 J46	16.15 12.33	1.04 .81	1.39 .93	10	52	56	10	1.22 .82	2.87 2.24
AIR RESISTANCE, SHEFFIELD T40-2 SHEFF. UNITS	E73 J46	172. 226.	11. 11.	12. 12.	10	33	40	10	11. 10.	30. 31.
AIR RESISTANCE, GURLEY HG FLOTATION T41-1 SEC/10 CC	E73 R82	1353. 1635.	199. 241.	608. 625.	10	12	13	10	532. 548.	553. 669.
SMOOTHNESS, PARKER PRINTSURF T44-1 MICRONS	J12 J49	4.97 6.00	.33 .55	.18 .09	10	8	8	10	.16 .08	.92 1.51
SMOOTHNESS, SHEFFIELD T45-1 SHEFF. UNITS	J12 J49	141.8 273.5	6.7 12.5	10.6 7.3	15	80	85	10	9.3 5.4	19.2 34.8
SMOOTHNESS, BEKK T45-2 BEKK SECONDS	J12 J49	30.21 9.88	2.36 .82	3.64 .57	15	11	13	10	3.19 .5C	6.78 2.29
SMOOTHNESS, BENDTSEN T47-1 ML/MIN	J12 J49	173. 483.	9. 37.	19. 36.	10	8	9	10	16. 31.	25. 102.
K & N INK ABSORPTION T56-1 K & N UNITS	E50 R59	63.4 63.6	5.2 5.2	.6 .4	4	7	11	4	.9 .6	14.4 14.4
PH, COLD T57-1 PH UNITS	J14 J18	6.95 4.70	.50 .32	.08 .03	5	6	7	2	.16 .06	1.39 .88
PH, HOT T57-2 PH UNITS	J14 J18	7.737 4.513	.345 .144	.110 .033	5	5	5	2	.216 .065	.972 .402
OPACITY, 8&L TYPE, 89% BACKING T60-1 PERCENT	J57 K23	92.71 95.44	.48 .34	.35 .28	10	66	79	5	.43 .35	1.36 .97
OPACITY, 8&L TYPE, PAPER BACKING T60-2 PERCENT	J57 K23	93.07 95.72	.27 .27	.51 .36	10	5	5	5	.63 .44	.88 .80
OPACITY, ELREPHO TYPE, PAPER BACKING T60-3 PERCENT	J57 K23	93.65 96.37	.13 .11	.22 .19	10	11	13	5	.28 .24	.42 .34
BLUE REFLECTANCE, DIRECTIONAL T65-1 PERCENT	J35 E78	83.91 96.11	.46 .68	.13 .14	8	21	41	6	.15 .15	1.29 1.90
BLUE REFLECTANCE, DIFFUSE, WITH TRAP T65-2 PERCENT	J35 E78	84.51 96.45	.57 .85	.09 .06	8	16	17	6	.10 .07	1.57 2.37
BLUE REFLECTANCE, DIFFUSE, NO TRAP T65-3 PERCENT	J35 E78	84.27 95.50	1.70 1.50	.11 .13	8	13	14	6	.12 .15	4.71 4.17
SPECULAR GLOSS, 75 DEGREE T75-1 GLOSS UNITS	J20 R59	47.53 84.62	1.73 2.12	1.37 .41	10	48	50	5	1.69 .51	4.94 5.89
THICKNESS (CALIPER) T90-1 MILS	B28 J65	5.50 6.37	.13 .11	.11 .12	10	53	67	10	.10 .10	.35 .29
GRAMMAGE (MASS PER UNIT AREA) T95-1 G/SQ.METER	D29 D30	124.60 92.92	1.46 1.24	.65 .61	10	15	17	3	1.05 .98	4.14 3.53

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