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PUBLICATIONS

TAPPI

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

# COLLABORATIVE REFERENCE PROGRAM FOR PAPER

REPORT NO. 58G

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

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1979
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# NBS COLLABORATIVE REFERENCE PROGRAMS

## TAPPI Paper and Board (6 times per year)

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

## FKBG-API Containerboard (48 times per year)

- Mullen burst of linerboard
- Concora test of medium

## MCCA Color and Appearance (4 times per year)

- Gloss at 60°
- Color and color difference

## CTS Rubber (4 times per year)

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

## CTS Thermal Insulation Materials (2 times per year)

19 test methods for thermal insulation materials covering: thermal properties; strength properties; dimensions, stability, and density properties; fire properties; and properties of vapor barriers

## ASTM Cement (2 times per year)

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

## AASHTO Bituminous

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

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

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TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

# COLLABORATIVE REFERENCE PROGRAM FOR PAPER

Report No. 58G

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NBSIR 79-1374

U. S. DEPARTMENT OF COMMERCE
National Bureau of Standards

INTRODUCTION

Reports 58S and 58G comprise the fourth set of reports for the 78-79 program y ar. Participants in tests which involve strength properties of paper will receive only the S report; those in tests which measure other properties will receive only the G report.

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

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

Jeffrey Horlick

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

June 8, 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



Analyses In The S Report

TABLE OF CONVERSION FACTORS TO METRIC (SI) UNITS

| Physical Quantity | To Convert From | To | Multiply by |
|---|---|---|---|
| Bursting strength | psi | kPa | 6.895 |
| | $kg/cm^2$ | kPa | 98.07 |
| | bar | kPa | 100.00 |
| Tearing strength | g | mN | 9.807 |
| Tensile strength | lb/in. | kN/m | .1751 |
| | lb/0.5 in. | kN/m | .3502 |
| | lb/15 mm | kN/m | .2965 |
| | kg/15 mm | kN/m | .6538 |
| | kg/25 mm | kN/m | .3923 |
| | kg/mm | kN/m | 9.807 |
| Tensile energy absorption | $ft\text{-}lb/ft^2$ | $J/m^2$ | 14.59 |
| | $in.\text{-}lb/in.^2$ | $J/m^2$ | 175.1 |
| | $kg\text{-}m/m^2$ | $J/m^2$ | 9.807 |
| Bending stiffness | g·cm | μN·m | 98.07 |
| Flat-crush strength (Concora) | lb | N | 4.448 |
| Ring-crush (TAPPI) | lb | N | 4.448 |
| (ISO) | lb/6.00 in. | kN/m | 0.0292 |
| Thickness | mil | μm | 25.40 |

## KEY TO TABLES AND GRAPHS

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

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

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

F - Flag, with following meaning:

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

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

M - Excluded because data for one sample are missing.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



| LAB CODE | SAMPLE K21 MEAN | PRINTING 103 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE K43 MEAN | PRINTING 60 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D.F = 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L100 | 56.6 | 5.4 | 1.78 | 7.3 | 1.70 | 17.0 | .6 | .73 | 1.3 | 1.11 | 40D | O | L100 |
| L106 | 40.5 | -10.7 | -3.56 | 1.2 | .28 | 12.6 | -3.8 | -4.52 | .7 | .59 | 40D | X | L106 |
| L107 | 52.6 | 1.3 | .44 | 5.8 | 1.35 | 17.1 | .7 | .89 | .6 | .49 | 40D | O | L107 |
| L121 | 50.9 | -.4 | -.12 | 4.2 | .97 | 15.7 | -.7 | -.80 | .7 | .58 | 40D | O | L121 |
| L122 | 50.0 | -1.2 | -.40 | 3.2 | .74 | 16.0 | -.4 | -.43 | 1.7 | 1.45 | 40D | O | L122 |
| L123 | 52.1 | .8 | .27 | 4.1 | .97 | 15.7 | -.7 | -.80 | 1.4 | 1.22 | 40D | O | L123 |
| L124G | 48.8 | -2.4 | -.81 | 2.9 | .67 | 16.0 | -.4 | -.44 | .8 | .66 | 40D | O | L124G |
| L125 | 50.0 | -1.3 | -.42 | 3.3 | .77 | 16.6 | .2 | .27 | 1.3 | 1.07 | 40D | O | L125 |
| L128 | 47.6 | -3.6 | -1.21 | 4.4 | 1.03 | 16.4 | .0 | .03 | 1.5 | 1.27 | 40D | O | L128 |
| L141 | 52.0 | .8 | .25 | 3.7 | .87 | 17.1 | .8 | .90 | 1.0 | .83 | 40D | O | L141 |
| L148 | 53.6 | 2.4 | .78 | 4.3 | 1.01 | 16.6 | .2 | .24 | 1.4 | 1.19 | 40D | O | L148 |
| L153 | 48.4 | -2.8 | -.94 | 5.9 | 1.38 | 16.9 | .5 | .62 | 1.4 | 1.17 | 40D | O | L153 |
| L158 | 46.9 | -4.3 | -1.44 | 4.9 | 1.14 | 15.8 | -.6 | -.69 | 1.3 | 1.11 | 40D | O | L158 |
| L159 | 50.9 | -.3 | -.10 | 1.7 | .39 | 15.9 | -.5 | -.62 | .8 | .71 | 40D | O | L159 |
| L163 | 52.3 | 1.0 | .34 | 5.8 | 1.36 | 16.6 | .2 | .29 | .8 | .69 | 40D | O | L163 |
| L166 | 51.6 | .3 | .11 | 4.1 | .96 | 16.5 | .2 | .18 | 1.3 | 1.07 | 40D | O | L166 |
| L174 | 51.4 | .2 | .05 | 4.8 | 1.12 | 16.6 | .2 | .22 | 1.2 | 1.02 | 40D | O | L174 |
| L182G | 50.9 | -.3 | -.11 | 7.1 | 1.66 | 16.4 | -.0 | -.02 | 1.6 | 1.38 | 40D | O | L182G |
| L183 | 56.7 | 5.5 | 1.81 | 4.9 | 1.14 | 17.3 | 1.0 | 1.15 | 1.2 | 1.04 | 40D | O | L183 |
| L190C | 52.7 | 1.5 | .49 | 5.6 | 1.32 | 16.4 | .0 | .01 | 1.7 | 1.43 | 40D | O | L190C |
| L190R | 54.4 | 3.2 | 1.05 | 6.7 | 1.57 | 16.1 | -.3 | -.31 | 1.2 | 1.05 | 40D | O | L190R |
| L212 | 47.4 | -3.8 | -1.27 | 5.8 | 1.36 | 14.5 | -1.9 | -2.23 | .8 | .66 | 40D | O | L212 |
| L219 | 47.4 | -3.8 | -1.26 | 2.9 | .68 | 15.9 | -.5 | -.60 | 1.0 | .85 | 40D | O | L219 |
| L223 | 53.6 | 2.4 | .78 | 4.1 | .96 | 17.6 | 1.2 | 1.43 | 1.3 | 1.10 | 40D | O | L223 |
| L230G | 59.7 | 8.5 | 2.81 | 5.5 | 1.28 | 18.3 | 1.9 | 2.30 | 1.3 | 1.06 | 40D | * | L230G |
| L232 | 43.0 | -8.3 | -2.75 | 7.8 | 1.83 | 14.6 | -1.8 | -2.13 | 1.1 | .93 | 40D | * | L232 |
| L236 | 52.7 | 1.5 | .48 | 5.4 | 1.26 | 17.0 | .6 | .76 | 1.0 | .83 | 40D | O | L236 |
| L238A | 51.7 | .5 | .15 | 2.5 | .58 | 17.0 | .6 | .76 | 1.0 | .86 | 40D | O | L238A |
| L241 | 47.8 | -3.4 | -1.14 | 3.8 | .88 | 15.7 | -.7 | -.81 | .9 | .80 | 40D | O | L241 |
| L242 | 50.0 | -1.2 | -.41 | 1.5 | .35 | 15.3 | -1.1 | -1.32 | 1.2 | 1.05 | 40D | O | L242 |
| L243G | 49.6 | -1.6 | -.54 | 4.8 | 1.13 | 15.7 | -.7 | -.85 | .8 | .70 | 40D | O | L243G |
| L254 | 52.2 | 1.0 | .32 | 3.8 | .89 | 17.2 | .8 | .98 | .9 | .78 | 40D | O | L254 |
| L259 | 47.9 | -3.3 | -1.11 | 3.1 | .73 | 14.8 | -1.5 | -1.83 | 1.1 | .92 | 40D | O | L259 |
| L261 | 51.8 | .6 | .19 | 5.6 | 1.30 | 16.1 | -.3 | -.31 | 1.4 | 1.19 | 40D | O | L261 |
| L262G | 50.4 | -.8 | -.27 | 1.8 | .43 | 16.6 | .2 | .22 | 1.2 | 1.05 | 40D | O | L262G |
| L265 | 48.5 | -2.8 | -.91 | 4.7 | 1.11 | 15.9 | -.5 | -.62 | 1.1 | .92 | 40D | O | L265 |
| L278 | 51.0 | -.3 | -.09 | 3.8 | .88 | 16.2 | -.2 | -.19 | 1.4 | 1.16 | 40D | O | L278 |
| L285 | 52.4 | 1.2 | .40 | 5.4 | 1.26 | 16.7 | .3 | .36 | 1.2 | 1.02 | 40D | O | L285 |
| L301 | 50.1 | -1.2 | -.38 | 4.3 | 1.00 | 16.3 | -.0 | -.06 | 1.3 | 1.08 | 40D | O | L301 |
| L308 | 50.9 | -.3 | -.11 | 3.7 | .86 | 16.6 | .2 | .29 | 1.3 | 1.14 | 40D | O | L308 |
| L320 | 46.8 | -4.4 | -1.47 | 2.7 | .63 | 15.6 | -.8 | -.93 | 1.8 | 1.55 | 40D | O | L320 |
| L321 | 46.0 | -5.2 | -1.74 | 3.6 | .85 | 12.8 | -3.6 | -4.28 | .6 | .53 | 40D | X | L321 |
| L324 | 50.4 | -.9 | -.28 | 4.2 | .98 | 16.4 | .1 | .06 | 1.0 | .81 | 40D | O | L324 |
| L326 | 54.3 | 3.1 | 1.03 | 7.1 | 1.65 | 18.4 | 2.0 | 2.40 | 1.0 | .88 | 40D | * | L326 |
| L328 | 50.8 | -.4 | -.14 | 4.8 | 1.12 | 16.7 | .3 | .35 | 1.4 | 1.20 | 40D | O | L328 |
| L339 | 40.4 | -10.8 | -3.60 | 5.0 | 1.18 | 12.1 | -4.3 | -5.10 | 1.0 | .86 | 40D | X | L339 |
| L344 | 47.4 | -3.8 | -1.27 | 4.8 | 1.12 | 15.6 | -.8 | -.98 | .9 | .76 | 40D | O | L344 |
| L376 | 53.6 | 2.4 | .78 | 5.0 | 1.17 | 17.0 | .6 | .70 | 1.4 | 1.17 | 40D | O | L376 |
| L380 | 50.6 | -.6 | -.21 | 2.1 | .48 | 15.6 | -.8 | -.93 | 1.3 | 1.07 | 40D | O | L380 |
| L388 | 59.5 | 8.2 | 2.73 | 5.0 | 1.16 | 17.2 | .9 | 1.03 | 1.6 | 1.39 | 40D | * | L388 |
| L394 | 54.4 | 3.2 | 1.05 | 5.1 | 1.19 | 17.6 | 1.2 | 1.43 | 1.3 | 1.13 | 40D | O | L394 |
| L396M | 48.5 | -2.7 | -.89 | 5.5 | 1.29 | 46.5 | 30.1 | 35.99 | 2.3 | 1.94 | 40D | # | L396M |
| L567 | 53.1 | 1.9 | .62 | 3.6 | .85 | 16.7 | .3 | .37 | 1.6 | 1.37 | 40D | O | L567 |
| L576 | 51.5 | .2 | .07 | 4.0 | .94 | 15.1 | -1.3 | -1.52 | 1.1 | .92 | 40D | O | L576 |
| L585 | 53.7 | 2.5 | .82 | 5.3 | 1.23 | 17.2 | .8 | .96 | 1.4 | 1.18 | 40D | O | L585 |
| L597 | 50.5 | -.7 | -.24 | 3.1 | .72 | 16.3 | -.1 | -.09 | 1.8 | 1.55 | 40D | O | L597 |
| L604 | 51.3 | .1 | .02 | 5.1 | 1.19 | 16.1 | -.3 | -.33 | .6 | .48 | 40D | O | L604 |
| L616 | 52.3 | 1.1 | .37 | 3.3 | .77 | 17.7 | 1.3 | 1.54 | .3 | .24 | 40D | O | L616 |
| L651 | 49.4 | -1.8 | -.61 | 3.8 | .88 | 15.0 | -1.4 | -1.65 | 1.1 | .89 | 40D | O | L651 |
| GR. MEAN = | 51.2 GURLEY UNITS | | | | | GRAND MEAN = | 16.4 GURLEY UNITS | | | | TEST DETERMINATIONS = 10 | | |
| SD MEANS = | 3.0 GURLEY UNITS | | | SD OF MEANS = | | .8 GURLEY UNITS | | | | | 55 LABS IN GRAND MEAN | | |
| | AVERAGE SDR = | | | 4.3 GURLEY UNITS | | | AVERAGE SDR = | | | 1.2 GURLEY UNITS | | | |
| L291 | 50.9 | -.3 | -.11 | 5.0 | 1.16 | 17.6 | 1.2 | 1.46 | 1.1 | .91 | 40U | * | L291 |

TOTAL NUMBER OF LABORATORIES REPORTING = 60

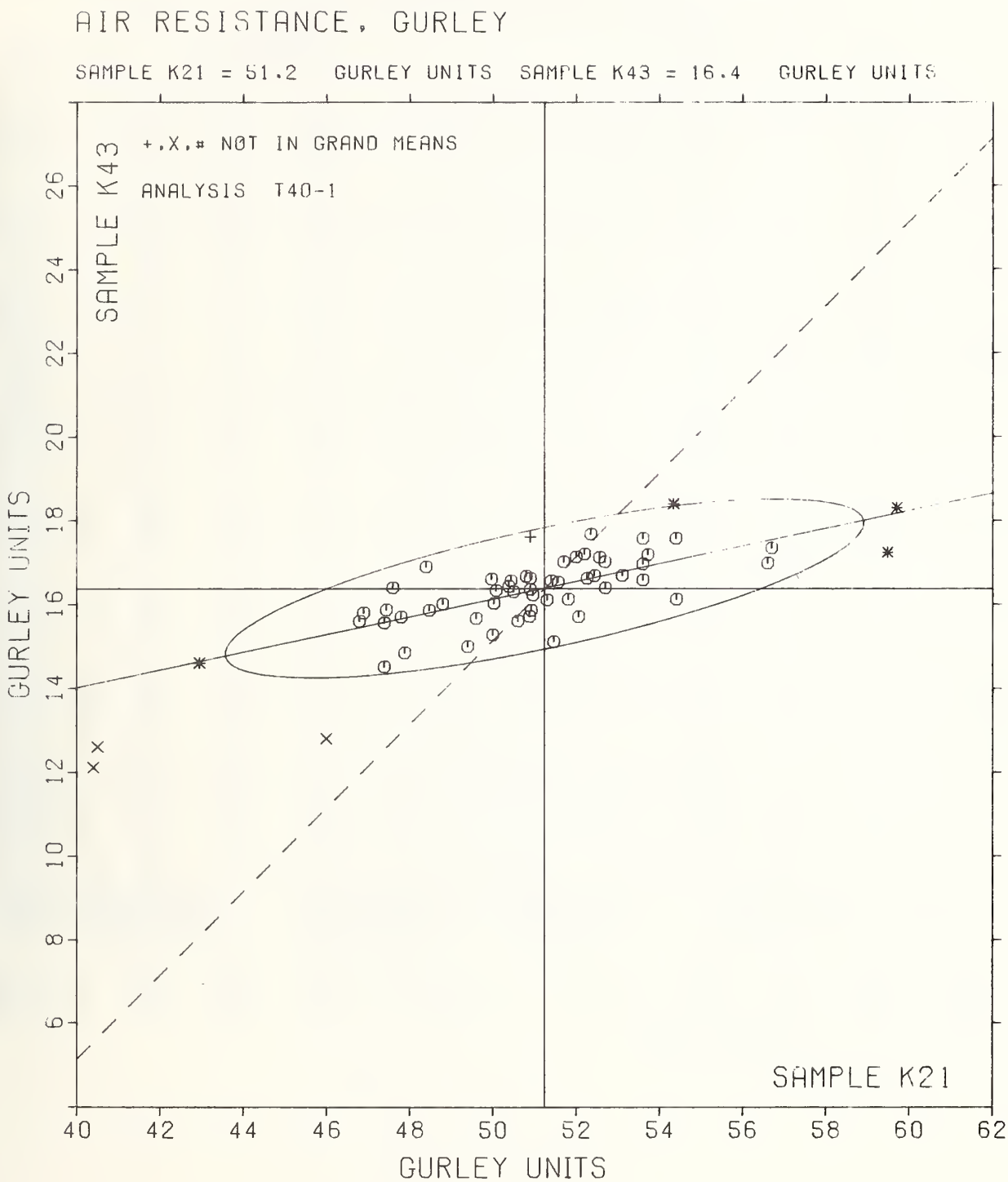
Best values: K21 51.0 ± 4.1 Gurley units
K43 16.3 ± 1.2 Gurley units



The following laboratories were omitted from the grand means because of extreme test results: 396M.

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

| LAB CODE | F | MEANS K21 | MEANS K43 | COORDINATES MAJOR | COORDINATES MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L339 | X | 40.4 | 12.1 | -11.5 | -1.9 | 1.02 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L106 | X | 40.5 | 12.6 | -11.3 | -1.5 | .43 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L232 | * | 43.0 | 14.6 | -8.5 | -.0 | 1.38 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L321 | X | 46.0 | 12.8 | -5.9 | -2.4 | .69 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L320 | O | 46.8 | 15.6 | -4.5 | .2 | 1.09 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L158 | O | 46.9 | 15.8 | -4.4 | .3 | 1.12 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L344 | O | 47.4 | 15.6 | -3.9 | -.0 | .94 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L212 | O | 47.4 | 14.5 | -4.1 | -1.0 | 1.01 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L219 | O | 47.4 | 15.9 | -3.8 | .3 | .76 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L128 | O | 47.6 | 16.4 | -3.6 | .8 | 1.15 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L241 | O | 47.8 | 15.7 | -3.5 | .0 | .84 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L259 | O | 47.9 | 14.8 | -3.6 | -.8 | .82 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L153 | O | 48.4 | 16.9 | -2.7 | 1.1 | 1.27 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L265 | O | 48.5 | 15.9 | -2.8 | .1 | 1.01 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L396N | # | 48.5 | 46.5 | 3.6 | 30.0 | 1.62 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L124G | O | 48.8 | 16.0 | -2.5 | .1 | .66 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L651 | O | 49.4 | 15.0 | -2.1 | -1.0 | .89 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L243G | O | 49.6 | 15.7 | -1.7 | -.4 | .91 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L125 | O | 50.0 | 16.6 | -1.2 | .5 | .92 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L242 | O | 50.0 | 15.3 | -1.4 | -.8 | .70 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L122 | O | 50.0 | 16.0 | -1.3 | -.1 | 1.09 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L301 | O | 50.1 | 16.3 | -1.1 | .2 | 1.04 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L324 | O | 50.4 | 16.4 | -.8 | .2 | .90 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L262G | O | 50.4 | 16.6 | -.8 | .3 | .74 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L597 | O | 50.5 | 16.3 | -.7 | .1 | 1.13 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L380 | O | 50.6 | 15.6 | -.8 | -.6 | .78 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L328 | O | 50.8 | 16.7 | -.4 | .4 | 1.16 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L121 | O | 50.9 | 15.7 | -.5 | -.6 | .77 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L291 | * | 50.9 | 17.6 | -.1 | 1.3 | 1.04 | 40U | AIR RESISTANCE, SHEFFIELD IN GURLEY UNITS |
| L308 | O | 50.9 | 16.6 | -.3 | .3 | 1.00 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L182G | O | 50.9 | 16.4 | -.3 | .1 | 1.52 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L159 | O | 50.9 | 15.9 | -.4 | -.4 | .55 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L278 | O | 51.0 | 16.2 | -.3 | -.1 | 1.02 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L604 | O | 51.3 | 16.1 | .0 | -.3 | .84 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L174 | O | 51.4 | 16.6 | .2 | .1 | 1.07 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L576 | O | 51.5 | 15.1 | -.0 | -1.3 | .93 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L166 | O | 51.6 | 16.5 | .3 | .1 | 1.02 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L238A | O | 51.7 | 17.0 | .6 | .5 | .72 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L261 | O | 51.8 | 16.1 | .5 | -.4 | 1.24 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L141 | O | 52.0 | 17.1 | .9 | .6 | .85 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L123 | O | 52.1 | 15.7 | .7 | -.8 | 1.09 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L254 | O | 52.2 | 17.2 | 1.1 | .6 | .83 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L163 | O | 52.3 | 16.6 | 1.1 | .0 | 1.02 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L616 | O | 52.3 | 17.7 | 1.4 | 1.0 | .50 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L285 | O | 52.4 | 16.7 | 1.2 | .0 | 1.14 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| I107 | O | 52.6 | 17.1 | 1.4 | .5 | .92 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L236 | O | 52.7 | 17.0 | 1.6 | .3 | 1.05 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L190C | O | 52.7 | 16.4 | 1.4 | -.3 | 1.37 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L567 | O | 53.1 | 16.7 | 1.9 | -.1 | 1.11 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L376 | O | 53.6 | 17.0 | 2.4 | .1 | 1.17 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L148 | O | 53.6 | 16.6 | 2.4 | -.3 | 1.10 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L223 | O | 53.6 | 17.6 | 2.6 | .7 | 1.03 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L585 | O | 53.7 | 17.2 | 2.6 | .3 | 1.20 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L326 | * | 54.3 | 18.4 | 3.4 | 1.3 | 1.27 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L394 | O | 54.4 | 17.6 | 3.3 | .5 | 1.16 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L190R | O | 54.4 | 16.1 | 3.1 | -.9 | 1.31 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L100 | O | 56.6 | 17.0 | 5.4 | -.5 | 1.40 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L183 | O | 56.7 | 17.3 | 5.5 | -.2 | 1.09 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L388 | * | 59.5 | 17.2 | 8.2 | -.9 | 1.27 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| L230G | * | 59.7 | 18.3 | 8.7 | .1 | 1.17 | 40D | AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION |
| GMEANS: | | 51.2 | 16.4 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 7.8 | 1.4 | WITH GAMMA = 11 DEGREES | | |


AIR RESISTANCE, GURLEY
SAMPLE K21 = 51.2 GURLEY UNITS SAMPLE K43 = 16.4 GURLEY UNITS
+,X,* NOT IN GRAND MEANS
ANALYSIS T40-1
SAMPLE K43
GURLEY UNITS
6
8
10
12
14
16
18
20
22
24
26
40
42
44
46
48
50
52
54
56
58
60
62
GURLEY UNITS
SAMPLE K21

ANALYSIS T40-2 TABLE 1

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

| LAB CODE | SAMPLE K21 MEAN | PRINTING 103 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE K43 MEAN | PRINTING 60 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D.= 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L114 | 79.4 | 8.3 | 1.40 | 4.9 | .82 | 177.7 | 10.1 | 1.10 | 13.0 | 1.48 | 40S | G | L114 |
| L121 | 89.0 | 17.9 | 3.03 | 5.8 | .97 | 172.9 | 5.3 | .58 | 9.8 | 1.11 | 40S | * | L121 |
| L124S | 70.2 | -.9 | -.15 | 6.8 | 1.15 | 168.0 | .4 | .05 | 7.4 | .84 | 40S | G | L124S |
| L132 | 69.0 | -2.1 | -.35 | 8.2 | 1.38 | 168.4 | .8 | .09 | 11.8 | 1.35 | 40S | G | L132 |
| L148 | 79.9 | 8.8 | 1.49 | 4.5 | .75 | 174.6 | 7.0 | .77 | 8.9 | 1.02 | 40S | G | L148 |
| L150 | 67.2 | -3.9 | -.66 | 4.4 | .74 | 194.5 | 26.9 | 2.93 | 23.9 | 2.72 | 40S | * | L150 |
| L157 | 67.8 | -3.3 | -.56 | 5.8 | .97 | 174.6 | 7.0 | .77 | 10.9 | 1.25 | 40S | G | L157 |
| L158 | 73.0 | 1.9 | .32 | 5.9 | .99 | 162.0 | -5.6 | -.60 | 11.4 | 1.29 | 40S | G | L158 |
| L173B | 67.5 | -3.6 | -.61 | 4.9 | .82 | 177.0 | 9.4 | 1.03 | 4.8 | .55 | 40S | G | L173B |
| L190C | 78.8 | 7.7 | 1.30 | 6.4 | 1.08 | 162.6 | -5.0 | -.54 | 8.8 | 1.00 | 40S | G | L190C |
| L213 | 75.7 | 4.6 | .78 | 5.7 | .96 | 165.2 | -2.4 | -.26 | 8.1 | .92 | 40S | G | L213 |
| L223 | 62.1 | -9.0 | -1.52 | 3.7 | .62 | 163.0 | -4.6 | -.50 | 10.2 | 1.17 | 40S | G | L223 |
| L228 | 66.4 | -4.7 | -.79 | 6.4 | 1.08 | 165.9 | -1.7 | -.18 | 5.8 | .66 | 40S | G | L228 |
| L230S | 69.6 | -1.5 | -.25 | 7.0 | 1.17 | 159.9 | -7.7 | -.83 | 4.0 | .46 | 40S | G | L230S |
| L233 | 55.4 | -15.7 | -2.66 | 7.2 | 1.21 | 158.0 | -9.6 | -1.04 | 8.2 | .93 | 40S | * | L233 |
| L241 | 79.7 | 8.6 | 1.46 | 5.7 | .95 | 176.4 | 8.8 | .96 | 7.6 | .87 | 40S | G | L241 |
| L249 | 65.9 | -5.2 | -.88 | 6.4 | 1.08 | 164.4 | -3.2 | -.34 | 10.0 | 1.14 | 40S | G | L249 |
| L255 | 92.1 | 21.0 | 3.55 | 6.2 | 1.03 | 188.7 | 21.1 | 2.30 | 5.8 | .66 | 40S | X | L255 |
| L257A | 77.6 | 6.5 | 1.10 | 5.0 | .85 | 157.5 | -10.1 | -1.09 | 8.7 | 1.00 | 40S | G | L257A |
| L257B | 68.6 | -2.5 | -.42 | 5.6 | .94 | 169.0 | 1.4 | .16 | 13.2 | 1.51 | 40S | G | L257B |
| L257C | 78.5 | 7.4 | 1.25 | 8.0 | 1.35 | 161.7 | -5.9 | -.64 | 8.0 | .92 | 40S | G | L257C |
| L260 | 71.2 | .1 | .02 | 6.7 | 1.12 | 173.4 | 5.8 | .64 | 13.9 | 1.59 | 40S | G | L260 |
| L262S | 71.4 | .3 | .05 | 4.1 | .68 | 157.2 | -10.4 | -1.13 | 8.4 | .96 | 40S | G | L262S |
| L288 | 73.3 | 2.2 | .37 | 4.1 | .69 | 187.3 | 19.7 | 2.15 | 13.6 | 1.55 | 40S | G | L288 |
| L301 | 68.2 | -2.9 | -.49 | 8.3 | 1.40 | 168.6 | 1.0 | .11 | 9.4 | 1.07 | 40S | G | L301 |
| L305 | 70.0 | -1.1 | -.19 | 5.8 | .97 | 171.0 | 3.4 | .37 | 6.5 | .74 | 40S | G | L305 |
| L318 | 70.2 | -.9 | -.15 | 6.4 | 1.07 | 158.5 | -9.1 | -.98 | 5.6 | .64 | 40S | G | L318 |
| L352 | 78.5 | 7.4 | 1.25 | 2.3 | .39 | 168.6 | 1.0 | .11 | 8.7 | .99 | 40S | G | L352 |
| L354 | 73.6 | 2.5 | .42 | 6.8 | 1.15 | 168.8 | 1.2 | .14 | 9.3 | 1.06 | 40S | G | L354 |
| L360 | 69.1 | -2.0 | -.34 | 2.8 | .48 | 157.2 | -10.4 | -1.13 | 6.5 | .74 | 40S | G | L360 |
| L370 | 67.3 | -3.8 | -.64 | 5.5 | .92 | 156.3 | -11.3 | -1.22 | 8.2 | .93 | 40S | G | L370 |
| L372 | 69.5 | -1.6 | -.27 | 9.9 | 1.66 | 170.4 | 2.8 | .31 | 6.5 | .74 | 40S | G | L372 |
| L390 | 66.5 | -4.6 | -.78 | 5.8 | .97 | 161.0 | -6.6 | -.71 | 8.4 | .96 | 40S | G | L390 |
| L562 | 71.5 | .4 | .07 | 6.3 | 1.06 | 181.8 | 14.2 | 1.55 | 9.1 | 1.03 | 40S | G | L562 |
| L575 | 71.1 | .0 | .00 | 4.4 | .74 | 168.2 | .6 | .07 | 12.3 | 1.40 | 40S | G | L575 |
| L585 | 71.5 | .4 | .07 | 8.2 | 1.38 | 167.5 | -.1 | -.01 | 11.8 | 1.35 | 40S | G | L585 |
| L597 | 70.6 | -.5 | -.08 | 6.9 | 1.16 | 158.9 | -8.7 | -.94 | 6.0 | .68 | 40S | G | L597 |
| L600 | 71.0 | -.1 | -.02 | 7.1 | 1.20 | 160.2 | -7.4 | -.80 | 5.5 | .63 | 40S | G | L600 |
| L626 | 64.4 | -6.7 | -1.13 | 8.8 | 1.47 | 146.3 | -21.3 | -2.31 | 6.7 | .77 | 40S | G | L626 |
| L684 | 64.5 | -6.6 | -1.12 | 3.7 | .62 | 176.7 | 9.1 | .99 | 8.9 | 1.02 | 40S | G | L684 |
| L687 | 69.1 | -2.0 | -.34 | 5.5 | .92 | 171.1 | 3.5 | .39 | 6.5 | .74 | 40S | G | L687 |
| GR. MEAN = | 71.1 SHEFF. UNITS | | | | | GRAND MEAN = | 167.6 SHEFF. UNITS | | | | TEST DETERMINATIONS = | | 10 |
| SD MEANS = | 5.9 SHEFF. UNITS | | | | | SD OF MEANS = | 9.2 SHEFF. UNITS | | | | 40 LABS IN GRAND MEANS | | |
| | AVERAGE SDR = | 5.9 SHEFF. UNITS | | | | | AVERAGE SDR = | 8.8 SHEFF. UNITS | | | | | |
| L182B | 246.5 | 175.4 | 29.67 | 18.3 | 3.07 | 762.5 | 594.9 | 64.67 | 35.8 | 4.09 | 40B | * | L182B |
| L243B | 280.2 | 209.1 | 35.37 | 24.5 | 4.12 | 821.4 | 653.6 | 71.07 | 52.2 | 5.95 | 40B | * | L243B |
| L312 | 80.0 | 8.9 | 1.51 | 3.8 | .63 | 167.5 | -.1 | -.01 | 6.5 | .74 | 40T | * | L312 |
| L587 | 74.0 | 2.9 | .49 | 5.7 | .95 | 169.5 | 1.9 | .21 | 8.3 | .95 | 40T | * | L587 |

TOTAL NUMBER OF LABORATORIES REPORTING = 45

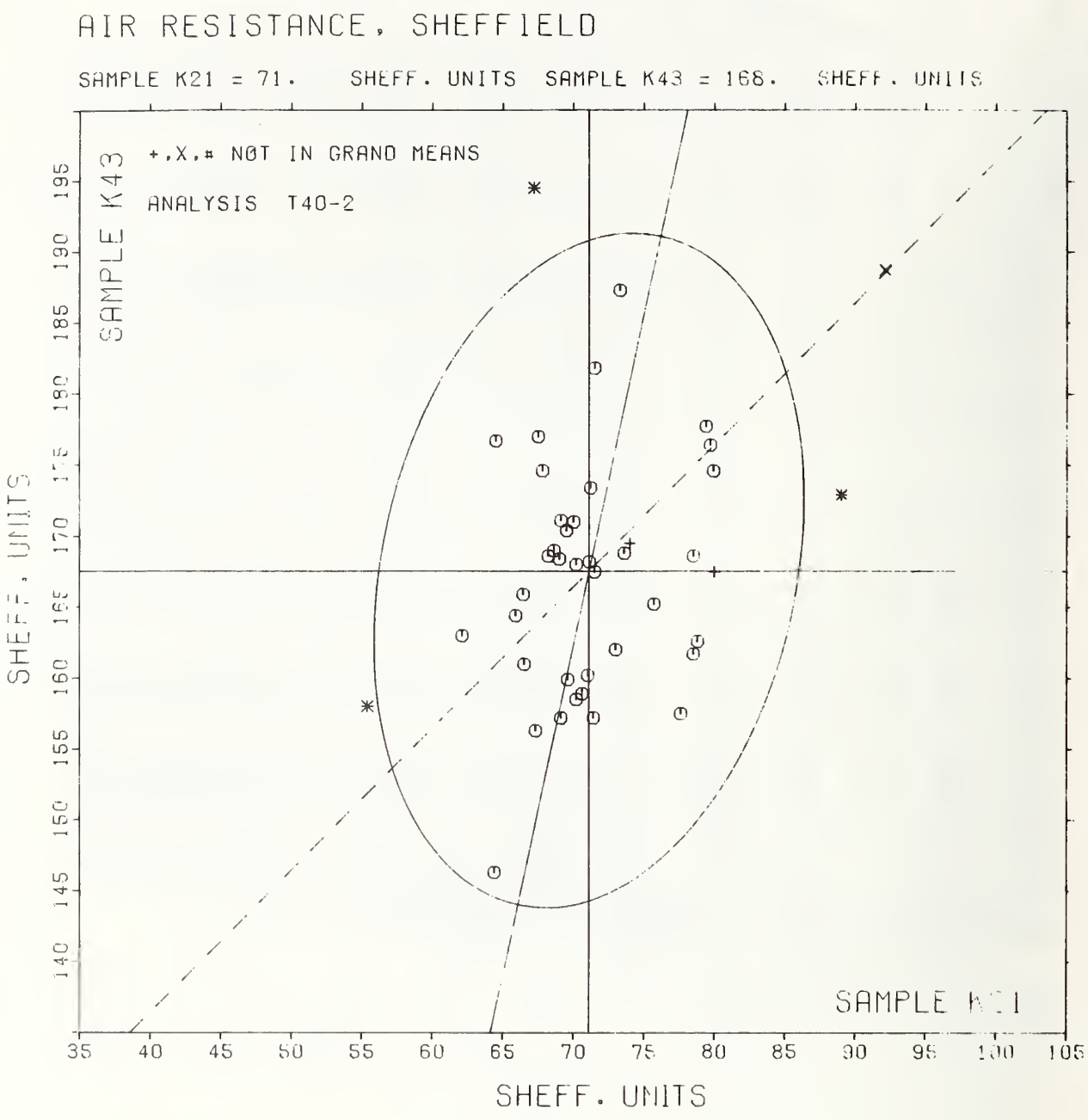
Best values: K21 71 ± 8 Sheffield units
K43 167 ± 14 Sheffield units

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 X21 | MEANS X43 | COORDINATES MAJOR | COORDINATES MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L233 | * | 55.4 | 158.0 | -12.6 | 13.3 | 1.07 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L223 | O | 62.1 | 163.0 | -6.3 | 7.8 | .89 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L626 | O | 64.4 | 146.3 | -22.2 | 2.1 | 1.12 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L684 | O | 64.5 | 176.7 | 7.6 | 8.4 | .82 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L249 | O | 65.9 | 164.4 | -4.2 | 4.4 | 1.11 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L228 | O | 66.4 | 165.9 | -2.6 | 4.2 | .87 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L390 | O | 66.5 | 161.0 | -7.4 | 3.1 | .97 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L150 | * | 67.2 | 194.5 | 25.5 | 9.5 | 1.73 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L370 | O | 67.3 | 156.3 | -11.8 | 1.3 | .92 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L173B | O | 67.5 | 177.0 | 8.5 | 5.5 | .68 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L157 | O | 67.8 | 174.6 | 6.2 | 4.7 | 1.11 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L301 | O | 68.2 | 168.6 | .4 | 3.0 | 1.23 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L257B | O | 68.6 | 169.0 | .9 | 2.7 | 1.23 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L132 | O | 69.0 | 168.4 | .4 | 2.2 | 1.37 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L687 | O | 69.1 | 171.1 | 3.0 | 2.7 | .83 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L360 | O | 69.1 | 157.2 | -10.5 | -.2 | .61 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L372 | O | 69.5 | 170.4 | 2.4 | 2.2 | 1.20 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L230S | O | 69.6 | 159.9 | -7.8 | -.1 | .82 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L305 | O | 70.0 | 171.0 | 3.1 | 1.8 | .85 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L124S | O | 70.2 | 168.0 | .2 | 1.0 | 1.00 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L318 | O | 70.2 | 158.5 | -9.0 | -1.0 | .86 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L597 | O | 70.6 | 158.9 | -8.6 | -1.3 | .92 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L600 | O | 71.0 | 160.2 | -7.2 | -1.5 | .91 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L575 | O | 71.1 | 168.2 | .6 | .1 | 1.07 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L260 | O | 71.2 | 173.4 | 5.7 | 1.1 | 1.35 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L262S | O | 71.4 | 157.2 | -10.1 | -2.5 | .82 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L585 | O | 71.5 | 167.5 | .0 | -.4 | 1.36 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L562 | O | 71.5 | 181.8 | 14.0 | 2.6 | 1.04 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L158 | O | 73.0 | 162.0 | -5.0 | -3.0 | 1.14 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L288 | O | 73.3 | 187.3 | 19.8 | 2.0 | 1.12 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L354 | O | 73.6 | 168.8 | 1.7 | -2.2 | 1.10 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L587 | + | 74.0 | 169.5 | 2.5 | -2.4 | .95 | 40T | AIR RESISTANCE, SHEFFIELD (3 INCH DIAMETER ORIFICE) |
| L213 | O | 75.7 | 165.2 | -1.3 | -5.0 | .94 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L257A | O | 77.6 | 157.5 | -8.5 | -8.5 | .92 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L352 | O | 78.5 | 168.6 | 2.6 | -7.0 | .69 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L257C | O | 78.5 | 161.7 | -4.2 | -8.5 | 1.13 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L190C | O | 78.8 | 162.6 | -3.2 | -8.6 | 1.04 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L114 | O | 79.4 | 177.7 | 11.7 | -6.0 | 1.15 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L241 | O | 79.7 | 176.4 | 10.5 | -6.6 | .91 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L148 | O | 79.9 | 174.6 | 8.7 | -7.1 | .88 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L312 | + | 80.0 | 167.5 | 1.8 | -8.7 | .68 | 40T | AIR RESISTANCE, SHEFFIELD (3 INCH DIAMETER ORIFICE) |
| L121 | * | 89.0 | 172.9 | 9.0 | -16.4 | 1.04 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L255 | X | 92.1 | 188.7 | 25.1 | -16.1 | .85 | 40S | AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE) |
| L182B | + | 246.5 | 762.5 | 618.5 | -46.6 | 3.58 | 40B | AIR RESISTANCE, BENDTSEN, WG 150 |
| L243B | + | 280.2 | 821.4 | 683.2 | -67.2 | 5.04 | 40B | AIR RESISTANCE, BENDTSEN, WG 150 |
| GMEANS: | | 71.1 | 167.6 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 24.1 | 14.7 | WITH GAMMA = 77 DEGREES | | |


AIR RESISTANCE, SHEFFIELD
SAMPLE K21 = 71. SHEFF. UNITS SAMPLE K43 = 168. SHEFF. UNITS
+,X,* NOT IN GRAND MEANS
ANALYSIS T40-2
SAMPLE K43
SHEFF. UNITS
SHEFF. UNITS

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

| LAB CODE | SAMPLE E68 95 GRAMS PER SQUARE METER MEAN | DEV | N.DEV | SDR | R.SDR | SAMPLE E65 98 GRAMS PER SQUARE METER MEAN | DEV | N.DEV | SDR | R.SDR | TEST D.F = 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L122 | 622. | -29. | -.47 | 144. | 1.69 | 657. | -73. | -1.17 | 202. | 1.37 | 41G | 6 | L122 |
| L128 | 620. | -31. | -.50 | 56. | .66 | 780. | 50. | .80 | 86. | .58 | 41G | 6 | L128 |
| L134 | 691. | 40. | .65 | 81. | .95 | 716. | -14. | -.23 | 177. | 1.20 | 41G | 6 | L134 |
| L166M | 603. | -48. | -.77 | 100. | 1.18 | 781. | 51. | .81 | 154. | 1.04 | 41G | 6 | L166M |
| L230 | 713. | 62. | 1.01 | 57. | .67 | 697. | -34. | -.54 | 124. | .84 | 41G | 6 | L230 |
| L259 | 625. | -26. | -.42 | 66. | .77 | 739. | 8. | .13 | 218. | 1.48 | 41G | 6 | L259 |
| L312 | 619. | -32. | -.52 | 70. | .82 | 662. | -69. | -1.10 | 157. | 1.06 | 41G | 6 | L312 |
| L358 | 536. | -115. | -1.86 | 86. | 1.01 | 629. | -102. | -1.63 | 90. | .61 | 41G | 6 | L358 |
| L557 | 770. | 118. | 1.92 | 142. | 1.67 | 754. | 23. | .37 | 116. | .78 | 41G | 6 | L557 |
| L558 | 697. | 46. | .74 | 78. | .92 | 838. | 107. | 1.71 | 177. | 1.20 | 41G | 6 | L558 |
| L574 | 684. | 33. | .53 | 51. | .60 | 722. | -9. | -.14 | 153. | 1.03 | 41G | 6 | L574 |
| L576 | 632. | -19. | -.31 | 91. | 1.07 | 793. | 63. | 1.00 | 119. | .81 | 41G | 6 | L576 |

GR. MEAN = 651. SEC/10 CC GRAND MEAN = 731. SEC/10 CC TEST DETERMINATIONS = 10
SD MEANS = 62. SEC/10 CC SD OF MEANS = 63. SEC/10 CC 12 LABS IN GRAND MEANS
AVERAGE SDR = 85. SEC/10 CC AVERAGE SDR = 148. SEC/10 CC
TOTAL NUMBER OF LABORATORIES REPORTING = 12

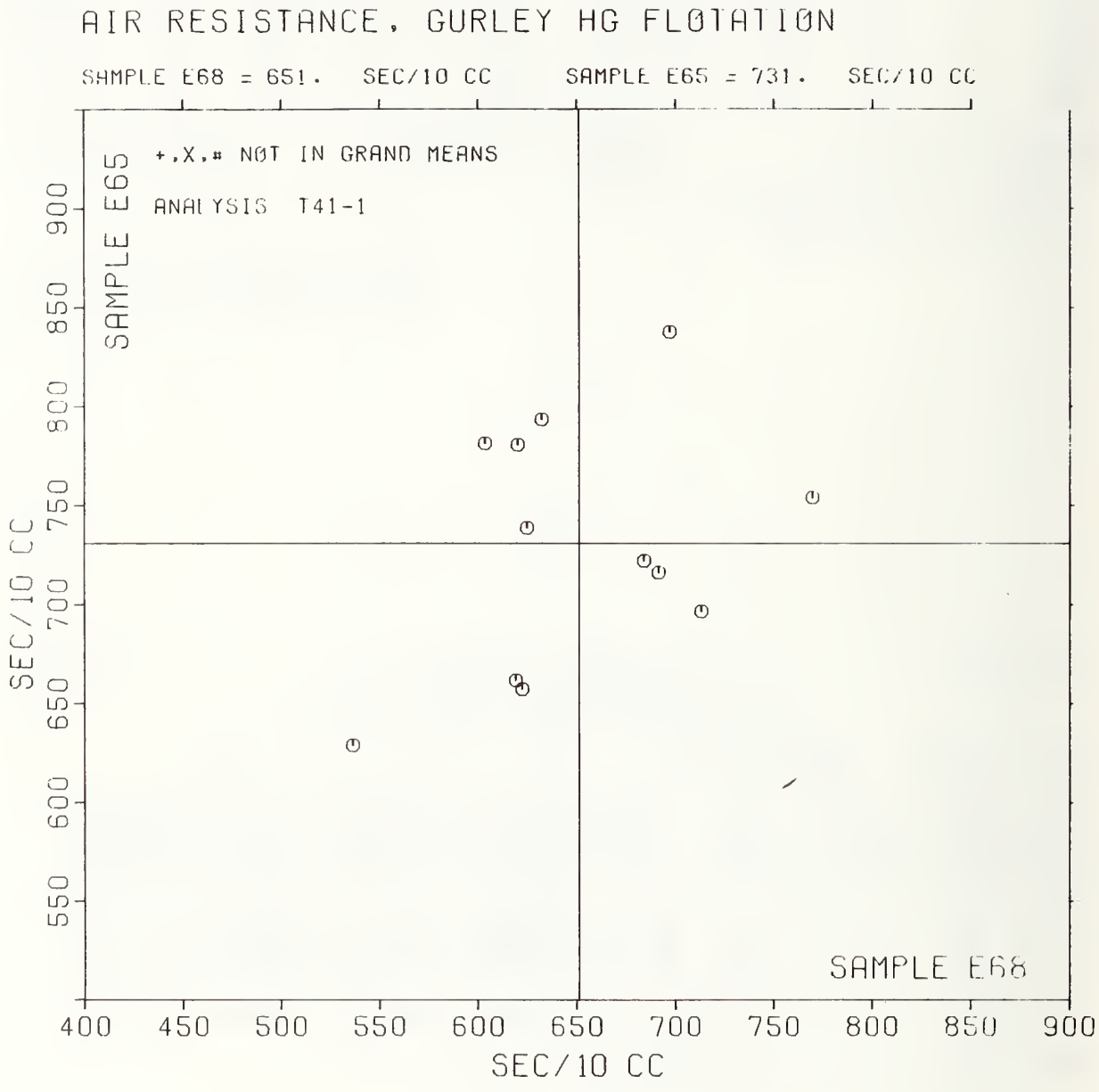
Best values: E68 650 seconds per 10cc,
E65 730 mercury density
(direct reading)

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



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

| LAB CODE | F | MEANS E68 | E65 | COORDINATES MAJOR | MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L358 | 6 | 536. | 629. | -153. | 12. | .81 | 41G | AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION |
| L166M | 6 | 603. | 781. | 3. | 70. | 1.11 | 41G | AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION |
| L312 | 6 | 619. | 662. | -72. | -25. | .94 | 41G | AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION |
| L128 | 6 | 620. | 780. | 14. | 57. | .62 | 41G | AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION |
| L122 | 6 | 622. | 657. | -73. | -30. | 1.53 | 41G | AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION |
| L259 | 6 | 625. | 739. | -13. | 24. | 1.13 | 41G | AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION |
| L576 | 6 | 632. | 793. | 32. | 57. | .94 | 41G | AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION |
| L574 | 6 | 684. | 722. | 17. | -30. | .82 | 41G | AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION |
| L134 | 6 | 691. | 716. | 18. | -39. | 1.08 | 41G | AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION |
| L558 | 6 | 697. | 838. | 109. | 42. | 1.06 | 41G | AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION |
| L230 | 6 | 713. | 697. | 19. | -68. | .75 | 41G | AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION |
| L557 | 6 | 770. | 754. | 99. | -69. | 1.22 | 41G | AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION |
| GMEANS: | | 651. | 731. | | | 1.00 | | |
| | | 95% ELLIPSE: | | 218. | 149. | WITH GAMMA = 45 DEGREES | | |


AIR RESISTANCE, GURLEY HG FLOTATION
SAMPLE E68 = 651. SEC/10 CC
SAMPLE E65 = 731. SEC/10 CC
+,X,# NOT IN GRAND MEANS
ANALYSIS T41-1
SAMPLE E65
SEC/10 CC
400 450 500 550 600 650 700 750 800 850 900
550 600 650 700 750 800 850 900
SAMPLE E68
SEC/10 CC

REPORT NO. 58G | TAPPI COLLABORATIVE REFERENCE PROGRAM | FEBRUARY 1979

ANALYSIS T44-1 TABLE 1

SMOOTHNESS, PARKER PRINTSURF

| LAB CODE | SAMPLE K45 PRINTING 60 GRAMS PER SQUARE METER MEAN | DEV | N.DEV | SDR | R.SDR | SAMPLE A83 WOVE ENVELOPE PAPER 75 GRAMS PER SQUARE METER MEAN | DEV | N.DEV | SDR | R.SDR | TEST D.= 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L122 | 6.19 | .72 | 1.66 | .11 | 1.11 | 5.43 | .60 | 1.50 | .39 | 1.61 | 44P | 6 | L122 |
| L136 | 5.29 | -.18 | -.42 | .17 | 1.71 | 4.36 | -.48 | -1.20 | .22 | .91 | 44P | 6 | L136 |
| L182 | 5.49 | .02 | .04 | .03 | .32 | 4.76 | -.07 | -.19 | .16 | .65 | 44P | 6 | L182 |
| L183 | 5.04 | -.43 | -1.00 | .05 | .53 | 4.54 | -.30 | -.75 | .16 | .65 | 44P | 6 | L183 |
| L223 | 5.46 | -.01 | -.03 | .10 | 1.06 | 4.90 | .06 | .15 | .34 | 1.38 | 44P | 6 | L223 |
| L288 | 6.00 | .53 | 1.21 | .09 | .97 | 5.45 | .61 | 1.54 | .35 | 1.44 | 44P | 6 | L288 |
| L317 | 5.57 | .10 | .22 | .15 | 1.53 | 5.00 | .16 | .41 | .24 | .97 | 44P | 6 | L317 |
| L588 | 4.78 | -.69 | -1.59 | .12 | 1.26 | 4.46 | -.38 | -.95 | .18 | .75 | 44P | 6 | L588 |
| L669 | 5.43 | -.04 | -.10 | .05 | .50 | 4.64 | -.20 | -.50 | .16 | .65 | 44P | 6 | L669 |

GR. MEAN = 5.47 MICRONS — GRAND MEAN = 4.84 MICRONS — TEST DETERMINATIONS = 10

SD MEANS = .43 MICRONS — SD OF MEANS = .40 MICRONS — 9 LABS IN GRAND MEANS

AVERAGE SDR = .10 MICRONS — AVERAGE SDR = .24 MICRONS

TOTAL NUMBER OF LABORATORIES REPORTING = 9

Best values: K45 5.5 microns
A83 4.7 microns

REPORT NO. 58G | TAPPI COLLABORATIVE REFERENCE PROGRAM | FEBRUARY 1979

ANALYSIS T44-1 TABLE 2

SMOOTHNESS, PARKER PRINTSURF

| LAB CODE | F | MEANS K45 | A83 | COORDINATES MAJOR | MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L588 | 6 | 4.78 | 4.46 | -.77 | .18 | 1.01 | 44P | SMOOTHNESS, PARKER PRINTSURF |
| L183 | 6 | 5.04 | 4.54 | -.52 | .07 | .59 | 44P | SMOOTHNESS, PARKER PRINTSURF |
| L136 | 6 | 5.29 | 4.36 | -.46 | -.23 | 1.31 | 44P | SMOOTHNESS, PARKER PRINTSURF |
| L669 | 6 | 5.43 | 4.64 | -.16 | -.12 | .57 | 44P | SMOOTHNESS, PARKER PRINTSURF |
| L223 | 6 | 5.46 | 4.90 | .03 | .05 | 1.22 | 44P | SMOOTHNESS, PARKER PRINTSURF |
| L182 | 6 | 5.49 | 4.76 | -.04 | -.07 | .49 | 44P | SMOOTHNESS, PARKER PRINTSURF |
| L317 | 6 | 5.57 | 5.00 | .18 | .05 | 1.25 | 44P | SMOOTHNESS, PARKER PRINTSURF |
| L288 | 6 | 6.00 | 5.45 | .80 | .10 | 1.20 | 44P | SMOOTHNESS, PARKER PRINTSURF |
| L122 | 6 | 6.19 | 5.43 | .93 | -.04 | 1.36 | 44P | SMOOTHNESS, PARKER PRINTSURF |
| GMEANS: | | 5.47 | 4.84 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 1.89 | .42 | WITH GAMMA = 42 DEGREES | | |

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

| LAB CODE | SAMPLE K45 PRINTING 60 GRAMS PER SQUARE METER MEAN | DEV | N.DEV | SDR | R.SDR | SAMPLE A83 WOVE ENVELOPE PAPER 75 GRAMS PER SQUARE METER MEAN | DEV | N.DEV | SDR | R.SDR | TEST D.F 15 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L100 | 162.5 | 2.3 | .32 | 5.0 | .55 | 96.2 | -9.2 | -1.36 | 6.9 | .65 | 45S | 0 | L100 |
| L108 | 155.0 | -5.3 | -.75 | 6.2 | .68 | 106.7 | 1.3 | .19 | 8.7 | .81 | 45S | 0 | L108 |
| L114 | 164.1 | 3.8 | .54 | 9.9 | 1.08 | 98.6 | -6.8 | -1.00 | 11.4 | 1.06 | 45S | 0 | L114 |
| L121 | 156.3 | -4.0 | -.57 | 7.4 | .80 | 106.1 | .7 | .10 | 11.5 | 1.08 | 45S | 0 | L121 |
| L122 | 161.9 | 1.6 | .23 | 8.4 | .92 | 112.1 | 6.7 | .98 | 13.3 | 1.24 | 45S | 0 | L122 |
| L123 | 163.4 | 3.1 | .45 | 11.2 | 1.23 | 101.9 | -3.6 | -.52 | 11.4 | 1.06 | 45S | 0 | L123 |
| L124 | 153.6 | -6.7 | -.95 | 11.0 | 1.20 | 103.1 | -2.4 | -.35 | 11.0 | 1.03 | 45S | 0 | L124 |
| L125 | 167.0 | 6.7 | .96 | 11.5 | 1.25 | 103.0 | -2.4 | -.36 | 16.8 | 1.56 | 45S | 0 | L125 |
| L126 | 164.5 | 4.3 | .61 | 15.3 | 1.68 | 106.2 | .8 | .11 | 14.8 | 1.38 | 45S | 0 | L126 |
| L128 | 160.5 | .2 | .03 | 11.7 | 1.28 | 102.9 | -2.6 | -.38 | 8.7 | .82 | 45S | 0 | L128 |
| L132 | 169.5 | 9.3 | 1.32 | 13.6 | 1.48 | 101.3 | -4.2 | -.61 | 14.3 | 1.33 | 45S | 0 | L132 |
| L134 | 150.7 | -9.6 | -1.37 | 7.5 | .82 | 97.7 | -7.8 | -1.14 | 6.2 | .58 | 45S | 0 | L134 |
| L139S | 163.9 | 3.6 | .51 | 6.7 | .74 | 118.5 | 13.1 | 1.92 | 9.0 | .84 | 45S | 0 | L139S |
| L148 | 169.0 | 8.7 | 1.24 | 9.5 | 1.03 | 116.3 | 10.8 | 1.59 | 13.2 | 1.23 | 45S | 0 | L148 |
| L150 | 170.9 | 10.6 | 1.51 | 18.6 | 2.03 | 105.5 | .0 | .00 | 14.9 | 1.39 | 45S | 0 | L150 |
| L152 | 163.2 | 2.9 | .42 | 5.4 | .59 | 111.7 | 6.3 | .92 | 11.3 | 1.06 | 45S | 0 | L152 |
| L153 | 173.7 | 13.4 | 1.91 | 7.3 | .79 | 114.7 | 9.2 | 1.35 | 7.6 | .71 | 45S | 0 | L153 |
| L157 | 168.5 | 8.2 | 1.17 | 11.5 | 1.26 | 116.6 | 11.2 | 1.64 | 14.5 | 1.36 | 45S | 0 | L157 |
| L158 | 158.0 | -2.3 | -.32 | 7.3 | .79 | 110.7 | 5.2 | .77 | 10.2 | .95 | 45S | 0 | L158 |
| L159 | 170.1 | 9.8 | 1.39 | 11.8 | 1.28 | 114.9 | 9.5 | 1.39 | 10.7 | 1.00 | 45S | 0 | L159 |
| L162 | 156.7 | -3.6 | -.51 | 6.2 | .67 | 107.0 | 1.6 | .23 | 7.0 | .65 | 45S | 0 | L162 |
| L166 | 153.9 | -6.3 | -.90 | 8.0 | .87 | 109.3 | 3.9 | .57 | 9.2 | .86 | 45S | 0 | L166 |
| L167 | 162.3 | 2.1 | .29 | 4.2 | .46 | 112.7 | 7.2 | 1.06 | 5.0 | .46 | 45S | 0 | L167 |
| L173B | 161.7 | 1.4 | .20 | 7.5 | .82 | 88.7 | -16.8 | -2.46 | 6.9 | .65 | 45S | * | L173B |
| L183S | 162.9 | 2.7 | .38 | 8.8 | .96 | 111.9 | 6.4 | .94 | 16.7 | 1.56 | 45S | 0 | L183S |
| L190C | 159.4 | -.9 | -.12 | 7.4 | .81 | 108.3 | 2.9 | .42 | 9.2 | .86 | 45S | 0 | L190C |
| L190R | 157.1 | -3.1 | -.45 | 9.3 | 1.01 | 93.1 | -12.3 | -1.81 | 12.0 | 1.11 | 45S | 0 | L190R |
| L206 | 163.6 | 3.3 | .47 | 6.3 | .68 | 114.4 | 9.0 | 1.31 | 11.6 | 1.08 | 45S | 0 | L206 |
| L211 | 149.4 | -10.9 | -1.55 | 7.4 | .81 | 101.1 | -4.4 | -.64 | 10.5 | .98 | 45S | 0 | L211 |
| L213 | 146.3 | -13.9 | -1.99 | 10.4 | 1.14 | 103.2 | -2.2 | -.33 | 10.2 | .95 | 45S | 0 | L213 |
| L219 | 170.2 | 9.9 | 1.41 | 16.9 | 1.85 | 108.3 | 2.9 | .42 | 10.8 | 1.01 | 45S | 0 | L219 |
| L223 | 157.7 | -2.6 | -.37 | 6.3 | .69 | 103.9 | -1.5 | -.22 | 14.0 | 1.31 | 45S | 0 | L223 |
| L226B | 149.9 | -10.3 | -1.47 | 9.1 | 1.00 | 96.1 | -9.3 | -1.37 | 11.2 | 1.05 | 45S | 0 | L226B |
| L228 | 163.3 | 3.1 | .44 | 10.5 | 1.15 | 108.1 | 2.7 | .39 | 13.4 | 1.25 | 45S | 0 | L228 |
| L230S | 162.1 | 1.9 | .26 | 8.6 | .94 | 101.5 | -3.9 | -.57 | 10.6 | .99 | 45S | 0 | L230S |
| L231 | 167.1 | 6.8 | .97 | 9.5 | 1.04 | 103.8 | -1.6 | -.24 | 13.0 | 1.21 | 45S | 0 | L231 |
| L232S | 160.3 | .1 | .01 | 5.8 | .64 | 92.7 | -12.8 | -1.87 | 8.8 | .82 | 45S | 0 | L232S |
| L233 | 155.2 | -5.1 | -.72 | 11.6 | 1.26 | 105.6 | .2 | .02 | 10.6 | .99 | 45S | 0 | L233 |
| L237 | 160.8 | .5 | .07 | 5.2 | .56 | 106.0 | .6 | .08 | 4.3 | .40 | 45S | 0 | L237 |
| L241 | 150.1 | -10.1 | -1.44 | 8.4 | .92 | 98.9 | -6.6 | -.96 | 7.7 | .71 | 45S | 0 | L241 |
| L249 | 156.1 | -4.1 | -.59 | 8.3 | .90 | 106.1 | .6 | .09 | 10.3 | .96 | 45S | 0 | L249 |
| L254 | 166.7 | 6.4 | .91 | 10.3 | 1.12 | 106.5 | 1.1 | .16 | 8.4 | .78 | 45S | 0 | L254 |
| L255 | 161.3 | 1.0 | .14 | 4.3 | .47 | 120.6 | 15.2 | 2.22 | 2.6 | .24 | 45S | 0 | L255 |
| L257A | 157.1 | -3.1 | -.45 | 10.2 | 1.11 | 102.8 | -2.6 | -.39 | 7.7 | .72 | 45S | 0 | L257A |
| L257B | 165.3 | 5.1 | .72 | 9.9 | 1.08 | 103.2 | -2.2 | -.33 | 9.7 | .90 | 45S | 0 | L257B |
| L257C | 160.0 | -.3 | -.04 | 7.1 | .78 | 106.5 | 1.1 | .16 | 7.7 | .72 | 45S | 0 | L257C |
| L259 | 174.2 | 13.9 | 1.98 | 14.8 | 1.62 | 116.4 | 11.0 | 1.61 | 10.4 | .97 | 45S | 0 | L259 |
| L260 | 160.6 | .3 | .05 | 6.2 | .67 | 111.4 | 6.0 | .87 | 16.2 | 1.51 | 45S | 0 | L260 |
| L261 | 156.4 | -3.9 | -.55 | 7.3 | .80 | 103.3 | -2.2 | -.32 | 8.6 | .80 | 45S | 0 | L261 |
| L262 | 157.6 | -2.7 | -.38 | 8.3 | .91 | 102.8 | -2.6 | -.39 | 8.3 | .78 | 45S | 0 | L262 |
| L275 | 156.7 | -3.5 | -.50 | 12.2 | 1.33 | 102.9 | -2.6 | -.38 | 13.7 | 1.28 | 45S | 0 | L275 |
| L278 | 167.0 | 6.7 | .96 | 8.9 | .97 | 113.7 | 8.2 | 1.21 | 13.3 | 1.24 | 45S | 0 | L278 |
| L281 | 162.7 | 2.4 | .34 | 10.2 | 1.11 | 109.9 | 4.5 | .66 | 14.5 | 1.35 | 45S | 0 | L281 |
| L285 | 148.7 | -11.6 | -1.65 | 8.3 | .91 | 101.7 | -3.8 | -.55 | 12.5 | 1.16 | 45S | 0 | L285 |
| L288 | 169.2 | 8.9 | 1.27 | 7.7 | .84 | 106.9 | 1.4 | .21 | 11.2 | 1.04 | 45S | 0 | L288 |
| L290 | 152.3 | -7.9 | -1.13 | 7.3 | .80 | 98.3 | -7.1 | -1.04 | 7.5 | .70 | 45S | 0 | L290 |
| L291S | 162.4 | 2.1 | .30 | 5.8 | .63 | 103.9 | -1.6 | -.23 | 11.2 | 1.04 | 45S | 0 | L291S |
| L301 | 163.0 | 2.7 | .39 | 7.4 | .81 | 116.3 | 10.8 | 1.59 | 12.4 | 1.15 | 45S | 0 | L301 |
| L305 | 165.2 | 4.9 | .70 | 8.4 | .92 | 109.1 | 3.6 | .53 | 7.4 | .69 | 45S | 0 | L305 |
| L308 | 156.9 | -3.4 | -.49 | 7.0 | .77 | 99.5 | -6.0 | -.88 | 11.2 | 1.05 | 45S | 0 | L308 |
| L312 | 161.4 | 1.1 | .16 | 13.4 | 1.46 | 115.0 | 9.6 | 1.40 | 9.4 | .88 | 45S | 0 | L312 |
| L317 | 157.3 | -3.0 | -.43 | 13.4 | 1.46 | 94.1 | -11.4 | -1.67 | 7.5 | .70 | 45S | 0 | L317 |
| L318 | 160.9 | .6 | .08 | 11.0 | 1.20 | 117.5 | 12.1 | 1.77 | 16.7 | 1.55 | 45S | 0 | L318 |
| L321 | 140.8 | -19.5 | -2.77 | 5.6 | .61 | 98.7 | -6.7 | -.98 | 12.4 | 1.15 | 45S | * | L321 |
| L323 | 164.0 | 3.7 | .53 | 10.4 | 1.13 | 103.7 | -1.8 | -.26 | 9.5 | .89 | 45S | 0 | L323 |

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

| LAB CODE | SAMPLE K45 MEAN | PRINTING 60 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE A83 MEAN | WOVE ENVELOPE PAPER 75 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D.= 15 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L326 | 159.7 | -.6 | -.09 | 5.1 | .56 | 110.8 | 5.4 | .79 | 9.2 | .86 | 45S | @ | L326 |
| L328 | 168.9 | 8.6 | 1.22 | 12.8 | 1.40 | 100.7 | -4.8 | -.70 | 10.1 | .95 | 45S | @ | L328 |
| L349 | 150.5 | -9.8 | -1.40 | 7.6 | .83 | 102.5 | -2.9 | -.43 | 8.7 | .81 | 45S | @ | L349 |
| L352 | 159.7 | -.5 | -.08 | 7.5 | .82 | 110.7 | 5.3 | .78 | 12.1 | 1.13 | 45S | @ | L352 |
| L360 | 162.1 | 1.9 | .26 | 5.6 | .62 | 102.0 | -3.4 | -.51 | 12.8 | 1.20 | 45S | @ | L360 |
| L370 | 154.3 | -5.9 | -.85 | 4.2 | .46 | 105.4 | -.0 | -.01 | 10.5 | .98 | 45S | @ | L370 |
| L372 | 159.7 | -.6 | -.09 | 6.1 | .67 | 99.0 | -6.4 | -.95 | 9.5 | .88 | 45S | @ | L372 |
| L376 | 178.5 | 18.2 | 2.59 | 19.1 | 2.09 | 107.7 | 2.2 | .33 | 4.9 | .46 | 45S | * | L376 |
| L380 | 156.1 | -4.1 | -.59 | 10.8 | 1.18 | 96.9 | -8.5 | -1.25 | 9.2 | .85 | 45S | @ | L380 |
| L382 | 159.9 | -.4 | -.06 | 10.2 | 1.11 | 110.5 | 5.1 | .75 | 12.6 | 1.19 | 45S | @ | L382 |
| L390 | 155.7 | -4.6 | -.66 | 9.0 | .99 | 107.3 | 1.9 | .28 | 19.5 | 1.82 | 45S | @ | L390 |
| L396M | 154.7 | -5.5 | -.79 | 9.9 | 1.09 | 96.3 | -9.2 | -1.35 | 8.0 | .74 | 45S | @ | L396M |
| L554 | 152.3 | -8.0 | -1.14 | 9.7 | 1.06 | 96.0 | -9.4 | -1.39 | 12.0 | 1.12 | 45S | @ | L554 |
| L567 | 159.1 | -1.1 | -.16 | 6.8 | .74 | 109.7 | 4.3 | .63 | 7.1 | .66 | 45S | @ | L567 |
| L575 | 169.0 | 8.7 | 1.24 | 11.0 | 1.20 | 109.9 | 4.4 | .65 | 10.3 | .96 | 45S | @ | L575 |
| L585 | 149.3 | -10.9 | -1.56 | 16.8 | 1.83 | 93.3 | -12.1 | -1.78 | 11.0 | 1.02 | 45S | @ | L585 |
| L587 | 169.0 | 8.7 | 1.24 | 9.1 | .99 | 104.3 | -1.1 | -.16 | 5.9 | .55 | 45S | @ | L587 |
| L597 | 155.2 | -5.1 | -.72 | 8.2 | .90 | 103.4 | -2.0 | -.30 | 13.6 | 1.27 | 45S | @ | L597 |
| L600 | 154.5 | -5.7 | -.82 | 12.5 | 1.36 | 90.1 | -15.4 | -2.26 | 12.9 | 1.21 | 45S | @ | L600 |
| L626 | 155.5 | -4.7 | -.68 | 7.7 | .84 | 113.6 | 8.2 | 1.20 | 10.9 | 1.02 | 45S | @ | L626 |
| L648 | 154.7 | -5.5 | -.79 | 9.4 | 1.03 | 100.2 | -5.2 | -.77 | 10.8 | 1.00 | 45S | @ | L648 |
| L651 | 145.9 | -14.3 | -2.04 | 7.8 | .86 | 107.6 | 2.2 | .32 | 13.0 | 1.21 | 45S | @ | L651 |
| L670 | 175.6 | 15.3 | 2.18 | 13.5 | 1.48 | 112.8 | 7.4 | 1.08 | 12.7 | 1.18 | 45S | @ | L670 |
| L679 | 134.5 | -25.7 | -3.67 | 7.7 | .84 | 83.0 | -22.4 | -3.29 | 7.9 | .74 | 45S | # | L679 |
| L688 | 164.3 | 4.1 | .58 | 11.3 | 1.24 | 103.9 | -1.6 | -.23 | 9.8 | .91 | 45S | @ | L688 |
| GR. MEAN = | 160.3 | SHEFF. UNITS | | GRAND MEAN = | | 105.4 | SHEFF. UNITS | | TEST DETERMINATIONS = | | | | 15 |
| SD MEANS = | 7.0 | SHEFF. UNITS | | SD OF MEANS = | | 6.8 | SHEFF. UNITS | | 89 LABS IN GRAND MEANS | | | | |
| | | AVERAGE SDR = | | 9.2 | SHEFF. UNITS | | AVERAGE SDR = | | 10.7 | SHEFF. UNITS | | | |
| L174 | 245.5 | 85.2 | 12.13 | 5.4 | .59 | 216.3 | 110.9 | 16.27 | 6.5 | .61 | 45R | * | L174 |

TOTAL NUMBER OF LABORATORIES REPORTING = 91

Best values: K45 160 ± 11 Sheffield units
A83 105 ± 11 Sheffield units

The following laboratories were omitted from the grand means because of extreme test results: 679.

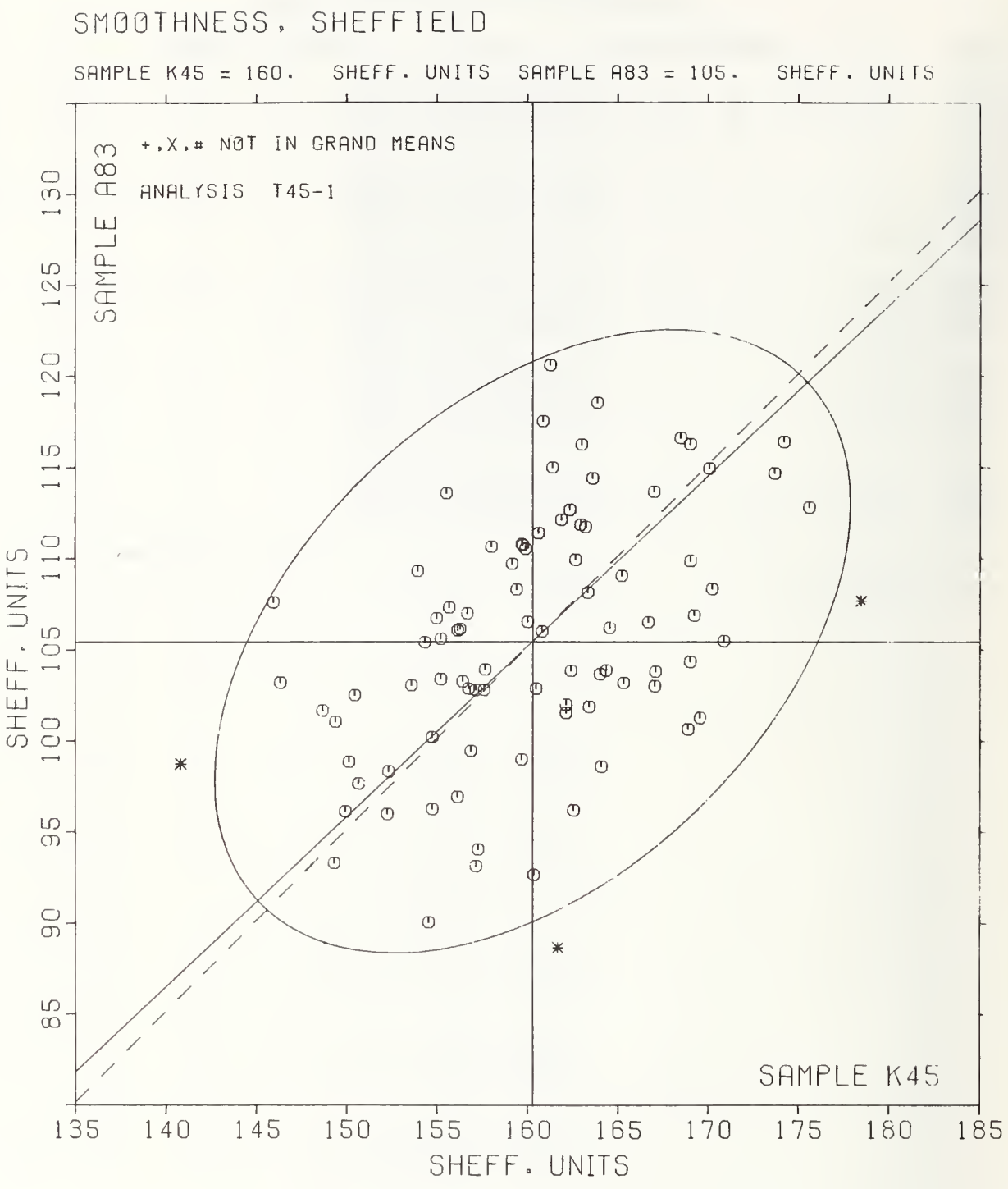
TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T45-1 TABLE 2
SMOOTHNESS, SHEFFIELD UNITS
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS



| LAB CODE | F | MEANS E45 | MEANS A83 | COORDINATES MAJOR | COORDINATES MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L679 | # | 134.5 | 83.0 | -34.1 | 1.2 | .79 | 45S | SMOOTHNESS, SHEFFIELD |
| L321 | * | 140.8 | 98.7 | -18.8 | 8.4 | .88 | 45S | SMOOTHNESS, SHEFFIELD |
| L651 | G | 145.9 | 107.6 | -9.0 | 11.4 | 1.03 | 45S | SMOOTHNESS, SHEFFIELD |
| L213 | G | 146.3 | 103.2 | -11.7 | 7.9 | 1.04 | 45S | SMOOTHNESS, SHEFFIELD |
| L285 | G | 148.7 | 101.7 | -11.1 | 5.2 | 1.04 | 45S | SMOOTHNESS, SHEFFIELD |
| L585 | G | 149.3 | 93.3 | -16.3 | -1.4 | 1.43 | 45S | SMOOTHNESS, SHEFFIELD |
| L211 | G | 149.4 | 101.1 | -10.9 | 4.2 | .90 | 45S | SMOOTHNESS, SHEFFIELD |
| L226B | G | 149.9 | 96.1 | -13.9 | .3 | 1.02 | 45S | SMOOTHNESS, SHEFFIELD |
| L241 | G | 150.1 | 98.9 | -11.9 | 2.1 | .82 | 45S | SMOOTHNESS, SHEFFIELD |
| L349 | G | 150.5 | 102.5 | -9.2 | 4.6 | .82 | 45S | SMOOTHNESS, SHEFFIELD |
| L134 | G | 150.7 | 97.7 | -12.3 | .9 | .70 | 45S | SMOOTHNESS, SHEFFIELD |
| L554 | G | 152.3 | 96.0 | -12.3 | -1.4 | 1.09 | 45S | SMOOTHNESS, SHEFFIELD |
| L290 | G | 152.3 | 98.3 | -10.7 | .2 | .75 | 45S | SMOOTHNESS, SHEFFIELD |
| L124 | G | 153.6 | 103.1 | -6.5 | 2.8 | 1.11 | 45S | SMOOTHNESS, SHEFFIELD |
| L166 | G | 153.9 | 109.3 | -2.0 | 7.2 | .87 | 45S | SMOOTHNESS, SHEFFIELD |
| L370 | G | 154.3 | 105.4 | -4.4 | 4.0 | .72 | 45S | SMOOTHNESS, SHEFFIELD |
| L600 | G | 154.5 | 90.1 | -14.7 | -7.3 | 1.28 | 45S | SMOOTHNESS, SHEFFIELD |
| L648 | G | 154.7 | 100.2 | -7.6 | -.0 | 1.02 | 45S | SMOOTHNESS, SHEFFIELD |
| L396M | G | 154.7 | 96.3 | -10.3 | -2.9 | .91 | 45S | SMOOTHNESS, SHEFFIELD |
| L108 | G | 155.0 | 106.7 | -3.0 | 4.5 | .75 | 45S | SMOOTHNESS, SHEFFIELD |
| L597 | G | 155.2 | 103.4 | -5.1 | 2.0 | 1.08 | 45S | SMOOTHNESS, SHEFFIELD |
| L233 | G | 155.2 | 105.6 | -3.6 | 3.6 | 1.13 | 45S | SMOOTHNESS, SHEFFIELD |
| L626 | G | 155.5 | 113.6 | 2.1 | 9.2 | .93 | 45S | SMOOTHNESS, SHEFFIELD |
| L390 | G | 155.7 | 107.3 | -2.1 | 4.5 | 1.40 | 45S | SMOOTHNESS, SHEFFIELD |
| L380 | G | 156.1 | 96.9 | -8.8 | -3.4 | 1.02 | 45S | SMOOTHNESS, SHEFFIELD |
| L249 | G | 156.1 | 106.1 | -2.6 | 3.3 | .93 | 45S | SMOOTHNESS, SHEFFIELD |
| L121 | G | 156.3 | 106.1 | -2.5 | 3.2 | .94 | 45S | SMOOTHNESS, SHEFFIELD |
| L261 | G | 156.4 | 103.3 | -4.3 | 1.1 | .80 | 45S | SMOOTHNESS, SHEFFIELD |
| L162 | G | 156.7 | 107.0 | -1.6 | 3.6 | .66 | 45S | SMOOTHNESS, SHEFFIELD |
| L275 | G | 156.7 | 102.9 | -4.3 | .5 | 1.30 | 45S | SMOOTHNESS, SHEFFIELD |
| L308 | G | 156.9 | 99.5 | -6.6 | -2.0 | .91 | 45S | SMOOTHNESS, SHEFFIELD |
| L190R | G | 157.1 | 93.1 | -10.7 | -6.8 | 1.06 | 45S | SMOOTHNESS, SHEFFIELD |
| L257A | G | 157.1 | 102.8 | -4.1 | .2 | .91 | 45S | SMOOTHNESS, SHEFFIELD |
| L317 | G | 157.3 | 94.1 | -10.0 | -6.3 | 1.08 | 45S | SMOOTHNESS, SHEFFIELD |
| L262 | G | 157.6 | 102.8 | -3.8 | -.1 | .84 | 45S | SMOOTHNESS, SHEFFIELD |
| L223 | G | 157.7 | 103.9 | -2.9 | .7 | 1.00 | 45S | SMOOTHNESS, SHEFFIELD |
| L158 | G | 158.0 | 110.7 | 1.9 | 5.4 | .87 | 45S | SMOOTHNESS, SHEFFIELD |
| L567 | G | 159.1 | 109.7 | 2.1 | 3.9 | .70 | 45S | SMOOTHNESS, SHEFFIELD |
| L190C | G | 159.4 | 108.3 | 1.3 | 2.7 | .83 | 45S | SMOOTHNESS, SHEFFIELD |
| L372 | G | 159.7 | 99.0 | -4.8 | -4.3 | .78 | 45S | SMOOTHNESS, SHEFFIELD |
| L326 | G | 159.7 | 110.8 | 3.2 | 4.3 | .71 | 45S | SMOOTHNESS, SHEFFIELD |
| L352 | G | 159.7 | 110.7 | 3.2 | 4.2 | .97 | 45S | SMOOTHNESS, SHEFFIELD |
| L382 | G | 159.9 | 110.5 | 3.2 | 4.0 | 1.15 | 45S | SMOOTHNESS, SHEFFIELD |
| L257C | G | 160.0 | 106.5 | .5 | 1.0 | .75 | 45S | SMOOTHNESS, SHEFFIELD |
| L232S | G | 160.3 | 92.7 | -8.7 | -9.4 | .73 | 45S | SMOOTHNESS, SHEFFIELD |
| L128 | G | 160.5 | 102.9 | -1.6 | -2.0 | 1.05 | 45S | SMOOTHNESS, SHEFFIELD |
| L260 | G | 160.6 | 111.4 | 4.3 | 4.1 | 1.09 | 45S | SMOOTHNESS, SHEFFIELD |
| L237 | G | 160.8 | 106.0 | .8 | .0 | .48 | 45S | SMOOTHNESS, SHEFFIELD |
| L318 | G | 160.9 | 117.5 | 8.7 | 8.4 | 1.38 | 45S | SMOOTHNESS, SHEFFIELD |
| L255 | G | 161.3 | 120.6 | 11.1 | 10.4 | .35 | 45S | SMOOTHNESS, SHEFFIELD |
| L312 | G | 161.4 | 115.0 | 7.3 | 6.2 | 1.17 | 45S | SMOOTHNESS, SHEFFIELD |
| L173B | * | 161.7 | 88.7 | -10.4 | -13.2 | .73 | 45S | SMOOTHNESS, SHEFFIELD |
| L122 | G | 161.9 | 112.1 | 5.7 | 3.8 | 1.08 | 45S | SMOOTHNESS, SHEFFIELD |
| L230S | G | 162.1 | 101.5 | -1.3 | -4.1 | .97 | 45S | SMOOTHNESS, SHEFFIELD |
| L360 | G | 162.1 | 102.0 | -1.0 | -3.8 | .91 | 45S | SMOOTHNESS, SHEFFIELD |
| L167 | G | 162.3 | 112.7 | 6.4 | 3.9 | .46 | 45S | SMOOTHNESS, SHEFFIELD |
| L291S | G | 162.4 | 103.9 | .5 | -2.6 | .84 | 45S | SMOOTHNESS, SHEFFIELD |
| L100 | G | 162.5 | 96.2 | -4.7 | -8.3 | .60 | 45S | SMOOTHNESS, SHEFFIELD |
| L281 | G | 162.7 | 109.9 | 4.8 | 1.6 | 1.23 | 45S | SMOOTHNESS, SHEFFIELD |
| L183S | G | 162.9 | 111.9 | 6.3 | 2.9 | 1.26 | 45S | SMOOTHNESS, SHEFFIELD |
| L301 | G | 163.0 | 116.3 | 9.4 | 6.0 | .98 | 45S | SMOOTHNESS, SHEFFIELD |
| L152 | G | 163.2 | 111.7 | 6.4 | 2.6 | .82 | 45S | SMOOTHNESS, SHEFFIELD |
| L228 | G | 163.3 | 108.1 | 4.1 | -.1 | 1.20 | 45S | SMOOTHNESS, SHEFFIELD |
| L123 | G | 163.4 | 101.9 | -.2 | -4.7 | 1.14 | 45S | SMOOTHNESS, SHEFFIELD |
| L206 | G | 163.6 | 114.4 | 8.5 | 4.3 | .88 | 45S | SMOOTHNESS, SHEFFIELD |

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

| LAB CODE | F | MEANS E45 | MEANS A83 | COORDINATES MAJOR | COORDINATES MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L139S | 6 | 163.9 | 118.5 | 11.6 | 7.1 | .79 | 45S | SMOOTHNESS, SHEFFIELD |
| L323 | 6 | 164.0 | 103.7 | 1.5 | -3.8 | 1.01 | 45S | SMOOTHNESS, SHEFFIELD |
| L114 | 6 | 164.1 | 98.6 | -1.9 | -7.6 | 1.07 | 45S | SMOOTHNESS, SHEFFIELD |
| L688 | 6 | 164.3 | 103.9 | 1.9 | -3.9 | 1.07 | 45S | SMOOTHNESS, SHEFFIELD |
| L126 | 6 | 164.5 | 106.2 | 3.6 | -2.4 | 1.53 | 45S | SMOOTHNESS, SHEFFIELD |
| L305 | 6 | 165.2 | 109.1 | 6.1 | -.7 | .80 | 45S | SMOOTHNESS, SHEFFIELD |
| L257B | 6 | 165.3 | 103.2 | 2.2 | -5.1 | .99 | 45S | SMOOTHNESS, SHEFFIELD |
| L254 | 6 | 166.7 | 106.5 | 5.4 | -3.6 | .95 | 45S | SMOOTHNESS, SHEFFIELD |
| L125 | 6 | 167.0 | 103.0 | 3.2 | -6.4 | 1.41 | 45S | SMOOTHNESS, SHEFFIELD |
| L278 | 6 | 167.0 | 113.7 | 10.5 | 1.4 | 1.11 | 45S | SMOOTHNESS, SHEFFIELD |
| L231 | 6 | 167.1 | 103.8 | 3.8 | -5.8 | 1.12 | 45S | SMOOTHNESS, SHEFFIELD |
| L157 | 6 | 168.5 | 116.6 | 13.6 | 2.6 | 1.31 | 45S | SMOOTHNESS, SHEFFIELD |
| L328 | 6 | 168.9 | 100.7 | 3.0 | -9.4 | 1.17 | 45S | SMOOTHNESS, SHEFFIELD |
| L148 | 6 | 169.0 | 116.3 | 13.8 | 1.9 | 1.13 | 45S | SMOOTHNESS, SHEFFIELD |
| L587 | 6 | 169.0 | 104.3 | 5.6 | -6.8 | .77 | 45S | SMOOTHNESS, SHEFFIELD |
| L575 | 6 | 169.0 | 109.9 | 9.4 | -2.7 | 1.08 | 45S | SMOOTHNESS, SHEFFIELD |
| L288 | 6 | 169.2 | 106.9 | 7.5 | -5.1 | .94 | 45S | SMOOTHNESS, SHEFFIELD |
| L132 | 6 | 169.5 | 101.3 | 3.9 | -9.4 | 1.41 | 45S | SMOOTHNESS, SHEFFIELD |
| L159 | 6 | 170.1 | 114.9 | 13.6 | .2 | 1.14 | 45S | SMOOTHNESS, SHEFFIELD |
| L219 | 6 | 170.2 | 108.3 | 9.2 | -4.7 | 1.43 | 45S | SMOOTHNESS, SHEFFIELD |
| L150 | 6 | 170.9 | 105.5 | 7.8 | -7.2 | 1.71 | 45S | SMOOTHNESS, SHEFFIELD |
| L153 | 6 | 173.7 | 114.7 | 16.1 | -2.4 | .75 | 45S | SMOOTHNESS, SHEFFIELD |
| L259 | 6 | 174.2 | 116.4 | 17.7 | -1.5 | 1.29 | 45S | SMOOTHNESS, SHEFFIELD |
| L670 | 6 | 175.6 | 112.8 | 16.2 | -5.1 | 1.33 | 45S | SMOOTHNESS, SHEFFIELD |
| L376 | * | 178.5 | 107.7 | 14.8 | -10.8 | 1.27 | 45S | SMOOTHNESS, SHEFFIELD |
| L174 | * | 245.5 | 216.3 | 138.0 | 22.8 | .60 | 45R | SMOOTHNESS, SHEFFIELD, NON-STANDARD INSTRUMENT |
| GMEANS: | | 160.3 | 105.4 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 20.8 | 13.0 | WITH GAMMA = 43 DEGREES | | |


SMOOTHNESS, SHEFFIELD
SAMPLE K45 = 160. SHEFF. UNITS
SAMPLE A83 = 105. SHEFF. UNITS
+,X,* NOT IN GRAND MEANS
ANALYSIS T45-1
SAMPLE A83
SHEFF. UNITS
85
90
95
100
105
110
115
120
125
130
SAMPLE K45
135
140
145
150
155
160
165
170
175
180
185
SHEFF. UNITS

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ANALYSIS T45-2 TABLE 1

SMOOTHNESS , BEKK SECONDS

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

| LAB CODE | SAMPLE K45 MEAN | PRINTING 60 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE A83 MEAN | WOVE ENVELOPE PAPER 75 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D.F 15 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L139B | 31.9 | 1.8 | .45 | 2.6 | 1.00 | 47.8 | -7.1 | -.94 | 7.3 | .79 | 45K | O | L139B |
| L162 | 24.1 | -6.1 | -1.56 | 2.3 | .90 | 48.2 | -6.7 | -.88 | 8.8 | .95 | 45K | O | L162 |
| L182K | 26.5 | -3.7 | -.95 | 2.3 | .90 | 48.5 | -6.4 | -.84 | 8.4 | .91 | 45K | O | L182K |
| L190C | 33.2 | 3.0 | .77 | 2.9 | 1.10 | 61.7 | 6.8 | .89 | 14.0 | 1.51 | 45K | O | L190C |
| L230B | 27.7 | -2.4 | -.63 | 3.6 | 1.38 | 52.9 | -2.0 | -.27 | 6.4 | .69 | 45K | O | L230B |
| L232B | 35.1 | 4.9 | 1.26 | 1.7 | .67 | 67.3 | 12.4 | 1.64 | 8.1 | .88 | 45K | O | L232B |
| L243K | 30.9 | .8 | .19 | 3.0 | 1.16 | 50.4 | -4.5 | -.59 | 9.8 | 1.07 | 45K | O | L243K |
| L291K | 34.7 | 4.5 | 1.16 | 2.9 | 1.13 | 64.6 | 9.7 | 1.28 | 9.2 | 1.00 | 45K | O | L291K |
| L581 | 27.5 | -2.7 | -.70 | 2.0 | .77 | 52.6 | -2.3 | -.30 | 11.0 | 1.19 | 45K | O | L581 |
| GR. MEAN = | 30.2 BEKK SECONDS | | | | GRAND MEAN = | 54.9 BEKK SECONDS | | | | | TEST DETERMINATIONS = 15 | | |
| SD MEANS = | 3.9 BEKK SECONDS | | | | SD OF MEANS = | 7.6 BEKK SECONDS | | | | | 9 LABS IN GRAND MEANS | | |
| | AVERAGE SDR = | 2.6 BEKK SECONDS | | | | AVERAGE SDR = | 9.2 BEKK SECONDS | | | | | | |
| L250M | 28.3 | -1.8 | -.47 | 2.4 | .91 | 40.5 | -14.4 | -1.89 | 6.0 | .65 | 45L | * | L250M |
| L251 | 30.2 | .0 | .00 | 2.4 | .92 | 52.4 | -2.5 | -.33 | 11.2 | 1.21 | 45L | * | L251 |

TOTAL NUMBER OF LABORATORIES REPORTING = 11

Best values: K45 30 Bekk seconds
A83 52 Bekk seconds

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ANALYSIS T45-2 TABLE 2

SMOOTHNESS , BEKK SECONDS

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

| LAB CODE | F | MEANS K45 | A83 | COORDINATES MAJOR | MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L162 | O | 24.1 | 48.2 | -8.6 | 2.9 | .92 | 45K | SMOOTHNESS, BEKK |
| L182K | O | 26.5 | 48.5 | -7.3 | .8 | .91 | 45K | SMOOTHNESS, BEKK |
| L581 | O | 27.5 | 52.6 | -3.2 | 1.6 | .98 | 45K | SMOOTHNESS, BEKK |
| L230B | O | 27.7 | 52.9 | -2.8 | 1.4 | 1.04 | 45K | SMOOTHNESS, BEKK |
| L250M | * | 28.3 | 40.5 | -13.9 | -4.1 | .78 | 45L | SMOOTHNESS, BEKK, 20 C, 65% RH |
| L251 | * | 30.2 | 52.4 | -2.3 | -1.0 | 1.06 | 45L | SMOOTHNESS, BEKK, 20 C, 65% RH |
| L243K | O | 30.9 | 50.4 | -3.8 | -2.5 | 1.11 | 45K | SMOOTHNESS, BEKK |
| L139B | O | 31.9 | 47.8 | -5.8 | -4.5 | .90 | 45K | SMOOTHNESS, BEKK |
| L190C | O | 33.2 | 61.7 | 7.4 | -.0 | 1.31 | 45K | SMOOTHNESS, BEKK |
| L291K | O | 34.7 | 64.6 | 10.7 | -.2 | 1.06 | 45K | SMOOTHNESS, BEKK |
| L232B | O | 35.1 | 67.3 | 13.4 | .5 | .77 | 45K | SMOOTHNESS, BEKK |
| GMEANS: | | 30.2 | 54.9 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 27.1 | 7.4 | WITH GAMMA = 66 DEGREES | | |

REPORT NO. 586 TAPPI COLLABORATIVE REFERENCE PROGRAM FEBRUARY 1979
ANALYSIS T47-1 TABLE 1
SMOOTHNESS, BENDTSEN

| LAB CODE | SAMPLE K45 PRINTING 60 GRAMS PER SQUARE METER MEAN | DEV | N.DEV | SDR | R.SDR | SAMPLE A83 WOVE ENVELOPE PAPER 75 GRAMS PER SQUARE METER MEAN | DEV | N.DEV | SDR | R.SDR | TEST D.F = 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L100 | 193. | -10. | -.67 | 13. | .70 | 91. | -22. | -1.69 | 12. | .65 | 47B | 6 | L100 |
| L182B | 230. | 28. | 1.92 | 27. | 1.46 | 122. | 9. | .71 | 26. | 1.47 | 47B | 6 | L182B |
| L236 | 200. | -2. | -.16 | 13. | .71 | 117. | 4. | .32 | 12. | .66 | 47B | 6 | L236 |
| L242 | 189. | -14. | -.94 | 18. | .97 | 110. | -3. | -.21 | 9. | .53 | 47B | 6 | L242 |
| L243B | 212. | 10. | .67 | 17. | .90 | 114. | 1. | .07 | 14. | .77 | 47B | 6 | L243B |
| L244 | 189. | -13. | -.91 | 20. | 1.10 | 107. | -6. | -.45 | 23. | 1.32 | 47B | 6 | L244 |
| L248 | 195. | -8. | -.53 | 22. | 1.18 | 136. | 23. | 1.75 | 24. | 1.34 | 47B | 6 | L248 |
| L333 | 211. | 9. | .61 | 18. | .98 | 106. | -6. | -.49 | 22. | 1.25 | 47B | 6 | L333 |

GR. MEAN = 203. ML/MIN GRAND MEAN = 113. ML/MIN TEST DETERMINATIONS = 10
SD MEANS = 14. ML/MIN SD OF MEANS = 13. ML/MIN 8 LABS IN GRAND MEANS
AVERAGE SDR = 19. ML/MIN AVERAGE SDR = 18. ML/MIN
TOTAL NUMBER OF LABORATORIES REPORTING = 8

Best values: K45 200 milliliter per minute
A83 120 milliliter per minute

REPORT NO. 586 TAPPI COLLABORATIVE REFERENCE PROGRAM FEBRUARY 1979
ANALYSIS T47-1 TABLE 2
SMOOTHNESS, BENDTSEN

| LAB CODE | F | MEANS K45 | A83 | COORDINATES MAJOR | MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L242 | 6 | 189. | 110. | -13. | 5. | .75 | 47B | SMOOTHNESS, BENDTSEN, WG 150 |
| L244 | 6 | 189. | 107. | -14. | 3. | 1.21 | 47B | SMOOTHNESS, BENDTSEN, WG 150 |
| L100 | 6 | 193. | 91. | -20. | -13. | .68 | 47B | SMOOTHNESS, BENDTSEN, WG 150 |
| L248 | 6 | 195. | 136. | 7. | 23. | 1.26 | 47B | SMOOTHNESS, BENDTSEN, WG 150 |
| L236 | 6 | 200. | 117. | 1. | 5. | .69 | 47B | SMOOTHNESS, BENDTSEN, WG 150 |
| L333 | 6 | 211. | 106. | 4. | -10. | 1.11 | 47B | SMOOTHNESS, BENDTSEN, WG 150 |
| L243B | 6 | 212. | 114. | 9. | -5. | .83 | 47B | SMOOTHNESS, BENDTSEN, WG 150 |
| L182B | 6 | 230. | 122. | 28. | -8. | 1.47 | 47B | SMOOTHNESS, BENDTSEN, WG 150 |
| GMEANS: | | 203. | 113. | | | 1.00 | | |
| | | 95% ELLIPSE: | | 54. | 40. | WITH GAMMA = 34 DEGREES | | |

ANALYSIS T56-1 TABLE 1
K & N INK ABSORPTION

| LAB CODE | SAMPLE E48 COATED GLOSS 91 GRAMS PER SQUARE METER MEAN | DEV | N.DEV | SDR | R.SDR | SAMPLE B58 HEAT SET OFFSET BOOK 76 GRAMS PER SQUARE METER MEAN | DEV | N.DEV | SDR | R.SDR | TEST D.F. = 4 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L126 | 74.9 | 50.2 | 15.40 | .6 | .66 | 42.2 | -19.2 | -2.77 | .6 | .82 | 56K | # | L126 |
| L149 | 23.7 | -1.0 | -.29 | .5 | .60 | 54.7 | -6.6 | -.96 | 1.0 | 1.28 | 56K | @ | L149 |
| L182 | 28.7 | 4.0 | 1.23 | .6 | .70 | 61.9 | .5 | .08 | .2 | .23 | 56K | @ | L182 |
| L213 | 28.4 | 3.7 | 1.13 | 1.0 | 1.14 | 64.7 | 3.4 | .49 | .6 | .86 | 56K | @ | L213 |
| L291 | 22.3 | -2.4 | -.73 | 1.3 | 1.53 | 64.9 | 3.5 | .51 | 1.2 | 1.56 | 56K | @ | L291 |
| L333 | 20.5 | -4.2 | -1.28 | .7 | .89 | 53.1 | -8.3 | -1.19 | 1.1 | 1.48 | 56K | @ | L333 |
| L339 | 28.2 | 3.5 | 1.09 | .5 | .60 | 71.6 | 10.2 | 1.48 | .5 | .64 | 56K | @ | L339 |
| L616 | 23.7 | -1.0 | -.29 | .5 | .60 | 66.7 | 5.4 | .77 | .5 | .67 | 56K | @ | L616 |
| L643 | 22.0 | -2.7 | -.83 | 1.6 | 1.95 | 53.2 | -8.1 | -1.17 | 1.0 | 1.28 | 56K | @ | L643 |
| GP. MEAN = | 24.7 K & N UNITS | | | | | GRAND MEAN = | 61.4 K & N UNITS | | | | TEST DETERMINATIONS = 4 | | |
| SD MEANS = | 3.3 K & N UNITS | | | | | SD OF MEANS = | 6.9 K & N UNITS | | | | 8 LABS IN GRAND MEANS | | |
| | AVERAGE SDR = | | | .8 K & N UNITS | | | AVERAGE SDR = | | | .7 K & N UNITS | | | |
| L651 | 61.5 | 36.8 | 11.30 | .8 | 1.00 | 31.7 | -29.6 | -4.28 | .9 | 1.16 | 56G | * | L651 |
| L688 | 60.2 | 35.5 | 10.90 | .9 | 1.10 | 30.1 | -31.3 | -4.52 | .3 | .46 | 56G | * | L688 |

TOTAL NUMBER OF LABORATORIES REPORTING = 11

Best values: E48 25 K & N units
B58 61 K & N units

The following laboratories were omitted from the grand means because of extreme test results; 126.

REPORT NO. 58G TAPPI COLLABORATIVE REFERENCE PROGRAM FEBRUARY 1979

ANALYSIS T56-1 TABLE 2
K & N INK ABSORPTION

| LAB CODE | F | MEANS E48 | B58 | COORDINATES MAJOR | MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L333 | @ | 20.5 | 53.1 | -9.2 | 1.3 | 1.18 | 56K | INK ABSORPTION, K&N INK TEST |
| L643 | @ | 22.0 | 53.2 | -8.6 | -.0 | 1.62 | 56K | INK ABSORPTION, K&N INK TEST |
| L291 | @ | 22.3 | 64.9 | 2.6 | 3.4 | 1.55 | 56K | INK ABSORPTION, K&N INK TEST |
| L149 | @ | 23.7 | 54.7 | -6.6 | -1.2 | .94 | 56K | INK ABSORPTION, K&N INK TEST |
| L616 | @ | 23.7 | 66.7 | 4.8 | 2.6 | .63 | 56K | INK ABSORPTION, K&N INK TEST |
| L339 | @ | 28.2 | 71.6 | 10.8 | -.1 | .62 | 56K | INK ABSORPTION, K&N INK TEST |
| L213 | @ | 28.4 | 64.7 | 4.4 | -2.4 | 1.00 | 56K | INK ABSORPTION, K&N INK TEST |
| L182 | @ | 28.7 | 61.9 | 1.8 | -3.6 | .46 | 56K | INK ABSORPTION, K&N INK TEST |
| L688 | * | 60.2 | 30.1 | -18.3 | -43.7 | .78 | 56G | INK ABSORPTION: OWN METHOD |
| L651 | * | 61.5 | 31.7 | -16.3 | -44.4 | 1.08 | 56G | INK ABSORPTION: OWN METHOD |
| L126 | # | 74.9 | 42.2 | -2.1 | -53.7 | .74 | 56K | INK ABSORPTION, K&N INK TEST |
| GMEANS: | | 24.7 | 61.4 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 25.2 | 8.3 | WITH GAMMA = 71 DEGREES | | |

REPORT NO. 58G TAPPI COLLABORATIVE REFERENCE PROGRAM FEBRUARY 1979
ANALYSIS T57-1 TABLE 1
HYDROGEN ION CONCENTRATION (PH), COLD
TAPPI STANDARD T509 OS-77

| LAB CODE | SAMPLE J78 MEAN | PRINTING 89 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE J75 MEAN | PRINTING 76 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L174C | 8.180 | .841 | 5.86 | .045 | 1.05 | 7.200 | 1.011 | 4.46 | .000 | .00 | 57F | # | L174C |
| L182C | 7.300 | -.039 | -.27 | .014 | .33 | 6.240 | .051 | .22 | .055 | 1.92 | 57D | O | L182C |
| L251C | 7.472 | .133 | .93 | .011 | .26 | 6.288 | .099 | .44 | .011 | .38 | 57P | O | L251C |
| L328 | 7.120 | -.219 | -1.53 | .027 | .64 | 5.800 | -.389 | -1.72 | .035 | 1.24 | 57M | O | L328 |
| L356 | 7.342 | .003 | .02 | .030 | .71 | 6.388 | .199 | .88 | .011 | .38 | 57V | O | L356 |
| L442 | 7.462 | .123 | .86 | .130 | 3.05 | 6.231 | .041 | .18 | .031 | 1.08 | 570 | O | L442 |

GR. MEAN = 7.339 PH UNITS GRAND MEAN = 6.189 PH UNITS TEST DETERMINATIONS = 5
SD MEANS = .143 PH UNITS SD OF MEANS = .226 PH UNITS 5 LABS IN GRAND MEANS
AVERAGE SDR = .043 PH UNITS AVERAGE SDR = .029 PH UNITS
TOTAL NUMBER OF LABORATORIES REPORTING = 6

Best values: J78 7.3 pH units
J75 6.2 pH units

The following laboratories were omitted from the grand means because of extreme test results: 174C.

REPORT NO. 58G TAPPI COLLABORATIVE REFERENCE PROGRAM FEBRUARY 1979
ANALYSIS T57-1 TABLE 2
HYDROGEN ION CONCENTRATION (PH), COLD
TAPPI STANDARD T509 OS-77

| LAB CODE | F | MEANS J78 | J75 | COORDINATES MAJOR | MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L328 | O | 7.120 | 5.800 | -.447 | -.001 | .94 | 57M | PH, COLD, BECKMAN ZEROMATIC |
| L182C | O | 7.300 | 6.240 | .025 | .059 | 1.13 | 57D | PH, COLD, RADIOMETER TYPE PH M 28 |
| L356 | O | 7.342 | 6.388 | .174 | .095 | .55 | 57V | PH, COLD, BECKMAN EXPANDOMATIC |
| L442 | O | 7.462 | 6.231 | .096 | -.086 | 2.06 | 570 | PH, COLD, ORION DIGITAL IONALYZER |
| L251C | O | 7.472 | 6.288 | .151 | -.067 | .32 | 57P | PH, COLD, RADIOMETER TYPE PH M64 |
| L174C | # | 8.180 | 7.200 | 1.294 | -.234 | .53 | 57F | PH, COLD, FISHER ACCUMET MODEL 220 |
| GMEANS: | | 7.339 | 6.189 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 1.294 | .395 | WITH GAMMA = 60 DEGREES | | |

REPORT NO. 58G TAPPI COLLABORATIVE REFERENCE PROGRAM FEBRUARY 1979
ANALYSIS T57-2 TABLE 1
HYDROGEN ION CONCENTRATION (PH), HOT
TAPPI STANDARD T435 OS-77

| LAB CODE | SAMPLE J78 MEAN | PRINTING 89 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE J75 MEAN | PRINTING 76 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D.= 5 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L128 | 7.812 | -.103 | -.49 | .046 | 1.32 | 5.756 | -.085 | -.22 | .034 | .98 | 57L | O | L128 |
| L162 | 7.926 | .012 | .06 | .067 | 1.90 | 5.470 | -.371 | -.94 | .070 | 1.99 | 57C | O | L162 |
| L174H | 8.200 | .286 | 1.37 | .000 | .00 | 6.400 | .559 | 1.42 | .000 | .00 | 57G | O | L174H |
| L182H | 7.720 | -.194 | -.93 | .027 | .78 | 5.738 | -.103 | -.26 | .036 | 1.04 | 57E | O | L182H |

GR. MEAN = 7.914 PH UNITS GRAND MEAN = 5.841 PH UNITS TEST DETERMINATIONS = 5
SD MEANS = .208 PH UNITS SD OF MEANS = .395 PH UNITS 4 LABS IN GRAND MEANS
AVERAGE SDR = .035 PH UNITS AVERAGE SDR = .035 PH UNITS
TOTAL NUMBER OF LABORATORIES REPORTING = 4

REPORT NO. 58G TAPPI COLLABORATIVE REFERENCE PROGRAM FEBRUARY 1979
ANALYSIS T57-2 TABLE 2
HYDROGEN ION CONCENTRATION (PH), HOT
TAPPI STANDARD T435 OS-77

| LAB CODE | F | MEANS J78 | J75 | COORDINATES MAJOR | MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L182H | O | 7.720 | 5.738 | -.173 | .137 | .91 | 57E | PH, HOT, RADIOMETER TYPE PH M 28 |
| L128 | O | 7.812 | 5.756 | -.119 | .060 | 1.15 | 57L | PH, HOT, L*N |
| L162 | O | 7.926 | 5.470 | -.335 | -.160 | 1.94 | 57C | PH, HOT, CORNING MODEL 12 RESEARCH METER |
| L174H | O | 8.200 | 6.400 | .627 | -.036 | .00 | 57G | PH, HOT, FISHER ACCUMET MODEL 220 |
| GMEANS: | | 7.914 | 5.841 | | | 1.00 | | |
| 95% ELLIPSE: | | | | 3.250 | .972 | WITH GAMMA = 66 DEGREES | | |

ANALYSIS T60-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT

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

| LAB CODE | SAMPLE E86 MEAN | BOND 79 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE B21 MEAN | SEMI BLEACHED 65 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D.F = 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L105 | 90.40 | .65 | 1.21 | .59 | 1.66 | 74.00 | 1.64 | 1.64 | .85 | .84 | 60H | O | L105 |
| L108 | 89.90 | .15 | .28 | .41 | 1.16 | 72.25 | -.11 | -.11 | .44 | .44 | 60B | O | L108 |
| L118 | 89.73 | -.02 | -.03 | .35 | 1.00 | 72.49 | .13 | .13 | 1.19 | 1.17 | 60B | O | L118 |
| L121 | 90.09 | .34 | .63 | .51 | 1.44 | 72.48 | .12 | .12 | 1.56 | 1.53 | 60B | O | L121 |
| L122 | 89.41 | -.34 | -.63 | .30 | .86 | 71.38 | -.98 | -.98 | .74 | .73 | 60D | O | L122 |
| L123 | 89.25 | -.50 | -.92 | .32 | .91 | 72.79 | .43 | .43 | 1.09 | 1.07 | 60W | O | L123 |
| L124 | 89.39 | -.36 | -.66 | .49 | 1.40 | 72.63 | .27 | .27 | .95 | .94 | 60B | O | L124 |
| L125 | 89.27 | -.48 | -.89 | .30 | .85 | 71.02 | -1.34 | -1.34 | 1.13 | 1.11 | 60H | O | L125 |
| L131 | 88.43 | -1.32 | -2.44 | .21 | .58 | 70.67 | -1.69 | -1.69 | .91 | .89 | 60R | O | L131 |
| L132 | 89.48 | -.27 | -.50 | .25 | .72 | 71.02 | -1.34 | -1.34 | 1.21 | 1.19 | 60B | O | L132 |
| L134 | 89.98 | .23 | .43 | .28 | .79 | 72.84 | .48 | .48 | 1.05 | 1.03 | 60R | O | L134 |
| L136 | 89.40 | -.35 | -.65 | .33 | .94 | 72.41 | .05 | .05 | 1.00 | .98 | 60H | O | L136 |
| L139 | 89.50 | -.25 | -.46 | .35 | .99 | 71.68 | -.68 | -.68 | .85 | .84 | 60B | O | L139 |
| L148H | 89.29 | -.46 | -.85 | .30 | .84 | 71.20 | -1.16 | -1.16 | 1.22 | 1.20 | 60H | O | L148H |
| L150 | 90.20 | .45 | .84 | .42 | 1.20 | 74.10 | 1.74 | 1.74 | .81 | .80 | 60B | O | L150 |
| L152 | 90.05 | .30 | .56 | .23 | .64 | 73.08 | .72 | .72 | .88 | .86 | 60B | O | L152 |
| L153 | 89.95 | .20 | .37 | .64 | 1.83 | 72.95 | .59 | .59 | .69 | .67 | 60B | O | L153 |
| L157 | 90.35 | .60 | 1.12 | .41 | 1.17 | 72.95 | .59 | .59 | 1.82 | 1.79 | 60B | O | L157 |
| L158 | 90.38 | .63 | 1.17 | .50 | 1.41 | 73.80 | 1.44 | 1.44 | 1.19 | 1.17 | 60D | O | L158 |
| L159 | 89.61 | -.14 | -.26 | .20 | .57 | 71.04 | -1.32 | -1.32 | 1.03 | 1.01 | 60R | O | L159 |
| L162 | 90.01 | .26 | .49 | .33 | .93 | 72.22 | -.14 | -.14 | .89 | .87 | 60W | O | L162 |
| L166 | 88.76 | -.99 | -1.83 | .58 | 1.63 | 71.37 | -.99 | -.99 | 1.57 | 1.54 | 60B | O | L166 |
| L173A | 90.30 | .55 | 1.02 | .48 | 1.37 | 72.20 | -.16 | -.16 | .92 | .90 | 60B | O | L173A |
| L190C | 89.08 | -.67 | -1.24 | .34 | .97 | 70.16 | -2.20 | -2.21 | 1.41 | 1.39 | 60B | O | L190C |
| L190R | 89.77 | .02 | .04 | .37 | 1.04 | 72.64 | .28 | .28 | 1.21 | 1.19 | 60B | O | L190R |
| L206 | 90.00 | .25 | .47 | .34 | .95 | 73.38 | 1.02 | 1.02 | 1.29 | 1.26 | 60B | O | L206 |
| L210B | 89.93 | .18 | .34 | .29 | .82 | 73.21 | .85 | .85 | .93 | .92 | 60B | O | L210B |
| L210D | 90.14 | .39 | .73 | .35 | 1.00 | 73.07 | .71 | .71 | .79 | .78 | 60D | O | L210D |
| L211S | 88.42 | -1.33 | -2.46 | .38 | 1.08 | 69.68 | -2.68 | -2.69 | 1.21 | 1.19 | 60R | * | L211S |
| L212 | 90.50 | .75 | 1.40 | .71 | 2.01 | 72.80 | .44 | .44 | .79 | .78 | 60B | O | L212 |
| L213 | 90.11 | .36 | .67 | .45 | 1.26 | 72.84 | .48 | .48 | .91 | .89 | 60B | O | L213 |
| L223B | 90.11 | .36 | .67 | .39 | 1.10 | 72.41 | .05 | .05 | 1.40 | 1.37 | 60B | O | L223B |
| L225 | 90.91 | 1.16 | 2.16 | .64 | 1.82 | 74.62 | 2.26 | 2.26 | 1.11 | 1.09 | 60B | O | L225 |
| L226B | 88.86 | -.89 | -1.65 | .30 | .86 | 70.84 | -1.52 | -1.52 | .74 | .73 | 60B | O | L226B |
| L228 | 89.44 | -.31 | -.57 | .27 | .76 | 72.35 | -.01 | -.01 | .91 | .90 | 60H | O | L228 |
| L230 | 89.92 | .17 | .32 | .18 | .51 | 72.02 | -.34 | -.34 | .50 | .49 | 60B | O | L230 |
| L236B | 89.02 | -.73 | -1.35 | .64 | 1.81 | 71.22 | -1.14 | -1.14 | .49 | .49 | 60B | O | L236B |
| L238A | 88.38 | -1.37 | -2.54 | .24 | .69 | 70.79 | -1.57 | -1.57 | .54 | .53 | 60R | * | L238A |
| L241 | 89.55 | -.20 | -.37 | .18 | .52 | 72.77 | .41 | .41 | 1.06 | 1.04 | 60B | O | L241 |
| L243 | 89.56 | -.19 | -.35 | .44 | 1.24 | 72.01 | -.35 | -.35 | .74 | .73 | 60B | O | L243 |
| L254 | 90.20 | .45 | .84 | .41 | 1.17 | 72.06 | -.30 | -.30 | 1.09 | 1.07 | 60H | O | L254 |
| L255 | 89.87 | .12 | .23 | .21 | .60 | 72.00 | -.36 | -.36 | .65 | .64 | 60B | O | L255 |
| L259 | 89.99 | .24 | .45 | .45 | 1.28 | 73.10 | .74 | .74 | .84 | .83 | 60B | O | L259 |
| L261 | 90.47 | .72 | 1.34 | .35 | 1.00 | 73.20 | .84 | .84 | 1.06 | 1.04 | 60B | O | L261 |
| L262 | 90.36 | .61 | 1.14 | .27 | .77 | 72.80 | .44 | .44 | .88 | .87 | 60R | O | L262 |
| L275 | 89.34 | -.41 | -.76 | .37 | 1.05 | 71.53 | -.83 | -.83 | .85 | .83 | 60R | O | L275 |
| L278 | 90.00 | .25 | .47 | .59 | 1.67 | 72.93 | .57 | .57 | .90 | .89 | 60B | O | L278 |
| L281 | 89.77 | .02 | .04 | .24 | .68 | 72.92 | .56 | .56 | .91 | .89 | 60D | O | L281 |
| L285D | 89.52 | -.23 | -.42 | .28 | .80 | 72.08 | -.28 | -.28 | 1.38 | 1.35 | 60D | O | L285D |
| L285R | 89.14 | -.61 | -1.13 | .21 | .60 | 71.26 | -1.10 | -1.10 | .88 | .86 | 60R | O | L285R |
| L288 | 90.03 | .28 | .52 | .46 | 1.30 | 72.13 | -.23 | -.23 | 1.12 | 1.10 | 60D | O | L288 |
| L301 | 89.61 | -.14 | -.26 | .23 | .66 | 72.22 | -.14 | -.14 | .71 | .70 | 60B | O | L301 |
| L305 | 89.67 | -.08 | -.14 | .18 | .52 | 71.52 | -.84 | -.84 | .87 | .85 | 60R | O | L305 |
| L308 | 90.45 | .70 | 1.30 | .22 | .62 | 73.13 | .77 | .77 | 1.35 | 1.33 | 60H | O | L308 |
| L315 | 89.21 | -.54 | -1.00 | .35 | 1.00 | 71.26 | -1.10 | -1.10 | 1.42 | 1.39 | 60D | O | L315 |
| L317 | 90.04 | .29 | .54 | .30 | .86 | 72.55 | .19 | .19 | .63 | .62 | 60B | O | L317 |
| L318 | 90.05 | .30 | .56 | .44 | 1.24 | 73.35 | .99 | .99 | .75 | .73 | 60B | O | L318 |
| L323 | 89.92 | .17 | .32 | .36 | 1.01 | 72.36 | -.00 | -.00 | 1.14 | 1.12 | 60W | O | L323 |
| L326 | 89.60 | -.15 | -.27 | .44 | 1.25 | 72.84 | .48 | .48 | 1.71 | 1.68 | 60B | O | L326 |
| L328 | 90.60 | .85 | 1.58 | .70 | 1.98 | 72.60 | .24 | .24 | 1.43 | 1.41 | 60B | O | L328 |
| L339 | 89.00 | -.75 | -1.39 | .47 | 1.34 | 90.00 | 17.64 | 17.67 | .00 | .00 | 60B | # | L339 |
| L349 | 89.75 | .00 | .00 | .19 | .54 | 72.80 | .44 | .44 | .75 | .74 | 60D | O | L349 |
| L352 | 89.18 | -.57 | -1.05 | .22 | .62 | 72.10 | -.26 | -.26 | .69 | .68 | 60R | O | L352 |
| L354 | 89.00 | -.75 | -1.39 | .00 | .00 | 71.20 | -1.16 | -1.16 | .79 | .78 | 60B | O | L354 |
| L390 | 89.92 | .17 | .32 | .27 | .75 | 73.92 | 1.56 | 1.56 | 1.92 | 1.89 | 60B | O | L390 |

ANALYSIS T60-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT

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

| LAB CODE | SAMPLE E86 MEAN | BOND 79 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE B21 MEAN | SEMI BLEACHED 65 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D.= 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L396 | 89.60 | -.15 | -.27 | .44 | 1.24 | 71.38 | -.98 | -.98 | .80 | .79 | 60B | O | L396 |
| L523 | 89.98 | .23 | .43 | .18 | .50 | 72.60 | .24 | .24 | .86 | .84 | 60R | O | L523 |
| L543 | 89.40 | -.35 | -.65 | .49 | 1.38 | 72.67 | .31 | .31 | .53 | .52 | 60D | O | L543 |
| L567 | 91.02 | 1.27 | 2.36 | .38 | 1.08 | 75.25 | 2.89 | 2.89 | 1.50 | 1.47 | 60D | * | L567 |
| L573 | 89.81 | .06 | .12 | .22 | .63 | 73.24 | .88 | .88 | .50 | .49 | 60H | O | L573 |
| L581 | 89.92 | .17 | .32 | .42 | 1.20 | 72.13 | -.23 | -.23 | 1.89 | 1.86 | 60B | O | L581 |
| L587 | 89.68 | -.07 | -.13 | .43 | 1.21 | 71.79 | -.57 | -.57 | 1.22 | 1.20 | 60B | O | L587 |
| L592 | 88.64 | -1.11 | -2.06 | .37 | 1.06 | 71.11 | -1.25 | -1.25 | .86 | .84 | 60W | O | L592 |
| L594 | 89.73 | -.02 | -.03 | .35 | .99 | 73.68 | 1.32 | 1.32 | 1.72 | 1.69 | 60D | O | L594 |
| L597 | 89.98 | .23 | .43 | .06 | .18 | 71.35 | -1.01 | -1.01 | .88 | .87 | 60B | O | L597 |
| L599 | 89.60 | -.15 | -.27 | .32 | .90 | 74.35 | 1.99 | 1.99 | 1.31 | 1.29 | 60B | X | L599 |
| L608 | 91.28 | 1.53 | 2.84 | .32 | .91 | 76.65 | 4.29 | 4.30 | .72 | .71 | 60D | # | L608 |
| L673R | 89.93 | .18 | .34 | .21 | .60 | 72.71 | .35 | .35 | .81 | .80 | 60B | O | L673R |
| L673T | 89.75 | .00 | .00 | .20 | .56 | 73.08 | .72 | .72 | .91 | .89 | 60B | O | L673T |
| L688 | 90.51 | .76 | 1.41 | .22 | .63 | 73.33 | .97 | .97 | .79 | .77 | 60B | O | L688 |
| L692 | 89.87 | .12 | .23 | .44 | 1.26 | 72.61 | .25 | .25 | 1.57 | 1.55 | 60D | O | L692 |
| GR. MEAN = | 89.75 PERCENT | | | | GRAND MEAN = | 72.36 PERCENT | | | | TEST DETERMINATIONS = | 10 | | |
| SD MEANS = | .54 PERCENT | | | | SD OF MEANS = | 1.00 PERCENT | | | | 78 LABS IN GRAND MEANS | | | |
| | | AVERAGE SDR = | .35 PERCENT | | | | AVERAGE SDR = | 1.02 PERCENT | | | | | |
| L100 | 89.70 | -.05 | -.09 | .21 | .58 | 72.01 | -.35 | -.35 | .43 | .43 | 60E | * | L100 |
| L232 | 89.05 | -.70 | -1.29 | .44 | 1.24 | 71.30 | -1.06 | -1.06 | .26 | .25 | 60P | * | L232 |
| L249 | 88.90 | -.85 | -1.57 | .32 | .90 | 71.28 | -1.08 | -1.08 | 1.17 | 1.15 | 60P | * | L249 |
| L256 | 88.70 | -1.05 | -1.94 | .19 | .53 | 71.44 | -.92 | -.92 | 1.53 | 1.51 | 60N | * | L256 |
| L260 | 89.75 | .00 | .00 | .42 | 1.21 | 72.00 | -.36 | -.36 | .67 | .66 | 60P | * | L260 |
| L312 | 88.30 | -1.45 | -2.69 | .26 | .73 | 70.10 | -2.26 | -2.27 | .88 | .86 | 60P | * | L312 |
| L380 | 89.00 | -.75 | -1.39 | .47 | 1.34 | 70.40 | -1.96 | -1.96 | .84 | .83 | 60P | * | L380 |
| L687 | 89.25 | -.50 | -.92 | .35 | 1.00 | 71.60 | -.76 | -.76 | .84 | .83 | 60P | * | L687 |

TOTAL NUMBER OF LABORATORIES REPORTING = 89

Best values: E86 89.8 ± 0.9 percent
B21 72.4 ± 1.5 percent

The following laboratories were omitted from the grand means because of extreme test results: 339, 608.

ANALYSIS T60-1 TABLE 2

OPACITY (89% REFLECTANCE BACKING) IN PERCENT

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

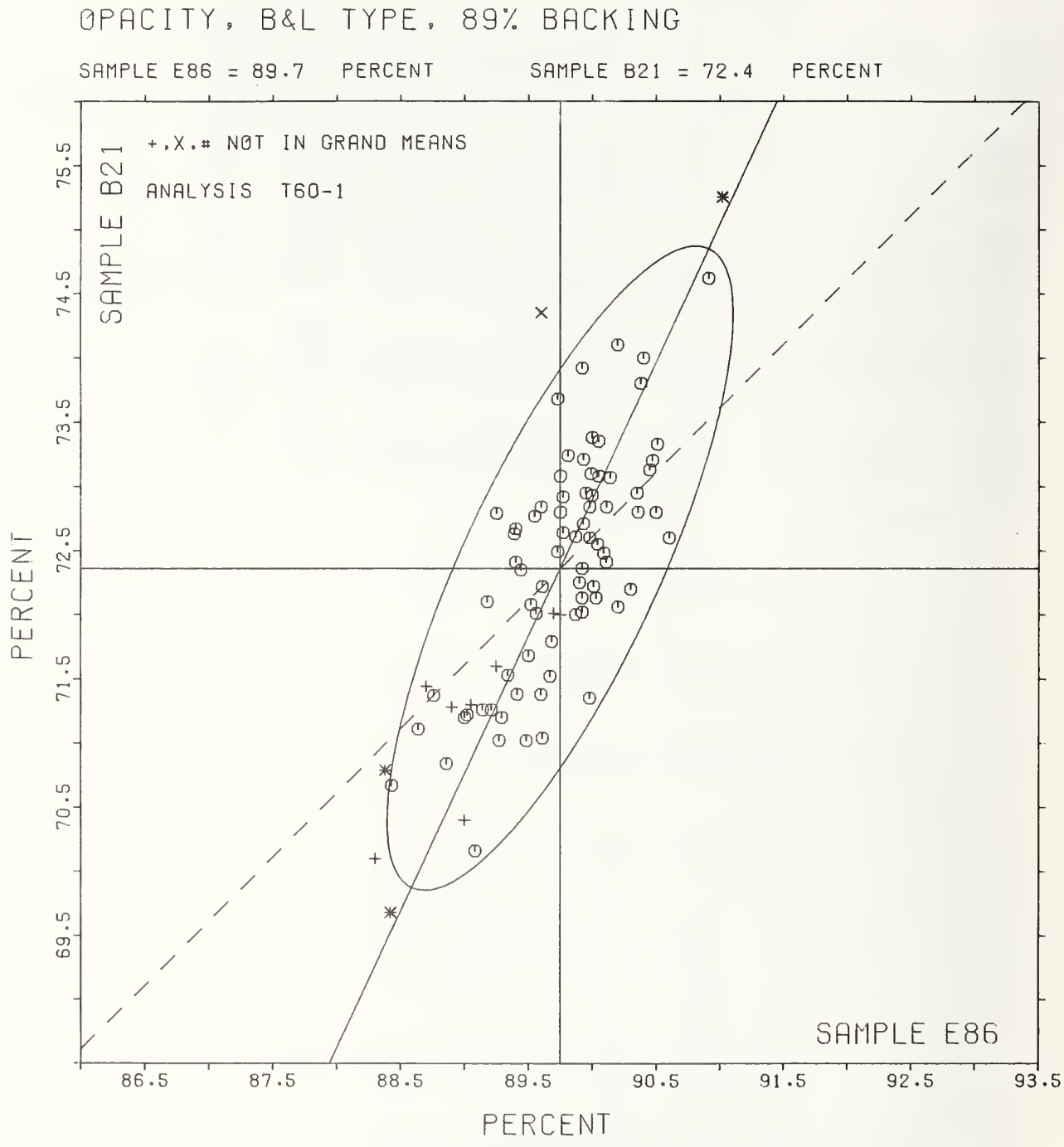
| LAB CODE | F | MEANS E86 | B21 | COORDINATES MAJOR | MINOR | AVG E.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L312 | * | 88.30 | 70.10 | +2.66 | .35 | .80 | 60P | OPACITY (WHITE BACKING), PHOTOVOLT |
| L238A | # | 88.38 | 70.79 | -2.00 | .57 | .61 | 60R | OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL) |
| L211S | # | 88.42 | 69.68 | -2.99 | .07 | 1.14 | 60R | OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL) |
| L131 | O | 88.43 | 70.67 | -2.09 | .48 | .74 | 60R | OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL) |
| L592 | O | 88.64 | 71.11 | -1.60 | .47 | .95 | 60W | OPACITY (WHITE BACKING), HUYGEN,DIGITAL |
| L256 | * | 88.70 | 71.44 | -1.28 | .56 | 1.02 | 60N | OPACITY (WHITE BACKING), HUNTER |
| L166 | O | 88.76 | 71.37 | -1.32 | .48 | 1.59 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L226B | O | 88.86 | 70.84 | -1.75 | .16 | .79 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L249 | * | 88.90 | 71.28 | -1.34 | .31 | 1.03 | 60P | OPACITY (WHITE BACKING), PHOTOVOLT |
| L380 | * | 89.00 | 70.40 | -2.09 | -.15 | 1.08 | 60P | OPACITY (WHITE BACKING), PHOTOVOLT |
| L354 | O | 89.00 | 71.20 | -1.37 | .19 | .39 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L339 | # | 89.00 | 90.00 | 15.66 | 8.15 | .67 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L236B | O | 89.02 | 71.22 | -1.34 | .18 | 1.15 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L232 | * | 89.05 | 71.30 | -1.26 | .18 | .75 | 60P | OPACITY (WHITE BACKING), PHOTOVOLT |
| L190C | O | 89.08 | 70.16 | -2.28 | -.33 | 1.18 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L285R | O | 89.14 | 71.26 | -1.25 | .08 | .73 | 60R | OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL) |
| L352 | O | 89.18 | 72.10 | -.48 | .40 | .65 | 60R | OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL) |
| L315 | O | 89.21 | 71.26 | -1.23 | .02 | 1.19 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| L687 | * | 89.25 | 71.60 | -.90 | .13 | .92 | 60P | OPACITY (WHITE BACKING), PHOTOVOLT |
| L123 | O | 89.25 | 72.79 | .18 | .63 | .99 | 60W | OPACITY (WHITE BACKING), BUYGEN,DIGITAL |
| L125 | O | 89.27 | 71.02 | -1.42 | -.13 | .98 | 60H | OPACITY (WHITE BACKING), BUYGEN |
| L148H | O | 89.29 | 71.20 | -1.25 | -.08 | 1.02 | 60H | OPACITY (WHITE BACKING), HUYGEN |
| L275 | O | 89.34 | 71.53 | -.93 | .02 | .94 | 60R | OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL) |
| L124 | O | 89.39 | 72.63 | .09 | .44 | 1.17 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L543 | O | 89.40 | 72.67 | .13 | .45 | .95 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| L136 | O | 89.40 | 72.41 | -.10 | .34 | .96 | 60H | OPACITY (WHITE BACKING), HUYGEN |
| L122 | O | 89.41 | 71.38 | -1.03 | -.11 | .79 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| L228 | O | 89.44 | 72.35 | -.14 | .27 | .83 | 60H | OPACITY (WHITE BACKING), HUYGEN |
| L132 | O | 89.48 | 71.02 | -1.33 | -.33 | .95 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L139 | O | 89.50 | 71.68 | -.72 | -.06 | .91 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L285D | O | 89.52 | 72.08 | -.35 | .09 | 1.08 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| L241 | O | 89.55 | 72.77 | .29 | .35 | .78 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L243 | O | 89.56 | 72.01 | -.40 | .02 | .99 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L599 | X | 89.60 | 74.35 | 1.74 | .98 | 1.09 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L396 | O | 89.60 | 71.38 | -.95 | -.28 | 1.01 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L326 | O | 89.60 | 72.84 | .37 | .34 | 1.46 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L159 | O | 89.61 | 71.04 | -1.26 | -.43 | .79 | 60R | OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL) |
| L301 | O | 89.61 | 72.22 | -.19 | .07 | .68 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L305 | O | 89.67 | 71.52 | -.80 | -.29 | .69 | 60R | OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL) |
| L587 | O | 89.68 | 71.79 | -.55 | -.18 | 1.20 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L100 | * | 89.70 | 72.01 | -.34 | -.11 | .50 | 60E | OPACITY (WHITE BACKING), ZEISS ELREPHO, FMY-C(10) FILTER |
| L118 | O | 89.73 | 72.49 | .11 | .07 | 1.08 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L594 | O | 89.73 | 73.68 | 1.19 | .57 | 1.34 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| L260 | * | 89.75 | 72.00 | -.33 | -.15 | .93 | 60P | OPACITY (WHITE BACKING), PHOTOVOLT |
| L673T | O | 89.75 | 73.08 | .65 | .30 | .72 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L349 | O | 89.75 | 72.80 | .40 | .18 | .64 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| L190R | O | 89.77 | 72.64 | .26 | .10 | 1.11 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L281 | O | 89.77 | 72.92 | .52 | .22 | .79 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| L573 | O | 89.81 | 73.24 | .82 | .32 | .56 | 60H | OPACITY (WHITE BACKING), HUYGEN |
| L255 | O | 89.87 | 72.00 | -.28 | -.26 | .62 | 60H | OPACITY (WHITE BACKING), BAUSCH + LOMH |
| L692 | O | 89.87 | 72.61 | .28 | -.01 | 1.40 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| L108 | O | 89.90 | 72.25 | -.04 | -.18 | .80 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L581 | O | 89.92 | 72.13 | -.14 | -.25 | 1.53 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L390 | O | 89.92 | 73.92 | 1.49 | .50 | 1.32 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L230 | O | 89.92 | 72.02 | -.24 | -.30 | .50 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L323 | O | 89.92 | 72.36 | .07 | -.16 | 1.06 | 60W | OPACITY (WHITE BACKING), HUYGEN,DIGITAL |
| L673R | O | 89.93 | 72.71 | .39 | -.02 | .70 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMH |
| L210B | O | 89.93 | 73.21 | .85 | .19 | .87 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMH |
| L153 | O | 89.95 | 72.95 | .62 | .07 | 1.25 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMH |
| L134 | O | 89.98 | 72.84 | .53 | -.01 | .91 | 60R | OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL) |
| L597 | O | 89.98 | 71.35 | -.82 | -.64 | .52 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L523 | O | 89.98 | 72.60 | .31 | -.11 | .67 | 60R | OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL) |
| L259 | O | 89.99 | 73.10 | .77 | .09 | 1.05 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L206 | O | 90.00 | 73.38 | 1.03 | .20 | 1.11 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |
| L278 | O | 90.00 | 72.93 | .62 | .01 | 1.28 | 60B | OPACITY (WHITE BACKING), BAUSCH + LOMB |

ANALYSIS T60-1 TABLE 2

OPACITY (89% REFLECTANCE BACKING) IN PERCENT

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

| LAB CODE | F | MEANS E86 | MEANS E21 | COORDINATES MAJOR | COORDINATES MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L162 | O | 90.01 | 72.22 | -.02 | -.30 | .90 | 60W | OPACITY (WHITE BACKING), HUYGEN,DIGITAL |
| L288 | O | 90.03 | 72.13 | -.09 | -.35 | 1.20 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| L317 | O | 90.04 | 72.55 | .29 | -.18 | .74 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L152 | O | 90.05 | 73.08 | .78 | .03 | .75 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L318 | O | 90.05 | 73.35 | 1.02 | .15 | .99 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L121 | O | 90.09 | 72.48 | .25 | -.26 | 1.48 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L223B | O | 90.11 | 72.41 | .20 | -.31 | 1.24 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L213 | O | 90.11 | 72.84 | .59 | -.13 | 1.08 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L210D | O | 90.14 | 73.07 | .81 | -.05 | .89 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| L150 | O | 90.20 | 74.10 | 1.77 | .33 | 1.00 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L254 | O | 90.20 | 72.06 | -.08 | -.54 | 1.12 | 60B | OPACITY (WHITE BACKING), HUYGEN |
| L173A | O | 90.30 | 72.20 | .09 | -.57 | 1.14 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L157 | O | 90.35 | 72.95 | .79 | -.30 | 1.48 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L262 | O | 90.36 | 72.80 | .66 | -.37 | .82 | 60R | OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL) |
| L158 | O | 90.38 | 73.80 | 1.57 | .04 | 1.29 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| L105 | O | 90.40 | 74.00 | 1.76 | .10 | 1.25 | 60H | OPACITY (WHITE BACKING), HUYGEN |
| L308 | O | 90.45 | 73.13 | .99 | -.31 | .97 | 60H | OPACITY (WHITE BACKING), HUYGEN |
| L261 | O | 90.47 | 73.20 | 1.07 | -.30 | 1.02 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L212 | O | 90.50 | 72.80 | .72 | -.50 | 1.39 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L688 | O | 90.51 | 73.33 | 1.20 | -.28 | .70 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L328 | O | 90.60 | 72.60 | .58 | -.67 | 1.69 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L225 | O | 90.91 | 74.62 | 2.54 | -.10 | 1.46 | 60B | OPACITY (WHITE BACKING), BAUSCH * LOMB |
| L567 | # | 91.02 | 75.25 | 3.16 | .07 | 1.28 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| L608 | # | 91.28 | 76.65 | 4.53 | .43 | .81 | 60D | OPACITY (WHITE BACKING), BNL-2 |
| GMEANS: | | 89.75 | 72.36 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 2.75 | .77 | WITH GAMMA = 64 DEGREES | | |


OPACITY, B&L TYPE, 89% BACKING
SAMPLE E86 = 89.7 PERCENT
SAMPLE B21 = 72.4 PERCENT
+,X,* NOT IN GRAND MEANS
ANALYSIS T60-1
SAMPLE B21
PERCENT
75.5
74.5
73.5
72.5
71.5
70.5
69.5
SAMPLE E86
86.5
87.5
88.5
89.5
90.5
91.5
92.5
93.5
PERCENT

REPORT NO. 58G TAPPI COLLABORATIVE REFERENCE PROGRAM FEBRUARY 1979

ANALYSIS T60-2 TABLE 1

OPACITY (PAPER BACKING) IN PERCENT

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

| LAB CODE | SAMPLE E86 MEAN | BOND 79 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE B21 MEAN | SEMI BLEACHED 65 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D.= 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L118 | 91.40 | -.09 | -.32 | .37 | 1.24 | 75.61 | .00 | .01 | .91 | .83 | 60C | 6 | L118 |
| L190C | 91.50 | .01 | .04 | .30 | 1.01 | 75.59 | -.02 | -.06 | 1.03 | .93 | 60C | 6 | L190C |
| L190R | 91.83 | .34 | 1.23 | .24 | .80 | 76.06 | .45 | 1.66 | 1.71 | 1.55 | 60C | 6 | L190R |
| L236B | 91.43 | -.06 | -.21 | .43 | 1.44 | 75.67 | .06 | .23 | .66 | .60 | 60C | 6 | L236B |
| L243 | 91.73 | .24 | .87 | .21 | .71 | 75.49 | -.12 | -.43 | .97 | .89 | 60C | 6 | L243 |
| L543 | 91.04 | -.45 | -1.61 | .24 | .80 | 75.22 | -.39 | -1.42 | 1.32 | 1.20 | 60V | 6 | L543 |

GR. MEAN = 91.49 PERCENT GRAND MEAN = 75.61 PERCENT TEST DETERMINATIONS = 10

SD MEANS = .28 PERCENT SD OF MEANS = .27 PERCENT 6 LABS IN GRAND MEANS

AVERAGE SDR = .30 PERCENT AVERAGE SDR = 1.10 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 6

Best values: E86 91.5 percent
B21 75.5 percent

REPORT NO. 58G TAPPI COLLABORATIVE REFERENCE PROGRAM FEBRUARY 1979

ANALYSIS T60-2 TABLE 2

OPACITY (PAPER BACKING) IN PERCENT

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

| LAB CODE | F | MEANS E86 | B21 | COORDINATES MAJOR | MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L543 | 6 | 91.04 | 75.22 | -.59 | .04 | 1.00 | 60V | OPACITY (PAPER BACKING), DIANO/BNL |
| L118 | 6 | 91.40 | 75.61 | -.06 | .06 | 1.03 | 60C | OPACITY (PAPER BACKING), BAUSCH + LOMB |
| L236B | 6 | 91.43 | 75.67 | .00 | .09 | 1.02 | 60C | OPACITY (PAPER BACKING), BAUSCH + LOMB |
| L190C | 6 | 91.50 | 75.59 | -.00 | -.02 | .97 | 60C | OPACITY (PAPER BACKING), BAUSCH + LOMB |
| L243 | 6 | 91.73 | 75.49 | .09 | -.25 | .80 | 60C | OPACITY (PAPER BACKING), BAUSCH + LOMB |
| L190R | 6 | 91.83 | 76.06 | .56 | .09 | 1.17 | 60C | OPACITY (PAPER BACKING), BAUSCH + LOMB |
| GMEANS: | | 91.49 | 75.61 | | | 1.00 | | |
| 95% ELLIPSE: | | | | 1.53 | .54 | WITH GAMMA = 44 DEGREES | | |

REPORT NO. 58G — TAPPI COLLABORATIVE REFERENCE PROGRAM — FEBRUARY 1979

ANALYSIS T60-3 TABLE 1

OPACITY (PAPER BACKING) IN PERCENT

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

| LAB CODE | SAMPLE E86 MEAN | BOND 79 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE B21 MEAN | SEMI BLEACHED 65 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D.F 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L100 | 92.07 | .00 | .02 | .22 | 1.14 | 76.65 | -.43 | -.66 | .46 | .60 | 60J | O | L100 |
| L150 | 92.05 | -.01 | -.08 | .21 | 1.08 | 77.05 | -.03 | -.04 | .94 | 1.23 | 60J | O | L150 |
| L182E | 92.04 | -.03 | -.13 | .20 | 1.04 | 77.15 | .07 | .10 | .69 | .91 | 60J | O | L182E |
| L233F | 91.85 | -.22 | -1.13 | .17 | .88 | 76.22 | -.86 | -1.31 | .80 | 1.05 | 60F | O | L233F |
| L236 | 91.93 | -.14 | -.71 | .19 | .97 | 76.74 | -.34 | -.52 | .86 | 1.14 | 60J | O | L236 |
| L242 | 92.17 | .10 | .55 | .22 | 1.14 | 77.65 | .57 | .86 | .93 | 1.22 | 60J | O | L242 |
| L244 | 91.95 | -.12 | -.60 | .25 | 1.29 | 76.88 | -.20 | -.31 | .73 | .95 | 60F | O | L244 |
| L250T | 91.98 | -.09 | -.45 | .27 | 1.37 | 76.83 | -.25 | -.38 | .78 | 1.02 | 60J | O | L250T |
| L251 | 92.04 | -.02 | -.12 | .22 | 1.13 | 76.46 | -.62 | -.95 | .89 | 1.17 | 60F | O | L251 |
| L309 | 88.88 | -3.19 | -16.69 | .30 | 1.53 | 70.36 | -6.72 | -10.20 | .42 | .55 | 60J | # | L309 |
| L360 | 91.77 | -.30 | -1.55 | .12 | .60 | 76.41 | -.67 | -1.02 | .68 | .89 | 60F | O | L360 |
| L446 | 92.01 | -.05 | -.28 | .19 | .96 | 77.14 | .05 | .08 | .67 | .88 | 60J | O | L446 |
| L575 | 92.21 | .14 | .76 | .18 | .92 | 77.42 | .34 | .51 | .97 | 1.27 | 60J | O | L575 |
| L598 | 92.50 | .43 | 2.28 | .15 | .77 | 78.69 | 1.61 | 2.44 | .63 | .83 | 60J | O | L598 |
| L678 | 92.34 | .28 | 1.44 | .13 | .69 | 77.87 | .79 | 1.19 | .64 | .84 | 60J | O | L678 |
| GR. MEAN = | 92.07 PERCENT | | | | | GRAND MEAN = | 77.08 PERCENT | | | | TEST DETERMINATIONS = | | 10 |
| SD MEANS = | .19 PERCENT | | | | | SD OF MEANS = | .66 PERCENT | | | | 14 LABS IN GRAND MEANS | | |
| | AVERAGE SDR = | .19 PERCENT | | | | | AVERAGE SDR = | .76 PERCENT | | | | | |
| L626 | 91.25 | -.82 | -4.27 | .26 | 1.36 | 75.70 | -1.38 | -2.10 | .59 | .77 | 60Q | * | L626 |

TOTAL NUMBER OF LABORATORIES REPORTING = 16

Best values: E86 92.1 ± 0.3 percent
B21 77.0 ± 1.0 percent

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

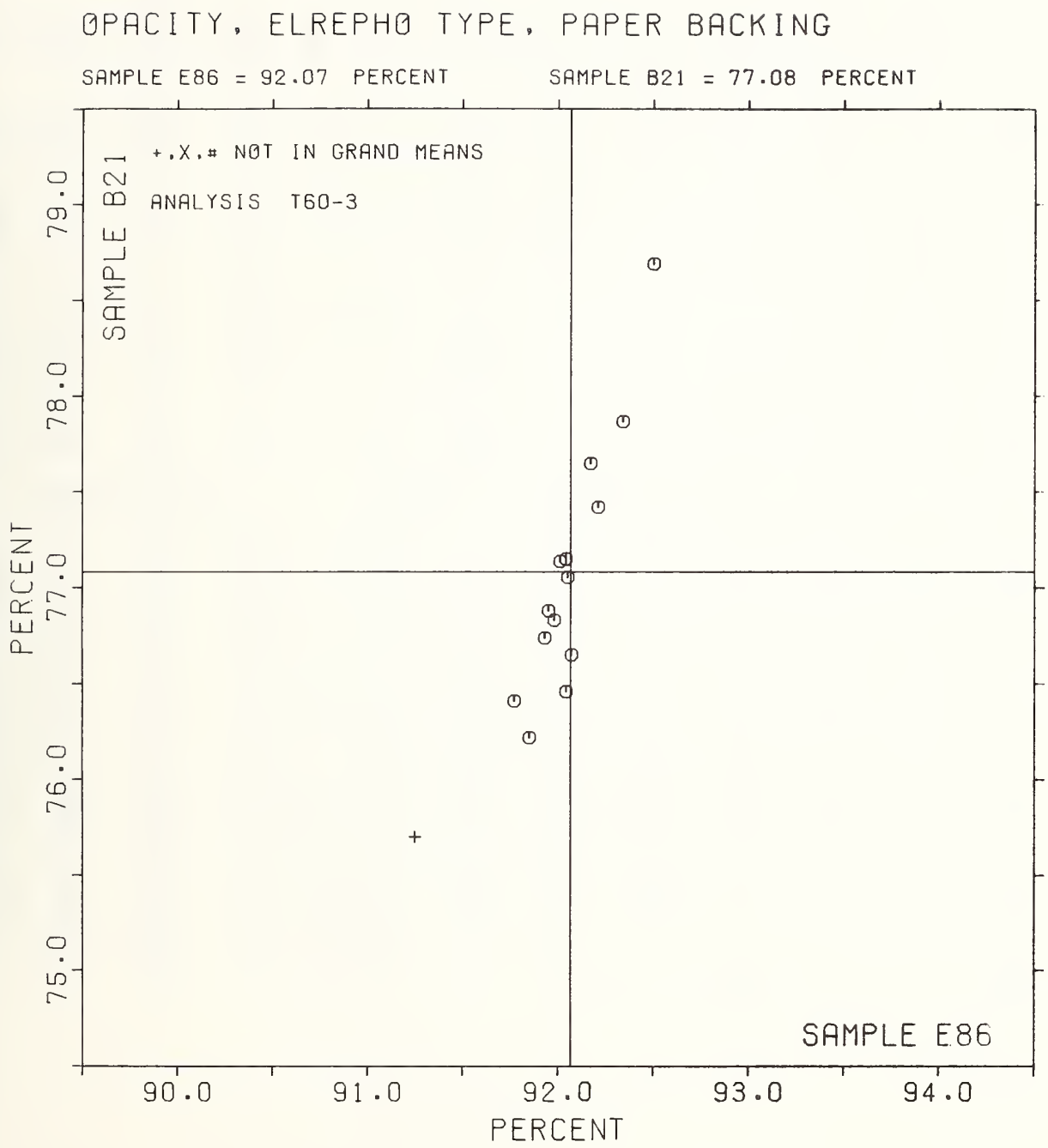
REPORT NO. 58G — TAPPI COLLABORATIVE REFERENCE PROGRAM — FEBRUARY 1979

ANALYSIS T60-3 TABLE 2

OPACITY (PAPER BACKING) IN PERCENT

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

| LAB CODE | F | MEANS E86 | B21 | COORDINATES MAJOR | MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L309 | # | 88.88 | 70.36 | -7.32 | 1.32 | 1.04 | 60J | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER |
| L626 | * | 91.25 | 75.70 | -1.55 | .43 | 1.06 | 60Q | OPACITY (PAPER BACKING), PHOTOVOLT |
| L360 | O | 91.77 | 76.41 | -.73 | .11 | .74 | 60F | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP |
| L233F | O | 91.85 | 76.22 | -.89 | -.02 | .97 | 60F | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP |
| L236 | O | 91.93 | 76.74 | -.37 | .04 | 1.05 | 60J | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER |
| L244 | O | 91.95 | 76.88 | -.23 | .06 | 1.12 | 60F | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP |
| L250T | O | 91.98 | 76.83 | -.27 | .02 | 1.20 | 60J | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER |
| L446 | O | 92.01 | 77.14 | .04 | .07 | .92 | 60J | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER |
| L182E | O | 92.04 | 77.15 | .06 | .04 | .97 | 60J | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER |
| L251 | O | 92.04 | 76.46 | -.61 | -.14 | 1.15 | 60F | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) NO TRAP |
| L150 | O | 92.05 | 77.05 | -.03 | .01 | 1.16 | 60J | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER |
| L100 | O | 92.07 | 76.65 | -.42 | -.12 | .87 | 60J | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER |
| L242 | O | 92.17 | 77.65 | .58 | .05 | 1.18 | 60J | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER |
| L575 | O | 92.21 | 77.42 | .36 | -.05 | 1.10 | 60J | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER |
| L678 | O | 92.34 | 77.87 | .83 | -.06 | .77 | 60J | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER |
| L598 | O | 92.50 | 78.69 | 1.67 | -.00 | .80 | 60J | OPACITY (PAPER BACKING), ZEISS ELREPHO, FMY-C(10) FILTER |
| GMEANS: | | 92.07 | 77.08 | | | 1.00 | | |
| 95% ELLIPSE: | | | | 1.98 | .21 | WITH GAMMA = 74 DEGREES | | |


ØPACITY, ELREPHØ TYPE, PAPER BACKING
SAMPLE E86 = 92.07 PERCENT
SAMPLE B21 = 77.08 PERCENT
+.X.# NØT IN GRAND MEANS
ANALYSIS T6Ø-3
SAMPLE B21
PERCENT
79.0
78.0
77.0
76.0
75.0
SAMPLE E86
90.0
91.0
92.0
93.0
94.0
PERCENT

ANALYSIS T65-1 TABLE 1

DIRECTIONAL BLUE REFLECTANCE IN PERCENT

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

| LAB CODE | SAMPLE J36 MEAN | PRINTING 94 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE J79 MEAN | PRINTING 73 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D.= 8 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L108 | 83.96 | .03 | .05 | .12 | .96 | 68.59 | .45 | 1.28 | .24 | 1.09 | 65M | G | L108 |
| L122 | 83.40 | -.53 | -.88 | .09 | .75 | 68.01 | -.13 | -.36 | .16 | .76 | 65N | G | L122 |
| L132 | 83.45 | -.48 | -.80 | .13 | 1.06 | 68.01 | -.13 | -.36 | .26 | 1.20 | 65N | G | L132 |
| L158 | 84.10 | .17 | .28 | .09 | .75 | 68.47 | .34 | .96 | .16 | .73 | 65N | G | L158 |
| L190C | 83.69 | -.24 | -.40 | .08 | .68 | 68.24 | .10 | .28 | .18 | .85 | 65A | G | L190C |
| L210M | 84.30 | .37 | .62 | .12 | .97 | 68.21 | .07 | .21 | .20 | .91 | 65M | G | L210M |
| L210N | 84.32 | .40 | .66 | .18 | 1.48 | 67.76 | -.38 | -1.07 | .28 | 1.28 | 65N | G | L210N |
| L211 | 81.64 | -2.29 | -3.82 | .19 | 1.56 | 68.02 | -.11 | -.32 | .35 | 1.63 | 65N | # | L211 |
| L225 | 83.49 | -.44 | -.74 | .11 | .91 | 68.29 | .15 | .43 | .40 | 1.85 | 65N | G | L225 |
| L243 | 83.31 | -.62 | -1.03 | .17 | 1.40 | 67.80 | -.34 | -.97 | .21 | .96 | 65A | G | L243 |
| L259 | 83.84 | -.09 | -.15 | .12 | .96 | 67.61 | -.53 | -1.50 | .11 | .52 | 65M | G | L259 |
| L275 | 83.70 | -.23 | -.38 | .12 | .97 | 68.57 | .44 | 1.25 | .10 | .48 | 65M | G | L275 |
| L285 | 85.56 | 1.63 | 2.72 | .05 | .42 | 68.17 | .04 | .11 | .17 | .77 | 65N | # | L285 |
| L288 | 83.72 | -.20 | -.34 | .09 | .72 | 67.76 | -.38 | -1.07 | .30 | 1.37 | 65N | G | L288 |
| L308 | 85.11 | 1.18 | 1.97 | .14 | 1.10 | 68.86 | .72 | 2.07 | .14 | .65 | 65N | G | L308 |
| L315 | 83.61 | -.32 | -.53 | .06 | .52 | 67.95 | -.19 | -.54 | .37 | 1.71 | 65N | G | L315 |
| L317 | 83.69 | -.24 | -.40 | .19 | 1.53 | 68.00 | -.14 | -.39 | .11 | .49 | 65M | G | L317 |
| L523 | 83.91 | -.02 | -.03 | .11 | .91 | 68.32 | .19 | .53 | .23 | 1.04 | 65N | G | L523 |
| L543 | 83.29 | -.64 | -1.07 | .24 | 1.96 | 68.55 | .41 | 1.18 | .23 | 1.08 | 65M | G | L543 |
| L565 | 83.56 | -.37 | -.61 | .07 | .60 | 68.27 | .14 | .39 | .07 | .33 | 65A | G | L565 |
| L598 | NO DATA REPORTED FOR SAMPLE J36 | | | | | 67.65 | -.49 | -1.39 | .17 | .78 | 65M | M | L598 |
| L636 | 84.82 | .90 | 1.49 | .07 | .57 | 67.57 | -.56 | -1.61 | .14 | .64 | 65M | G | L636 |
| L673R | 83.67 | -.25 | -.42 | .15 | 1.21 | 67.85 | -.29 | -.82 | .45 | 2.07 | 65N | G | L673R |
| L692 | 80.51 | -3.42 | -5.69 | .38 | 3.04 | 66.36 | -1.78 | -5.07 | .46 | 2.12 | 65N | # | L692 |
| GR. MEAN = | 83.93 PERCENT | | | | | GRAND MEAN = | 68.14 PERCENT | | | | TEST DETERMINATIONS = | | 8 |
| SD MEANS = | .60 PERCENT | | | | | SD OF MEANS = | .35 PERCENT | | | | 21 LABS IN GRAND MEANS | | |
| | AVERAGE SDR = | | | .12 PERCENT | | | AVERAGE SDR = | | | .22 PERCENT | | | |
| L105 | 83.65 | -.28 | -.47 | .08 | .61 | 67.49 | -.65 | -1.86 | .11 | .52 | 65T | * | L105 |
| L213 | 84.25 | .32 | .53 | .09 | .75 | 67.87 | -.26 | -.75 | .22 | 1.01 | 65T | * | L213 |
| L219 | 85.20 | 1.27 | 2.12 | .13 | 1.06 | 68.81 | .67 | 1.93 | .37 | 1.72 | 65P | * | L219 |
| L223 | 85.86 | 1.93 | 3.22 | .07 | .60 | 68.75 | .61 | 1.75 | .13 | .60 | 65G | * | L223 |
| L232 | 85.00 | 1.07 | 1.78 | .00 | .00 | 67.94 | -.20 | -.57 | .18 | .82 | 65P | * | L232 |
| L241 | 84.16 | .23 | .39 | .23 | 1.88 | 68.51 | .37 | 1.07 | .10 | .46 | 65I | * | L241 |
| L249 | 84.51 | .58 | .97 | .11 | .91 | 69.22 | 1.09 | 3.10 | .16 | .73 | 65P | * | L249 |
| L256 | 83.41 | -.52 | -.86 | .10 | .80 | 67.34 | -.80 | -2.29 | .12 | .55 | 65H | * | L256 |
| L260 | 84.26 | .33 | .55 | .13 | 1.05 | 69.05 | .91 | 2.60 | .08 | .35 | 65P | * | L260 |
| L278 | 85.56 | 1.63 | 2.72 | .32 | 2.59 | 71.15 | 3.01 | 8.60 | .35 | 1.62 | 65P | * | L278 |
| L301 | 84.05 | .12 | .20 | .14 | 1.15 | 68.32 | .19 | .53 | .13 | .59 | 65G | * | L301 |
| L312 | 84.87 | .95 | 1.57 | .23 | 1.87 | 70.94 | 2.80 | 7.99 | .18 | .82 | 65P | * | L312 |
| L321 | 85.94 | 2.01 | 3.34 | .18 | 1.43 | 70.00 | 1.86 | 5.32 | .00 | .00 | 65P | * | L321 |
| L328 | 87.65 | 3.72 | 6.20 | .18 | 1.44 | 71.64 | 3.50 | 9.99 | .23 | 1.07 | 65P | * | L328 |
| L339 | 86.62 | 2.70 | 4.49 | .35 | 2.86 | 71.87 | 3.74 | 10.67 | .23 | 1.07 | 65P | * | L339 |
| L380 | 84.12 | .20 | .33 | .23 | 1.87 | 72.00 | 3.86 | 11.03 | .00 | .00 | 65P | * | L380 |
| L442 | 91.00 | 7.07 | 11.77 | .17 | 1.37 | 72.97 | 4.84 | 13.81 | .24 | 1.12 | 65T | * | L442 |
| L562 | 87.00 | 3.07 | 5.11 | .00 | .00 | 74.50 | 6.36 | 18.17 | .00 | .00 | 65P | * | L562 |
| L587 | 84.37 | .45 | .74 | .07 | .57 | 68.01 | -.13 | -.36 | .30 | 1.41 | 65I | * | L587 |
| L591 | 83.85 | -.08 | -.13 | .08 | .63 | 66.79 | -1.35 | -3.85 | .09 | .39 | 65H | * | L591 |
| L626 | 86.34 | 2.41 | 4.01 | .19 | 1.56 | 70.24 | 2.10 | 6.00 | .23 | 1.07 | 65P | * | L626 |
| L684 | 83.77 | -.15 | -.26 | .16 | 1.28 | 66.79 | -1.35 | -3.86 | .83 | 3.84 | 65H | * | L684 |

TOTAL NUMBER OF LABORATORIES REPORTING = 46

Best values: J36 83.7 ± 1.2 percent
J79 68.0 ± 0.6 percent

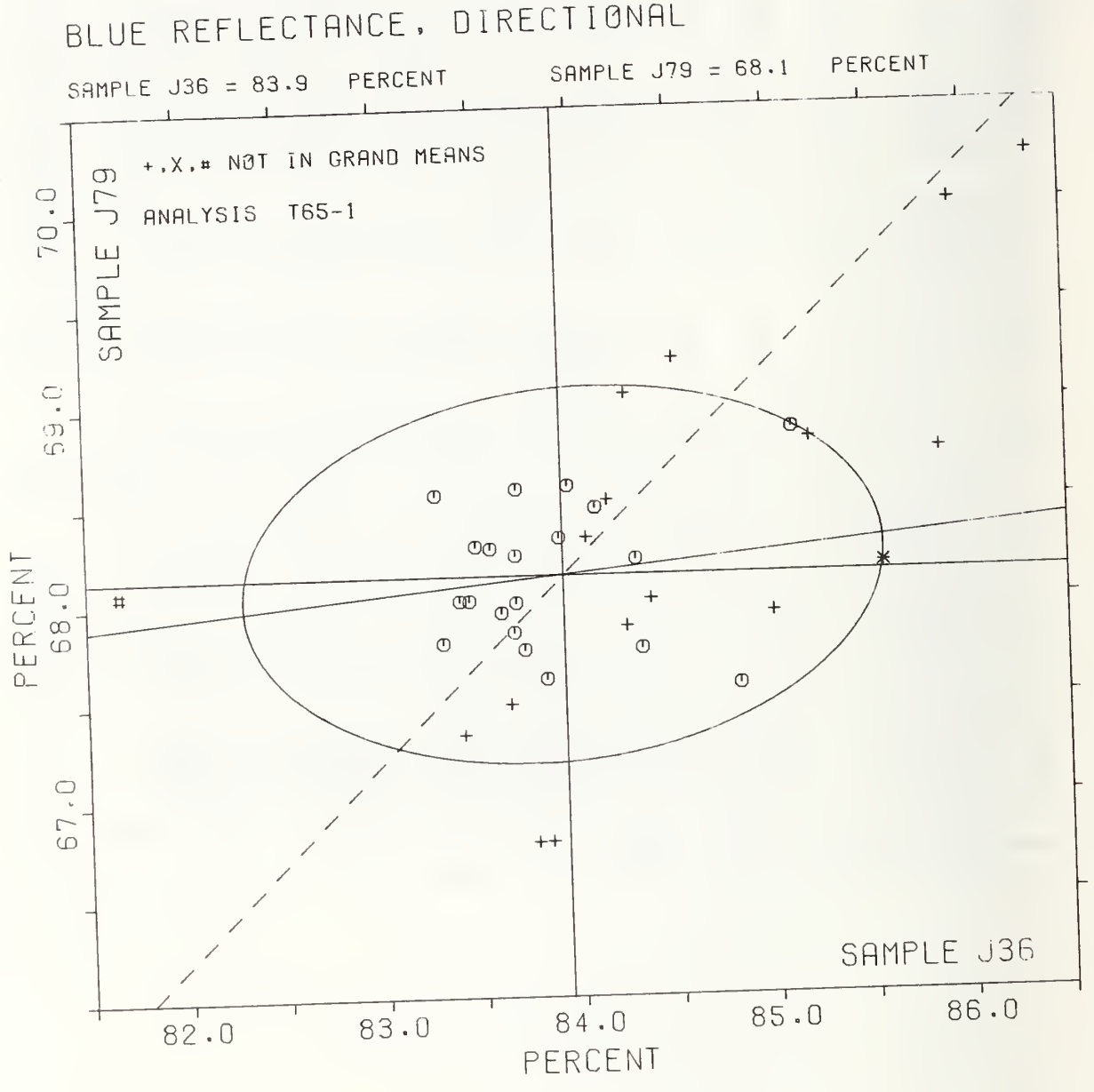
The following laboratories were omitted from the grand means because of extreme test results: 211, 692.

ANALYSIS T65-1 TABLE 2

DIRECTIONAL BLUE REFLECTANCE IN PERCENT

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

| LAB CODE | F | MEANS J36 | MEANS J79 | COORDINATES MAJOR | COORDINATES MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L598 | M | | 67.65 | | | .78 | 65M | BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1 |
| L692 | # | 80.51 | 66.36 | -3.58 | -1.43 | 2.58 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L211 | # | 81.64 | 68.02 | -2.29 | .12 | 1.60 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L543 | O | 83.29 | 68.55 | -.60 | .47 | 1.52 | 65M | BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1 |
| L243 | O | 83.31 | 67.80 | -.65 | -.27 | 1.18 | 65A | BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT),S-2 |
| L122 | O | 83.40 | 68.01 | -.54 | -.07 | .75 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L256 | * | 83.41 | 67.34 | -.59 | -.74 | .68 | 65H | BLUE REFLECTANCE (DIRECTIONAL), HUNTER |
| L132 | O | 83.45 | 68.01 | -.49 | -.08 | 1.13 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L225 | O | 83.49 | 68.29 | -.43 | .19 | 1.38 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L565 | O | 83.56 | 68.27 | -.35 | .17 | .46 | 65A | BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT),S-2 |
| L315 | O | 83.61 | 67.95 | -.33 | -.16 | 1.11 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L105 | * | 83.65 | 67.49 | -.34 | -.62 | .57 | 65T | BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M |
| L673R | O | 83.67 | 67.85 | -.28 | -.26 | 1.64 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L190C | O | 83.69 | 68.24 | -.23 | .12 | .76 | 65A | BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT),S-2 |
| L317 | O | 83.69 | 68.00 | -.25 | -.11 | 1.01 | 65M | BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1 |
| L275 | O | 83.70 | 68.57 | -.18 | .46 | .72 | 65M | BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1 |
| L288 | O | 83.72 | 67.76 | -.24 | -.35 | 1.05 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L684 | * | 83.77 | 66.79 | -.29 | -1.33 | 2.56 | 65H | BLUE REFLECTANCE (DIRECTIONAL), HUNTER |
| L259 | O | 83.84 | 67.61 | -.14 | -.51 | .74 | 65M | BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1 |
| L591 | * | 83.85 | 66.79 | -.22 | -1.33 | .51 | 65H | BLUE REFLECTANCE (DIRECTIONAL), HUNTER |
| L523 | O | 83.91 | 68.32 | .00 | .19 | .98 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L108 | O | 83.96 | 68.59 | .08 | .44 | 1.03 | 65M | BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1 |
| L301 | * | 84.05 | 68.32 | .14 | .17 | .87 | 65G | BLUE REFLECTANCE (DIRECTIONAL), GARDNER |
| L158 | O | 84.10 | 68.47 | .20 | .32 | .74 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L380 | * | 84.12 | 72.00 | .58 | 3.82 | .94 | 65P | BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT |
| L241 | * | 84.16 | 68.51 | .27 | .35 | 1.17 | 65I | BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2A |
| L213 | * | 84.25 | 67.87 | .29 | -.29 | .88 | 65T | BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M |
| L260 | * | 84.26 | 69.05 | .42 | .87 | .70 | 65P | BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT |
| L210M | O | 84.30 | 68.21 | .38 | .04 | .94 | 65M | BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1 |
| L210N | O | 84.32 | 67.76 | .36 | -.41 | 1.38 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L587 | * | 84.37 | 68.01 | .43 | -.17 | .99 | 65I | BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2A |
| L249 | * | 84.51 | 69.22 | .69 | 1.02 | .82 | 65P | BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT |
| L636 | O | 84.82 | 67.57 | .83 | -.65 | .61 | 65M | BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1 |
| L312 | * | 84.87 | 70.94 | 1.22 | 2.69 | 1.35 | 65P | BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT |
| L232 | * | 85.00 | 67.94 | 1.04 | -.31 | .41 | 65P | BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT |
| L308 | O | 85.11 | 68.86 | 1.25 | .60 | .87 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L219 | * | 85.20 | 68.81 | 1.33 | .54 | 1.39 | 65P | BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT |
| L278 | * | 85.56 | 71.15 | 1.93 | 2.83 | 2.11 | 65P | BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT |
| L285 | * | 85.56 | 68.17 | 1.63 | -.13 | .60 | 65N | BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4 |
| L223 | * | 85.86 | 68.75 | 1.98 | .42 | .60 | 65G | BLUE REFLECTANCE (DIRECTIONAL), GARDNER |
| L321 | * | 85.94 | 70.00 | 2.18 | 1.65 | .72 | 65P | BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT |
| L626 | * | 86.34 | 70.24 | 2.61 | 1.85 | 1.32 | 65P | BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT |
| L339 | * | 86.62 | 71.87 | 3.06 | 3.45 | 1.97 | 65P | BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT |
| L562 | * | 87.00 | 74.50 | 3.69 | 6.02 | .00 | 65P | BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT |
| L328 | * | 87.65 | 71.64 | 4.05 | 3.11 | 1.26 | 65P | BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT |
| L442 | * | 91.00 | 72.97 | 7.52 | 4.11 | 1.25 | 65T | BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M |
| GMEANS: | | 83.93 | 68.14 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 1.64 | .94 | WITH GAMMA = 5 DEGREES | | |


BLUE REFLECTANCE, DIRECTIONAL
SAMPLE J36 = 83.9 PERCENT
SAMPLE J79 = 68.1 PERCENT
+,X,# NOT IN GRAND MEANS
ANALYSIS T65-1
SAMPLE J79
PERCENT
70.0
69.0
68.0
67.0
SAMPLE J36
82.0
83.0
84.0
85.0
86.0
PERCENT

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ANALYSIS I65-2 TABLE 1

DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)

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

| LAB | SAMPLE J36 | PRINTING 94 GRAMS PER SQUARE METER | | | | SAMPLE J79 | PRINTING 73 GRAMS PER SQUARE METER | | | | TEST D.* 8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CODE | MEAN | DEV | N.DEV | SDR | R.SDR | MEAN | DEV | N.DEV | SDR | R.SDR | VAR | F | LAB |
| L100 | 84.62 | .17 | .36 | .09 | 1.10 | 67.47 | -.40 | -.55 | .16 | .92 | 65F | 0 | L100 |
| L121 | 84.58 | .13 | .28 | .08 | .89 | 68.74 | .87 | 1.21 | .13 | .73 | 65K | 0 | L121 |
| L136 | 84.53 | .08 | .17 | .16 | 1.85 | 67.65 | -.22 | -.31 | .17 | .95 | 65F | 0 | L136 |
| L150 | 84.15 | -.30 | -.64 | .06 | .77 | 67.01 | -.87 | -1.20 | .14 | .82 | 65Q | 0 | L150 |
| L170 | 84.00 | -.45 | -.96 | .00 | .00 | 67.60 | -.27 | -.38 | .23 | 1.33 | 65B | 0 | L170 |
| L210K | 85.05 | .60 | 1.27 | .05 | .61 | 69.28 | 1.41 | 1.95 | .20 | 1.12 | 65K | 0 | L210K |
| L236 | 84.82 | .37 | .78 | .08 | .90 | 67.94 | .07 | .09 | .09 | .53 | 65F | 0 | L236 |
| L242 | 84.30 | -.15 | -.31 | .08 | 1.00 | 66.75 | -1.12 | -1.55 | .32 | 1.82 | 65F | 0 | L242 |
| L250T | 84.36 | -.10 | -.21 | .13 | 1.55 | 67.66 | -.21 | -.29 | .16 | .91 | 65F | 0 | L250T |
| L280 | 84.29 | -.16 | -.35 | .09 | 1.06 | 67.72 | -.15 | -.21 | .23 | 1.33 | 65Q | 0 | L280 |
| L325 | 85.08 | .62 | 1.32 | .09 | 1.10 | 67.98 | .10 | .15 | .25 | 1.41 | 65F | 0 | L325 |
| L349 | 84.00 | -.46 | -.97 | .16 | 1.94 | 67.17 | -.71 | -.98 | .20 | 1.14 | 65K | 0 | L349 |
| L446 | 84.09 | -.36 | -.77 | .11 | 1.28 | 67.38 | -.49 | -.68 | .15 | .85 | 65F | 0 | L446 |
| L573 | 85.53 | 1.08 | 2.29 | .08 | .90 | 68.33 | .46 | .64 | .11 | .65 | 65F | 0 | L573 |
| L575 | 83.98 | -.48 | -1.01 | .05 | .62 | 67.56 | -.31 | -.43 | .25 | 1.41 | 65F | 0 | L575 |
| L598 | 84.25 | -.21 | -.44 | .05 | .61 | 69.21 | 1.33 | 1.85 | .09 | .52 | 65K | 0 | L598 |
| L636 | 84.83 | .38 | .81 | .05 | .63 | 68.76 | .88 | 1.22 | .16 | .89 | 65K | 0 | L636 |
| L680 | 83.70 | -.76 | -1.61 | .10 | 1.17 | 67.49 | -.38 | -.53 | .12 | .67 | 65K | 0 | L680 |

GR. MEAN = 84.45 PERCENT GRAND MEAN = 67.87 PERCENT TEST DETERMINATIONS = 8

SD MEANS = .47 PERCENT SD OF MEANS = .72 PERCENT 18 LABS IN GRAND MEANS

AVERAGE SDR = .08 PERCENT AVERAGE SDR = .18 PERCENT

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L289 | 83.37 | -1.08 | -2.29 | .05 | .55 | 67.34 | -.53 | -.74 | .07 | .42 | 65O | * | L289 |

TOTAL NUMBER OF LABORATORIES REPORTING = 19

Best values: J36 84.4 ± 0.7 percent
J79 67.8 ± 1.0 percent

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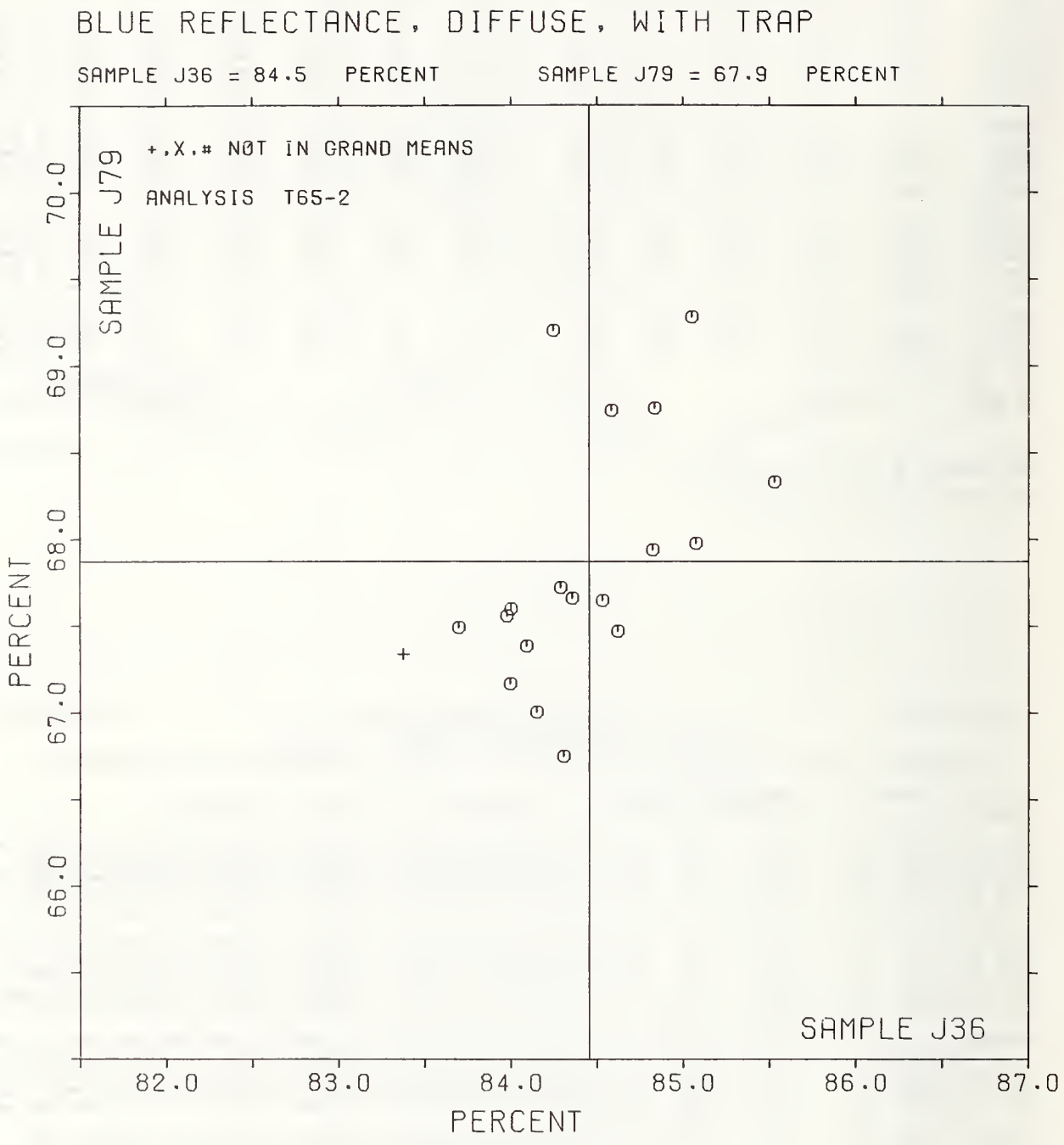
ANALYSIS I65-2 TABLE 2

DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)

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

| LAB | | MEANS | | COORDINATES | | AVG | | |
|---|---|---|---|---|---|---|---|---|
| CODE | F | J36 | J79 | MAJOR | MINOR | R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
| L289 | * | 83.37 | 67.34 | -.94 | .75 | .49 | 65O | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, SPECIFIC CALIBRATION |
| L680 | 0 | 83.70 | 67.49 | -.67 | .52 | .92 | 65K | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE |
| L575 | 0 | 83.98 | 67.56 | -.48 | .30 | 1.01 | 65F | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE |
| L349 | 0 | 84.00 | 67.17 | -.83 | .11 | 1.54 | 65K | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE |
| L170 | 0 | 84.00 | 67.60 | -.44 | .29 | .66 | 65B | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NBS ABSOLUTE BASE |
| L446 | 0 | 84.09 | 67.38 | -.60 | .12 | 1.07 | 65F | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE |
| L150 | 0 | 84.15 | 67.01 | -.91 | -.09 | .79 | 65Q | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, ZEISS ABSOLUTE BASE |
| L598 | 0 | 84.25 | 69.21 | 1.12 | .75 | .57 | 65K | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE |
| L280 | 0 | 84.29 | 67.72 | -.21 | .09 | 1.19 | 65Q | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, ZEISS ABSOLUTE BASE |
| L242 | 0 | 84.30 | 66.75 | -1.08 | -.34 | 1.41 | 65F | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE |
| L250T | 0 | 84.36 | 67.66 | -.23 | -.00 | 1.23 | 65F | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE |
| L136 | 0 | 84.53 | 67.65 | -.17 | -.17 | 1.40 | 65F | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE |
| L121 | 0 | 84.58 | 68.74 | .84 | .25 | .81 | 65K | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE |
| L100 | 0 | 84.62 | 67.47 | -.29 | -.32 | 1.01 | 65F | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE |
| L236 | 0 | 84.82 | 67.94 | .22 | -.31 | .72 | 65F | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE |
| L636 | 0 | 84.83 | 68.76 | .96 | .03 | .76 | 65K | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE |
| L210K | 0 | 85.05 | 69.28 | 1.53 | .06 | .87 | 65K | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE |
| L325 | 0 | 85.08 | 67.98 | .36 | -.52 | 1.26 | 65F | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE |
| L573 | 0 | 85.53 | 68.33 | .87 | -.78 | .78 | 65F | DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE |
| GMEANS: | | 84.45 | 67.87 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 2.16 | 1.03 | WITH GAMMA = 64 DEGREES | | |


BLUE REFLECTANCE, DIFFUSE, WITH TRAP
SAMPLE J36 = 84.5 PERCENT
SAMPLE J79 = 67.9 PERCENT
+,X,# NØT IN GRAND MEANS
ANALYSIS T65-2
SAMPLE J79
PERCENT
70.0
69.0
68.0
67.0
66.0
SAMPLE J36
82.0
83.0
84.0
85.0
86.0
87.0
PERCENT

REPORT NO. 58G TAPPI COLLABORATIVE REFERENCE PROGRAM FEBRUARY 1979

ANALYSIS T65-3 TABLE 1

DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)

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

| LAB CODE | SAMPLE J36 MEAN | PRINTING 94 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE J79 MEAN | PRINTING 73 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST D.= | | 8 |
| L152 | 83.40 | -.65 | -1.06 | .05 | .65 | 68.23 | -.24 | -.37 | .09 | .66 | 65E | O | L152 |
| L157 | 84.41 | .36 | .60 | .05 | .63 | 68.82 | .35 | .53 | .13 | .93 | 65E | O | L157 |
| L161 | 83.92 | -.13 | -.21 | .05 | .64 | 68.97 | .50 | .76 | .08 | .61 | 65E | O | L161 |
| L173A | 83.76 | -.28 | -.47 | .10 | 1.20 | 68.44 | -.03 | -.04 | .11 | .77 | 65E | O | L173A |
| L194 | 85.34 | 1.30 | 2.13 | .08 | .92 | 73.30 | 4.83 | 7.42 | .10 | .75 | 65E | # | L194 |
| L219 | 84.20 | .15 | .25 | .11 | 1.30 | 68.68 | .21 | .32 | .22 | 1.61 | 65E | O | L219 |
| L238A | 84.25 | .20 | .33 | .05 | .65 | 69.09 | .62 | .95 | .08 | .55 | 65E | O | L238A |
| L241 | 83.12 | -.92 | -1.51 | .14 | 1.68 | 66.75 | -1.72 | -2.64 | .20 | 1.44 | 65E | O | L241 |
| L244 | 84.65 | .61 | 1.00 | .09 | 1.10 | 68.16 | -.31 | -.48 | .20 | 1.45 | 65D | O | L244 |
| L251 | 83.79 | -.26 | -.43 | .15 | 1.83 | 68.32 | -.15 | -.23 | .05 | .33 | 65E | O | L251 |
| L255 | 85.25 | 1.21 | 1.98 | .08 | .92 | 69.44 | .97 | 1.50 | .13 | .97 | 65D | O | L255 |
| L305 | 80.70 | -3.34 | -5.49 | .17 | 2.10 | 67.83 | -.64 | -.99 | .09 | .68 | 65D | # | L305 |
| L309 | 84.71 | .66 | 1.09 | .09 | 1.12 | 68.09 | -.38 | -.58 | .30 | 2.14 | 65J | O | L309 |
| L360 | 83.79 | -.26 | -.43 | .05 | .63 | 68.42 | -.05 | -.08 | .14 | 1.00 | 65E | O | L360 |
| L384 | 80.10 | -3.95 | -6.48 | .12 | 1.45 | 67.32 | -1.15 | -1.76 | .09 | .64 | 65S | # | L384 |
| L565 | 83.35 | -.70 | -1.14 | .05 | .65 | 68.70 | .23 | .35 | .08 | .55 | 65W | O | L565 |

GR. MEAN = 84.05 PERCENT GRAND MEAN = 68.47 PERCENT TEST DETERMINATIONS = 8

SD MEANS = .61 PERCENT SD OF MEANS = .65 PERCENT 13 LABS IN GRAND MEANS

AVERAGE SDR = .08 PERCENT AVERAGE SDR = .14 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 16

Best values: J36 84.0 ± 1.2 percent
J79 68.5 ± 1.1 percent

The following laboratories were omitted from the grand means because of extreme test results: 194, 305, 384.

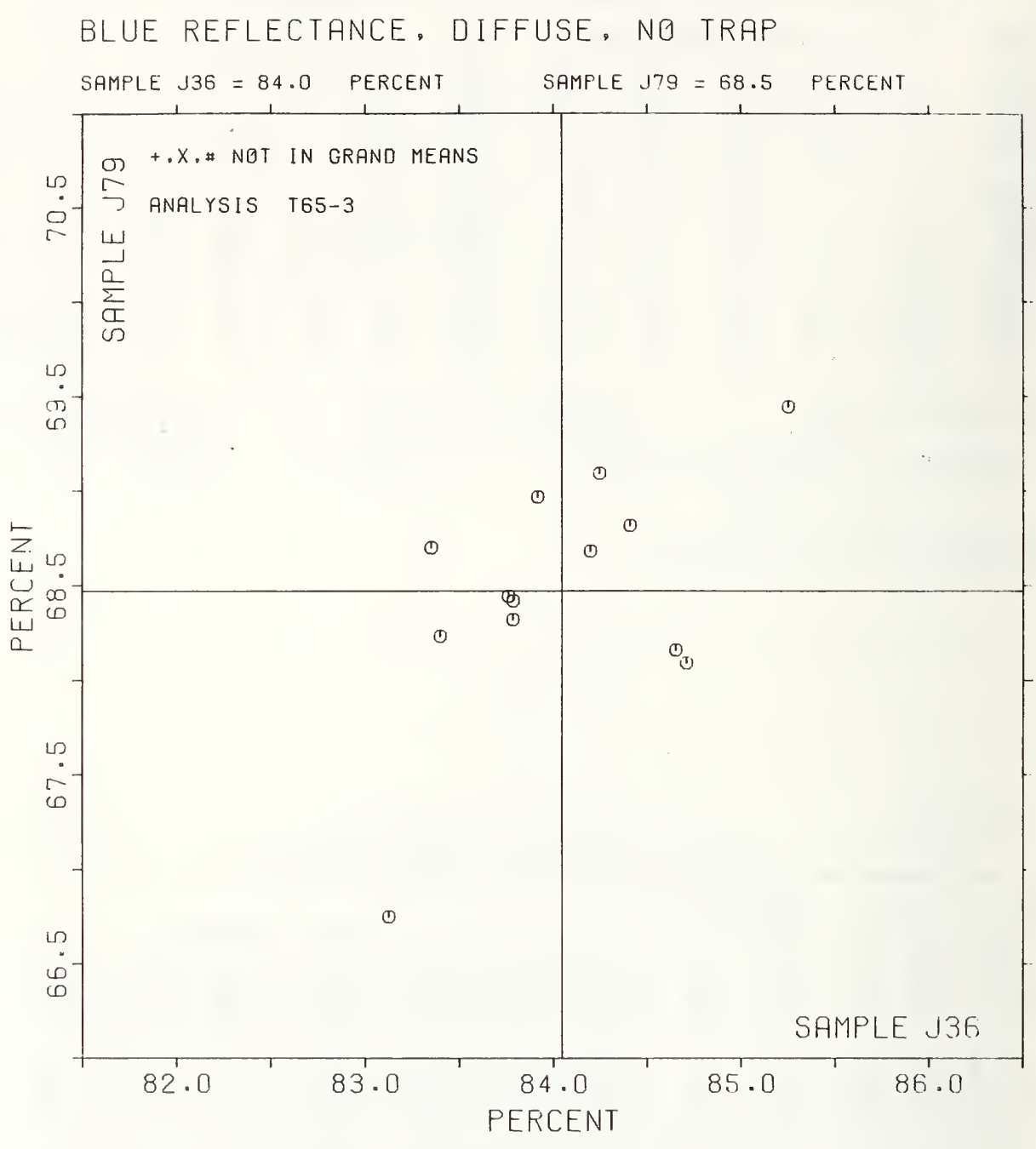
REPORT NO. 58G TAPPI COLLABORATIVE REFERENCE PROGRAM FEBRUARY 1979

ANALYSIS T65-3 TABLE 2

DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)

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

| LAB CODE | F | MEANS J36 | J79 | COORDINATES MAJOR | MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L384 | # | 80.10 | 67.32 | -3.47 | 2.20 | 1.05 | 65S | DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, ABSOLUTE-UNKNOWN BASE |
| L305 | # | 80.70 | 67.83 | -2.69 | 2.08 | 1.39 | 65D | DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, NRC-PTB ABSOLUTE |
| L241 | O | 83.12 | 66.75 | -1.90 | -.45 | 1.56 | 65E | DIFFUSE REFLECTANCE, ELREPBO, NO TRAP, MGO (ZEISS) BASE |
| L565 | O | 83.35 | 68.70 | -.29 | .67 | .60 | 65W | DIFFUSE REFLECTANCE, ELREPBO, NO TRAP, NBS MGO BASE |
| L152 | O | 83.40 | 68.23 | -.61 | .33 | .65 | 65E | DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE |
| L173A | O | 83.76 | 68.44 | -.21 | .20 | .99 | 65E | DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE |
| L360 | O | 83.79 | 68.42 | -.21 | .16 | .82 | 65E | DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE |
| L251 | O | 83.79 | 68.32 | -.29 | .09 | 1.08 | 65E | DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE |
| L161 | O | 83.92 | 68.97 | .29 | .43 | .63 | 65E | DIFFUSE REFLECTANCE, ELREPBO, NO TRAP, MGO (ZEISS) BASE |
| L219 | O | 84.20 | 68.68 | .26 | .03 | 1.45 | 65E | DIFFUSE REFLECTANCE, ELREPBO, NO TRAP, MGO (ZEISS) BASE |
| L238A | O | 84.25 | 69.09 | .60 | .26 | .60 | 65E | DIFFUSE REFLECTANCE, ELREPBO, NO TRAP, MGO (ZEISS) BASE |
| L157 | O | 84.41 | 68.82 | .50 | -.04 | .78 | 65E | DIFFUSE REFLECTANCE, ELREPBO, NO TRAP, MGO (ZEISS) BASE |
| L244 | O | 84.65 | 68.16 | .17 | -.66 | 1.27 | 65D | DIFFUSE REFLECTANCE, ELREPBO, NO TRAP, NRC-PTB ABSOLUTE |
| L309 | O | 84.71 | 68.09 | .16 | -.75 | 1.63 | 65J | DIFFUSE REFLECTANCE, ELREPBO, NO TRAP, NBS ABSOLUTE |
| L255 | O | 85.25 | 69.44 | 1.53 | -.26 | .94 | 65D | DIFFUSE REFLECTANCE, ELREPBO, NO TRAP, NRC-PTB ABSOLUTE |
| L194 | # | 85.34 | 73.30 | 4.48 | 2.23 | .83 | 65E | DIFFUSE REFLECTANCE, ELREPBO, NO TRAP, MGO (ZEISS) BASE |
| GMEANS: | | 84.05 | 68.47 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 2.31 | 1.25 | WITH GAMMA = 48 DEGREES | | |


BLUE REFLECTANCE, DIFFUSE, NØ TRAP
SAMPLE J36 = 84.0 PERCENT
SAMPLE J79 = 68.5 PERCENT
+,X,# NØT IN GRAND MEANS
ANALYSIS T65-3
SAMPLE J79
SAMPLE J36
PERCENT
70.5
69.5
68.5
67.5
66.5
82.0
83.0
84.0
85.0
86.0
PERCENT

ANALYSIS T75-1 TABLE 1

SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS

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

| LAB CODE | SAMPLE E87 MEAN | COATED OFFSET 117 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R. SDR | SAMPLE E51 MEAN | COATED BOOK 118 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R. SDR | TEST D. = 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L108 | 68.0 | -.3 | -.20 | 2.4 | 1.25 | 69.3 | 1.2 | .75 | .6 | .56 | 75H | ó | L108 |
| L121 | 69.8 | 1.5 | .86 | 2.9 | 1.50 | 70.0 | 1.9 | 1.20 | 1.3 | 1.17 | 75H | ó | L121 |
| L122 | 68.5 | .1 | .08 | 2.7 | 1.40 | 67.3 | -.8 | -.54 | .8 | .74 | 75H | ó | L122 |
| L128 | 66.8 | -1.5 | -.89 | 2.5 | 1.29 | 68.7 | .6 | .38 | .9 | .87 | 75G | ó | L128 |
| L134 | 69.2 | .9 | .51 | 2.0 | 1.06 | 69.5 | 1.4 | .89 | 1.3 | 1.16 | 75H | ó | L134 |
| L136 | 70.5 | 2.2 | 1.27 | 1.7 | .86 | 71.2 | 3.1 | 1.99 | .6 | .58 | 75G | ó | L136 |
| L149 | 61.9 | -6.4 | -3.76 | 2.2 | 1.13 | 62.9 | -5.2 | -3.33 | 1.2 | 1.09 | 75G | * | L149 |
| L153 | 70.4 | 2.1 | 1.21 | 2.0 | 1.04 | 70.7 | 2.6 | 1.65 | .7 | .62 | 75G | ó | L153 |
| L162 | 73.0 | 4.7 | 2.74 | 2.1 | 1.09 | 72.4 | 4.3 | 2.74 | 1.0 | .92 | 75G | * | L162 |
| L173A | 64.8 | -3.5 | -2.06 | 2.7 | 1.40 | 65.6 | -2.5 | -1.60 | 1.3 | 1.23 | 75G | ó | L173A |
| L182 | 69.1 | .8 | .47 | 1.8 | .95 | 67.7 | -.4 | -.26 | 1.0 | .96 | 75H | ó | L182 |
| L189 | 68.2 | -.1 | -.05 | .9 | .46 | 65.1 | -3.0 | -1.92 | 1.7 | 1.55 | 75P | ó | L189 |
| L190C | 65.4 | -2.9 | -1.71 | 1.9 | .98 | 66.6 | -1.5 | -.97 | 1.7 | 1.56 | 75G | ó | L190C |
| L190R | 67.3 | -1.1 | -.62 | 1.8 | .95 | 68.1 | -.0 | -.03 | 1.5 | 1.37 | 75G | ó | L190R |
| L206 | 68.6 | .3 | .18 | 1.4 | .73 | 67.7 | -.5 | -.29 | 1.3 | 1.14 | 75H | ó | L206 |
| L210 | 72.2 | 3.9 | 2.26 | 1.6 | .84 | 69.4 | 1.3 | .83 | 1.4 | 1.31 | 75H | ó | L210 |
| L211 | 69.5 | 1.2 | .71 | 1.2 | .63 | 68.8 | .7 | .43 | .9 | .79 | 75H | ó | L211 |
| L212 | 71.6 | 3.3 | 1.91 | 2.3 | 1.20 | 69.4 | 1.3 | .82 | 1.0 | .88 | 75P | ó | L212 |
| L213 | 68.5 | .2 | .11 | 1.6 | .82 | 67.1 | -1.0 | -.61 | .8 | .70 | 75H | ó | L213 |
| L223 | 68.7 | .4 | .22 | 1.5 | .79 | 68.0 | -.1 | -.08 | .9 | .84 | 75H | ó | L223 |
| L230 | 68.6 | .3 | .16 | 1.3 | .66 | 66.7 | -1.4 | -.90 | .9 | .87 | 75H | ó | L230 |
| L243 | 69.8 | 1.5 | .86 | 1.9 | .97 | 69.3 | 1.2 | .76 | 1.1 | .97 | 75B | ó | L243 |
| L251 | 69.4 | 1.1 | .63 | 1.8 | .91 | 67.4 | -.7 | -.42 | 1.1 | 1.04 | 75G | ó | L251 |
| L255 | 67.8 | -.5 | -.31 | 1.2 | .64 | 69.5 | 1.4 | .89 | .8 | .78 | 75G | ó | L255 |
| L256 | 69.2 | .9 | .52 | 1.7 | .90 | 68.0 | -.1 | -.05 | 1.0 | .92 | 75H | ó | L256 |
| L259 | 67.7 | -.6 | -.37 | 2.8 | 1.47 | 68.8 | .7 | .44 | 1.6 | 1.48 | 75H | ó | L259 |
| L262 | 68.9 | .6 | .33 | 2.5 | 1.29 | 70.8 | 2.7 | 1.75 | .9 | .83 | 75K | ó | L262 |
| L278 | 62.9 | -5.4 | -3.18 | 2.8 | 1.45 | 61.8 | -6.3 | -4.00 | 1.7 | 1.55 | 75G | # | L278 |
| L291 | 66.6 | -1.7 | -1.02 | 3.1 | 1.59 | 67.1 | -1.0 | -.62 | 2.0 | 1.85 | 75H | ó | L291 |
| L301 | 67.4 | -1.0 | -.57 | 2.4 | 1.27 | 68.5 | .3 | .22 | .9 | .79 | 75H | ó | L301 |
| L315 | 67.9 | -.4 | -.25 | 2.6 | 1.35 | 67.1 | -1.0 | -.65 | 1.0 | .91 | 75G | ó | L315 |
| L317 | 68.2 | -.1 | -.09 | 2.2 | 1.14 | 67.9 | -.2 | -.14 | 1.1 | 1.02 | 75H | ó | L317 |
| L321 | 69.4 | 1.1 | .63 | 2.0 | 1.06 | 70.1 | 2.0 | 1.30 | 1.1 | 1.01 | 75G | ó | L321 |
| L323 | 66.9 | -1.4 | -.82 | 2.7 | 1.38 | 68.5 | .4 | .27 | .7 | .67 | 75H | ó | L323 |
| L328 | 67.2 | -1.1 | -.65 | 1.4 | .70 | 66.2 | -1.9 | -1.21 | 1.1 | 1.04 | 75H | ó | L328 |
| L339 | 65.4 | -2.9 | -1.71 | 3.2 | 1.64 | 66.6 | -1.5 | -.97 | 2.0 | 1.83 | 75P | ó | L339 |
| L349 | 65.8 | -2.5 | -1.46 | 1.3 | .70 | 67.9 | -.2 | -.10 | 1.1 | .96 | 75H | ó | L349 |
| L372 | 67.7 | -.6 | -.34 | 1.6 | .84 | 67.2 | -.9 | -.58 | 1.1 | .97 | 75B | ó | L372 |
| L388 | 60.3 | -8.0 | -4.70 | 1.1 | .55 | 59.9 | -8.2 | -5.25 | 1.0 | .91 | 75P | # | L388 |
| L396 | 69.3 | 1.0 | .57 | 1.0 | .51 | 69.2 | 1.1 | .70 | 1.0 | .89 | 75G | ó | L396 |
| L456 | 68.7 | .3 | .19 | 1.6 | .84 | 67.3 | -.8 | -.53 | 1.0 | .95 | 75H | ó | L456 |
| L483 | 68.0 | -.3 | -.20 | 1.7 | .86 | 67.9 | -.2 | -.15 | 1.3 | 1.19 | 75H | ó | L483 |
| L573 | 65.4 | -2.9 | -1.71 | 2.2 | 1.15 | 66.4 | -1.7 | -1.09 | 1.0 | .88 | 75G | ó | L573 |
| L574 | 66.9 | -1.5 | -.85 | 1.7 | .88 | 66.7 | -1.4 | -.88 | 1.0 | .93 | 75G | ó | L574 |
| L583 | 69.5 | 1.1 | .66 | 2.0 | 1.02 | 69.1 | 1.0 | .66 | .6 | .53 | 75H | ó | L583 |
| L587 | 69.6 | 1.3 | .74 | .8 | .44 | 69.4 | 1.3 | .82 | 1.0 | .88 | 75H | ó | L587 |
| L592 | 68.6 | .3 | .18 | 1.5 | .76 | 67.1 | -1.0 | -.62 | 1.4 | 1.27 | 75H | ó | L592 |
| L598 | 67.8 | -.5 | -.29 | 1.2 | .62 | 66.9 | -1.2 | -.78 | 1.1 | 1.05 | 75H | ó | L598 |
| L643 | 68.3 | -.0 | -.03 | 1.7 | .87 | 65.7 | -2.5 | -1.57 | .9 | .78 | 75H | ó | L643 |
| L668 | 68.4 | .0 | .02 | 2.5 | 1.32 | 66.0 | -2.2 | -1.37 | 1.1 | 1.05 | 75G | ó | L668 |
| L670 | 65.2 | -3.1 | -1.83 | 2.8 | 1.43 | 66.6 | -1.5 | -.95 | .8 | .70 | 75H | ó | L670 |
| L688 | 68.4 | .0 | .02 | 1.2 | .63 | 68.7 | .6 | .40 | 1.1 | .97 | 75G | ó | L688 |
| GR. MEAN = | 68.3 GLOSS UNITS | | | | GRAND MEAN = | 68.1 GLOSS UNITS | | | | TEST DETERMINATIONS = 10 | | | |
| SD MEANS = | 1.7 GLOSS UNITS | | | | SD OF MEANS = | 1.6 GLOSS UNITS | | | | 49 LABS IN GRAND MEANS | | | |
| | AVERAGE SDR = | 1.9 GLOSS UNITS | | | | AVERAGE SDR = | 1.1 GLOSS UNITS | | | | | | |
| L250 | 63.4 | -4.9 | -2.88 | 1.3 | .70 | 59.5 | -8.6 | -5.50 | 1.2 | 1.08 | 75Q | * | L250 |
| L288 | 68.0 | -.3 | -.20 | 2.8 | 1.44 | 68.7 | .6 | .41 | .8 | .71 | 75I | * | L288 |

TOTAL NUMBER OF LABORATORIES REPORTING = 54

Best values: E87 68 ± 3 gloss units
E51 68 ± 2 gloss units

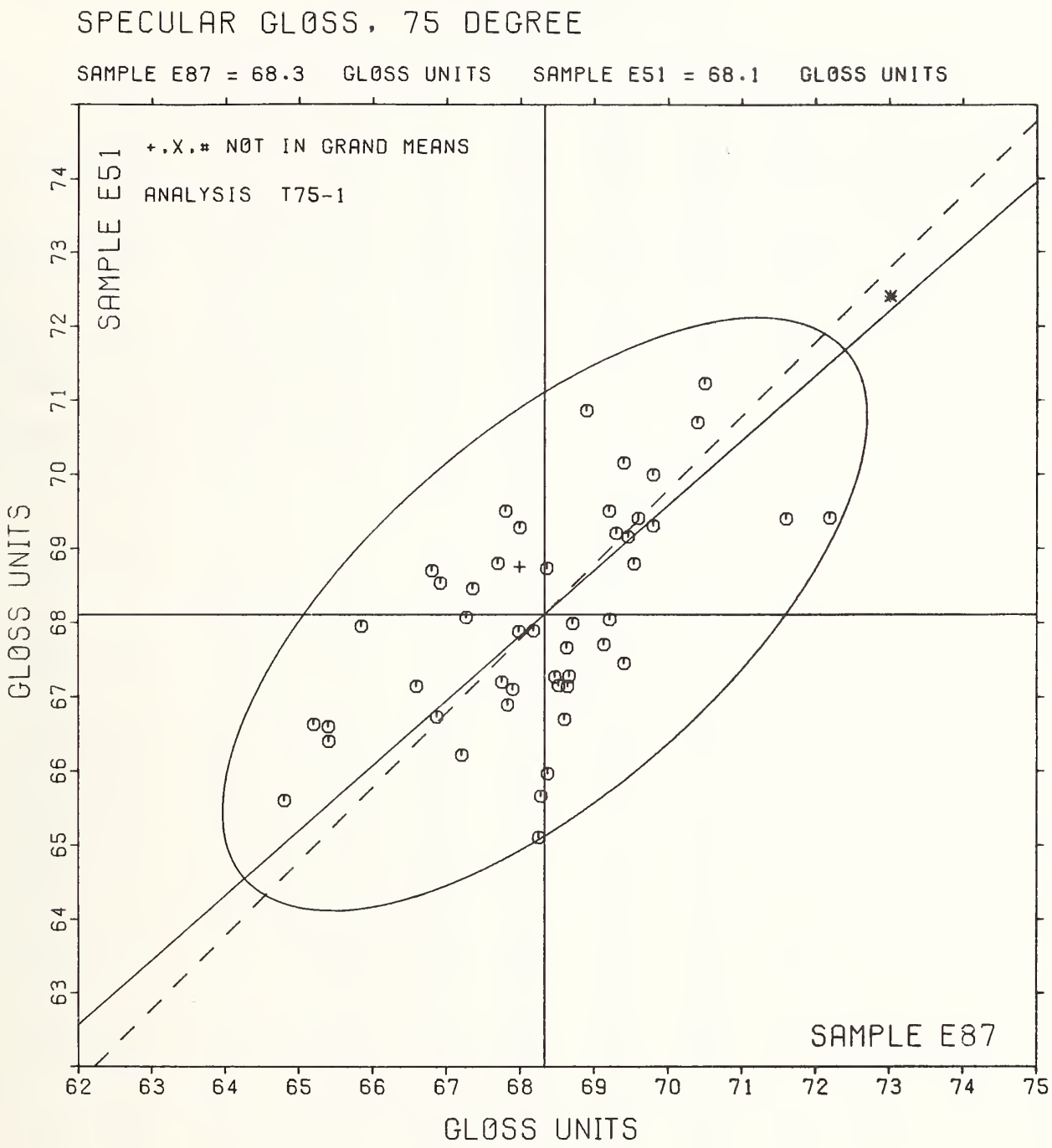
The following laboratories were omitted from the grand means because of extreme test results: 149, 278, 388.

ANALYSIS T75-1 TABLE 2

SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS

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

| LAB CODE | F | MEANS E87 | MEANS E51 | COORDINATES MAJOR | COORDINATES MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L388 | # | 60.3 | 59.9 | -11.5 | -.9 | .73 | 75P | SPECULAR GLOSS (75 DEGREE), PHOTOVOLT |
| L149 | # | 61.9 | 62.9 | -8.3 | .3 | 1.11 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L278 | # | 62.9 | 61.8 | -8.2 | -1.1 | 1.50 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L250 | * | 63.4 | 59.5 | -9.4 | -3.2 | .89 | 75Q | SPECULAR GLOSS (75 DEGREE), PHOTOVOLT, 20 C, 65% RH |
| L173A | O | 64.8 | 65.6 | -4.3 | .4 | 1.32 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L670 | O | 65.2 | 66.6 | -3.3 | .9 | 1.07 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L573 | O | 65.4 | 66.4 | -3.3 | .6 | 1.02 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L339 | O | 65.4 | 66.6 | -3.2 | .8 | 1.74 | 75P | SPECULAR GLOSS (75 DEGREE), PHOTOVOLT |
| L190C | O | 65.4 | 66.6 | -3.2 | .8 | 1.27 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L349 | O | 65.8 | 67.9 | -2.0 | 1.5 | .83 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L291 | O | 66.6 | 67.1 | -1.9 | .4 | 1.72 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L128 | O | 66.8 | 68.7 | -.8 | 1.5 | 1.08 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L574 | O | 66.9 | 66.7 | -2.0 | -.1 | .90 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L323 | O | 66.9 | 68.5 | -.8 | 1.2 | 1.02 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L328 | O | 67.2 | 66.2 | -2.1 | -.7 | .87 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L190R | O | 67.3 | 68.1 | -.8 | .7 | 1.16 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L301 | O | 67.4 | 68.5 | -.5 | .9 | 1.03 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L259 | O | 67.7 | 68.8 | -.0 | .9 | 1.47 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L372 | O | 67.7 | 67.2 | -1.0 | -.3 | .90 | 75B | SPECULAR GLOSS (75 DEGREE), BAUSCH • LOMB |
| L255 | O | 67.8 | 69.5 | .5 | 1.4 | .71 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L598 | O | 67.8 | 66.9 | -1.2 | -.6 | .83 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L315 | O | 67.9 | 67.1 | -1.0 | -.5 | 1.13 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L483 | O | 68.0 | 67.9 | -.4 | .1 | 1.03 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L288 | * | 68.0 | 68.7 | .2 | .7 | 1.07 | 75I | SPECULAR GLOSS (75 DEGREE), HUNTER, 20 C, 65% RH |
| L108 | O | 68.0 | 69.3 | .5 | 1.1 | .90 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L317 | O | 68.2 | 67.9 | -.3 | -.1 | 1.08 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L189 | O | 68.2 | 65.1 | -2.0 | -2.2 | 1.00 | 75P | SPECULAR GLOSS (75 DEGREE), PHOTOVOLT |
| L643 | O | 68.3 | 65.7 | -1.7 | -1.8 | .83 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L688 | O | 68.4 | 68.7 | .4 | .4 | .80 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L668 | O | 68.4 | 66.0 | -1.4 | -1.6 | 1.18 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L122 | O | 68.5 | 67.3 | -.4 | -.7 | 1.07 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L213 | O | 68.5 | 67.1 | -.5 | -.8 | .76 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L230 | O | 68.6 | 66.7 | -.7 | -1.2 | .76 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L206 | O | 68.6 | 67.7 | -.1 | -.5 | .94 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L592 | O | 68.6 | 67.1 | -.4 | -.9 | 1.01 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L456 | O | 68.7 | 67.3 | -.3 | -.8 | .89 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L223 | O | 68.7 | 68.0 | .2 | -.3 | .82 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L262 | O | 68.9 | 70.8 | 2.2 | 1.7 | 1.06 | 75K | SPECULAR GLOSS (75 DEGREE), GAERTNER (K-C TYPE) |
| L182 | O | 69.1 | 67.7 | .3 | -.8 | .95 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L134 | O | 69.2 | 69.5 | 1.6 | .5 | 1.11 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L256 | O | 69.2 | 68.0 | .6 | -.6 | .91 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L396 | O | 69.3 | 69.2 | 1.4 | .2 | .70 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L251 | O | 69.4 | 67.4 | .4 | -1.2 | .98 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L321 | O | 69.4 | 70.1 | 2.1 | .8 | 1.03 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L583 | O | 69.5 | 69.1 | 1.5 | .0 | .77 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L211 | O | 69.5 | 68.8 | 1.4 | -.3 | .71 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L587 | O | 69.6 | 69.4 | 1.8 | .1 | .66 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L121 | O | 69.8 | 70.0 | 2.3 | .4 | 1.34 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L243 | O | 69.8 | 69.3 | 1.9 | -.1 | .97 | 75B | SPECULAR GLOSS (75 DEGREE), BAUSCH • LOMB |
| L153 | O | 70.4 | 70.7 | 3.3 | .6 | .83 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L136 | O | 70.5 | 71.2 | 3.7 | .9 | .72 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| L212 | O | 71.6 | 69.4 | 3.3 | -1.2 | 1.04 | 75P | SPECULAR GLOSS (75 DEGREE), PHOTOVOLT |
| L210 | O | 72.2 | 69.4 | 3.8 | -1.6 | 1.07 | 75H | SPECULAR GLOSS (75 DEGREE), HUNTER |
| L162 | * | 73.0 | 72.4 | 6.3 | .1 | 1.01 | 75G | SPECULAR GLOSS (75 DEGREE), GARDNER |
| GMEANS: | | 68.3 | 68.1 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 5.4 | 2.4 | WITH GAMMA • 41 DEGREES | | |


SPECULAR GLOSS, 75 DEGREE
SAMPLE E87 = 68.3 GLOSS UNITS
SAMPLE E51 = 68.1 GLOSS UNITS
+,X,* NOT IN GRAND MEANS
ANALYSIS T75-1
SAMPLE E51
GLOSS UNITS
SAMPLE E87
GLOSS UNITS
62 63 64 65 66 67 68 69 70 71 72 73 74 75
63 64 65 66 67 68 69 70 71 72 73 74

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



| LAB CODE | SAMPLE J64 MEAN | PRINTING 85 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE J83 MEAN | PRINTING 73 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D. = 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L100 | 5.409 | .150 | 1.66 | .044 | .99 | 2.806 | .068 | .83 | .028 | .71 | 90V | @ | L100 |
| L105 | 5.244 | -.015 | -.17 | .027 | .61 | 2.783 | .045 | .55 | .050 | 1.27 | 90Q | @ | L105 |
| L118 | 5.379 | .120 | 1.33 | .033 | .74 | 2.759 | .021 | .26 | .043 | 1.10 | 90Q | @ | L118 |
| L122 | 5.375 | .116 | 1.29 | .066 | 1.48 | 2.830 | .092 | 1.13 | .034 | .85 | 90V | @ | L122 |
| L123F | 5.356 | .097 | 1.08 | .028 | .64 | 2.880 | .142 | 1.73 | .048 | 1.22 | 90F | @ | L123F |
| L125 | 5.266 | .007 | .08 | .053 | 1.19 | 2.781 | .043 | .53 | .035 | .89 | 90T | @ | L125 |
| L128 | 5.292 | .033 | .37 | .050 | 1.13 | 2.751 | .013 | .16 | .038 | .95 | 90T | @ | L128 |
| L141 | 5.199 | -.060 | -.67 | .057 | 1.28 | 2.734 | -.004 | -.04 | .038 | .97 | 90T | @ | L141 |
| L153 | 5.388 | .129 | 1.43 | .054 | 1.21 | 2.937 | .199 | 2.43 | .040 | 1.01 | 90T | * | L153 |
| L158 | 5.254 | -.005 | -.06 | .046 | 1.04 | 5.711 | 2.973 | 36.22 | .033 | .84 | 90T | # | L158 |
| L159 | 5.353 | .094 | 1.04 | .049 | 1.11 | 2.827 | .089 | 1.09 | .041 | 1.03 | 90T | @ | L159 |
| L162 | 5.190 | -.069 | -.77 | .057 | 1.28 | 2.490 | -.248 | -3.02 | .032 | .80 | 90D | X | L162 |
| L166 | 5.261 | .002 | .02 | .023 | .51 | 2.817 | .079 | .97 | .030 | .76 | 90T | @ | L166 |
| L173B | 5.370 | .111 | 1.23 | .067 | 1.52 | 2.740 | .002 | .03 | .052 | 1.31 | 90F | @ | L173B |
| L174 | 5.230 | -.029 | -.32 | .082 | 1.85 | 2.710 | -.028 | -.34 | .074 | 1.87 | 90T | @ | L174 |
| L182 | 5.272 | .013 | .14 | .058 | 1.31 | 2.723 | -.015 | -.18 | .051 | 1.28 | 90L | @ | L182 |
| L183 | 5.363 | .104 | 1.15 | .038 | .85 | 2.760 | .022 | .27 | .042 | 1.07 | 90T | @ | L183 |
| L190C | 5.150 | -.109 | -1.21 | .053 | 1.19 | 2.680 | -.058 | -.70 | .042 | 1.07 | 90T | @ | L190C |
| L212 | 5.345 | .086 | .95 | .044 | .98 | 2.780 | .042 | .52 | .026 | .65 | 90T | @ | L212 |
| L213 | 5.110 | -.149 | -1.65 | .032 | .71 | 2.590 | -.148 | -1.80 | .032 | .80 | 90T | @ | L213 |
| L223 | 5.260 | .001 | .01 | .030 | .67 | 2.699 | -.039 | -.47 | .028 | .72 | 90V | @ | L223 |
| L228 | 5.245 | -.014 | -.16 | .050 | 1.12 | 2.765 | .027 | .33 | .063 | 1.58 | 90T | @ | L228 |
| L233 | 5.579 | .320 | 3.55 | .047 | 1.05 | 2.753 | .015 | .19 | .028 | .71 | 90Q | X | L233 |
| L238A | 5.320 | .061 | .68 | .063 | 1.42 | 2.710 | -.028 | -.34 | .032 | .80 | 90T | @ | L238A |
| L241 | 5.315 | .056 | .62 | .041 | .93 | 2.845 | .107 | 1.31 | .064 | 1.63 | 90T | @ | L241 |
| L249 | 5.220 | -.039 | -.43 | .046 | 1.03 | 2.637 | -.101 | -1.23 | .059 | 1.50 | 90T | @ | L249 |
| L259 | 10.121 | 4.862 | 53.94 | 15.066 | 338.78 | 2.734 | -.004 | -.04 | .022 | .55 | 90T | X | L259 |
| L260 | 5.199 | -.060 | -.67 | .026 | .58 | 2.643 | -.095 | -1.15 | .031 | .77 | 90T | @ | L260 |
| L261 | 5.293 | .034 | .38 | .046 | 1.03 | 2.690 | -.048 | -.58 | .017 | .43 | 90T | @ | L261 |
| L262 | 5.195 | -.064 | -.71 | .037 | .83 | 2.670 | -.068 | -.82 | .054 | 1.36 | 90T | @ | L262 |
| L285 | 5.193 | -.066 | -.73 | .031 | .69 | 2.798 | .060 | .74 | .023 | .57 | 90T | @ | L285 |
| L291 | 5.340 | .081 | .90 | .039 | .89 | 2.815 | .077 | .94 | .034 | .85 | 90T | @ | L291 |
| L305 | 5.255 | -.004 | -.04 | .055 | 1.24 | 2.765 | .027 | .33 | .041 | 1.04 | 90T | @ | L305 |
| L309 | 5.240 | -.019 | -.21 | .084 | 1.90 | 2.650 | -.088 | -1.07 | .053 | 1.33 | 90T | @ | L309 |
| L318 | 5.100 | -.159 | -1.76 | .053 | 1.19 | 2.590 | -.148 | -1.80 | .032 | .80 | 90T | @ | L318 |
| L320 | 5.110 | -.149 | -1.65 | .032 | .71 | 2.585 | -.153 | -1.86 | .034 | .85 | 90T | @ | L320 |
| L323 | 5.037 | -.222 | -2.46 | .043 | .97 | 2.549 | -.189 | -2.30 | .021 | .53 | 90T | @ | L323 |
| L324 | 5.206 | -.053 | -.59 | .020 | .44 | 2.712 | -.026 | -.31 | .011 | .29 | 90T | @ | L324 |
| L326 | 5.315 | .056 | .62 | .034 | .76 | 2.745 | .007 | .09 | .037 | .93 | 90T | @ | L326 |
| L328 | 5.210 | -.049 | -.54 | .056 | 1.25 | 2.724 | -.014 | -.17 | .027 | .68 | 90T | @ | L328 |
| L331 | 5.229 | -.030 | -.33 | .079 | 1.78 | 2.813 | .075 | .92 | .027 | .68 | 90T | @ | L331 |
| L339 | 5.195 | -.064 | -.71 | .055 | 1.24 | 2.755 | .017 | .21 | .037 | .93 | 90T | @ | L339 |
| L352 | 5.267 | .008 | .09 | .032 | .73 | 2.761 | .023 | .28 | .019 | .47 | 90Q | @ | L352 |
| L356 | 5.202 | -.057 | -.63 | .038 | .85 | 2.700 | -.038 | -.46 | .028 | .71 | 90T | @ | L356 |
| L358 | 5.160 | -.099 | -1.10 | .066 | 1.48 | 2.661 | -.077 | -.93 | .039 | .98 | 90T | @ | L358 |
| L376 | 5.340 | .081 | .90 | .052 | 1.16 | 2.815 | .077 | .94 | .041 | 1.04 | 90T | @ | L376 |
| L380 | 5.200 | -.059 | -.65 | .000 | .00 | 2.800 | .062 | .76 | .000 | .00 | 90T | @ | L380 |
| L382 | 5.310 | .051 | .57 | .032 | .71 | 2.710 | -.028 | -.34 | .152 | 3.86 | 90T | @ | L382 |
| L390 | 5.452 | .193 | 2.14 | .043 | .98 | 2.880 | .142 | 1.73 | .039 | .98 | 90T | @ | L390 |
| L442 | 5.399 | .140 | 1.55 | .044 | .99 | 2.879 | .141 | 1.72 | .029 | .74 | 90V | @ | L442 |
| L556 | 5.262 | .003 | .03 | .034 | .77 | 2.690 | -.048 | -.58 | .047 | 1.18 | 90T | @ | L556 |
| L557 | 5.170 | -.089 | -.99 | .067 | 1.52 | 2.660 | -.078 | -.95 | .084 | 2.13 | 90T | @ | L557 |
| L574 | 5.095 | -.164 | -1.82 | .045 | 1.02 | 2.663 | -.075 | -.91 | .034 | .86 | 90V | @ | L574 |
| L575 | 5.216 | -.043 | -.48 | .048 | 1.07 | 2.714 | -.024 | -.29 | .025 | .62 | 90T | @ | L575 |
| L581 | 5.380 | .121 | 1.34 | .026 | .58 | 2.830 | .092 | 1.13 | .026 | .65 | 90T | @ | L581 |
| L585 | 5.300 | .041 | .45 | .000 | .00 | 2.710 | -.028 | -.34 | .032 | .80 | 90T | @ | L585 |
| L587 | 5.220 | -.039 | -.43 | .042 | .95 | 2.680 | -.058 | -.70 | .063 | 1.60 | 90T | @ | L587 |
| L626 | 4.940 | -.319 | -3.54 | .076 | 1.72 | 2.377 | -.361 | -4.39 | .027 | .69 | 90T | # | L626 |
| L679 | 5.175 | -.084 | -.93 | .054 | 1.21 | 2.630 | -.108 | -1.31 | .026 | .65 | 90T | @ | L679 |
| L693 | 5.258 | -.001 | -.01 | .056 | 1.26 | 2.738 | .000 | .00 | .025 | .63 | 90T | @ | L693 |

GR. MEAN = 5.259 MILS — GRAND MEAN = 2.738 MILS — TEST DETERMINATIONS = 10
SD MEANS = .090 MILS — SD OF MEANS = .082 MILS — 55 LABS IN GRAND MEANS
AVERAGE SDR = .044 MILS — AVERAGE SDR = .040 MILS
GR. MEAN = 133.58 MICROMETER — GRAND MEAN = 69.54 MICROMETER

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

| LAB CODE | SAMPLE J64 MEAN | PRINTING 85 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE J83 MEAN | PRINTING 73 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D.F 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L106 | 5.090 | -.165 | -1.87 | .057 | 1.28 | 2.860 | .122 | 1.49 | .070 | 1.77 | 90C | * | L106 |
| L185 | 5.190 | -.065 | -.77 | .025 | .57 | 2.698 | -.040 | -.48 | .020 | .50 | 90B | * | L185 |
| L242O | 5.303 | .044 | .49 | .020 | .46 | 2.742 | .005 | .06 | .028 | .70 | 90O | * | L242O |
| L242P | 5.406 | .147 | 1.63 | .041 | .92 | 2.825 | .087 | 1.06 | .027 | .67 | 90P | * | L242P |
| L243 | 5.162 | -.097 | -1.08 | .026 | .58 | 2.672 | -.066 | -.80 | .029 | .72 | 90S | * | L243 |
| L251 | 5.236 | -.023 | -.25 | .034 | .78 | 2.726 | -.011 | -.14 | .031 | .79 | 90W | * | L251 |
| L344 | 5.280 | .021 | .23 | .063 | 1.42 | 2.690 | -.048 | -.58 | .032 | .80 | 90U | * | L344 |
| L396M | 51.200 | 45.941 | 509.63 | .789 | 17.74 | 26.400 | 23.662 | 288.24 | .516 | 13.07 | 90S | * | L396M |
| L563 | 5.340 | .081 | .90 | .052 | 1.16 | 2.820 | .082 | 1.00 | .063 | 1.60 | 90U | * | L563 |
| L567 | 5.266 | .007 | .08 | .047 | 1.06 | 2.674 | -.064 | -.77 | .052 | 1.32 | 90B | * | L567 |
| L576 | 5.135 | -.124 | -1.38 | .048 | 1.08 | 2.662 | -.076 | -.92 | .043 | 1.09 | 90C | * | L576 |
| L616 | 5.336 | .077 | .85 | .039 | .87 | 2.832 | .094 | 1.15 | .041 | 1.05 | 90C | * | L616 |
| L684 | 5.211 | -.048 | -.53 | .020 | .44 | 2.830 | .092 | 1.13 | .036 | .90 | 90U | * | L684 |

TOTAL NUMBER OF LABORATORIES REPORTING * 73

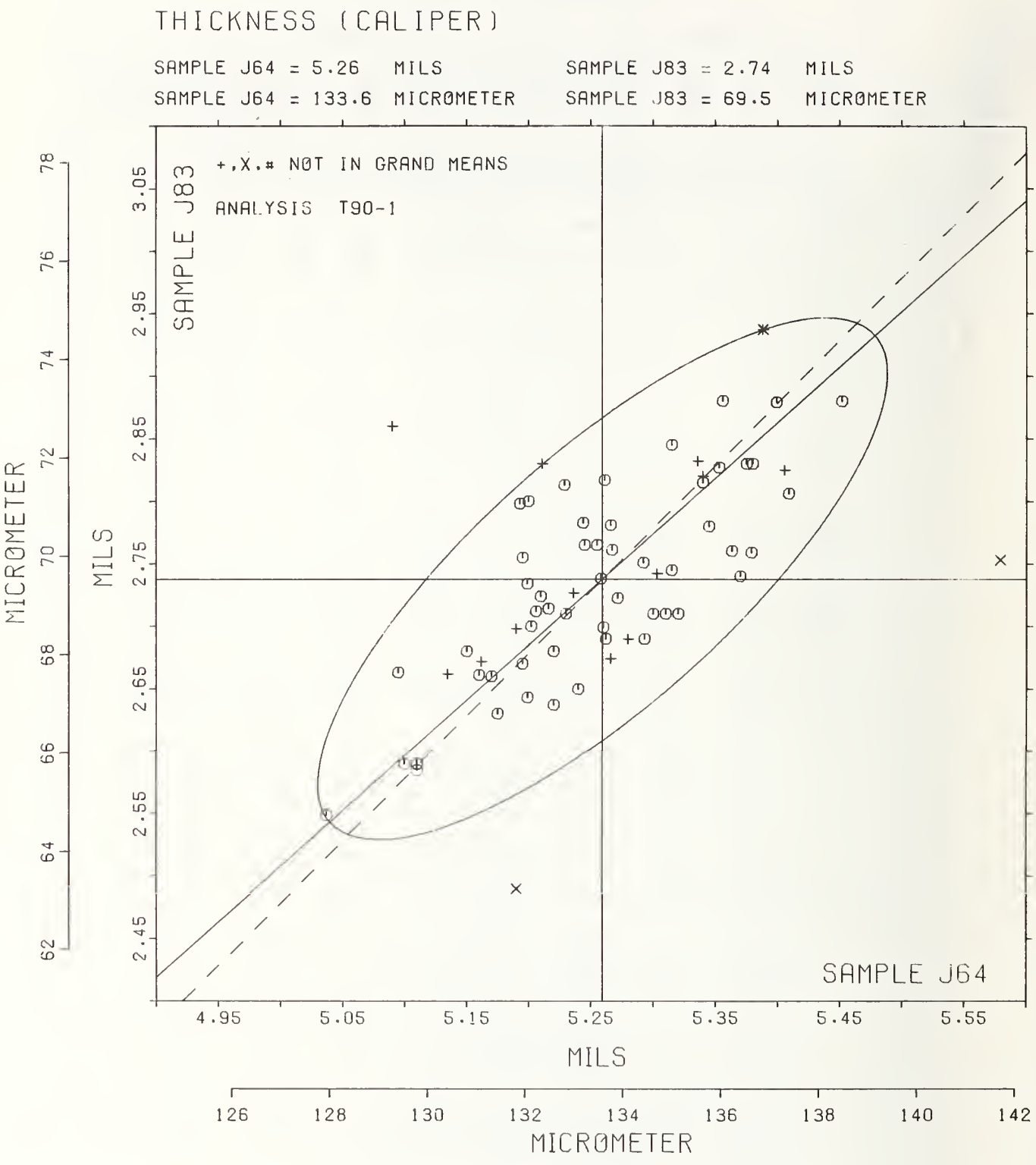
Best values: J64 5.26 ± 0.14 mils
J83 2.74 ± 0.13 mils

The following laboratories were omitted from the grand means because of extreme test results: 158, 626.

| LAB CODE | F | MEANS J64 | MEANS J83 | COORDINATES MAJOR | COORDINATES MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L626 | # | 4.940 | 2.377 | -.478 | -.058 | 1.20 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L323 | O | 5.037 | 2.549 | -.291 | .006 | .75 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L106 | * | 5.090 | 2.860 | -.045 | .204 | 1.52 | 90C | THICKNESS (CALIPER), CADY, HAND DRIVEN |
| L574 | O | 5.095 | 2.663 | -.172 | .053 | .94 | 90V | THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED |
| L318 | O | 5.100 | 2.590 | -.217 | -.005 | .99 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L320 | O | 5.110 | 2.585 | -.213 | -.015 | .78 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L213 | O | 5.110 | 2.590 | -.209 | -.011 | .76 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L576 | * | 5.135 | 2.662 | -.143 | .026 | 1.08 | 90C | THICKNESS (CALIPER), CADY, HAND DRIVEN |
| L190C | O | 5.150 | 2.680 | -.120 | .029 | 1.13 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L358 | O | 5.160 | 2.661 | -.125 | .008 | 1.23 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L243 | * | 5.162 | 2.672 | -.116 | .015 | .65 | 90S | THICKNESS (CALIPER), SCHOPPER, HAND DRIVEN |
| L557 | O | 5.170 | 2.660 | -.118 | .001 | 1.83 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L679 | O | 5.175 | 2.630 | -.134 | -.025 | .93 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L185 | * | 5.190 | 2.698 | -.078 | .016 | .54 | 90B | THICKNESS (CALIPER), AMTHOR, HAND DRIVEN |
| L162 | X | 5.190 | 2.490 | -.216 | -.139 | 1.04 | 90D | THICKNESS (CALIPER), CADY, MOTOR DRIVEN |
| L285 | O | 5.193 | 2.798 | -.009 | .089 | .63 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L339 | O | 5.195 | 2.755 | -.036 | .055 | 1.09 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L262 | O | 5.195 | 2.670 | -.093 | -.008 | 1.09 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L141 | O | 5.199 | 2.734 | -.047 | .037 | 1.13 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L260 | O | 5.199 | 2.643 | -.108 | -.031 | .68 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L380 | O | 5.200 | 2.800 | -.003 | .086 | .00 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L356 | O | 5.202 | 2.700 | -.067 | .010 | .78 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L324 | O | 5.206 | 2.712 | -.057 | .016 | .36 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L328 | O | 5.210 | 2.724 | -.046 | .022 | .96 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L684 | * | 5.211 | 2.830 | .025 | .101 | .67 | 90U | THICKNESS (CALIPER), TMI, HAND DRIVEN |
| L575 | O | 5.216 | 2.714 | -.048 | .011 | .85 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L249 | O | 5.220 | 2.637 | -.096 | -.049 | 1.27 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L587 | O | 5.220 | 2.680 | -.067 | -.017 | 1.27 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L331 | O | 5.229 | 2.813 | .028 | .076 | 1.23 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L174 | O | 5.230 | 2.710 | -.040 | -.001 | 1.86 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L251 | * | 5.236 | 2.726 | -.024 | .007 | .78 | 90W | THICKNESS (CALIPER), L + W, MOTOR DRIVEN, 20 C, 65% RH |
| L309 | O | 5.240 | 2.650 | -.072 | -.053 | 1.62 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L105 | O | 5.244 | 2.783 | .019 | .044 | .94 | 90Q | THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN |
| L228 | O | 5.245 | 2.765 | .008 | .030 | 1.35 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L158 | # | 5.254 | 5.711 | 1.970 | 2.227 | .94 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L305 | O | 5.255 | 2.765 | .015 | .023 | 1.14 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L693 | O | 5.258 | 2.738 | -.000 | .001 | .95 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L223 | O | 5.260 | 2.699 | -.025 | -.030 | .70 | 90V | THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED |
| L166 | O | 5.261 | 2.817 | .054 | .058 | .64 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L556 | O | 5.262 | 2.690 | -.029 | -.038 | .98 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L567 | * | 5.266 | 2.674 | -.037 | -.052 | 1.19 | 90B | THICKNESS (CALIPER), AMTHOR, HAND DRIVEN |
| L125 | O | 5.266 | 2.781 | .034 | .028 | 1.04 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L352 | O | 5.267 | 2.761 | .022 | .012 | .60 | 90Q | THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN |
| L182 | O | 5.272 | 2.723 | -.000 | -.020 | 1.30 | 90L | THICKNESS (CALIPER), L + W, MOTOR DRIVEN |
| L344 | * | 5.280 | 2.690 | -.016 | -.050 | 1.11 | 90U | THICKNESS (CALIPER), TMI, HAND DRIVEN |
| L128 | O | 5.292 | 2.751 | .034 | -.012 | 1.04 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L261 | O | 5.293 | 2.690 | -.006 | -.058 | .73 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L585 | O | 5.300 | 2.710 | .012 | -.048 | .40 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L242O | * | 5.303 | 2.742 | .036 | -.026 | .58 | 90O | THICKNESS (CALIPER), MESSMER, MOTOR DRIVEN, BS3983 |
| L382 | O | 5.310 | 2.710 | .020 | -.055 | 2.28 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L326 | O | 5.315 | 2.745 | .047 | -.032 | .85 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L241 | O | 5.315 | 2.845 | .113 | .043 | 1.28 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L238A | O | 5.320 | 2.710 | .027 | -.061 | 1.11 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L616 | * | 5.336 | 2.832 | .120 | .019 | .96 | 90C | THICKNESS (CALIPER), CADY, HAND DRIVEN |
| L563 | * | 5.340 | 2.820 | .115 | .008 | 1.38 | 90U | THICKNESS (CALIPER), TMI, HAND DRIVEN |
| L291 | O | 5.340 | 2.815 | .112 | .004 | .87 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L376 | O | 5.340 | 2.815 | .112 | .004 | 1.10 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L212 | O | 5.345 | 2.780 | .092 | -.025 | .82 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L159 | O | 5.353 | 2.827 | .130 | .004 | 1.07 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L123F | O | 5.356 | 2.880 | .167 | .042 | .93 | 90F | THICKNESS (CALIPER), FEDERAL, MOTOR DRIVEN |
| L183 | O | 5.363 | 2.760 | .093 | -.052 | .96 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L173B | O | 5.370 | 2.740 | .085 | -.072 | 1.41 | 90F | THICKNESS (CALIPER), FEDERAL, MOTOR DRIVEN |
| L122 | O | 5.375 | 2.830 | .148 | -.008 | 1.17 | 90V | THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED |
| L118 | O | 5.379 | 2.759 | .104 | -.064 | .92 | 90Q | THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN |
| L581 | O | 5.380 | 2.830 | .152 | -.011 | .62 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |

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

| LAB CODE | F | MEANS J64 | MEANS J83 | COORDINATES MAJOR | COORDINATES MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L153 | * | 5.388 | 2.937 | .229 | .063 | 1.11 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L442 | O | 5.399 | 2.879 | .199 | .013 | .87 | 90V | THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED |
| L242P | + | 5.406 | 2.825 | .168 | -.032 | .79 | 90P | THICKNESS (CALIPER), MESSMER, MOTOR DRIVEN, ISO R534 |
| L100 | O | 5.409 | 2.806 | .158 | -.048 | .85 | 90V | THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED |
| L390 | O | 5.452 | 2.880 | .239 | -.022 | .98 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L233 | X | 5.579 | 2.753 | .250 | -.201 | .88 | 90Q | THICKNESS (CALIPER), ENVECO, MOTOR DRIVEN |
| L259 | X | 10.121 | 2.734 | 3.633 | -3.231 | 169.67 | 90T | THICKNESS (CALIPER), TMI, MOTOR DRIVEN |
| L396M | + | 51.200 | 26.400 | 50.065 | -12.806 | 15.40 | 90S | THICKNESS (CALIPER), SCHOPPER, HAND DRIVEN |
| GMEANS: | | 5.259 | 2.738 | | | 1.00 | | |
| | | 95% ELLIPSE: | | .293 | .101 | WITH GAMMA = 41 DEGREES | | |


THICKNESS (CALIPER)
SAMPLE J64 = 5.26 MILS
SAMPLE J64 = 133.6 MICROMETER
SAMPLE J83 = 2.74 MILS
SAMPLE J83 = 69.5 MICROMETER
+,X,* NOT IN GRAND MEANS
ANALYSIS T90-1
SAMPLE J83
SAMPLE J64
MILS
MICROMETER
2.45
2.55
2.65
2.75
2.85
2.95
3.05
62
64
66
68
70
72
74
76
78
4.95
5.05
5.15
5.25
5.35
5.45
5.55
126
128
130
132
134
136
138
140
142

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

| LAB CODE | SAMPLE D32 MEAN | BOND 79 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | SAMPLE D33 MEAN | MANILA ENVELOPE 118 GRAMS PER SQUARE METER DEV | N.DEV | SDR | R.SDR | TEST D.F = 10 VAR | F | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L100 | 79.30 | .02 | .04 | .31 | .89 | 118.10 | .30 | .32 | 1.52 | 1.19 | 95C | O | L100 |
| L121 | 79.31 | .03 | .05 | .48 | 1.41 | 116.31 | -1.49 | -1.58 | 1.21 | .95 | 95B | O | L121 |
| L162 | 79.00 | -.28 | -.50 | .00 | .00 | 116.59 | -1.21 | -1.28 | 1.77 | 1.38 | 95K | O | L162 |
| L213 | 80.20 | .92 | 1.65 | .44 | 1.27 | 118.28 | .48 | .51 | 1.65 | 1.29 | 95F | O | L213 |
| L233 | 30.43 | -48.85 | -87.72 | .19 | .57 | 45.35 | -72.46 | -76.70 | .45 | .35 | 95T | # | L233 |
| L249 | 79.46 | .18 | .32 | .30 | .87 | 118.80 | 1.00 | 1.06 | 1.19 | .92 | 95I | O | L249 |
| L280 | 79.14 | -.14 | -.25 | .46 | 1.33 | 117.97 | .17 | .18 | 1.51 | 1.18 | 95T | O | L280 |
| L305 | 78.40 | -.88 | -1.58 | .28 | .82 | 116.30 | -1.50 | -1.59 | .89 | .69 | 95T | O | L305 |
| L339 | 78.51 | -.77 | -1.38 | .19 | .54 | 117.37 | -.43 | -.46 | .69 | .54 | 95T | O | L339 |
| L342 | 80.39 | 1.11 | 2.00 | .34 | 1.00 | 118.35 | .55 | .58 | 1.78 | 1.39 | 95C | O | L342 |
| L344 | 79.89 | .61 | 1.09 | .33 | .97 | 118.41 | .61 | .64 | .21 | .16 | 95T | O | L344 |
| L442 | 79.16 | -.12 | -.22 | .16 | .48 | 117.71 | -.09 | -.10 | .65 | .50 | 95K | O | L442 |
| L557 | 78.91 | -.37 | -.66 | .59 | 1.71 | 116.53 | -1.27 | -1.34 | 1.72 | 1.34 | 95C | O | L557 |
| L559 | 79.43 | .15 | .26 | .44 | 1.27 | 118.15 | .35 | .37 | 1.89 | 1.47 | 95K | O | L559 |
| L567 | 79.59 | .31 | .56 | .43 | 1.26 | 118.26 | .46 | .48 | 1.67 | 1.30 | 95E | O | L567 |
| L574 | 78.75 | -.53 | -.95 | .37 | 1.08 | 117.41 | -.39 | -.41 | 1.52 | 1.18 | 95D | O | L574 |
| L597 | 80.26 | .98 | 1.76 | .76 | 2.21 | 123.00 | 5.20 | 5.50 | 3.16 | 2.47 | 95C | # | L597 |
| L626 | 78.65 | -.63 | -1.13 | .40 | 1.16 | 117.35 | -.45 | -.48 | 1.14 | .89 | 95E | O | L626 |
| L688 | 79.09 | -.19 | -.33 | .30 | .89 | 118.82 | 1.02 | 1.07 | 1.25 | .97 | 95T | O | L688 |
| L693 | 79.86 | .58 | 1.04 | .36 | 1.04 | 119.72 | 1.92 | 2.03 | .83 | .65 | 95G | O | L693 |

GR. MEAN = 79.28 G/SQ.METER GRAND MEAN =117.80 G/SQ.METER TEST DETERMINATIONS = 10
SD MEANS = .56 G/SQ.METER SD OF MEANS = .94 G/SQ.METER 18 LABS IN GRAND MEANS
AVERAGE SDR = .34 G/SQ.METER AVERAGE SDR = 1.28 G/SQ.METER
TOTAL NUMBER OF LABORATORIES REPORTING = 20

Best values: D32 79.2 ± 0.9 grams per square meter
D33 117.8 ± 1.5 grams per square meter

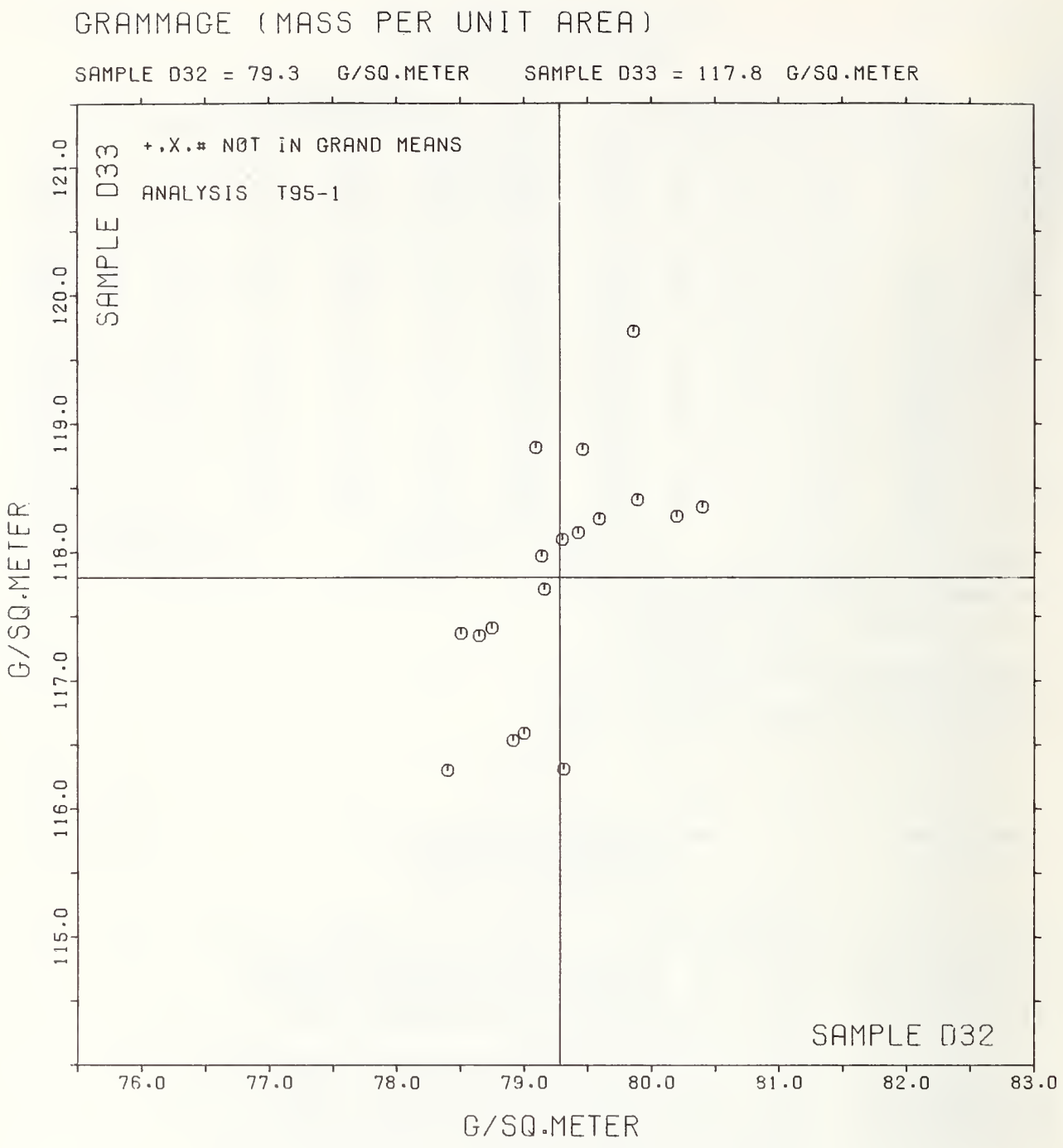
The following laboratories were omitted from the grand means because of extreme test results: 597.

Data from the following laboratories apppear to be off by a multiplicative factor: 233.



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

| LAB CODE | F | MEANS D32 | D33 | COORDINATES MAJOR | MINOR | AVG R.SDR | VAR | PROPERTY---TEST INSTRUMENT---CONDITIONS |
|---|---|---|---|---|---|---|---|---|
| L233 | # | 30.43 | 45.35 | -86.14 | 14.69 | .46 | 95T | BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT |
| L305 | O | 78.40 | 116.30 | -1.73 | .18 | .76 | 95T | BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT |
| L339 | O | 78.51 | 117.37 | -.71 | .52 | .54 | 95T | BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT |
| L626 | O | 78.65 | 117.35 | -.67 | .39 | 1.02 | 95E | BASIS WEIGHT (GRAMMAGE), GUILLOTINE TYPE CUTTER |
| L574 | O | 78.75 | 117.41 | -.58 | .32 | 1.13 | 95D | BASIS WEIGHT (GRAMMAGE), DIE CUT |
| L557 | O | 78.91 | 116.53 | -1.31 | -.19 | 1.53 | 95C | BASIS WEIGHT (GRAMMAGE), CUTTING BOARD |
| L162 | O | 79.00 | 116.59 | -1.22 | -.24 | .69 | 95K | BASIS WEIGHT (GRAMMAGE), WEIGHED AS RECEIVED |
| L688 | O | 79.09 | 118.82 | .85 | .59 | .93 | 95T | BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT |
| L280 | O | 79.14 | 117.97 | .10 | .20 | 1.25 | 95T | BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT |
| L442 | O | 79.16 | 117.71 | -.13 | .07 | .49 | 95K | BASIS WEIGHT (GRAMMAGE), WEIGHED AS RECEIVED |
| L100 | O | 79.30 | 118.10 | .28 | .10 | 1.04 | 95C | BASIS WEIGHT (GRAMMAGE), CUTTING BOARD |
| L121 | O | 79.31 | 116.31 | -1.35 | -.64 | 1.18 | 95B | BASIS WEIGHT (GRAMMAGE), CONCORA CUTTER |
| L559 | O | 79.43 | 118.15 | .38 | .01 | 1.37 | 95K | BASIS WEIGHT (GRAMMAGE), WEIGHED AS RECEIVED |
| L249 | O | 79.46 | 118.80 | .98 | .25 | .90 | 95I | BASIS WEIGHT (GRAMMAGE), INGENTO PAPER CUTTER |
| L567 | O | 79.59 | 118.26 | .54 | -.09 | 1.28 | 95E | BASIS WEIGHT (GRAMMAGE), GUILLOTINE TYPE CUTTER |
| L693 | O | 79.86 | 119.72 | 1.99 | .26 | .84 | 95G | BASIS WEIGHT (GRAMMAGE), PRECISION CUTTER |
| L344 | O | 79.89 | 118.41 | .80 | -.30 | .57 | 95T | BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT |
| L213 | O | 80.20 | 118.28 | .81 | -.64 | 1.28 | 95F | BASIS WEIGHT (GRAMMAGE), FOUR-SQUARE CUTTER |
| L597 | # | 80.26 | 123.00 | 5.14 | 1.25 | 2.34 | 95C | BASIS WEIGHT (GRAMMAGE), CUTTING BOARD |
| L342 | O | 80.39 | 118.35 | .96 | -.79 | 1.19 | 95C | BASIS WEIGHT (GRAMMAGE), CUTTING BOARD |
| GMEANS: | | 79.28 | 117.80 | | | 1.00 | | |
| | | 95% ELLIPSE: | | 2.84 | 1.11 | WITH GAMMA = 65 DEGREES | | |


GRAMMAGE (MASS PER UNIT AREA)
SAMPLE D32 = 79.3 G/SQ.METER
SAMPLE D33 = 117.8 G/SQ.METER
+,X,* NOT IN GRAND MEANS
ANALYSIS T95-1
SAMPLE D33
SAMPLE D32
G/SQ.METER
G/SQ.METER
121.0
120.0
119.0
118.0
117.0
116.0
115.0
76.0
77.0
78.0
79.0
80.0
81.0
82.0
83.0

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 | | K21 | 51.2 | 3.0 | 4.3 | 10 | 55 | 60 | 10 | 3.8 | 8.3 |
| T40-1 | GURLEY UNITS | K43 | 16.4 | .8 | 1.2 | | | | | 1.0 | 2.3 |
| AIR RESISTANCE, SHEFFIELD | | K21 | 71.1 | 5.9 | 5.9 | 10 | 40 | 45 | 10 | 5.2 | 16.4 |
| T40-2 | SHEFF. UNITS | K43 | 167.6 | 9.2 | 8.8 | | | | | 7.7 | 25.5 |
| AIR RESISTANCE, GURLEY HG FLOTATION | | E68 | 651. | 62. | 85. | 10 | 12 | 12 | 10 | 75. | 171. |
| T41-1 | SEC/10 CC | E65 | 731. | 63. | 148. | | | | | 129. | 173. |
| SMOOTHNESS, PARKER PRINTSURF | | K45 | 5.47 | .43 | .10 | 10 | 9 | 9 | 10 | .09 | 1.20 |
| T44-1 | MICRONS | A83 | 4.84 | .40 | .24 | | | | | .21 | 1.10 |
| SMOOTHNESS, SHEFFIELD | | K45 | 160.3 | 7.0 | 9.2 | 15 | 89 | 91 | 10 | 8.0 | 20.0 |
| T45-1 | SHEFF. UNITS | A83 | 105.4 | 6.8 | 10.7 | | | | | 9.4 | 19.6 |
| SMOOTHNESS, HEKK | | K45 | 30.2 | 3.9 | 2.6 | 15 | 9 | 11 | 10 | 2.3 | 10.9 |
| T45-2 | HEKK SECONDS | A83 | 54.9 | 7.6 | 9.2 | | | | | 8.1 | 21.5 |
| SMOOTHNESS, HENDTSEN | | K45 | 203. | 14. | 19. | 10 | 8 | 8 | 10 | 16. | 40. |
| T47-1 | ML/MIN | A83 | 113. | 13. | 18. | | | | | 16. | 36. |
| K & N INK ABSORPTION | | E48 | 24.7 | 3.3 | .8 | 4 | 8 | 11 | 4 | 1.2 | 9.0 |
| T56-1 | K & N UNITS | H58 | 61.4 | 6.9 | .7 | | | | | 1.0 | 19.2 |
| PH, COLD | | J78 | 7.339 | .143 | .043 | 5 | 5 | 6 | 2 | .083 | .402 |
| T57-1 | PH UNITS | J75 | 6.189 | .226 | .029 | | | | | .056 | .629 |
| PH, HOT | | J78 | 7.914 | .208 | .035 | 5 | 4 | 4 | 2 | .069 | .579 |
| T57-2 | PH UNITS | J75 | 5.841 | .395 | .035 | | | | | .069 | 1.095 |
| OPACITY, H&L TYPE, 89% BACKING | | E86 | 89.75 | .54 | .35 | 10 | 78 | 89 | 5 | .44 | 1.52 |
| T60-1 | PERCENT | H21 | 72.36 | 1.00 | 1.02 | | | | | 1.26 | 2.90 |
| OPACITY, H&L TYPE, PAPER BACKING | | E86 | 91.49 | .28 | .30 | 10 | 6 | 6 | 5 | .37 | .81 |
| T60-2 | PERCENT | H21 | 75.61 | .27 | 1.10 | | | | | 1.36 | 1.23 |
| OPACITY, ELREPHO TYPE, PAPER BACKING | | E86 | 92.07 | .19 | .19 | 10 | 14 | 16 | 5 | .24 | .56 |
| T60-3 | PERCENT | H21 | 77.08 | .66 | .76 | | | | | .94 | 1.94 |
| BLUE REFLECTANCE, DIRECTIONAL | | J36 | 83.93 | .60 | .12 | 8 | 21 | 46 | 6 | .14 | 1.66 |
| T65-1 | PERCENT | J79 | 68.14 | .35 | .22 | | | | | .24 | .98 |
| BLUE REFLECTANCE, DIFFUSE, WITH TRAP | | J36 | 84.45 | .47 | .08 | 8 | 18 | 19 | 6 | .10 | 1.31 |
| T65-2 | PERCENT | J79 | 67.87 | .72 | .18 | | | | | .20 | 2.00 |
| BLUE REFLECTANCE, DIFFUSE, NO TRAP | | J36 | 84.05 | .61 | .08 | 8 | 13 | 16 | 6 | .09 | 1.69 |
| T65-3 | PERCENT | J79 | 68.47 | .65 | .14 | | | | | .16 | 1.81 |
| SPECULAR GLOSS, 75 DEGREE | | E87 | 68.3 | 1.7 | 1.9 | 10 | 49 | 54 | 5 | 2.4 | 5.0 |
| T75-1 | GLOSS UNITS | E51 | 68.1 | 1.6 | 1.1 | | | | | 1.4 | 4.4 |
| THICKNESS (CALIPER) | | J64 | 5.259 | .090 | .044 | 10 | 55 | 73 | 10 | .039 | .250 |
| T90-1 | MILS | J83 | 2.738 | .082 | .040 | | | | | .035 | .227 |
| GRAMMAGE (MASS PER UNIT AREA) | | D32 | 79.28 | .56 | .34 | 10 | 18 | 20 | 3 | .55 | 1.61 |
| T95-1 | G/SQ.METER | D33 | 117.80 | .94 | 1.28 | | | | | 2.05 | 3.13 |

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16. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

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

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Collaborative reference program; Laboratory evaluation; Paper; Precision; Reference samples; Testing calibration

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