TAPPI

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

REPORT NO. 60S
STRENGTH TESTS

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

NBS COLLABORATIVE REFERENCE PROGRAMS

TAPPI Paper and Board (6 times per year)

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

FKBG-API Containerboard (48 times per year)

- Mullen burst of linerboard
- Concora test of medium

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- 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
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Report No. 60S
STRENGTH TESTS

R. G. Powell
TAPPI-NBS Research Associate
Collaborative Testing Services, Inc.

J. Horlick
Office of Testing Laboratory Evaluation Technology
Office of Engineering Standards
National Engineering Laboratory

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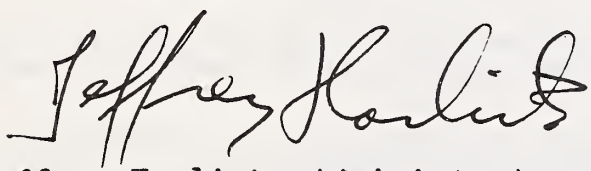
U. S. DEPARTMENT OF COMMERCE
National Bureau of Standards

INTRODUCTION

Reports 60S and 60G comprise the last set of reports for the 78-79 program year. Participants in tests which involve strength properties of paper will receive only the G report; those in tests which measure other properties will receive only the S 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.

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



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

August 13, 1979

BACKGROUND AND PURPOSE

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

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

HOW THE PROGRAM WORKS

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

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

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

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

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

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

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

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

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Analyses In This Report

Analyses In The G 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 participant should take this as a warning to reexamine his testing procedure

S - Included in grand mean but only after omission of one of 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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ANALYSIS T10-1 TABLE 1
BURSTING STRENGTH, PSI
TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C

LAB CODE	SAMPLE J40 MEAN	PRINTING 85 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	SAMPLE J68 MEAN	PRINTING 76 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	TEST D. = 15 VAR	F	LAB
L121	27.37	-2.10	-1.10	1.34	.87	17.32	.02	.01	1.30	1.16	10C	O	L121
L131	27.73	-1.74	-.91	2.05	1.33	15.13	-2.16	-1.53	1.19	1.06	10C	O	L131
L134	31.93	2.46	1.29	1.28	.83	16.80	-.50	-.35	1.26	1.13	10C	O	L134
L150	28.97	-.50	-.26	.97	.63	17.23	-.06	-.04	1.62	1.45	10C	O	L150
L153	30.47	1.00	.52	1.48	.96	17.67	.37	.26	.99	.89	10C	O	L153
L158	28.73	-.74	-.39	1.05	.68	16.33	-.96	-.68	.92	.82	10C	O	L158
L167	29.27	-.20	-.11	.72	.47	18.09	.79	.56	.66	.59	10C	O	L167
L183	26.93	-2.54	-1.33	1.22	.79	17.23	-.06	-.04	1.45	1.29	10C	O	L183
L191	28.10	-1.37	-.72	1.66	1.08	13.97	-3.33	-2.36	1.27	1.14	10C	O	L191
L203A	28.12	-1.35	-.71	1.83	1.19	16.28	-1.01	-.72	1.37	1.22	10C	O	L203A
L203B	30.78	1.31	.69	2.39	1.55	16.08	-1.21	-.86	1.49	1.33	10C	O	L203B
L207	30.27	.80	.42	1.45	.94	18.80	1.50	1.07	.62	.55	10C	O	L207
L212	29.00	-.47	-.25	1.56	1.01	17.17	-.13	-.09	.94	.84	10C	O	L212
L223A	30.43	.96	.50	1.29	.84	18.91	1.61	1.14	.98	.88	10C	O	L223A
L225	31.10	1.63	.85	1.28	.83	18.47	1.17	.83	1.48	1.32	10C	O	L225
L232	26.03	-3.44	-1.80	1.25	.81	16.43	-.86	-.61	.59	.53	10C	O	L232
L237A	28.00	-1.47	-.77	1.46	.95	16.87	-.43	-.30	.92	.82	10C	O	L237A
L237B	28.93	-.54	-.28	1.16	.76	18.80	1.50	1.07	.94	.84	10C	O	L237B
L248	28.46	-1.01	-.53	1.22	.79	18.79	1.50	1.06	1.28	1.14	10E	O	L248
L249	30.16	.69	.36	2.02	1.31	17.12	-.18	-.13	.87	.78	10C	O	L249
L261	28.74	-.73	-.38	1.93	1.25	17.83	.54	.38	1.36	1.21	10C	O	L261
L264	29.40	-.07	-.04	.83	.54	15.47	-1.83	-1.30	1.25	1.11	10C	O	L264
L274	29.93	.46	.24	1.15	.75	16.90	-.40	-.28	.71	.64	10C	O	L274
L278	27.03	-2.44	-1.28	1.55	1.01	14.97	-2.33	-1.65	1.30	1.16	10C	O	L278
L279	31.20	1.73	.91	2.14	1.39	17.73	.44	.31	.70	.63	10C	O	L279
L299	35.03	5.56	2.91	1.77	1.15	20.30	3.00	2.13	.94	.84	10C	*	L299
L305	29.83	.36	.19	1.29	.84	16.90	-.40	-.28	.76	.68	10C	O	L305
L311	31.13	1.66	.87	2.12	1.37	18.67	1.37	.97	1.35	1.20	10C	O	L311
L312	29.47	-.00	-.00	1.21	.79	17.24	-.06	-.04	.73	.66	10C	O	L312
L315	33.07	3.60	1.88	1.74	1.13	18.23	.94	.66	1.19	1.06	10C	O	L315
L321	33.70	4.23	2.21	1.26	.82	18.80	1.50	1.07	1.32	1.18	10C	O	L321
L326	31.03	1.56	.82	.90	.58	20.37	3.07	2.18	1.41	1.26	10C	O	L326
L330	29.10	-.37	-.19	1.93	1.25	17.74	.44	.31	1.24	1.11	10C	O	L330
L331	27.80	-1.67	-.87	1.78	1.16	15.73	-1.56	-1.11	.80	.71	10Y	O	L331
L333	26.87	-2.60	-1.36	3.62	2.35	15.60	-1.70	-1.20	2.53	2.26	10C	O	L333
L339	23.83	-5.64	-2.95	1.37	.89	12.10	-5.20	-3.69	1.24	1.11	10C	X	L339
L344	26.43	-3.04	-1.59	1.59	1.03	15.07	-2.23	-1.58	.88	.79	10C	O	L344
L356	27.20	-2.27	-1.19	2.08	1.35	18.07	.77	.55	1.17	1.04	10C	O	L356
L358	30.50	1.03	.54	.56	.37	16.47	-.83	-.59	.40	.36	10C	O	L358
L360	29.70	.23	.12	1.35	.87	17.93	.64	.45	1.15	1.02	10C	O	L360
L366	28.83	-.64	-.33	1.73	1.12	18.70	1.40	1.00	.92	.82	10C	O	L366
L390	29.43	-.04	-.02	1.22	.79	16.50	-.80	-.56	1.12	1.00	10C	O	L390
L568	31.90	2.43	1.27	1.70	1.11	19.20	1.90	1.35	1.26	1.13	10C	O	L568
L599	30.04	.57	.30	1.88	1.22	17.30	.00	.00	1.33	1.19	10C	O	L599
L684	28.50	-.97	-.51	1.95	1.26	15.83	-1.46	-1.04	1.13	1.01	10C	O	L684
L696	33.67	4.20	2.20	2.60	1.69	18.58	1.28	.91	1.49	1.33	10C	#	L696

GR. MEAN = 29.47 PSI — GRAND MEAN = 17.30 PSI — TEST DETERMINATIONS = 15
SD MEANS = 1.91 PSI — SD OF MEANS = 1.41 PSI — 44 LABS IN GRAND MEANS
AVERAGE SDR = 1.54 PSI — AVERAGE SDR = 1.12 PSI
GR. MEAN = 203.2 KILOPASCAL — GRAND MEAN = 119.3 KILOPASCAL

L128	30.60	1.13	.59	1.30	.84	19.00	1.70	1.21	1.00	.89	10B	*	L128
L219	32.62	3.15	1.65	1.06	.69	20.08	2.78	1.97	1.44	1.28	10T	*	L219
L242	31.75	2.29	1.20	2.09	1.36	19.89	2.60	1.84	1.09	.97	10T	*	L242
L250L	26.00	-3.47	-1.81	1.28	.83	16.58	-.72	-.51	.82	.73	10N	*	L250L
L251	30.69	1.22	.64	2.04	1.33	19.53	2.23	1.58	.84	.75	10V	*	L251
L269	33.60	4.13	2.16	1.55	1.01	21.67	4.37	3.10	1.40	1.25	10A	*	L269
L484	27.70	-1.77	-.93	1.42	.93	15.97	-1.33	-.94	.61	.55	10M	*	L484

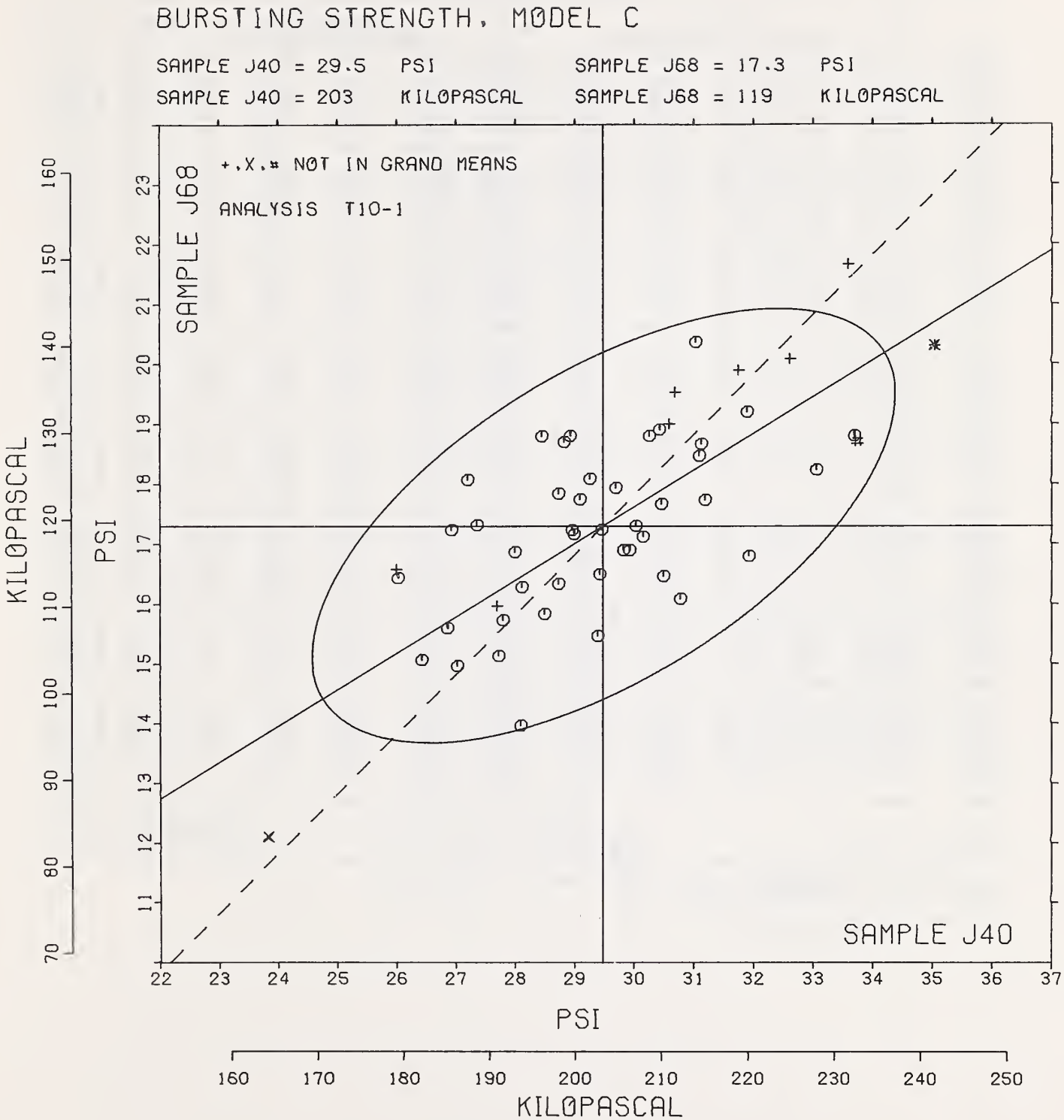
TOTAL NUMBER OF LABORATORIES REPORTING = 53

Best values: J40 29.5 ± 3.1 psi
J68 17.3 ± 2.3 psi

Data from the following laboratories were omitted from the grand means because the tests were performed in ambient conditions: 695.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T10-1 TABLE 2
BURSTING STRENGTH, PSI
TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C

LAB CODE	F	MEANS J40	MEANS J68	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L339	X	23.83	12.10	-7.52	-1.50	1.00	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L250L	*	26.00	16.58	-3.33	1.19	.78	10N	BURSTING STRENGTH UP TO 45 PSI,LHOMARGY,MAN.CLAMP, 20C,65%RH
L232	O	26.03	16.43	-3.38	1.05	.67	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L344	O	26.43	15.07	-3.75	-.32	.91	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L333	O	26.87	15.60	-3.11	-.09	2.31	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L183	O	26.93	17.23	-2.20	1.27	1.04	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L278	O	27.03	14.97	-3.29	-.72	1.09	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L356	O	27.20	18.07	-1.54	1.84	1.20	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L121	O	27.37	17.32	-1.78	1.11	1.02	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L484	*	27.70	15.97	-2.20	-.21	.74	10M	BURSTING STRENGTH UP TO 45 PSI,REGMED MT/MGT,MANUAL CLAMP
L131	O	27.73	15.13	-2.61	-.94	1.20	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L331	O	27.80	15.73	-2.24	-.46	.93	10Y	BURSTING STRENGTH UP TO 45 PSI,PERKINS C, M.CLAMP,TRANSDUCER
L237A	O	28.00	16.87	-1.48	.40	.88	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L191	O	28.10	13.97	-2.90	-2.13	1.11	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L203A	O	28.12	16.28	-1.68	-.16	1.21	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L248	O	28.46	18.79	-.08	1.80	.97	10E	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L684	O	28.50	15.83	-1.59	-.74	1.14	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L158	O	28.73	16.33	-1.13	-.44	.75	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L261	O	28.74	17.83	-.34	.84	1.23	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L366	O	28.83	18.70	.19	1.53	.97	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L237B	O	28.93	18.80	.33	1.56	.80	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L150	O	28.97	17.23	-.46	.21	1.04	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L212	O	29.00	17.17	-.47	.13	.92	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L330	O	29.10	17.74	-.08	.57	1.18	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L167	O	29.27	18.09	.24	.78	.53	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L264	O	29.40	15.47	-1.01	-1.53	.82	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L390	O	29.43	16.50	-.45	-.66	.90	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L312	O	29.47	17.24	-.03	-.05	.72	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L360	O	29.70	17.93	.53	.42	.95	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L305	O	29.83	16.90	.10	-.53	.76	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L274	O	29.93	16.90	.19	-.58	.69	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L599	O	30.04	17.30	.49	-.29	1.21	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L249	O	30.16	17.12	.50	-.51	1.05	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L207	O	30.27	18.80	1.46	.87	.75	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L223A	O	30.43	18.91	1.66	.87	.86	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L153	O	30.47	17.67	1.04	-.20	.92	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L358	O	30.50	16.47	.45	-1.24	.36	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L128	*	30.60	19.00	1.85	.87	.87	10B	BURSTING STRENGTH UP TO 45 PSI, PERKINS B, MANUAL CLAMP
L251	*	30.69	19.53	2.21	1.27	1.04	10V	BURSTING STRENGTH UP TO 45 PSI, L*W,MANUAL CLAMP, 20C,65% RH
L203B	O	30.78	16.08	.49	-1.72	1.44	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L326	O	31.03	20.37	2.93	1.81	.92	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L225	O	31.10	18.47	2.00	.15	1.08	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L311	O	31.13	18.67	2.13	.30	1.29	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L279	O	31.20	17.73	1.70	-.53	1.01	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L242	*	31.75	19.89	3.30	1.03	1.16	10T	BURSTING STRENGTH UP TO 45 PSI, L*W,MANUAL CLAMP
L568	O	31.90	19.20	3.07	.36	1.12	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L134	O	31.93	16.80	1.84	-1.71	.98	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L219	*	32.62	20.08	4.13	.73	.98	10T	BURSTING STRENGTH UP TO 45 PSI, L*W,MANUAL CLAMP
L315	O	33.07	18.23	3.56	-1.07	1.10	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L269	*	33.60	21.67	5.80	1.58	1.13	10A	BURSTING STRENGTH UP TO 45 PSI, PERKINS A, MANUAL CLAMP
L696	#	33.67	18.58	4.25	-1.09	1.51	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L321	O	33.70	18.80	4.39	-.92	1.00	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L299	*	35.03	20.30	6.31	-.33	.99	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
GMEANS:		29.47	17.30			1.00		
		95% ELLIPSE:		5.53	2.57	WITH GAMMA = 31 DEGREES		


BURSTING STRENGTH, MODEL C
SAMPLE J40 = 29.5 PSI
SAMPLE J40 = 203 KILOPASCAL
SAMPLE J68 = 17.3 PSI
SAMPLE J68 = 119 KILOPASCAL
+,X,* NOT IN GRAND MEANS
ANALYSIS T10-1
SAMPLE J68
SAMPLE J40
PSI
KILOPASCAL
11 12 13 14 15 16 17 18 19 20 21 22 23
70 80 90 100 110 120 130 140 150 160
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
160 170 180 190 200 210 220 230 240 250

ANALYSIS T10-2 TABLE 1

BURSTING STRENGTH, PSI

TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C-A OR C WITH AIR OR HYDRAULIC CLAMPS

	SAMPLE	PRINTING				SAMPLE	PRINTING				TEST D.= 15		
LAB	J40	85 GRAMS PER SQUARE METER				J68	76 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	30.71	1.56	.81	1.50	.94	19.15	1.81	.95	.93	.86	10D	O	L100
L105	29.13	-.02	-.01	2.23	1.40	17.00	-.34	-.18	1.21	1.12	10D	O	L105
L106C	29.00	-.15	-.08	1.65	1.03	18.13	.79	.42	1.30	1.20	10D	O	L106C
L115	31.27	2.12	1.09	1.81	1.14	16.23	-1.11	-.58	1.12	1.03	10D	*	L115
L118	30.20	1.05	.54	1.74	1.09	18.83	1.49	.78	.94	.87	10D	O	L118
L122	27.53	-1.62	-.83	1.60	1.00	15.20	-2.14	-1.12	1.01	.94	10F	O	L122
L125	27.37	-1.78	-.92	2.22	1.40	14.83	-2.51	-1.32	1.53	1.41	10D	O	L125
L148	30.80	1.65	.85	1.08	.68	18.47	1.13	.59	1.25	1.15	10D	O	L148
L157	31.70	2.55	1.32	1.18	.74	18.83	1.49	.79	1.21	1.11	10D	O	L157
L159	26.32	-2.83	-1.46	1.69	1.06	15.89	-1.45	-.76	1.15	1.06	10D	O	L159
L162	27.53	-1.62	-.83	1.46	.91	13.60	-3.74	-1.97	2.06	1.90	10D	O	L162
L163	29.23	.08	.04	1.40	.88	18.07	.73	.38	.98	.90	10D	O	L163
L166	31.93	2.78	1.44	2.09	1.31	18.53	1.19	.63	.85	.79	10D	O	L166
L176	30.40	1.25	.65	.99	.62	20.53	3.19	1.68	.64	.59	10D	O	L176
L185	30.93	1.78	.92	1.22	.77	18.57	1.23	.65	1.16	1.07	10D	O	L185
L190C	27.53	-1.62	-.83	1.36	.85	16.33	-1.01	-.53	1.18	1.08	10D	O	L190C
L190R	28.53	-.62	-.32	1.59	1.00	16.97	-.37	-.20	1.34	1.24	10D	O	L190R
L194	29.73	.58	.30	1.43	.89	19.00	1.66	.87	.53	.49	10D	O	L194
L217	30.47	1.32	.68	1.19	.75	19.13	1.79	.94	1.19	1.10	10F	O	L217
L224	30.77	1.62	.83	2.03	1.28	18.60	1.26	.66	1.70	1.57	10D	O	L224
L226B	29.01	-.14	-.07	1.45	.91	17.93	.59	.31	1.15	1.06	10D	O	L226B
L226C	24.93	-4.22	-2.17	2.81	1.76	14.87	-2.47	-1.30	1.32	1.21	10D	O	L226C
L233	28.30	-.85	-.44	1.33	.83	17.71	.37	.20	.89	.82	10D	O	L233
L241	29.97	.82	.42	2.02	1.27	18.91	1.57	.83	1.21	1.12	10D	O	L241
L255	27.73	-1.42	-.73	.59	.37	16.73	-.61	-.32	.59	.55	10D	O	L255
L257A	29.20	.05	.03	1.42	.89	18.33	.99	.52	1.29	1.19	10D	O	L257A
L257B	29.53	.38	.20	1.19	.75	17.87	.53	.28	.83	.77	10D	O	L257B
L257C	29.40	.25	.13	2.41	1.52	17.73	.39	.21	.88	.82	10D	O	L257C
L262	30.30	1.15	.59	1.35	.85	18.13	.79	.42	1.03	.95	10D	O	L262
L275	25.25	-3.90	-2.01	1.45	.91	12.65	-4.69	-2.47	1.21	1.11	10D	O	L275
L280	32.94	3.79	1.96	1.64	1.03	19.91	2.57	1.35	.90	.83	10D	O	L280
L309	29.15	-.00	-.00	1.64	1.03	17.46	.12	.06	.96	.88	10D	O	L309
L313	25.60	-3.55	-1.83	1.61	1.01	14.36	-2.98	-1.57	1.27	1.17	10I	O	L313
L341	29.20	.05	.03	.80	.50	17.23	-.11	-.06	.42	.38	10D	O	L341
L352	26.29	-2.86	-1.47	1.71	1.07	16.25	-1.09	-.57	.83	.77	10D	O	L352
L563	30.30	1.15	.59	1.91	1.20	16.89	-.45	-.24	.96	.88	10U	O	L563
L575	31.13	1.98	1.02	1.56	.98	18.58	1.24	.65	1.15	1.06	10D	O	L575
L581	29.90	.75	.39	1.51	.95	19.20	1.86	.98	1.01	.94	10D	O	L581
L652	25.33	-3.82	-1.97	2.25	1.41	12.07	-5.27	-2.77	1.60	1.48	10D	*	L652
L688	29.73	.58	.30	2.50	1.57	18.30	.96	.51	.89	.82	10D	O	L688
L698	30.81	1.66	.86	1.58	.99	17.87	.53	.28	1.32	1.21	10D	O	L698

GR. MEAN = 29.15 PSI GRAND MEAN = 17.34 PSI TEST DETERMINATIONS = 15

SD MEANS = 1.94 PSI SD OF MEANS = 1.90 PSI 41 LABS IN GRAND MEANS

AVERAGE SDR = 1.59 PSI AVERAGE SDR = 1.08 PSI

GR. MEAN = 201.0 KILOPASCAL GRAND MEAN = 119.6 KILOPASCAL

TOTAL NUMBER OF LABORATORIES REPORTING = 41

Best values: J40 29.3 ± 3.6 psi
J68 17.4 ± 3.1 psi

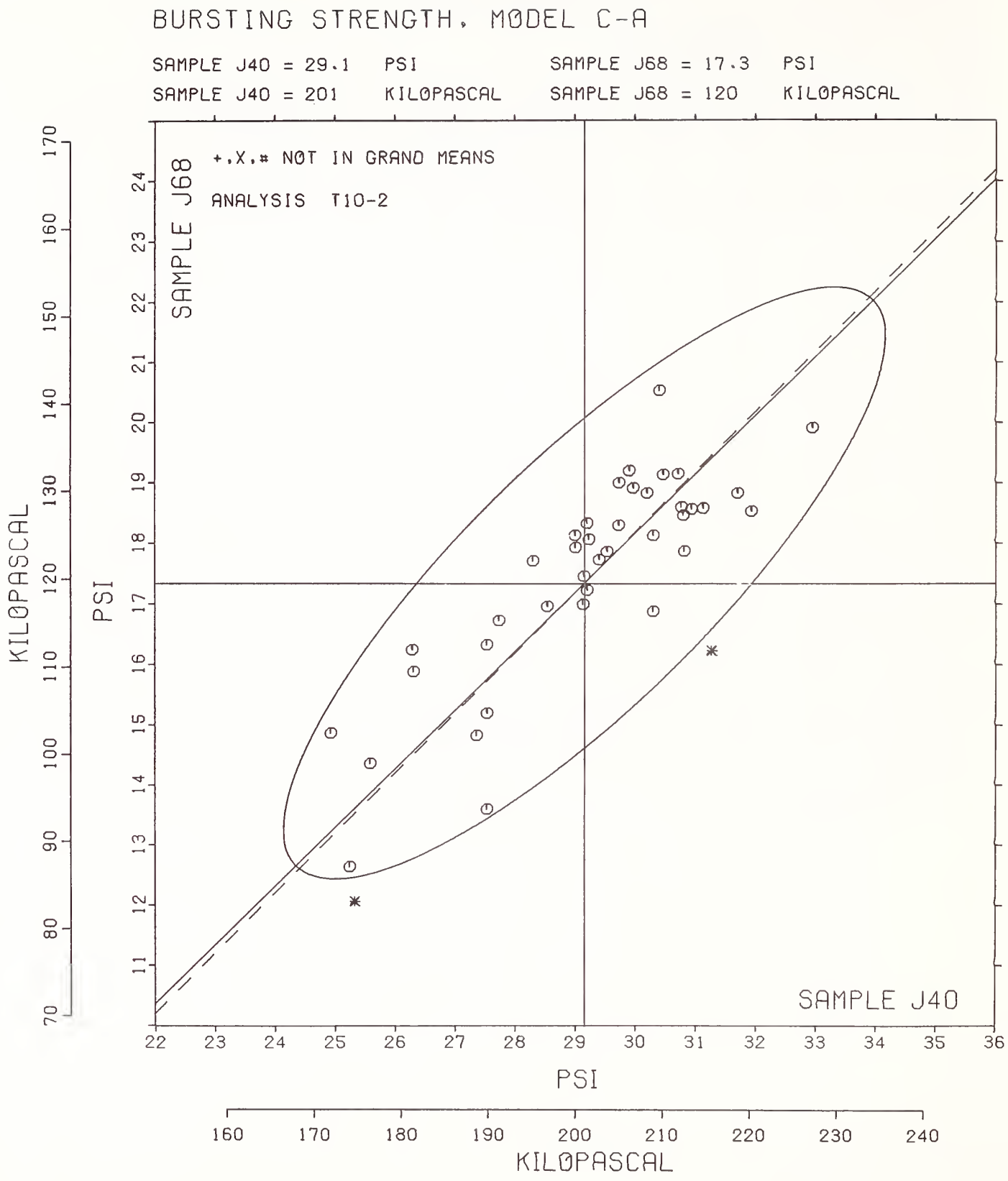
REPORT NO. 60S TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1979

ANALYSIS T10-2 TABLE 2

BURSTING STRENGTH, PSI

TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C-A OR C WITH AIR OR HYDRAULIC CLAMPS

LAB CODE	F	MEANS J40	MEANS J68	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L226C	O	24.93	14.87	-4.74	1.18	1.49	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L275	O	25.25	12.65	-6.07	-.63	1.01	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L652	*	25.33	12.07	-6.41	-1.10	1.45	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L313	O	25.60	14.36	-4.62	.35	1.09	10I	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L352	O	26.29	16.25	-2.80	1.22	.92	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L159	O	26.32	15.89	-3.04	.94	1.06	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L125	O	27.37	14.83	-3.03	-.55	1.40	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L190C	O	27.53	16.33	-1.86	.41	.97	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L162	O	27.53	13.60	-3.77	-1.55	1.41	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L122	O	27.53	15.20	-2.65	-.40	.97	10F	BURSTING STRENGTH UP TO 45 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L255	O	27.73	16.73	-1.44	.56	.46	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L233	O	28.30	17.71	-.35	.86	.83	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L190R	O	28.53	16.97	-.70	.16	1.12	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L106C	O	29.00	18.13	.45	.67	1.12	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L226B	O	29.01	17.93	.31	.52	.99	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L105	O	29.13	17.00	-.25	-.23	1.26	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L309	O	29.15	17.46	.08	.09	.96	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L341	O	29.20	17.23	-.04	-.11	.44	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257A	O	29.20	18.33	.73	.68	1.04	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L163	O	29.23	18.07	.57	.46	.89	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257C	O	29.40	17.73	.46	.11	1.17	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257B	O	29.53	17.87	.64	.11	.76	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L688	O	29.73	18.30	1.08	.28	1.19	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L194	O	29.73	19.00	1.58	.78	.69	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L581	O	29.90	19.20	1.84	.81	.94	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L241	O	29.97	18.91	1.69	.55	1.19	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L118	O	30.20	18.83	1.79	.33	.98	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L563	O	30.30	16.89	.50	-1.12	1.04	10U	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L262	O	30.30	18.13	1.38	-.24	.90	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L176	O	30.40	20.53	3.13	1.41	.60	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L217	O	30.47	19.13	2.20	.36	.92	10F	BURSTING STRENGTH UP TO 45 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L100	O	30.71	19.15	2.39	.20	.90	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L224	O	30.77	18.60	2.04	-.23	1.42	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L148	O	30.80	18.47	1.97	-.35	.91	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L698	O	30.81	17.87	1.56	-.78	1.10	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L185	O	30.93	18.57	2.13	-.37	.92	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L575	O	31.13	18.58	2.28	-.49	1.02	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L115	*	31.27	16.23	.74	-2.27	1.08	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L157	O	31.70	18.83	2.87	-.71	.93	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L166	O	31.93	18.53	2.83	-1.09	1.05	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L280	O	32.94	19.91	4.51	-.81	.93	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
GMEANS:		29.15	17.34			1.00		
		95% ELLIPSE:		6.70	2.04	WITH GAMMA = 44 DEGREES		


BURSTING STRENGTH, MODEL C-A
SAMPLE J40 = 29.1 PSI
SAMPLE J40 = 201 KILOPASCAL
SAMPLE J68 = 17.3 PSI
SAMPLE J68 = 120 KILOPASCAL
+,X,* NOT IN GRAND MEANS
ANALYSIS T10-2
SAMPLE J68
SAMPLE J40
PSI
KILOPASCAL
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
11 12 13 14 15 16 17 18 19 20 21 22 23 24
70 80 90 100 110 120 130 140 150 160 170
160 170 180 190 200 210 220 230 240

ANALYSIS T11-1 TABLE 1

BURSTING STRENGTH, HIGH RANGE, PSI

TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C OR C-A

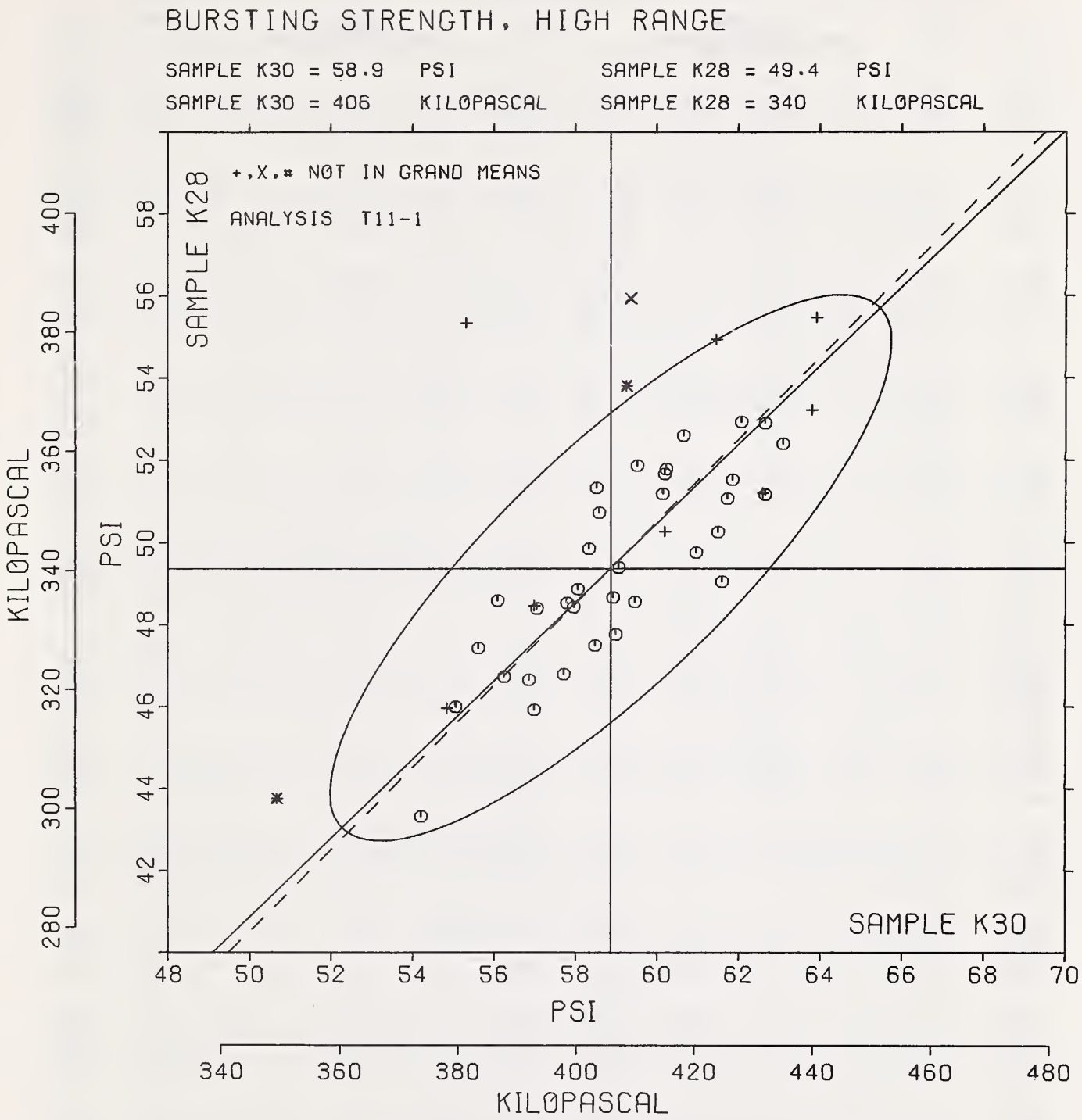
LAB CODE	SAMPLE K30 MEAN	KRAFT 123 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE K28 MEAN	PRINTING 105 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.F 15 VAR	F	LAB
L100	59.5	.7	.25	3.8	.98	51.9	2.5	.98	3.1	.85	11D	O	L100
L103	62.7	3.8	1.43	2.2	.56	51.2	1.8	.70	1.4	.38	11C	O	L103
L107	60.7	1.8	.68	5.6	1.43	52.6	3.2	1.26	4.8	1.33	11C	O	L107
L118	63.1	4.2	1.60	4.1	1.06	52.4	3.0	1.18	3.7	1.02	11D	O	L118
L122	56.3	-2.6	-.98	2.9	.74	46.7	-2.6	-1.03	3.6	.99	11F	O	L122
L128	59.1	.2	.08	3.1	.80	49.4	.0	.01	3.5	.98	11D	O	L128
L148	61.9	3.0	1.13	4.1	1.06	51.5	2.2	.85	4.3	1.20	11D	O	L148
L159	56.1	-2.8	-1.04	3.9	1.00	48.6	-.8	-.30	3.7	1.04	11D	O	L159
L170	61.5	2.6	.99	2.4	.63	50.3	.9	.35	1.4	.38	11C	O	L170
L176	58.5	-.3	-.13	3.2	.83	51.3	2.0	.77	4.4	1.22	11D	O	L176
L182	58.1	-.8	-.30	6.4	1.63	48.9	-.5	-.20	4.5	1.25	11D	O	L182
L218	59.0	.1	.05	4.2	1.07	47.8	-1.6	-.63	4.0	1.10	11D	O	L218
L232	50.7	-8.2	-3.08	8.3	2.12	43.8	-5.6	-2.19	4.2	1.18	11C	*	L232
L237A	57.1	-1.8	-.68	1.3	.33	48.4	-1.0	-.38	1.0	.27	11C	O	L237A
L237B	60.2	1.3	.50	2.3	.59	51.7	2.3	.90	1.8	.50	11C	O	L237B
L238A	61.6	2.7	1.03	6.1	1.56	49.1	-.3	-.12	4.2	1.16	11Y	O	L238A
L248	58.3	-.5	-.20	4.5	1.16	49.9	.5	.19	4.3	1.20	11E	O	L248
L278	55.6	-3.2	-1.22	5.1	1.31	47.4	-1.9	-.76	3.3	.91	11C	O	L278
L279	59.4	.5	.19	3.1	.80	55.9	6.6	2.57	3.1	.86	11C	X	L279
L280	62.1	3.2	1.22	3.2	.83	52.9	3.6	1.40	3.8	1.04	11D	O	L280
L294	59.3	.4	.15	3.8	.98	53.8	4.4	1.73	4.2	1.15	11C	*	L294
L303	58.0	-.9	-.34	1.9	.49	48.4	-.9	-.37	2.5	.71	11C	O	L303
L330	60.2	1.4	.52	3.5	.91	51.8	2.4	.94	3.7	1.02	11C	O	L330
L331	57.0	-1.9	-.70	5.0	1.29	45.9	-3.4	-1.34	4.0	1.10	11G	O	L331
L333	58.6	-.3	-.10	4.6	1.19	50.7	1.4	.53	4.3	1.20	11C	O	L333
L334	62.7	3.8	1.44	5.5	1.41	52.9	3.5	1.38	2.1	.57	11D	O	L334
L344	56.9	-2.0	-.75	5.3	1.35	46.7	-2.7	-1.06	4.9	1.36	11C	O	L344
L356	59.5	.6	.23	2.1	.53	48.6	-.8	-.31	2.9	.79	11C	O	L356
L565	57.8	-1.1	-.40	3.3	.85	48.5	-.8	-.33	2.6	.72	11D	O	L565
L575	60.1	1.3	.48	6.1	1.56	51.2	1.8	.71	4.4	1.21	11D	O	L575
L581	58.9	.1	.03	4.0	1.02	48.7	-.7	-.27	5.3	1.48	11D	O	L581
L599	61.0	2.1	.80	3.5	.91	49.8	.4	.16	3.3	.92	11C	O	L599
L604	58.5	-.4	-.14	5.1	1.30	47.5	-1.9	-.73	4.6	1.28	11C	O	L604
L622	54.2	-4.6	-1.75	3.3	.84	43.3	-6.0	-2.36	4.2	1.16	11E	O	L622
L650	57.7	-1.1	-.43	4.1	1.06	46.8	-2.6	-1.00	5.0	1.39	11D	O	L650
L651	61.7	2.9	1.08	2.3	.59	51.1	1.7	.66	5.3	1.46	11D	O	L651
L680	55.1	-3.8	-1.43	4.4	1.12	46.0	-3.4	-1.32	3.0	.82	11D	O	L680
GR. MEAN =	58.9 PSI					GRAND MEAN =	49.4 PSI				TEST DETERMINATIONS =		15
SD MEANS =	2.6 PSI					SD OF MEANS =	2.6 PSI				36 LABS IN GRAND MEANS		
	AVERAGE SDR =	3.9 PSI					AVERAGE SDR =	3.6 PSI					
GR. MEAN =	405.9 KILOPASCAL					GRAND MEAN =	340.4 KILOPASCAL						
L242	63.8	4.9	1.86	3.9	1.01	53.2	3.8	1.50	4.1	1.13	11T	+	L242
L250L	54.9	-4.0	-1.51	3.0	.76	46.0	-3.4	-1.33	2.9	.81	11N	+	L250L
L251	67.0	8.1	3.07	4.5	1.16	60.6	11.2	4.37	3.3	.93	11V	+	L251
L274	55.3	-3.5	-1.33	5.1	1.31	55.3	6.0	2.33	4.6	1.28	11H	+	L274
L290	61.5	2.6	.98	3.2	.83	54.9	5.6	2.17	2.1	.59	11A	+	L290
L393	57.0	-1.9	-.70	4.3	1.10	48.5	-.9	-.35	3.4	.94	11H	+	L393
L394	71.0	12.1	4.58	4.2	1.07	63.9	14.6	5.69	3.3	.93	11H	+	L394
L570	60.2	1.3	.50	3.7	.96	50.3	.9	.35	3.7	1.03	11H	+	L570
L576	62.6	3.7	1.41	3.5	.90	51.2	1.8	.72	3.6	1.00	11P	+	L576
L598	63.9	5.1	1.91	4.4	1.12	55.5	6.1	2.38	5.2	1.43	11B	+	L598

TOTAL NUMBER OF LABORATORIES REPORTING = 47

Best values: K30 59 ± 4 psi
K28 49 ± 4 psi

ANALYSIS T11-1 TABLE 2
BURSTING STRENGTH, HIGH RANGE, PSI
TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C OR C-A

LAB CODE	F	MEANS K30	MEANS K28	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L232	*	50.7	43.8	-9.8	1.6	1.65	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L622	O	54.2	43.3	-7.5	-1.1	1.00	11E	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L250L	*	54.9	46.0	-5.2	.3	.78	11N	BURSTING STRENGTH 40 - 100 PSI,LHOMARGY,MAN.CLAMP, 20C,65%RH
L680	O	55.1	46.0	-5.1	.2	.97	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L274	*	55.3	55.3	1.6	6.7	1.30	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L278	O	55.6	47.4	-3.7	.8	1.11	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L159	O	56.1	48.6	-2.5	1.4	1.02	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L122	O	56.3	46.7	-3.7	-.1	.86	11F	BURSTING STRENGTH 40 - 100 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L344	O	56.9	46.7	-3.3	-.6	1.35	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L393	*	57.0	48.5	-2.0	.6	1.02	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L331	O	57.0	45.9	-3.7	-1.2	1.20	11G	BURSTING STRENGTH 40 - 100 PSI,PERKINS C, M.CLAMP,TRANSDUCER
L237A	O	57.1	48.4	-2.0	.5	.30	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L650	O	57.7	46.8	-2.6	-1.1	1.23	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L565	O	57.8	48.5	-1.3	.1	.78	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L303	O	58.0	48.4	-1.3	-.1	.60	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L182	O	58.1	48.9	-.9	.2	1.44	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L248	O	58.3	49.9	-.0	.7	1.18	11E	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L604	O	58.5	47.5	-1.6	-1.1	1.29	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L176	O	58.5	51.3	1.1	1.6	1.03	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L333	O	58.6	50.7	.8	1.2	1.20	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L581	O	58.9	48.7	-.4	-.6	1.25	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L218	O	59.0	47.8	-1.0	-1.3	1.09	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L128	O	59.1	49.4	.2	-.1	.89	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L294	*	59.3	53.8	3.4	2.9	1.07	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L279	X	59.4	55.9	4.9	4.4	.83	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L356	O	59.5	48.6	-.1	-1.0	.66	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L100	O	59.5	51.9	2.2	1.3	.91	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L575	O	60.1	51.2	2.2	.4	1.39	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L570	*	60.2	50.3	1.6	-.3	1.00	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L237B	O	60.2	51.7	2.6	.7	.55	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L330	O	60.2	51.8	2.7	.8	.96	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L107	O	60.7	52.6	3.5	1.1	1.38	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L599	O	61.0	49.8	1.8	-1.2	.91	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L290	*	61.5	54.9	5.7	2.2	.71	11A	BURSTING STRENGTH 40 - 100 PSI, PERKINS A, MANUAL CLAMP
L170	O	61.5	50.3	2.5	-1.2	.50	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L238A	O	61.6	49.1	1.8	-2.1	1.36	11Y	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L651	O	61.7	51.1	3.2	-.8	1.02	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L148	O	61.9	51.5	3.7	-.5	1.13	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L280	O	62.1	52.9	4.8	.3	.94	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L576	*	62.6	51.2	4.0	-1.3	.95	11P	BURSTING STRENGTH 40 - 100 PSI, PERKINS LC, MANUAL CLAMP
L103	O	62.7	51.2	4.0	-1.3	.47	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L334	O	62.7	52.9	5.2	-.1	.99	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L118	O	63.1	52.4	5.2	-.7	1.04	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L242	*	63.8	53.2	6.2	-.6	1.07	11T	BURSTING STRENGTH 40 - 100 PSI, L*W,MANUAL CLAMP
L598	*	63.9	55.5	7.9	.9	1.28	11B	BURSTING STRENGTH 40 - 100 PSI, MESSMER, MANUAL CLAMP
L251	*	67.0	60.6	13.6	2.5	1.04	11V	BURSTING STRENGTH 40 - 100 PSI, L*W,MANUAL CLAMP, 20C,65% RH
L394	*	71.0	63.9	18.8	2.1	1.00	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
GMEANS:		58.9	49.4			1.00		
		95% ELLIPSE:		9.1	2.8	WITH GAMMA = 43 DEGREES		


BURSTING STRENGTH, HIGH RANGE
SAMPLE K30 = 58.9 PSI
SAMPLE K30 = 406 KILOPASCAL
SAMPLE K28 = 49.4 PSI
SAMPLE K28 = 340 KILOPASCAL
+,X,* NOT IN GRAND MEANS
ANALYSIS T11-1
SAMPLE K28
PSI
KILOPASCAL
SAMPLE K30
PSI
KILOPASCAL

ANALYSIS T15-1 TABLE 1

TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

	SAMPLE	PRINTING				SAMPLE	WRITING				TEST D. = 15		
LAB	G02	116 GRAMS PER SQUARE METER				G07	74 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	82.2	-3.1	-.88	2.1	.77	35.9	-2.8	-1.39	.7	.49	15M	@	L100
L103	84.3	-1.1	-.30	1.8	.67	37.3	-1.4	-.68	1.0	.67	15T	@	L103
L105	82.9	-2.4	-.69	2.3	.84	48.3	9.5	4.70	1.3	.88	15T	X	L105
L107	86.7	1.3	.38	2.5	.92	39.6	.9	.43	2.6	1.82	15T	@	L107
L115	84.0	-1.3	-.37	2.2	.81	37.5	-1.2	-.59	2.4	1.66	15C	@	L115
L118	84.9	-.5	-.13	1.7	.64	37.3	-1.5	-.72	.8	.55	15T	@	L118
L121	85.0	-.3	-.09	3.3	1.24	37.9	-.8	-.39	1.8	1.26	15T	@	L121
L122	80.5	-4.9	-1.40	3.3	1.24	36.0	-2.7	-1.32	1.5	1.01	15C	@	L122
L124	86.5	1.1	.33	2.6	.99	38.2	-.5	-.26	1.8	1.23	15T	@	L124
L126	85.9	.6	.17	2.3	.85	38.4	-.3	-.16	1.7	1.16	15T	@	L126
L128	84.7	-.7	-.19	1.2	.46	38.5	-.2	-.09	.9	.63	15T	@	L128
L131	92.0	6.7	1.91	3.6	1.35	41.7	3.0	1.48	3.8	2.59	15A	@	L131
L134	90.5	5.2	1.49	2.0	.75	43.3	4.6	2.27	.8	.56	15C	@	L134
L139	87.3	2.0	.57	2.8	1.04	37.3	-1.5	-.72	.9	.61	15T	@	L139
L143	72.3	-13.0	-3.72	2.9	1.10	32.0	-6.7	-3.31	2.4	1.64	15T	X	L143
L148	82.5	-2.8	-.80	1.9	.72	37.3	-1.4	-.68	1.6	1.12	15T	@	L148
L150	93.7	8.4	2.41	2.6	.97	46.7	7.9	3.91	1.4	.96	15T	X	L150
L151	95.0	9.7	2.77	2.4	.91	44.2	5.5	2.70	1.7	1.17	15C	*	L151
L153	87.4	2.1	.59	2.3	.84	39.6	.9	.43	1.2	.81	15C	@	L153
L157	82.3	-3.0	-.86	2.4	.90	35.4	-3.3	-1.64	1.2	.81	15T	@	L157
L158	87.5	2.1	.61	4.7	1.77	43.7	5.0	2.47	2.8	1.94	15R	*	L158
L159	80.9	-4.4	-1.26	4.0	1.48	37.0	-1.7	-.85	2.5	1.73	15L	@	L159
L162	85.3	.0	.00	2.6	.96	36.9	-1.8	-.88	1.3	.88	15T	@	L162
L163	81.9	-3.5	-.99	2.4	.88	35.9	-2.8	-1.37	1.2	.84	15T	@	L163
L166	84.4	-.9	-.27	2.8	1.04	39.1	.4	.20	1.1	.77	15T	@	L166
L167	85.5	.1	.04	1.6	.60	37.6	-1.1	-.55	.8	.57	15C	@	L167
L170	80.1	-5.2	-1.49	1.2	.44	36.5	-2.2	-1.08	1.0	.68	15T	@	L170
L173B	85.7	.3	.10	2.4	.88	37.7	-1.0	-.49	1.5	1.02	15T	@	L173B
L176	87.7	2.4	.69	2.9	1.09	39.5	.7	.37	1.2	.82	15T	@	L176
L182A	77.7	-7.6	-2.18	3.2	1.18	37.2	-1.5	-.75	2.3	1.59	15A	@	L182A
L182T	91.1	5.7	1.64	3.5	1.31	39.2	.5	.23	1.4	.94	15T	@	L182T
L183	89.0	3.7	1.05	1.8	.68	41.5	2.7	1.35	.7	.51	15T	@	L183
L185	85.3	-.1	-.02	2.4	.91	38.9	.2	.10	1.5	1.02	15T	@	L185
L189	85.5	.1	.04	2.1	.78	35.6	-3.1	-1.54	1.0	.68	15T	@	L189
L190C	89.3	4.0	1.15	2.5	.92	40.0	1.3	.63	1.3	.86	15T	@	L190C
L191	92.0	6.7	1.91	4.1	1.52	37.6	-1.1	-.55	1.4	.93	15T	*	L191
L194	90.3	5.0	1.42	2.6	.97	41.0	2.3	1.14	1.1	.75	15T	@	L194
L195	91.7	6.4	1.83	3.3	1.23	39.9	1.1	.56	3.6	2.47	15C	@	L195
L206	85.1	-.2	-.06	2.8	1.04	39.0	.3	.14	1.8	1.25	15T	@	L206
L207	90.7	5.4	1.55	2.6	.96	55.2	16.5	8.13	2.8	1.94	15R	#	L207
L211	84.1	-1.2	-.34	2.6	.98	39.1	.3	.17	1.4	.99	15R	@	L211
L212	84.1	-1.3	-.36	4.1	1.52	38.7	-.1	-.03	2.6	1.81	15T	@	L212
L213	84.7	-.7	-.19	2.0	.73	36.7	-2.1	-1.01	1.0	.67	15T	@	L213
L217	90.5	5.2	1.48	2.3	.86	38.9	.2	.10	1.1	.79	15Q	@	L217
L219	84.9	-.4	-.11	2.7	1.01	40.4	1.7	.82	2.0	1.40	15L	@	L219
L223	88.7	3.3	.96	1.7	.63	40.7	2.0	.98	1.0	.71	15R	@	L223
L224	82.5	-2.9	-.82	2.0	.73	34.9	-3.9	-1.90	.8	.57	15T	@	L224
L225	88.3	2.9	.84	2.4	.89	41.3	2.5	1.25	1.4	.95	15T	@	L225
L226C	84.4	-.9	-.27	3.5	1.30	39.1	.3	.17	1.3	.88	15T	@	L226C
L228	85.1	-.3	-.08	1.7	.64	37.7	-1.0	-.49	1.0	.66	15T	@	L228
L230	82.1	-3.2	-.92	4.3	1.61	35.8	-2.9	-1.45	1.2	.80	15R	@	L230
L232	84.8	-.5	-.15	2.2	.84	37.6	-1.1	-.55	1.5	1.07	15T	@	L232
L233	91.2	5.9	1.68	3.5	1.31	42.1	3.3	1.65	2.8	1.92	15T	@	L233
L236	85.2	-.1	-.04	3.3	1.22	36.6	-2.1	-1.05	1.8	1.21	15T	@	L236
L237A	84.5	-.9	-.25	1.5	.56	39.0	.3	.14	1.4	.94	15T	@	L237A
L237B	86.8	1.5	.42	1.9	.72	39.7	1.0	.50	1.0	.66	15T	@	L237B
L238A	87.9	2.5	.73	2.6	.96	38.5	-.3	-.13	1.4	.93	15T	@	L238A
L241	86.1	.7	.21	1.7	.64	42.5	3.8	1.87	.6	.44	15T	@	L241
L242	85.4	.0	.01	2.4	.89	38.1	-.6	-.28	1.1	.79	15U	@	L242
L244	86.8	1.5	.42	2.3	.86	39.9	1.2	.59	1.0	.71	15C	@	L244
L248	84.6	-.7	-.21	2.3	.85	38.1	-.6	-.30	1.8	1.21	15J	@	L248
L249	85.1	-.2	-.06	2.3	.86	39.5	.8	.40	1.5	1.04	15T	@	L249
L254	87.1	1.7	.50	3.3	1.23	39.5	.7	.37	1.2	.82	15T	@	L254
L255	85.2	-.1	-.04	1.0	.38	38.3	-.4	-.19	.5	.34	15T	@	L255
L257A	84.9	-.4	-.11	2.7	1.01	40.4	1.7	.82	1.1	.77	15C	@	L257A

ANALYSIS T15-1 TABLE 1

TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

	SAMPLE	PRINTING				SAMPLE	WRITING				TEST D. = 15		
LAB	G02	116 GRAMS PER SQUARE METER				G07	74 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L257B	83.9	-1.5	-.42	2.4	.91	39.9	1.1	.56	1.6	1.10	15C	G	L257B
L257C	83.6	-1.7	-.50	2.6	.99	40.1	1.4	.69	1.9	1.32	15C	G	L257C
L259	83.6	-1.7	-.50	4.0	1.51	36.0	-2.7	-1.34	1.4	.94	15T	G	L259
L261	85.3	.0	.00	3.4	1.28	37.9	-.8	-.39	1.3	.88	15T	G	L261
L262	84.9	-.4	-.11	2.3	.84	42.8	4.1	2.01	1.3	.87	15T	*	L262
L264	84.8	-.5	-.15	3.1	1.16	41.1	2.3	1.15	1.8	1.26	15T	G	L264
L273	90.3	4.9	1.41	2.0	.74	43.5	4.7	2.33	1.5	1.00	15T	G	L273
L274	85.7	.4	.12	1.5	.56	39.2	.5	.23	1.0	.70	15T	G	L274
L275	NO DATA REPORTED FOR SAMPLE G02					39.7	.9	.46	1.3	.89	15T	M	L275
L277	87.6	2.3	.65	3.7	1.39	39.9	1.1	.56	1.8	1.22	15T	G	L277
L278	89.5	4.1	1.18	3.0	1.11	38.5	-.2	-.09	1.2	.82	15T	G	L278
L279	80.9	-4.4	-1.26	3.2	1.19	36.1	-2.6	-1.28	1.2	.82	15T	G	L279
L280	80.7	-4.6	-1.32	2.8	1.03	35.2	-3.5	-1.73	.9	.65	15L	G	L280
L281	84.5	-.9	-.25	3.6	1.35	40.5	1.7	.86	1.1	.77	15T	G	L281
L285	82.7	-2.7	-.76	3.5	1.31	38.4	-.3	-.16	1.7	1.19	15T	G	L285
L288	89.9	4.6	1.32	4.0	1.51	42.5	3.8	1.87	1.9	1.32	15T	G	L288
L290	84.3	-1.1	-.30	2.3	.86	39.0	.3	.14	1.5	1.04	15T	G	L290
L291	81.8	-3.5	-1.01	2.5	.94	36.6	-2.1	-1.05	1.0	.68	15A	G	L291
L299	89.6	4.3	1.22	2.7	1.00	40.9	2.2	1.09	2.4	1.63	15T	G	L299
L303	82.7	-2.7	-.76	1.6	.61	36.7	-2.0	-.98	1.3	.88	15L	G	L303
L305	84.9	-.5	-.13	1.9	.70	38.3	-.4	-.19	1.0	.72	15T	G	L305
L309	86.4	1.1	.31	4.5	1.67	38.0	-.7	-.36	1.3	.90	15T	G	L309
L311	79.7	-5.6	-1.60	2.2	.83	35.1	-3.6	-1.77	1.6	1.07	15T	G	L311
L312	82.1	-3.3	-.93	3.3	1.23	38.9	.2	.10	1.7	1.15	15T	G	L312
L313	81.3	-4.0	-1.14	3.6	1.34	35.9	-2.9	-1.41	1.6	1.10	15L	G	L313
L315	84.3	-1.0	-.29	2.4	.88	40.3	1.5	.76	1.2	.80	15T	G	L315
L321	80.0	-5.3	-1.53	2.5	.93	40.4	1.7	.82	4.5	3.13	15T	*	L321
L324	84.0	-1.4	-.39	1.3	.49	38.5	-.2	-.11	.9	.61	15T	G	L324
L328	83.3	-2.1	-.59	2.3	.84	37.1	-1.6	-.78	1.6	1.13	15T	G	L328
L331	84.1	-1.2	-.34	3.8	1.41	40.2	1.5	.73	3.0	2.05	15T	G	L331
L334	81.7	-3.6	-1.03	2.2	.83	36.3	-2.5	-1.21	1.8	1.20	15T	G	L334
L336	86.3	1.0	.29	4.4	1.63	40.1	1.4	.69	2.0	1.40	15T	G	L336
L344	95.7	10.3	2.96	22.1	8.24	40.3	1.6	.79	1.4	1.00	15C	*	L344
L345	81.1	-4.2	-1.20	2.6	.96	37.2	-1.5	-.75	1.9	1.31	15T	G	L345
L352	88.3	3.0	.85	2.4	.91	41.1	2.4	1.18	1.6	1.08	15C	G	L352
L358	93.3	8.0	2.29	2.2	.82	43.5	4.7	2.33	1.7	1.16	15T	*	L358
L360	85.2	-.2	-.05	1.8	.66	38.5	-.2	-.11	.9	.65	15T	G	L360
L372	85.5	.2	.06	2.5	.93	40.2	1.5	.73	.4	.28	15T	G	L372
L376	82.0	-3.3	-.95	3.4	1.29	36.4	-2.3	-1.14	1.6	1.13	15T	G	L376
L382	85.3	-.1	-.02	2.5	.94	39.5	.8	.40	1.0	.68	15T	G	L382
L388	77.7	-7.6	-2.18	2.7	1.00	50.8	12.1	5.94	3.1	2.12	15T	X	L388
L390	88.1	2.8	.80	3.6	1.35	40.7	1.9	.96	1.0	.72	15T	G	L390
L396M	88.0	2.7	.76	2.8	1.03	40.6	1.9	.92	1.5	1.00	15T	G	L396M
L442	93.9	8.5	2.44	2.8	1.05	42.1	3.4	1.68	1.6	1.13	15R	G	L442
L484	86.1	.8	.23	3.1	1.15	39.1	.3	.17	1.0	.71	15T	G	L484
L554	85.4	.0	.01	4.4	1.66	40.8	2.1	1.02	1.6	1.11	15C	G	L554
L557	85.6	.2	.07	3.2	1.18	36.7	-2.1	-1.01	1.4	.96	15T	G	L557
L558	83.1	-2.3	-.65	3.5	1.32	36.5	-2.2	-1.08	.9	.63	15T	G	L558
L559	87.4	2.1	.59	1.8	.69	37.5	-1.3	-.62	1.3	.90	15T	G	L559
L562	82.1	-3.2	-.92	1.6	.60	36.6	-2.1	-1.05	1.5	1.07	15T	G	L562
L565	81.9	-3.5	-.99	3.7	1.37	39.8	1.1	.53	1.0	.70	15T	G	L565
L566	76.3	-9.0	-2.58	2.6	.97	37.9	-.8	-.39	1.9	1.29	15T	*	L566
L575	83.9	-1.5	-.42	2.0	.75	36.7	-2.0	-.99	1.1	.73	15L	G	L575
L576	92.9	7.6	2.18	2.2	.82	39.4	.7	.33	1.8	1.27	15T	*	L576
L580	86.7	1.4	.40	1.3	.50	39.7	.9	.46	1.4	1.00	15T	G	L580
L581	83.0	-2.4	-.68	3.0	1.14	37.9	-.9	-.42	1.5	1.02	15Q	G	L581
L596	328.5	243.2	69.65	39.1	14.61	153.9	115.1	56.67	16.9	11.61	15T	#	L596
L597	84.7	-.7	-.19	2.0	.73	39.7	1.0	.50	.7	.48	15T	G	L597
L599	84.6	-.7	-.21	2.8	1.06	37.2	-1.5	-.75	1.6	1.08	15T	G	L599
L600	86.4	1.1	.31	3.9	1.45	39.8	1.1	.53	1.6	1.08	15T	G	L600
L604	77.3	-8.0	-2.29	2.5	.92	60.0	21.3	10.47	4.5	3.12	15T	#	L604
L606	82.4	-2.9	-.84	2.2	.83	36.7	-2.0	-.98	1.5	1.06	15T	G	L606
L610	86.8	1.5	.42	2.5	.94	37.5	-1.3	-.62	1.3	.90	15T	G	L610
L622	92.9	7.6	2.18	3.8	1.44	51.4	12.7	6.24	3.5	2.38	15T	X	L622
L626	81.3	-4.0	-1.14	2.4	.91	36.6	-2.1	-1.03	1.2	.85	15L	G	L626

ANALYSIS T15-1 TABLE 1

TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE G02 PRINTING 116 GRAMS PER SQUARE METER MEAN	DEV	N. DEV	SDR	R. SDR	SAMPLE G07 WRITING 74 GRAMS PER SQUARE METER MEAN	DEV	N. DEV	SDR	R. SDR	TEST D. = 15 VAR	F	LAB
L651	78.9	-6.4	-1.83	1.8	.68	39.4	.7	.33	4.1	2.83	15T	*	L651
L652	86.7	1.4	.40	5.6	2.10	38.8	.1	.04	3.6	2.48	15C	Ø	L652
L654	79.9	-5.4	-1.55	2.4	.90	37.3	-1.5	-.72	1.3	.88	15T	Ø	L654
L670	78.1	-7.3	-2.08	2.8	1.03	36.7	-2.1	-1.01	1.5	1.06	15T	Ø	L670
L676	80.5	-4.8	-1.37	3.5	1.31	35.2	-3.5	-1.73	1.7	1.14	15T	Ø	L676
L679	87.4	2.1	.59	3.0	1.13	39.1	.3	.17	1.2	.84	15T	Ø	L679
L680	86.2	.9	.25	2.4	.89	40.2	1.5	.73	3.1	2.13	15T	Ø	L680
L684	88.7	3.3	.96	3.3	1.22	51.3	12.6	6.21	3.8	2.58	15L	X	L684
L692	86.4	1.1	.31	2.3	.87	35.9	-2.9	-1.41	1.2	.82	15T	Ø	L692
L696	84.3	-1.1	-.30	3.8	1.44	37.3	-1.4	-.68	2.7	1.85	15T	#	L696
L697	84.7	-.6	-.17	2.9	1.09	38.0	-.7	-.34	1.3	.90	15T	Ø	L697
L698	85.3	.0	.00	3.2	1.19	39.5	.7	.37	1.1	.73	15L	Ø	L698
GR. MEAN =	85.3 GRAMS					GRAND MEAN =	38.7 GRAMS				TEST DETERMINATIONS =		15
SD MEANS =	3.5 GRAMS					SD OF MEANS =	2.0 GRAMS				131 LABS IN GRAND MEANS		
	AVERAGE SDR =	2.7 GRAMS					AVERAGE SDR =	1.5 GRAMS					
GR. MEAN =	836.8 MILLINEWTON					GRAND MEAN =	379.8 MILLINEWTON						
L190R	85.7	.4	.12	1.8	.68	36.7	-2.1	-1.01	1.0	.67	15V	*	L190R
L226B	86.7	1.3	.38	1.4	.54	37.7	-1.0	-.49	1.3	.88	15V	*	L226B
L250L	92.7	7.3	2.10	3.6	1.33	41.9	3.2	1.58	1.5	1.00	15H	*	L250L
L251	85.1	-.3	-.08	3.4	1.27	38.3	-.4	-.19	1.4	1.00	15K	*	L251
L366	80.1	-5.2	-1.49	3.0	1.11	36.3	-2.5	-1.21	1.5	1.02	15V	*	L366
L688	91.1	5.7	1.64	4.7	1.74	42.9	4.2	2.07	2.3	1.55	15V	*	L688

TOTAL NUMBER OF LABORATORIES REPORTING = 148

Best values: G02 85 ± 6 grams
G07 38 ± 3 grams

The following laboratories were omitted from the grand means because of extreme test results: 207, 604.

Data from the following laboratories appear to be off by a multiplicative factor: 596.

Data from the following laboratories were omitted from the grand means because the tests were performed in ambient conditions: 696.

Data from the following laboratories appeared to be off by a multiplicative factor: 190R, 226B, 366, 688. Code 15V was assigned temporarily put in a factor of 2.

Please see the diagram on the inside of the back cover of this report which shows how to distinguish between an Elmendorf tear tester with DEEP CUTOUT and an older tester with NO CUTOUT.

ANALYSIS T15-1 TABLE 2

TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 IS-65, ANY MAKE ELMENDORF WITE DEEP CUTOUT IS STANDARD FOR TEIS ANALYSIS

LAB CODE	F	MEANS G02	G07	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L275	M		39.7			.89	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L143	X	72.3	32.0	-14.6	-.8	1.37	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L566	*	76.3	37.9	-8.5	3.0	1.13	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L604	#	77.3	60.0	1.4	22.7	2.02	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L388	X	77.7	50.8	-2.0	14.1	1.56	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L182A	O	77.7	37.2	-7.6	1.7	1.39	15A	TEARING STRENGTH, STANDARD, APPITA
L670	O	78.1	36.7	-7.5	1.1	1.05	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L651	*	78.9	39.4	-5.6	3.2	1.76	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L311	O	79.7	35.1	-6.6	-1.0	.95	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L654	O	79.9	37.3	-5.5	.9	.89	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L321	*	80.0	40.4	-4.2	3.7	2.03	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L366	*	80.1	36.3	-5.7	-.1	1.07	15V	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)X2
L170	O	80.1	36.5	-5.6	.1	.56	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L122	O	80.5	36.0	-5.5	-.5	1.13	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L676	O	80.5	35.2	-5.8	-1.3	1.22	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L280	O	80.7	35.2	-5.6	-1.3	.84	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L279	O	80.9	36.1	-5.1	-.6	1.01	15T	TEARING STRENGTE, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L159	O	80.9	37.0	-4.7	.2	1.61	15L	TEARING STRENGTE, STANDARD, LORENTZ-WETTRES
L345	O	81.1	37.2	-4.5	.3	1.13	15T	TEARING STRENGTE, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L626	O	81.3	36.6	-4.5	-.3	.88	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L313	O	81.3	35.9	-4.8	-1.0	1.22	15L	TEARING STRENGTE, STANDARD, LORENTZ-WETTRES
L334	O	81.7	36.3	-4.3	-.8	1.02	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L291	O	81.8	36.6	-4.1	-.5	.81	15A	TEARING STRENGTE, STANDARD, APPITA
L565	O	81.9	39.8	-2.7	2.4	1.03	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L163	O	81.9	35.9	-4.3	-1.1	.86	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L376	O	82.0	36.4	-4.0	-.8	1.21	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L312	O	82.1	38.9	-2.9	1.5	1.19	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L230	O	82.1	35.8	-4.1	-1.4	1.20	15R	TEARING STRENGTH, STANDARD, THWING-ELMENDORF, DIGITAL READOUT
L562	O	82.1	36.6	-3.8	-.6	.83	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L100	O	82.2	35.9	-4.0	-1.3	.63	15M	TEARING STRENGTH, STANDARD, T.M.MIRFIELD(APPITA-ELMENDORF)
L157	O	82.3	35.4	-4.1	-1.8	.86	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L606	O	82.4	36.7	-3.5	-.6	.94	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L224	O	82.5	34.9	-4.2	-2.3	.65	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L148	O	82.5	37.3	-3.1	-.1	.92	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L303	O	82.7	36.7	-3.2	-.7	.75	15L	TEARING STRENGTE, STANDARD, LORENTZ-WETTRES
L285	O	82.7	38.4	-2.6	.8	1.25	15T	TEARING STRENGTE, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L105	X	82.9	48.3	1.7	9.7	.86	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L581	O	83.0	37.9	-2.5	.2	1.08	15Q	TEARING STRENGTH, STANDARD, THWING-ELMENDORF, AIR CLAMP, DIGITL
L558	O	83.1	36.5	-3.0	-1.1	.97	15T	TEARING STRENGTE, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L328	O	83.3	37.1	-2.5	-.6	.99	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L259	O	83.6	36.0	-2.7	-1.8	1.22	15T	TEARING STRENGTE, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L257C	O	83.6	40.1	-1.0	2.0	1.15	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L257B	O	83.9	39.9	-.9	1.6	1.01	15C	TEARING STRENGTE, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L575	O	83.9	36.7	-2.1	-1.2	.74	15L	TEARING STRENGTE, STANDARD, LORENTZ-WETTRES
L324	O	84.0	38.5	-1.3	.4	.55	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L115	O	84.0	37.5	-1.7	-.6	1.23	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L212	O	84.1	38.7	-1.2	.5	1.67	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L331	O	84.1	40.2	-.5	1.8	1.73	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L211	O	84.1	39.1	-1.0	.8	.98	15R	TEARING STRENGTH, STANDARD, THWING-ELMENDORF, DIGITAL READOUT
L696	#	84.3	37.3	-1.5	-.8	1.64	15T	TEARING STRENGTE, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L103	O	84.3	37.3	-1.5	-.8	.67	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L290	O	84.3	39.0	-.9	.7	.95	15T	TEARING STRENGTE, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L315	O	84.3	40.3	-.3	1.8	.84	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L166	O	84.4	39.1	-.7	.8	.91	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L226C	O	84.4	39.1	-.7	.7	1.09	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L281	O	84.5	40.5	-.1	1.9	1.06	15T	TEARING STRENGTE, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L237A	O	84.5	39.0	-.7	.6	.75	15T	TEARING STRENGTE, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L599	O	84.6	37.2	-1.3	-1.1	1.07	15T	TEARING STRENGTE, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L248	O	84.6	38.1	-.9	-.3	1.03	15J	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L597	O	84.7	39.7	-.2	1.2	.61	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L128	O	84.7	38.5	-.7	.1	.55	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L213	O	84.7	36.7	-1.4	-1.6	.70	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L697	O	84.7	38.0	-.8	-.4	.99	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L232	O	84.8	37.6	-.9	-.8	.95	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L264	O	84.8	41.1	.5	2.4	1.21	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)

ANALYSIS T15-1 TABLE 2

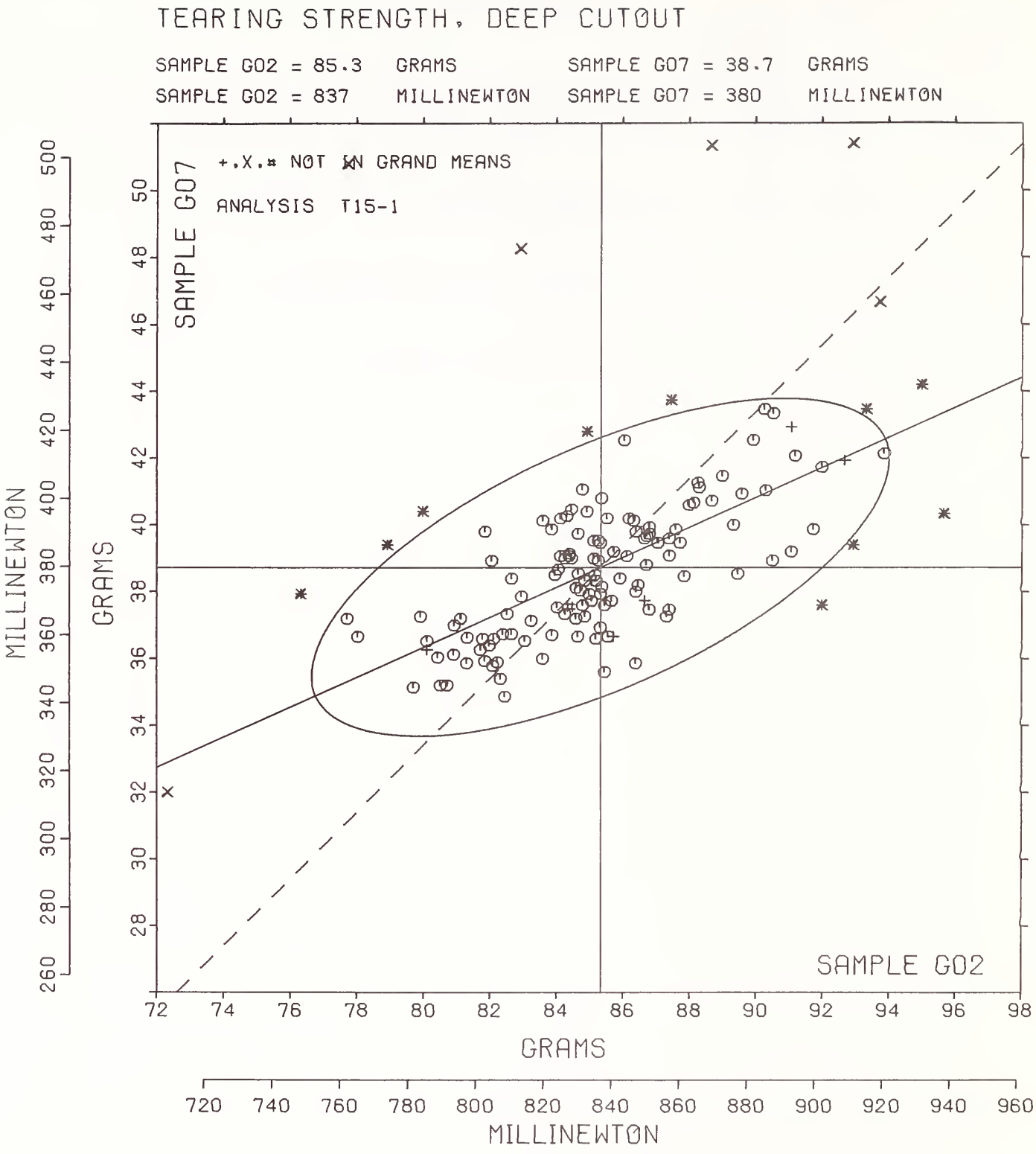
TEARING STRENGTH, GRAMS

TAPPI STANDARD I414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS G02	MEANS G07	COORDINATES MAJOR	COORDINATES MINOR	AVG R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L305	6	84.9	38.3	-.6	-.2	.71	1ST	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L118	6	84.9	37.3	-1.0	-1.1	.60	1ST	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L219	6	84.9	40.4	.3	1.7	1.20	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L257A	6	84.9	40.4	.3	1.7	.89	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W. AIR CLAMP)
L262	*	84.9	42.8	1.3	3.9	.86	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L121	6	85.0	37.9	-.6	-.6	1.25	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L251	*	85.1	38.3	-.4	-.2	1.13	15K	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES, 20 C, 65% RH
L228	6	85.1	37.7	-.6	-.8	.65	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L206	6	85.1	39.0	-.1	.3	1.14	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L249	6	85.1	39.5	.2	.8	.95	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L360	6	85.2	38.5	-.2	-.1	.66	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L236	6	85.2	36.6	-1.0	-1.9	1.22	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L255	6	85.2	38.3	-.3	-.3	.36	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L185	6	85.3	38.9	.0	.2	.97	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L382	6	85.3	39.5	.3	.8	.81	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L698	6	85.3	39.5	.3	.7	.96	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L261	6	85.3	37.9	-.3	-.7	1.08	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L162	6	85.3	36.9	-.7	-1.6	.92	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L554	6	85.4	40.8	.9	1.9	1.38	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W. AIR CLAMP)
L242	6	85.4	38.1	-.2	-.5	.84	15U	TEARING STRENGTH, STANDARD, AUSTRALIAN OPT. CO.
L189	6	85.5	35.6	-1.2	-2.9	.73	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L167	6	85.5	37.6	-.3	-1.1	.58	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W. AIR CLAMP)
L372	6	85.5	40.2	.8	1.3	.61	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L557	6	85.6	36.7	-.6	-2.0	1.07	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L173B	6	85.7	37.7	-.1	-1.0	.95	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L190R	*	85.7	36.7	-.5	-2.0	.68	15V	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)X2
L274	6	85.7	39.2	.6	.3	.63	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L126	6	85.9	38.4	.4	-.5	1.00	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L241	6	86.1	42.5	2.2	3.2	.54	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L484	6	86.1	39.1	.9	-.0	.93	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L680	6	86.2	40.2	1.4	1.0	1.51	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L336	6	86.3	40.1	1.5	.9	1.51	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L692	6	86.4	35.9	-.2	-3.0	.84	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L600	6	86.4	39.8	1.4	.5	1.27	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L309	6	86.4	38.0	.7	-1.1	1.29	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L124	6	86.5	38.2	.8	-.9	1.11	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L226B	*	86.7	37.7	.8	-1.5	.71	15V	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)X2
L107	6	86.7	39.6	1.6	.3	1.37	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L652	6	86.7	38.8	1.3	-.5	2.29	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W. AIR CLAMP)
L580	6	86.7	39.7	1.7	.3	.75	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L610	6	86.8	37.5	.8	-1.7	.92	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L244	6	86.8	39.9	1.8	.5	.79	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W. AIR CLAMP)
L237B	6	86.8	39.7	1.8	.3	.69	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L254	6	87.1	39.5	1.9	-.0	1.02	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L139	6	87.3	37.3	1.2	-2.2	.83	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L679	6	87.4	39.1	2.0	-.5	.98	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L153	6	87.4	39.6	2.2	-.0	.83	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W. AIR CLAMP)
L559	6	87.4	37.5	1.4	-2.0	.79	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L158	*	87.5	43.7	4.0	3.7	1.86	15R	TEARING STRENGTH, STANDARD, THWING-ELMENDORF, DIGITAL READOUT
L277	6	87.6	39.9	2.5	.1	1.30	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L176	6	87.7	39.5	2.5	-.3	.95	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L238A	6	87.9	38.5	2.2	-1.3	.94	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L396M	6	88.0	40.6	3.2	.6	1.01	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L390	6	88.1	40.7	3.4	.6	1.04	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L225	6	88.3	41.3	3.7	1.1	.92	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L352	6	88.3	41.1	3.7	1.0	.99	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W. AIR CLAMP)
L684	X	88.7	51.3	8.2	10.1	1.90	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L223	6	88.7	40.7	3.9	.4	.67	15R	TEARING STRENGTH, STANDARD, THWING-ELMENDORF, DIGITAL READOUT
L183	6	89.0	41.5	4.5	1.0	.59	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L190C	6	89.3	40.0	4.2	-.5	.89	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L278	6	89.5	38.5	3.7	-1.9	.96	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L299	6	89.6	40.9	4.8	.3	1.31	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L288	6	89.9	42.5	5.8	1.6	1.42	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L273	6	90.3	43.5	6.4	2.3	.87	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)
L194	6	90.3	41.0	5.5	.1	.86	15T	TEARING STRENGTH, STANDARD, THWING-ELMENDORF(SCALE TO 100)

ANALYSIS T15-1 TABLE 2
TEARING STRENGTH, GRAMS
TAPPI STANDARD 1414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS G02	G07	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L217	6	90.5	38.9	4.8	-1.9	.82	15Q	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,AIR CLAMP,DIGITL
L134	6	90.5	43.3	6.6	2.1	.65	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L207	#	90.7	55.2	11.7	12.9	1.45	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L688	*	91.1	42.9	7.0	1.5	1.64	15V	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)X2
L182T	6	91.1	39.2	5.4	-1.9	1.13	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L233	6	91.2	42.1	6.7	.6	1.61	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L195	6	91.7	39.9	6.3	-1.6	1.85	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L131	6	92.0	41.7	7.3	.0	1.97	15A	TEARING STRENGTH, STANDARD, APPITA
L191	*	92.0	37.6	5.6	-3.8	1.23	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L250L	*	92.7	41.9	8.0	-.1	1.17	15H	TEARING STRENGTH, STANDARD, LHOMARGY, 20 C, 65% RH
L622	X	92.9	51.4	12.1	8.5	1.91	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L576	*	92.9	39.4	7.2	-2.5	1.04	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L358	*	93.3	43.5	9.2	1.1	.99	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L150	X	93.7	46.7	10.9	3.8	.96	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L442	6	93.9	42.1	9.2	-.4	1.09	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L151	*	95.0	44.2	11.1	1.0	1.04	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L344	*	95.7	40.3	10.1	-2.8	4.62	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L596	#	328.5	153.9	269.0	5.5	13.11	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
GMEANS:		85.3	38.7			1.00		
		95% ELLIPSE:		9.4	3.6	WITH GAMMA = 24 DEGREES		


TEARING STRENGTH, DEEP CUTOUT
SAMPLE G02 = 85.3 GRAMS
SAMPLE G02 = 837 MILLINEWTON
SAMPLE G07 = 38.7 GRAMS
SAMPLE G07 = 380 MILLINEWTON
+,X,* NOT IN GRAND MEANS
ANALYSIS T15-1
SAMPLE G07
GRAMS
MILLINEWTON
SAMPLE G02
GRAMS
MILLINEWTON

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ANALYSIS T17-1 TABLE 1

TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 TS-65, THWING-ELMENDORF WITHOUT DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE K20 MEAN	KRAFT 123 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE K36 MEAN	PRINTING 105 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 15 VAR	F	LAB
L106	152.5	4.1	.71	4.4	.68	121.5	.9	.15	3.7	.80	17N	0	L106
L122	146.4	-1.9	-.33	6.5	1.01	124.4	3.8	.66	8.4	1.82	17N	0	L122
L148	143.7	-4.6	-.79	4.4	.68	116.3	-4.3	-.75	3.8	.81	17N	0	L148
L231	145.7	-2.6	-.45	6.1	.95	117.7	-2.9	-.50	2.9	.63	17N	0	L231
L267	156.5	8.2	1.40	9.1	1.42	126.0	5.4	.94	6.8	1.47	17N	0	L267
L269	145.6	-2.7	-.47	10.7	1.67	125.1	4.5	.79	5.5	1.18	17N	0	L269
L308	155.9	7.5	1.29	7.9	1.23	128.1	7.5	1.31	5.8	1.24	17N	0	L308
L326	144.0	-4.3	-.74	9.1	1.41	117.8	-2.8	-.48	3.8	.81	17N	0	L326
L339	154.9	6.6	1.13	5.3	.83	124.9	4.3	.75	4.7	1.00	17N	0	L339
L341	148.0	-.3	-.06	3.0	.47	115.6	-5.0	-.87	2.7	.59	17N	0	L341
L393	138.4	-9.9	-1.70	4.2	.66	109.1	-11.5	-2.00	3.0	.65	17N	0	L393
GR. MEAN = 148.3 GRAMS						GRAND MEAN = 120.6 GRAMS					TEST DETERMINATIONS = 15		
SD MEANS = 5.8 GRAMS						SD OF MEANS = 5.8 GRAMS					11 LABS IN GRAND MEANS		
		AVERAGE SDR = 6.4 GRAMS					AVERAGE SDR = 4.6 GRAMS						
GR. MEAN =1454.7 MILLINEWTON						GRAND MEAN =1182.6 MILLINEWTON							
L234	140.0	-8.3	-1.43	6.2	.97	122.5	1.9	.34	3.2	.70	17V	*	L234

TOTAL NUMBER OF LABORATORIES REPORTING = 12

Best values: K20 147 grams
K36 121 grams

Data from the following laboratories appeared to be off by a multiplicative factor: 234. Code 17V was assigned temporarily to put in a factor of 2.

Please see the diagram on the inside of the back cover of this report which shows how to distinguish between an Elmendorf tear tester with DEEP CUTOUT and an older tester with NO CUTOUT.

17-1

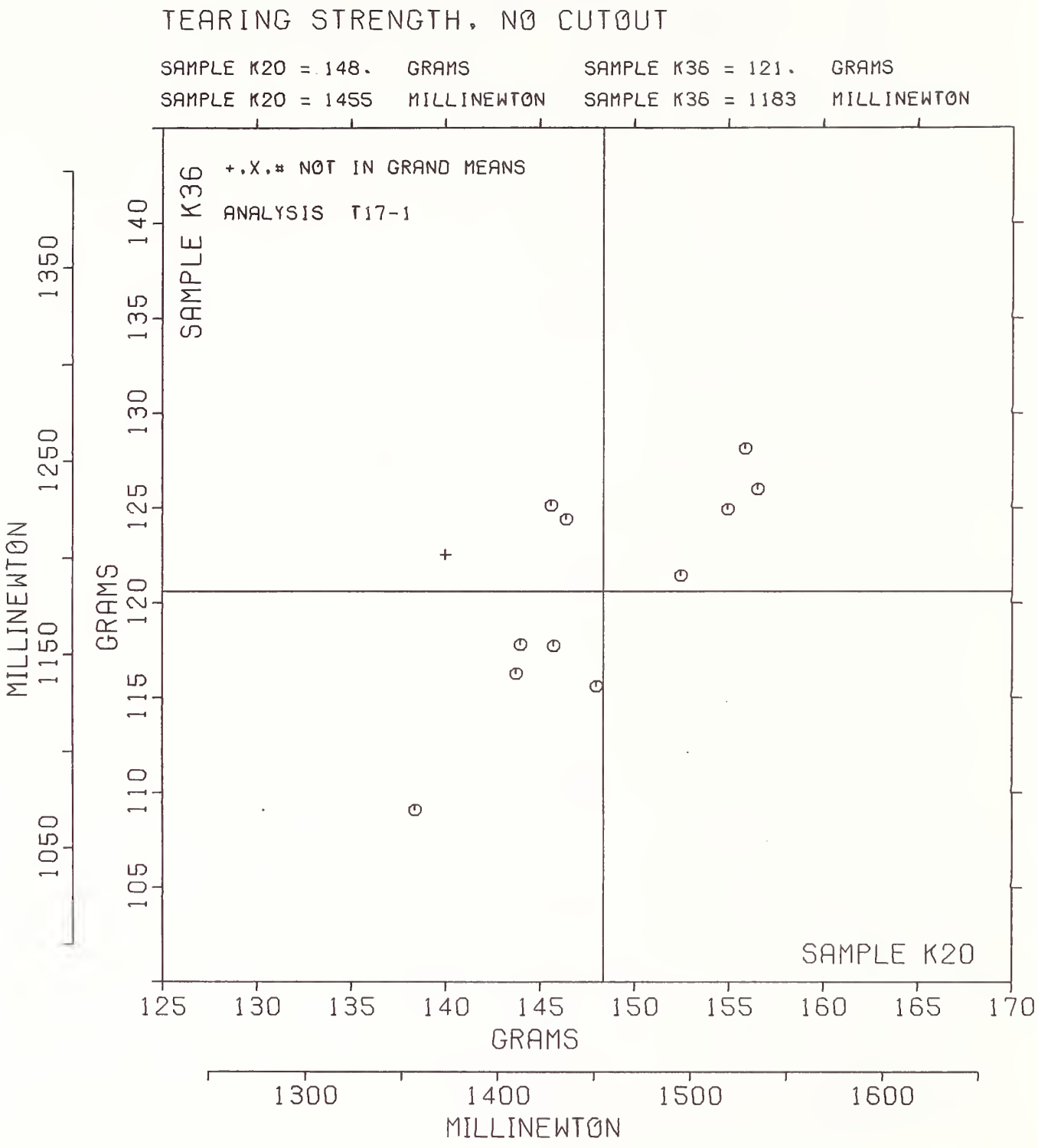
REPORT NO. 60S — TAPPI COLLABORATIVE REFERENCE PROGRAM — JUNE 1979

ANALYSIS T17-1 TABLE 2

TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 TS-65, THWING-ELMENDORF WITHOUT DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS K20	K36	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L393	0	138.4	109.1	-15.2	-1.2	.65	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L234	*	140.0	122.5	-4.6	7.2	.83	17V	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF(MULT BY 2)
L148	0	143.7	116.3	-6.3	.1	.75	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L326	0	144.0	117.8	-5.0	1.1	1.11	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L269	0	145.6	125.1	1.2	5.2	1.42	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L231	0	145.7	117.7	-3.9	-.2	.79	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L122	0	146.4	124.4	1.3	4.1	1.41	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L341	0	148.0	115.6	-3.7	-3.3	.53	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L106	0	152.5	121.5	3.6	-2.3	.74	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L339	0	154.9	124.9	7.7	-1.5	.91	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L308	0	155.9	128.1	10.7	.1	1.24	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L267	0	156.5	126.0	9.6	-1.9	1.44	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
GMEANS:		148.3	120.6			1.00		
95% ELLIPSE:				24.0	8.0	WITH GAMMA = 44 DEGREES		


TEARING STRENGTH, NØ CUTØUT
SAMPLE K20 = 148. GRAMS
SAMPLE K20 = 1455 MILLINEWTØN
SAMPLE K36 = 121. GRAMS
SAMPLE K36 = 1183 MILLINEWTØN
+.X.* NØT IN GRAND MEANS
ANALYSIS T17-1
SAMPLE K36
GRAMS
MILLINEWTØN
SAMPLE K20
125 130 135 140 145 150 155 160 165 170
GRAMS
1300 1400 1500 1600
MILLINEWTØN

ANALYSIS T19-1 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PACKAGING PAPER

TAPPI STANDARDS T404 OS-76 AND T494 OS-70, TENSILE BREAKING STRENGTH, PENDULUM AND CRE TYPES

LAB CODE	SAMPLE K32 PRINTING 105 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE K34 KRAFT 123 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.= 20 VAR	F	LAB
L100	8.80	.16	.39	.25	.53	9.81	.41	.99	.27	.46	19E	O	L100
L106	8.76	.11	.29	.56	1.17	9.39	-.02	-.05	.37	.64	19A	O	L106
L107	7.83	-.81	-2.04	.48	1.01	8.57	-.84	-2.04	.47	.81	19A	O	L107
L122	8.39	-.25	-.64	.41	.86	9.29	-.11	-.27	.57	.97	19A	O	L122
L126	8.94	.29	.73	.27	.58	9.11	-.29	-.71	.47	.80	19A	O	L126
L151	8.22	-.43	-1.07	.44	.92	8.86	-.55	-1.34	.44	.75	19A	O	L151
L153	8.70	.05	.12	.41	.87	9.72	.31	.76	.65	1.10	19P	O	L153
L157A	8.35	-.30	-.74	.56	1.18	9.95	.55	1.33	.61	1.04	19P	O	L157A
L157I	8.01	-.64	-1.60	.62	1.31	9.63	.23	.55	.76	1.29	19A	O	L157I
L167	9.75	1.10	2.77	.55	1.16	10.55	1.15	2.78	.57	.97	19G	*	L167
L182I	8.55	-.10	-.24	.43	.91	9.46	.06	.14	.52	.89	19D	O	L182I
L182L	8.75	.11	.27	.40	.85	9.24	-.17	-.41	.54	.92	19T	O	L182L
L207	8.51	-.14	-.34	.28	.59	9.33	-.08	-.19	.53	.91	19A	O	L207
L217P	8.91	.26	.65	.37	.78	9.73	.33	.79	.63	1.08	19P	O	L217P
L219	8.91	.26	.66	.42	.88	9.40	-.01	-.01	.69	1.17	19E	O	L219
L224	8.73	.08	.20	.44	.92	9.58	.17	.42	.68	1.16	19A	O	L224
L225	8.65	.01	.02	.41	.85	9.58	.18	.43	.54	.92	19P	O	L225
L234L	8.44	-.21	-.52	.29	.60	8.86	-.54	-1.32	.59	1.01	19P	O	L234L
L237A	8.85	.21	.52	.41	.85	9.48	.07	.17	.44	.75	19Q	O	L237A
L237B	9.23	.59	1.47	.49	1.03	9.53	.12	.29	.50	.85	19A	O	L237B
L238A	8.81	.16	.41	.62	1.29	9.50	.09	.22	.62	1.06	19T	O	L238A
L257A	8.98	.34	.84	.41	.87	9.48	.07	.18	.61	1.04	19P	O	L257A
L257C	8.94	.29	.74	.47	.99	9.55	.14	.34	.40	.69	19P	O	L257C
L264A	9.01	.36	.90	.44	.93	9.28	-.13	-.31	.60	1.03	19A	O	L264A
L264P	8.98	.33	.83	.32	.68	9.71	.31	.75	.70	1.19	19P	O	L264P
L265	7.99	-.65	-1.64	.38	.79	9.11	-.30	-.73	.42	.71	19A	O	L265
L267	8.76	.11	.29	.44	.93	9.33	-.08	-.19	.64	1.09	19A	O	L267
L273	8.43	-.22	-.54	.38	.81	8.60	-.81	-1.96	.56	.95	19P	O	L273
L274	8.65	.01	.02	.26	.54	9.17	-.24	-.58	.16	.28	19P	O	L274
L280	8.10	-.54	-1.37	.56	1.18	9.08	-.33	-.80	.52	.88	19G	O	L280
L281	8.67	.02	.06	.38	.81	9.07	-.34	-.81	.43	.74	19G	O	L281
L305	8.71	.06	.15	.22	.46	10.08	.67	1.63	.45	.76	19V	O	L305
L312	8.69	.04	.10	.49	1.02	9.49	.08	.20	.64	1.09	19D	O	L312
L318	8.66	.02	.04	.46	.98	9.22	-.19	-.46	.34	.58	19G	O	L318
L324	8.78	.14	.34	.50	1.06	9.52	.11	.28	.58	.99	19A	O	L324
L334	8.51	-.14	-.35	.46	.97	9.88	.47	1.14	.48	.81	19P	O	L334
L336	8.31	-.34	-.85	.52	1.10	9.38	-.02	-.05	.53	.91	19G	O	L336
L356	8.91	.26	.66	.67	1.41	9.48	.07	.17	.92	1.57	19P	O	L356
L366	8.58	-.06	-.16	.66	1.40	9.72	.31	.75	.62	1.06	19P	O	L366
L562	8.26	-.39	-.98	.97	2.04	9.67	.27	.65	1.40	2.39	19P	O	L562
L565	8.40	-.24	-.61	.74	1.56	9.29	-.12	-.28	.35	.59	19T	O	L565
L568	7.55	-1.10	-2.77	.33	.70	8.88	-.53	-1.28	.53	.90	19P	*	L568
L575	8.76	.11	.27	.54	1.13	9.36	-.05	-.12	.62	1.06	19G	O	L575
L576	8.84	.19	.48	.44	.92	9.33	-.08	-.19	.59	1.01	19A	O	L576
L580	8.47	-.18	-.45	.47	1.00	8.44	-.97	-2.34	.61	1.04	19G	*	L580
L581	8.98	.34	.84	.47	.99	9.93	.52	1.26	.60	1.03	19A	O	L581
L582	8.05	-.59	-1.49	.61	1.29	9.11	-.30	-.72	.53	.91	19A	O	L582
L604	8.17	-.47	-1.19	.58	1.22	8.88	-.53	-1.28	1.12	1.91	19A	O	L604
L606	8.79	.15	.37	.39	.83	9.57	.17	.40	.52	.89	19P	O	L606
L610	8.23	-.42	-1.05	.31	.65	9.15	-.26	-.62	.50	.86	19A	O	L610
L622	9.47	.82	2.07	.56	1.17	10.30	.89	2.16	.62	1.06	19O	O	L622
L650	9.21	.57	1.43	.57	1.19	9.63	.22	.54	.73	1.24	19G	O	L650
L652	10.10	1.46	3.66	.63	1.31	9.37	-.04	-.09	.70	1.19	19A	X	L652
L676	9.15	.50	1.26	.63	1.33	10.06	.65	1.58	.93	1.59	19A	O	L676
L684	8.91	.26	.66	.89	1.86	8.91	-.50	-1.21	.97	1.66	19*	O	L684
L689	8.57	-.08	-.19	.42	.89	9.16	-.25	-.60	.51	.87	19A	O	L689

GR. MEAN = 8.65 KILONEWTON/M — GRAND MEAN = 9.41 KILONEWTON/M — TEST DETERMINATIONS = 20

SD MEANS = .40 KILONEWTON/M — SD OF MEANS = .41 KILONEWTON/M — 55 LABS IN GRAND MEANS

AVERAGE SDR = .48 KILONEWTON/M — AVERAGE SDR = .59 KILONEWTON/M

GR. MEAN = 49.39 LB/INCH — GRAND MEAN = 53.72 LB/INCH

L250I	8.15	-.49	-1.24	.18	.37	8.24	-1.16	-2.82	.30	.52	19L	*	L250I
L251	7.66	-.99	-2.48	.55	1.16	8.51	-.90	-2.18	.47	.81	19I	*	L251

TOTAL NUMBER OF LABORATORIES REPORTING = 58

Best values: K32 8.7 ± 0.7 kilonewton per meter

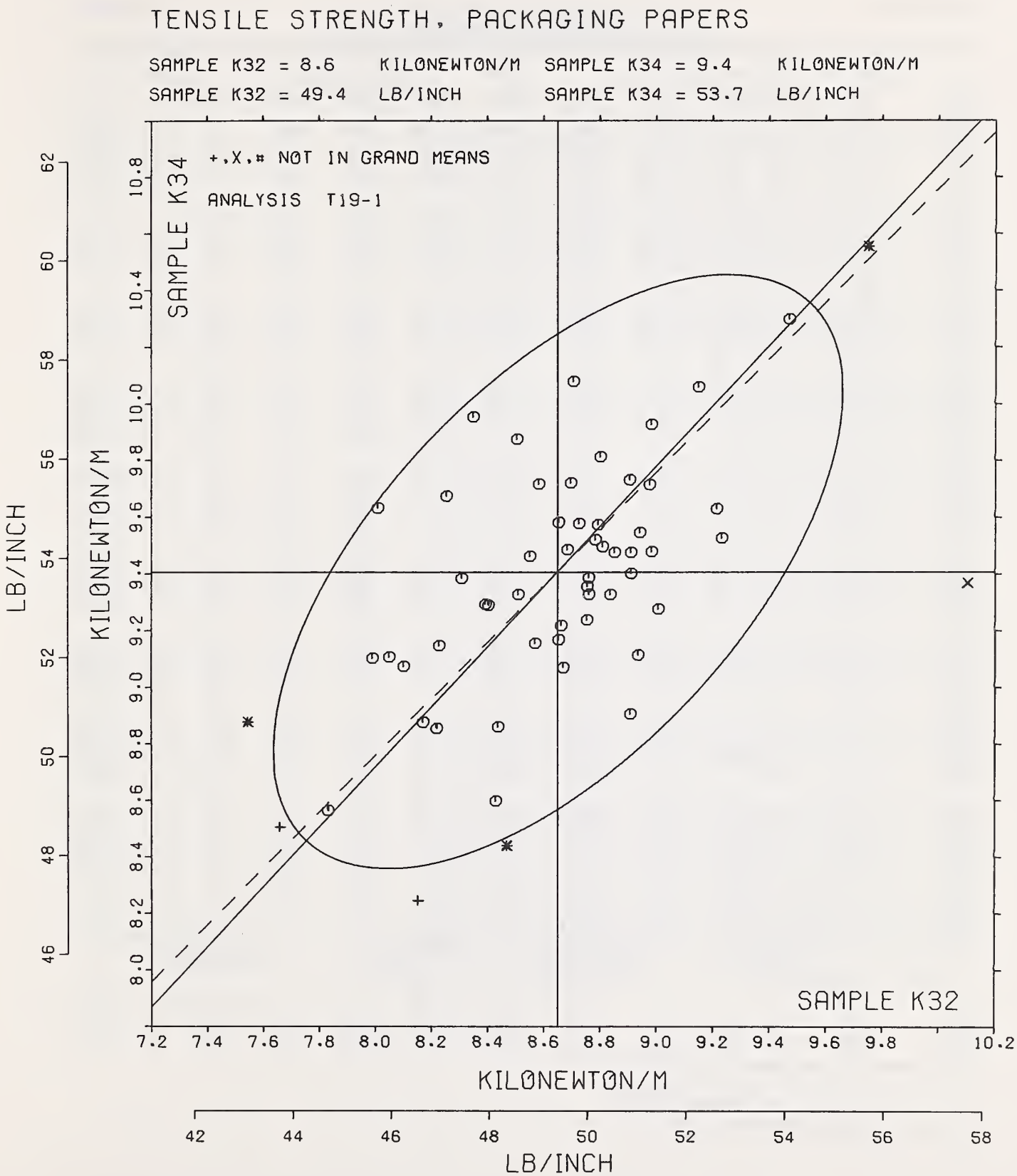
K34 9.4 ± 0.7 kilonewton per meter

ANALYSIS T19-1 TABLE 2

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PACKAGING PAPER

TAPPI STANDARDS T404 OS-76 AND T494 OS-70, TENSILE BREAKING STRENGTH, PENDULUM AND CRE TYPES

LAB CODE	F	MEANS X32	X34	COORDINATES MAJOR	MINOR	AVG R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L568	*	7.55	8.88	-1.14	.44	.80	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L251	*	7.66	8.51	-1.33	.10	.98	19I	TENSILE STRENGTH, PACKAGING PAPER, CRE, 20C, 65% RH
L107	O	7.83	8.57	-1.17	.02	.91	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L265	O	7.99	9.11	-.67	.27	.75	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L157I	O	8.01	9.63	-.27	.62	1.30	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L582	O	8.05	9.11	-.62	.23	1.10	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L280	O	8.10	9.08	-.61	.17	1.03	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L250I	*	8.15	8.24	-1.19	-.44	.44	19L	TENSILE STRENGTH, PACKAGING PAPER, CRE, 20 C, 65% RH
L604	O	8.17	8.88	-.71	-.02	1.56	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L151	O	8.22	8.86	-.69	-.07	.84	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L610	O	8.23	9.15	-.47	.13	.76	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L562	O	8.26	9.67	-.07	.47	2.21	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L336	O	8.31	9.38	-.25	.23	1.00	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L157A	O	8.35	9.95	.20	.59	1.11	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L122	O	8.39	9.29	-.26	.11	.92	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L565	O	8.40	9.29	-.25	.10	1.08	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L273	O	8.43	8.60	-.74	-.40	.88	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L234L	O	8.44	8.86	-.54	-.22	.81	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L580	*	8.47	8.44	-.83	-.53	1.02	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L334	O	8.51	9.88	.25	.42	.89	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L207	O	8.51	9.33	-.15	.05	.75	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L182I	O	8.55	9.46	-.02	.11	.90	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L689	O	8.57	9.16	-.23	-.12	.88	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L366	O	8.58	9.72	.18	.26	1.23	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L274	O	8.65	9.17	-.17	-.17	.41	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L225	O	8.65	9.58	.13	.12	.89	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L318	O	8.66	9.22	-.13	-.14	.78	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L281	O	8.67	9.07	-.23	-.25	.77	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L312	O	8.69	9.49	.09	.03	1.06	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L153	O	8.70	9.72	.26	.18	.98	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L305	O	8.71	10.08	.53	.42	.61	19V	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L224	O	8.73	9.58	.18	.06	1.04	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L182L	O	8.75	9.24	-.05	-.19	.88	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L575	O	8.76	9.36	.04	-.11	1.09	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L106	O	8.76	9.39	.06	-.10	.90	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L267	O	8.76	9.33	.02	-.14	1.01	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L324	O	8.78	9.52	.18	-.02	1.02	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L606	O	8.79	9.57	.22	.01	.86	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L100	O	8.80	9.81	.40	.17	.50	19E	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L238A	O	8.81	9.50	.18	-.06	1.18	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L576	O	8.84	9.33	.07	-.19	.97	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L237A	O	8.85	9.48	.19	-.10	.80	19Q	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L217P	O	8.91	9.73	.41	.03	.93	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L684	O	8.91	8.91	-.18	-.53	1.76	19*	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L356	O	8.91	9.48	.23	-.14	1.49	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L219	O	8.91	9.40	.18	-.20	1.03	19E	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L126	O	8.94	9.11	-.01	-.41	.69	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L257C	O	8.94	9.55	.30	-.12	.84	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L264P	O	8.98	9.71	.45	-.03	.94	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L581	O	8.98	9.93	.61	.11	1.01	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L257A	O	8.98	9.48	.28	-.19	.95	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L264A	O	9.01	9.28	.15	-.35	.98	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L676	O	9.15	10.06	.82	.08	1.46	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L650	O	9.21	9.63	.55	-.26	1.21	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L237B	O	9.23	9.53	.49	-.34	.94	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L622	O	9.47	10.30	1.21	.01	1.11	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L167	*	9.75	10.55	1.59	-.02	1.07	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L652	X	10.10	9.37	.57	-1.09	1.25	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
GMEANS:		8.65	9.41			1.00		
		95% ELLIPSE:		1.30	.65	WITH GAMMA = 46 DEGREES		


TENSILE STRENGTH, PACKAGING PAPERS
SAMPLE K32 = 8.6 KILONEWTON/M SAMPLE K34 = 9.4 KILONEWTON/M
SAMPLE K32 = 49.4 LB/INCH SAMPLE K34 = 53.7 LB/INCH
+,X,* NOT IN GRAND MEANS
ANALYSIS T19-1
SAMPLE K34
KILONEWTON/M
LB/INCH
SAMPLE K32
KILONEWTON/M
LB/INCH

ANALYSIS T20-1 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	SAMPLE G04 BEAT SET OFFSET BOOK 76 GRAMS PER SQUARE METER MEAN	DEV	No. DEV	SDR	R. SDR	SAMPLE G07 WRITING 74 GRAMS PER SQUARE METER MEAN	DEV	No. DEV	SDR	R. SDR	TEST D. = 20 VAR	F	LAB
L100	3.08	-.05	-.46	.13	.94	3.50	.18	1.14	.13	.84	20E	O	L100
L105	3.27	.14	1.29	.13	.88	3.34	.02	.10	.10	.64	20A	O	L105
L115	3.00	-.13	-1.20	.13	.95	3.27	-.05	-.32	.14	.94	20D	O	L115
L118	3.14	.01	.09	.15	1.03	3.32	-.00	-.01	.15	1.01	20A	O	L118
L122	3.12	-.01	-.08	.13	.95	3.28	-.04	-.24	.08	.57	20A	O	L122
L124C	3.07	-.06	-.57	.15	1.05	2.91	-.41	-2.60	.17	1.11	20A	*	L124C
L125	3.25	.12	1.08	.21	1.50	3.46	.14	.87	.15	.99	20C	O	L125
L131	3.23	.10	.93	.13	.94	3.26	-.06	-.38	.25	1.65	20E	O	L131
L143	1.98	-1.15	-10.43	.09	.65	2.11	-1.21	-7.64	.08	.52	20E	#	L143
L148	3.21	.08	.72	.19	1.33	3.24	-.09	-.54	.28	1.85	20A	O	L148
L159	3.11	-.02	-.23	.12	.85	3.46	.14	.88	.11	.73	20A	O	L159
L163	3.02	-.11	-.98	.14	.95	3.52	.20	1.26	.12	.84	20D	O	L163
L167	3.51	.38	3.44	.10	.68	3.84	.52	3.29	.11	.74	20G	X	L167
L176	2.89	-.24	-2.16	.30	2.10	2.86	-.47	-2.93	.45	3.05	20G	*	L176
L185	3.22	.09	.84	.12	.87	3.56	.24	1.51	.13	.89	20C	O	L185
L190R	2.99	-.14	-1.31	.14	1.02	3.17	-.16	-.98	.18	1.23	20A	O	L190R
L194	3.01	-.12	-1.09	.13	.90	3.36	.04	.24	.11	.75	20A	O	L194
L223B	3.12	-.01	-.12	.16	1.14	3.28	-.04	-.27	.13	.88	20A	O	L223B
L226C	1.40	-1.73	-15.69	.10	.69	1.71	-1.62	-10.19	.09	.61	20C	#	L226C
L230	3.06	-.07	-.63	.09	.62	3.18	-.14	-.91	.10	.66	20D	O	L230
L260	3.02	-.11	-.98	.12	.85	3.14	-.18	-1.13	.09	.59	20A	O	L260
L261	3.16	.03	.27	.13	.91	3.35	.03	.17	.09	.58	20A	O	L261
L278	3.24	.11	.99	.16	1.13	3.34	.02	.14	.19	1.29	20A	O	L278
L291	2.97	-.16	-1.42	.18	1.27	3.33	.01	.06	.26	1.76	20A	O	L291
L309	3.19	.06	.53	.17	1.20	3.16	-.16	-1.02	.16	1.08	20E	O	L309
L315	3.04	-.09	-.82	.13	.93	3.19	-.13	-.83	.14	.94	20A	O	L315
L318	3.11	-.02	-.22	.09	.64	3.35	.03	.16	.12	.83	20G	O	L318
L325	3.19	.06	.51	.15	1.09	3.28	-.04	-.26	.17	1.14	20E	O	L325
L328	3.17	.04	.35	.12	.81	3.51	.19	1.17	.14	.92	20A	O	L328
L331	3.22	.09	.81	.17	1.20	3.41	.09	.54	.1.	.94	20A	O	L331
L333	3.27	.14	1.30	.13	.89	3.49	.17	1.04	.11	.74	20A	O	L333
L344	3.03	-.10	-.88	.17	1.17	3.33	.01	.05	.19	1.27	20A	O	L344
L352	3.00	-.13	-1.18	.15	1.08	3.29	-.03	-.20	.16	1.06	20A	O	L352
L356	3.19	.06	.58	.07	.49	3.31	-.01	-.05	.14	.93	20A	O	L356
L360	3.19	.05	.49	.16	1.13	3.46	.14	.88	.16	1.06	20B	O	L360
L390	3.23	.10	.87	.13	.93	3.40	.08	.51	.15	1.04	20A	O	L390
L442	3.11	-.02	-.23	.11	.80	3.31	-.02	-.10	.08	.52	20G	O	L442
L557	2.97	-.16	-1.42	.15	1.07	3.25	-.07	-.44	.17	1.15	20A	O	L557
L558	3.13	-.00	-.01	.12	.82	3.32	-.00	-.03	.12	.81	20A	O	L558
L559	3.20	.07	.62	.09	.61	3.62	.30	1.86	.08	.53	20A	O	L559
L563A	2.97	-.16	-1.48	.24	1.69	3.22	-.10	-.65	.25	1.69	20A	O	L563A
L563B	3.41	.28	2.54	.16	1.15	3.59	.27	1.67	.20	1.32	20A	O	L563B
L575	3.27	.14	1.29	.11	.74	3.33	.01	.05	.12	.82	20G	O	L575
L592	3.22	.09	.83	.15	1.02	3.31	-.01	-.09	.14	.91	20A	O	L592
L616	1.06	-2.07	-18.81	.04	.29	1.16	-2.17	-13.65	.08	.51	20D	#	L616
L692	3.07	-.06	-.53	.16	1.15	3.09	-.23	-1.48	.21	1.38	20A	O	L692
L698	3.25	.12	1.06	.20	1.37	3.51	.18	1.16	.18	1.21	20E	O	L698

GR. MEAN = 3.13 KILONEWTON/M — GRAND MEAN = 3.32 KILONEWTON/M — TEST DETERMINATIONS = 20

SD MEANS = .11 KILONEWTON/M — SD OF MEANS = .16 KILONEWTON/M — 43 LABS IN GRAND MEANS

AVERAGE SDR = .14 KILONEWTON/M — AVERAGE SDR = .15 KILONEWTON/M

GR. MEAN =10.559 LB/15 MM — GRAND MEAN =11.206 LB/15 MM

L139	3.23	.10	.92	.11	.78	3.44	.12	.73	.13	.84	20H	+	L139
L211	9.37	6.24	56.65	.48	3.40	10.15	6.83	43.05	.54	3.63	20I	+	L211
L250I	2.58	-.55	-5.00	.08	.55	2.66	-.66	-4.16	.12	.80	20L	+	L250I
L251	2.69	-.44	-4.03	.22	1.54	2.72	-.60	-3.77	.24	1.58	20I	+	L251

TOTAL NUMBER OF LABORATORIES REPORTING = 51

Best values: G04 3.1 ± 0.2 kilonewton per meter
G07 3.3 ± 0.3 kilonewton per meter

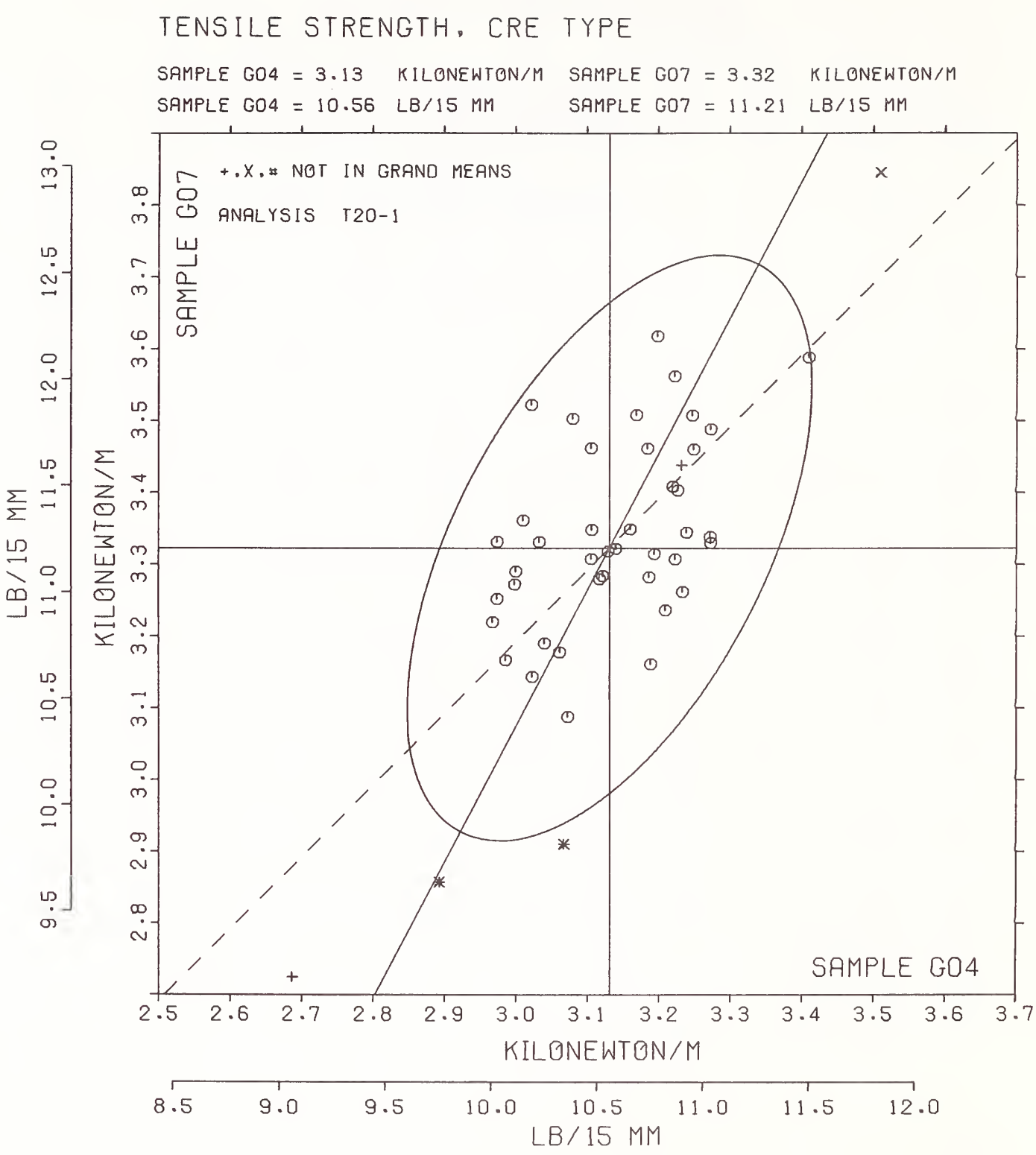
Data from the following laboratories appear to be off by a multiplicative factor: 143, 226C, 616.

ANALYSIS T20-1 TABLE 2

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	F	MEANS G04	MEANS G07	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L616	#	1.06	1.16	-2.88	.82	.40	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L226C	#	1.40	1.71	-2.23	.77	.65	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L143	#	1.98	2.11	-1.61	.45	.59	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L250I	*	2.58	2.66	-.84	.18	.68	20L	TENSILE STRENGTH, PRINTING PAPER, CRE, 20 C, 65% RH
L251	*	2.69	2.72	-.74	.11	1.56	20I	TENSILE STRENGTH, PRINTING PAPER, CRE, 20 C, 65% RH
L176	*	2.89	2.86	-.52	-.01	2.57	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L563A	O	2.97	3.22	-.17	.10	1.69	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L557	O	2.97	3.25	-.14	.11	1.11	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L291	O	2.97	3.33	-.07	.14	1.51	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L190R	O	2.99	3.17	-.21	.06	1.13	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L115	O	3.00	3.27	-.11	.09	.94	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L352	O	3.00	3.29	-.09	.10	1.07	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L194	O	3.01	3.36	-.02	.12	.83	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L163	O	3.02	3.52	.13	.19	.89	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L260	O	3.02	3.14	-.21	.01	.72	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L344	O	3.03	3.33	-.04	.09	1.22	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L315	O	3.04	3.19	-.16	.02	.94	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L230	O	3.06	3.18	-.16	-.01	.64	20O	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L124C	*	3.07	2.91	-.39	-.14	1.08	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L692	O	3.07	3.09	-.23	-.06	1.27	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L100	O	3.08	3.50	.14	.13	.89	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L159	O	3.11	3.46	.11	.09	.79	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L442	O	3.11	3.31	-.02	.01	.66	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L318	O	3.11	3.35	.01	.03	.73	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L223B	O	3.12	3.28	-.04	-.01	1.01	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L122	O	3.12	3.28	-.04	-.01	.76	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L558	O	3.13	3.32	-.00	-.00	.81	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L118	O	3.14	3.32	.00	-.01	1.02	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L261	O	3.16	3.35	.04	-.01	.74	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L328	O	3.17	3.51	.18	.05	.87	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L360	O	3.19	3.46	.15	.02	1.09	20B	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L325	O	3.19	3.28	-.01	-.07	1.11	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L309	O	3.19	3.16	-.12	-.13	1.14	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L356	O	3.19	3.31	.02	-.06	.71	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L559	O	3.20	3.62	.29	.08	.57	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L148	O	3.21	3.24	-.04	-.11	1.59	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L331	O	3.22	3.41	.12	-.04	1.07	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L592	O	3.22	3.31	.03	-.09	.97	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L185	O	3.22	3.56	.26	.03	.88	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L390	O	3.23	3.40	.12	-.05	.98	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L139	*	3.23	3.44	.15	-.04	.81	20H	TENSILE STRENGTH, PRINTING PAPER, CRE, SHORT TEST SPAN
L131	O	3.23	3.26	-.01	-.12	1.29	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L278	O	3.24	3.34	.07	-.09	1.21	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L698	O	3.25	3.51	.22	-.02	1.29	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L125	O	3.25	3.46	.18	-.04	1.25	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L105	O	3.27	3.34	.08	-.12	.76	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L575	O	3.27	3.33	.07	-.12	.78	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L333	O	3.27	3.49	.21	-.05	.81	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L563B	O	3.41	3.59	.36	-.12	1.24	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L167	X	3.51	3.84	.64	-.09	.71	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L211	*	9.37	10.15	8.95	-2.33	3.52	20I	TENSILE STRENGTH, PRINTING PAPER, CRE, 20 C, 65% RH
GMEANS:		3.13	3.32			1.00		
		95% ELLIPSE:		.45	.22	WITH GAMMA = 62 DEGREES		


TENSILE STRENGTH, CRE TYPE
SAMPLE G04 = 3.13 KILONEWTON/M
SAMPLE G04 = 10.56 LB/15 MM
SAMPLE G07 = 3.32 KILONEWTON/M
SAMPLE G07 = 11.21 LB/15 MM
+.X.* NOT IN GRAND MEANS
ANALYSIS T20-1
SAMPLE G07
KILONEWTON/M
LB/15 MM
SAMPLE G04
KILONEWTON/M
LB/15 MM

ANALYSIS T20-2 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

TAPPI STANDARD T404 OS-76, TENSILE BREAKING STRENGTH OF PAPER AND PAPERBOARD (PENDULUM-TYPE TESTER)

LAB CODE	SAMPLE G04 HEAT SET OFFSET BOOK 76 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R. SDR	SAMPLE G07 WRITING 74 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R. SDR	TEST D. = 20 VAR	F	LAB
L103	3.26	.04	.23	.11	.69	3.34	-.07	-.31	.13	.83	20R	ó	L103
L108	3.29	.08	.40	.21	1.39	3.33	-.08	-.36	.20	1.31	20P	ó	L108
L121	3.28	.07	.34	.12	.77	3.66	.26	1.16	.14	.87	20P	ó	L121
L124P	3.17	-.05	-.25	.19	1.25	3.39	-.01	-.07	.24	1.56	20P	ó	L124P
L128	3.07	-.15	-.76	.16	1.03	3.51	.10	.47	.16	1.04	20T	ó	L128
L148	3.13	-.09	-.47	.16	1.02	3.20	-.21	-.93	.13	.86	20P	ó	L148
L158	2.49	-.73	-3.80	.12	.77	2.91	-.50	-2.25	.14	.90	20T	X	L158
L162	3.26	.04	.22	.17	1.08	3.16	-.25	-1.13	.21	1.32	20*	ó	L162
L182L	3.13	-.08	-.43	.18	1.13	3.28	-.12	-.56	.15	.94	20T	ó	L182L
L189	3.52	.31	1.60	.13	.87	3.57	.17	.75	.15	.96	20R	ó	L189
L191P	3.24	.03	.15	.18	1.19	3.37	-.04	-.18	.14	.89	20P	ó	L191P
L195	2.90	-.31	-1.63	.16	1.06	2.87	-.54	-2.43	.17	1.12	20R	ó	L195
L212	3.19	-.03	-.14	.19	1.23	3.35	-.06	-.25	.16	1.03	20R	ó	L212
L213	2.77	-.45	-2.33	.15	.95	3.13	-.27	-1.23	.13	.81	20T	ó	L213
L218	3.31	.09	.47	.11	.73	3.45	.05	.21	.14	.88	20P	ó	L218
L233	2.98	-.23	-1.22	.14	.90	3.34	-.06	-.28	.15	.98	20Q	ó	L233
L241	3.10	-.12	-.62	.10	.67	3.46	.05	.24	.16	1.00	20R	ó	L241
L242	2.96	-.25	-1.31	.12	.75	3.38	-.03	-.12	.10	.62	20Y	ó	L242
L249	3.24	.02	.12	.14	.92	3.48	.08	.34	.18	1.17	20P	ó	L249
L259	3.53	.32	1.66	.16	1.01	3.68	.27	1.24	.16	1.06	20P	ó	L259
L262	3.30	.08	.43	.11	.72	3.59	.18	.83	.14	.89	20R	ó	L262
L274	3.19	-.02	-.12	.11	.69	3.34	-.07	-.31	.13	.85	20P	ó	L274
L275	3.14	-.08	-.41	.13	.86	3.29	-.12	-.54	.19	1.20	20R	ó	L275
L279P	3.44	.22	1.15	.36	2.29	3.80	.39	1.77	.09	.59	20P	ó	L279P
L285	3.26	.04	.23	.10	.68	3.22	-.19	-.86	.10	.62	20P	ó	L285
L290	3.14	-.08	-.41	.10	.64	2.97	-.44	-1.98	.15	.97	20P	ó	L290
L311	3.22	.00	.00	.15	.99	3.47	.07	.30	.14	.91	20V	ó	L311
L313	3.07	-.14	-.74	.15	.99	3.49	.08	.38	.15	.99	20T	ó	L313
L321	2.93	-.28	-1.48	.25	1.63	3.02	-.39	-1.77	.15	.96	20Q	ó	L321
L330	3.25	.04	.18	.21	1.37	3.73	.32	1.45	.15	.94	20P	ó	L330
L356	3.18	-.04	-.21	.20	1.30	3.31	-.10	-.43	.19	1.21	20P	ó	L356
L376	3.25	.03	.18	.16	1.02	3.37	-.04	-.18	.20	1.26	20P	ó	L376
L393	3.53	.32	1.66	.14	.91	3.73	.32	1.44	.14	.88	20P	ó	L393
L484	3.18	-.03	-.17	.06	.40	3.23	-.17	-.79	.10	.63	20U	ó	L484
L554	3.52	.30	1.59	.15	.94	3.71	.30	1.38	.13	.84	20P	ó	L554
L556	3.69	.47	2.47	.19	1.24	3.85	.44	2.00	.23	1.45	20P	ó	L556
L571	3.46	.25	1.29	.16	1.02	3.62	.21	.94	.24	1.54	20P	ó	L571
L585	3.12	-.10	-.50	.14	.93	3.29	-.11	-.51	.08	.49	20V	ó	L585
L599	3.28	.06	.34	.16	1.02	3.40	-.01	-.03	.21	1.35	20V	ó	L599
L626	3.21	-.00	-.02	.12	.75	3.56	.15	.67	.11	.72	20T	ó	L626
L680	2.94	-.28	-1.45	.16	1.00	3.34	-.07	-.30	.23	1.47	20R	ó	L680

GR. MEAN = 3.22 KILONEWTON/M GRAND MEAN = 3.41 KILONEWTON/M TEST DETERMINATIONS = 20

SD MEANS = .19 KILONEWTON/M SD OF MEANS = .22 KILONEWTON/M 40 LABS IN GRAND MEANS

AVERAGE SDR = .16 KILONEWTON/M AVERAGE SDR = .16 KILONEWTON/M

GR. MEAN =10.845 LB/15 MM GRAND MEAN =11.492 LB/15 MM

TOTAL NUMBER OF LABORATORIES REPORTING = 41

Best values: G04 3.2 ± 0.3 kilonewton per meter
G07 3.4 ± 0.4 kilonewton per meter

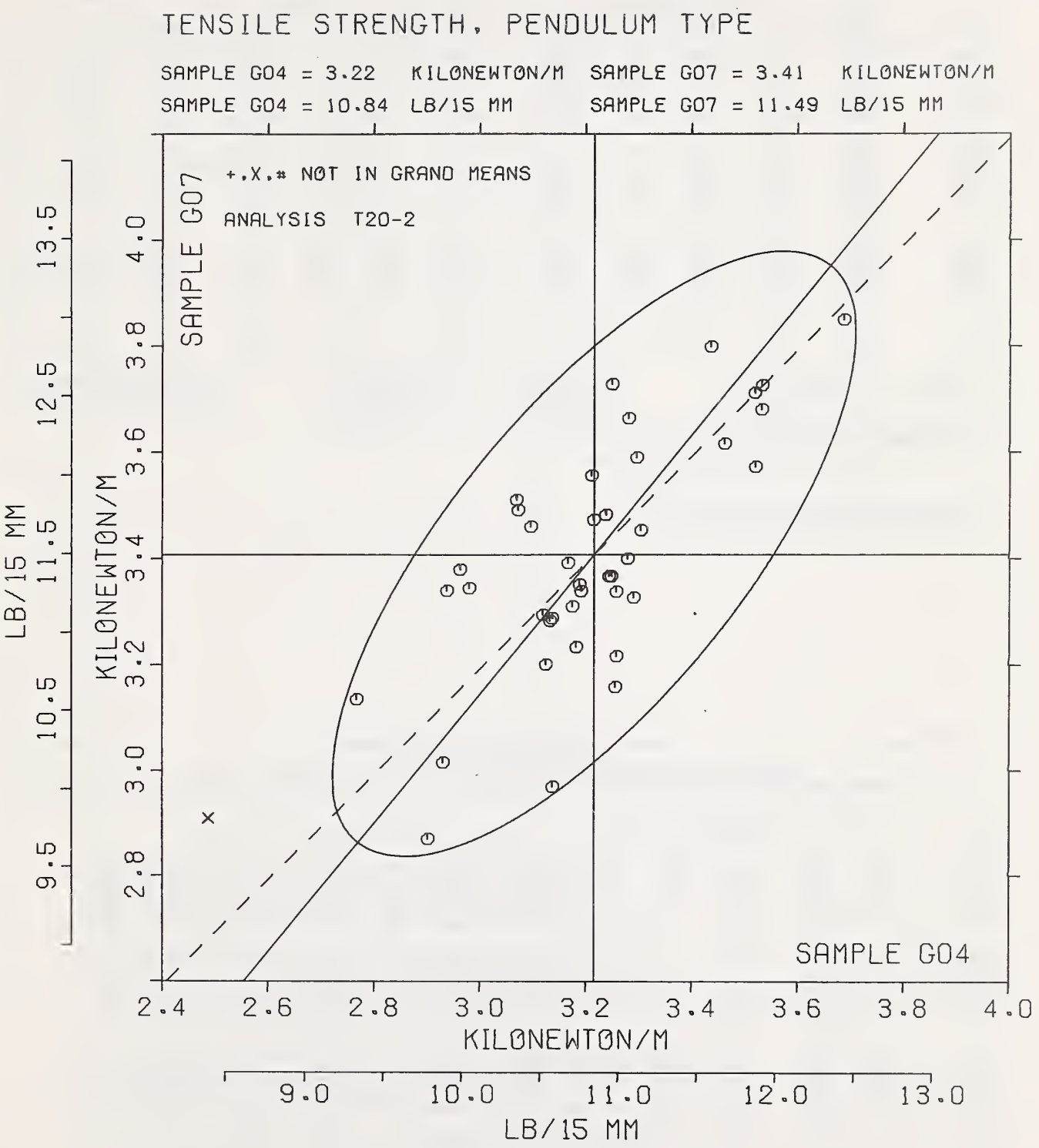
REPORT NO. 605 TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1979

ANALYSIS T20-2 TABLE 2

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

TAPPI STANDARD T404 OS-76, TENSILE BREAKING STRENGTH OF PAPER AND PAPERBOARD (PENDULUM-TYPE TESTER)

LAB CODE	F	MEANS G04	MEANS G07	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L158	X	2.49	2.91	-.85	.25	.83	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L213	O	2.77	3.13	-.49	.17	.88	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L195	O	2.90	2.87	-.61	-.10	1.09	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L321	O	2.93	3.02	-.48	-.03	1.30	20Q	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L680	O	2.94	3.34	-.23	.17	1.23	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L242	O	2.96	3.38	-.18	.18	.69	20Y	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L233	O	2.98	3.34	-.20	.14	.94	20Q	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L128	O	3.07	3.51	-.01	.18	1.03	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L313	O	3.07	3.49	-.03	.16	.99	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L241	O	3.10	3.46	-.03	.13	.84	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L585	O	3.12	3.29	-.15	.00	.71	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L148	O	3.13	3.20	-.22	-.06	.94	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L182L	O	3.13	3.28	-.15	-.01	1.03	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L275	O	3.14	3.29	-.14	-.01	1.03	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L290	O	3.14	2.97	-.39	-.22	.81	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L124P	O	3.17	3.39	-.04	.03	1.41	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L356	O	3.18	3.31	-.10	-.03	1.25	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L484	O	3.18	3.23	-.16	-.09	.51	20U	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L212	O	3.19	3.35	-.06	-.01	1.13	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L274	O	3.19	3.34	-.07	-.03	.77	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L626	O	3.21	3.56	.11	.10	.73	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L311	O	3.22	3.47	.05	.04	.95	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L249	O	3.24	3.48	.07	.03	1.04	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L191P	O	3.24	3.37	-.01	-.05	1.04	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L376	O	3.25	3.37	-.01	-.05	1.14	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L330	O	3.25	3.73	.27	.18	1.16	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L162	O	3.26	3.16	-.17	-.19	1.20	20*	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L103	O	3.26	3.34	-.03	-.08	.76	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L285	O	3.26	3.22	-.12	-.15	.65	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L599	O	3.28	3.40	.04	-.05	1.18	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L121	O	3.28	3.66	.24	.11	.82	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L108	O	3.29	3.33	-.01	-.11	1.35	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L262	O	3.30	3.59	.19	.05	.80	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L218	O	3.31	3.45	.09	-.04	.81	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L279P	O	3.44	3.80	.44	.08	1.44	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L571	O	3.46	3.62	.32	-.06	1.28	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L554	O	3.52	3.71	.43	-.04	.89	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L189	O	3.52	3.57	.32	-.13	.91	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L259	O	3.53	3.68	.41	-.07	1.03	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L393	O	3.53	3.73	.45	-.04	.89	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L556	O	3.69	3.85	.64	-.08	1.35	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
GMEANS:		3.22	3.41			1.00		
		95% ELLIPSE:		.70	.28	WITH GAMMA = 50 DEGREES		


TENSILE STRENGTH, PENDULUM TYPE
SAMPLE G04 = 3.22 KILONEWTON/M SAMPLE G07 = 3.41 KILONEWTON/M
SAMPLE G04 = 10.84 LB/15 MM SAMPLE G07 = 11.49 LB/15 MM
+.X.* NOT IN GRAND MEANS
ANALYSIS T20-2
SAMPLE G07
KILONEWTON/M
LB/15 MM
SAMPLE G04
2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0
9.0 10.0 11.0 12.0 13.0
9.5 10.5 11.5 12.5 13.5

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ANALYSIS T25-1 TABLE 1

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PACKAGING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	SAMPLE K32 MEAN	PRINTING 105 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE K34 MEAN	KRAFT 123 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	VAR	F	LAB	TEST D. = 20
L106	77.9	.0	.00	15.4	1.56	87.3	-4.7	-.45	12.2	.96	25F	O	L106	
L122	82.3	4.5	.61	10.6	1.08	106.7	14.6	1.38	12.1	.95	25P	O	L122	
L126	87.5	9.6	1.30	6.6	.67	94.3	2.2	.21	10.8	.85	25G	O	L126	
L151	77.3	-.6	-.08	10.7	1.08	91.8	-.3	-.03	14.0	1.10	25F	O	L151	
L182	69.5	-8.4	-1.14	10.7	1.09	92.9	.8	.08	11.6	.91	25B	O	L182	
L237B	84.3	6.4	.87	9.3	.94	92.4	.4	.04	9.7	.76	25H	O	L237B	
L250	74.6	-3.3	-.45	2.9	.30	87.4	-4.7	-.44	9.7	.76	25A	O	L250	
L264	78.3	.4	.05	7.1	.72	86.3	-5.8	-.54	11.9	.93	25F	O	L264	
L267	80.7	2.9	.39	8.3	.84	99.5	7.4	.70	14.5	1.14	25F	O	L267	
L273	83.9	6.0	.82	10.5	1.06	96.9	4.8	.45	13.1	1.03	25F	O	L273	
L280	65.5	-12.3	-1.68	11.0	1.11	85.8	-6.2	-.59	11.1	.88	25B	O	L280	
L312	88.4	10.5	1.43	15.0	1.53	111.8	19.7	1.86	17.5	1.38	25J	O	L312	
L318	84.2	6.3	.86	8.9	.91	99.3	7.3	.68	12.0	.94	25A	O	L318	
L580	65.5	-12.4	-1.68	10.2	1.04	65.0	-27.0	-2.54	10.7	.84	25C	O	L580	
L604	49.0	-28.9	-3.92	8.4	.85	99.9	7.8	.74	9.6	.75	25A	#	L604	
L676	77.0	-.9	-.12	11.0	1.12	93.5	1.5	.14	20.8	1.64	25F	O	L676	
L689	69.2	-8.7	-1.19	9.4	.96	81.9	-10.1	-.95	11.9	.93	25F	O	L689	

GR. MEAN = 77.9 JOULES/SQ M GRAND MEAN = 92.1 JOULES/SQ M TEST DETERMINATIONS = 20

SD MEANS = 7.4 JOULES/SQ M SD OF MEANS = 10.6 JOULES/SQ M 16 LABS IN GRAND MEANS

AVERAGE SDR = 9.8 JOULES/SQ M AVERAGE SDR = 12.7 JOULES/SQ M

GR. MEAN = 5.335 FT.LB/SQ FT GRAND MEAN = 6.306 FT.LB/SQ FT

TOTAL NUMBER OF LABORATORIES REPORTING = 17

Best values: K32 78 $\pm$ 11 joules per square meter
K34 93 $\pm$ 15 joules per square meter

The following laboratories were omitted from the grand means because of extreme test results: 604.

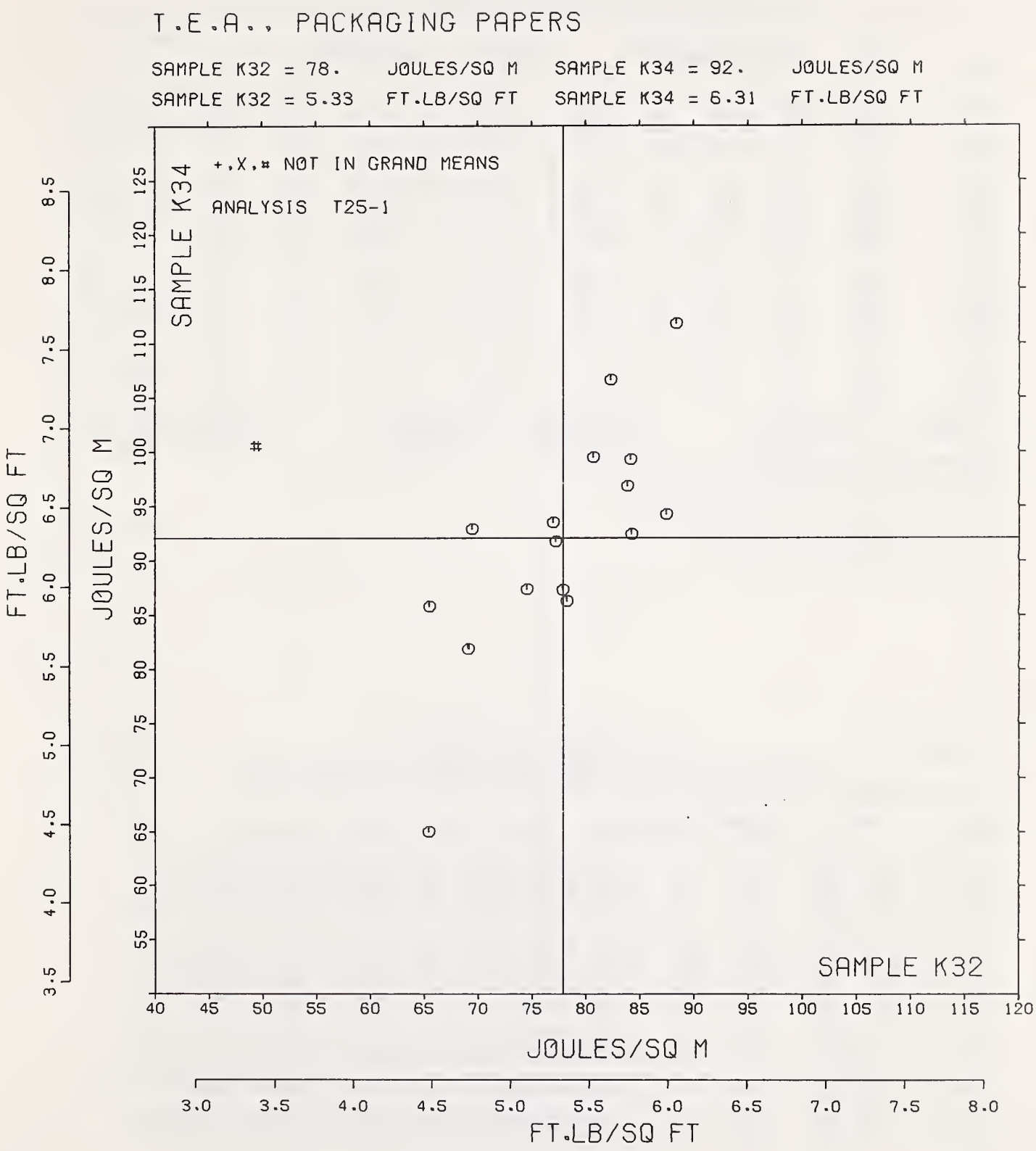
REPORT NO. 60S TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1979

ANALYSIS T25-1 TABLE 2

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PACKAGING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	F	MEANS K32	K34	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L604	#	49.0	99.9	-8.6	28.6	.80	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L580	O	65.5	65.0	-29.5	-3.8	.94	25C	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINE JAWS
L280	O	65.5	85.8	-11.8	7.2	.99	25B	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L689	O	69.2	81.9	-13.2	2.0	.95	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L182	O	69.5	92.9	-3.7	7.5	1.00	25B	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L250	O	74.6	87.4	-5.7	.3	.53	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L676	O	77.0	93.5	.8	1.5	1.38	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L151	O	77.3	91.8	-.6	.4	1.09	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L106	O	77.9	87.3	-4.0	-2.5	1.26	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L264	O	78.3	86.3	-4.7	-3.4	.83	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L267	O	80.7	99.5	7.8	1.5	.99	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L122	O	82.3	106.7	14.8	3.9	1.01	25P	TENSILE ENERGY ABS.,PACKAGING PAPER,PATTERNED FLAT JAWS
L273	O	83.9	96.9	7.3	-2.6	1.05	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L318	O	84.2	99.3	9.5	-1.5	.92	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L237B	O	84.3	92.4	3.7	-5.2	.85	25H	TENSILE ENERGY ABS.,PACKAGING PAPER,2-PIN STRAIN GAGE
L126	O	87.5	94.3	7.0	-7.0	.76	25G	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINE JAWS
L312	O	88.4	111.8	22.3	1.5	1.45	25J	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
GMEANS:		77.9	92.1			1.00		
		95% ELLIPSE:		34.7	11.6	WITH GAMMA = 58 DEGREES		


T.E.A., PACKAGING PAPERS
SAMPLE K32 = 78. JOULES/SQ M
SAMPLE K32 = 5.33 FT.LB/SQ FT
SAMPLE K34 = 92. JOULES/SQ M
SAMPLE K34 = 6.31 FT.LB/SQ FT
+,X,# NOT IN GRAND MEANS
ANALYSIS T25-1
SAMPLE K34
SAMPLE K32
JOULES/SQ M
FT.LB/SQ FT
40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120
55 60 65 70 75 80 85 90 95 100 105 110 115 120 125
3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0
3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5

ANALYSIS T26-1 TABLE 1

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PRINTING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB	SAMPLE G04 MEAN	HEAT SET OFFSET BOOK 76 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE G07 MEAN	WRITING 74 GRAMS PER SQUARE METER DEV	N.DBV	SDR	R.SDR	TEST D.= 20 VAR	F	LAB
L100	32.3	-.2	-.11	2.0	.68	38.6	3.7	1.30	3.0	.78	26A	ô	L100
L115	30.2	-2.3	-1.05	2.2	.72	36.0	1.2	.40	3.6	.95	26C	ô	L115
L118	30.8	-1.7	-.79	3.8	1.28	32.3	-2.5	-.86	4.3	1.12	26E	ô	L118
L122	34.7	2.2	1.03	2.9	.96	36.4	1.5	.52	3.6	.95	26L	ô	L122
L139	33.5	1.0	.46	2.3	.78	36.3	1.5	.52	5.0	1.31	26H	ô	L139
L159	33.1	.6	.26	3.4	1.12	39.3	4.4	1.54	4.1	1.08	26F	ô	L159
L163	29.3	-3.2	-1.51	2.8	.92	35.5	.7	.24	3.5	.91	26J	ô	L163
L167	35.1	2.6	1.22	1.0	.32	38.4	3.6	1.25	1.1	.29	26D	ô	L167
L185	61.0	28.5	13.38	6.1	2.04	68.8	34.0	11.76	8.2	2.16	26C	#	L185
L211	32.3	-.2	-.07	6.3	2.10	32.0	-2.8	-.98	5.4	1.42	26Z	ô	L211
L250	28.4	-4.1	-1.90	2.6	.86	29.4	-5.4	-1.87	4.2	1.10	26A	ô	L250
L309	32.6	.1	.03	3.7	1.24	31.2	-3.7	-1.26	5.4	1.43	26J	ô	L309
L318	31.8	-.7	-.31	4.3	1.44	36.7	1.9	.65	3.1	.82	26A	ô	L318
L356	33.7	1.2	.56	2.7	.90	34.5	-.3	-.10	5.2	1.36	26A	ô	L356
L393	30.2	-2.3	-1.06	2.2	.72	31.0	-3.8	-1.33	2.3	.61	26V	ô	L393
L442	36.0	3.5	1.66	2.5	.84	36.7	1.8	.63	3.2	.83	26B	ô	L442
L575	34.2	1.7	.77	3.1	1.01	33.6	-1.2	-.42	3.9	1.03	26A	ô	L575
L592	34.2	1.7	.80	3.3	1.11	34.2	-.6	-.22	3.8	1.01	26H	ô	L592

GR. MEAN = 32.5 JOULES/SQ M GRAND MEAN = 34.8 JOULES/SQ M TEST DETERMINATIONS = 20

SD MEANS = 2.1 JOULES/SQ M SD OF MEANS = 2.9 JOULBS/SQ M 17 LABS IN GRAND MEANS

AVERAGE SDR = 3.0 JOULES/SQ M AVERAGE SDR = 3.8 JOULES/SQ M

GR. MEAN = 2.226 FT.LB/SQ FT GRAND MEAN = 2.386 FT.LB/SQ FT

TOTAL NUMBER OF LABORATORIES REPORTING = 18

Best values: G04 32 ± 4 joules per square meter

G07 35 ± 4 joules per square meter

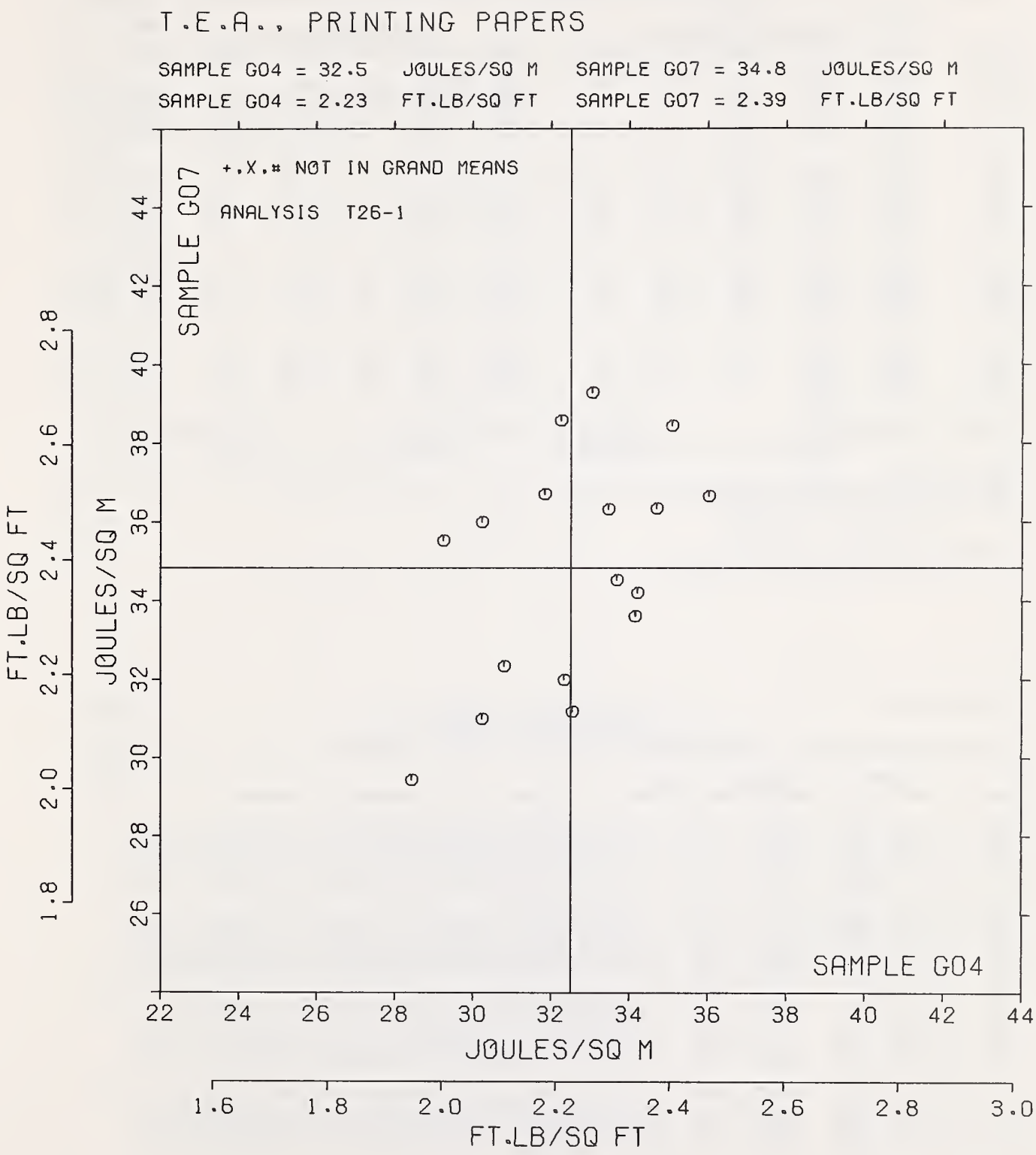
Data from the following laboratories appear to be off by a multiplicative factor: 185.

ANALYSIS T26-1 TABLE 2

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PRINTING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	F	MEANS G04	G07	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L250	ô	28.4	29.4	-6.7	1.0	.98	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L163	ô	29.3	35.5	-.9	3.2	.91	26J	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L393	ô	30.2	31.0	-4.4	.1	.67	26V	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L115	ô	30.2	36.0	-.1	2.5	.84	26C	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/LINE JAWS
L118	ô	30.8	32.3	-3.0	.3	1.20	26E	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L318	ô	31.8	36.7	1.3	1.5	1.13	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L100	ô	32.3	38.6	3.2	2.0	.73	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L211	ô	32.3	32.0	-2.6	-1.2	1.76	26Z	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/LINE JAWS
L309	ô	32.6	31.2	-3.2	-1.8	1.33	26J	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L159	ô	33.1	39.3	4.2	1.7	1.10	26F	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L139	ô	33.5	36.3	1.8	-.1	1.04	26H	TENSILE ENERGY ABS.,PRINTING PAPERS,2-PIN STRAIN GAGE
L356	ô	33.7	34.5	.3	-1.2	1.13	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L575	ô	34.2	33.6	-.3	-2.0	1.02	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L592	ô	34.2	34.2	.3	-1.8	1.06	26H	TENSILE ENERGY ABS.,PRINTING PAPERS,2-PIN STRAIN GAGE
L122	ô	34.7	36.4	2.4	-1.2	.95	26L	TENSILE ENERGY ABS.,PRINTING PAPERS,PATTERNED FLAT JAWS
L167	ô	35.1	38.4	4.4	-.5	.31	26D	TENSILE ENERGY ABS.,PRINTING PAPERS,2-PIN STRAIN GAGE
L442	ô	36.0	36.7	3.3	-2.2	.83	26B	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L185	#	61.0	68.8	43.5	-8.7	2.10	26C	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/LINE JAWS
GMEANS:		32.5	34.8			1.00		
		95% ELLIPSE:		8.9	4.8	WITH GAMMA = 61 DEGREES		


T.E.A., PRINTING PAPERS
SAMPLE G04 = 32.5 JOULES/SQ M
SAMPLE G04 = 2.23 FT.LB/SQ FT
SAMPLE G07 = 34.8 JOULES/SQ M
SAMPLE G07 = 2.39 FT.LB/SQ FT
+.X.* NOT IN GRAND MEANS
ANALYSIS T26-1
SAMPLE G07
SAMPLE G04
JOULES/SQ M
FT.LB/SQ FT
22 24 26 28 30 32 34 36 38 40 42 44
1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0
26 28 30 32 34 36 38 40 42 44
1.8 2.0 2.2 2.4 2.6 2.8

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ANALYSIS T28-1 TABLE 1

ELONGATION TO BREAK, PERCENT - PACKAGING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	SAMPLE K32 MEAN	PRINTING 105 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE K34 MEAN	KRAFT 123 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 20 VAR	F	LAB
L100	1.410	-.128	-.64	.064	.51	1.585	-.093	-.46	.067	.53	28A	O	L100
L106	1.520	-.018	-.09	.219	1.73	1.680	.002	.01	.177	1.41	28B	O	L106
L122	1.664	.126	.63	.118	.93	1.873	.195	.96	.113	.90	28P	O	L122
L126	1.542	.004	.02	.068	.53	1.610	-.068	-.34	.110	.88	28C	O	L126
L151	1.750	.212	1.06	.267	2.10	1.760	.082	.40	.201	1.60	28B	O	L151
L182	1.335	-.203	-1.01	.114	.90	1.570	-.108	-.54	.103	.82	28B	O	L182
L264	1.570	.032	.16	.086	.68	1.645	-.033	-.17	.150	1.20	28B	O	L264
L265	1.409	-.129	-.64	.113	.89	1.578	-.100	-.50	.117	.93	28A	O	L265
L267	1.414	-.124	-.62	.114	.90	1.623	-.055	-.27	.128	1.02	28B	O	L267
L280	1.423	-.115	-.57	.126	.99	1.640	-.038	-.19	.103	.82	28B	O	L280
L312	1.840	.302	1.51	.139	1.10	2.005	.327	1.61	.164	1.31	28B	O	L312
L318	1.586	.048	.24	.095	.75	1.744	.066	.32	.102	.81	28A	O	L318
L324	1.425	-.113	-.56	.085	.67	1.585	-.093	-.46	.099	.79	28P	O	L324
L336	1.443	-.094	-.47	.129	1.02	1.651	-.027	-.14	.121	.96	28A	O	L336
L580	1.375	-.163	-.81	.148	1.17	1.305	-.373	-1.85	.164	1.31	28C	*	L580
L581	1.570	.033	.16	.152	1.20	1.662	-.016	-.08	.096	.77	28A	O	L581
L582	2.500	.962	4.81	.000	.00	2.625	.947	4.68	.385	3.07	28A	#	L582
L676	2.100	.562	2.81	.395	3.11	2.230	.552	2.73	.434	3.46	28B	*	L676
L689	1.300	-.238	-1.19	.141	1.11	1.465	-.213	-1.06	.157	1.25	28B	O	L689
GR. MEAN = 1.538 PERCENT						GRAND MEAN = 1.678 PERCENT					TEST DETERMINATIONS = 20		
SD MEANS = .200 PERCENT						SD OF MEANS = .202 PERCENT					18 LABS IN GRAND MEANS		
AVERAGE SDR = .127 PERCENT						AVERAGE SDR = .125 PERCENT							
L153	1.525	-.013	-.06	.097	.76	1.815	.137	.68	.163	1.30	28Q	+	L153

TOTAL NUMBER OF LABORATORIES REPORTING = 20

Best values: K32 1.51 ± 0.32 percent
K34 1.67 ± 0.21 percent

The following laboratories were omitted from the grand means because of extreme test results: 582.

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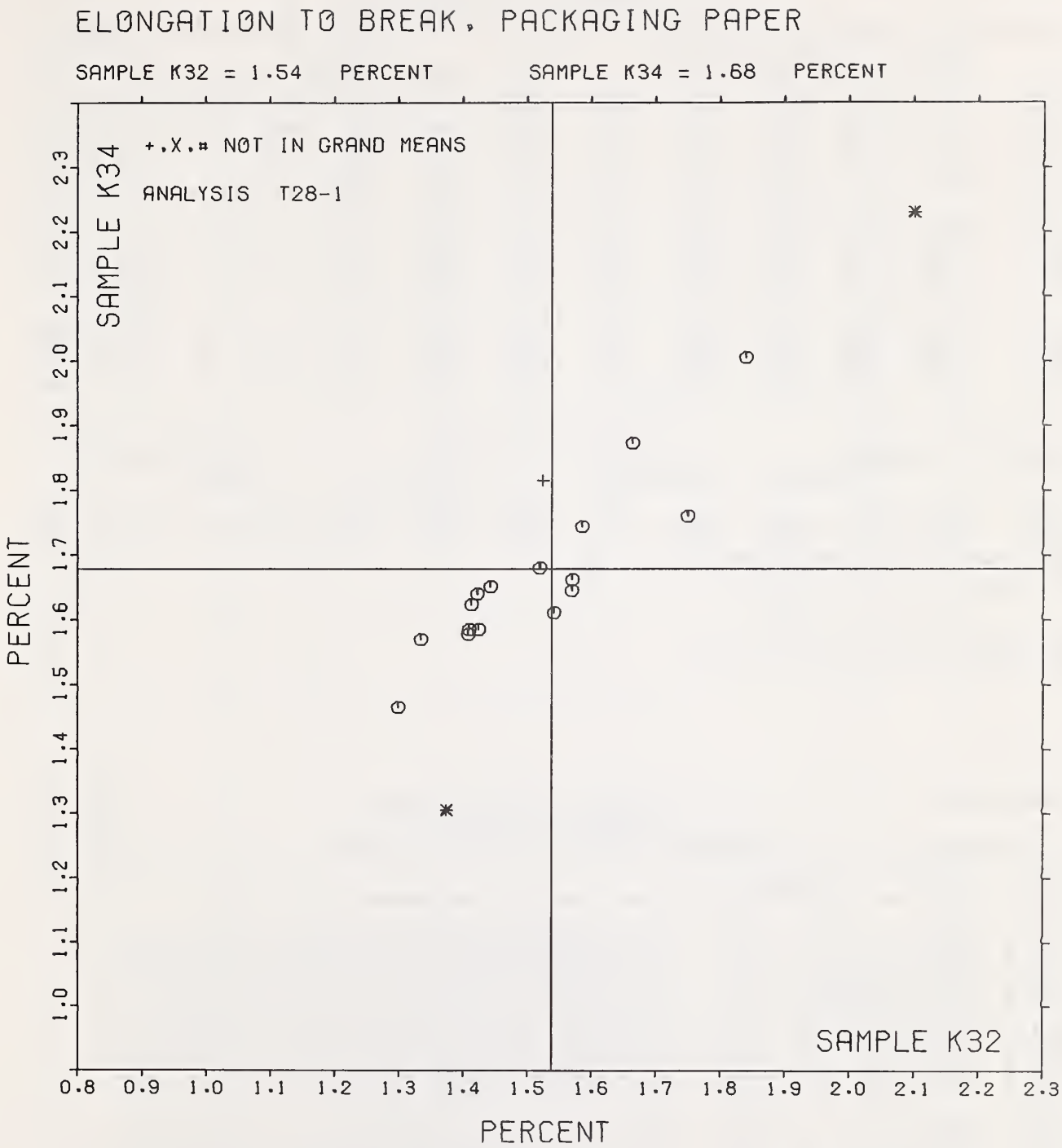
ANALYSIS T28-1 TABLE 2

ELONGATION TO BREAK, PERCENT - PACKAGING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	F	MEANS K32	K34	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L689	O	1.300	1.465	-.319	.019	1.18	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L182	O	1.335	1.570	-.220	.068	.86	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L580	*	1.375	1.305	-.380	-.147	1.24	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L265	O	1.409	1.578	-.162	.021	.91	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L100	O	1.410	1.585	-.156	.025	.52	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L267	O	1.414	1.623	-.126	.049	.96	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L280	O	1.423	1.640	-.108	.054	.91	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L324	O	1.425	1.585	-.146	.014	.73	28P	ELONGATION,PACKAGING PAPER,LOAD CELL,PATTERNED FLAT JAWS
L336	O	1.443	1.651	-.086	.048	.99	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L106	O	1.520	1.680	-.011	.014	1.57	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L153	+	1.525	1.815	.088	.105	1.03	28Q	ELONGATION,PACKAGING PAPER,PENDULUM, PATTERNED FLAT JAWS
L126	O	1.542	1.610	-.045	-.051	.70	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L264	O	1.570	1.645	-.001	-.047	.94	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L581	O	1.570	1.662	.011	-.035	.98	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L318	O	1.586	1.744	.081	.012	.78	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L122	O	1.664	1.873	.227	.047	.92	28P	ELONGATION,PACKAGING PAPER,LOAD CELL,PATTERNED FLAT JAWS
L151	O	1.750	1.760	.207	-.094	1.85	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L312	O	1.840	2.005	.445	.014	1.20	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L676	*	2.100	2.230	.788	-.012	3.29	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L582	#	2.500	2.625	1.350	-.019	1.53	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
GMEANS:		1.538	1.678			1.00		
95% ELLIPSE:				.775	.155	WITH GAMMA = 45 DEGREES		


ELONGATION TO BREAK, PACKAGING PAPER
SAMPLE K32 = 1.54 PERCENT
SAMPLE K34 = 1.68 PERCENT
+.X.* NOT IN GRAND MEANS
ANALYSIS T28-1
SAMPLE K34
SAMPLE K32
PERCENT
PERCENT
0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3

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ANALYSIS T29-1 TABLE 1

ELONGATION TO BREAK, PERCENT - PRINTING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	SAMPLE G04 HEAT SET OFFSET BOOK 76 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R. SDR	SAMPLE G07 WRITING 74 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R. SDR	VAR	F	LAB
											TEST D. = 20		
L100	1.520	-.063	-.56	.089	.83	1.620	.035	.30	.089	.61	29A	O	L100
L105	1.362	-.220	-1.95	.128	1.19	1.300	-.285	-2.48	.174	1.19	29A	O	L105
L118	1.588	.006	.05	.098	.92	1.617	.032	.28	.165	1.13	29A	O	L118
L122	1.786	.204	1.81	.126	1.17	1.773	.188	1.63	.118	.81	29P	O	L122
L176	2.412	.830	7.36	.429	3.99	2.137	.551	4.78	.658	4.51	29B	#	L176
L185	1.496	-.086	-.77	.078	.72	1.504	-.081	-.71	.153	1.05	29C	O	L185
L190R	1.452	-.131	-1.16	.129	1.20	1.510	-.075	-.65	.203	1.39	29A	O	L190R
L278	1.460	-.123	-1.09	.105	.97	1.495	-.090	-.78	.139	.96	29A	O	L278
L309	1.706	.123	1.09	.117	1.09	1.652	.067	.58	.212	1.45	29A	O	L309
L318	1.650	.068	.60	.071	.66	1.720	.135	1.17	.089	.61	29A	O	L318
L344	1.552	-.031	-.27	.127	1.18	1.530	-.056	-.48	.192	1.32	29A	O	L344
L356	1.572	-.010	-.09	.104	.97	1.563	-.022	-.19	.159	1.09	29A	O	L356
L442	1.684	.102	.90	.075	.70	1.625	.040	.35	.090	.62	29B	O	L442
L575	1.587	.005	.04	.100	.93	1.540	-.045	-.39	.108	.74	29A	O	L575
L592	1.680	.097	.86	.120	1.11	1.620	.035	.30	.140	.96	29D	O	L592
L698	1.644	.061	.54	.146	1.36	1.710	.125	1.08	.157	1.08	29C	O	L698
GR. MEAN = 1.583 PERCENT						GRAND MEAN = 1.585 PERCENT					TEST DETERMINATIONS = 20		
SD MEANS = .113 PERCENT						SD OF MEANS = .115 PERCENT					15 LABS IN GRAND MEANS		
AVERAGE SDR = .107 PERCENT						AVERAGE SDR = .146 PERCENT							
L242	1.970	.387	3.43	.126	1.17	2.135	.550	4.76	.088	.60	29R	*	L242
L484	1.026	-.557	-4.94	.205	1.91	1.054	-.531	-4.61	.195	1.33	29R	*	L484
L626	1.505	-.078	-.69	.083	.77	1.520	-.065	-.57	.077	.53	29R	*	L626

TOTAL NUMBER OF LABORATORIES REPORTING = 19

Best values: G04 1.58 ± 0.20 percent
G07 1.61 ± 0.16 percent

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

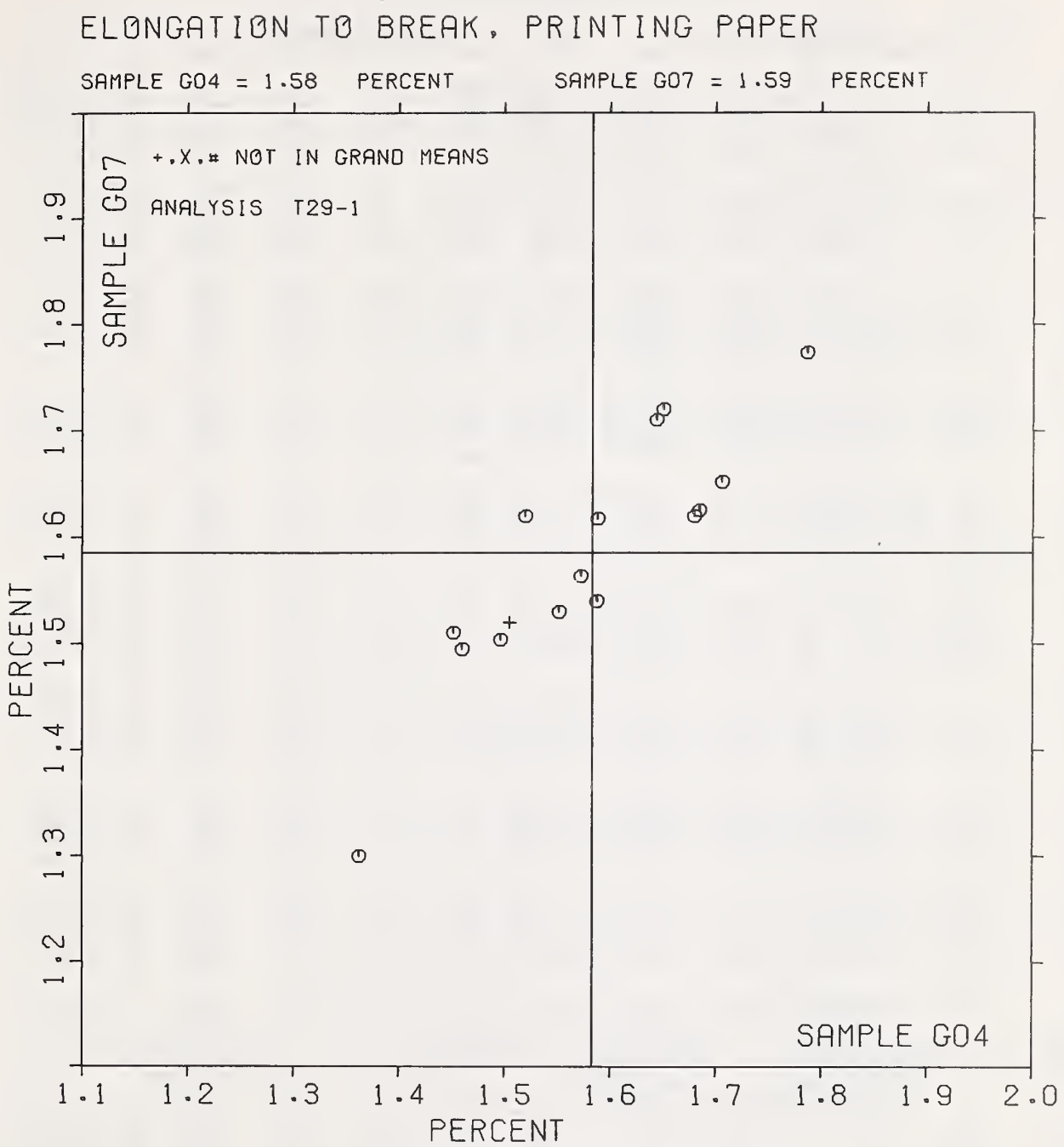
REPORT NO. 60S — TAPPI COLLABORATIVE REFERENCE PROGRAM — JUNE 1979

ANALYSIS T29-1 TABLE 2

ELONGATION TO BREAK, PERCENT - PRINTING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	F	MEANS G04	G07	COORDINATES MAJOR	MINOR	AVG R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L484	*	1.026	1.054	-.769	.028	1.62	29R	ELONGATION,PRINTING PAPERS,PENDULUM, FLAT/FLAT JAWS
L105	O	1.362	1.300	-.358	-.042	1.19	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L190R	O	1.452	1.510	-.145	.041	1.29	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L278	O	1.460	1.495	-.151	.025	.96	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L185	O	1.496	1.504	-.119	.005	.88	29C	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/LINE JAWS
L626	*	1.505	1.520	-.101	.010	.65	29R	ELONGATION,PRINTING PAPERS,PENDULUM, FLAT/FLAT JAWS
L100	O	1.520	1.620	-.019	.069	.72	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L344	O	1.552	1.530	-.061	-.017	1.25	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L356	O	1.572	1.563	-.023	-.008	1.03	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L575	O	1.587	1.540	-.029	-.035	.84	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L118	O	1.588	1.617	.027	.018	1.02	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L698	O	1.644	1.710	.132	.043	1.22	29C	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/LINE JAWS
L318	O	1.650	1.720	.144	.046	.63	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L592	O	1.680	1.620	.093	-.045	1.04	29D	ELONGATION,PRINTING PAPERS,LOAD CELL,2-PIN STRAIN GAGE
L442	O	1.684	1.625	.100	-.045	.66	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
L309	O	1.706	1.652	.134	-.042	1.27	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L122	O	1.786	1.773	.277	-.015	.99	29P	ELONGATION,PRINTING PAPERS,LOAD CELL,PATTERNED FLAT JAWS
L242	*	1.970	2.135	.664	.106	.89	29R	ELONGATION,PRINTING PAPERS,PENDULUM, FLAT/FLAT JAWS
L176	#	2.412	2.137	.974	-.209	4.25	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
GMEANS:		1.583	1.585			1.00		
95% ELLIPSE:				.448	.110	WITH GAMMA = 45 DEGREES		


ELONGATION TO BREAK, PRINTING PAPER
SAMPLE G04 = 1.58 PERCENT
SAMPLE G07 = 1.59 PERCENT
+,X,* NOT IN GRAND MEANS
ANALYSIS T29-1
SAMPLE G07
SAMPLE G04
PERCENT
PERCENT
1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T30-1 TABLE 1
FOLDING ENDURANCE (MIT), DOUBLE FOLDS
TAPPI STANDARD T511 SU-69

LAB CODE	SAMPLE A92 WOVE ENVELOPE PAPER 75 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R. SDR	SAMPLE B88 HEAT SET OFFSET BOOK 88 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R. SDR	TEST D. = 15 VAR	F	LAB
L100M	21.2	-9.6	-1.63	6.3	.60	31.7	-18.4	-1.26	9.4	.46	30M	@	L100M
L100N	22.8	-8.0	-1.36	7.5	.71	36.0	-14.2	-.97	9.2	.46	30N	@	L100N
L105	12.7	-18.1	-3.08	2.3	.22	8.2	-42.0	-2.87	2.4	.12	30M	#	L105
L118	28.5	-2.3	-.40	6.0	.57	44.4	-5.8	-.39	16.3	.81	30D	@	L118
L121	28.1	-2.7	-.45	12.2	1.15	53.6	3.4	.23	30.5	1.51	30M	@	L121
L122	31.3	.5	.09	10.0	.94	62.7	12.6	.86	27.8	1.37	30M	@	L122
L124	29.1	-1.7	-.28	7.1	.67	55.7	5.6	.38	12.6	.62	30N	@	L124
L150	28.1	-2.7	-.46	7.1	.67	45.2	-5.0	-.34	34.5	1.71	30M	@	L150
L158	20.4	-10.4	-1.77	6.2	.58	23.8	-26.4	-1.80	7.7	.38	30N	@	L158
L159	37.6	6.8	1.16	13.2	1.24	50.1	-.1	-.01	17.3	.86	30N	@	L159
L162	27.1	-3.7	-.62	12.1	1.14	27.5	-22.7	-1.55	11.9	.59	30M	@	L162
L163	33.5	2.7	.46	12.0	1.13	33.7	-16.5	-1.13	14.4	.71	30N	@	L163
L176	41.1	10.3	1.74	12.6	1.19	74.7	24.6	1.68	29.0	1.43	30N	@	L176
L182M	35.9	5.1	.86	12.5	1.18	68.3	18.2	1.24	16.9	.83	30M	@	L182M
L185	38.1	7.3	1.25	14.4	1.36	74.1	24.0	1.64	22.6	1.12	30N	@	L185
L190C	44.3	13.5	2.30	15.2	1.43	122.7	72.5	4.95	58.3	2.88	30N	#	L190C
L212	30.1	-.7	-.11	14.1	1.33	63.7	13.6	.93	15.8	.78	30M	@	L212
L223F	42.2	11.4	1.94	12.3	1.16	59.3	9.2	.63	23.8	1.18	30M	@	L223F
L230	34.4	3.6	.61	11.0	1.03	36.9	-13.3	-.91	21.6	1.07	30N	@	L230
L232	44.5	13.7	2.33	15.7	1.48	94.1	44.0	3.00	42.1	2.08	30N	#	L232
L236	32.7	1.9	.32	11.5	1.08	43.7	-6.4	-.44	15.0	.74	30N	@	L236
L238A	19.5	-11.3	-1.91	6.6	.62	21.7	-28.5	-1.95	11.7	.58	30N	@	L238A
L238B	20.7	-10.1	-1.72	8.2	.77	23.6	-26.6	-1.82	9.2	.45	30D	@	L238B
L254	20.1	-10.7	-1.81	9.8	.93	40.7	-9.5	-.65	29.1	1.44	30M	@	L254
L262	29.9	-.9	-.15	8.9	.84	58.8	8.6	.59	20.1	1.00	30N	@	L262
L274	32.5	1.7	.29	11.1	1.04	55.4	5.2	.36	23.1	1.14	30N	@	L274
L275	43.6	12.8	2.17	13.6	1.28	69.3	19.1	1.30	24.1	1.19	30N	@	L275
L278	28.9	-1.9	-.32	10.0	.95	33.1	-17.0	-1.16	11.4	.56	30C	@	L278
L279	34.1	3.3	.57	12.1	1.14	65.7	15.6	1.06	22.0	1.09	30N	@	L279
L285A	25.0	-5.8	-.99	6.6	.63	54.9	4.8	.33	31.7	1.57	30N	@	L285A
L285B	29.0	-1.8	-.31	11.5	1.08	56.3	6.1	.42	29.0	1.43	30N	@	L285B
L299	31.1	.3	.06	10.2	.96	72.7	22.5	1.54	27.3	1.35	30N	@	L299
L320	30.7	-.1	-.01	9.3	.88	57.6	7.4	.51	27.5	1.36	30N	@	L320
L321	36.3	5.5	.93	13.4	1.26	39.4	-10.8	-.74	19.6	.97	30M	@	L321
L326N	29.7	-1.1	-.18	13.5	1.27	32.4	-17.8	-1.21	12.1	.60	30N	@	L326N
L339	24.6	-6.2	-1.05	11.2	1.06	45.1	-5.1	-.35	15.5	.77	30N	@	L339
L366A	36.9	6.1	1.03	13.9	1.31	56.7	6.5	.44	19.2	.95	30N	@	L366A
L376	32.4	1.6	.27	16.7	1.57	49.3	-.8	-.06	38.4	1.90	30N	@	L376
L388	33.3	2.5	.43	10.4	.98	55.1	5.0	.34	22.2	1.10	30N	@	L388
L390	29.1	-1.7	-.28	10.6	1.00	49.3	-.8	-.06	25.6	1.27	30N	@	L390
L393	26.4	-4.4	-.75	5.1	.48	41.9	-8.2	-.56	11.1	.55	30M	@	L393
L396M	35.3	4.5	.77	12.4	1.17	73.1	22.9	1.56	32.9	1.63	30N	@	L396M
L565	34.7	3.9	.67	12.5	1.18	63.1	13.0	.89	22.6	1.12	30N	@	L565
L589	30.1	-.7	-.12	10.1	.95	41.1	-9.0	-.62	13.1	.65	30N	@	L589
L599	31.5	.7	.11	10.3	.97	57.1	6.9	.47	23.3	1.15	30C	@	L599
L622	49.5	18.7	3.17	29.2	2.75	130.8	80.6	5.51	103.6	5.13	30M	#	L622
L670	36.5	5.7	.96	10.1	.96	58.9	8.7	.59	11.4	.57	30N	@	L670
GR. MEAN =	30.8 DOUBLE FOLDS					GRAND MEAN =	50.2 DOUBLE FOLDS				TEST DETERMINATIONS = 15		
SD MEANS =	5.9 DOUBLE FOLDS					SD OF MEANS =	14.6 DOUBLE FOLDS				43 LABS IN GRAND MEANS		
				AVERAGE SDR =	10.6 DOUBLE FOLDS				AVERAGE SDR =	20.2 DOUBLE FOLDS			
L182S	23.7	-7.1	-1.21	9.1	.86	36.7	-13.5	-.92	14.2	.70	30S	*	L182S
L190D	34.9	4.1	.69	10.8	1.02	22.7	-27.4	-1.88	8.1	.40	30S	*	L190D
L280	16.6	-14.2	-2.41	6.8	.64	15.3	-34.8	-2.38	6.6	.33	30K	*	L280
L326S	34.3	3.5	.60	9.1	.86	33.3	-16.8	-1.15	8.4	.42	30S	*	L326S
L396S	18.5	-12.3	-2.10	6.3	.59	17.5	-32.6	-2.23	6.1	.30	30T	*	L396S

TOTAL NUMBER OF LABORATORIES REPORTING = 52

Best values: A92 30 double folds
B88 50 double folds

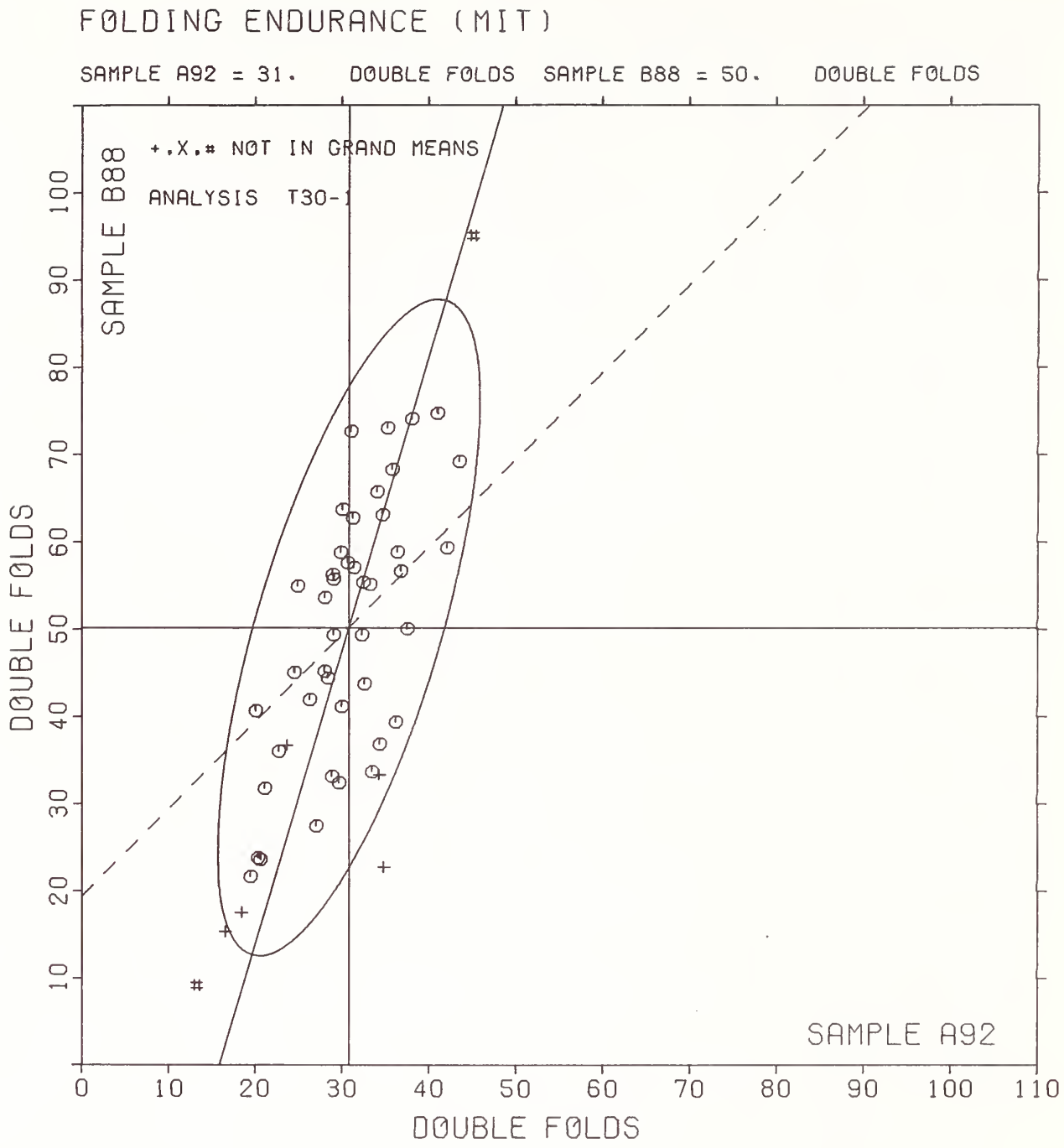
The following laboratories were omitted from the grand means because of extreme test results: 105, 190C, 232, 622.

The ISO (International Standards Organization) is proposing that MIT folding endurance be reported as the logarithm (to the base 10) of the double fold instead of the double fold as in the past.

Please see page 43 of this report for a demonstration of this proposal.

ANALYSIS T30-\ TABLE 2
FOLDING ENDURANCE (MIT), DOUBLE FOLDS
TAPPI STANDARD T511 SU-69

LAB CODE	F	MEANS A92	MEANS B88	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L105	#	12.7	8.2	-45.4	5.4	.17	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L280	*	16.6	15.3	-37.4	3.7	.48	30K	FOLDING ENDURANCE, KOHLER-MOLIN
L396S	*	18.5	17.5	-34.8	2.5	.45	30T	FOLDING ENDURANCE, SCHOPPER, TWI
L238A	O	19.5	21.7	-30.5	2.7	.60	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L254	O	20.1	40.7	-12.2	7.5	1.18	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L158	O	20.4	23.8	-28.2	2.5	.48	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L238B	O	20.7	23.6	-28.4	2.1	.61	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L100M	O	21.2	31.7	-20.4	3.9	.53	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L100N	O	22.8	36.0	-15.9	3.6	.58	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182S	*	23.7	36.7	-15.0	3.0	.78	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L339	O	24.6	45.1	-6.7	4.5	.91	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L285A	O	25.0	54.9	2.9	6.9	1.10	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L393	O	26.4	41.9	-9.2	1.9	.52	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L162	O	27.1	27.5	-22.8	-3.0	.86	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L150	O	28.1	45.2	-5.5	1.2	1.19	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L121	O	28.1	53.6	2.5	3.5	1.33	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L118	O	28.5	44.4	-6.2	.6	.69	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L278	O	28.9	33.1	-16.9	-3.1	.76	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L285B	O	29.0	56.3	5.3	3.5	1.26	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L390	O	29.1	49.3	-1.3	1.4	1.13	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L124	O	29.1	55.7	4.9	3.2	.65	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326N	O	29.7	32.4	-17.3	-4.0	.93	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L262	O	29.9	58.8	8.0	3.3	.92	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L589	O	30.1	41.1	-8.9	-1.9	.80	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L212	O	30.1	63.7	12.8	4.5	1.05	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L320	O	30.7	57.6	7.1	2.2	1.12	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L299	O	31.1	72.7	21.7	6.1	1.15	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L122	O	31.3	62.7	12.2	3.1	1.16	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L599	O	31.5	57.1	6.8	1.3	1.06	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L376	O	32.4	49.3	-.4	-1.8	1.74	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L274	O	32.5	55.4	5.5	-.2	1.09	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L236	O	32.7	43.7	-5.6	-3.6	.91	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L388	O	33.3	55.1	5.5	-1.0	1.04	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L163	O	33.5	33.7	-15.0	-7.3	.92	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L279	O	34.1	65.7	15.9	1.2	1.11	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326S	*	34.3	33.3	-15.1	-8.2	.64	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L230	O	34.4	36.9	-11.7	-7.2	1.05	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L565	O	34.7	63.1	13.5	-.1	1.15	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L190D	*	34.9	22.7	-25.1	-11.7	.71	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L396M	O	35.3	73.1	23.2	2.2	1.40	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182M	O	35.9	68.3	18.8	.3	1.01	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L321	O	36.3	39.4	-8.8	-8.3	1.11	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L670	O	36.5	58.9	9.9	-3.0	.76	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L366A	O	36.9	56.7	8.0	-4.0	1.13	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L159	O	37.6	50.1	1.8	-6.5	1.05	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L185	O	38.1	74.1	25.1	-.2	1.24	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L176	O	41.1	74.7	26.5	-2.8	1.31	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L223F	O	42.2	59.3	12.0	-8.3	1.17	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L275	O	43.6	69.3	21.9	-6.8	1.24	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L190C	#	44.3	122.7	73.3	7.7	2.16	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L232	#	44.5	94.1	46.0	-.6	1.78	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L622	#	49.5	130.8	82.6	5.1	3.94	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
GMEANS:		30.8	50.2			1.00		
		95% ELLIPSE:		39.1	10.7	WITH GAMMA = 73 DEGREES		


FØLDING ENDURANCE (MIT)
SAMPLE A92 = 31. DØUBLE FØLDS
SAMPLE B88 = 50. DØUBLE FØLDS
+.X.# NØT IN GRAND MEANS
ANALYSIS T3Ø-1
SAMPLE B88
DØUBLE FØLDS
SAMPLE A92
DØUBLE FØLDS
0 10 20 30 40 50 60 70 80 90 100 110
10 20 30 40 50 60 70 80 90 100

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T30-2 TABLE 1
FOLDING ENDURANCE (MIT)
DATA IS LOG(BASE 10) OF THE DOUBLE FOLD MEASUREMENT

LAB CODE	SAMPLE A92 WOVE ENVELOPE PAPER 75 GRAMS PER SQUARE METER MEAN	DEV	N. DEV	SDR	R. SDR	SAMPLE B88 HEAT SET OFFSET BOOK 88 GRAMS PER SQUARE METER MEAN	DEV	N. DEV	SDR	R. SDR	TEST D. = 15 VAR	F	LAB
L100M	1.31	-.15	-1.67	.14	.93	1.49	-.16	-1.08	.11	.63	30M	O	L100M
L100N	1.34	-.12	-1.35	.15	.99	1.54	-.10	-.69	.11	.60	30N	O	L100N
L105	1.10	-.36	-4.03	.08	.51	.90	-.75	-5.12	.12	.69	30M	#	L105
L118	1.45	-.01	-.12	.09	.63	1.62	-.02	-.15	.15	.85	30D	O	L118
L121	1.41	-.05	-.54	.21	1.38	1.67	.03	.20	.23	1.29	30M	O	L121
L122	1.48	.02	.23	.13	.90	1.76	.12	.79	.19	1.06	30M	O	L122
L124	1.45	-.00	-.02	.10	.66	1.74	.09	.63	.10	.55	30N	O	L124
L150	1.43	-.02	-.26	.13	.85	1.57	-.07	-.51	.27	1.53	30M	O	L150
L158	1.29	-.16	-1.84	.13	.87	1.35	-.29	-2.01	.16	.91	30N	O	L158
L159	1.55	.10	1.08	.14	.97	1.68	.03	.23	.14	.80	30N	O	L159
L162	1.39	-.06	-.71	.20	1.32	1.40	-.25	-1.68	.20	1.12	30M	O	L162
L163	1.50	.05	.51	.15	.99	1.50	-.15	-1.02	.17	.94	30N	O	L163
L176	1.60	.14	1.58	.12	.80	1.84	.20	1.38	.16	.93	30N	O	L176
L182M	1.53	.08	.85	.14	.96	1.82	.18	1.23	.11	.60	30M	O	L182M
L185	1.55	.10	1.09	.16	1.09	1.85	.21	1.42	.13	.76	30N	O	L185
L190C	1.62	.16	1.80	.18	1.22	2.02	.37	2.57	.30	1.73	30N	#	L190C
L212	1.44	-.01	-.14	.18	1.17	1.79	.15	1.03	.10	.56	30M	O	L212
L223F	1.61	.15	1.70	.13	.87	1.74	.10	.67	.18	1.01	30M	O	L223F
L230	1.52	.06	.67	.14	.95	1.51	-.13	-.92	.22	1.26	30N	O	L230
L232	1.62	.17	1.89	.15	1.00	1.93	.29	1.99	.19	1.11	30N	#	L232
L236	1.49	.03	.37	.16	1.05	1.61	-.03	-.20	.16	.92	30N	O	L236
L238A	1.27	-.19	-2.11	.15	.99	1.28	-.36	-2.48	.22	1.23	30N	O	L238A
L238B	1.28	-.17	-1.94	.18	1.18	1.35	-.30	-2.05	.16	.89	30D	O	L238B
L254	1.25	-.20	-2.29	.23	1.52	1.50	-.14	-.98	.33	1.85	30M	O	L254
L262	1.46	.00	.01	.14	.92	1.74	.10	.69	.15	.88	30N	O	L262
L274	1.49	.04	.39	.14	.94	1.70	.06	.40	.21	1.18	30N	O	L274
L275	1.62	.16	1.83	.14	.95	1.82	.17	1.19	.15	.84	30N	O	L275
L278	1.44	-.02	-.22	.16	1.05	1.50	-.14	-.99	.13	.76	30C	O	L278
L279	1.51	.06	.63	.14	.92	1.79	.15	1.01	.16	.93	30N	O	L279
L285A	1.38	-.07	-.81	.12	.79	1.68	.03	.24	.24	1.37	30N	O	L285A
L285B	1.43	-.02	-.27	.17	1.12	1.70	.05	.35	.23	1.30	30N	O	L285B
L299	1.47	.02	.17	.15	.99	1.83	.19	1.30	.16	.93	30N	O	L299
L320	1.47	.01	.16	.13	.86	1.71	.06	.44	.23	1.32	30N	O	L320
L321	1.53	.08	.85	.16	1.09	1.55	-.10	-.68	.22	1.23	30M	O	L321
L326N	1.44	-.02	-.23	.18	1.24	1.48	-.16	-1.11	.17	.94	30N	O	L326N
L339	1.36	-.10	-1.11	.17	1.16	1.63	-.01	-.09	.14	.81	30N	O	L339
L366A	1.54	.08	.95	.16	1.04	1.73	.08	.56	.17	.97	30N	O	L366A
L376	1.46	-.00	-.00	.23	1.54	1.59	-.05	-.38	.31	1.74	30N	O	L376
L388	1.50	.05	.52	.14	.94	1.71	.06	.43	.19	1.05	30N	O	L388
L390	1.43	-.02	-.23	.17	1.15	1.64	-.00	-.03	.22	1.27	30N	O	L390
L393	1.41	-.04	-.47	.08	.57	1.61	-.04	-.26	.13	.71	30H	O	L393
L396M	1.52	.07	.76	.15	1.01	1.83	.19	1.27	.17	.98	30N	O	L396M
L565	1.52	.06	.67	.15	1.02	1.78	.13	.90	.15	.85	30N	O	L565
L589	1.46	.00	.04	.13	.84	1.59	-.05	-.36	.15	.85	30N	O	L589
L599	1.47	.02	.22	.15	1.00	1.71	.07	.47	.22	1.24	30C	O	L599
L622	1.60	.14	1.62	.33	2.21	1.92	.28	1.90	.53	3.03	30M	#	L622
L670	1.55	.09	1.02	.12	.79	1.76	.12	.81	.09	.52	30N	O	L670
GR. MEAN =	1.46 LOG(10) FOLD					GRAND MEAN =	1.64 LOG(10) FOLD				TEST DETERMINATIONS = 15		
SD MEANS =	.09 LOG(10) FOLD					SD OF MEANS =	.15 LOG(10) FOLD				43 LABS IN GRAND MEANS		
			AVERAGE SDR =	.15 LOG(10) FOLD				AVERAGE SDR =	.18 LOG(10) FOLD				
L182S	1.35	-.11	-1.23	.16	1.10	1.54	-.11	-.74	.16	.92	30S	+	L182S
L190D	1.52	.07	.75	.14	.93	1.33	-.32	-2.16	.17	.95	30S	+	L190D
L280	1.19	-.27	-3.02	.18	1.21	1.15	-.50	-3.41	.19	1.10	30K	+	L280
L326S	1.52	.07	.73	.12	.79	1.51	-.14	-.93	.12	.69	30S	+	L326S
L396S	1.24	-.21	-2.37	.14	.95	1.22	-.42	-2.91	.15	.85	30T	+	L396S

TOTAL NUMBER OF LABORATORIES REPORTING = 52

The ISO (International Standards Organization) is proposing that MIT folding endurance be reported as the logarithm (to the base 10) of the double fold instead of the double fold as in the past.

Analysis T30-1 in this report is the same as in the past with no changes. The analysis, T30-2, shows the data as the ISO proposes. This analysis uses the raw data reported for T30-1. The raw data are converted to the logarithm (base 10) as shown in the example to the right, and then the mean of the converted data is calculated and reported as ISO folding endurance.

Raw data (Folding number in double folds)	log (base 10) of raw data
207	2.32
166	2.22
151	2.18
332	2.52
260	2.41
137	2.14
199	2.30
230	2.36
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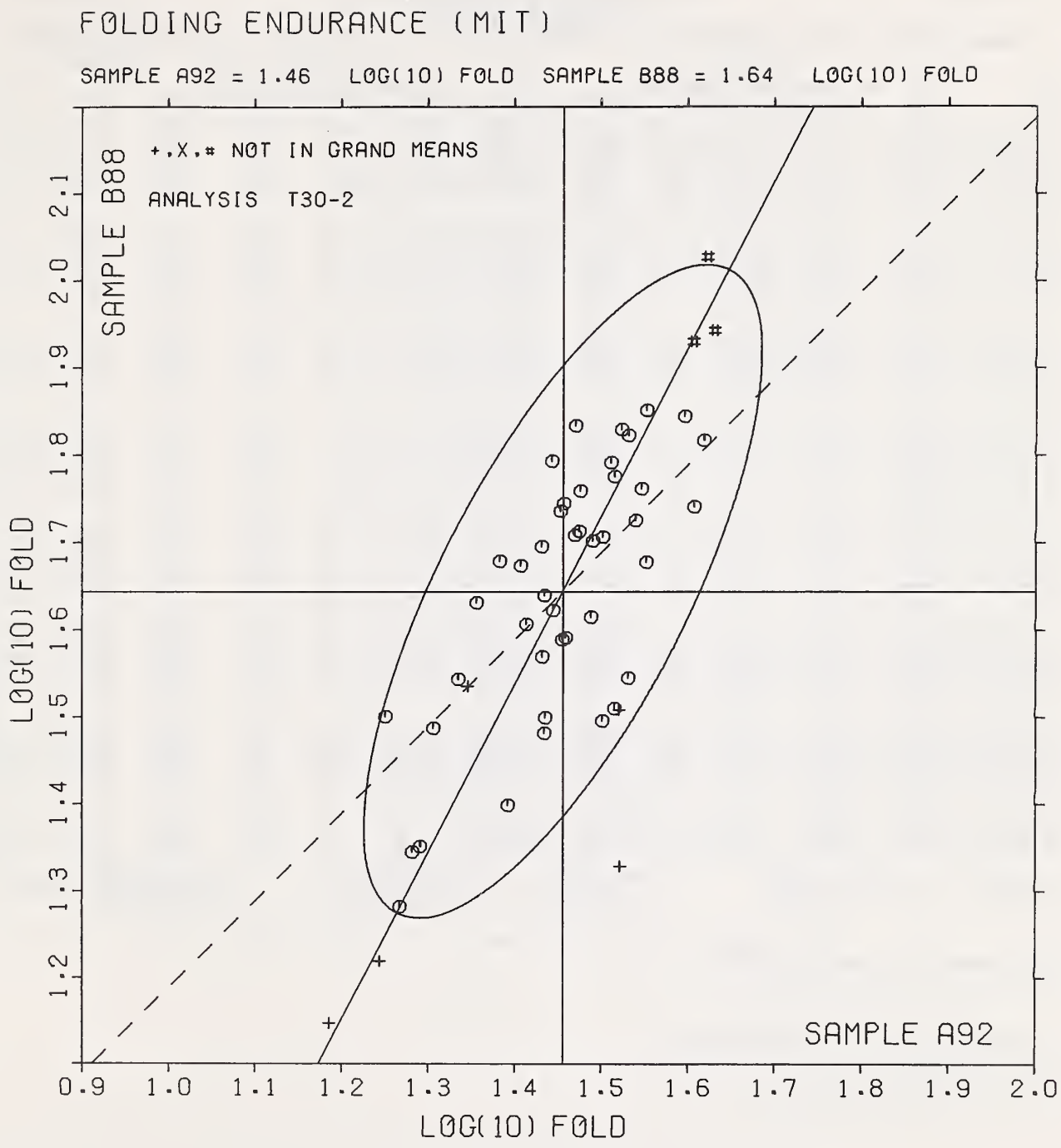
210	2.31
mean of raw data	mean of logs "Folding endurance"

ANALYSIS T30-2 TABLE 2

FOLDING ENDURANCE (MIT)

DATA IS LOG(BASE 10) OF THE DOUBLE FOLD MEASUREMENT

LAB CODE	F	MEANS A92	MEANS B88	COORDINATES MAJOR	COORDINATES MINOR	AVG R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L105	#	1.10	.90	-.83	-.02	.60	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L280	*	1.19	1.15	-.57	.01	1.15	30K	FOLDING ENDURANCE, KOHLER-MOLIN
L396S	*	1.24	1.22	-.47	-.01	.90	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L254	O	1.25	1.50	-.22	.12	1.69	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L238A	O	1.27	1.28	-.41	.00	1.11	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L238B	O	1.28	1.35	-.34	.02	1.04	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L158	O	1.29	1.35	-.34	.01	.89	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L100M	O	1.31	1.49	-.21	.06	.78	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L100N	O	1.34	1.54	-.14	.06	.79	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182S	*	1.35	1.54	-.15	.05	1.01	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L339	O	1.36	1.63	-.06	.08	.99	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L285A	O	1.38	1.68	-.00	.08	1.08	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L162	O	1.39	1.40	-.25	-.06	1.22	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L121	O	1.41	1.67	.00	.06	1.33	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L393	O	1.41	1.61	-.05	.02	.64	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L285B	O	1.43	1.70	.03	.04	1.21	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L150	O	1.43	1.57	-.08	-.01	1.19	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L390	O	1.43	1.64	-.01	.02	1.21	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326N	O	1.44	1.48	-.15	-.06	1.09	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L278	O	1.44	1.50	-.14	-.05	.91	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L212	O	1.44	1.79	.13	.08	.87	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L118	O	1.45	1.62	-.02	-.00	.74	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L124	O	1.45	1.74	.08	.04	.60	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L376	O	1.46	1.59	-.05	-.02	1.64	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L262	O	1.46	1.74	.09	.05	.90	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L589	O	1.46	1.59	-.04	-.03	.85	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L320	O	1.47	1.71	.06	.02	1.09	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L299	O	1.47	1.83	.18	.07	.96	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L599	O	1.47	1.71	.07	.01	1.12	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L122	O	1.48	1.76	.11	.03	.98	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L236	O	1.49	1.61	-.01	-.04	.99	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L274	O	1.49	1.70	.07	-.00	1.06	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L163	O	1.50	1.50	-.11	-.11	.96	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L388	O	1.50	1.71	.08	-.01	1.00	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L279	O	1.51	1.79	.16	.02	.92	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L230	O	1.52	1.51	-.09	-.11	1.10	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L565	O	1.52	1.78	.14	.01	.94	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326S	*	1.52	1.51	-.09	-.12	.74	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L190D	*	1.52	1.33	-.25	-.20	.94	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L396M	O	1.52	1.83	.20	.02	.99	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L321	O	1.53	1.55	-.05	-.11	1.16	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L182M	O	1.53	1.82	.19	.01	.78	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L366A	O	1.54	1.73	.11	-.04	1.00	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L670	O	1.55	1.76	.15	-.03	.65	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L159	O	1.55	1.68	.07	-.07	.88	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L185	O	1.55	1.85	.23	.01	.93	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L176	O	1.60	1.84	.24	-.03	.87	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L622	#	1.60	1.92	.31	-.00	2.62	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L223F	O	1.61	1.74	.16	-.09	.94	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L190C	#	1.62	2.02	.41	.03	1.48	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L275	O	1.62	1.82	.23	-.07	.90	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L232	#	1.62	1.93	.33	-.02	1.05	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
GMEANS:		1.46	1.64			1.00		
		95% ELLIPSE:		.42	.14	WITH GAMMA = 62 DEGREES		


FOLDING ENDURANCE (MIT)
SAMPLE A92 = 1.46 LOG(10) FOLD SAMPLE B88 = 1.64 LOG(10) FOLD
+,X,# NOT IN GRAND MEANS
ANALYSIS T30-2
SAMPLE B88
LOG(10) FOLD
SAMPLE A92
LOG(10) FOLD
0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1

ANALYSIS T35-1 TABLE 1

GURLEY STIFFNESS

RESULTS EXPRESSED IN STANDARD GURLEY UNITS: MILLIGRAMS FOR A 1X3 INCH SPECIMEN (ACTUAL LENGTH 3.5 INCHES)

LAB CODE	SAMPLE J26 MEAN	PRINTING 103 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R. SDR	SAMPLE J28 MEAN	PRINTING 93 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R. SDR	TEST D. = 10 VAR	F	LAB
L100	256.	14.	.67	10.	.93	451.	-19.	-.61	11.	.40	35G	0	L100
L118	242.	-1.	-.03	16.	1.40	489.	18.	.57	46.	1.64	35G	0	L118
L121	216.	-26.	-1.30	8.	.75	416.	-55.	-1.72	26.	.93	35G	0	L121
L122	225.	-17.	-.84	20.	1.76	449.	-22.	-.70	38.	1.36	35G	0	L122
L132	234.	-8.	-.41	10.	.86	398.	-73.	-2.28	16.	.58	35G	*	L132
L139	240.	-3.	-.14	6.	.51	440.	-31.	-.98	21.	.75	35G	0	L139
L148	234.	-9.	-.43	11.	.98	476.	5.	.15	30.	1.08	35G	0	L148
L153	243.	1.	.05	13.	1.13	476.	5.	.16	37.	1.33	35G	0	L153
L159	260.	18.	.88	14.	1.29	492.	22.	.67	78.	2.83	35G	0	L159
L162	223.	-19.	-.94	9.	.83	452.	-19.	-.60	19.	.68	35G	0	L162
L163	221.	-21.	-1.05	17.	1.54	452.	-19.	-.59	40.	1.43	35G	0	L163
L183	240.	-2.	-.12	12.	1.09	471.	0.	.00	25.	.89	35G	0	L183
L190C	183.	-59.	-2.91	8.	.67	404.	-67.	-2.09	25.	.91	35G	*	L190C
L195	292.	50.	2.46	59.	5.27	489.	18.	.58	33.	1.18	35G	*	L195
L212	255.	13.	.63	8.	.67	502.	31.	.96	40.	1.44	35G	0	L212
L223	242.	0.	.00	5.	.44	467.	-4.	-.13	13.	.47	35G	0	L223
L224	272.	30.	1.46	14.	1.29	508.	38.	1.17	25.	.89	35G	0	L224
L232	260.	17.	.85	8.	.69	503.	32.	1.00	23.	.82	35G	0	L232
L236	274.	32.	1.57	12.	1.03	536.	65.	2.02	19.	.67	35G	0	L236
L241	171.	-71.	-3.51	9.	.77	245.	-226.	-7.06	6.	.22	35G	#	L241
L249	258.	15.	.76	15.	1.33	464.	-7.	-.23	29.	1.05	35G	0	L249
L254	219.	-23.	-1.16	12.	1.05	444.	-27.	-.84	27.	.99	35G	0	L254
L260	245.	2.	.11	3.	.28	472.	1.	.03	8.	.31	35G	0	L260
L285	250.	8.	.38	14.	1.20	474.	3.	.09	22.	.78	35G	0	L285
L291	248.	6.	.29	12.	1.05	517.	46.	1.45	19.	.67	35G	0	L291
L308	238.	-4.	-.22	12.	1.09	467.	-4.	-.12	35.	1.28	35G	0	L308
L321	199.	-43.	-2.13	16.	1.44	418.	-53.	-1.66	19.	.70	35G	0	L321
L356	234.	-8.	-.40	7.	.59	481.	10.	.30	24.	.86	35G	0	L356
L376	246.	4.	.18	11.	.95	486.	15.	.48	43.	1.55	35G	0	L376
L382	254.	12.	.59	11.	.95	457.	-14.	-.45	19.	.70	35G	0	L382
L390	249.	7.	.32	9.	.84	477.	6.	.19	12.	.45	35G	0	L390
L396	244.	2.	.08	15.	1.31	457.	-14.	-.44	28.	1.02	35G	0	L396
L571	71.	-171.	-8.41	8.	.73	128.	-343.	-10.73	15.	.53	35G	#	L571
L600	244.	2.	.09	12.	1.04	509.	38.	1.20	22.	.79	35G	0	L600
L648	255.	12.	.61	7.	.65	497.	26.	.83	38.	1.37	35G	0	L648
L650	242.	-0.	-.02	11.	1.02	514.	43.	1.35	35.	1.26	35G	0	L650
L693	245.	3.	.12	10.	.88	478.	7.	.23	17.	.61	35G	0	L693

GR. MEAN = 242. GURLEY UNITS — GRAND MEAN = 471. GURLEY UNITS — TEST DETERMINATIONS = 10

SD MEANS = 20. GURLEY UNITS — SD OF MEANS = 32. GURLEY UNITS — 35 LABS IN GRAND MEANS

AVERAGE SDR = 11. GURLEY UNITS — AVERAGE SDR = 28. GURLEY UNITS

L213	241.	-2.	-.08	10.	.87	454.	-16.	-.51	27.	.98	35H	*	L213

TOTAL NUMBER OF LABORATORIES REPORTING = 38

Best values: J26 240 ± 40 Gurley units
J28 470 ± 50 Gurley units

The following laboratories were omitted from the grand means because of extreme test results: 241.

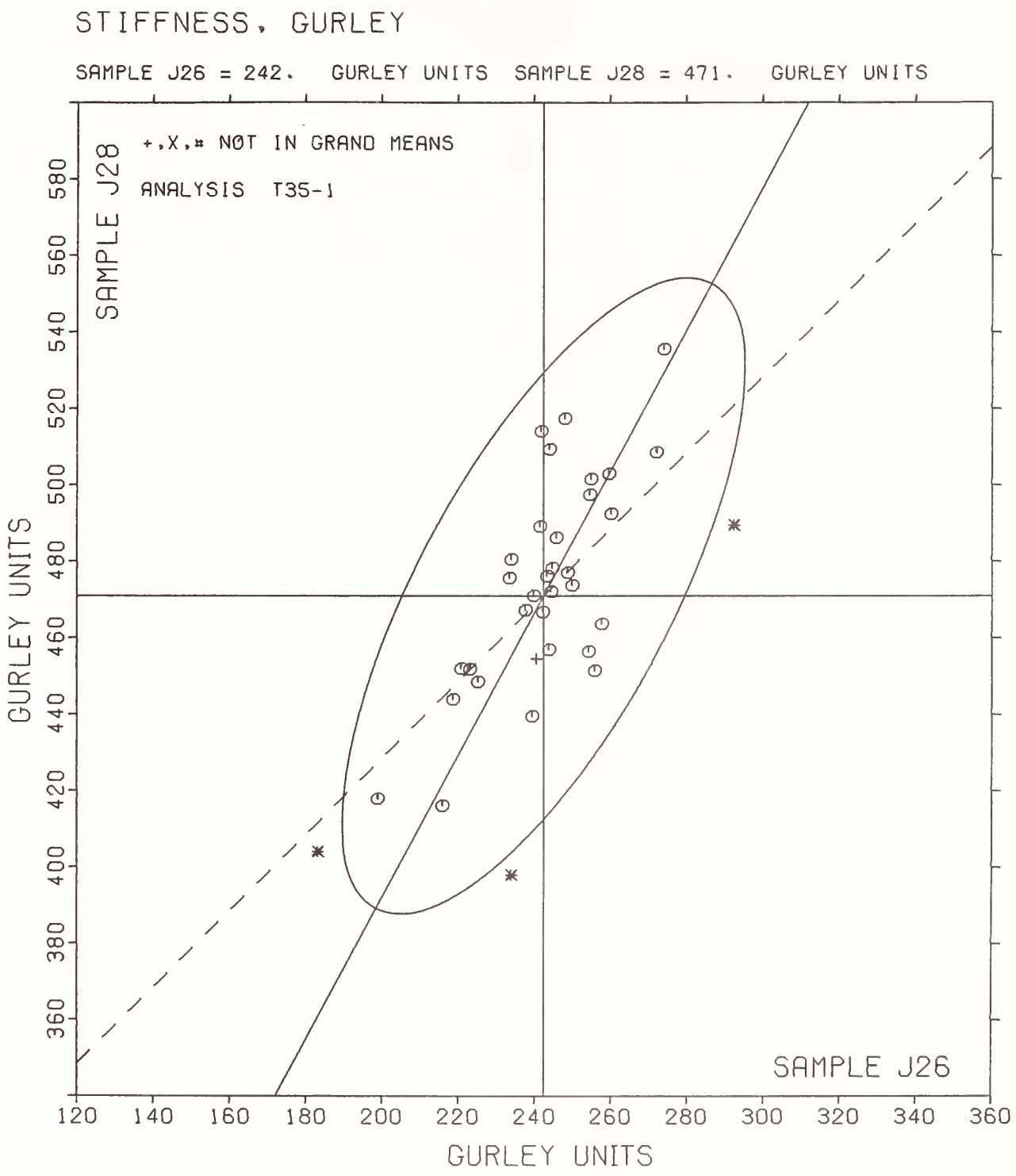
Data from the following laboratories appear to be off by a multiplicative factor: 571.

ANALYSIS T35-1 TABLE 2

GURLEY STIFFNESS

RESULTS EXPRESSED IN STANDARD GURLEY UNITS: MILLIGRAMS FOR A 1X3 INCH SPECIMEN (ACTUAL LENGTH 3.5 INCHES)

LAB CODE	F	MEANS J26	J28	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L571	#	71.	128.	-383.	-12.	.63	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L241	#	171.	245.	-233.	-44.	.50	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L190C	*	183.	404.	-87.	20.	.79	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L321	O	199.	418.	-67.	13.	1.07	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L121	O	216.	416.	-61.	-3.	.84	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L254	O	219.	444.	-35.	8.	1.02	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L163	O	221.	452.	-27.	10.	1.49	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L162	O	223.	452.	-26.	8.	.75	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L122	O	225.	449.	-28.	4.	1.56	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L148	O	234.	476.	-0.	10.	1.03	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L132	*	234.	398.	-68.	-27.	.72	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L356	O	234.	481.	5.	12.	.72	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L308	O	238.	467.	-5.	2.	1.18	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L139	O	240.	440.	-29.	-12.	.63	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L183	O	240.	471.	-1.	2.	.99	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L213	*	241.	454.	-15.	-6.	.92	35H	STIFFNESS, GURLEY (UNITS: MG/1X3 TEST PIECE), 20 C, 65% RH
L118	O	242.	489.	16.	9.	1.52	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L650	O	242.	514.	38.	21.	1.14	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L223	O	242.	467.	-4.	-2.	.45	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L153	O	243.	476.	5.	1.	1.23	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L396	O	244.	457.	-12.	-8.	1.16	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L600	O	244.	509.	35.	17.	.92	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L260	O	245.	472.	2.	-1.	.29	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L693	O	245.	478.	8.	1.	.75	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L376	O	246.	486.	15.	4.	1.25	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L291	O	248.	517.	44.	17.	.86	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L390	O	249.	477.	8.	-3.	.64	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L285	O	250.	474.	6.	-5.	.99	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L382	O	254.	457.	-7.	-17.	.82	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L648	O	255.	497.	29.	2.	1.01	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L212	O	255.	502.	33.	3.	1.05	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L100	O	256.	451.	-11.	-21.	.67	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L249	O	258.	464.	1.	-17.	1.19	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L232	O	260.	503.	36.	-0.	.76	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L159	O	260.	492.	27.	-6.	2.06	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L224	O	272.	508.	47.	-8.	1.09	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L236	O	274.	536.	72.	3.	.85	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L195	*	292.	489.	40.	-35.	3.23	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
GMEANS:		242.	471.			1.00		
		95% ELLIPSE:		93.	33.	WITH GAMMA = 61 DEGREES		


STIFFNESS, GURLEY
SAMPLE J26 = 242. GURLEY UNITS SAMPLE J28 = 471. GURLEY UNITS
+,X,* NOT IN GRAND MEANS
ANALYSIS T35-1
SAMPLE J28
GURLEY UNITS
360
380
400
420
440
460
480
500
520
540
560
580
SAMPLE J26
120
140
160
180
200
220
240
260
280
300
320
340
360
GURLEY UNITS

ANALYSIS T36-1 TABLE 1

TABER STIFFNESS

TAPPI STANDARD T489 OS-76, RESULTS EXPRESSED IN GRAM CENTIMETERS

LAB CODE	SAMPLE J70 MEAN	PRINTING 85 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	SAMPLE B63 MEAN	KRAFT ENVELOPE 124 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	TEST D. = 10 VAR	F	LAB
L107A	8.08	2.19	2.09	.43	1.28	19.51	.67	.50	.54	.68	36T	6	L107A
L122	6.41	.52	.49	.28	.83	17.35	-1.49	-1.11	2.12	2.65	36T	6	L122
L123	6.20	.31	.29	.42	1.25	18.70	-.14	-.10	.48	.61	36T	6	L123
L126	4.58	-1.32	-1.26	.20	.59	17.72	-1.11	-.83	.40	.50	36T	6	L126
L150	4.45	-1.44	-1.38	.16	.49	18.80	-.04	-.03	1.75	2.20	36T	6	L150
L158	2.28	-3.62	-3.47	.15	.44	5.11	-13.72	-10.27	.14	.17	36T	#	L158
L163	5.41	-.48	-.46	.19	.57	19.45	.61	.46	.86	1.08	36T	6	L163
L173B	6.47	.58	.55	.30	.88	18.67	-.17	-.13	.45	.56	36T	6	L173B
L182	6.10	.21	.20	.47	1.39	18.62	-.22	-.16	.88	1.11	36T	6	L182
L207	7.63	1.74	1.66	.59	1.73	19.47	.63	.47	.65	.81	36T	6	L207
L228	5.48	-.41	-.40	.47	1.40	19.00	.16	.12	.82	1.02	36T	6	L228
L230	6.60	.71	.68	.70	2.07	20.30	1.46	1.09	1.42	1.78	36T	6	L230
L236	4.97	-.92	-.89	.22	.64	22.30	3.46	2.59	2.06	2.58	36T	*	L236
L242	6.22	.33	.32	.43	1.28	18.96	.12	.09	.90	1.13	36T	6	L242
L260	6.16	.27	.26	.33	.98	18.53	-.31	-.23	.71	.89	36T	6	L260
L262	6.10	.21	.20	.57	1.68	20.70	1.86	1.39	.48	.61	36T	6	L262
L274	6.00	.11	.10	.24	.70	18.95	.11	.08	.60	.75	36T	6	L274
L290	6.50	.61	.58	.39	1.17	21.90	3.06	2.29	1.10	1.38	36T	6	L290
L313	5.23	-.66	-.64	.21	.62	1.95	-16.89	-12.64	.07	.09	36T	#	L313
L318	4.50	-1.39	-1.33	.10	.30	17.37	-1.46	-1.09	.44	.56	36T	6	L318
L321	5.00	-.89	-.86	.00	.00	17.24	-1.60	-1.19	.55	.69	36T	6	L321
L324	5.03	-.86	-.83	.16	.48	19.10	.26	.20	.70	.88	36T	6	L324
L339	4.22	-1.67	-1.60	.17	.49	17.25	-1.59	-1.19	.42	.53	36T	6	L339
L388	5.45	-.44	-.42	.25	.75	68.95	50.11	37.50	2.92	3.66	36T	#	L388
L442	6.41	.52	.49	.34	1.01	19.04	.20	.15	.52	.65	36T	6	L442
L484	4.26	-1.63	-1.57	.25	.75	16.90	-1.94	-1.45	.61	.77	36T	6	L484
L570	6.30	.41	.39	.48	1.43	19.10	.26	.20	.74	.93	36T	6	L570
L580	5.90	.01	.01	.57	1.68	17.70	-1.14	-.85	.67	.85	36T	6	L580
L616	6.00	.11	.10	.00	.00	17.25	-1.59	-1.19	.26	.33	36T	6	L616
L651	8.20	2.31	2.21	.63	1.87	19.60	.76	.57	1.58	1.98	36T	6	L651
L692	5.85	-.04	-.04	.24	.71	17.95	-.89	-.66	.86	1.08	36T	6	L692

GR. MEAN = 5.89 TABER UNITS — GRAND MEAN = 18.84 TABER UNITS — TEST DETERMINATIONS = 10

SD MEANS = 1.04 TABER UNITS — SD OF MEANS = 1.34 TABER UNITS — 28 LABS IN GRAND MEANS

AVERAGE SDR = .34 TABER UNITS — AVERAGE SDR = .80 TABER UNITS

L250	6.65	.76	.72	.53	1.56	18.13	-.71	-.53	.54	.68	36U	+	L250

TOTAL NUMBER OF LABORATORIES REPORTING = 32

Best values: J70 6.0 ± 1.7 Taber units
B63 18.8 ± 1.8 Taber units

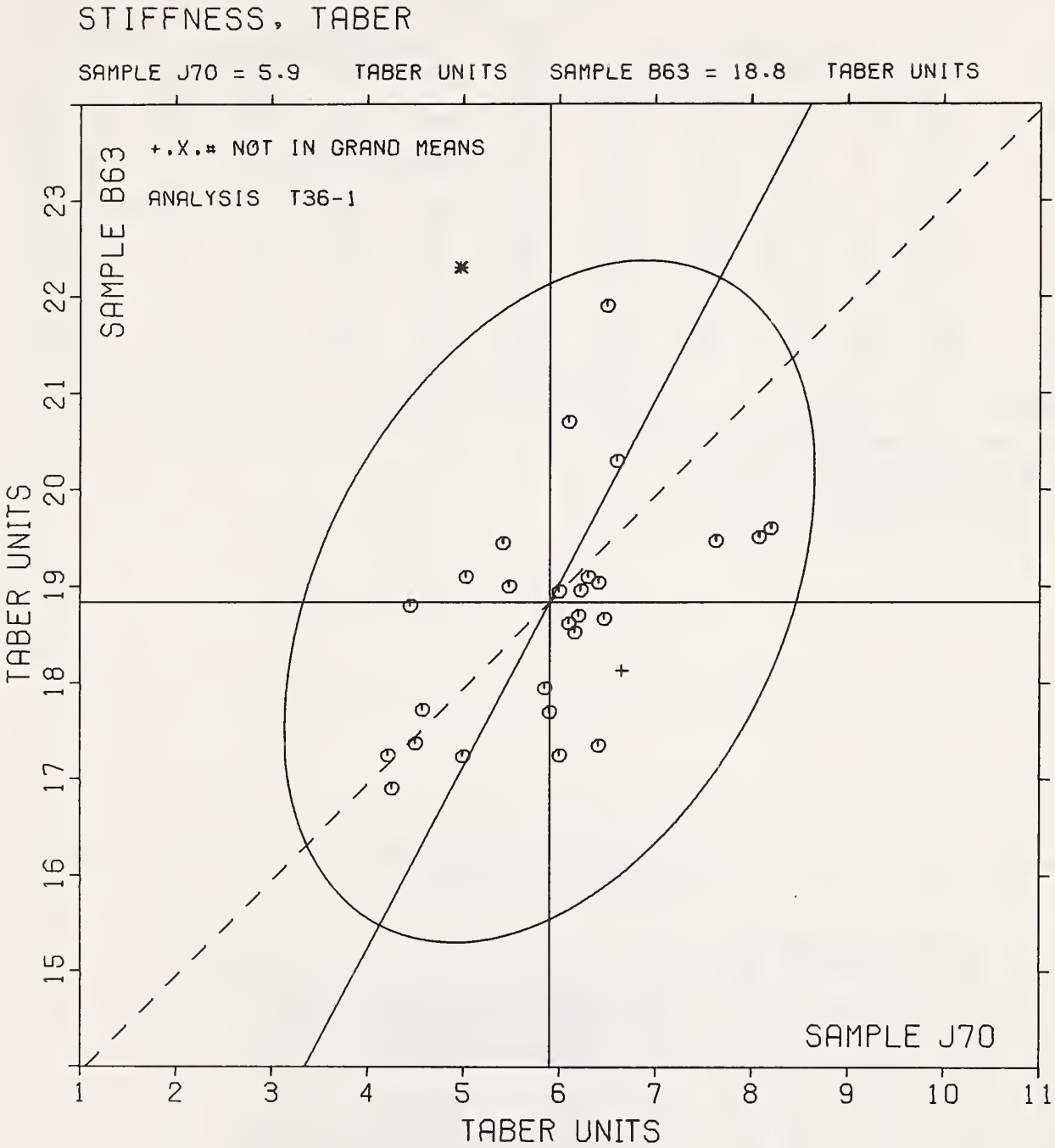
The following laboratories were omitted from the grand means because of extreme test results: 158, 313, 388.

ANALYSIS T36-1 TABLE 2

TABER STIFFNESS

TAPPI STANDARD T489 OS-76, RESULTS EXPRESSED IN GRAM CENTIMETERS

LAB CODE	F	MEANS J70	MEANS B63	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L158	#	2.28	5.11	-13.83	-3.19	.31	36T STIFFNESS, TABER
L339	@	4.22	17.25	-2.18	.74	.51	36T STIFFNESS, TABER
L484	@	4.26	16.90	-2.48	.54	.76	36T STIFFNESS, TABER
L150	@	4.45	18.80	-.71	1.26	1.34	36T STIFFNESS, TABER
L318	@	4.50	17.37	-1.94	.55	.43	36T STIFFNESS, TABER
L126	@	4.58	17.72	-1.60	.65	.55	36T STIFFNESS, TABER
L236	*	4.97	22.30	2.63	2.43	1.61	36T STIFFNESS, TABER
L321	@	5.00	17.24	-1.83	.05	.34	36T STIFFNESS, TABER
L324	@	5.03	19.10	-.17	.89	.68	36T STIFFNESS, TABER
L313	#	5.23	1.95	-15.25	-7.28	.35	36T STIFFNESS, TABER
L163	@	5.41	19.45	.32	.71	.83	36T STIFFNESS, TABER
L388	#	5.45	68.95	44.14	23.74	2.21	36T STIFFNESS, TABER
L228	@	5.48	19.00	-.05	.44	1.21	36T STIFFNESS, TABER
L692	@	5.85	17.95	-.81	-.37	.90	36T STIFFNESS, TABER
L580	@	5.90	17.70	-1.00	-.53	1.26	36T STIFFNESS, TABER
L274	@	6.00	18.95	.15	-.04	.72	36T STIFFNESS, TABER
L616	@	6.00	17.25	-1.36	-.83	.17	36T STIFFNESS, TABER
L182	@	6.10	18.62	-.10	-.28	1.25	36T STIFFNESS, TABER
L262	@	6.10	20.70	1.74	.69	1.14	36T STIFFNESS, TABER
L260	@	6.16	18.53	-.15	-.38	.94	36T STIFFNESS, TABER
L123	@	6.20	18.70	.02	-.33	.93	36T STIFFNESS, TABER
L242	@	6.22	18.56	.26	-.24	1.21	36T STIFFNESS, TABER
L570	@	6.30	19.10	.42	-.24	1.18	36T STIFFNESS, TABER
L122	@	6.41	17.35	-1.08	-1.15	1.74	36T STIFFNESS, TABER
L442	@	6.41	19.04	.42	-.36	.83	36T STIFFNESS, TABER
L173B	@	6.47	18.67	.12	-.59	.72	36T STIFFNESS, TABER
L290	@	6.50	21.90	2.99	.89	1.27	36T STIFFNESS, TABER
L230	@	6.60	20.30	1.62	.06	1.92	36T STIFFNESS, TABER
L250	*	6.65	18.13	-.27	-1.00	1.12	36U STIFFNESS, TABER, 20 C, 65% RH
L207	@	7.63	19.47	1.37	-1.24	1.27	36T STIFFNESS, TABER
L107A	@	8.08	19.51	1.61	-1.62	.98	36T STIFFNESS, TABER
L651	@	8.20	19.60	1.75	-1.68	1.92	36T STIFFNESS, TABER
GMEANS:		5.89	18.84			1.00	
		95% ELLIPSE:		3.79	2.40	WITH GAMMA = 62 DEGREES	


STIFFNESS, TABER
SAMPLE J70 = 5.9 TABER UNITS
SAMPLE B63 = 18.8 TABER UNITS
+.X.* NOT IN GRAND MEANS
ANALYSIS T36-1
SAMPLE B63
TABER UNITS
15
16
17
18
19
20
21
22
23
SAMPLE J70
1
2
3
4
5
6
7
8
9
10
11
TABER UNITS

REPORT NO. 60S TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1979

ANALYSIS T49-1 TABLE 1

SURFACE PICK STRENGTH, IGT

LAB CODE	SAMPLE J52 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J54 MEAN	PRINTING 149 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 4 VAR	F	LAB
L122	40.5	-13.4	-.61	1.7	.44	53.2	-15.3	-.49	1.4	.33	49Q	O	L122
L149	38.7	-15.3	-.69	6.1	1.63	44.3	-24.2	-.78	5.5	1.32	49L	O	L149
L182I	30.5	-23.4	-1.06	1.4	.38	25.1	-43.4	-1.40	.6	.14	49Q	O	L182I
L190C	50.0	-4.0	-.18	3.6	.94	57.5	-11.0	-.36	4.2	1.01	49T	O	L190C
L207	56.7	2.8	.13	8.1	2.14	NO DATA REPORTED FOR SAMPLE J54					49I	M	L207
L242	28.8	-25.2	-1.14	1.7	.46	41.0	-27.5	-.89	3.3	.80	49P	O	L242
L274	60.1	6.1	.28	2.0	.52	60.6	-7.9	-.25	1.3	.30	49I	O	L274
L277	73.9	19.9	.90	11.6	3.07	114.7	46.2	1.49	7.9	1.89	49I	O	L277
L280	48.8	-5.1	-.23	2.6	.69	69.6	1.1	.04	3.8	.91	49U	#	L280
L291	61.0	7.1	.32	2.2	.58	66.7	-1.8	-.06	2.5	.60	49I	O	L291
L484	83.1	29.1	1.32	1.0	.26	94.8	26.3	.85	4.4	1.06	49P	O	L484
L564	21.2	-32.8	-1.48	7.5	1.97	44.5	-24.0	-.77	11.0	2.65	49D	O	L564
L598	78.1	24.1	1.09	3.9	1.03	102.1	33.6	1.09	4.8	1.15	49W	O	L598
L643	81.6	27.6	1.25	2.7	.73	117.4	48.9	1.58	3.1	.75	49I	O	L643

GR. MEAN = 54.0 KP CM/SEC GRAND MEAN = 68.5 KP CM/SEC TEST DETERMINATIONS = 4

SD MEANS = 22.1 KP CM/SEC SD OF MEANS = 31.0 KP CM/SEC 12 LABS IN GRAND MEANS

AVERAGE SDR = 3.8 KP CM/SEC AVERAGE SDR = 4.2 KP CM/SEC

TOTAL NUMBER OF LABORATORIES REPORTING = 14

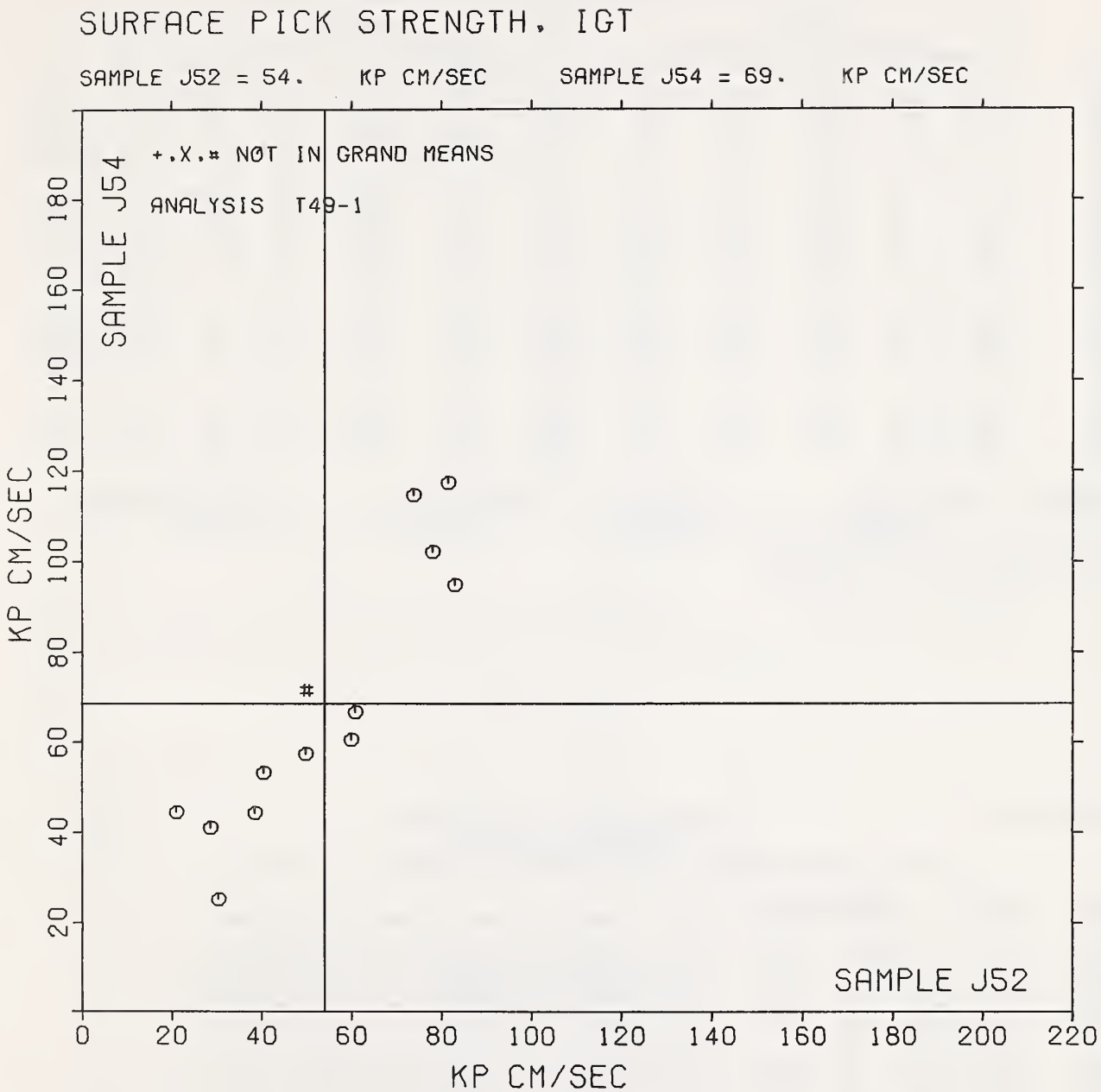
Data from the following laboratories were omitted from the grand means because no viscosity values were reported: 280. The data from these labs were converted to the common unit, cm/sec.

REPORT NO. 60S TAPPI COLLABORATIVE REFERENCE PROGRAM JUNE 1979

ANALYSIS T49-1 TABLE 2

SURFACE PICK STRENGTH, IGT

LAB CODE	F	MEANS J52	J54	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L564	O	21.2	44.5	-38.4	13.3	2.31	49D	SURFACE PICK STRENGTH, IGT, INK
L242	O	28.8	41.0	-36.9	5.0	.63	49P	SURFACE PICK STRENGTH, IGT, IGT OIL
L182I	O	30.5	25.1	-49.0	-5.4	.26	49Q	SURFACE PICK STRENGTH, IGT, IGT OIL
L149	O	38.7	44.3	-28.6	-1.2	1.47	49L	SURFACE PICK STRENGTH, IGT, PIB FLUID
L122	O	40.5	53.2	-20.2	2.3	.38	49Q	SURFACE PICK STRENGTH, IGT, IGT OIL
L280	#	48.8	69.6	-2.0	4.9	.80	49U	SURFACE PICK STRENGTH, IGT, OIL
L190C	O	50.0	57.5	-11.3	-3.0	.98	49T	SURFACE PICK STRENGTH, IGT, IPC FLUID
L207	M	56.7				2.14	49I	SURFACE PICK STRENGTH, IGT, PIB FLUID
L274	O	60.1	60.6	-3.0	-9.5	.41	49I	SURFACE PICK STRENGTH, IGT, PIB FLUID
L291	O	61.0	66.7	2.6	-6.9	.59	49I	SURFACE PICK STRENGTH, IGT, PIB FLUID
L277	O	73.9	114.7	49.3	9.9	2.48	49I	SURFACE PICK STRENGTH, IGT, PIB FLUID
L598	O	78.1	102.1	41.4	-.7	1.09	49W	SURFACE PICK STRENGTH, IGT, OIL
L643	O	81.6	117.4	55.9	5.1	.74	49I	SURFACE PICK STRENGTH, IGT, PIB FLUID
L484	O	83.1	94.8	38.2	-9.0	.66	49P	SURFACE PICK STRENGTH, IGT, IGT OIL
GMEANS:		54.0	68.5			1.00		
		95% ELLIPSE:		112.2	22.0	WITH GAMMA = 55 DEGREES		


SURFACE PICK STRENGTH, IGT
SAMPLE J52 = 54. KP CM/SEC
SAMPLE J54 = 69. KP CM/SEC
+.X.# NOT IN GRAND MEANS
ANALYSIS T49-1
SAMPLE J54
KP CM/SEC
SAMPLE J52
KP CM/SEC
0 20 40 60 80 100 120 140 160 180 200 220
20 40 60 80 100 120 140 160 180

REPORT NO. 60S — TAPPI COLLABORATIVE REFERENCE PROGRAM — JUNE 1979

ANALYSIS T50-1 TABLE 1

SURFACE PICK STRENGTH, WAX NUMBER

TAPPI STANDARD T459 OS-75, SURFACE STRENGTH OF PAPER (WAX PICK TEST)

LAB CODE	SAMPLE J52 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J54 MEAN	PRINTING 149 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 5 VAR	F	LAB
L105	11.00	1.99	2.48	.00	.00	11.00	1.16	1.41	.00	.00	50W	Ø	L105
L122	8.80	-.21	-.26	.45	1.13	10.00	.16	.19	.00	.00	50W	Ø	L122
L158	9.00	-.01	-.01	.00	.00	9.00	-.84	-1.02	.00	.00	50W	Ø	L158
L162	9.00	-.01	-.01	.00	.00	9.00	-.84	-1.02	.00	.00	50W	Ø	L162
L173A	7.20	-1.81	-2.26	.45	1.13	8.00	-1.84	-2.24	.00	.00	50W	Ø	L173A
L182W	9.20	.19	.24	.45	1.13	10.60	.76	.92	.55	2.25	50W	Ø	L182W
L183	8.80	-.21	-.26	.45	1.13	9.40	-.44	-.54	.55	2.25	50W	Ø	L183
L195	8.40	-.61	-.76	.55	1.38	9.40	-.44	-.54	.55	2.25	50W	Ø	L195
L213	8.80	-.21	-.26	.84	2.11	11.20	1.36	1.65	.45	1.84	50W	Ø	L213
L225	9.40	.39	.49	.55	1.38	9.60	-.24	-.29	.55	2.25	50W	Ø	L225
L228	8.00	-1.01	-1.26	.00	.00	9.00	-.84	-1.02	.00	.00	50W	Ø	L228
L230	8.40	-.61	-.76	.55	1.38	9.40	-.44	-.54	.55	2.25	50W	Ø	L230
L236	9.20	.19	.24	.45	1.13	10.00	.16	.19	.00	.00	50W	Ø	L236
L274	9.40	.39	.49	.55	1.38	10.40	.56	.68	.55	2.25	50W	Ø	L274
L285	10.40	1.39	1.73	.55	1.38	10.00	.16	.19	.00	.00	50W	Ø	L285
L339	8.80	-.21	-.26	.45	1.13	10.00	.16	.19	.00	.00	50W	Ø	L339
L366	9.20	.19	.24	.84	2.11	11.20	1.36	1.65	.45	1.84	50W	Ø	L366
L616	9.00	-.01	-.01	.00	.00	10.00	.16	.19	.00	.00	50W	Ø	L616
L697	9.20	.19	.24	.45	1.13	9.80	-.04	-.05	.45	1.84	50W	Ø	L697

GR. MEAN = 9.01 WAX NUMBER — GRAND MEAN = 9.84 WAX NUMBER — TEST DETERMINATIONS = 5

SD MEANS = .80 WAX NUMBER — SD OF MEANS = .82 WAX NUMBER — 19 LABS IN GRAND MEANS

AVERAGE SDR = .40 WAX NUMBER — AVERAGE SDR = .24 WAX NUMBER

TOTAL NUMBER OF LABORATORIES REPORTING = 19

Best values: J52 9.0 ± 1.4 wax number
J54 10.0 ± 1.2 wax number

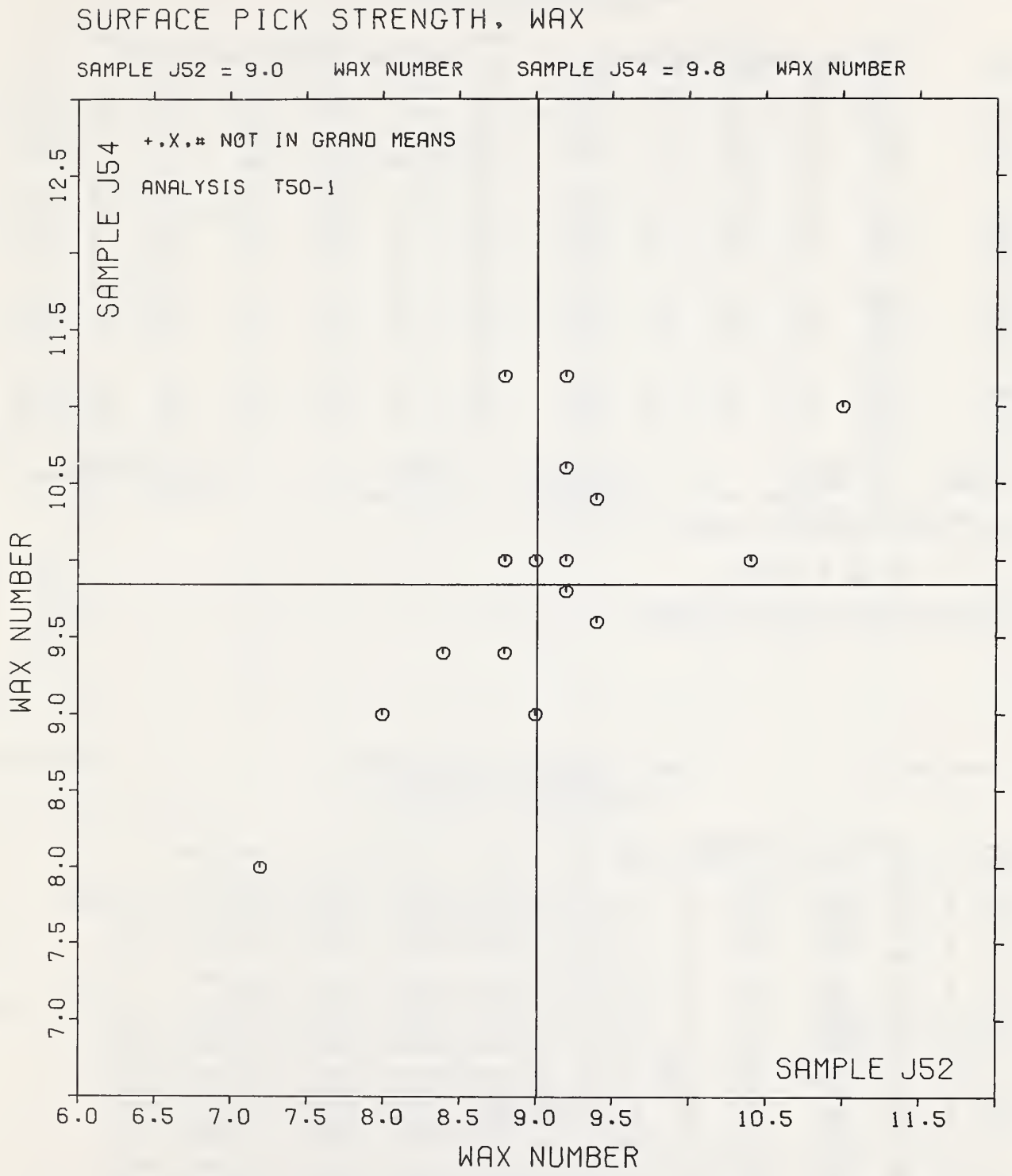
REPORT NO. 60S — TAPPI COLLABORATIVE REFERENCE PROGRAM — JUNE 1979

ANALYSIS T50-1 TABLE 2

SURFACE PICK STRENGTH, WAX NUMBER

TAPPI STANDARD T459 OS-75, SURFACE STRENGTH OF PAPER (WAX PICK TEST)

LAB CODE	F	MEANS J52	J54	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L173A	Ø	7.20	8.00	-2.58	.03	.56	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L228	Ø	8.00	9.00	-1.31	.15	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L230	Ø	8.40	9.40	-.74	.14	1.81	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L195	Ø	8.40	9.40	-.74	.14	1.81	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L339	Ø	8.80	10.00	-.03	.26	.56	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L122	Ø	8.80	10.00	-.03	.26	.56	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L213	Ø	8.80	11.20	.83	1.09	1.57	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L183	Ø	8.80	9.40	-.46	-.15	1.69	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L616	Ø	9.00	10.00	.11	.12	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L162	Ø	9.00	9.00	-.62	-.57	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L158	Ø	9.00	9.00	-.62	-.57	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L697	Ø	9.20	9.80	.10	-.17	1.48	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L182W	Ø	9.20	10.60	.68	.39	1.69	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L236	Ø	9.20	10.00	.25	-.03	.56	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L366	Ø	9.20	11.20	1.11	.80	1.97	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L274	Ø	9.40	10.40	.67	.10	1.81	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L225	Ø	9.40	9.60	.09	-.45	1.81	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L285	Ø	10.40	10.00	1.08	-.89	.69	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L105	Ø	11.00	11.00	2.21	-.64	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
GMEANS:		9.01	9.84			1.00		
		95% ELLIPSE:		2.87	1.35	WITH GAMMA = 46 DEGREES		


SURFACE PICK STRENGTH, WAX
SAMPLE J52 = 9.0 WAX NUMBER
SAMPLE J54 = 9.8 WAX NUMBER
+.X.# NOT IN GRAND MEANS
ANALYSIS T50-1
SAMPLE J54
SAMPLE J52
WAX NUMBER
WAX NUMBER
6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.5 11.5
7.0 7.5 8.0 8.5 9.0 9.5 10.5 11.5 12.5

REPORT NO. 60S

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T91-1 TABLE 1
CONCORA (CORRUGATING MEDIUM TEST-CMT)
TAPPI STANDARD T809 OS-71

JUNE 1979

LAB CODE	SAMPLE E94 MEAN	TUBE WINDING 133 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE E67 MEAN	KRAFT 143 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D. = 10 VAR	F	LAB
L100	352.	15.	.85	8.	.47	200.	16.	1.26	6.	.53	91N	@	L100
L176	347.	11.	.60	14.	.85	169.	-14.	-1.08	13.	1.19	91P	@	L176
L182	357.	20.	1.16	16.	.95	178.	-5.	-.36	16.	1.48	91N	@	L182
L218	312.	-25.	-1.40	9.	.51	162.	-21.	-1.63	16.	1.47	91A	@	L218
L242	291.	-46.	-2.60	12.	.70	174.	-9.	-.70	12.	1.12	91G	@	L242
L248	395.	58.	3.31	19.	1.15	228.	45.	3.47	15.	1.36	91B	#	L248
L255	224.	-113.	-6.38	4.	.22	158.	-25.	-1.94	9.	.82	91P	#	L255
L269	332.	-5.	-.26	18.	1.06	174.	-9.	-.67	8.	.72	91P	@	L269
L274	339.	3.	.15	11.	.66	186.	3.	.21	12.	1.12	91P	@	L274
L280	330.	-6.	-.36	21.	1.27	178.	-5.	-.39	11.	1.00	91N	@	L280
L289	339.	3.	.15	5.	.31	195.	12.	.93	7.	.62	91P	@	L289
L313	332.	-5.	-.29	22.	1.33	185.	2.	.16	8.	.75	91L	@	L313
L329	366.	29.	1.66	17.	1.04	177.	-6.	-.44	9.	.81	91P	@	L329
L394	330.	-7.	-.38	14.	.85	166.	-17.	-1.29	9.	.80	91P	@	L394
L484	325.	-12.	-.66	9.	.54	183.	-0.	-.01	6.	.56	91N	@	L484
L621	339.	3.	.15	26.	1.54	209.	26.	2.01	18.	1.66	91P	@	L621
L622	351.	14.	.78	23.	1.37	182.	-1.	-.09	10.	.95	91P	@	L622
L650	349.	13.	.72	24.	1.44	202.	19.	1.44	11.	1.04	91N	@	L650
L666	332.	-5.	-.26	36.	2.11	192.	9.	.66	13.	1.17	91S	@	L666

GR. MEAN = 337. NEWTONS — GRAND MEAN = 183. NEWTONS — TEST DETERMINATIONS = 10
SD MEANS = 18. NEWTONS — SD OF MEANS = 13. NEWTONS — 17 LABS IN GRAND MEANS
AVERAGE SDR = 17. NEWTONS — AVERAGE SDR = 11. NEWTONS
GR. MEAN = 75.72 POUNDS — GRAND MEAN = 41.17 POUNDS
TOTAL NUMBER OF LABORATORIES REPORTING = 19

Best values: E94 350 ± 30 newtons
E67 180 ± 20 newtons

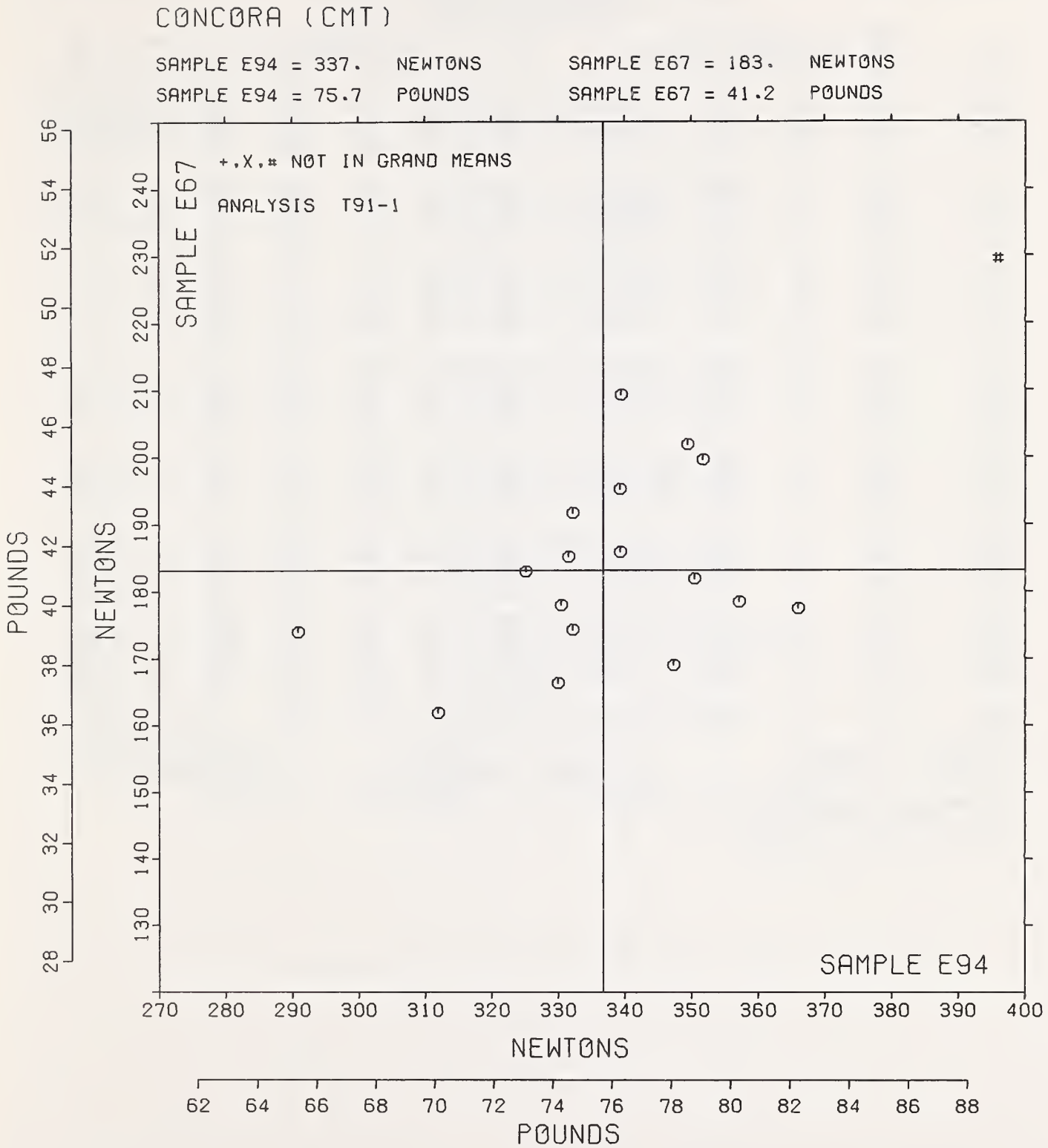
The following laboratories were omitted from the grand means because of extreme test results: 248, 255.

REPORT NO. 60S

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T91-1 TABLE 2
CONCORA (CORRUGATING MEDIUM TEST-CMT)
TAPPI STANDARD T809 OS-71

JUNE 1979

LAB CODE	F	MEANS E94	E67	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L255	#	224.	158.	-113.	23.	.52	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L242	@	291.	174.	-46.	10.	.91	91G	FLAT CRUSH STRENGTH, CONCORA, GAYDON FLAT CRUSH TESTER
L218	@	312.	162.	-31.	-9.	.99	91A	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L484	@	325.	183.	-11.	5.	.55	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L394	@	330.	166.	-13.	-13.	.83	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L280	@	330.	178.	-8.	-2.	1.14	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L313	@	332.	185.	-4.	4.	1.04	91L	FLAT CRUSH STRENGTH, CONCORA, LIBERTY
L666	@	332.	192.	-1.	10.	1.64	91S	FLAT CRUSH STRENGTH, CONCORA, TOYO SEIKI (METHOD JIS-P-8126)
L269	@	332.	174.	-8.	-6.	.89	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L274	@	339.	186.	3.	1.	.89	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L289	@	339.	195.	7.	10.	.47	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L621	@	339.	209.	13.	23.	1.60	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L176	@	347.	169.	4.	-17.	1.02	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L650	@	349.	202.	19.	12.	1.24	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L622	@	351.	182.	12.	-7.	1.16	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L100	@	352.	200.	20.	9.	.50	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L182	@	357.	178.	17.	-13.	1.22	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L329	@	366.	177.	24.	-17.	.92	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L248	#	395.	228.	72.	18.	1.26	91B	FLAT CRUSH STRENGTH, CONCORA, INSTRON
GMEANS:		337.	183.			1.00		
		95% ELLIPSE:		52.	33.	WITH GAMMA = 23 DEGREES		


CONCORA (CMT)
SAMPLE E94 = 337. NEWTONS
SAMPLE E94 = 75.7 POUNDS
SAMPLE E67 = 183. NEWTONS
SAMPLE E67 = 41.2 POUNDS
+,X,# NOT IN GRAND MEANS
ANALYSIS T91-1
SAMPLE E67
SAMPLE E94
NEWTONS
POUNDS
270 280 290 300 310 320 330 340 350 360 370 380 390 400
62 64 66 68 70 72 74 76 78 80 82 84 86 88
130 140 150 160 170 180 190 200 210 220 230 240
28 30 32 34 36 38 40 42 44 46 48 50 52 54 56

REPORT NO. 60S

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T96-1 TABLE 1
RING CRUSH (COMPRESSION RESISTANCE OF PAPERBOARD)
TAPPI STANDARD T818 OS-76

JUNE 1979

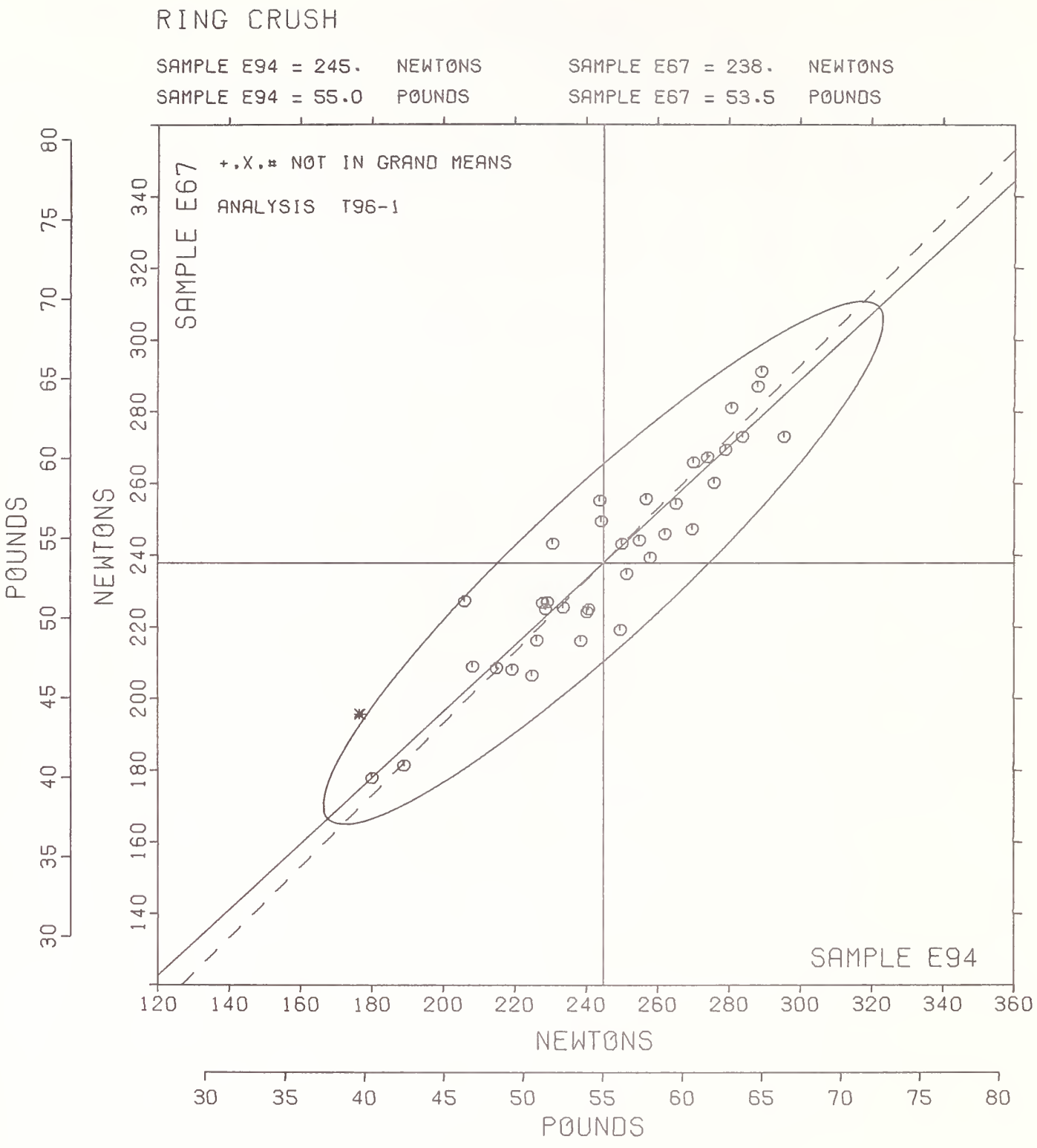
LAB CODE	SAMPLE E94 MEAN	TUBE WINDING 133 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	SAMPLE E67 MEAN	KRAFT 143 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	TEST D. = 10 VAR	F	LAB
L100	274.	29.	.97	7.	.46	267.	29.	1.05	6.	.39	96N	Ø	L100
L107	189.	-56.	-1.84	21.	1.31	181.	-56.	-2.01	15.	1.04	96P	Ø	L107
L114	276.	31.	1.03	11.	.72	260.	22.	.79	14.	.95	96P	Ø	L114
L122	215.	-30.	-.99	21.	1.33	209.	-29.	-1.04	20.	1.36	96P	Ø	L122
L124	250.	5.	.16	20.	1.27	219.	-19.	-.66	20.	1.42	96P	Ø	L124
L126	226.	-19.	-.61	13.	.81	216.	-22.	-.76	10.	.67	96P	Ø	L126
L157	244.	-1.	-.02	9.	.54	250.	12.	.41	16.	1.10	96P	Ø	L157
L171	229.	-16.	-.52	18.	1.15	227.	-11.	-.39	11.	.74	96N	Ø	L171
L176	208.	-37.	-1.21	18.	1.18	209.	-29.	-1.03	27.	1.90	96P	Ø	L176
L182	258.	13.	.44	16.	1.00	239.	1.	.05	12.	.80	96N	Ø	L182
L191	229.	-16.	-.53	27.	1.75	225.	-13.	-.46	21.	1.44	96P	Ø	L191
L218	225.	-20.	-.66	11.	.69	207.	-31.	-1.11	9.	.66	96I	Ø	L218
L234	177.	-68.	-2.25	36.	2.31	196.	-42.	-1.50	33.	2.32	96P	*	L234
L237	270.	25.	.84	19.	1.20	266.	28.	1.00	16.	1.08	96P	Ø	L237
L242	279.	34.	1.13	20.	1.29	269.	32.	1.12	22.	1.54	96G	Ø	L242
L274	180.	-65.	-2.14	8.	.52	178.	-60.	-2.13	10.	.71	96P	Ø	L274
L303	284.	39.	1.29	13.	.83	273.	35.	1.25	15.	1.04	96N	Ø	L303
L305	255.	10.	.34	22.	1.40	244.	6.	.22	16.	1.14	96N	Ø	L305
L329	295.	51.	1.67	16.	1.04	273.	35.	1.25	23.	1.58	96P	Ø	L329
L333	206.	-39.	-1.28	22.	1.44	227.	-11.	-.38	14.	.98	96I	Ø	L333
L336	228.	-17.	-.56	13.	.82	227.	-11.	-.39	14.	1.00	96P	Ø	L336
L350	265.	20.	.67	12.	.77	254.	17.	.59	13.	.93	96P	Ø	L350
L393	257.	12.	.39	15.	.93	256.	18.	.63	11.	.77	96P	Ø	L393
L484	234.	-11.	-.37	14.	.90	225.	-12.	-.44	11.	.79	96R	Ø	L484
L553	270.	25.	.82	13.	.86	247.	9.	.33	17.	1.15	96P	Ø	L553
L562	240.	-5.	-.15	27.	1.72	224.	-14.	-.49	19.	1.29	96P	Ø	L562
L570	241.	-4.	-.13	10.	.66	225.	-13.	-.46	11.	.77	96P	Ø	L570
L603	262.	17.	.57	19.	1.21	246.	8.	.29	17.	1.15	96P	Ø	L603
L610	250.	5.	.17	12.	.77	243.	5.	.19	9.	.60	96P	Ø	L610
L617	244.	-1.	-.03	20.	1.29	255.	17.	.62	8.	.53	96P	Ø	L617
L621	289.	44.	1.47	18.	1.12	291.	53.	1.90	16.	1.08	96P	Ø	L621
L623	281.	36.	1.19	11.	.69	281.	43.	1.54	15.	1.03	96P	Ø	L623
L649	238.	-6.	-.21	7.	.47	216.	-22.	-.77	15.	1.02	96P	Ø	L649
L650	288.	43.	1.43	14.	.88	287.	49.	1.75	14.	1.00	96N	Ø	L650
L663	219.	-25.	-.84	12.	.76	208.	-30.	-1.06	14.	.94	96P	Ø	L663
L676	231.	-14.	-.47	15.	.98	243.	5.	.19	11.	.77	96P	Ø	L676
L686	251.	7.	.22	19.	1.22	235.	-3.	-.11	9.	.65	96P	Ø	L686

GR. MEAN = 245. NEWTONS — GRAND MEAN = 238. NEWTONS — TEST DETERMINATIONS = 10
SD MEANS = 30. NEWTONS — SD OF MEANS = 28. NEWTONS — 37 LABS IN GRAND MEANS
AVERAGE SDR = 16. NEWTONS — AVERAGE SDR = 14. NEWTONS
GR. MEAN = 55.01 POUNDS — GRAND MEAN = 53.48 POUNDS
TOTAL NUMBER OF LABORATORIES REPORTING = 37

Best values: E94 250 ± 50 newtons
E67 230 ± 50 newtons

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T96-1 TABLE 2
RING CRUSH (COMPRESSION RESISTANCE OF PAPERBOARD)
TAPPI STANDARD T818 OS-76

LAB CODE	F	MEANS E94	MEANS E67	COORDINATES MAJOR	COORDINATES MINOR	AVG E.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L234	*	177.	196.	-79.	15.	2.32	96P	RING CRUSH, TMI/HINDE & DAUCH
L274	0	180.	178.	-88.	-0.	.62	96P	RING CRUSH, TMI/HINDE & DAUCH
L107	0	189.	181.	-79.	-4.	1.18	96P	RING CRUSH, TMI/HINDE & DAUCH
L333	0	206.	227.	-36.	19.	1.21	96I	RING CRUSH, INSTRON
L176	0	208.	209.	-46.	4.	1.54	96P	RING CRUSH, TMI/HINDE & DAUCH
L122	0	215.	209.	-42.	-1.	1.35	96P	RING CRUSH, TMI/HINDE & DAUCH
L663	0	219.	208.	-39.	-5.	.85	96P	RING CRUSH, TMI/HINDE & DAUCH
L218	0	225.	207.	-36.	-9.	.67	96I	RING CRUSH, INSTRON
L126	0	226.	216.	-28.	-3.	.74	96P	RING CRUSH, TMI/HINDE & DAUCH
L336	0	228.	227.	-20.	3.	.91	96P	RING CRUSH, TMI/HINDE & DAUCH
L191	0	229.	225.	-21.	1.	1.59	96P	RING CRUSH, TMI/HINDE & DAUCH
L171	0	229.	227.	-19.	3.	.95	96N	RING CRUSH, TMI/HINDE & DAUCH
L676	0	231.	243.	-7.	14.	.87	96P	RING CRUSH, TMI/HINDE & DAUCH
L484	0	234.	225.	-17.	-2.	.84	96R	RING CRUSH, REGMED
L649	0	238.	216.	-19.	-12.	.74	96P	RING CRUSH, TMI/HINDE & DAUCH
L562	0	240.	224.	-13.	-7.	1.50	96P	RING CRUSH, TMI/HINDE & DAUCH
L570	0	241.	225.	-12.	-7.	.72	96P	RING CRUSH, TMI/HINDE & DAUCH
L617	0	244.	255.	11.	13.	.91	96P	RING CRUSH, TMI/HINDE & DAUCH
L157	0	244.	250.	8.	9.	.82	96P	RING CRUSH, TMI/HINDE & DAUCH
L124	0	250.	219.	-9.	-17.	1.35	96P	RING CRUSH, TMI/HINDE & DAUCH
L610	0	250.	243.	8.	0.	.68	96P	RING CRUSH, TMI/HINDE & DAUCH
L686	0	251.	235.	3.	-7.	.93	96P	RING CRUSH, TMI/HINDE & DAUCH
L305	0	255.	244.	12.	-2.	1.27	96N	RING CRUSH, TMI/HINDE & DAUCH
L393	0	257.	256.	21.	5.	.85	96P	RING CRUSH, TMI/HINDE & DAUCH
L182	0	258.	239.	11.	-8.	.90	96N	RING CRUSH, TMI/HINDE & DAUCH
L603	0	262.	246.	18.	-6.	1.18	96P	RING CRUSH, TMI/HINDE & DAUCH
L350	0	265.	254.	26.	-2.	.85	96P	RING CRUSH, TMI/HINDE & DAUCH
L553	0	270.	247.	25.	-10.	1.00	96P	RING CRUSH, TMI/HINDE & DAUCH
L237	0	270.	266.	38.	3.	1.14	96P	RING CRUSH, TMI/HINDE & DAUCH
L100	0	274.	267.	41.	2.	.42	96N	RING CRUSH, TMI/HINDE & DAUCH
L114	0	276.	260.	38.	-5.	.83	96P	RING CRUSH, TMI/HINDE & DAUCH
L242	0	279.	269.	47.	-0.	1.42	96G	RING CRUSH, GAYDON FLAT CRUSH TESTER
L623	0	281.	281.	56.	7.	.86	96P	RING CRUSH, TMI/HINDE & DAUCH
L303	0	284.	273.	53.	-1.	.94	96N	RING CRUSH, TMI/HINDE & DAUCH
L650	0	288.	287.	65.	7.	.94	96N	RING CRUSH, TMI/HINDE & DAUCH
L621	0	289.	291.	69.	9.	1.10	96P	RING CRUSH, TMI/HINDE & DAUCH
L329	0	295.	273.	61.	-9.	1.31	96P	RING CRUSH, TMI/HINDE & DAUCH
GMEANS:		245.	238.			1.00		
		95% ELLIPSE:		105.	21.	WITH GAMMA = 42 DEGREES		


RING CRUSH
SAMPLE E94 = 245. NEWTONS
SAMPLE E94 = 55.0 POUNDS
SAMPLE E67 = 238. NEWTONS
SAMPLE E67 = 53.5 POUNDS
+.X.* NOT IN GRAND MEANS
ANALYSIS T96-1
SAMPLE E67
NEWTONS
POUNDS
SAMPLE E94
NEWTONS
POUNDS

SUMMARY TABLE

TEST METHOD		SAMPLE CODE	GRAND MEAN	SD OF MEAN	AVER SDR	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
BURSTING STRENGTH, MODEL C		J40	29.47	1.91	1.54	15	44	53	10	1.35	5.35
T10-1	PSI	J68	17.30	1.41	1.12					.98	3.95
BURSTING STRENGTH, MODEL C-A		J40	29.15	1.94	1.59	15	41	41	10	1.40	5.43
T10-2	PSI	J68	17.34	1.90	1.08					.95	5.30
BURSTING STRENGTH, HIGH RANGE		K30	58.9	2.6	3.9	15	36	47	10	3.4	7.6
T11-1	PSI	K28	49.4	2.6	3.6					3.2	7.3
TEARING STRENGTH, DEEP CUTOUT		G02	85.3	3.5	2.7	15	131	148	10	2.3	9.8
T15-1	GRAMS	G07	38.7	2.0	1.5					1.3	5.7
TEARING STRENGTH, NO CUTOUT		K20	148.3	5.8	6.4	15	11	12	10	5.6	16.5
T17-1	GRAMS	K36	120.6	5.8	4.6					4.1	16.2
TENSILE STRENGTH, PACKAGING PAPERS		K32	8.65	.40	.48	20	55	58	12	.38	1.13
T19-1	KILONEWTON/M	K34	9.41	.41	.59					.47	1.18
TENSILE STRENGTH, CRE TYPE		G04	3.13	.11	.14	20	43	51	12	.11	.31
T20-1	KILONEWTON/M	G07	3.32	.16	.15					.12	.45
TENSILE STRENGTH, PENDULUM TYPE		G04	3.22	.19	.16	20	40	41	12	.12	.54
T20-2	KILONEWTON/M	G07	3.41	.22	.16					.12	.62
T.E.A., PACKAGING PAPERS		K32	77.9	7.4	9.8	20	16	17	12	7.9	21.0
T25-1	JOULES/SQ M	K34	92.1	10.6	12.7					10.2	30.1
T.E.A., PRINTING PAPERS		G04	32.5	2.1	3.0	20	17	18	12	2.4	6.1
T26-1	JOULES/SQ M	G07	34.8	2.9	3.8					3.0	8.2
ELONGATION TO BREAK, PACKAGING PAPER		K32	1.538	.200	.127	20	18	20	12	.101	.558
T28-1	PERCENT	K34	1.678	.202	.125					.100	.564
ELONGATION TO BREAK, PRINTING PAPER		G04	1.583	.113	.107	20	15	19	12	.086	.317
T29-1	PERCENT	G07	1.585	.115	.146					.117	.328
FOLDING ENDURANCE (MIT)		A92	30.8	5.9	10.6	15	43	52	10	9.3	17.2
T30-1	DOUBLE FOLDS	B88	50.2	14.6	20.2					17.7	41.8
FOLDING ENDURANCE (MIT)		A92	1.46	.09	.15	15	43	52	10	.13	.26
T30-2	LOG(10) FOLD	B88	1.64	.15	.18					.15	.41
STIFFNESS, GURLEY		J26	242.	20.	11.	10	35	38	10	10.	56.
T35-1	GURLEY UNITS	J28	471.	32.	28.					24.	89.
STIFFNESS, TABER		J70	5.89	1.04	.34	10	28	32	5	.42	2.91
T36-1	TABER UNITS	B63	18.84	1.34	.80					.99	3.77
SURFACE PICK STRENGTH, IGT		J52	54.0	22.1	3.8	4	12	14	4	5.2	61.1
T49-1	KP CM/SEC	J54	68.5	31.0	4.2					5.8	85.9
SURFACE PICK STRENGTH, WAX		J52	9.01	.80	.40	5	19	19	5	.49	2.22
T50-1	WAX NUMBER	J54	9.84	.82	.24					.30	2.28
CONCORA (CMT)		E94	337.	18.	17.	10	17	19	10	15.	49.
T91-1	NEWTONS	E67	183.	13.	11.					10.	36.
RING CRUSH		E94	245.	30.	16.	10	37	37	10	14.	84.
T96-1	NEWTONS	E67	238.	28.	14.					13.	78.

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☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

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.

17. KEY WORDS (*six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons*)

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

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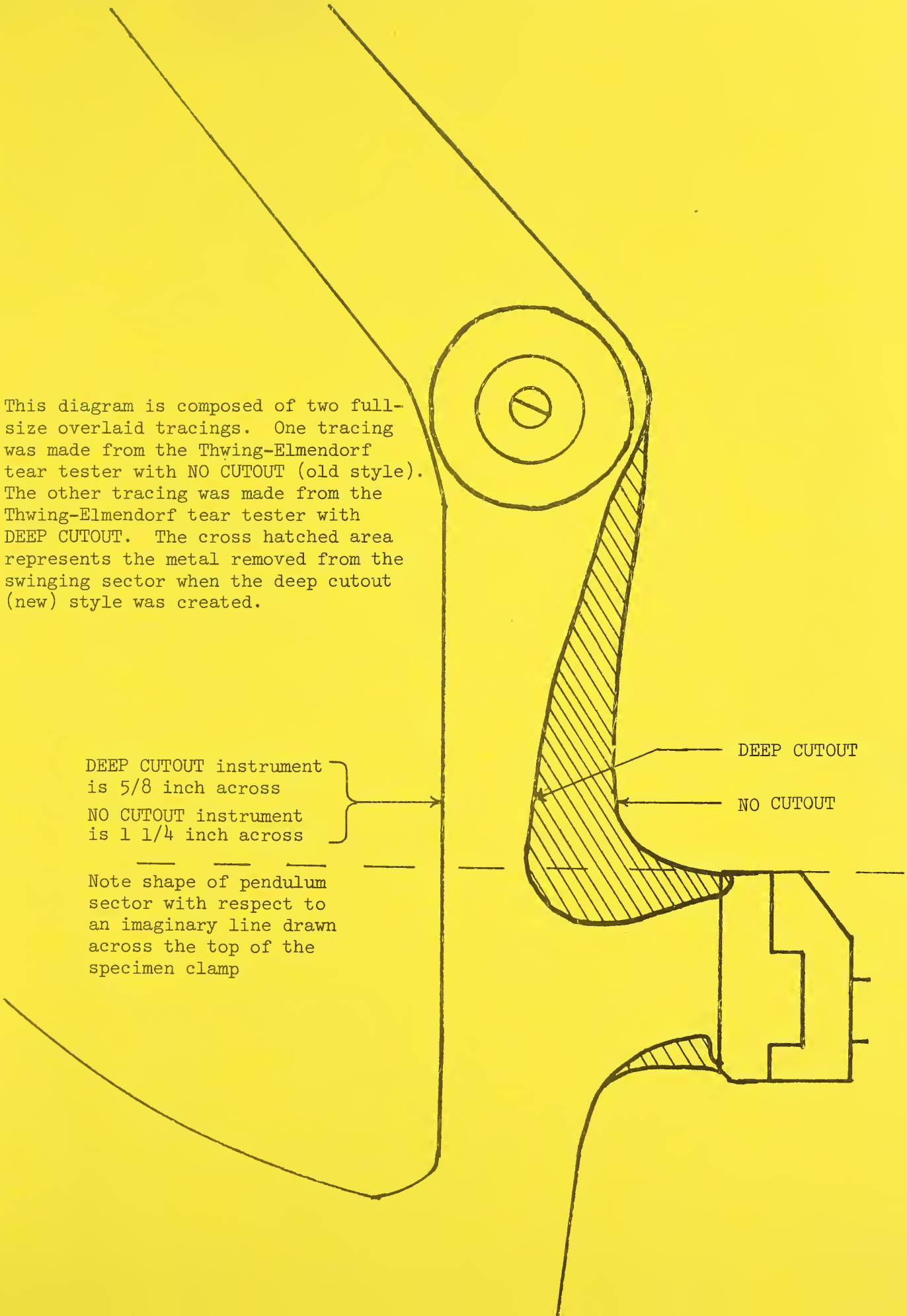
This diagram is composed of two full-size overlaid tracings. One tracing was made from the Thwing-Elmendorf tear tester with NO CUTOUT (old style). The other tracing was made from the Thwing-Elmendorf tear tester with DEEP CUTOUT. The cross hatched area represents the metal removed from the swinging sector when the deep cutout (new) style was created.
DEEP CUTOUT instrument is 5/8 inch across
NO CUTOUT instrument is 1 1/4 inch across
Note shape of pendulum sector with respect to an imaginary line drawn across the top of the specimen clamp
DEEP CUTOUT
NO CUTOUT